System Composer™

Reference

MATLAB® & SIMULINK®

R2022a

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System Composer™ Reference

Revision History

March 2019	Online only	New for Version 1.0 (Release 2019a)
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Contents

Blocks

Adapter

Connect components with different interfaces

Description

The Adapter block allows you to connect the source and destination ports of components that have different interface definitions.

To add or connect System Composer components:

- Add an Adapter block from the **Modeling** tab or the palette. The Adapter block has `In` and `Out` ports.
- Click and drag a port to create a connection. Connect each port to another component. You can also create a new component to complete the connection.
- Insert an Adapter block between two ports with different interfaces. You can create mappings between interface elements on each port.

To map between interfaces, apply interface conversions, and enter bus creation mode for architecture models:

- Double-click the Adapter block to open the "Interface Adapter" dialog. From here, you can create and edit mappings between input and output interfaces, and apply interface conversions: `UnitDelay` to break an algebraic loop or `RateTransition` to reconcile different sample time rates for reference models. When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces as you work.

To merge multiple signal or message lines for software architecture models:

- Add a Merge block from the toolstrip, which is a preconfigured Adapter block for merging.
- Manually configure the Adapter block by double-clicking the block to open the "Interface Adapter". Set the **Apply Interface conversion** parameter to **Merge**.

Limitations

- When used for structural interface adaptations, the Adapter block uses bus element ports internally and, subsequently, only supports virtual buses.
- The Adapter block does not support mixing messages and signals as inputs and outputs.

Ports

Input

`Source` — Input connection from a component
interface

If you connect to a source component, the interfaces on the ports should be compatible.

Output

`Destination` — Output connection to a component
interface

If you connect to a destination component, the interfaces on the ports should be compatible.

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

Functions
`connect`

Blocks
Component | Reference Component | Variant Component

Topics
"Define Port Interfaces Between Components"

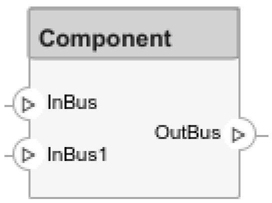
Introduced in R2019a

Component

Add components to an architecture model

Description

Use a Component block to represent a structural or behavioral element at any level of an architecture model hierarchy. Add ports to the block to connect to other components. Define an interface for the ports and add properties using stereotypes.



To add or connect System Composer components:

- Add an architecture Component block from the **Modeling** tab or the palette. You can also click and drag a box on the canvas, then select the Component block.
- To add a port, select an edge of the component and choose a direction from the menu: `Input`, `Output`, or `Physical`
- Click and drag the port to create a connection. Connect to another component. You can also create a new component to complete the connection.
- To connect Component blocks to architecture or composition model root ports, drag from the component ports to the containing model boundary. When you release the connection, a root port is created at the boundary.

Ports

Input

`Source` — Input connection from another component
interface

If you connect to a source component, the interfaces on the ports are shared.

Output

`Destination` — Output connection to another component
interface

If you connect to a destination component, the interfaces on the ports are shared.

Physical

`Physical` — Physical connection to another component
physical interface

If you connect to another component, the physical interfaces on the ports are shared.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink® subsystem with Simscape™ connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”

Term	Definition	Application	More Information
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also

Functions
`addComponent` | `addPort` | `connect`

Blocks
Reference Component | Variant Component | Adapter

Topics
"Compose Architecture Visually"

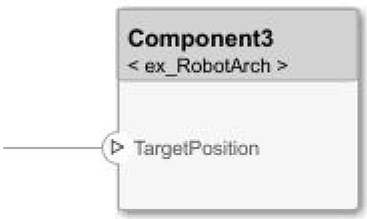
Introduced in R2019a

Reference Component

Link to an architectural definition or Simulink behavior

Description

Use a Reference Component block to link an architectural definition of a System Composer component or a Simulink behavior.



To add or connect System Composer components:

- Add an architecture Reference Component block from the **Modeling** tab or the palette. You can also click and drag a box on the canvas, then select the Reference Component block.
- Attach a referenced model to the component by selecting `<Enter Model Name>`.
- Click and drag any port to create a connection. Connect to another component. You can also create a new component to complete the connection.
- To connect Reference Component blocks to architecture or composition model root ports, drag from the component ports to the containing model boundary. When you release the connection, a root port is created at the boundary.

To manage Reference Component block contents:

- When you create a Reference Component block, you have the option to right-click the component and select `Block Parameters`. From here, you can specify your reference model name, if it already exists. The reference model can be a System Composer architecture model or a Simulink model.
- With a regular Component block, you can right-click on the block and convert it to a reference component.
  - Select `Save As Architecture Model` to save the contents of the component as an architecture model that can be referenced in multiple places and kept in sync. The component will become a reference component that links to the referenced architecture model.
  - Select `Create Simulink Behavior` to create a new Simulink reference model or subsystem and link to it.
  - Select `Link to Model` to link to a known model or subsystem that can be either a System Composer architecture model or a Simulink model.
- To break the reference link for a Reference Component block, you have the option to right-click and select `Inline Model`, which removes the contents of the architecture model referenced by the specified component and breaks the link to the reference model. The Reference Component block becomes a regular Component block.

Note Components with physical ports cannot be saved as architecture models, model references, software architectures, or Stateflow® chart behaviors. Components with physical ports can only be saved as subsystem references or subsystem component behaviors.

Ports

Input

`Source` — Input connection from another component
interface

If you connect to a source component, the interfaces on the ports are shared.

Output

`Destination` — Output connection to another component
interface

If you connect to a destination component, the interfaces on the ports are shared.

Physical

`Physical` — Physical connection to another component
physical interface

If you connect to another component, the physical interfaces on the ports are shared.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• “Implement Behaviors for Architecture Model Simulation” • “Describe Component Behavior Using Stateflow Charts”

See Also

Functions
`addComponent` | `addPort` | `connect` | `inlineComponent` | `createSimulinkBehavior` | `createArchitectureModel` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `linkToModel` | `isReference`

Blocks
Component | Variant Component | Adapter

Topics
“Describe Component Behavior Using Simulink”
“Decompose and Reuse Components”
“Describe Component Behavior Using Stateflow Charts”
“Create Simulink Subsystem Behavior Using Subsystem Component”
“Simulate and Deploy Software Architectures”

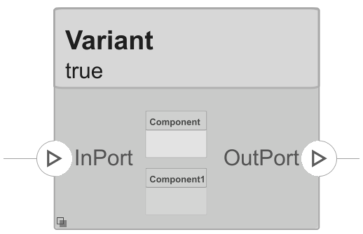
Introduced in R2019a

Variant Component

Add components with alternative designs

Description

Use a Variant Component block to create multiple design alternatives for a component.



To add or connect System Composer components:

- Add an architecture Variant Component block from the **Modeling** tab or the palette. You can also click and drag a box on the canvas, then select the Variant Component block. You can also create a variant component from a component or reference component. Right-click on the component and select **Add Variant Choice**.
- To add a port, select an edge of the component and choose a direction from the menu: `Input` or `Output`
- Click and drag the port to create a connection. Connect to another component. You can also create a new component to complete the connection.
- To connect Variant Component blocks to architecture or composition model root ports, drag from the component ports to the containing model boundary. When you release the connection, a root port is created at the boundary.

To manage Variant Component choices:

- By default, two variant choices are created when you create a Variant Component block. Right-click the Variant Component block and select **Variant > Label Mode Active Choice**, then select the active choice.
- To add an additional variant choice, right-click on the Variant Component block and select **Variant > Add Variant Choice**.
- Double-click into the Variant Component block to design the variants within it.
- Use the Variant Manager to easily switch between variant choices in a complex model hierarchy. Right-click on the Variant Component block and select **Variant > Open in Variant Manager**.

Ports

Input

`Source` — Input connection from another component
interface

If you connect to a source component, the interfaces on the ports are shared.

Output

`Destination` — Output connection to another component
interface

If you connect to a destination component, the interfaces on the ports are shared.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	"Create Variants"
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	"Set Variant Control Condition" on page 3-603

See Also

Functions
`addVariantComponent` | `addChoice` | `getActiveChoice` | `getChoices` | `getCondition` | `setActiveChoice` | `setCondition` | `addPort` | `makeVariant` | `connect`

Blocks
Component | Reference Component | Adapter

Topics
"Decompose and Reuse Components"

Introduced in R2019a

Classes

systemcomposer.allocation.Allocation

Allocation between source element and target element

Description

An `Allocation` object defines the allocation between the source element and the target element.

Related objects include:

- `systemcomposer.allocation.AllocationScenario`
- `systemcomposer.allocation.AllocationSet`

Creation

Create two allocations between four elements in the default scenario, `Scenario 1`, using the `allocate` function.

```
defaultScenario = allocSet.getScenario("Scenario 1");
defaultScenario.allocate(sourceElement1,sourceElement2);
defaultScenario.allocate(sourceElement3,sourceElement4);
```

Properties

`Source` — Source element
element object

Source element, specified as a `systemcomposer.arch.Element` object.

`Target` — Target element
element object

Target element, specified as a `systemcomposer.arch.Element` object.

`Scenario` — Allocation scenario
allocation scenario object

Allocation scenario, specified as a `systemcomposer.allocation.AllocationScenario` object.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for allocation, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

Object Functions

destroy Remove allocation scenario or allocation

Examples

Allocate Architectures in Tire Pressure Monitoring System

Use allocations to analyze a tire pressure monitoring system.

Overview

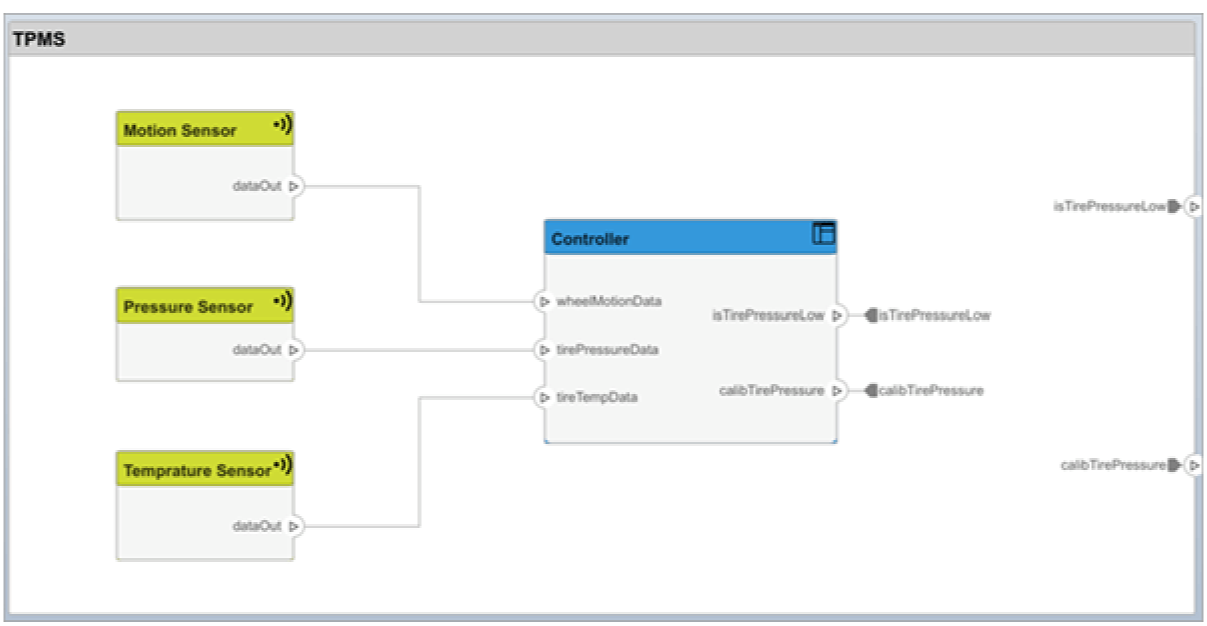
In systems engineering, it is common to describe a system at different levels of abstraction. For example, you can describe a system in terms of its high-level functions. These functions may not have any behavior associated with them but most likely trace back to some operating requirements the system must fulfill. We refer to this layer (or architecture) as the *functional architecture*. In this example, an automobile tire pressure monitoring system is described in three different architectures:

1. Functional Architecture — Describes the system in terms of its high-level functions. The connections show dependencies between functions.
2. Logical Architecture — Describes the system in terms of its logical components and how data is exchanged between them. Additionally, this architecture specifies behaviors for model simulation.
3. Platform Architecture — Describes the physical hardware needed for the system at a high level.

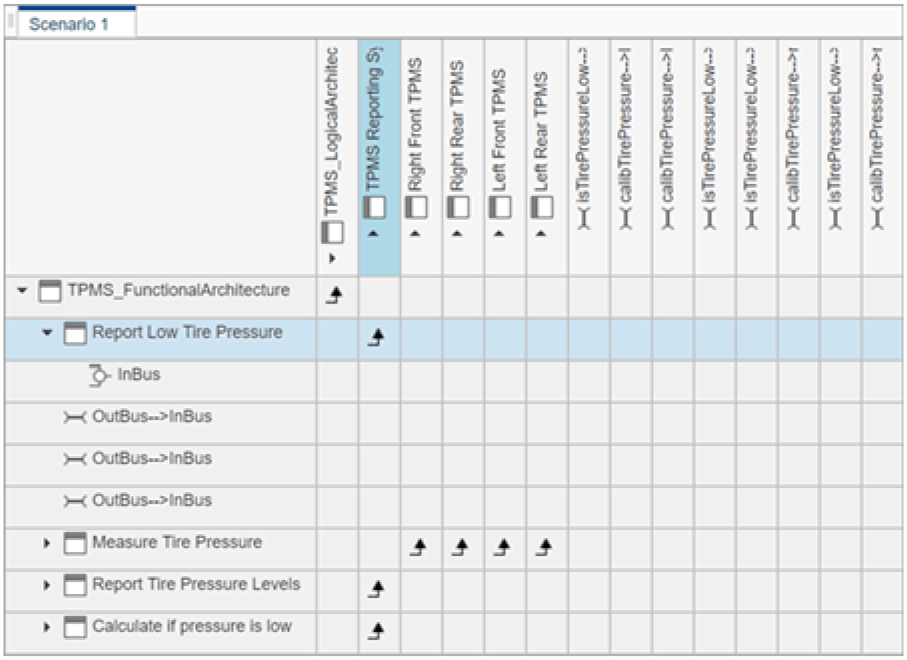
The allocation process is defined as linking these three architectures that fully describe the system. The linking captures the information about each architectural layer and makes it accessible to the others.

Use this command to open the project.

```
scExampleTirePressureMonitorSystem
```



Open the `FunctionalAllocation.mldatx` file, which displays allocations from `TPMS_FunctionalArchitecture` to `TPMS_LogicalArchitecture` in the Allocation Editor. The elements of `TPMS_FunctionalArchitecture` are displayed in the first column. The elements of `TPMS_LogicalArchitecture` are displayed in the first row. The arrows indicate the allocations between model elements.



The arrows display allocated components in the model. You can observe allocations for each element in the model hierarchy.

The rest of the example shows how to use this allocation information to further analyze the model.

Functional to Logical Allocation and Coverage Analysis

This section shows how to perform coverage analysis to verify that all functions have been allocated. This process requires using the allocation information specified between the functional and logical architectures.

To start the analysis, load the allocation set.

```
allocSet = systemcomposer.allocation.load('FunctionalAllocation');
scenario = allocSet.Scenarios;
```

Verify that each function in the system is allocated.

```
import systemcomposer.query.*;
[~, allFunctions] = allocSet.SourceModel.find(HasStereotype(IsStereotypeDerivedFrom("TPMSProfi
unAllocatedFunctions = [];
for i = 1:numel(allFunctions)
    if isempty(scenario.getAllocatedTo(allFunctions(i)))
        unAllocatedFunctions = [unAllocatedFunctions allFunctions(i)];
    end
end
```

```
if isempty(unAllocatedFunctions)
    fprintf('All functions are allocated');
else
    fprintf('%d Functions have not been allocated', numel(unAllocatedFunctions));
end
```

```
All functions are allocated
```

The result displays `All functions are allocated` to verify that all functions in the system are allocated.

Analyze Suppliers Providing Functions

This section shows how to identify which functions will be provided by which suppliers using the specified allocations. Since suppliers will be delivering these components to the system integrator, the supplier information is stored in the logical model.

```
suppliers = {'Supplier A', 'Supplier B', 'Supplier C', 'Supplier D'};
functionNames = arrayfun(@(x) x.Name, allFunctions, 'UniformOutput', false);
numFunNames = length(allFunctions);
numSuppliers = length(suppliers);
allocTable = table('Size', [numFunNames, numSuppliers], 'VariableTypes', repmat("double", 1, nu
allocTable.Properties.VariableNames = suppliers;
allocTable.Properties.RowNames = functionNames;
for i = 1:numFunNames
    elem = scenario.getAllocatedTo(allFunctions(i));
    for j = 1:numel(elem)
        elemSupplier = elem(j).getEvaluatedPropertyValue("TPMSProfile.LogicalComponent.Supplie
        allocTable{i, strcmp(elemSupplier, suppliers)} = 1;
    end

end
```

The table shows which suppliers are responsible for the corresponding functions.

```
allocTable
```

allocTable=*8×4 table*

	Supplier A	Supplier B	Supplier C	Supplier D
Report Tire Pressure Levels	1	0	0	0
Measure temprature of tire	0	0	0	1
Report Low Tire Pressure	1	0	0	0
Calculate Tire Pressure	0	1	0	0
Measure Tire Pressure	0	0	0	0
Measure rotations	0	1	0	0
Measure pressure on tire	0	0	1	0
Calculate if pressure is low	1	0	0	0

Analyze Software Deployment Strategies

You can determine if the Engine Control Unit (ECU) has enough capacity to house all the software components. The software components are allocated to the cores themselves, but the ECU is the component that has the budget property.

Get the platform architecture.

```
platformArch = systemcomposer.loadModel('PlatformArchitecture');
```

Load the allocation.

```
softwareDeployment = systemcomposer.allocation.load('SoftwareDeployment');

frontECU = platformArch.lookup('Path', 'PlatformArchitecture/Front ECU');
rearECU = platformArch.lookup('Path', 'PlatformArchitecture/Rear ECU');

scenario1 = softwareDeployment.getScenario('Scenario 1');
scenario2 = softwareDeployment.getScenario('Scenario 2');
frontECU_availMemory = frontECU.getEvaluatedPropertyValue("TPMSProfile.ECU.MemoryCapacity");
rearECU_availMemory = rearECU.getEvaluatedPropertyValue("TPMSProfile.ECU.MemoryCapacity");

frontECU_memoryUsed1 = getUtilizedMemoryOnECU(frontECU, scenario1);
frontECU_isOverBudget1 = frontECU_memoryUsed1 > frontECU_availMemory;
rearECU_memoryUsed1 = getUtilizedMemoryOnECU(rearECU, scenario1);
rearECU_isOverBudget1 = rearECU_memoryUsed1 > rearECU_availMemory;

frontECU_memoryUsed2 = getUtilizedMemoryOnECU(frontECU, scenario2);
frontECU_isOverBudget2 = frontECU_memoryUsed2 > frontECU_availMemory;
rearECU_memoryUsed2 = getUtilizedMemoryOnECU(rearECU, scenario2);
rearECU_isOverBudget2 = rearECU_memoryUsed2 > rearECU_availMemory;
```

Build a table to showcase the results.

```
softwareDeploymentTable = table([frontECU_memoryUsed1;frontECU_availMemory; ...
    frontECU_isOverBudget1;rearECU_memoryUsed1;rearECU_availMemory;rearECU_isOverBudget1], ...
    [frontECU_memoryUsed2; frontECU_availMemory; frontECU_isOverBudget2;rearECU_memoryUsed2; .
    rearECU_availMemory; rearECU_isOverBudget2], ...
    'VariableNames',{'Scenario 1','Scenario 2'},...
    'RowNames', {'Front ECUMemory Used (MB)', 'Front ECU Memory (MB)', 'Front ECU Overloaded',
    'Rear ECU Memory Used (MB)', 'Rear ECU Memory (MB)', 'Rear ECU Overloaded'})
```

```
softwareDeploymentTable=6×2 table
                                 Scenario 1    Scenario 2
                                 __________    __________

    Front ECUMemory Used (MB)       110            90
    Front ECU Memory (MB)           100           100
    Front ECU Overloaded              1             0
    Rear ECU Memory Used (MB)         0            20
    Rear ECU Memory (MB)            100           100
    Rear ECU Overloaded               0             0
```

```
function memoryUsed = getUtilizedMemoryOnECU(ecu, scenario)
```

For each component in the ECU, accumulate the binary size required for each allocated software component.

```
coreNames = {'Core1','Core2','Core3','Core4'};
memoryUsed = 0;
for i = 1:numel(coreNames)
    core = ecu.Model.lookup('Path', [ecu.getQualifiedName '/' coreNames{i}]);
    allocatedSWComps = scenario.getAllocatedFrom(core);
    for j = 1:numel(allocatedSWComps)
        binarySize = allocatedSWComps(j).getEvaluatedPropertyValue("TPMSProfile.SWComponent.Bi
        memoryUsed = memoryUsed + binarySize;
```

```
        end
    end

    end
```

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also

`getAllocatedFrom` | `getAllocation` | `getAllocatedTo` | `allocate` | `getScenario`

Topics

"Create and Manage Allocations"

Introduced in R2020b

systemcomposer.allocation.AllocationScenario

Allocation scenario

Description

An AllocationScenario object defines a collection of allocations between elements in the source model to elements in the target model.

Creation

Create an allocation set with name myNewAllocation using the systemcomposer.allocation.createAllocationSet function.

```
systemcomposer.allocation.createAllocationSet("myNewAllocation", ...
    "Source_Model_Allocation","Target_Model_Allocation");
```

Create a second allocation scenario Scenario 2 in addition to the default scenario Scenario 1 using the createScenario function.

```
scenario = createScenario(myAllocationSet,"Scenario 2")
```

Properties

Name — Name of allocation scenario
character vector

Name of allocation scenario, specified as a character vector.

Example: 'Scenario 1'

Data Types: char

Allocations — Allocations in scenario
array of allocation objects

Allocations in scenario, specified as an array of systemcomposer.allocation.Allocation objects.

AllocationSet — Allocation set to which scenario belongs
allocation set object

Allocation set to which scenario belongs, specified as an systemcomposer.allocation.AllocationSet object.

Description — Description of allocation scenario
character vector

Description of allocation scenario, specified as a character vector.

Data Types: char

`UUID` — Universal unique identifier
character vector

Universal unique identifier for allocation scenario, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

Object Functions

allocate	Create new allocation
deallocate	Delete allocation
getAllocation	Get allocation between source and target elements
getAllocatedFrom	Get allocation source
getAllocatedTo	Get allocation target
destroy	Remove allocation scenario or allocation

Examples

Allocate Architectures in Tire Pressure Monitoring System

Use allocations to analyze a tire pressure monitoring system.

Overview

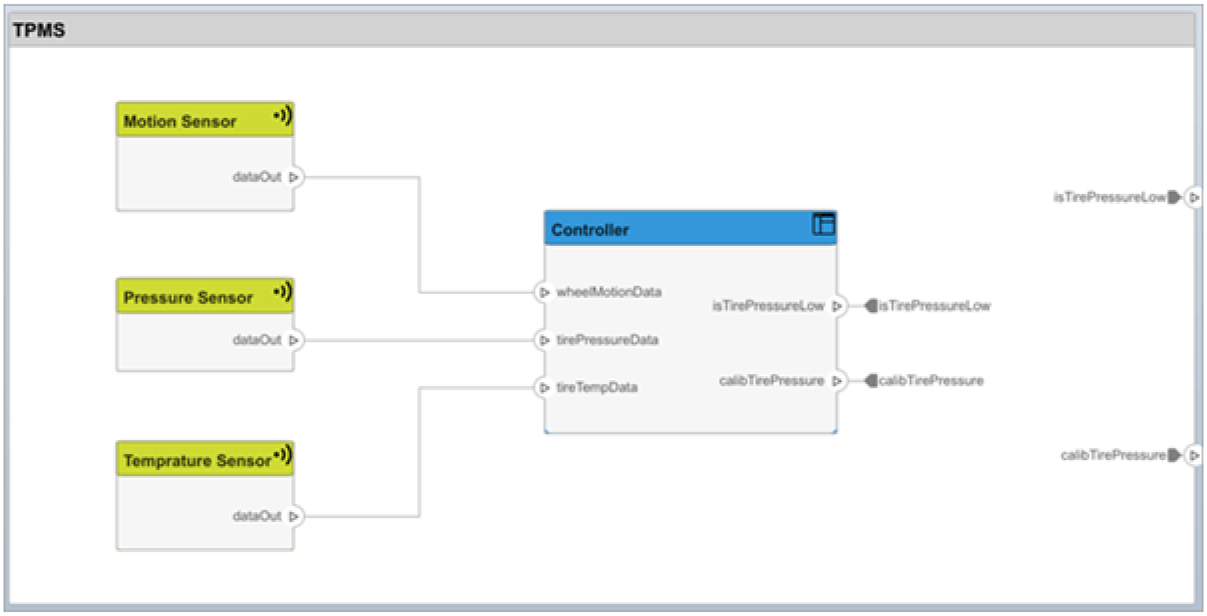
In systems engineering, it is common to describe a system at different levels of abstraction. For example, you can describe a system in terms of its high-level functions. These functions may not have any behavior associated with them but most likely trace back to some operating requirements the system must fulfill. We refer to this layer (or architecture) as the *functional architecture*. In this example, an automobile tire pressure monitoring system is described in three different architectures:

1. Functional Architecture — Describes the system in terms of its high-level functions. The connections show dependencies between functions.
2. Logical Architecture — Describes the system in terms of its logical components and how data is exchanged between them. Additionally, this architecture specifies behaviors for model simulation.
3. Platform Architecture — Describes the physical hardware needed for the system at a high level.

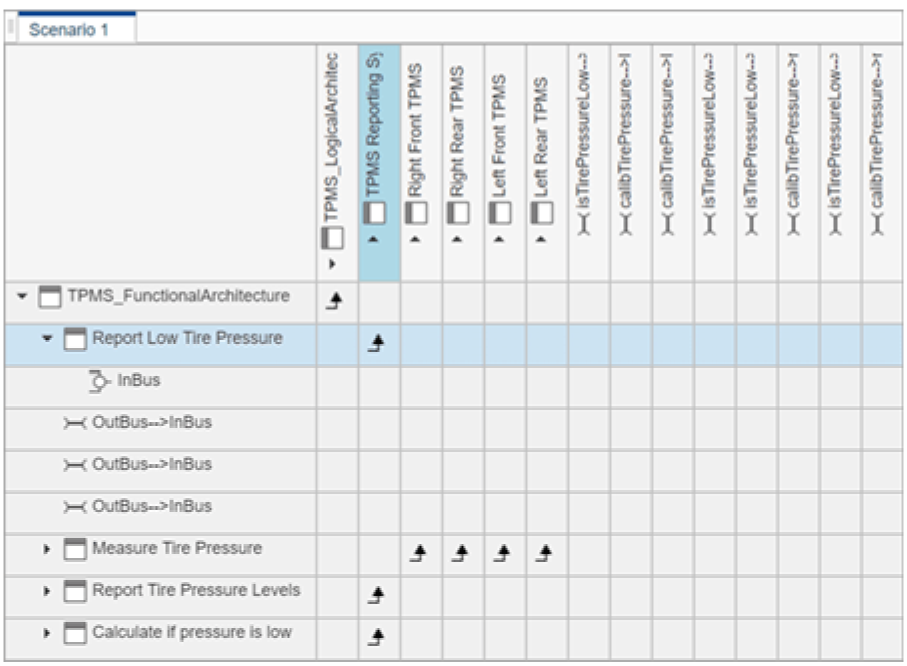
The allocation process is defined as linking these three architectures that fully describe the system. The linking captures the information about each architectural layer and makes it accessible to the others.

Use this command to open the project.

```
scExampleTirePressureMonitorSystem
```



Open the `FunctionalAllocation.mldatx` file, which displays allocations from `TPMS_FunctionalArchitecture` to `TPMS_LogicalArchitecture` in the Allocation Editor. The elements of `TPMS_FunctionalArchitecture` are displayed in the first column. The elements of `TPMS_LogicalArchitecture` are displayed in the first row. The arrows indicate the allocations between model elements.



The arrows display allocated components in the model. You can observe allocations for each element in the model hierarchy.

The rest of the example shows how to use this allocation information to further analyze the model.

Functional to Logical Allocation and Coverage Analysis

This section shows how to perform coverage analysis to verify that all functions have been allocated. This process requires using the allocation information specified between the functional and logical architectures.

To start the analysis, load the allocation set.

```
allocSet = systemcomposer.allocation.load('FunctionalAllocation');
scenario = allocSet.Scenarios;
```

Verify that each function in the system is allocated.

```
import systemcomposer.query.*;
[~, allFunctions] = allocSet.SourceModel.find(HasStereotype(IsStereotypeDerivedFrom("TPMSProfil
unAllocatedFunctions = [];
for i = 1:numel(allFunctions)
    if isempty(scenario.getAllocatedTo(allFunctions(i)))
        unAllocatedFunctions = [unAllocatedFunctions allFunctions(i)];
    end
end

if isempty(unAllocatedFunctions)
    fprintf('All functions are allocated');
else
    fprintf('%d Functions have not been allocated', numel(unAllocatedFunctions));
end
```

```
All functions are allocated
```

The result displays `All functions are allocated` to verify that all functions in the system are allocated.

Analyze Suppliers Providing Functions

This section shows how to identify which functions will be provided by which suppliers using the specified allocations. Since suppliers will be delivering these components to the system integrator, the supplier information is stored in the logical model.

```
suppliers = {'Supplier A', 'Supplier B', 'Supplier C', 'Supplier D'};
functionNames = arrayfun(@(x) x.Name, allFunctions, 'UniformOutput', false);
numFunNames = length(allFunctions);
numSuppliers = length(suppliers);
allocTable = table('Size', [numFunNames, numSuppliers], 'VariableTypes', repmat("double", 1, nu
allocTable.Properties.VariableNames = suppliers;
allocTable.Properties.RowNames = functionNames;
for i = 1:numFunNames
    elem = scenario.getAllocatedTo(allFunctions(i));
    for j = 1:numel(elem)
        elemSupplier = elem(j).getEvaluatedPropertyValue("TPMSProfile.LogicalComponent.Supplie
        allocTable{i, strcmp(elemSupplier, suppliers)} = 1;
    end

end
```

The table shows which suppliers are responsible for the corresponding functions.

```
allocTable
```

```
allocTable=8×4 table
                                    Supplier A    Supplier B    Supplier C    Supplier D
                                    __________    __________    __________    __________

    Report Tire Pressure Levels         1             0             0             0
    Measure temprature of tire          0             0             0             1
    Report Low Tire Pressure            1             0             0             0
    Calculate Tire Pressure             0             1             0             0
    Measure Tire Pressure               0             0             0             0
    Measure rotations                   0             1             0             0
    Measure pressure on tire            0             0             1             0
    Calculate if pressure is low        1             0             0             0
```

Analyze Software Deployment Strategies

You can determine if the Engine Control Unit (ECU) has enough capacity to house all the software components. The software components are allocated to the cores themselves, but the ECU is the component that has the budget property.

Get the platform architecture.

```
platformArch = systemcomposer.loadModel('PlatformArchitecture');
```

Load the allocation.

```
softwareDeployment = systemcomposer.allocation.load('SoftwareDeployment');

frontECU = platformArch.lookup('Path', 'PlatformArchitecture/Front ECU');
rearECU = platformArch.lookup('Path', 'PlatformArchitecture/Rear ECU');

scenario1 = softwareDeployment.getScenario('Scenario 1');
scenario2 = softwareDeployment.getScenario('Scenario 2');
frontECU_availMemory = frontECU.getEvaluatedPropertyValue("TPMSProfile.ECU.MemoryCapacity");
rearECU_availMemory = rearECU.getEvaluatedPropertyValue("TPMSProfile.ECU.MemoryCapacity");

frontECU_memoryUsed1 = getUtilizedMemoryOnECU(frontECU, scenario1);
frontECU_isOverBudget1 = frontECU_memoryUsed1 > frontECU_availMemory;
rearECU_memoryUsed1 = getUtilizedMemoryOnECU(rearECU, scenario1);
rearECU_isOverBudget1 = rearECU_memoryUsed1 > rearECU_availMemory;

frontECU_memoryUsed2 = getUtilizedMemoryOnECU(frontECU, scenario2);
frontECU_isOverBudget2 = frontECU_memoryUsed2 > frontECU_availMemory;
rearECU_memoryUsed2 = getUtilizedMemoryOnECU(rearECU, scenario2);
rearECU_isOverBudget2 = rearECU_memoryUsed2 > rearECU_availMemory;
```

Build a table to showcase the results.

```
softwareDeploymentTable = table([frontECU_memoryUsed1;frontECU_availMemory; ...
    frontECU_isOverBudget1;rearECU_memoryUsed1;rearECU_availMemory;rearECU_isOverBudget1], ...
    [frontECU_memoryUsed2; frontECU_availMemory; frontECU_isOverBudget2;rearECU_memoryUsed2; .
    rearECU_availMemory; rearECU_isOverBudget2], ...
    'VariableNames',{'Scenario 1','Scenario 2'},...
    'RowNames', {'Front ECUMemory Used (MB)', 'Front ECU Memory (MB)', 'Front ECU Overloaded',
    'Rear ECU Memory Used (MB)', 'Rear ECU Memory (MB)', 'Rear ECU Overloaded'})
```

```
softwareDeploymentTable=6×2 table
                                 Scenario 1    Scenario 2
```

```
                                   __________    __________

    Front ECUMemory Used (MB)         110            90
    Front ECU Memory (MB)             100           100
    Front ECU Overloaded                1             0
    Rear ECU Memory Used (MB)           0            20
    Rear ECU Memory (MB)              100           100
    Rear ECU Overloaded                 0             0
```

```
function memoryUsed = getUtilizedMemoryOnECU(ecu, scenario)
```

For each component in the ECU, accumulate the binary size required for each allocated software component.

```
coreNames = {'Core1','Core2','Core3','Core4'};
memoryUsed = 0;
for i = 1:numel(coreNames)
    core = ecu.Model.lookup('Path', [ecu.getQualifiedName '/' coreNames{i}]);
    allocatedSWComps = scenario.getAllocatedFrom(core);
    for j = 1:numel(allocatedSWComps)
        binarySize = allocatedSWComps(j).getEvaluatedPropertyValue("TPMSProfile.SWComponent.Bi
        memoryUsed = memoryUsed + binarySize;
    end
end

end
```

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also
createScenario

Topics
"Create and Manage Allocations"

Introduced in R2020b

systemcomposer.allocation.AllocationSet

Set of allocation scenarios

Description

An AllocationSet object defines a collection of allocation scenarios between two System Composer models.

Creation

Create an allocation set with name myNewAllocation using the systemcomposer.allocation.createAllocationSet function.

```
systemcomposer.allocation.createAllocationSet("myNewAllocation", ...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Properties

Name — Name of allocation set
character vector

Name of allocation set, specified as a character vector.

Example: 'MyNewAllocation'

Data Types: char

SourceModel — Source model for allocation
model object

Source model for allocation, specified as a systemcomposer.arch.Model object.

TargetModel — Target model for allocation
model object

Target model for allocation, specified as a systemcomposer.arch.Model object.

Scenarios — Allocation scenarios
array of allocation scenario objects

Allocation scenarios, specified as an array of systemcomposer.allocation.AllocationScenario objects.

Description — Description of allocation set
character vector

Description of allocation set, specified as a character vector.

Data Types: char

`NeedsRefresh` — Whether allocation set is out of date
`true` or 1 | `false` or 0

Whether allocation set is out of date with the source model, target model, or both, specified as a logical.

Data Types: `logical`

`Dirty` — Whether allocation has unsaved changes
`true` or 1 | `false` or 0

Whether allocation set has unsaved changes, specified as a logical.

Data Types: `logical`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for allocation set, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

Object Functions

createScenario	Create new empty allocation scenario
getScenario	Get allocation scenario
deleteScenario	Delete allocation scenario
synchronizeChanges	Synchronize changes of models in allocation set
find	Find loaded allocation set
save	Save allocation set as file
close	Close allocation set
closeAll	Close all open allocation sets

Examples

Allocate Architectures in Tire Pressure Monitoring System

Use allocations to analyze a tire pressure monitoring system.

Overview

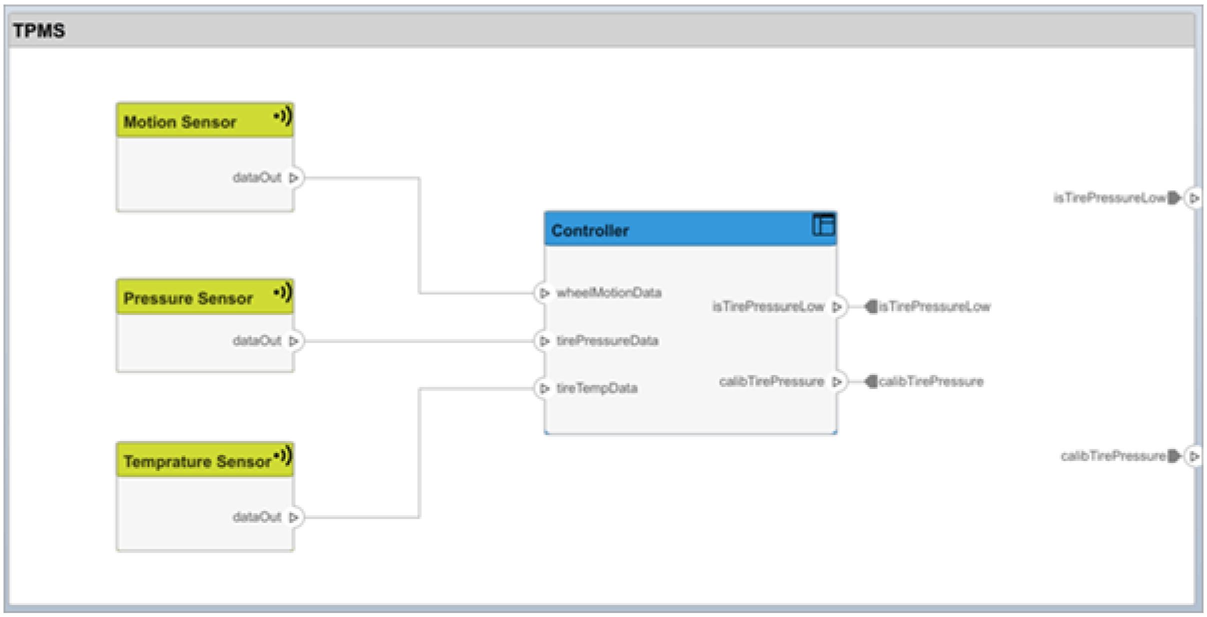
In systems engineering, it is common to describe a system at different levels of abstraction. For example, you can describe a system in terms of its high-level functions. These functions may not have any behavior associated with them but most likely trace back to some operating requirements the system must fulfill. We refer to this layer (or architecture) as the *functional architecture*. In this example, an automobile tire pressure monitoring system is described in three different architectures:

1. Functional Architecture — Describes the system in terms of its high-level functions. The connections show dependencies between functions.
2. Logical Architecture — Describes the system in terms of its logical components and how data is exchanged between them. Additionally, this architecture specifies behaviors for model simulation.
3. Platform Architecture — Describes the physical hardware needed for the system at a high level.

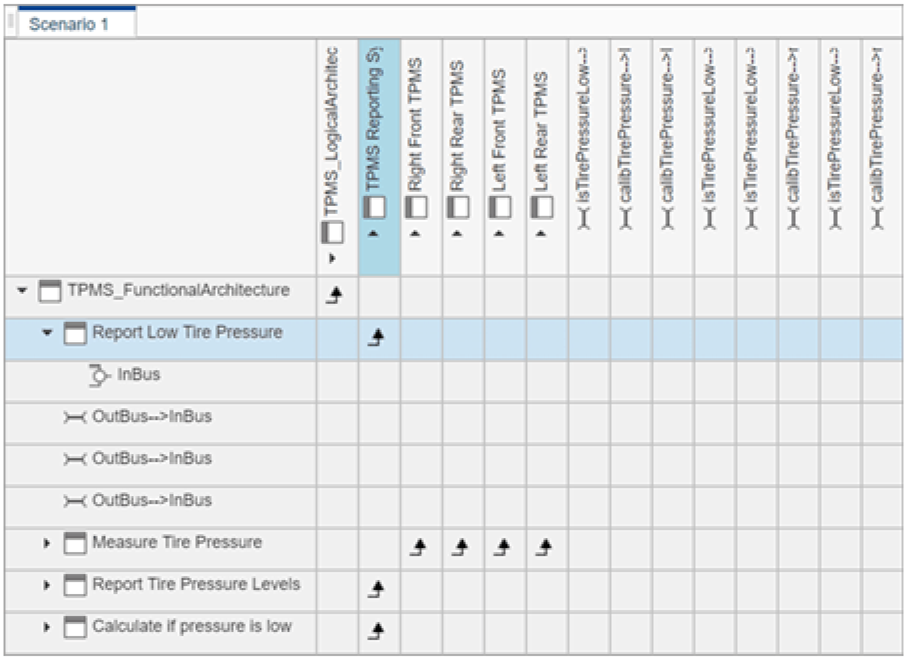
The allocation process is defined as linking these three architectures that fully describe the system. The linking captures the information about each architectural layer and makes it accessible to the others.

Use this command to open the project.

```
scExampleTirePressureMonitorSystem
```



Open the `FunctionalAllocation.mldatx` file, which displays allocations from `TPMS_FunctionalArchitecture` to `TPMS_LogicalArchitecture` in the Allocation Editor. The elements of `TPMS_FunctionalArchitecture` are displayed in the first column. The elements of `TPMS_LogicalArchitecture` are displayed in the first row. The arrows indicate the allocations between model elements.



The arrows display allocated components in the model. You can observe allocations for each element in the model hierarchy.

The rest of the example shows how to use this allocation information to further analyze the model.

Functional to Logical Allocation and Coverage Analysis

This section shows how to perform coverage analysis to verify that all functions have been allocated. This process requires using the allocation information specified between the functional and logical architectures.

To start the analysis, load the allocation set.

```
allocSet = systemcomposer.allocation.load('FunctionalAllocation');
scenario = allocSet.Scenarios;
```

Verify that each function in the system is allocated.

```
import systemcomposer.query.*;
[~, allFunctions] = allocSet.SourceModel.find(HasStereotype(IsStereotypeDerivedFrom("TPMSProfi
unAllocatedFunctions = [];
for i = 1:numel(allFunctions)
    if isempty(scenario.getAllocatedTo(allFunctions(i)))
        unAllocatedFunctions = [unAllocatedFunctions allFunctions(i)];
    end
end

if isempty(unAllocatedFunctions)
    fprintf('All functions are allocated');
else
    fprintf('%d Functions have not been allocated', numel(unAllocatedFunctions));
end
```

```
All functions are allocated
```

The result displays `All functions are allocated` to verify that all functions in the system are allocated.

Analyze Suppliers Providing Functions

This section shows how to identify which functions will be provided by which suppliers using the specified allocations. Since suppliers will be delivering these components to the system integrator, the supplier information is stored in the logical model.

```
suppliers = {'Supplier A', 'Supplier B', 'Supplier C', 'Supplier D'};
functionNames = arrayfun(@(x) x.Name, allFunctions, 'UniformOutput', false);
numFunNames = length(allFunctions);
numSuppliers = length(suppliers);
allocTable = table('Size', [numFunNames, numSuppliers], 'VariableTypes', repmat("double", 1, nu
allocTable.Properties.VariableNames = suppliers;
allocTable.Properties.RowNames = functionNames;
for i = 1:numFunNames
    elem = scenario.getAllocatedTo(allFunctions(i));
    for j = 1:numel(elem)
        elemSupplier = elem(j).getEvaluatedPropertyValue("TPMSProfile.LogicalComponent.Supplie
        allocTable{i, strcmp(elemSupplier, suppliers)} = 1;
    end

end
```

The table shows which suppliers are responsible for the corresponding functions.

```
allocTable
```

allocTable=*8×4 table*

	Supplier A	Supplier B	Supplier C	Supplier D
Report Tire Pressure Levels	1	0	0	0
Measure temprature of tire	0	0	0	1
Report Low Tire Pressure	1	0	0	0
Calculate Tire Pressure	0	1	0	0
Measure Tire Pressure	0	0	0	0
Measure rotations	0	1	0	0
Measure pressure on tire	0	0	1	0
Calculate if pressure is low	1	0	0	0

Analyze Software Deployment Strategies

You can determine if the Engine Control Unit (ECU) has enough capacity to house all the software components. The software components are allocated to the cores themselves, but the ECU is the component that has the budget property.

Get the platform architecture.

```
platformArch = systemcomposer.loadModel('PlatformArchitecture');
```

Load the allocation.

```
softwareDeployment = systemcomposer.allocation.load('SoftwareDeployment');

frontECU = platformArch.lookup('Path', 'PlatformArchitecture/Front ECU');
```

```
rearECU = platformArch.lookup('Path', 'PlatformArchitecture/Rear ECU');

scenario1 = softwareDeployment.getScenario('Scenario 1');
scenario2 = softwareDeployment.getScenario('Scenario 2');
frontECU_availMemory = frontECU.getEvaluatedPropertyValue("TPMSProfile.ECU.MemoryCapacity");
rearECU_availMemory = rearECU.getEvaluatedPropertyValue("TPMSProfile.ECU.MemoryCapacity");

frontECU_memoryUsed1 = getUtilizedMemoryOnECU(frontECU, scenario1);
frontECU_isOverBudget1 = frontECU_memoryUsed1 > frontECU_availMemory;
rearECU_memoryUsed1 = getUtilizedMemoryOnECU(rearECU, scenario1);
rearECU_isOverBudget1 = rearECU_memoryUsed1 > rearECU_availMemory;

frontECU_memoryUsed2 = getUtilizedMemoryOnECU(frontECU, scenario2);
frontECU_isOverBudget2 = frontECU_memoryUsed2 > frontECU_availMemory;
rearECU_memoryUsed2 = getUtilizedMemoryOnECU(rearECU, scenario2);
rearECU_isOverBudget2 = rearECU_memoryUsed2 > rearECU_availMemory;
```

Build a table to showcase the results.

```
softwareDeploymentTable = table([frontECU_memoryUsed1;frontECU_availMemory; ...
    frontECU_isOverBudget1;rearECU_memoryUsed1;rearECU_availMemory;rearECU_isOverBudget1], ...
    [frontECU_memoryUsed2; frontECU_availMemory; frontECU_isOverBudget2;rearECU_memoryUsed2; .
    rearECU_availMemory; rearECU_isOverBudget2], ...
    'VariableNames',{'Scenario 1','Scenario 2'},...
    'RowNames', {'Front ECUMemory Used (MB)', 'Front ECU Memory (MB)', 'Front ECU Overloaded',
    'Rear ECU Memory Used (MB)', 'Rear ECU Memory (MB)', 'Rear ECU Overloaded'})
```

```
softwareDeploymentTable=6×2 table
                                 Scenario 1    Scenario 2
                                 __________    __________

    Front ECUMemory Used (MB)       110            90
    Front ECU Memory (MB)           100           100
    Front ECU Overloaded              1             0
    Rear ECU Memory Used (MB)         0            20
    Rear ECU Memory (MB)            100           100
    Rear ECU Overloaded               0             0
```

```
function memoryUsed = getUtilizedMemoryOnECU(ecu, scenario)
```

For each component in the ECU, accumulate the binary size required for each allocated software component.

```
coreNames = {'Core1','Core2','Core3','Core4'};
memoryUsed = 0;
for i = 1:numel(coreNames)
    core = ecu.Model.lookup('Path', [ecu.getQualifiedName '/' coreNames{i}]);
    allocatedSWComps = scenario.getAllocatedFrom(core);
    for j = 1:numel(allocatedSWComps)
        binarySize = allocatedSWComps(j).getEvaluatedPropertyValue("TPMSProfile.SWComponent.Bi
        memoryUsed = memoryUsed + binarySize;
    end
end
```

```
end
```

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`systemcomposer.allocation.Allocation` | `systemcomposer.allocation.AllocationScenario` | `editor` | `createAllocationSet`

Topics

“Create and Manage Allocations”

Introduced in R2020b

systemcomposer.analysis.ArchitectureInstance

Architecture in analysis instance

Description

An `ArchitectureInstance` object represents an instance of an architecture.

Creation

Create an instance of an architecture using the `instantiate` function.

```
instance = instantiate(model.Architecture,'LatencyProfile','NewInstance', ...
'Function',@calculateLatency,'Arguments','3','Strict',true, ...
'NormalizeUnits',false,'Direction','PreOrder')
```

Properties

`Name` — Name of instance
character vector

Name of instance, specified as a character vector.

Example: `'NewInstance'`

Data Types: `char`

`Components` — Child components of instance
array of component instance objects

Child components of instance, specified as an array of `systemcomposer.analysis.ComponentInstance` objects.

`Ports` — Ports of architecture instance
array of port instance objects

Ports of architecture instance, specified as an array of `systemcomposer.analysis.PortInstance` objects.

`Connectors` — Connectors in architecture instance
array of connector instance objects

Connectors in architecture instance, specified as an array of `systemcomposer.analysis.ConnectorInstance` objects, connecting child components.

`Specification` — Reference to architecture in design model
architecture object

Reference to architecture in design model, specified as a `systemcomposer.arch.Architecture` object.

`NormalizeUnits` — Whether units normalize
`true` or 1 | `false` or 0

Whether units normalize the value of properties in the instantiation, specified as a logical.

Data Types: `logical`

`IsStrict` — Whether instances get properties
`true` or 1 | `false` or 0

Whether instances get properties if the specification of the instance has the stereotype applied, specified as a logical.

Data Types: `logical`

`AnalysisFunction` — Analysis function
MATLAB® function handle

Analysis function, specified as the MATLAB function handle to be executed when analysis is run.

Example: `@calculateLatency`

`AnalysisDirection` — Analysis direction
enumeration | character vector

Analysis direction, specified as one of the following enumerations:

- `systemcomposer.IteratorDirection.TopDown`
- `systemcomposer.IteratorDirection.BottomUp`
- `systemcomposer.IteratorDirection.PreOrder`
- `systemcomposer.IteratorDirection.PostOrder`

or a character vector of one of the following options: `'TopDown'`, `'PreOrder'`, `'PostOrder'`, or `'BottomUp'`

Data Types: `enum` | `char`

`AnalysisArguments` — Analysis arguments
character vector

Analysis arguments, specified as a character vector of optional arguments to the analysis function.

Example: `'3'`

Data Types: `char`

`ImmediateUpdate` — Whether analysis instance updates automatically
`true` or 1 | `false` or 0

Whether analysis viewer updates automatically when the design model changes, specified as a logical.

Data Types: `logical`

Object Functions

getValue	Get value of property from element instance

setValue	Set value of property for element instance
hasValue	Find if element instance has property value
iterate	Iterate over model elements
lookup	Search for architectural element
save	Save architecture instance
update	Update architecture model
refresh	Refresh architecture instance
isArchitecture	Find if instance is architecture instance
isComponent	Find if instance is component instance
isConnector	Find if instance is connector instance
isPort	Find if instance is port instance

Examples

Analyze Latency Characteristics

Create an instantiation for analysis for a system with latency in its wiring. The materials used are copper, fiber, and WiFi.

Create Latency Profile with Stereotypes and Properties

Create a System Composer profile with a base, connector, component, and port stereotype. Add properties with default values to each stereotype as needed for analysis.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfileC");
```

Add a base stereotype with properties.

```
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
```

Add a connector stereotype with properties.

```
connLatency = profile.addStereotype("ConnectorLatency",...
    Parent="LatencyProfileC.LatencyBase");
connLatency.addProperty("secure",Type="boolean",DefaultValue="true");
connLatency.addProperty("linkDistance",Type="double");
```

Add a component stereotype with properties.

```
nodeLatency = profile.addStereotype("NodeLatency",...
    Parent="LatencyProfileC.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");
```

Add a port stereotype with properties.

```
portLatency = profile.addStereotype("PortLatency",...
    Parent="LatencyProfileC.LatencyBase");
portLatency.addProperty("queueDepth",Type="double",DefaultValue="4.29");
portLatency.addProperty("dummy",Type="int32");
```

Instantiate Using Analysis Function

Create a new model and apply the profile. Create components, ports, and connections in the model. Apply stereotypes to the model elements. Finally, instantiate using the analysis function.

```
model = systemcomposer.createModel("archModel",true);
arch = model.Architecture;
```

Apply profile to model.

```
model.applyProfile("LatencyProfileC");
```

Create components, ports, and connections.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','out'});

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower','MotionCommand'}
componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});

c_sensorData = connect(arch,componentSensor,componentPlanning);
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Clean up the canvas.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Batch apply stereotypes to model elements.

```
batchApplyStereotype(arch,"Component","LatencyProfileC.NodeLatency");
batchApplyStereotype(arch,"Port","LatencyProfileC.PortLatency");
batchApplyStereotype(arch,"Connector","LatencyProfileC.ConnectorLatency");
```

Instantiate using the analysis function.

```
instance = instantiate(model.Architecture,"LatencyProfileC","NewInstance",...
    Function=@calculateLatency,Arguments="3", ...
    Strict=true,NormalizeUnits=false,Direction="PreOrder")
```

```
instance = 
  ArchitectureInstance with properties:

        Specification: [1x1 systemcomposer.arch.Architecture]
             IsStrict: 1
       NormalizeUnits: 0
     AnalysisFunction: @calculateLatency
    AnalysisDirection: PreOrder
    AnalysisArguments: '3'
      ImmediateUpdate: 0
           Components: [1x3 systemcomposer.analysis.ComponentInstance]
                Ports: [0x0 systemcomposer.analysis.PortInstance]
           Connectors: [1x3 systemcomposer.analysis.ConnectorInstance]
                 Name: 'NewInstance'
```

Inspect Component, Port, and Connector Instances

Get properties from component, port, and connector instances.

```
defaultResources = instance.Components(1).getValue("LatencyProfileC.NodeLatency.resources")
```

```
defaultResources = 1
```

```
defaultSecure = instance.Connectors(1).getValue("LatencyProfileC.ConnectorLatency.secure")
```

```
defaultSecure = logical
   1
```

```
defaultQueueDepth = instance.Components(1).Ports(1).getValue("LatencyProfileC.PortLatency.queueDe
```

```
defaultQueueDepth = 4.2900
```

Battery Sizing and Automotive Electrical System Analysis

Overview

Model a typical automotive electrical system as an architectural model and run a primitive analysis. The elements in the model can be broadly grouped as either a source or a load. Various properties of the sources and loads are set as part of the stereotype. This example uses the `iterate` method of the specification API to iterate through each element of the model and run analysis using the stereotype properties.

Structure of Model

The generator charges the battery while the engine is running. The battery and the generator support the electrical loads in the vehicle, like ECU, radio, and body control. The inductive loads like motors and other coils have the `InRushCurrent` stereotype property defined. Based on the properties set on each component, the following analyses are performed:

- Total `KeyOffLoad`.
- Number of days required for `KeyOffLoad` to discharge 30% of the battery.
- Total `CrankingInRush` current.
- Total `Cranking` current.
- Ability of the battery to start the vehicle at 0°F based on the battery cold cranking amps (CCA). The discharge time is computed based on Puekert coefficient (k), which describes the relationship between the rate of discharge and the available capacity of the battery.

Load Model and Run Analysis

```
scExampleAutomotiveElectricalSystemAnalysis
archModel = systemcomposer.loadModel('scExampleAutomotiveElectricalSystemAnalysis');
```

Instantiate battery sizing class used by the analysis function to store analysis results.

```
objcomputeBatterySizing = computeBatterySizing;
```

Run the analysis using the iterator.

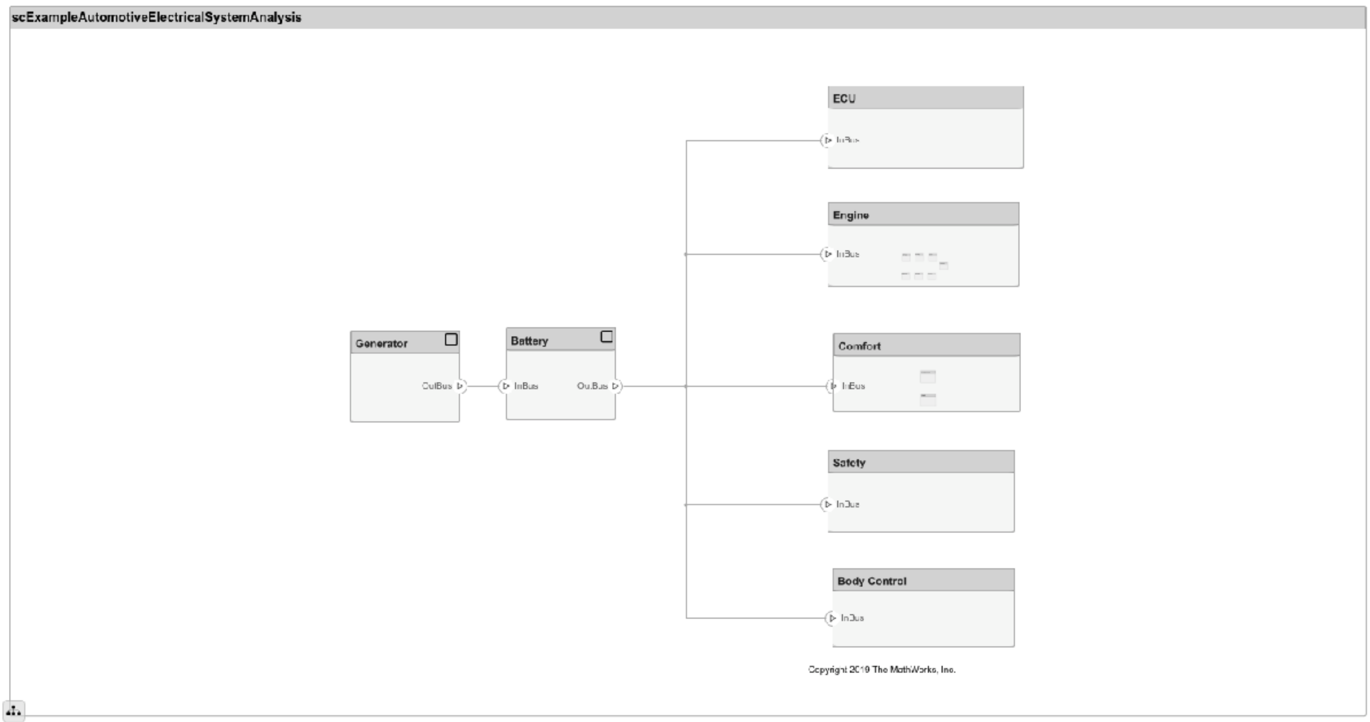
```
archModel.iterate('Topdown',@computeLoad,objcomputeBatterySizing)
```

Display analysis results.

```
objcomputeBatterySizing.displayResults
```

```
Total KeyOffLoad: 158.708 mA
Number of days required for KeyOffLoad to discharge 30% of battery: 55.789.
```

```
Total CrankingInRush current: 70 A
Total Cranking current: 104 A
CCA of the specified battery is sufficient to start the car at 0 F.

ans =
  computeBatterySizing with properties:

    totalCrankingInrushCurrent: 70
          totalCrankingCurrent: 104
        totalAccesoriesCurrent: 71.6667
               totalKeyOffLoad: 158.7080
                    batteryCCA: 500
               batteryCapacity: 850
            puekertcoefficient: 1.2000
```



Close Model

```
bdclose('scExampleAutomotiveElectricalSystemAnalysis');
```

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• “Analyze Architecture Model with Analysis Function” • “Analyze Architecture”
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• “Analysis Function Constructs” • “Write Analysis Function”
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	“Run Analysis Function”
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	“Create a Model Instance for Analysis”

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

See Also

`deleteInstance` | `instantiate` | `loadInstance` | `systemcomposer.analysis.ComponentInstance` | `systemcomposer.analysis.PortInstance` | `systemcomposer.analysis.ConnectorInstance` | `systemcomposer.analysis.Instance`

Topics

“Write Analysis Function”

Introduced in R2019a

systemcomposer.analysis.ComponentInstance

Component in analysis instance

Description

A ComponentInstance object represents an instance of a component.

Creation

Create an instance of an architecture using the instantiate function.

```
instance = instantiate(model.Architecture,'LatencyProfile','NewInstance', ...
'Function',@calculateLatency,'Arguments','3','Strict',true, ...
'NormalizeUnits',false,'Direction','PreOrder')
```

Properties

Name — Name of instance
character vector

Name of instance, specified as a character vector.

Example: 'NewInstance'

Data Types: char

Components — Child components of instance
array of component instance objects

Child components of instance, specified as an array of systemcomposer.analysis.ComponentInstance objects.

Ports — Ports of component instance
array of port instance objects

Ports of component instance, specified as an array of systemcomposer.analysis.PortInstance objects.

Connectors — Connectors in component instance
array of connector instance objects

Connectors in component instance that connect child components, specified as an array of systemcomposer.analysis.ConnectorInstance objects.

Parent — Parent of component
architecture instance object

Parent of component, specified as a systemcomposer.analysis.ArchitectureInstance object.

Specification — Reference to component in design model
component object

Reference to component in design model, specified as a `systemcomposer.arch.Component` object.

Object Functions

getValue	Get value of property from element instance
setValue	Set value of property for element instance
hasValue	Find if element instance has property value
isArchitecture	Find if instance is architecture instance
isComponent	Find if instance is component instance
isConnector	Find if instance is connector instance
isPort	Find if instance is port instance

Examples

Analyze Latency Characteristics

Create an instantiation for analysis for a system with latency in its wiring. The materials used are copper, fiber, and WiFi.

Create Latency Profile with Stereotypes and Properties

Create a System Composer profile with a base, connector, component, and port stereotype. Add properties with default values to each stereotype as needed for analysis.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfileC");
```

Add a base stereotype with properties.

```
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
```

Add a connector stereotype with properties.

```
connLatency = profile.addStereotype("ConnectorLatency",...
    Parent="LatencyProfileC.LatencyBase");
connLatency.addProperty("secure",Type="boolean",DefaultValue="true");
connLatency.addProperty("linkDistance",Type="double");
```

Add a component stereotype with properties.

```
nodeLatency = profile.addStereotype("NodeLatency",...
    Parent="LatencyProfileC.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");
```

Add a port stereotype with properties.

```
portLatency = profile.addStereotype("PortLatency",...
    Parent="LatencyProfileC.LatencyBase");
portLatency.addProperty("queueDepth",Type="double",DefaultValue="4.29");
portLatency.addProperty("dummy",Type="int32");
```

Instantiate Using Analysis Function

Create a new model and apply the profile. Create components, ports, and connections in the model. Apply stereotypes to the model elements. Finally, instantiate using the analysis function.

```
model = systemcomposer.createModel("archModel",true);
arch = model.Architecture;
```

Apply profile to model.

```
model.applyProfile("LatencyProfileC");
```

Create components, ports, and connections.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','out'});

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower','MotionCommand'}
componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});

c_sensorData = connect(arch,componentSensor,componentPlanning);
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Clean up the canvas.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Batch apply stereotypes to model elements.

```
batchApplyStereotype(arch,"Component","LatencyProfileC.NodeLatency");
batchApplyStereotype(arch,"Port","LatencyProfileC.PortLatency");
batchApplyStereotype(arch,"Connector","LatencyProfileC.ConnectorLatency");
```

Instantiate using the analysis function.

```
instance = instantiate(model.Architecture,"LatencyProfileC","NewInstance",...
    Function=@calculateLatency,Arguments="3", ...
    Strict=true,NormalizeUnits=false,Direction="PreOrder")
```

```
instance = 
  ArchitectureInstance with properties:

        Specification: [1x1 systemcomposer.arch.Architecture]
             IsStrict: 1
       NormalizeUnits: 0
     AnalysisFunction: @calculateLatency
    AnalysisDirection: PreOrder
    AnalysisArguments: '3'
      ImmediateUpdate: 0
           Components: [1x3 systemcomposer.analysis.ComponentInstance]
                Ports: [0x0 systemcomposer.analysis.PortInstance]
           Connectors: [1x3 systemcomposer.analysis.ConnectorInstance]
                 Name: 'NewInstance'
```

Inspect Component, Port, and Connector Instances

Get properties from component, port, and connector instances.

```
defaultResources = instance.Components(1).getValue("LatencyProfileC.NodeLatency.resources")
```

```
defaultResources = 1
```

```
defaultSecure = instance.Connectors(1).getValue("LatencyProfileC.ConnectorLatency.secure")
```

```
defaultSecure = logical
   1
```

```
defaultQueueDepth = instance.Components(1).Ports(1).getValue("LatencyProfileC.PortLatency.queueDe
```

```
defaultQueueDepth = 4.2900
```

Battery Sizing and Automotive Electrical System Analysis

Overview

Model a typical automotive electrical system as an architectural model and run a primitive analysis. The elements in the model can be broadly grouped as either a source or a load. Various properties of the sources and loads are set as part of the stereotype. This example uses the `iterate` method of the specification API to iterate through each element of the model and run analysis using the stereotype properties.

Structure of Model

The generator charges the battery while the engine is running. The battery and the generator support the electrical loads in the vehicle, like ECU, radio, and body control. The inductive loads like motors and other coils have the `InRushCurrent` stereotype property defined. Based on the properties set on each component, the following analyses are performed:

- Total `KeyOffLoad`.
- Number of days required for `KeyOffLoad` to discharge 30% of the battery.
- Total `CrankingInRush` current.
- Total `Cranking` current.
- Ability of the battery to start the vehicle at 0°F based on the battery cold cranking amps (CCA). The discharge time is computed based on Puekert coefficient (k), which describes the relationship between the rate of discharge and the available capacity of the battery.

Load Model and Run Analysis

```
scExampleAutomotiveElectricalSystemAnalysis
archModel = systemcomposer.loadModel('scExampleAutomotiveElectricalSystemAnalysis');
```

Instantiate battery sizing class used by the analysis function to store analysis results.

```
objcomputeBatterySizing = computeBatterySizing;
```

Run the analysis using the iterator.

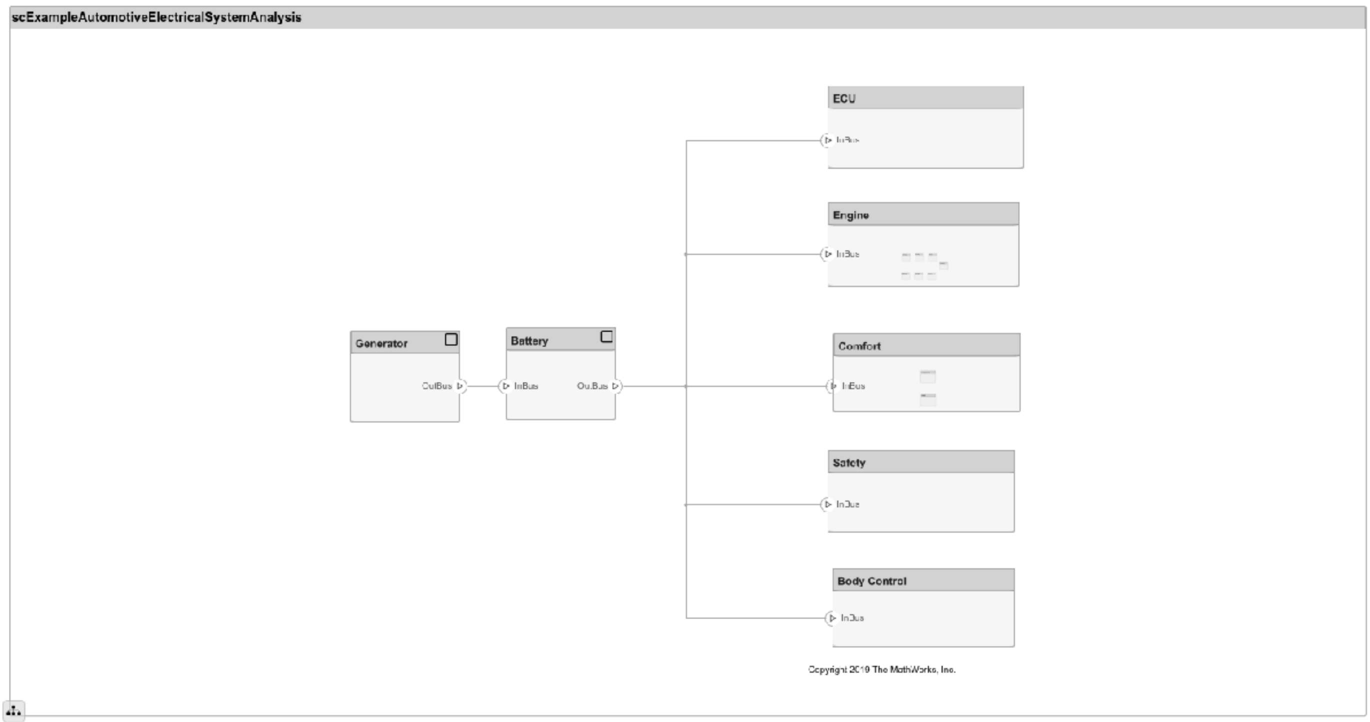
```
archModel.iterate('Topdown',@computeLoad,objcomputeBatterySizing)
```

Display analysis results.

```
objcomputeBatterySizing.displayResults
```

```
Total KeyOffLoad: 158.708 mA
Number of days required for KeyOffLoad to discharge 30% of battery: 55.789.
```

```
Total CrankingInRush current: 70 A
Total Cranking current: 104 A
CCA of the specified battery is sufficient to start the car at 0 F.

ans = 
  computeBatterySizing with properties:

    totalCrankingInrushCurrent: 70
          totalCrankingCurrent: 104
        totalAccesoriesCurrent: 71.6667
               totalKeyOffLoad: 158.7080
                    batteryCCA: 500
               batteryCapacity: 850
            puekertcoefficient: 1.2000
```



Close Model

```
bdclose('scExampleAutomotiveElectricalSystemAnalysis');
```

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`deleteInstance` | `update` | `refresh` | `save` | `instantiate` | `loadInstance` | `iterate` | `systemcomposer.analysis.ArchitectureInstance` | `systemcomposer.analysis.PortInstance` | `systemcomposer.analysis.ConnectorInstance` | `systemcomposer.analysis.Instance`

Topics

"Write Analysis Function"

Introduced in R2019a

systemcomposer.analysis.ConnectorInstance

Connector in analysis instance

Description

A `ConnectorInstance` object represents an instance of a connector.

Creation

Create an instance of an architecture using the `instantiate` function.

```
instance = instantiate(model.Architecture,'LatencyProfile','NewInstance', ...
'Function',@calculateLatency,'Arguments','3','Strict',true, ...
'NormalizeUnits',false,'Direction','PreOrder')
```

Properties

Name — Name of instance
character vector

Name of instance, specified as a character vector.

Example: `'NewInterface'`

Data Types: `char`

`Parent` — Component that contains connector
component instance object

Component that contains connector, specified as a `systemcomposer.analysis.ComponentInstance` object.

`SourcePort` — Source port instance
port instance object

Source port instance, specified as a `systemcomposer.analysis.PortInstance` object.

`DestinationPort` — Destination port instance
port instance object

Destination port instance, specified as a `systemcomposer.analysis.PortInstance` object.

`Specification` — Reference to connector in design model
connector object | physical connector object

Reference to connector in design model, specified as a `systemcomposer.arch.Connector` or `systemcomposer.arch.PhysicalConnector` object.

`QualifiedName` — Qualified name of connector
character vector

Qualified name of connector, specified as a character vector of the form `'<PathToSourceComponent>:<PortDirection>-><PathToDestinationComponent>:<PortDirection>'`.

Example: `'model2:In->model2/Component:In'`

Data Types: `char`

Object Functions

getValue	Get value of property from element instance
setValue	Set value of property for element instance
hasValue	Find if element instance has property value
isArchitecture	Find if instance is architecture instance
isComponent	Find if instance is component instance
isConnector	Find if instance is connector instance
isPort	Find if instance is port instance

Examples

Analyze Latency Characteristics

Create an instantiation for analysis for a system with latency in its wiring. The materials used are copper, fiber, and WiFi.

Create Latency Profile with Stereotypes and Properties

Create a System Composer profile with a base, connector, component, and port stereotype. Add properties with default values to each stereotype as needed for analysis.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfileC");
```

Add a base stereotype with properties.

```
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
```

Add a connector stereotype with properties.

```
connLatency = profile.addStereotype("ConnectorLatency",...
    Parent="LatencyProfileC.LatencyBase");
connLatency.addProperty("secure",Type="boolean",DefaultValue="true");
connLatency.addProperty("linkDistance",Type="double");
```

Add a component stereotype with properties.

```
nodeLatency = profile.addStereotype("NodeLatency",...
    Parent="LatencyProfileC.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");
```

Add a port stereotype with properties.

```
portLatency = profile.addStereotype("PortLatency",...
    Parent="LatencyProfileC.LatencyBase");
portLatency.addProperty("queueDepth",Type="double",DefaultValue="4.29");
portLatency.addProperty("dummy",Type="int32");
```

Instantiate Using Analysis Function

Create a new model and apply the profile. Create components, ports, and connections in the model. Apply stereotypes to the model elements. Finally, instantiate using the analysis function.

```
model = systemcomposer.createModel("archModel",true);
arch = model.Architecture;
```

Apply profile to model.

```
model.applyProfile("LatencyProfileC");
```

Create components, ports, and connections.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','out'});

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower','MotionCommand'},
componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});

c_sensorData = connect(arch,componentSensor,componentPlanning);
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Clean up the canvas.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Batch apply stereotypes to model elements.

```
batchApplyStereotype(arch,"Component","LatencyProfileC.NodeLatency");
batchApplyStereotype(arch,"Port","LatencyProfileC.PortLatency");
batchApplyStereotype(arch,"Connector","LatencyProfileC.ConnectorLatency");
```

Instantiate using the analysis function.

```
instance = instantiate(model.Architecture,"LatencyProfileC","NewInstance",...
    Function=@calculateLatency,Arguments="3", ...
    Strict=true,NormalizeUnits=false,Direction="PreOrder")
```

```
instance = 
  ArchitectureInstance with properties:

        Specification: [1x1 systemcomposer.arch.Architecture]
             IsStrict: 1
       NormalizeUnits: 0
     AnalysisFunction: @calculateLatency
    AnalysisDirection: PreOrder
    AnalysisArguments: '3'
      ImmediateUpdate: 0
           Components: [1x3 systemcomposer.analysis.ComponentInstance]
                Ports: [0x0 systemcomposer.analysis.PortInstance]
           Connectors: [1x3 systemcomposer.analysis.ConnectorInstance]
                 Name: 'NewInstance'
```

Inspect Component, Port, and Connector Instances

Get properties from component, port, and connector instances.

```
defaultResources = instance.Components(1).getValue("LatencyProfileC.NodeLatency.resources")
```

```
defaultResources = 1
```

```
defaultSecure = instance.Connectors(1).getValue("LatencyProfileC.ConnectorLatency.secure")
```

```
defaultSecure = logical
   1
```

```
defaultQueueDepth = instance.Components(1).Ports(1).getValue("LatencyProfileC.PortLatency.queueDe
```

```
defaultQueueDepth = 4.2900
```

Battery Sizing and Automotive Electrical System Analysis

Overview

Model a typical automotive electrical system as an architectural model and run a primitive analysis. The elements in the model can be broadly grouped as either a source or a load. Various properties of the sources and loads are set as part of the stereotype. This example uses the `iterate` method of the specification API to iterate through each element of the model and run analysis using the stereotype properties.

Structure of Model

The generator charges the battery while the engine is running. The battery and the generator support the electrical loads in the vehicle, like ECU, radio, and body control. The inductive loads like motors and other coils have the `InRushCurrent` stereotype property defined. Based on the properties set on each component, the following analyses are performed:

- Total `KeyOffLoad`.
- Number of days required for `KeyOffLoad` to discharge 30% of the battery.
- Total `CrankingInRush` current.
- Total `Cranking` current.
- Ability of the battery to start the vehicle at 0°F based on the battery cold cranking amps (CCA). The discharge time is computed based on Puekert coefficient (k), which describes the relationship between the rate of discharge and the available capacity of the battery.

Load Model and Run Analysis

```
scExampleAutomotiveElectricalSystemAnalysis
archModel = systemcomposer.loadModel('scExampleAutomotiveElectricalSystemAnalysis');
```

Instantiate battery sizing class used by the analysis function to store analysis results.

```
objcomputeBatterySizing = computeBatterySizing;
```

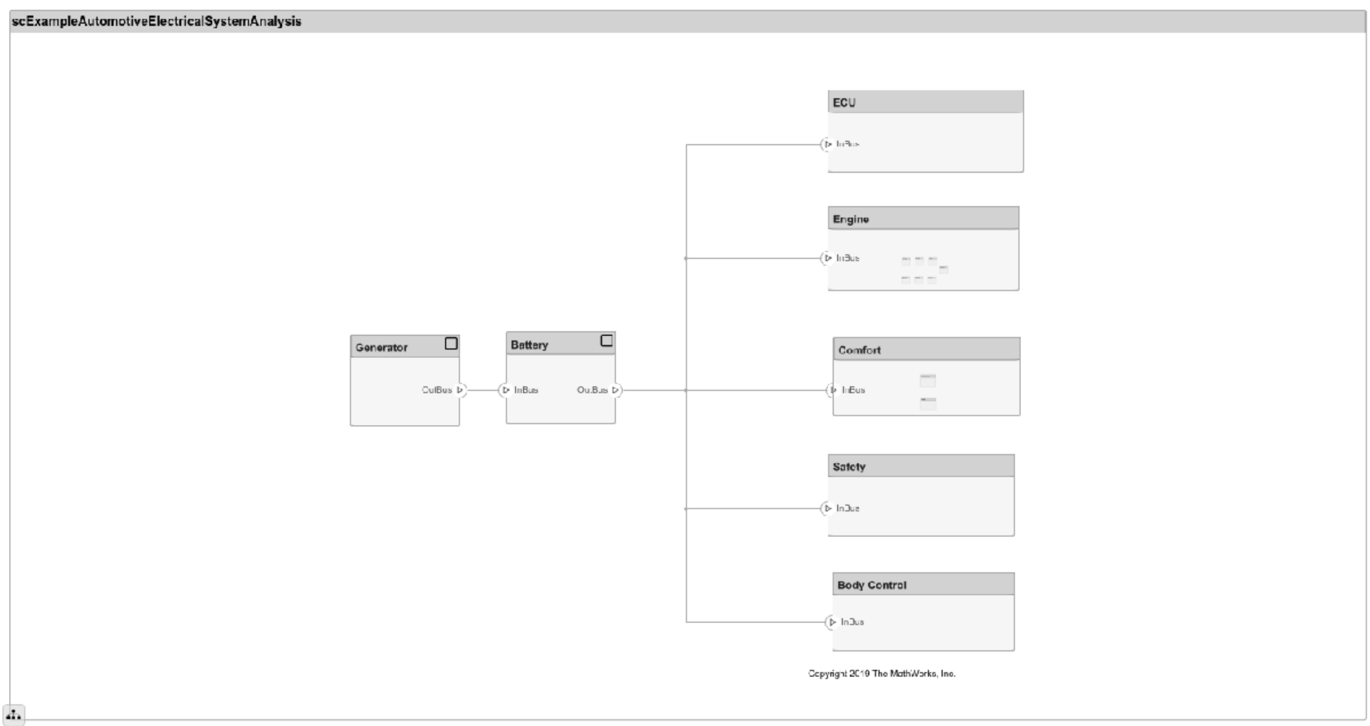
Run the analysis using the iterator.

```
archModel.iterate('Topdown',@computeLoad,objcomputeBatterySizing)
```

Display analysis results.

```
objcomputeBatterySizing.displayResults
```

```
Total KeyOffLoad: 158.708 mA
Number of days required for KeyOffLoad to discharge 30% of battery: 55.789.
Total CrankingInRush current: 70 A
Total Cranking current: 104 A
CCA of the specified battery is sufficient to start the car at 0 F.

ans =
  computeBatterySizing with properties:

    totalCrankingInrushCurrent: 70
          totalCrankingCurrent: 104
        totalAccesoriesCurrent: 71.6667
               totalKeyOffLoad: 158.7080
                    batteryCCA: 500
               batteryCapacity: 850
            puekertcoefficient: 1.2000
```



Close Model

```
bdclose('scExampleAutomotiveElectricalSystemAnalysis');
```

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`deleteInstance` | `update` | `refresh` | `save` | `instantiate` | `loadInstance` | `iterate` | `systemcomposer.analysis.PortInstance` | `systemcomposer.analysis.ArchitectureInstance` | `systemcomposer.analysis.ComponentInstance` | `systemcomposer.analysis.Instance`

Topics

"Write Analysis Function"

Introduced in R2019a

systemcomposer.analysis.Instance

Element in analysis instance

Description

An `Instance` object represents an instance of a System Composer model element.

Related objects include:

- `systemcomposer.analysis.ArchitectureInstance`
- `systemcomposer.analysis.ComponentInstance`
- `systemcomposer.analysis.PortInstance`
- `systemcomposer.analysis.ConnectorInstance`

Creation

Create an instance of an architecture using the `instantiate` function.

```
instance = instantiate(model.Architecture,'LatencyProfile','NewInstance', ...
'Function',@calculateLatency,'Arguments','3','Strict',true, ...
'NormalizeUnits',false,'Direction','PreOrder')
```

Properties

Name — Name of instance
character vector

Name of instance, specified as a character vector.

Example: `'NewInstance'`

Data Types: `char`

Object Functions

getValue	Get value of property from element instance
setValue	Set value of property for element instance
hasValue	Find if element instance has property value
isArchitecture	Find if instance is architecture instance
isComponent	Find if instance is component instance
isConnector	Find if instance is connector instance
isPort	Find if instance is port instance

Examples

Analyze Latency Characteristics

Create an instantiation for analysis for a system with latency in its wiring. The materials used are copper, fiber, and WiFi.

Create Latency Profile with Stereotypes and Properties

Create a System Composer profile with a base, connector, component, and port stereotype. Add properties with default values to each stereotype as needed for analysis.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfileC");
```

Add a base stereotype with properties.

```
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
```

Add a connector stereotype with properties.

```
connLatency = profile.addStereotype("ConnectorLatency",...
    Parent="LatencyProfileC.LatencyBase");
connLatency.addProperty("secure",Type="boolean",DefaultValue="true");
connLatency.addProperty("linkDistance",Type="double");
```

Add a component stereotype with properties.

```
nodeLatency = profile.addStereotype("NodeLatency",...
    Parent="LatencyProfileC.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");
```

Add a port stereotype with properties.

```
portLatency = profile.addStereotype("PortLatency",...
    Parent="LatencyProfileC.LatencyBase");
portLatency.addProperty("queueDepth",Type="double",DefaultValue="4.29");
portLatency.addProperty("dummy",Type="int32");
```

Instantiate Using Analysis Function

Create a new model and apply the profile. Create components, ports, and connections in the model. Apply stereotypes to the model elements. Finally, instantiate using the analysis function.

```
model = systemcomposer.createModel("archModel",true);
arch = model.Architecture;
```

Apply profile to model.

```
model.applyProfile("LatencyProfileC");
```

Create components, ports, and connections.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','out'});

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower','MotionCommand'}
componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

```
c_sensorData = connect(arch,componentSensor,componentPlanning);
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Clean up the canvas.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Batch apply stereotypes to model elements.

```
batchApplyStereotype(arch,"Component","LatencyProfileC.NodeLatency");
batchApplyStereotype(arch,"Port","LatencyProfileC.PortLatency");
batchApplyStereotype(arch,"Connector","LatencyProfileC.ConnectorLatency");
```

Instantiate using the analysis function.

```
instance = instantiate(model.Architecture,"LatencyProfileC","NewInstance",...
    Function=@calculateLatency,Arguments="3", ...
    Strict=true,NormalizeUnits=false,Direction="PreOrder")
```

```
instance = 
  ArchitectureInstance with properties:

        Specification: [1x1 systemcomposer.arch.Architecture]
             IsStrict: 1
       NormalizeUnits: 0
     AnalysisFunction: @calculateLatency
    AnalysisDirection: PreOrder
    AnalysisArguments: '3'
      ImmediateUpdate: 0
           Components: [1x3 systemcomposer.analysis.ComponentInstance]
                Ports: [0x0 systemcomposer.analysis.PortInstance]
           Connectors: [1x3 systemcomposer.analysis.ConnectorInstance]
                 Name: 'NewInstance'
```

Inspect Component, Port, and Connector Instances

Get properties from component, port, and connector instances.

```
defaultResources = instance.Components(1).getValue("LatencyProfileC.NodeLatency.resources")
```

```
defaultResources = 1
```

```
defaultSecure = instance.Connectors(1).getValue("LatencyProfileC.ConnectorLatency.secure")
```

```
defaultSecure = logical
   1
```

```
defaultQueueDepth = instance.Components(1).Ports(1).getValue("LatencyProfileC.PortLatency.queueDe
```

```
defaultQueueDepth = 4.2900
```

Battery Sizing and Automotive Electrical System Analysis

Overview

Model a typical automotive electrical system as an architectural model and run a primitive analysis. The elements in the model can be broadly grouped as either a source or a load. Various properties of the sources and loads are set as part of the stereotype. This example uses the `iterate` method of the specification API to iterate through each element of the model and run analysis using the stereotype properties.

Structure of Model

The generator charges the battery while the engine is running. The battery and the generator support the electrical loads in the vehicle, like ECU, radio, and body control. The inductive loads like motors and other coils have the `InRushCurrent` stereotype property defined. Based on the properties set on each component, the following analyses are performed:

- Total `KeyOffLoad`.
- Number of days required for `KeyOffLoad` to discharge 30% of the battery.
- Total `CrankingInRush` current.
- Total `Cranking` current.
- Ability of the battery to start the vehicle at 0°F based on the battery cold cranking amps (CCA). The discharge time is computed based on Puekert coefficient (k), which describes the relationship between the rate of discharge and the available capacity of the battery.

Load Model and Run Analysis

```
scExampleAutomotiveElectricalSystemAnalysis
archModel = systemcomposer.loadModel('scExampleAutomotiveElectricalSystemAnalysis');
```

Instantiate battery sizing class used by the analysis function to store analysis results.

```
objcomputeBatterySizing = computeBatterySizing;
```

Run the analysis using the iterator.

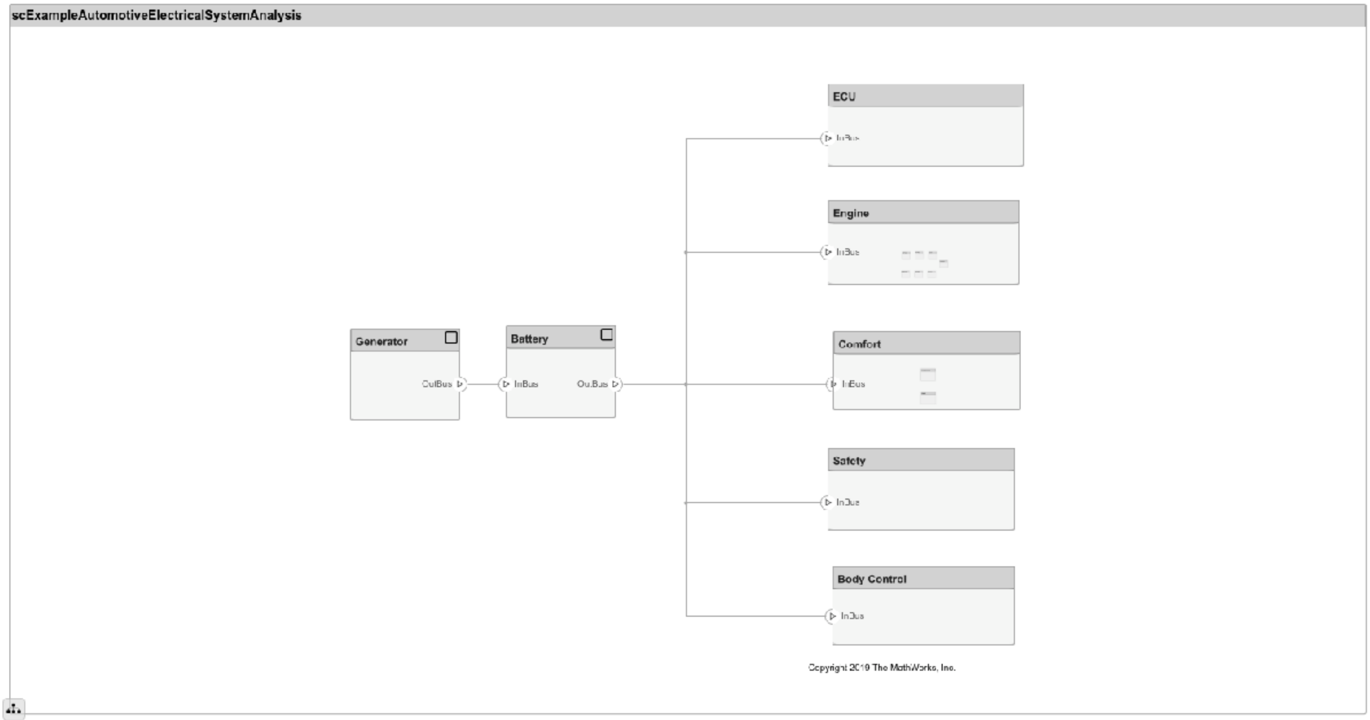
```
archModel.iterate('Topdown',@computeLoad,objcomputeBatterySizing)
```

Display analysis results.

```
objcomputeBatterySizing.displayResults
```

```
Total KeyOffLoad: 158.708 mA
Number of days required for KeyOffLoad to discharge 30% of battery: 55.789.
Total CrankingInRush current: 70 A
Total Cranking current: 104 A
CCA of the specified battery is sufficient to start the car at 0 F.

ans =
  computeBatterySizing with properties:

    totalCrankingInrushCurrent: 70
          totalCrankingCurrent: 104
        totalAccesoriesCurrent: 71.6667
               totalKeyOffLoad: 158.7080
                    batteryCCA: 500
```

```
    batteryCapacity: 850
puekertcoefficient: 1.2000
```



Close Model

```
bdclose('scExampleAutomotiveElectricalSystemAnalysis');
```

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• “Analyze Architecture Model with Analysis Function” • “Analyze Architecture”

Term	Definition	Application	More Information
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`deleteInstance` | `instantiate` | `loadInstance` | `save` | `update` | `refresh` | `iterate` | `systemcomposer.analysis.ArchitectureInstance` | `systemcomposer.analysis.ComponentInstance` | `systemcomposer.analysis.PortInstance` | `systemcomposer.analysis.ConnectorInstance`

Topics

"Write Analysis Function"

Introduced in R2019a

systemcomposer.analysis.PortInstance

Port in analysis instance

Description

A `PortInstance` object represents an instance of a port.

Creation

Create an instance of an architecture using the `instantiate` function.

```
instance = instantiate(model.Architecture,'LatencyProfile','NewInstance', ...
'Function',@calculateLatency,'Arguments','3','Strict',true, ...
'NormalizeUnits',false,'Direction','PreOrder')
```

Properties

Name — Name of instance
character vector

Name of instance, specified as a character vector.

Example: `'NewInstance'`

Data Types: `char`

Parent — Component that contains port
component instance object

Component that contains port, specified as a `systemcomposer.analysis.ComponentInstance` object.

Specification — Reference to port in design model
base port object

Reference to port in design model, specified as a `systemcomposer.arch.BasePort` object.

QualifiedName — Qualified name of port
character vector

Qualified name of port, specified as a character vector of the form `'<PathToComponent>:<PortDirection>'`.

Example: `'model/Component:In'`

Data Types: `char`

Incoming — Incoming connection
connector instance object

Incoming connection, specified as a `systemcomposer.analysis.ConnectorInstance` object.

`Outgoing` — Outgoing connection
connector instance object

Outgoing connection, specified as a `systemcomposer.analysis.ConnectorInstance` object.

Object Functions

getValue	Get value of property from element instance
setValue	Set value of property for element instance
hasValue	Find if element instance has property value
isArchitecture	Find if instance is architecture instance
isComponent	Find if instance is component instance
isConnector	Find if instance is connector instance
isPort	Find if instance is port instance

Examples

Analyze Latency Characteristics

Create an instantiation for analysis for a system with latency in its wiring. The materials used are copper, fiber, and WiFi.

Create Latency Profile with Stereotypes and Properties

Create a System Composer profile with a base, connector, component, and port stereotype. Add properties with default values to each stereotype as needed for analysis.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfileC");
```

Add a base stereotype with properties.

```
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
```

Add a connector stereotype with properties.

```
connLatency = profile.addStereotype("ConnectorLatency",...
    Parent="LatencyProfileC.LatencyBase");
connLatency.addProperty("secure",Type="boolean",DefaultValue="true");
connLatency.addProperty("linkDistance",Type="double");
```

Add a component stereotype with properties.

```
nodeLatency = profile.addStereotype("NodeLatency",...
    Parent="LatencyProfileC.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");
```

Add a port stereotype with properties.

```
portLatency = profile.addStereotype("PortLatency",...
    Parent="LatencyProfileC.LatencyBase");
portLatency.addProperty("queueDepth",Type="double",DefaultValue="4.29");
portLatency.addProperty("dummy",Type="int32");
```

Instantiate Using Analysis Function

Create a new model and apply the profile. Create components, ports, and connections in the model. Apply stereotypes to the model elements. Finally, instantiate using the analysis function.

```
model = systemcomposer.createModel("archModel",true);
arch = model.Architecture;
```

Apply profile to model.

```
model.applyProfile("LatencyProfileC");
```

Create components, ports, and connections.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','out'});

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower','MotionCommand'}
componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});

c_sensorData = connect(arch,componentSensor,componentPlanning);
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Clean up the canvas.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Batch apply stereotypes to model elements.

```
batchApplyStereotype(arch,"Component","LatencyProfileC.NodeLatency");
batchApplyStereotype(arch,"Port","LatencyProfileC.PortLatency");
batchApplyStereotype(arch,"Connector","LatencyProfileC.ConnectorLatency");
```

Instantiate using the analysis function.

```
instance = instantiate(model.Architecture,"LatencyProfileC","NewInstance",...
    Function=@calculateLatency,Arguments="3", ...
    Strict=true,NormalizeUnits=false,Direction="PreOrder")
```

```
instance = 
  ArchitectureInstance with properties:

        Specification: [1x1 systemcomposer.arch.Architecture]
             IsStrict: 1
       NormalizeUnits: 0
     AnalysisFunction: @calculateLatency
    AnalysisDirection: PreOrder
    AnalysisArguments: '3'
      ImmediateUpdate: 0
           Components: [1x3 systemcomposer.analysis.ComponentInstance]
                Ports: [0x0 systemcomposer.analysis.PortInstance]
           Connectors: [1x3 systemcomposer.analysis.ConnectorInstance]
                 Name: 'NewInstance'
```

Inspect Component, Port, and Connector Instances

Get properties from component, port, and connector instances.

```
defaultResources = instance.Components(1).getValue("LatencyProfileC.NodeLatency.resources")
```

```
defaultResources = 1
```

```
defaultSecure = instance.Connectors(1).getValue("LatencyProfileC.ConnectorLatency.secure")
```

```
defaultSecure = logical
   1
```

```
defaultQueueDepth = instance.Components(1).Ports(1).getValue("LatencyProfileC.PortLatency.queueDe
```

```
defaultQueueDepth = 4.2900
```

Battery Sizing and Automotive Electrical System Analysis

Overview

Model a typical automotive electrical system as an architectural model and run a primitive analysis. The elements in the model can be broadly grouped as either a source or a load. Various properties of the sources and loads are set as part of the stereotype. This example uses the `iterate` method of the specification API to iterate through each element of the model and run analysis using the stereotype properties.

Structure of Model

The generator charges the battery while the engine is running. The battery and the generator support the electrical loads in the vehicle, like ECU, radio, and body control. The inductive loads like motors and other coils have the `InRushCurrent` stereotype property defined. Based on the properties set on each component, the following analyses are performed:

- Total `KeyOffLoad`.
- Number of days required for `KeyOffLoad` to discharge 30% of the battery.
- Total `CrankingInRush` current.
- Total `Cranking` current.
- Ability of the battery to start the vehicle at 0°F based on the battery cold cranking amps (CCA). The discharge time is computed based on Puekert coefficient (k), which describes the relationship between the rate of discharge and the available capacity of the battery.

Load Model and Run Analysis

```
scExampleAutomotiveElectricalSystemAnalysis
archModel = systemcomposer.loadModel('scExampleAutomotiveElectricalSystemAnalysis');
```

Instantiate battery sizing class used by the analysis function to store analysis results.

```
objcomputeBatterySizing = computeBatterySizing;
```

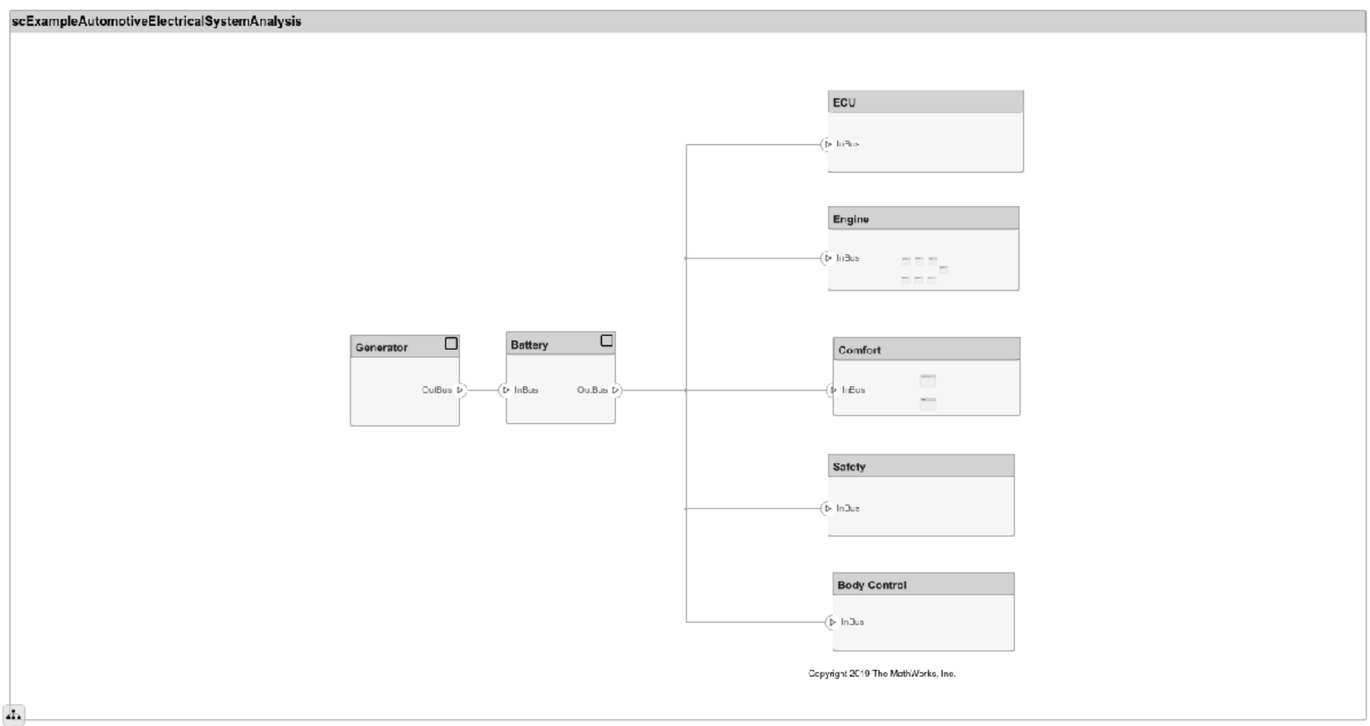
Run the analysis using the iterator.

```
archModel.iterate('Topdown',@computeLoad,objcomputeBatterySizing)
```

Display analysis results.

```
objcomputeBatterySizing.displayResults
```

```
Total KeyOffLoad: 158.708 mA
Number of days required for KeyOffLoad to discharge 30% of battery: 55.789.
Total CrankingInRush current: 70 A
Total Cranking current: 104 A
CCA of the specified battery is sufficient to start the car at 0 F.

ans = 
  computeBatterySizing with properties:

    totalCrankingInrushCurrent: 70
          totalCrankingCurrent: 104
        totalAccesoriesCurrent: 71.6667
               totalKeyOffLoad: 158.7080
                    batteryCCA: 500
               batteryCapacity: 850
             puekertcoefficient: 1.2000
```



Close Model

```
bdclose('scExampleAutomotiveElectricalSystemAnalysis');
```

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

See Also

`deleteInstance` | `update` | `refresh` | `save` | `instantiate` | `loadInstance` | `iterate` | `systemcomposer.analysis.ConnectorInstance` | `systemcomposer.analysis.ComponentInstance` | `systemcomposer.analysis.ArchitectureInstance` | `systemcomposer.analysis.Instance`

Topics

“Write Analysis Function”

Introduced in R2019a

systemcomposer.arch.Architecture

Architecture in model

Description

The `Architecture` object represents the architecture in a System Composer model. This class is derived from `systemcomposer.arch.Element`.

Creation

Create a model using the `systemcomposer.createModel` function and get the root architecture using the `Architecture` property on the `systemcomposer.arch.Model` object.

```
model = systemcomposer.createModel('archModel');
arch = get(model,'Architecture')
```

Properties

Name — Name of architecture
character vector

Name of architecture, specified as a character vector. The architecture name is derived from the parent component or model name to which the architecture belongs.

Example: `'archModel'`

Data Types: `char`

`Definition` — Definition type of architecture
`ArchitectureDefinition` enumeration

Definition type of architecture, specified as `composition`, `behavior`, or `view`.

Data Types: `enum`

`Parent` — Parent component
component object

Parent component that owns architecture, specified as a `systemcomposer.arch.Component` object.

`Components` — Child components
array of component objects

Child components of architecture, specified as an array of `systemcomposer.arch.Component` objects.

`Ports` — Architecture ports
array of architecture port objects

Architecture ports, specified as an array of `systemcomposer.arch.ArchitecturePort` objects.

`Connectors` — Connectors that connect child components of architecture
array of connector objects

Connectors that connect child components of architecture, specified as an array of `systemcomposer.arch.Connector` or `systemcomposer.arch.PhysicalConnector` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for architecture, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the architecture and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of architecture, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of architecture, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox™ APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of architecture, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

addComponent	Add components to architecture
addVariantComponent	Add variant components to architecture
addPort	Add ports to architecture
addFunction	Add functions to architecture of software component

connect	Create architecture model connections
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
batchApplyStereotype	Apply stereotype to all elements in architecture
iterate	Iterate over model elements
instantiate	Create analysis instance from specification
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
removeProfile	Remove profile from model
applyProfile	Apply profile to model
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
getParameterDefinition	Get instance-specific parameter definition
getEvaluatedParameterValue	Get evaluated value of parameter from element
getParameterNames	Get parameter names on element
getParameterValue	Get value of parameter
setParameterValue	Set value of parameter
setUnit	Set units on parameter value
resetParameterToDefault	Reset parameter on component to default value

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
```

```
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

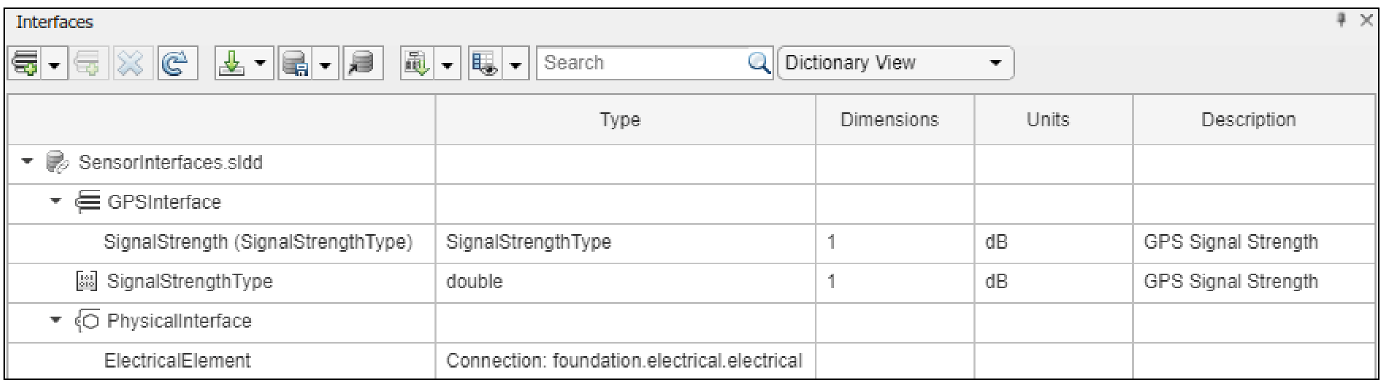
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



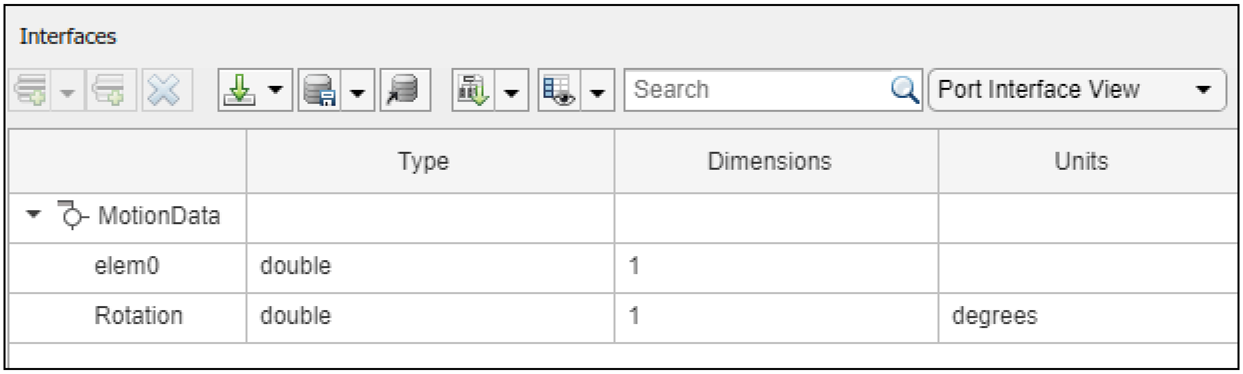
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

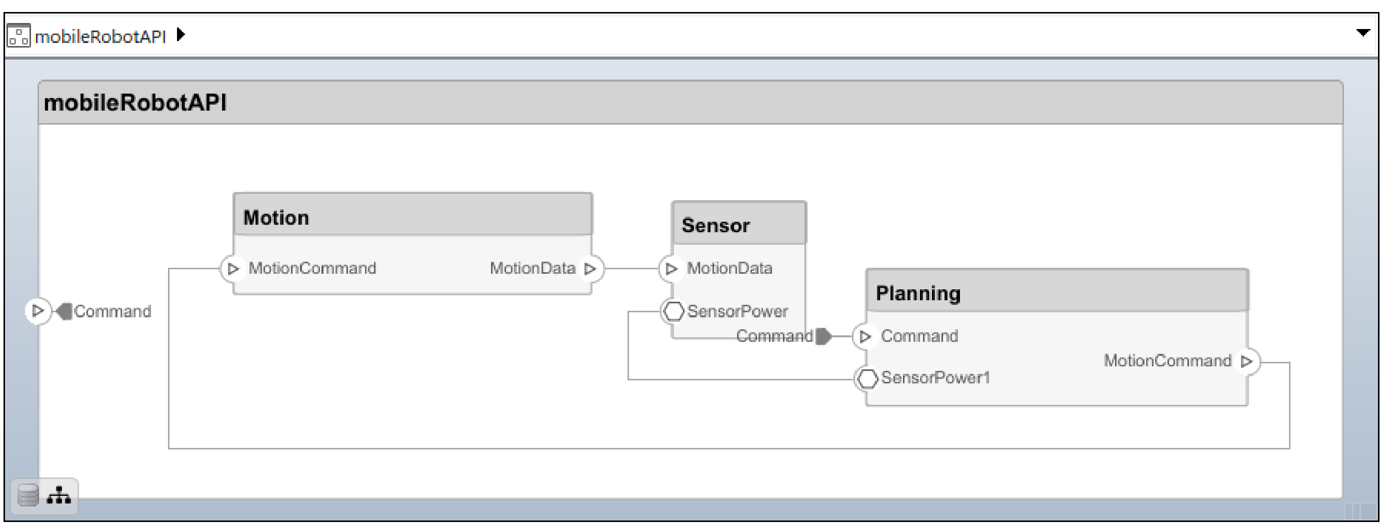
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

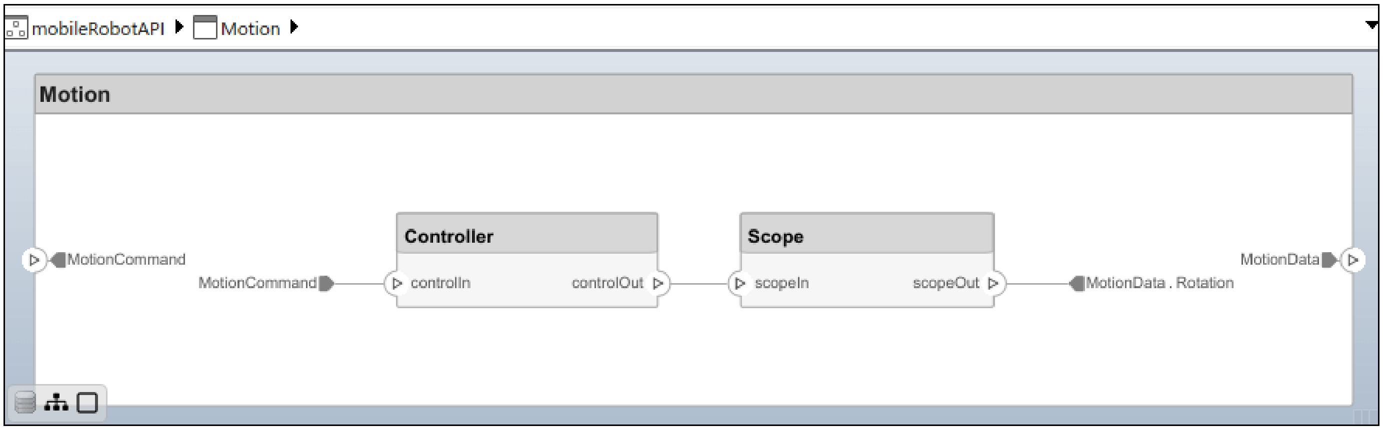
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named `MotionAlt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on `MotionAlt`.

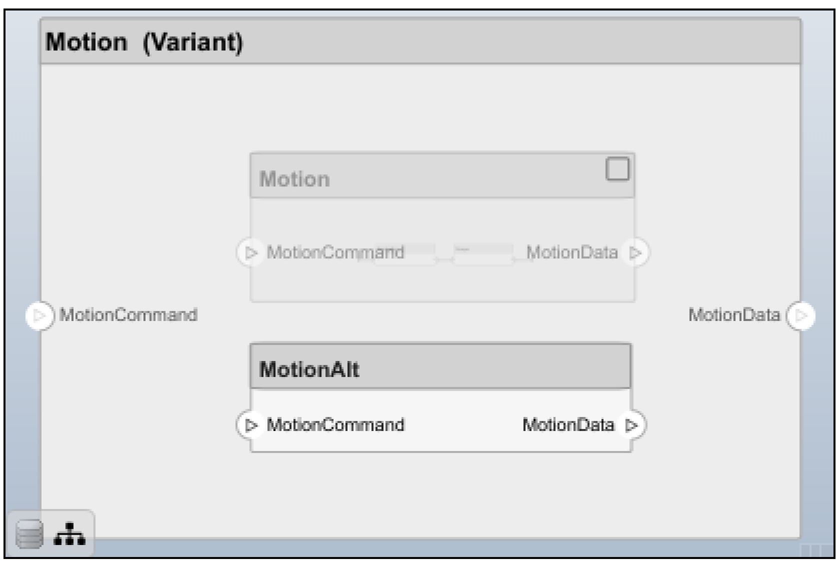
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make `MotionAlt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`systemcomposer.arch.Component` | `systemcomposer.arch.Element` | Component

Topics

"Create Architecture Model"

Introduced in R2019a

systemcomposer.arch.ArchitecturePort

Architecture port

Description

An `ArchitecturePort` object represents the input, output, and physical ports of a System Composer architecture. This class inherits from `systemcomposer.arch.BasePort`. This class is derived from `systemcomposer.arch.Element`.

Creation

Create an architecture port using the `addPort` function.

```
port = addPort(architecture,'in')
```

Properties

`Name` — Name of port
character vector

Name of port, specified as a character vector.

Example: `'newPort'`

Data Types: `char`

`Direction` — Port direction
`'Input'` | `'Output'` | `'Physical'`

Port direction, specified as a character vector.

Data Types: `char`

`InterfaceName` — Name of interface associated with port
character vector

Name of interface associated with port, specified as a character vector.

Data Types: `char`

`Interface` — Interface associated with port
data interface object | value type object

Interface associated with port, specified as a `systemcomposer.interface.DataInterface` or `systemcomposer.ValueType` object.

`Connectors` — Port connectors
array of connector objects

Port connectors, specified as an array of `systemcomposer.arch.Connector` or `systemcomposer.arch.PhysicalConnector` objects.

`Connected` — Whether port has connections
`true` or 1 | `false` or 0

Whether port has connections, specified as a logical.

Data Types: `logical`

`Parent` — Architecture that owns port
architecture object

Architecture that owns port, specified as a `systemcomposer.arch.Architecture` object.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for architecture port, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the architecture port and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of architecture port, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of architecture port, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of architecture port, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

connect	Create architecture model connections
setName	Set name for port
setInterface	Set interface for port
createInterface	Create and set owned interface for port
makeOwnedInterfaceShared	Convert owned interface to shared interface
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
getQualifiedName	Get model element qualified name
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

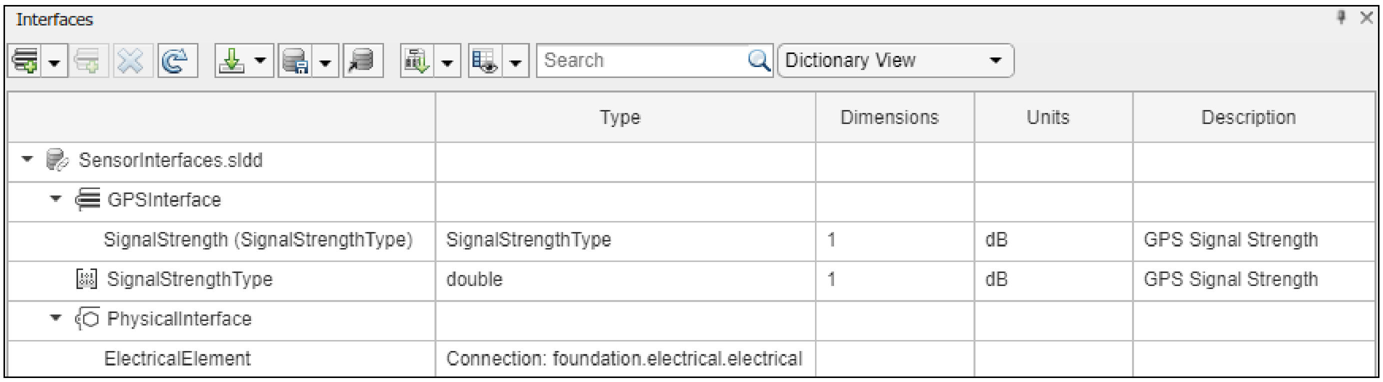
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



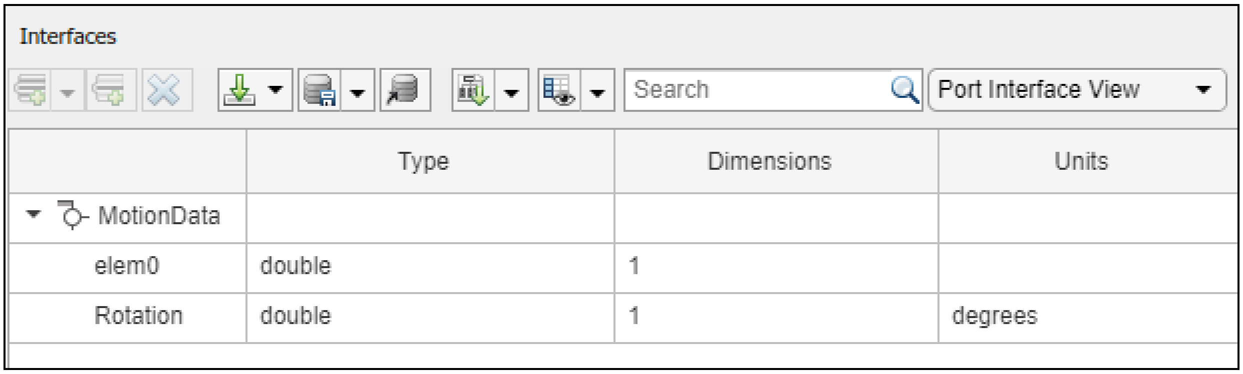
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

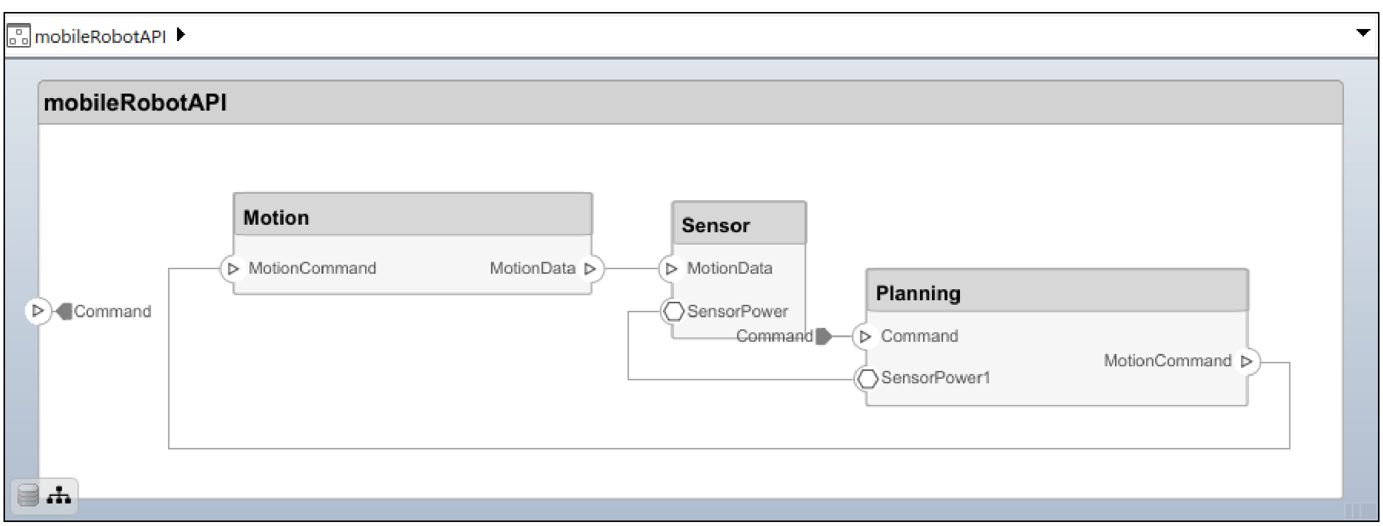
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

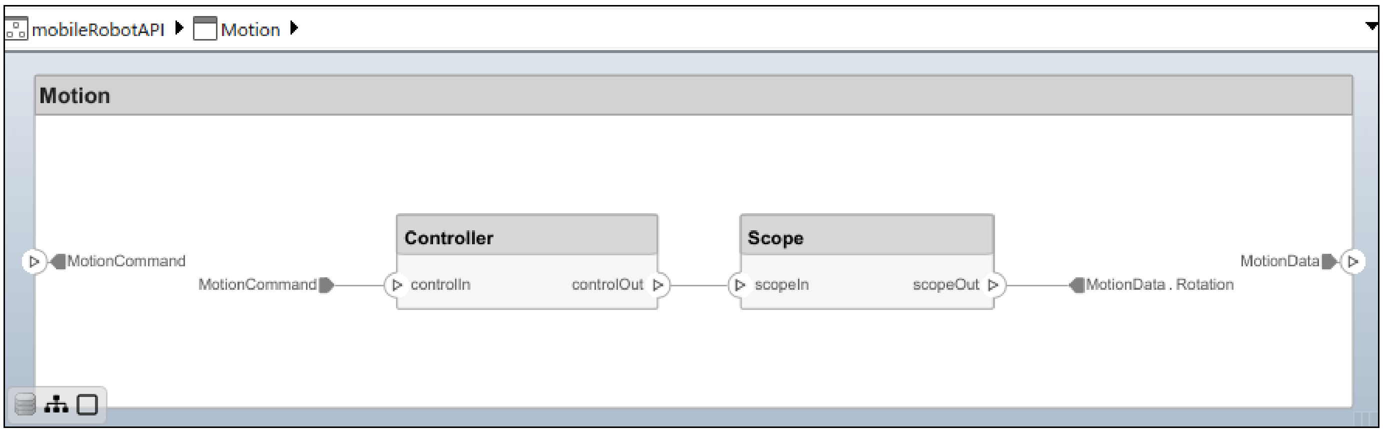
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save
```

```
linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named `MotionAlt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on `MotionAlt`.

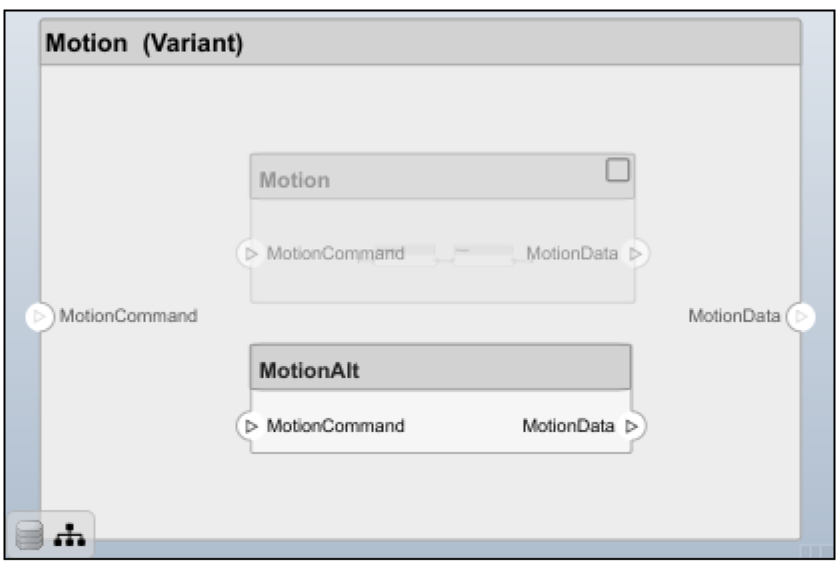
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make `MotionAlt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`systemcomposer.arch.Element` | `systemcomposer.arch.ComponentPort` | `systemcomposer.arch.BasePort` | `addPort` | Component

Topics

"Create Architecture Model"

Introduced in R2019a

systemcomposer.arch.BaseComponent

All components in architecture model

Description

A `BaseComponent` object cannot be constructed. Either create a `systemcomposer.arch.Component` or `systemcomposer.arch.VariantComponent` object. The `systemcomposer.arch.BaseComponent` class is derived from `systemcomposer.arch.Element`.

Properties

`Name` — Name of component
character vector

Name of component, specified as a character vector.

Example: `'newComponent'`

Data Types: `char`

`Architecture` — Architecture that defines component structure
architecture object

Architecture that defines component structure, specified as a `systemcomposer.arch.Architecture` object. For a component that references a different architecture model, this property returns a handle to the root architecture of that model. For variant components, the architecture is that of the active variant.

`Parent` — Architecture that owns component
architecture object

Architecture that owns component, specified as a `systemcomposer.arch.Architecture` object.

`Ports` — Input and output ports of component
component port object

Input and output ports of component, specified as a `systemcomposer.arch.ComponentPort` object.

`OwnedArchitecture` — Architecture owned by component
architecture object

Architecture owned by component, specified as a `systemcomposer.arch.Architecture` object.

`OwnedPorts` — Component ports
array of component port objects

Component ports, specified as an array of `systemcomposer.arch.ComponentPort` objects. For reference components, this property is empty.

`Position` — Position of component on canvas
vector of coordinates in pixels

Position of component on canvas, specified as a vector of coordinates in pixels: `[left top right bottom]`.

Data Types: `double`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for model component, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the model component and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of component, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of component, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of component, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

getProperty	Get property value corresponding to stereotype applied to element
setProperty	Set property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element

applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
isProtected	Find if component reference model is protected
isReference	Find if component is referenced to another model
connect	Create architecture model connections
getPort	Get port from component
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
getEvaluatedParameterValue	Get evaluated value of parameter from element
getParameterNames	Get parameter names on element
getParameterValue	Get value of parameter
setParameterValue	Set value of parameter
setUnit	Set units on parameter value
resetParameterToDefault	Reset parameter on component to default value
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stren
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

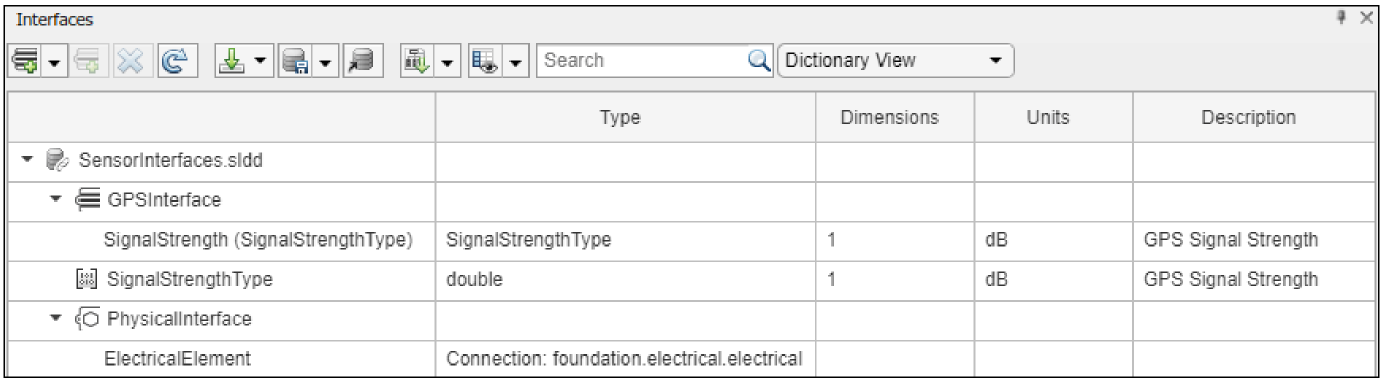
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



	Type	Dimensions	Units	Description
SensorInterfaces.sldd				
GPSInterface				
SignalStrength (SignalStrengthType)	SignalStrengthType	1	dB	GPS Signal Strength
SignalStrengthType	double	1	dB	GPS Signal Strength
PhysicalInterface				
ElectricalElement	Connection: foundation.electrical.electrical			

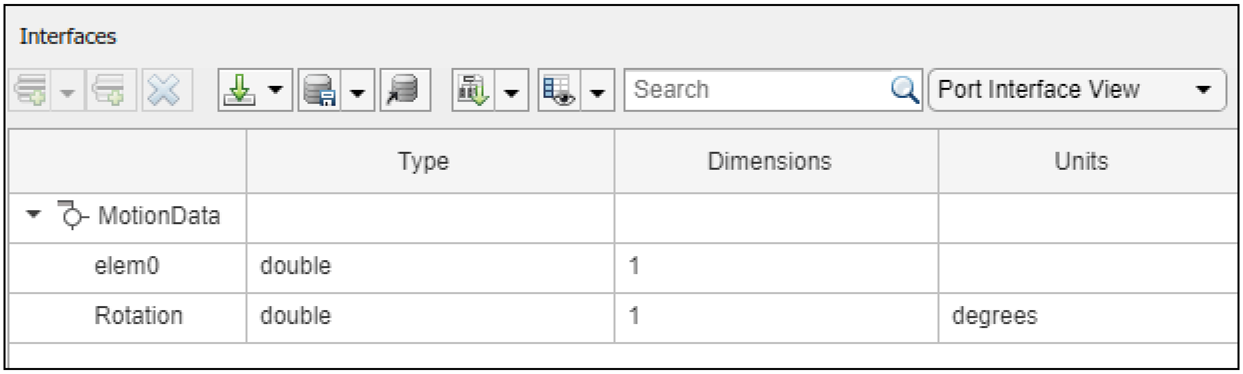
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

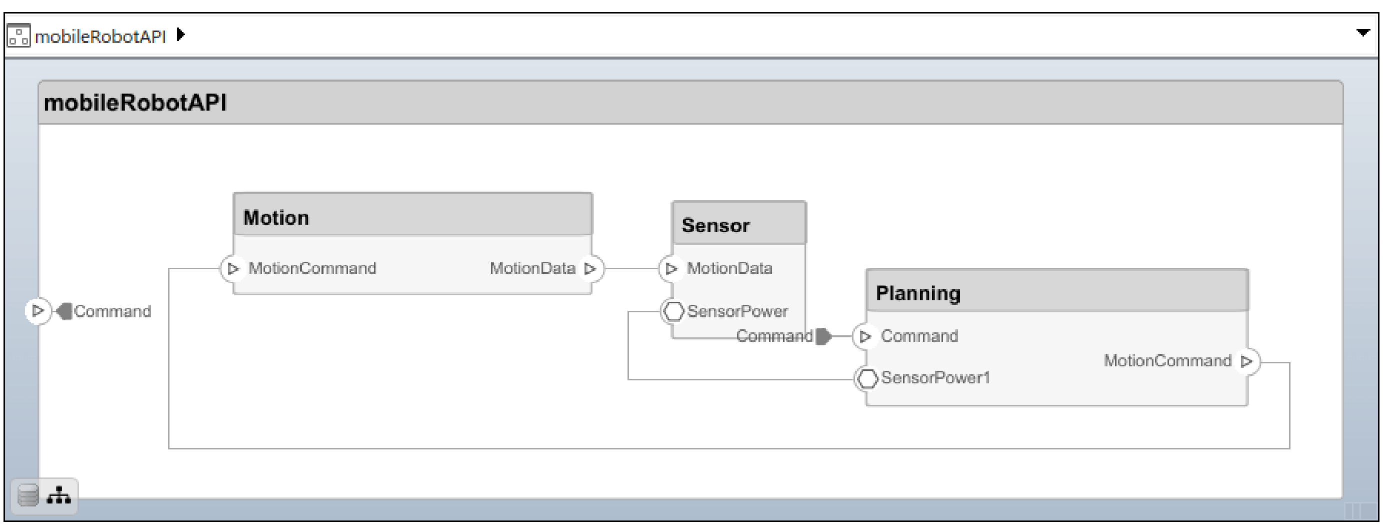
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

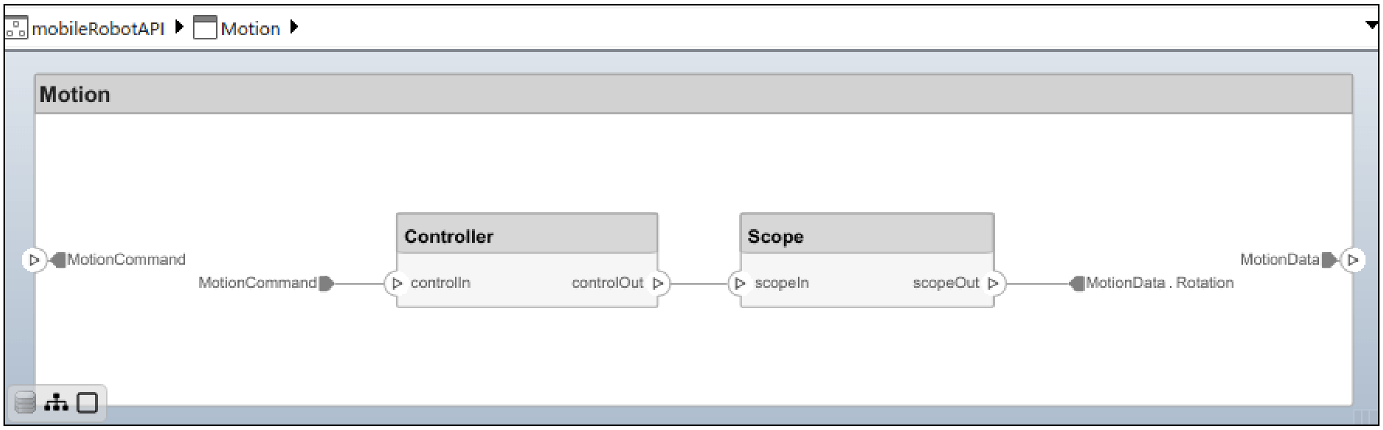
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save
```

```
linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named `MotionAlt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on `MotionAlt`.

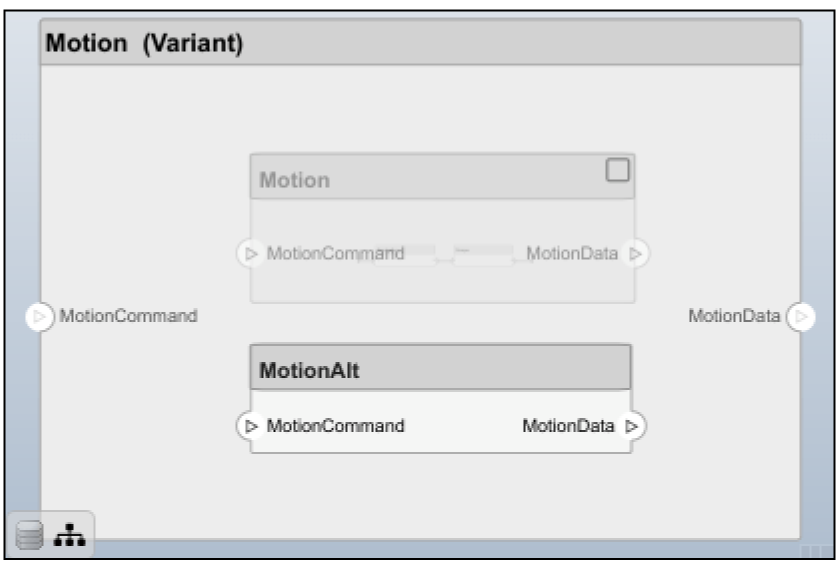
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make `MotionAlt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

Component | `systemcomposer.arch.Element` | `systemcomposer.arch.VariantComponent` | `systemcomposer.arch.Component`

Topics

"Create Architecture Model"

Introduced in R2019b

systemcomposer.arch.BaseConnector

All connectors in architecture model

Description

A `BaseConnector` object cannot be constructed. Create either a `systemcomposer.arch.Connector` or a `systemcomposer.arch.PhysicalConnector` object. The `systemcomposer.arch.BaseConnector` class is derived from `systemcomposer.arch.Element`.

Properties

`Name` — Name of connector
character vector

Name of connector, specified as a character vector.

Example: `'newConnector'`

Data Types: `char`

`Parent` — Architecture that owns connector
architecture object

Architecture that owns connector, specified as a `systemcomposer.arch.Architecture` object.

`Ports` — Ports of connection
array of port objects

Ports of connection, specified as an array of `systemcomposer.arch.ArchitecturePort` or `systemcomposer.arch.ComponentPort` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for model connector, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the model connector and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of connector, specified as a `systemcomposer.arch.Model` object.

SimulinkHandle — Simulink handle
numeric value

Simulink handle of connector, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

SimulinkModelHandle — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of connector, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
getProperty	Get property value corresponding to stereotype applied to element
setProperty	Set property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
getDestinationElement	Gets data elements selected on destination port for connection
getSourceElement	Gets data elements selected on source port for connection
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

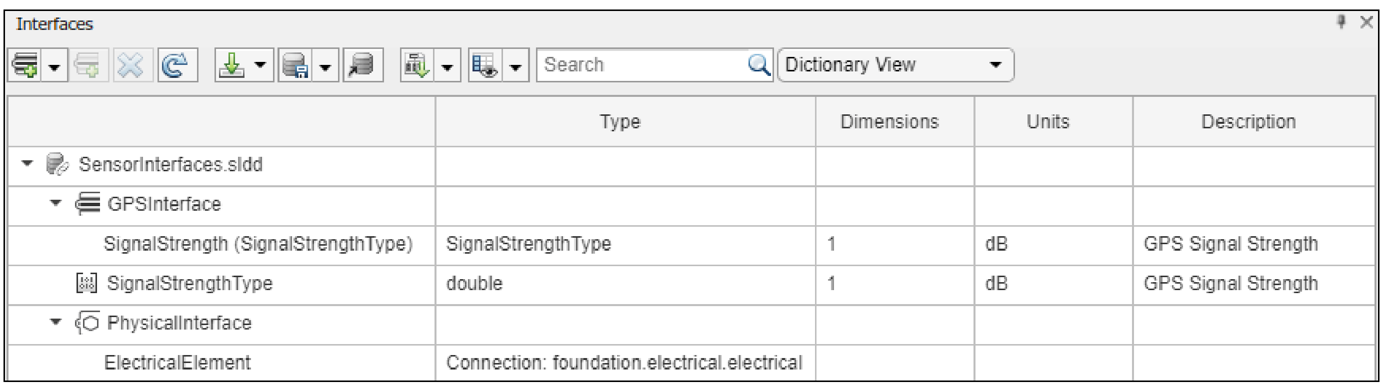
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



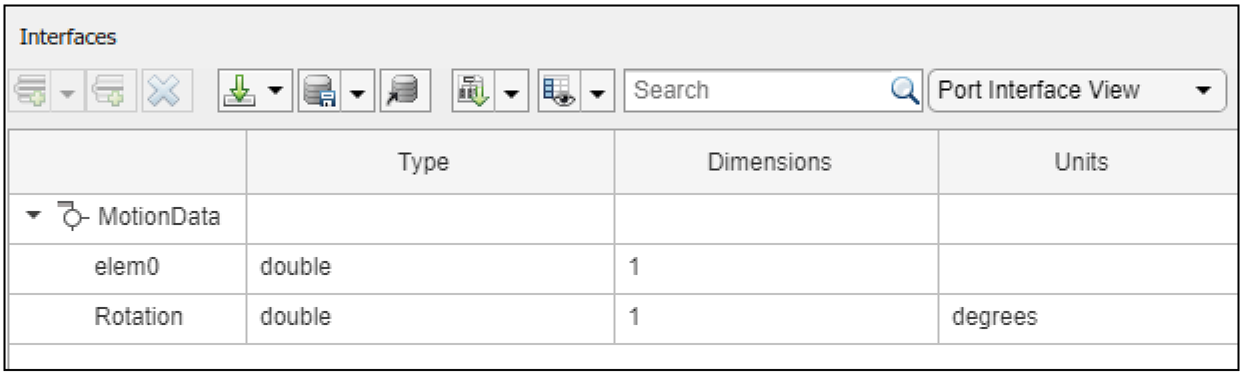
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

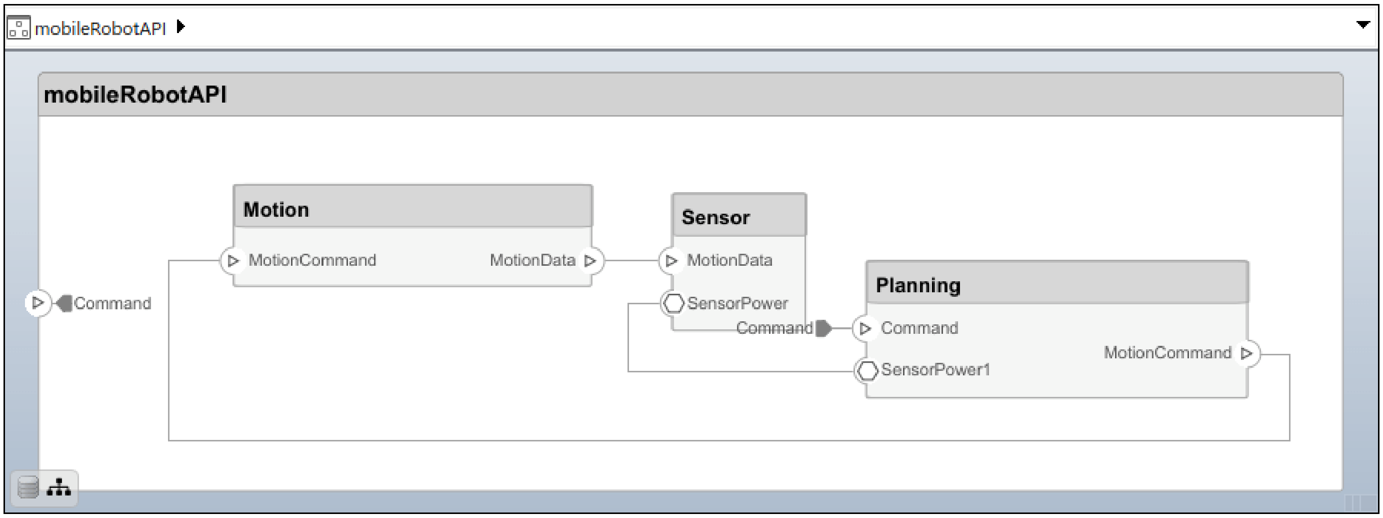
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
```

```
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype.

Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

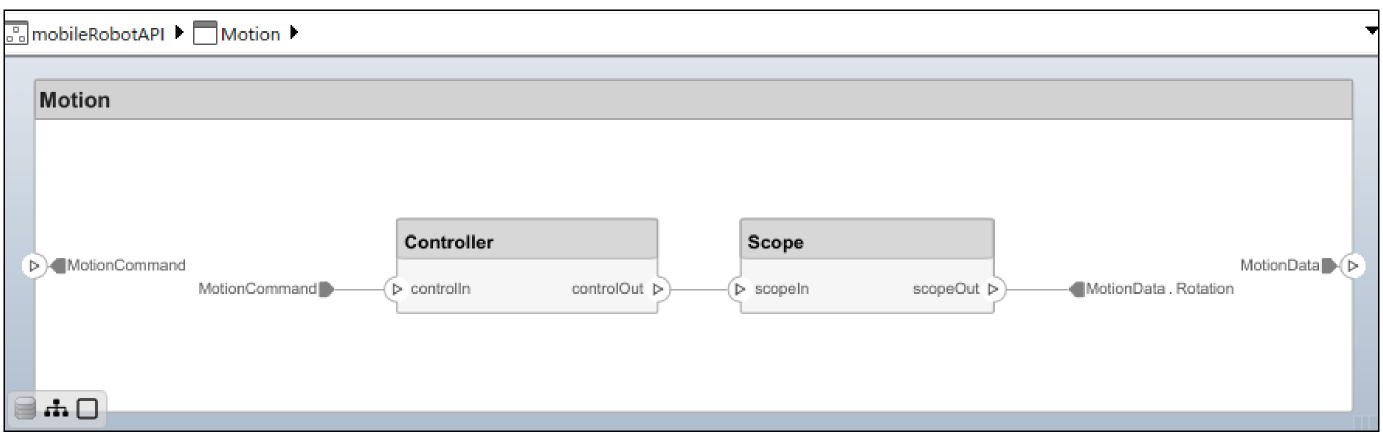
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



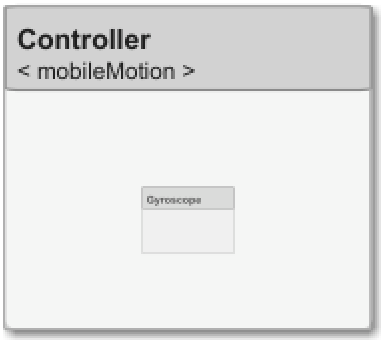
Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
```

```
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```



Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named Motion`Alt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on Motion`Alt`.

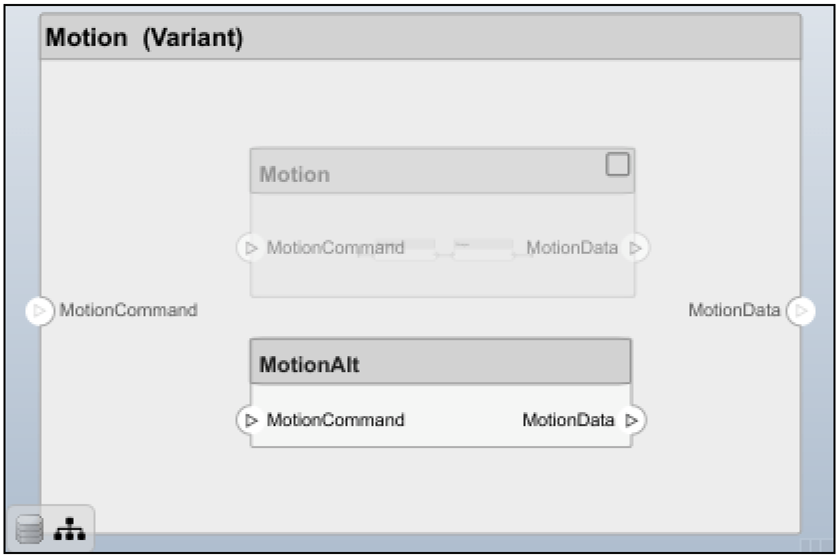
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make Motion`Alt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	“Specify Physical Interfaces on Ports”
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	“Describe Component Behavior Using Simscape”

See Also

`systemcomposer.arch.Element` | `systemcomposer.arch.Connector` | `systemcomposer.arch.PhysicalConnector` | Component

Topics

“Create Architecture Model”
“Describe Component Behavior Using Simscape”

Introduced in R2021b

systemcomposer.arch.BasePort

All ports in architecture model

Description

A `BasePort` object cannot be constructed. Create either a `systemcomposer.arch.ArchitecturePort` or a `systemcomposer.arch.ComponentPort` object. The `systemcomposer.arch.BasePort` class is derived from `systemcomposer.arch.Element`.

Properties

`Name` — Name of port
character vector

Name of port, specified as a character vector.

Example: `'newPort'`

Data Types: `char`

`Direction` — Port direction
`'Input'` | `'Output'` | `'Physical'`

Port direction, specified as a character vector.

Data Types: `char`

`Parent` — Architecture that owns port
architecture object

Architecture that owns port, specified as a `systemcomposer.arch.Architecture` object.

`InterfaceName` — Name of interface associated with port
character vector

Name of interface associated with port, specified as a character vector.

Data Types: `char`

`Interface` — Interface associated with port
data interface object | value type object

Interface associated with port, specified as a `systemcomposer.interface.DataInterface` or `systemcomposer.ValueType` object.

`Connectors` — Port connectors
array of connector objects

Port connectors, specified as an array of `systemcomposer.arch.Connector` or `systemcomposer.arch.PhysicalConnector` objects.

`Connected` — Whether port has connections
`true` or 1 | `false` or 0

Whether port has connections, specified as a logical.

Data Types: `logical`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for model port, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the model port and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of port, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of port, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of port, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

getProperty	Get property value corresponding to stereotype applied to element
setProperty	Set property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model

removeStereotype	Remove stereotype from model element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

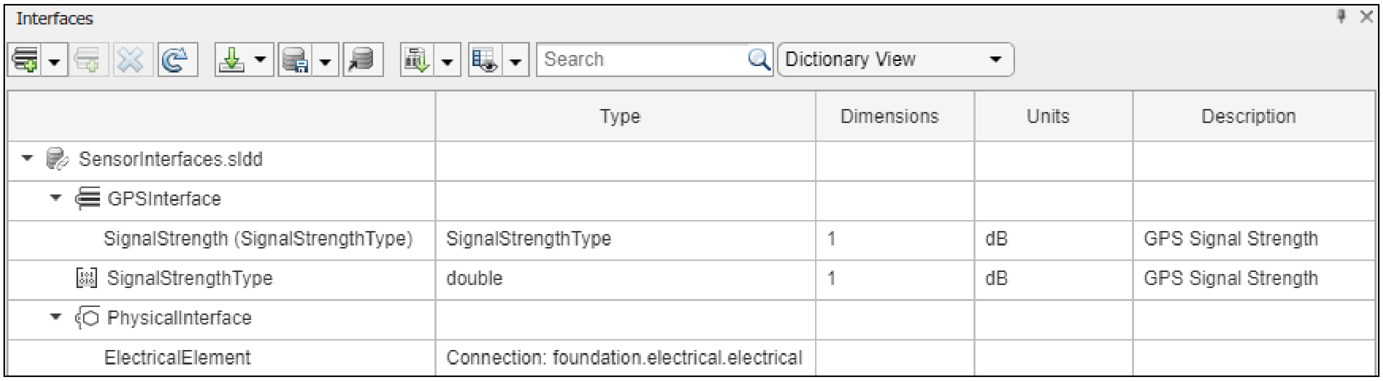
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



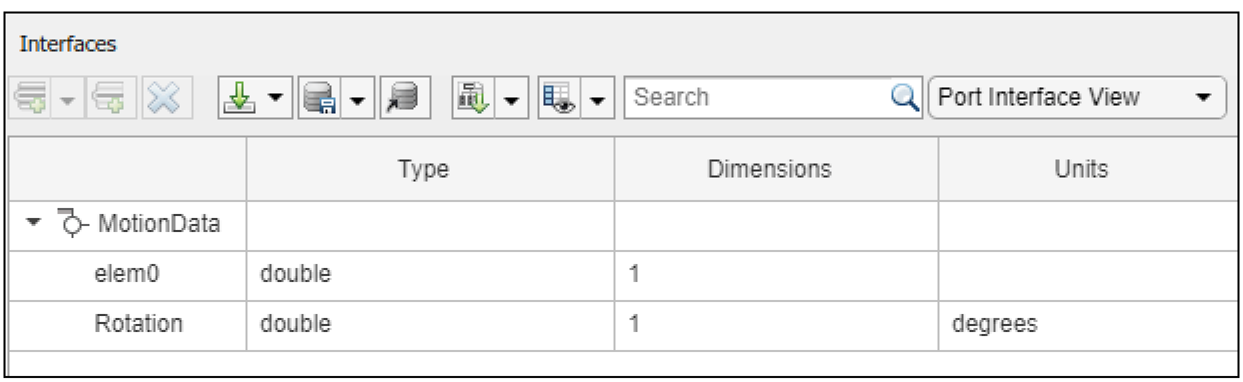
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

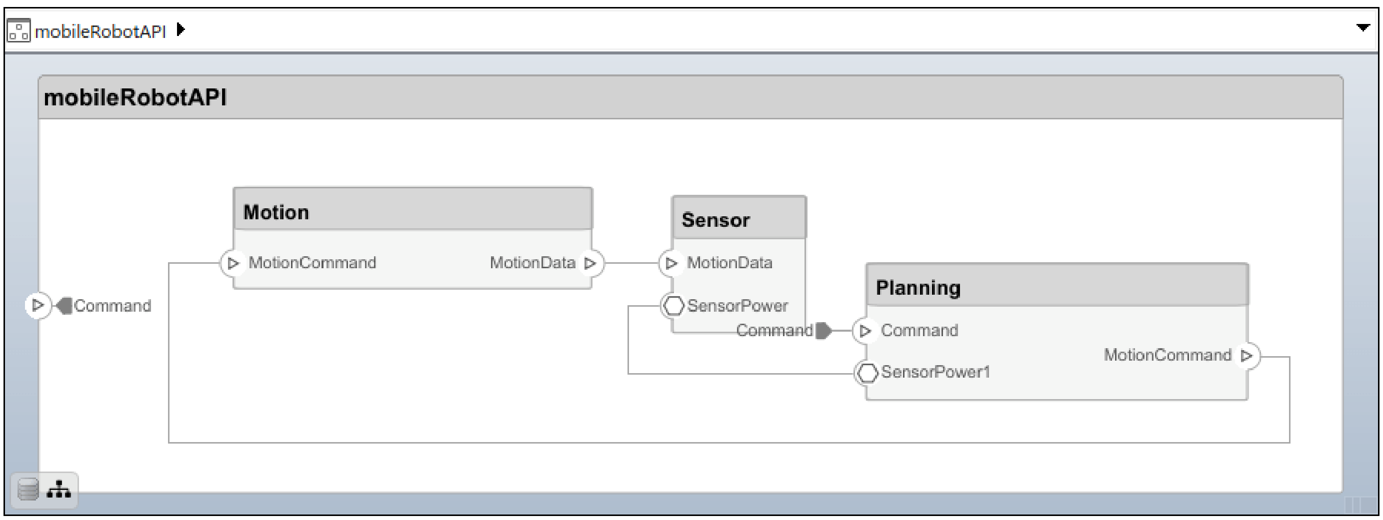
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



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Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
```

```
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

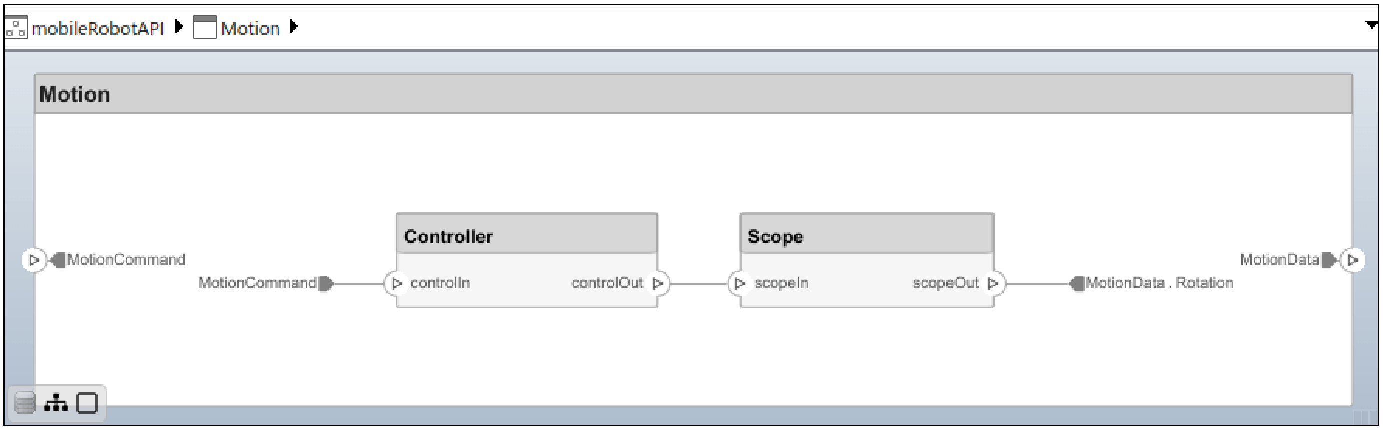
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active

choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

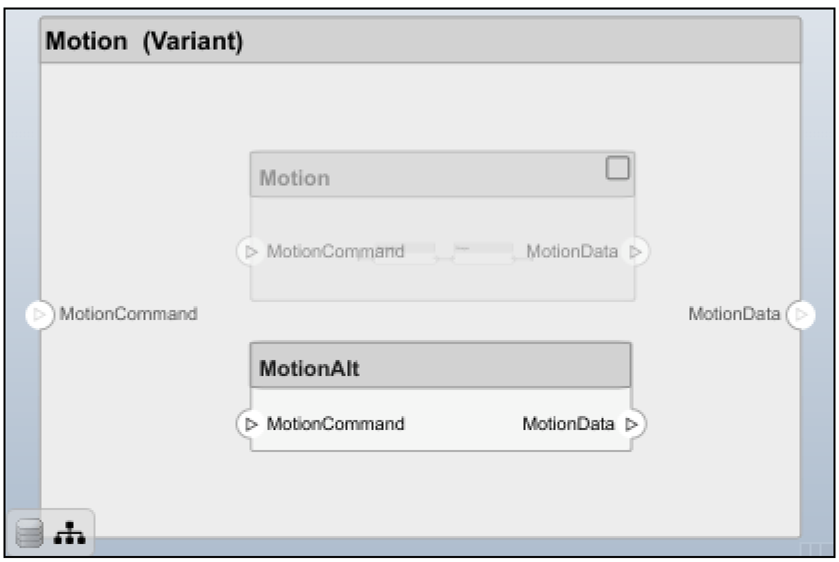
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`systemcomposer.arch.Element` | `systemcomposer.arch.ComponentPort` | `systemcomposer.arch.ArchitecturePort` | Component

Topics

"Create Architecture Model"

Introduced in R2019a

systemcomposer.arch.Component

System Composer component

Description

A `Component` object represents a component in a System Composer model. This class inherits from `systemcomposer.arch.BaseComponent`. This class is derived from `systemcomposer.arch.Element`.

Creation

Create a component in an architecture model using the `addComponent` function.

```
model = systemcomposer.createModel('archModel');
arch = get(model,'Architecture');
component = addComponent(arch,'newComponent');
```

Properties

Name — Name of component
character vector

Name of component, specified as a character vector.

Example: `'newComponent'`

Data Types: `char`

`Parent` — Architecture that owns component
architecture object

Architecture that owns component, specified as a `systemcomposer.arch.Architecture` object.

`Architecture` — Architecture that defines component structure
architecture object

Architecture that defines component structure, specified as a `systemcomposer.arch.Architecture` object. For a component that references a different architecture model, this property returns a handle to the root architecture of that model. For variant components, the architecture is that of the active variant.

`OwnedArchitecture` — Architecture that component owns
architecture object

Architecture that component owns, specified as a `systemcomposer.arch.Architecture` object. For components that reference an architecture, this property is empty. For variant components, this property is the architecture in which the individual variant components reside.

`Ports` — Array of component ports
array of component port objects

Array of component ports, specified as an array of `systemcomposer.arch.ComponentPort` objects.

`OwnedPorts` — Array of component ports
array of component port objects

Array of component ports, specified as an array of `systemcomposer.arch.ComponentPort` objects. For reference components, this property is empty.

`Position` — Position of component on canvas
vector of coordinates in pixels

Position of component on canvas, specified as a vector of coordinates, in pixels `[left top right bottom]`.

`ReferenceName` — Name of model that component references
character vector

Name of model that component references if linked component, specified as a character vector.

Data Types: `char`

`IsAdapterComponent` — Whether component is adapter block
`true` or 1 | `false` or 0

Whether component is adapter block, specified as a logical 1 (`true`) or 0 (`false`).

Data Types: `logical`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for model component, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the model component and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of component, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of component, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of component, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

createArchitectureModel	Create architecture model from component
createSimulinkBehavior	Create Simulink behavior and link to component
createStateflowChartBehavior	Add Stateflow chart behavior to component
linkToModel	Link component to model
inlineComponent	Remove reference architecture or behavior from component
makeVariant	Convert component to variant choice
isProtected	Find if component reference model is protected
isReference	Find if component is referenced to another model
connect	Create architecture model connections
getPort	Get port from component
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
getQualifiedName	Get model element qualified name
getEvaluatedParameterValue	Get evaluated value of parameter from element
getParameterNames	Get parameter names on element
getParameterValue	Get value of parameter
setParameterValue	Set value of parameter
setUnit	Set units on parameter value
resetParameterToDefault	Reset parameter on component to default value
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

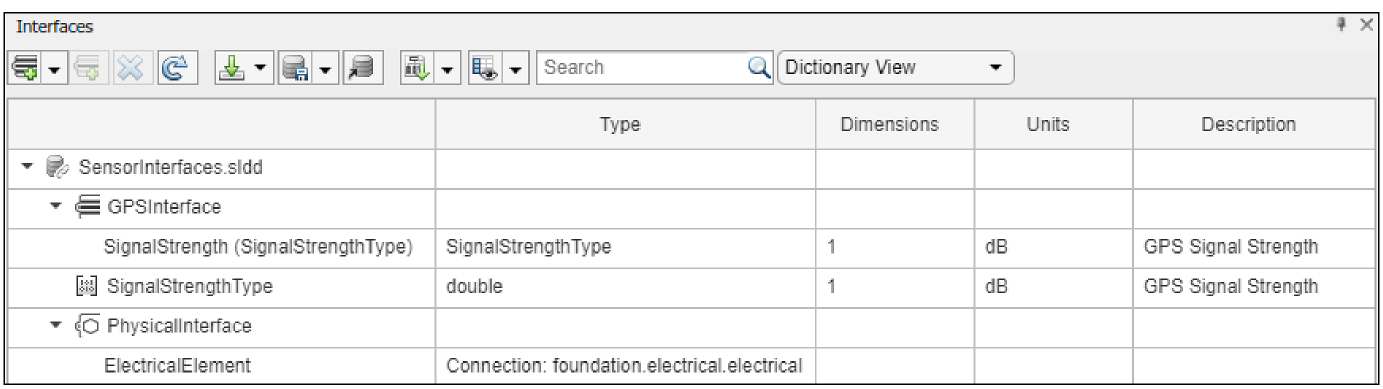
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

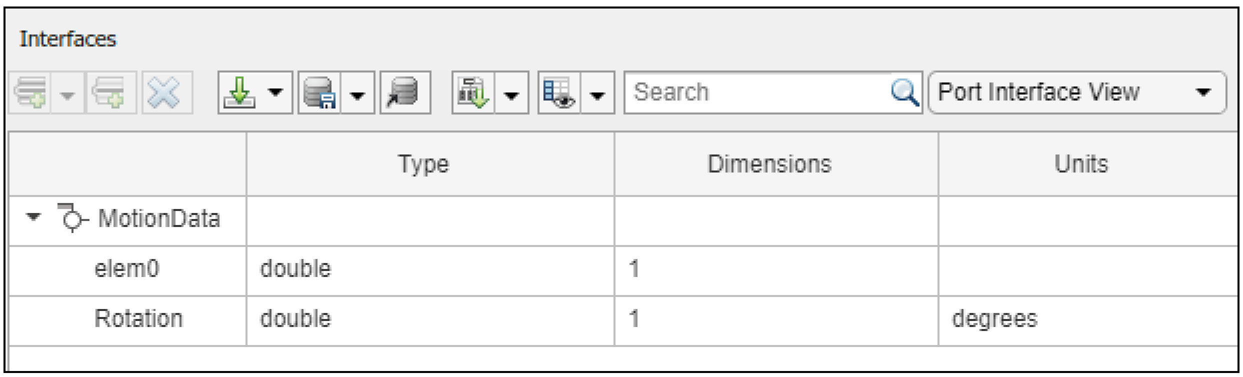
```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
```

```
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

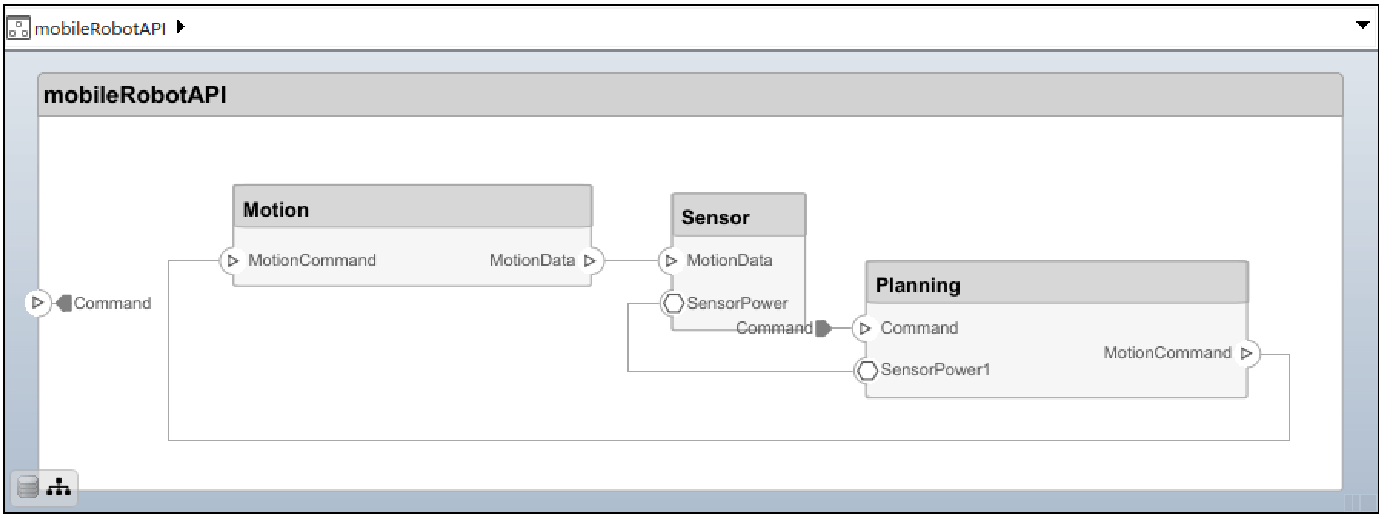
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
```

```
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype.

Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

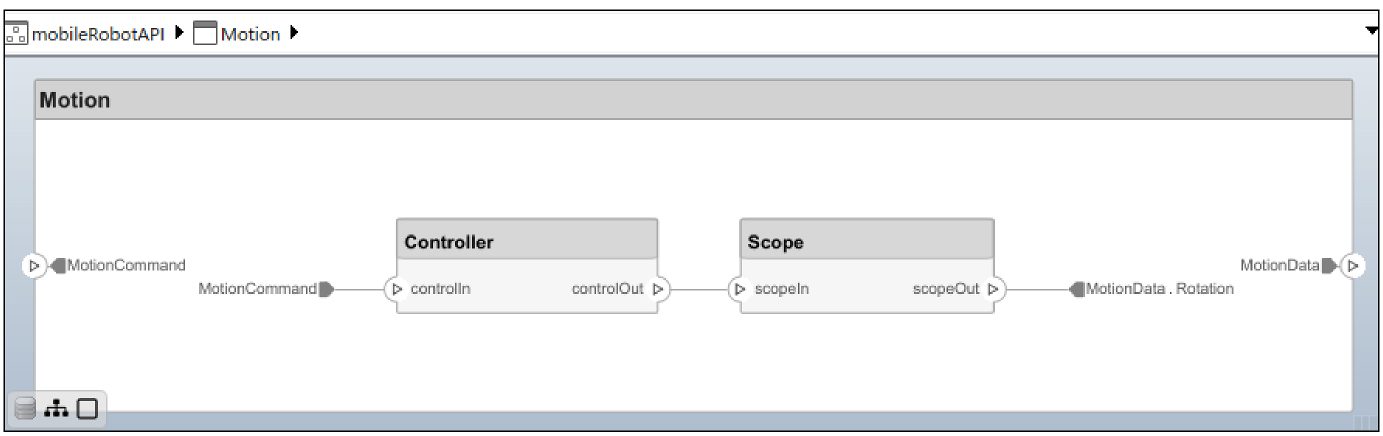
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



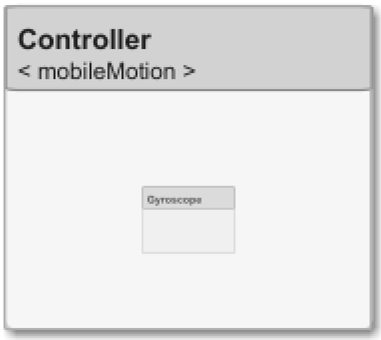
Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
```

```
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```



Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named Motion`Alt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on Motion`Alt`.

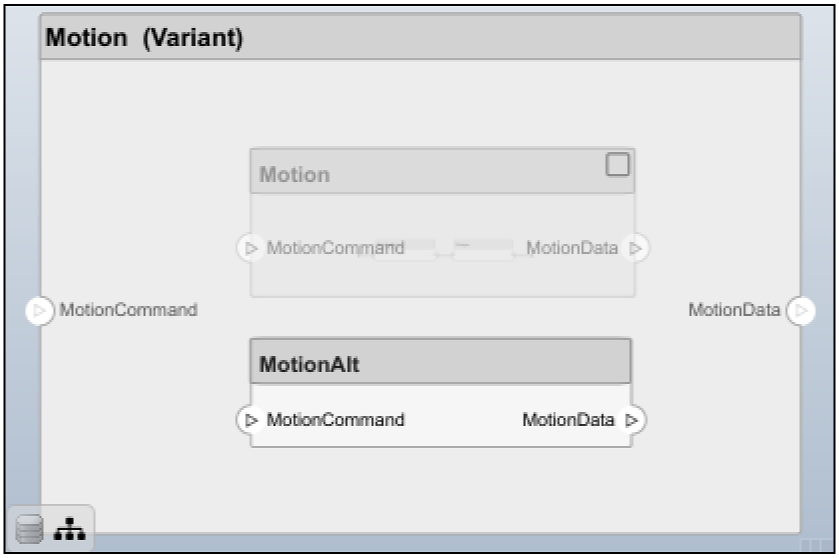
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make Motion`Alt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`systemcomposer.arch.Architecture` | `systemcomposer.arch.Element` | `createModel` | `addComponent` | Component

Topics

"Create Architecture Model"

Introduced in R2019a

systemcomposer.arch.ComponentPort

Component port

Description

A `ComponentPort` object represents the input, output, and physical ports of a System Composer component. This class inherits from `systemcomposer.arch.BasePort`. This class is derived from `systemcomposer.arch.Element`.

Creation

A component port is constructed by creating an architecture port on the architecture of the component using the `addPort` function, then getting the component port using the `getPort` function.

```
addPort(compObj.Architecture,'portName','in');
compPortObj = getPort(compObj,'portName');
```

Properties

Name — Name of port
character vector

Name of port, specified as a character vector.

Example: `'portName'`

Data Types: `char`

`Direction` — Port direction
`'Input'` | `'Output'` | `'Physical'`

Port direction, specified as a character vector.

Data Types: `char`

`InterfaceName` — Name of interface
character vector

Name of interface associated with port, specified as a character vector.

Data Types: `char`

`Interface` — Interface associated with port
data interface object | value type object

Interface associated with port, specified as a `systemcomposer.interface.DataInterface` or `systemcomposer.ValueType` object.

`Connectors` — Port connectors
array of connector objects

Port connectors, specified as an array of `systemcomposer.arch.Connector` or `systemcomposer.arch.PhysicalConnector` objects.

`Connected` — Whether port has connections
`true` or 1 | `false` or 0

Whether port has connections, specified as a logical.

Data Types: `logical`

`Parent` — Component that owns port
architecture object

Component that owns port, specified as a `systemcomposer.arch.Architecture` object.

`ArchitecturePort` — Architecture port
architecture port object

Architecture port within the component that maps to port, specified as a `systemcomposer.arch.ArchitecturePort` object.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for model component port, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the model component port and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of port, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of port, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of port, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

setName	Set name for port
setInterface	Set interface for port
createInterface	Create and set owned interface for port
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
connect	Create architecture model connections
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
getQualifiedName	Get model element qualified name

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
```

```
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

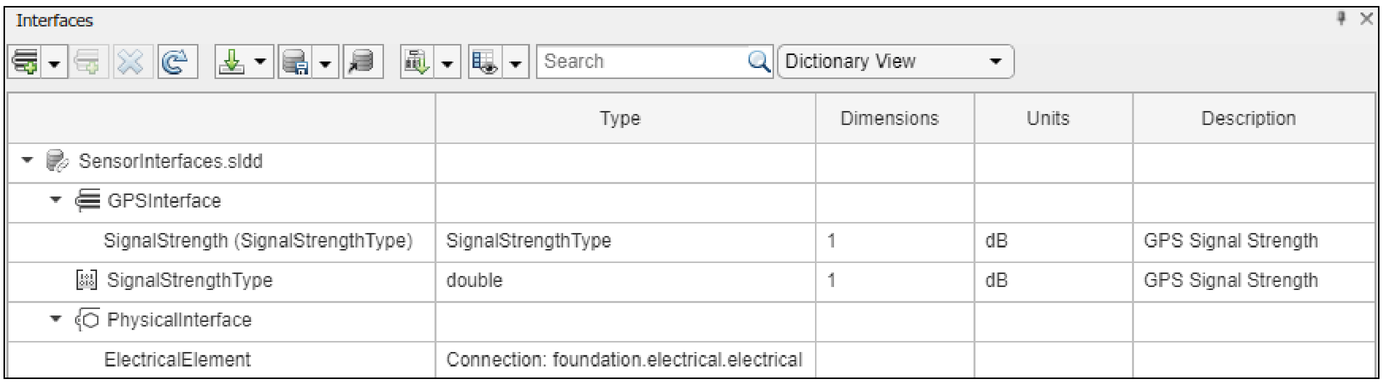
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



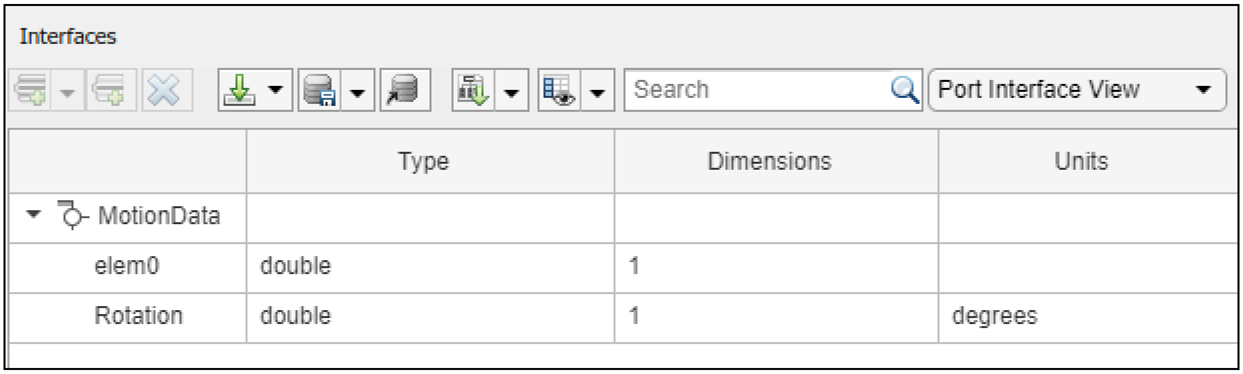
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

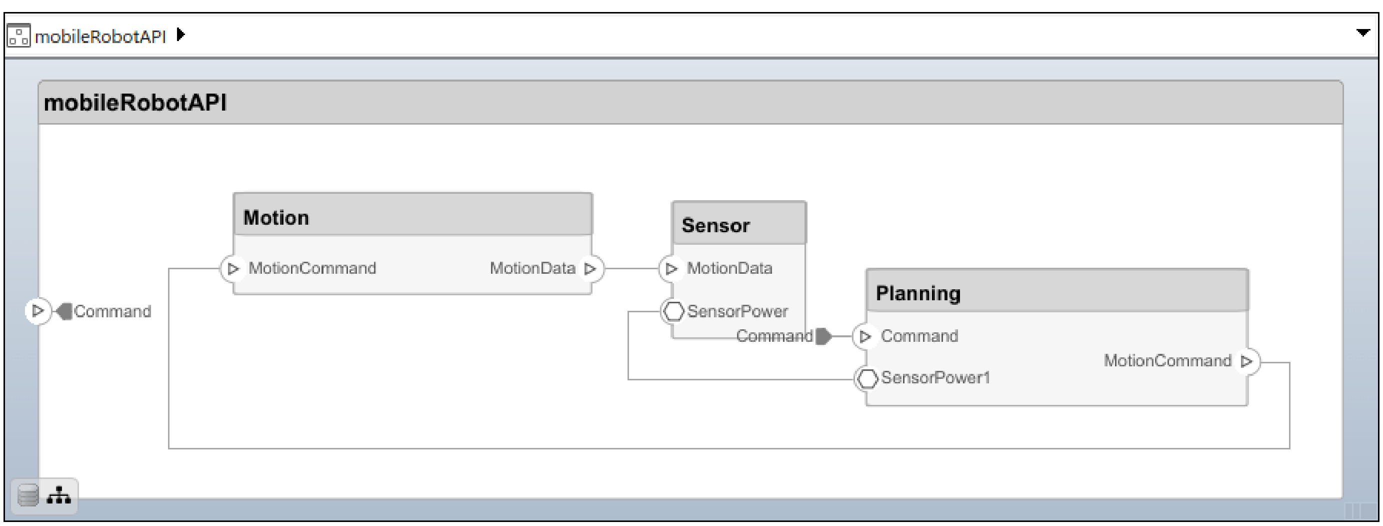
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

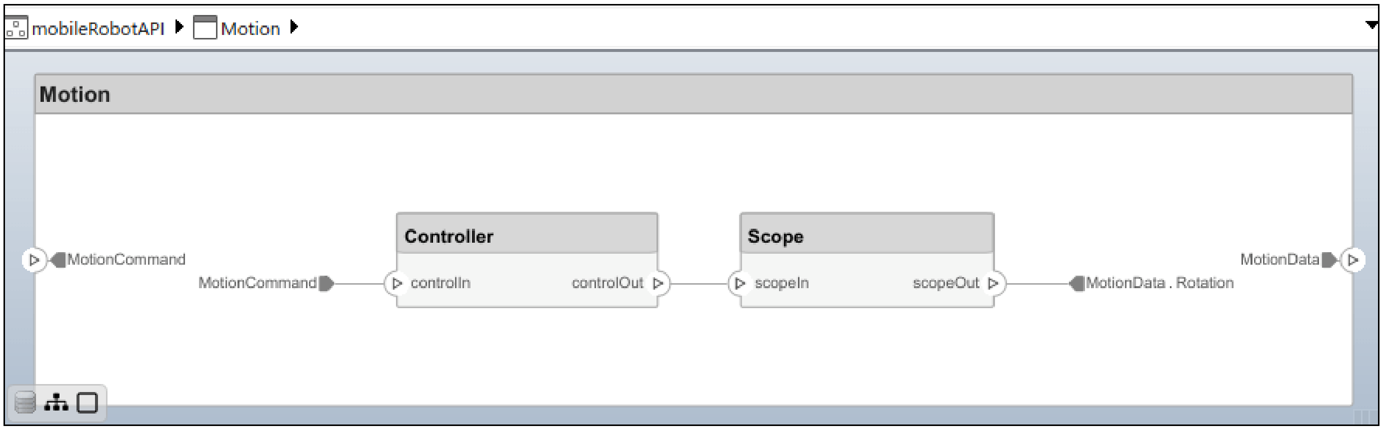
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named `MotionAlt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on `MotionAlt`.

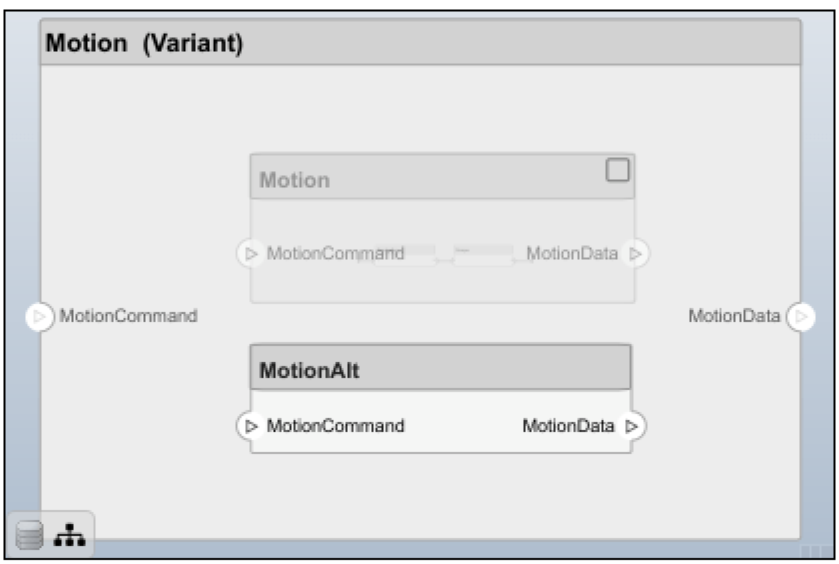
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make `MotionAlt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`systemcomposer.arch.ArchitecturePort` | `systemcomposer.arch.BasePort` | `systemcomposer.arch.Element` | `getPort` | `addPort` | Component

Topics

"Create Architecture Model"

Introduced in R2019a

systemcomposer.arch.Connector

Connector between ports

Description

A `Connector` object represents a connector between ports for a System Composer model. This class inherits from `systemcomposer.arch.BaseConnector`. This class is derived from `systemcomposer.arch.Element`.

Creation

Create connectors using the `connect` function.

```
conns = connect(architecture,outPorts,inPorts)
```

Properties

`Parent` — Parent architecture that owns connector
architecture object

Parent architecture that owns connector, specified as a `systemcomposer.arch.Architecture` object.

`Name` — Name of connector
character vector

Name of connector, specified as a character vector.

Data Types: `char`

`SourcePort` — Source of connection
architecture port object | component port object

Source of connection as output port, specified as a `systemcomposer.arch.ArchitecturePort` or `systemcomposer.arch.ComponentPort` object.

`DestinationPort` — Destination of connection
architecture port object | component port object

Destination of connection as input port, specified as a `systemcomposer.arch.ArchitecturePort` or `systemcomposer.arch.ComponentPort` object.

`Ports` — Ports of connection
array of port objects

Ports of connection, specified as an array of `systemcomposer.arch.ArchitecturePort` or `systemcomposer.arch.ComponentPort` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for model connector, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the model connector and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of connector, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of connector, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of connector, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
getSourceElement	Gets data elements selected on source port for connection
getDestinationElement	Gets data elements selected on destination port for connection
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
getQualifiedName	Get model element qualified name
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

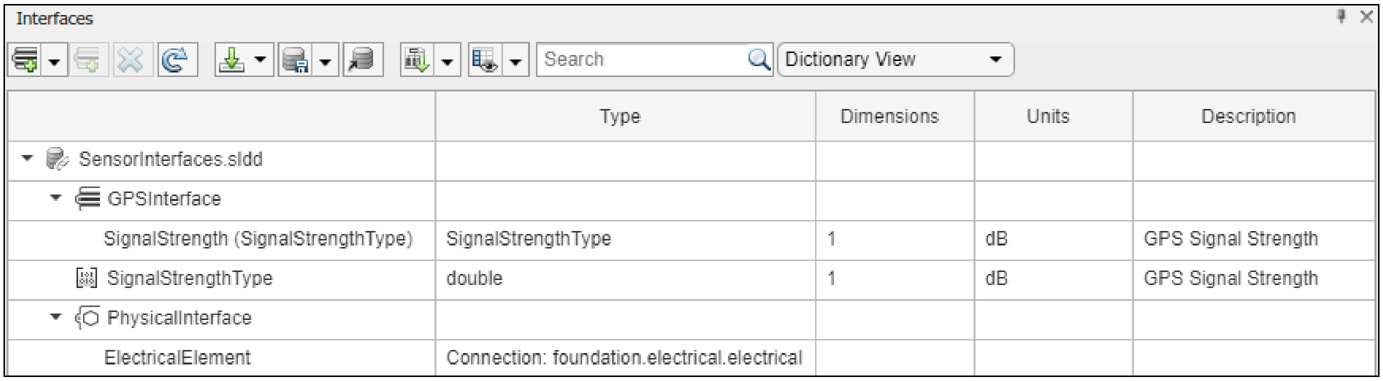
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



	Type	Dimensions	Units	Description
SensorInterfaces.sldd				
GPSInterface				
SignalStrength (SignalStrengthType)	SignalStrengthType	1	dB	GPS Signal Strength
SignalStrengthType	double	1	dB	GPS Signal Strength
PhysicalInterface				
ElectricalElement	Connection: foundation.electrical.electrical			

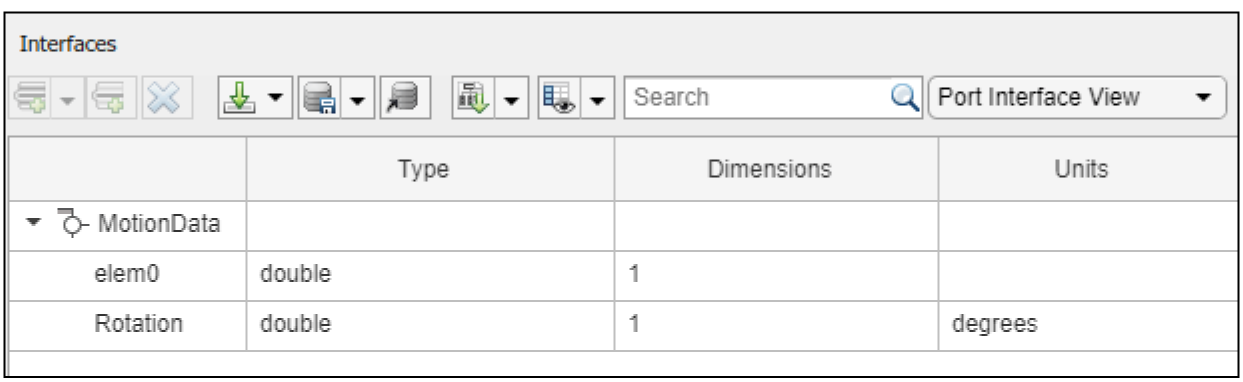
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



	Type	Dimensions	Units
MotionData			
elem0	double	1	
Rotation	double	1	degrees

Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

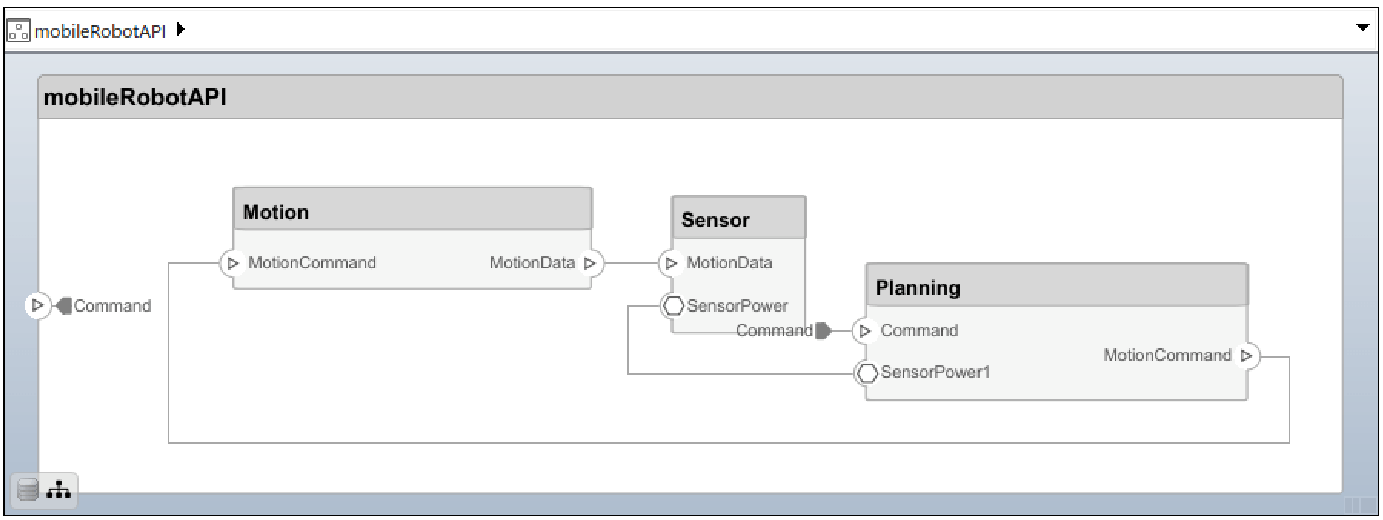
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
```

```
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contr
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

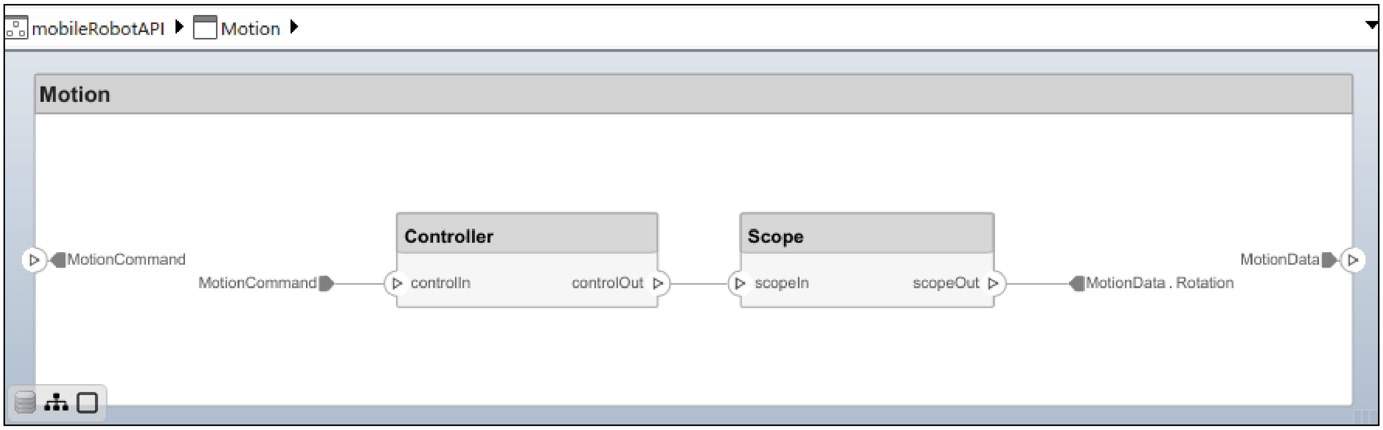
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```

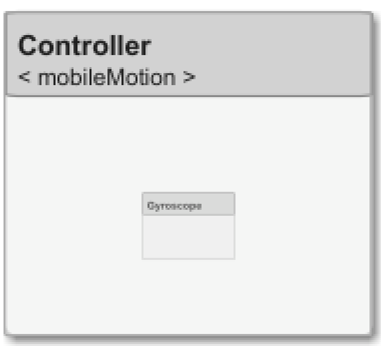


Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```



Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active

choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

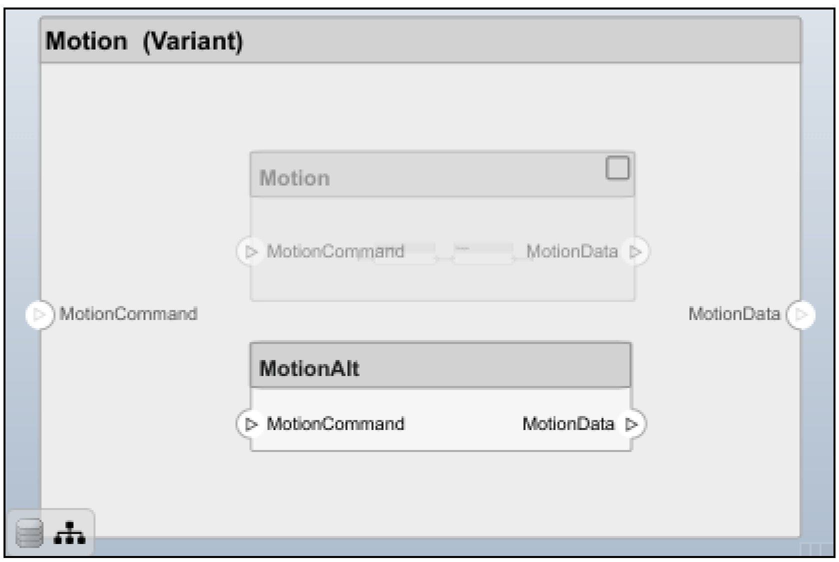
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`systemcomposer.arch.Element` | `systemcomposer.arch.BaseConnector` | `systemcomposer.arch.PhysicalConnector` | `connect` | Component

Topics

"Create Architecture Model"

Introduced in R2019a

systemcomposer.arch.Element

All model elements

Description

The `Element` class is the base class for all System Composer model elements:

- `systemcomposer.arch.Architecture`
- `systemcomposer.arch.Component`
- `systemcomposer.arch.VariantComponent`
- `systemcomposer.arch.BaseComponent`
- `systemcomposer.arch.ComponentPort`
- `systemcomposer.arch.ArchitecturePort`
- `systemcomposer.arch.BasePort`
- `systemcomposer.arch.Connector`
- `systemcomposer.arch.PhysicalConnector`
- `systemcomposer.arch.BaseConnector`

Creation

Create a component using the `addComponent` function, a port using the `addPort` function, or a connector using the `connect` function.

Properties

`UUID` — Universal unique identifier
character vector

Universal unique identifier for model element, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the model element and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of element, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of element, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of element, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stren
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

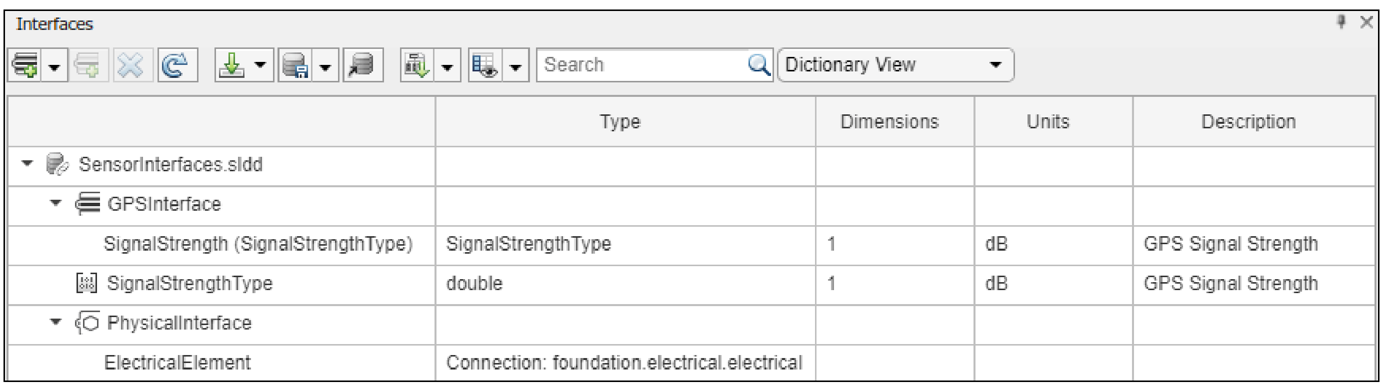
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



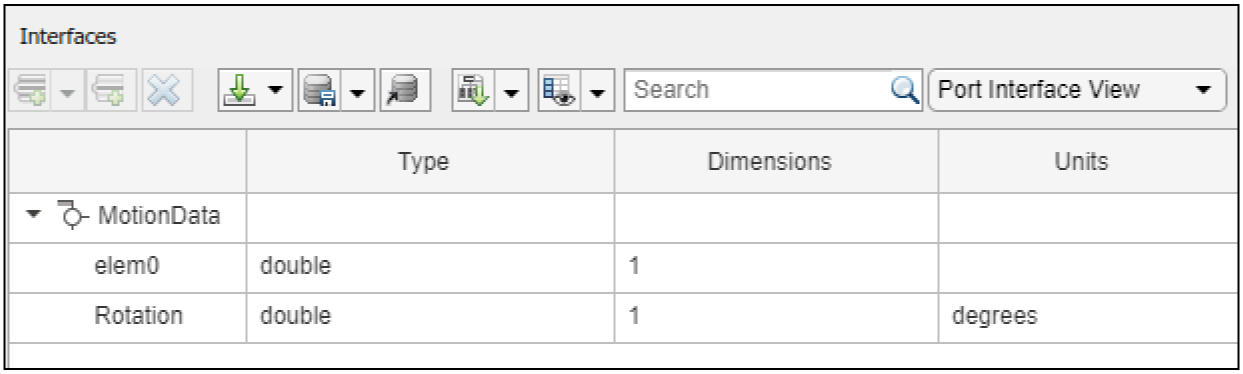
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

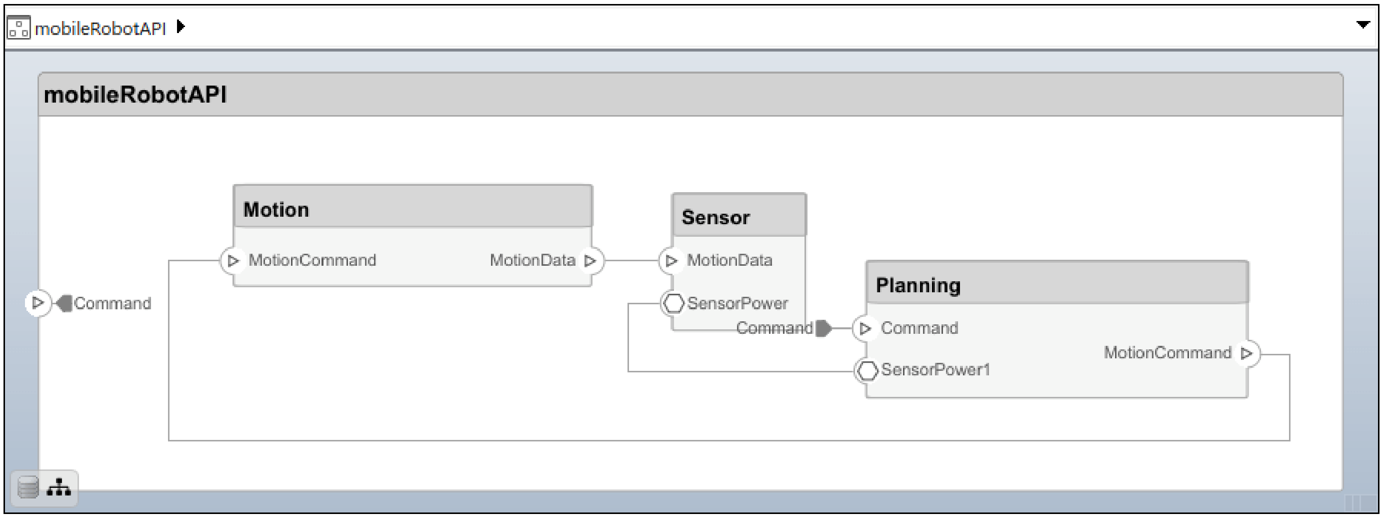
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
```

```
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype.

Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

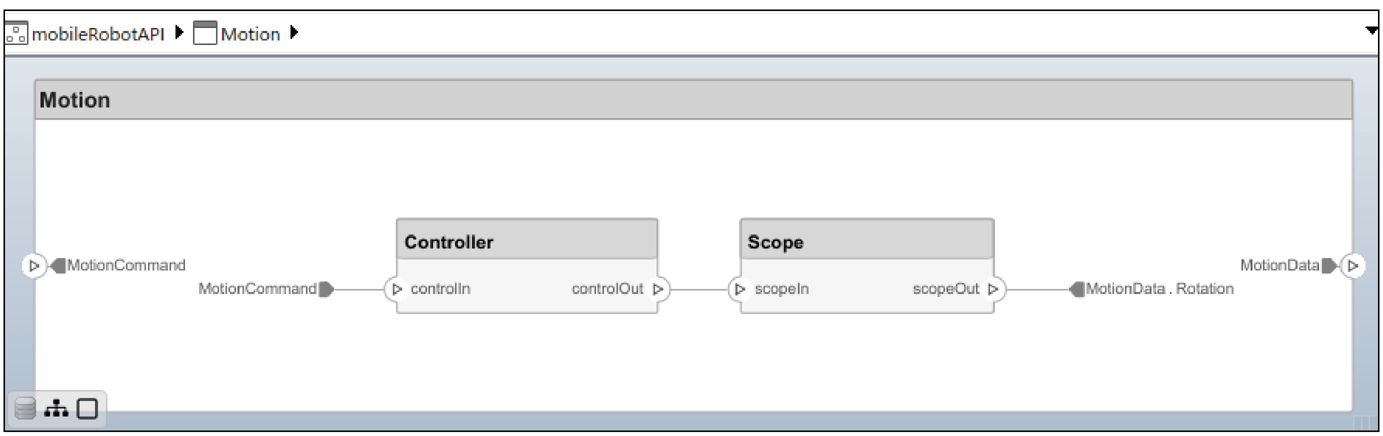
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



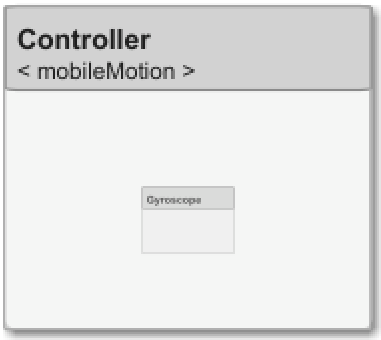
Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
```

```
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```



Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named Motion`Alt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on Motion`Alt`.

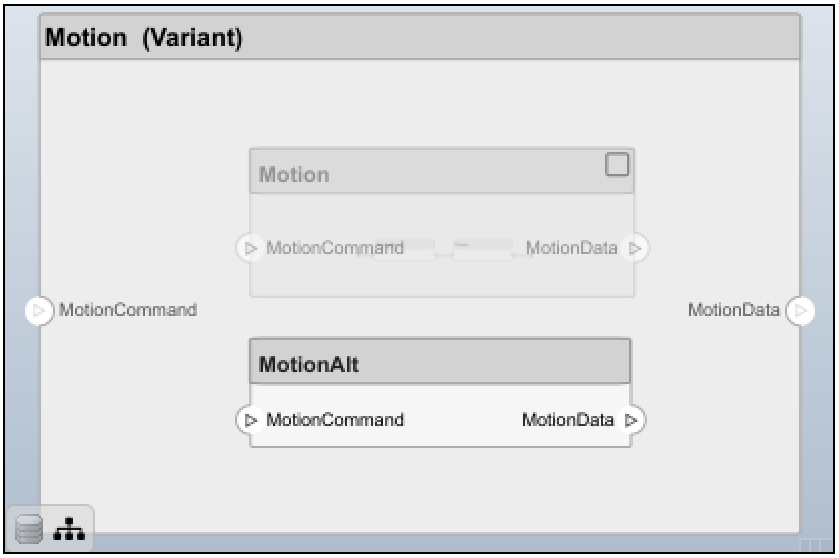
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make Motion`Alt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

Topics
"Create Architecture Model"

Introduced in R2019a

systemcomposer.arch.Function

Software architecture function

Description

A `Function` object represents a function in a software architecture model.

Use the **Functions Editor** from the toolstrip on a software architecture model, to edit the simulation execution order and sample time of functions with inherited sample time (`-1`) in your software architecture.

Creation

Get functions in a software architecture model with the `Functions` property on the `systemcomposer.arch.Architecture` object.

```
model = systemcomposer.openModel('ThrottleControlComposition');
sim('ThrottleControlComposition');
functions = model.Architecture.Functions
```

Properties

`Model` — Architecture model
model object

Architecture model where element belongs, specified as a `systemcomposer.arch.Model` object.

`ExecutionOrder` — Execution order of functions
row vector of numeric values

Execution order of functions, specified as a row vector of numeric values.

Example: `[model.Architecture.Functions.ExecutionOrder]`

Data Types: `uint64`

`Name` — Name of function
character vector

Name of function, specified as a character vector.

Data Types: `char`

`Component` — Component where function is defined
component object

Component where function is defined, specified as a `systemcomposer.arch.Component` object.

`Parent` — Parent architecture of element
architecture object

Parent architecture of element where function is defined, specified as a `systemcomposer.arch.Architecture` object.

`Period` — Period of function
numeric | string

Period of function, specified as a numeric value convertible to a string, or a string of valid MATLAB variables. The `Period` property of aperiodic functions is editable. Editing the `Period` property of a periodic function will result in an error.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for function, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier for function, specified as a character vector. The external ID is preserved over the lifespan of the function and through all operations that preserve the `UUID`.

Data Types: `char`

Object Functions

increaseExecutionOrder	Change function execution order to later
decreaseExecutionOrder	Change function execution order to earlier
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Examples

Change Execution Order of Software Functions

This example shows the software architecture of a throttle position control system and how to schedule the execution order of the root level functions.

```
model = systemcomposer.openModel("ThrottleControlComposition");
```

Simulate the model to populate it with functions.

```
sim("ThrottleControlComposition");
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'Controller_run_5ms'    }
    {'TPS_Primary_read_5ms'  }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

Decrease the execution order of the third function.

```
decreaseExecutionOrder(model.Architecture.Functions(3))
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'TPS_Primary_read_5ms'  }
    {'Controller_run_5ms'    }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

The third function is now moved up in execution order, executing earlier.

Increase the execution order of the second function.

```
increaseExecutionOrder(model.Architecture.Functions(2))
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'Controller_run_5ms'    }
    {'TPS_Primary_read_5ms'  }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

The second function is now moved down in execution order, executing later.

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• “Author Software Architectures” • “Simulate and Deploy Software Architectures”
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• “Implement Behaviors for Architecture Model Simulation” • “Create Software Architecture from Component”
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	“Modeling the Software Architecture of a Throttle Position Control System”
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	“Author and Extend Functions for Software Architectures”
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	“Class Diagram View of Software Architectures”

See Also

`systemcomposer.createModel` | `createArchitectureModel` | `createSimulinkBehavior`

Topics

"Modeling the Software Architecture of a Throttle Position Control System"
"Simulate and Deploy Software Architectures"
"Author Software Architectures"

Introduced in R2021b

systemcomposer.arch.Model

System Composer model

Description

A `Model` object is used to manage architecture objects in a System Composer model.

Creation

Create a model using the `createModel` function.

```
objModel = systemcomposer.createModel('NewModel')
```

Properties

`Name` — Name of model
character vector

Name of model, specified as a character vector. This property must be a valid MATLAB identifier.

Example: `'NewModel'`

Data Types: `char`

`Architecture` — Root architecture
architecture object

Root architecture of model, specified as a `systemcomposer.arch.Architecture` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle, specified as a numeric value.

Data Types: `double`

`Profiles` — Profiles
array of profile objects

Profiles attached to the model, specified as an array of `systemcomposer.profile.Profile` objects.

`InterfaceDictionary` — Dictionary object that holds interfaces
dictionary object

Dictionary object that holds interfaces, specified as a `systemcomposer.interface.Dictionary` object. If the model is not linked to an external dictionary, this property is a handle to the implicit dictionary.

`Views` — Views
array of view objects

Views, specified as an array of `systemcomposer.view.View` objects.

Example: `objView = get(objModel,'Views')`

Object Functions

open	Open architecture model
close	Close architecture model
save	Save architecture model or data dictionary
find	Find architecture model elements using query
lookup	Search for architectural element
openViews	Open Architecture Views Gallery
createView	Create architecture view
getView	Find architecture view
deleteView	Delete architecture view
applyProfile	Apply profile to model
removeProfile	Remove profile from model
saveToDictionary	Save interfaces to dictionary
linkDictionary	Link data dictionary to architecture model
unlinkDictionary	Unlink data dictionary from architecture model
renameProfile	Rename profile in model
iterate	Iterate over model elements

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
```

```
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

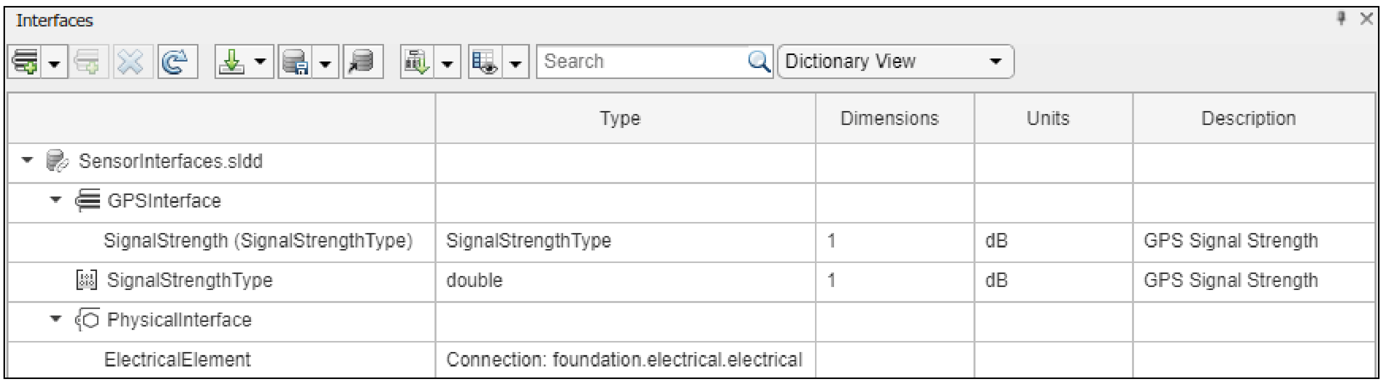
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



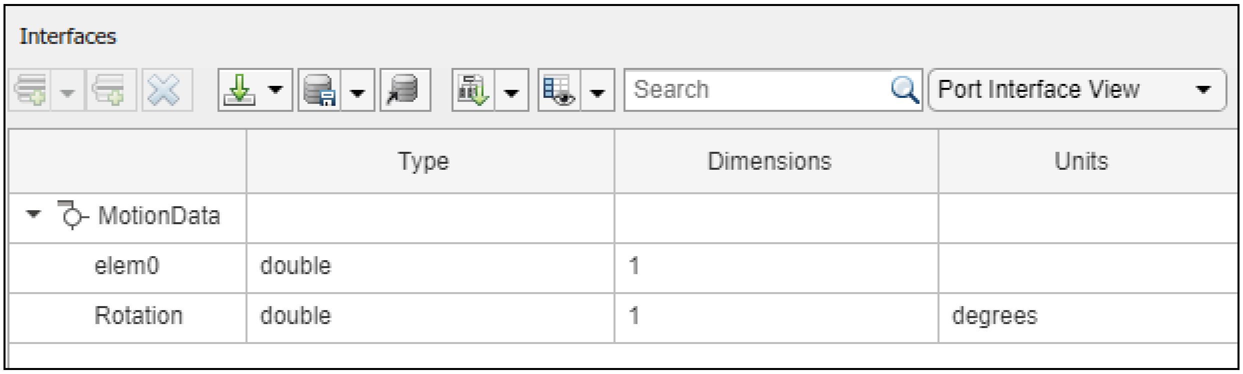
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

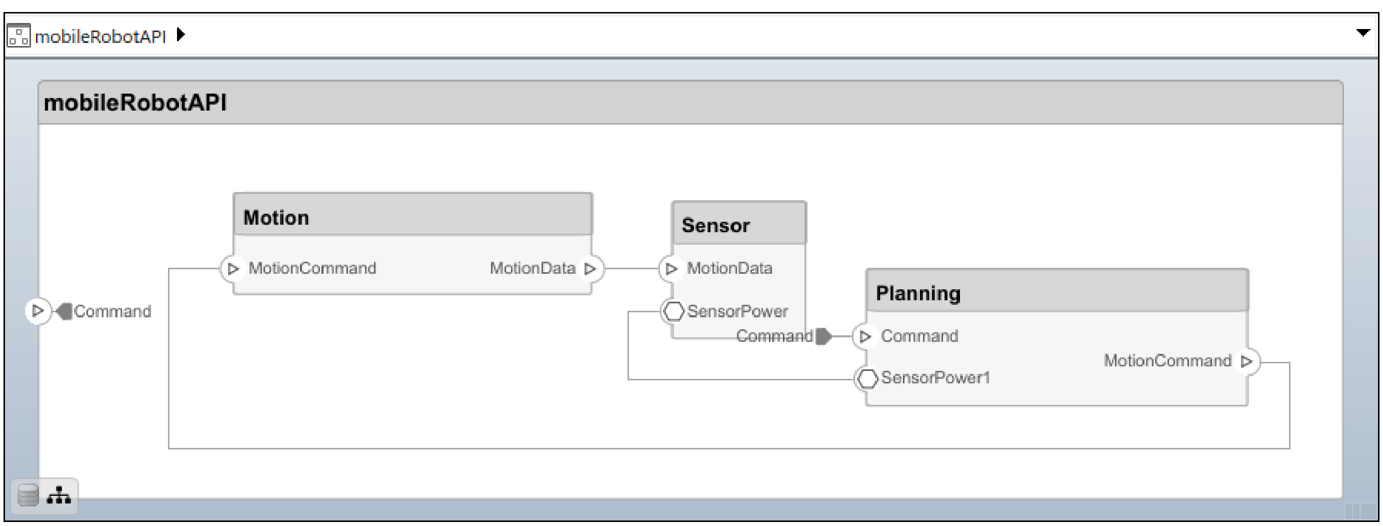
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

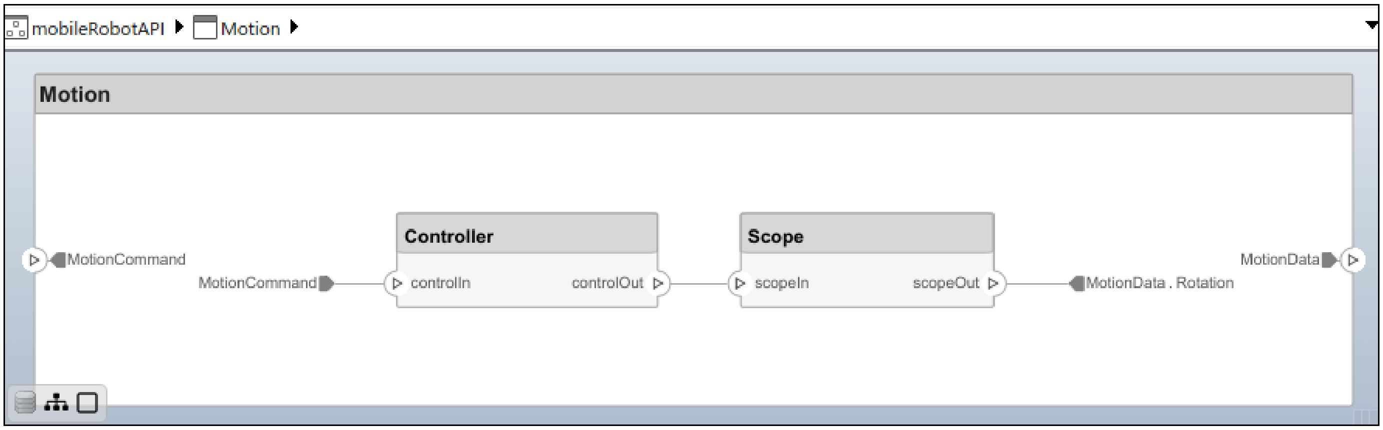
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named Motion`Alt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on Motion`Alt`.

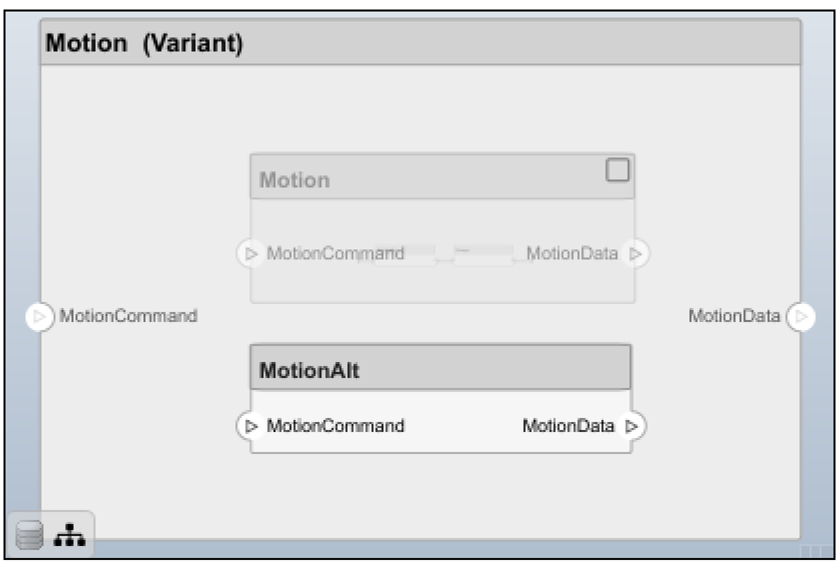
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make Motion`Alt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`createModel` | `loadModel` | `importModel` | `exportModel` | `openModel` | `createArchitectureModel`

Topics

"Create Architecture Model"

Introduced in R2019a

systemcomposer.arch.PhysicalConnector

Connector between physical ports

Description

A `PhysicalConnector` object represents a connector between physical ports for a System Composer model. This class inherits from `systemcomposer.arch.BaseConnector`. This class is derived from `systemcomposer.arch.Element`.

Creation

Create physical connectors using the `connect` function.

```
physConns = connect(architecture,physPortsA,physPortsB)
```

Properties

`Name` — Name of connector
character vector

Name of connector, specified as a character vector.

Example: `'newConnector'`

Data Types: `char`

`Parent` — Architecture that owns connector
architecture object

Architecture that owns connector, specified as a `systemcomposer.arch.Architecture` object.

`Ports` — Ports of connection
array of port objects

Ports of connection, specified as an array of `systemcomposer.arch.ArchitecturePort` or `systemcomposer.arch.ComponentPort` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for model connector, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the model connector and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of connector, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of connector, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of connector, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
getSourceElement	Gets data elements selected on source port for connection
getDestinationElement	Gets data elements selected on destination port for connection
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
getQualifiedName	Get model element qualified name
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stren
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

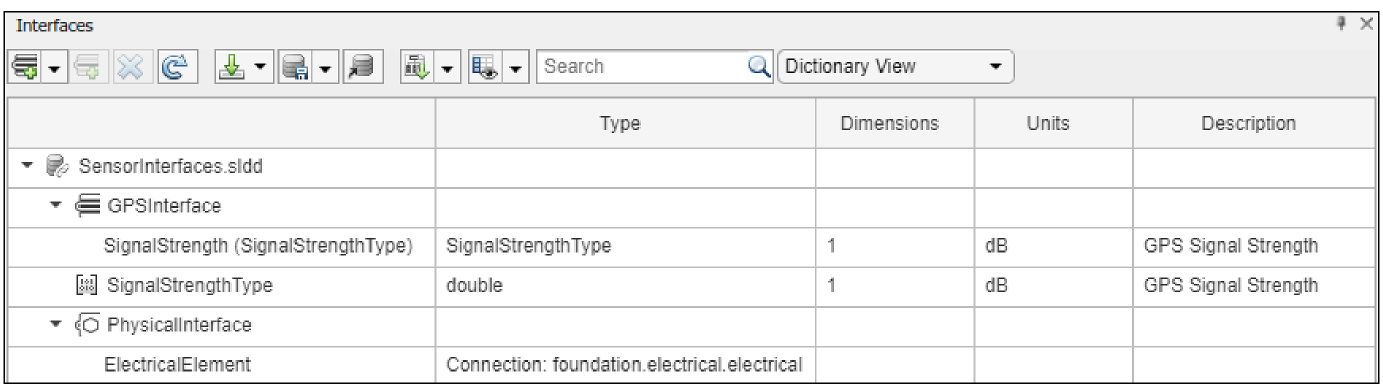
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



	Type	Dimensions	Units	Description
SensorInterfaces.sldd				
GPSInterface				
SignalStrength (SignalStrengthType)	SignalStrengthType	1	dB	GPS Signal Strength
SignalStrengthType	double	1	dB	GPS Signal Strength
PhysicalInterface				
ElectricalElement	Connection: foundation.electrical.electrical			

Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

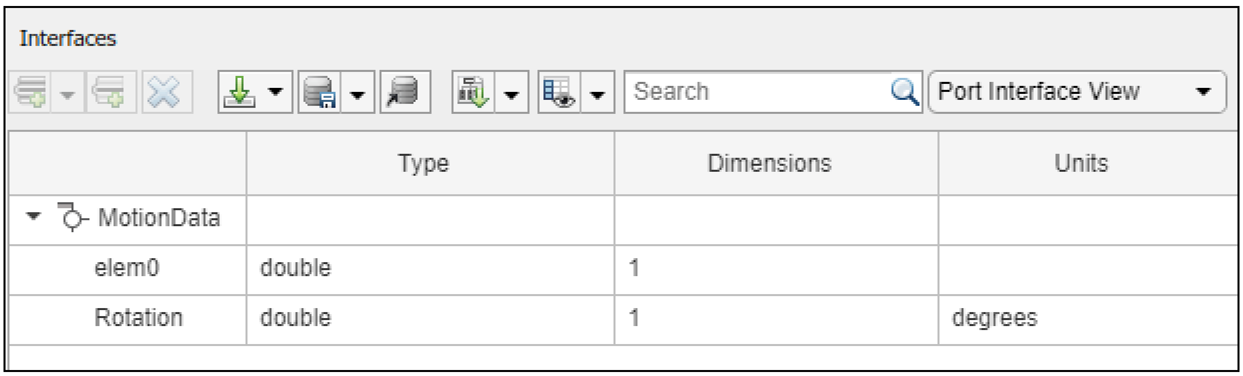
```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'}
sensorPorts(2).setInterface(physicalInterface)
```

```
componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

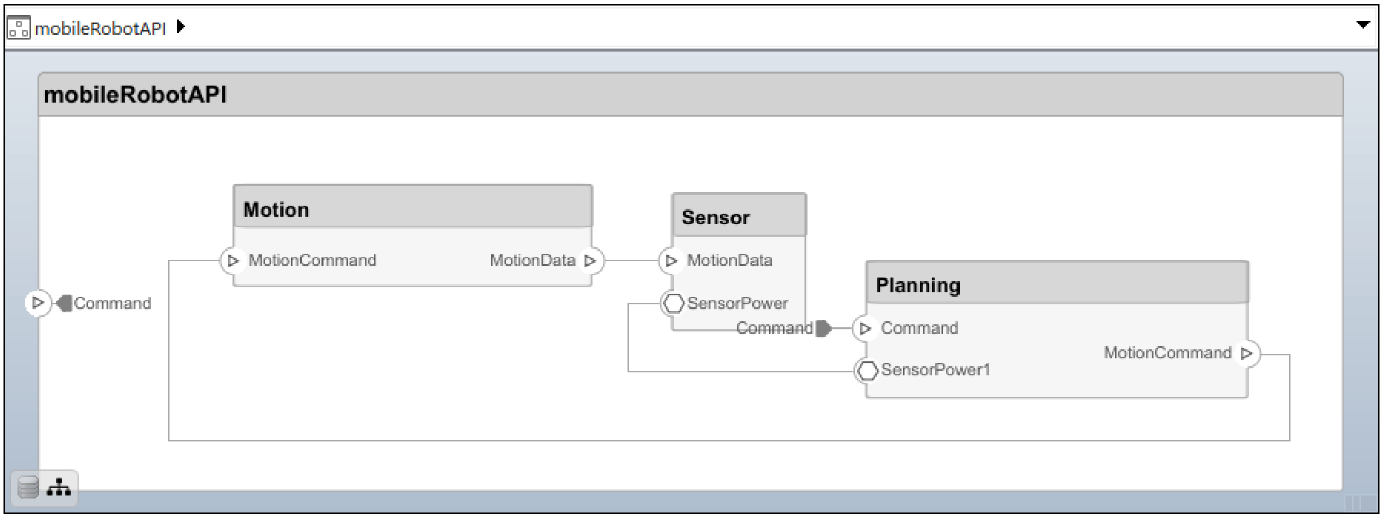
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
```

```
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype.

Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

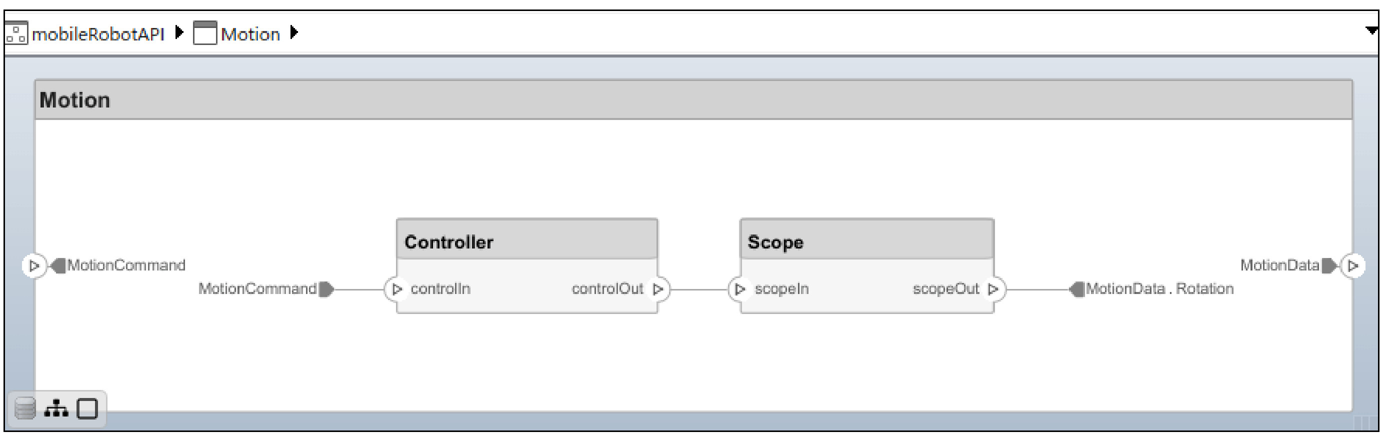
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



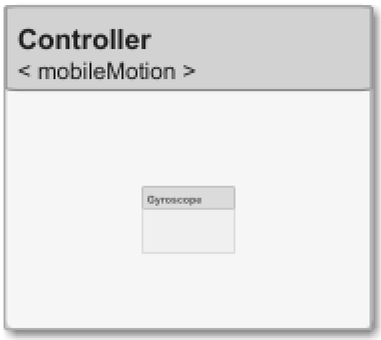
Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
```

```
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```



Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named `MotionAlt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on `MotionAlt`.

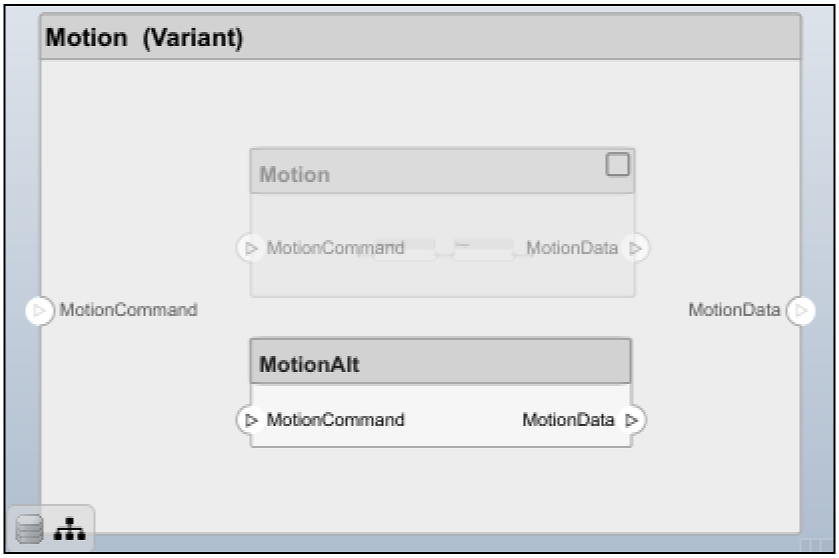
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make `MotionAlt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also

`systemcomposer.arch.Element` | `systemcomposer.arch.BaseConnector` | `systemcomposer.arch.Connector` | `connect` | Component

Topics

"Create Architecture Model"
"Describe Component Behavior Using Simscape"

Introduced in R2021b

systemcomposer.arch.VariantComponent

Variant component in System Composer model

Description

A `VariantComponent` object represents a variant component that allows you to create multiple design alternatives for a component in a System Composer model. This class inherits from `systemcomposer.arch.BaseComponent`. This class is derived from `systemcomposer.arch.Element`.

Creation

Create a variant component using the `addVariantComponent` function.

```
varComp = addVariantComponent(archObj,'compName');
```

Properties

`Name` — Name of variant component
character vector

Name of variant component, specified as a character vector.

Data Types: `char`

`Position` — Position of component on canvas
vector of coordinates in pixels

Position of component on canvas, specified as a vector of coordinates in pixels: `[left top right bottom]`.

`Parent` — Architecture that owns variant component
architecture object

Architecture that owns variant component, specified as a `systemcomposer.arch.Architecture` object.

`Architecture` — Architecture of active variant choice
architecture object

Architecture of the active variant choice, specified as a `systemcomposer.arch.Architecture` object.

`Ports` — Input and output ports
component port objects

Input and output ports of variant component, specified as `systemcomposer.arch.ComponentPort` objects.

`OwnedArchitecture` — Architecture owned by variant component
architecture object

Architecture owned by variant component, specified as a `systemcomposer.arch.Architecture` object.

`OwnedPorts` — Array of component ports
array of component port objects

Array of component ports, specified as an array of `systemcomposer.arch.ComponentPort` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for variant component, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the variant component and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of component, specified as a `systemcomposer.arch.Model` object.

`SimulinkHandle` — Simulink handle
numeric value

Simulink handle of component, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkHandle')`

Data Types: `double`

`SimulinkModelHandle` — Simulink handle to parent model
numeric value

Simulink handle to parent System Composer model of component, specified as a `double`. This property is necessary for several Simulink related work flows and for using Requirements Toolbox APIs.

Example: `handle = get(object,'SimulinkModelHandle')`

Data Types: `double`

Object Functions

addChoice	Add variant choices to variant component

setCondition	Set condition on variant choice
setActiveChoice	Set active choice on variant component
getChoices	Get available choices in variant component
getActiveChoice	Get active choice on variant component
getCondition	Return variant control on choice within variant component
isProtected	Find if component reference model is protected
isReference	Find if component is referenced to another model
connect	Create architecture model connections
getPort	Get port from component
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
getProperty	Get property value corresponding to stereotype applied to element
setProperty	Set property value corresponding to stereotype applied to element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
getQualifiedName	Get model element qualified name
getEvaluatedParameterValue	Get evaluated value of parameter from element
getParameterNames	Get parameter names on element
getParameterValue	Get value of parameter
setParameterValue	Set value of parameter
setUnit	Set units on parameter value
resetParameterToDefault	Reset parameter on component to default value
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

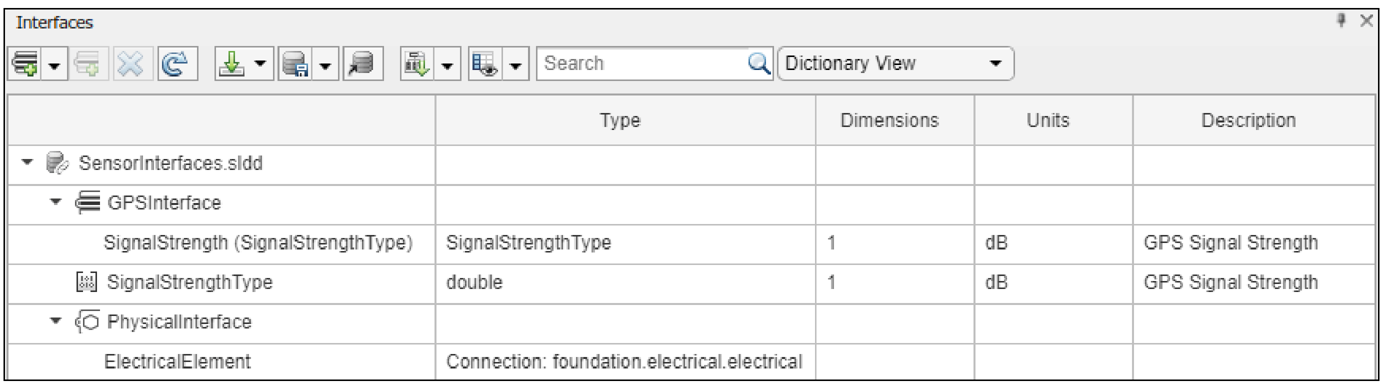
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



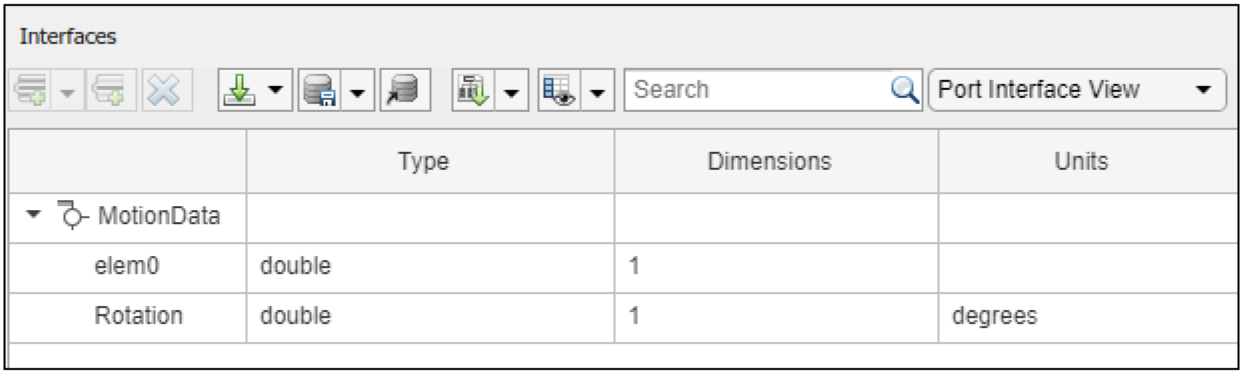
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

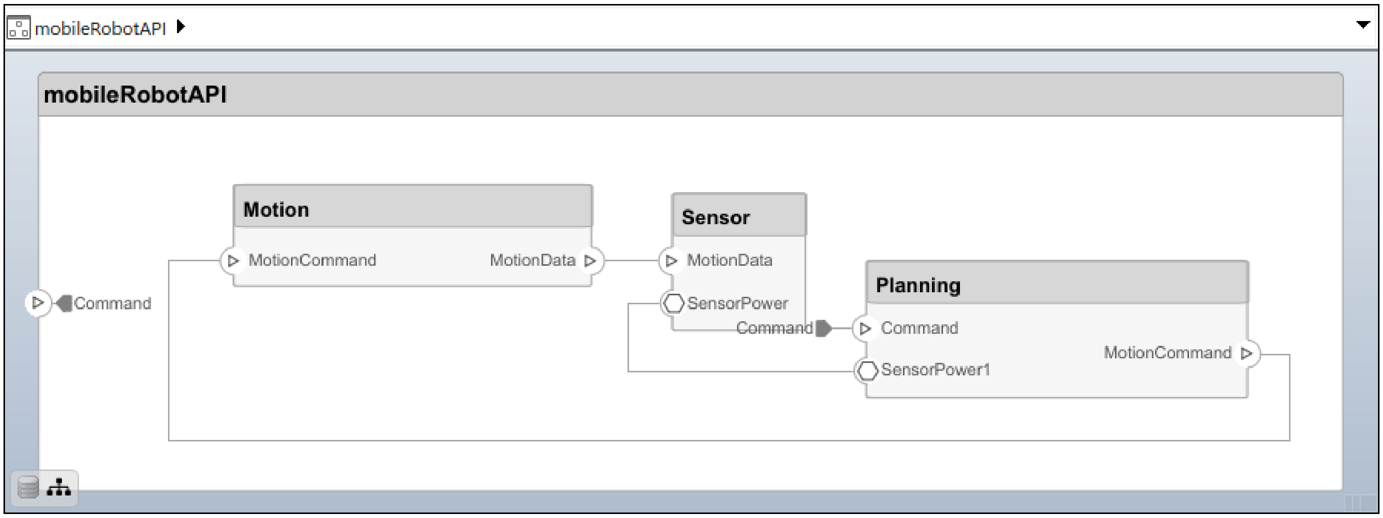
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
```

```
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype.

Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

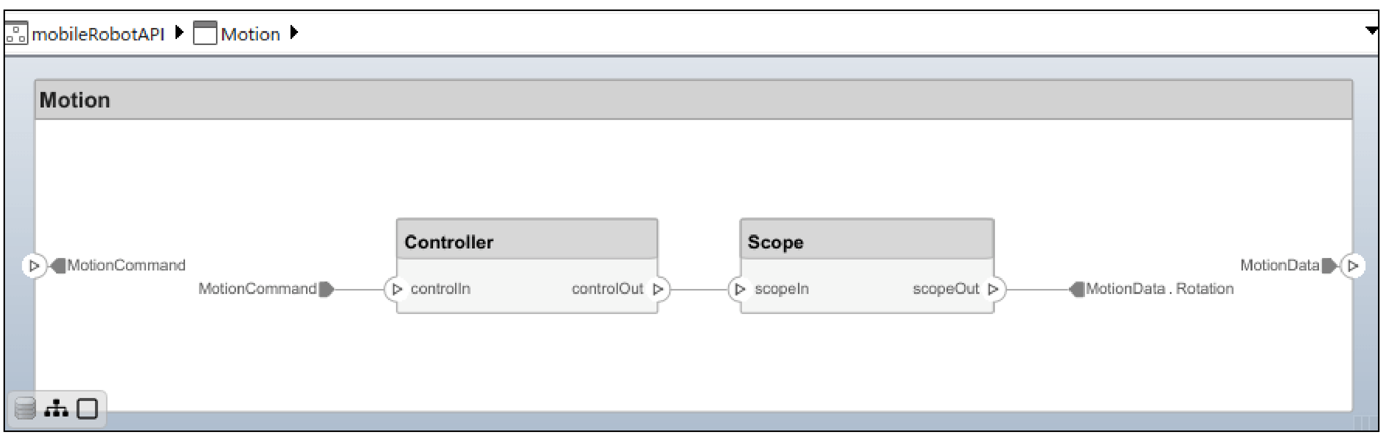
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
```

```
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named Motion`Alt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on Motion`Alt`.

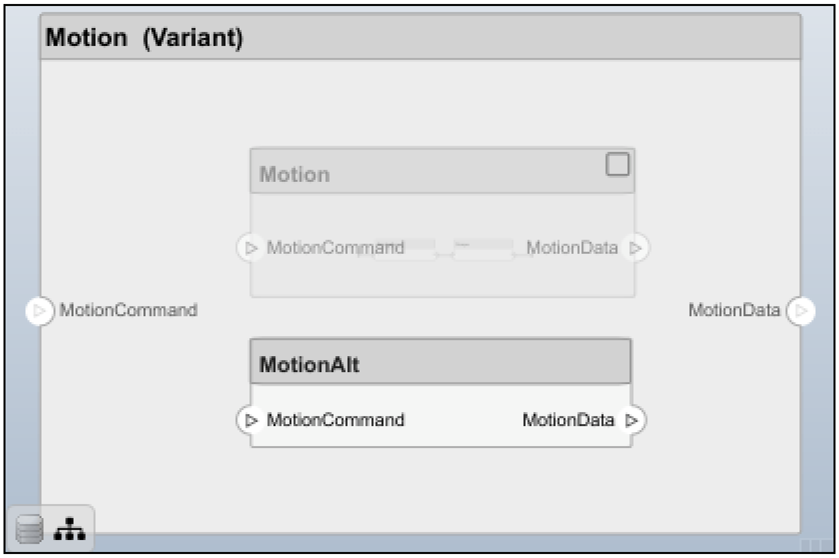
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make Motion`Alt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	“Create Variants”
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	“Set Variant Control Condition” on page 3-603

See Also

Variant Component

Topics

“Decompose and Reuse Components”

Introduced in R2019a

systemcomposer.interface.DataElement

Data element in data interface

Description

A `DataElement` object represents a data element in a data interface.

Creation

Create a data element using the `addElement` function.

```
element = addElement(interface,'newElement')
```

Properties

`Interface` — Parent data interface of data element
data interface object

Parent data interface of data element, specified as a `systemcomposer.interface.DataInterface` object.

`Name` — Data element name
character vector | string

Data element name, specified as a character vector or string.

Example: `'newElement'`

Data Types: `char` | `string`

`Type` — Type of data element
data interface object | value type object

Type of data element, specified as a `systemcomposer.interface.DataInterface` or `systemcomposer.ValueType` object.

`Dimensions` — Dimensions of data element
character vector | string

Dimensions of data element, specified as a character vector or string.

Data Types: `char` | `string`

`Description` — Description of data element
character vector | string

Description of data element, specified as a character vector or string.

Data Types: `char` | `string`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for data element, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the data element and through all operations that preserve the `UUID`.

Data Types: `char`

Object Functions

setName	Set name for value type, function argument, interface, or element
setType	Set shared type on data element or function argument
setDimensions	Set dimensions for value type
setUnits	Set units for value type
setComplexity	Set complexity for value type
setMinimum	Set minimum for value type
setMaximum	Set maximum for value type
setDescription	Set description for value type
createOwnedType	Create owned value type on data element or function argument
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

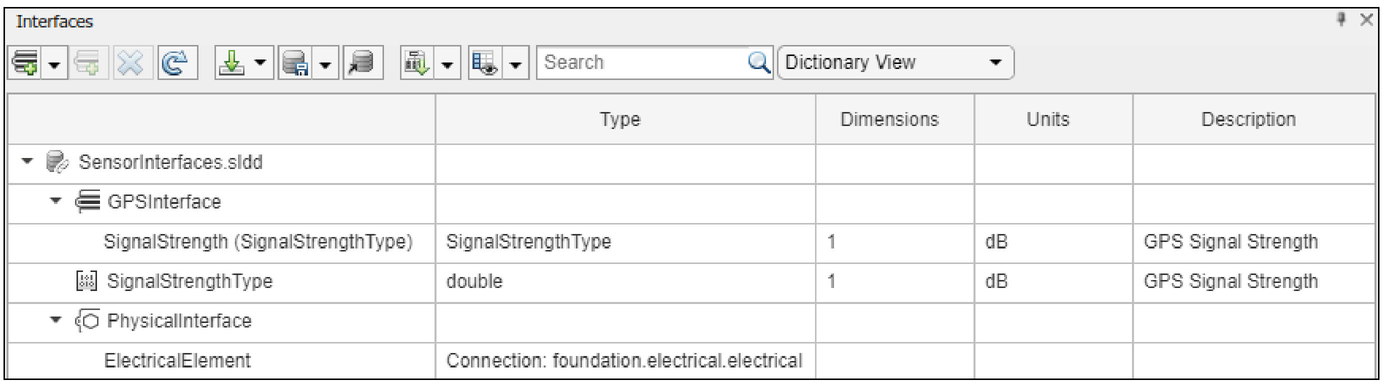
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



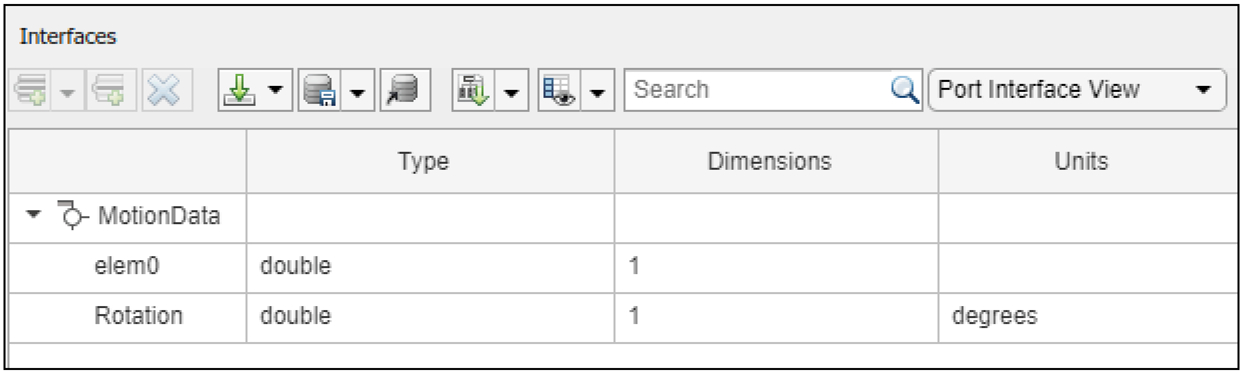
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

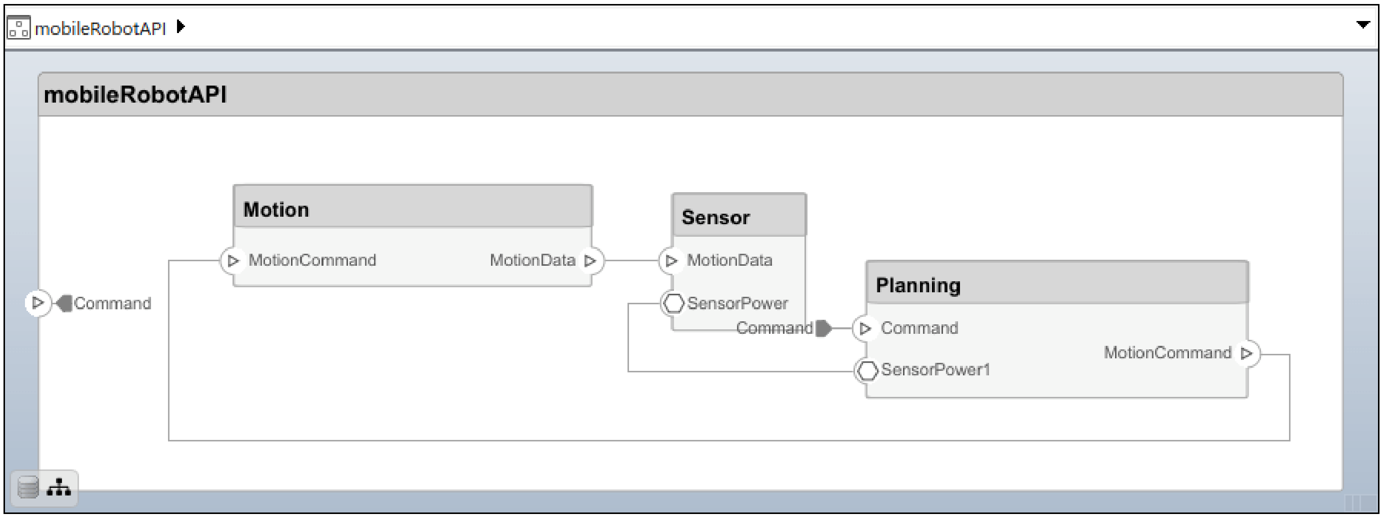
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
```

```
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype.

Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

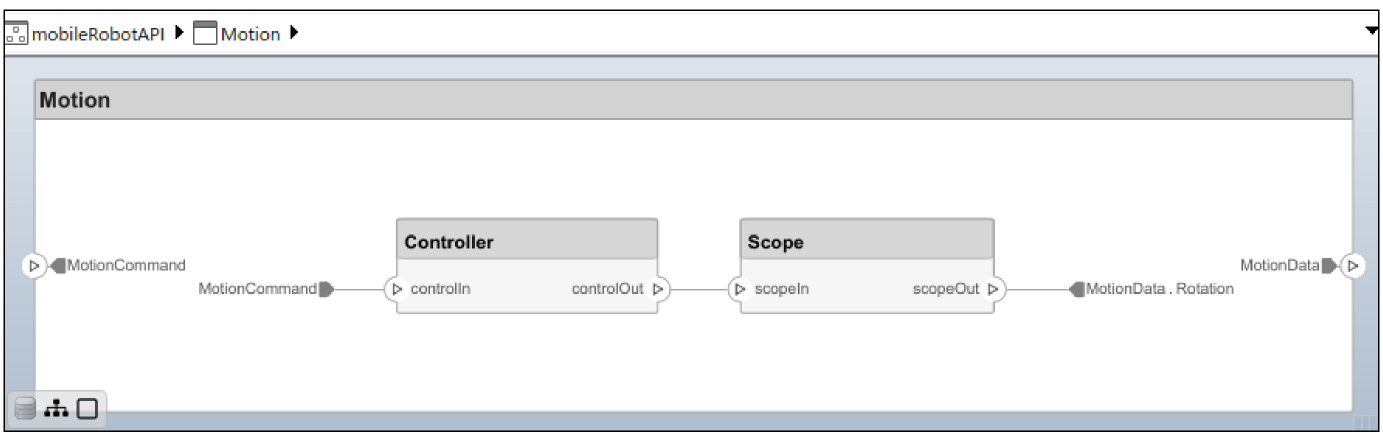
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



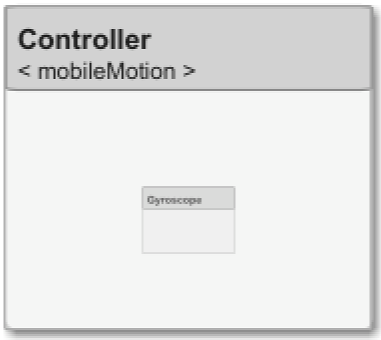
Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
```

```
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```



Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the Planning component to a variant component using the makeVariant function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

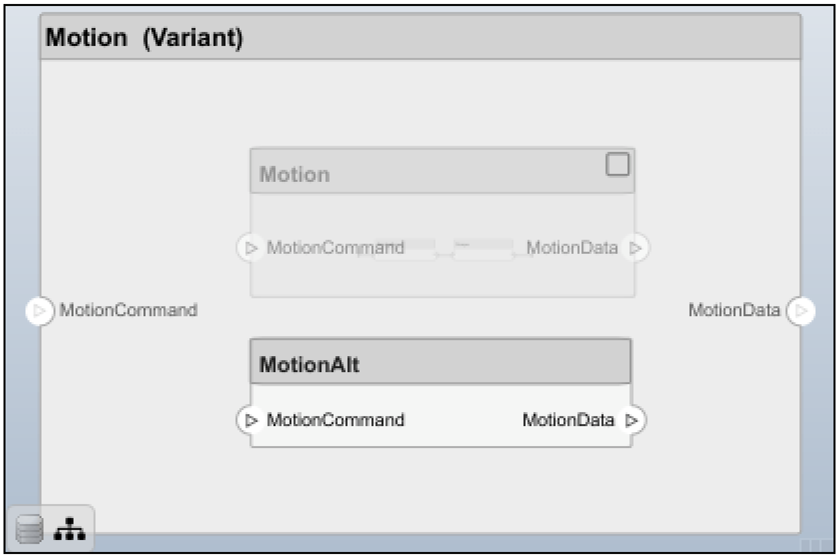
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"

Term	Definition	Application	More Information
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`addElement` | `removeElement` | `getElement` | `systemcomposer.ValueType` | `systemcomposer.interface.Dictionary` | `systemcomposer.interface.DataInterface`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

systemcomposer.interface.DataInterface

Data interface

Description

A `DataInterface` object represents the structure of a data interface.

Creation

Create a data interface using the `addInterface` function.

```
interface = addInterface(dictionary,'newInterface')
```

Properties

`Owner` — Parent of data interface
dictionary object | data element object | architecture port object

Parent of data interface, specified as a `systemcomposer.interface.Dictionary`, `systemcomposer.interface.DataElement`, or `systemcomposer.arch.ArchitecturePort` object.

`Model` — Parent model
model object

Parent System Composer model of data interface, specified as a `systemcomposer.arch.Model` object.

`Name` — Data interface name
character vector | string

Data interface name, specified as a character vector or string. This property must be a valid MATLAB identifier.

Example: `'newInterface'`

Data Types: `char` | `string`

`Elements` — Elements in interface
array of data element objects

Elements in interface, specified as an array of `systemcomposer.interface.DataElement` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for data interface, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

ExternalUID — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the data interface and through all operations that preserve the UUID.

Data Types: char

Object Functions

addElement	Add element
getElement	Get object for element
removeElement	Remove element
setName	Set name for value type, function argument, interface, or element
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
getStereotypeProperties	Get stereotype property names on element
removeStereotype	Remove stereotype from model element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
setProperty	Set property value corresponding to stereotype applied to element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
```

```
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stren
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

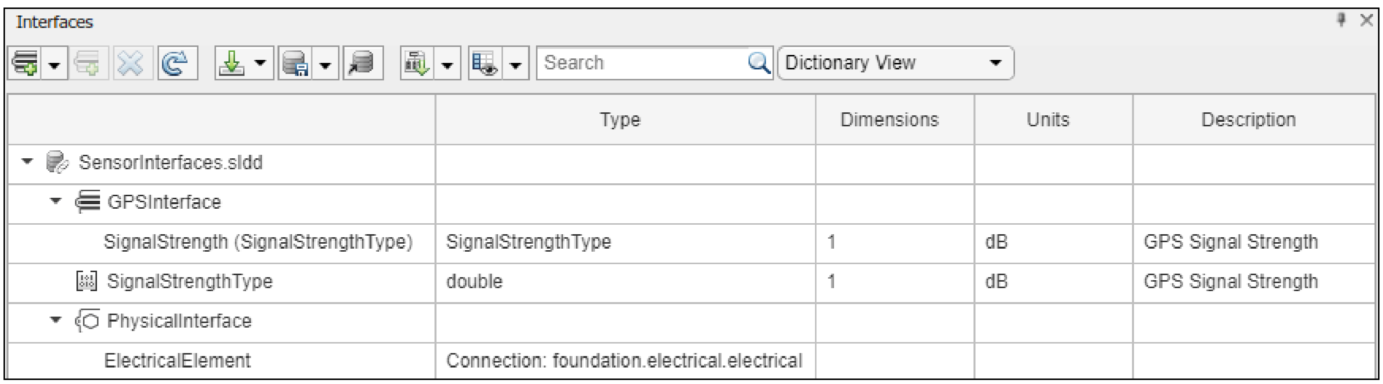
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



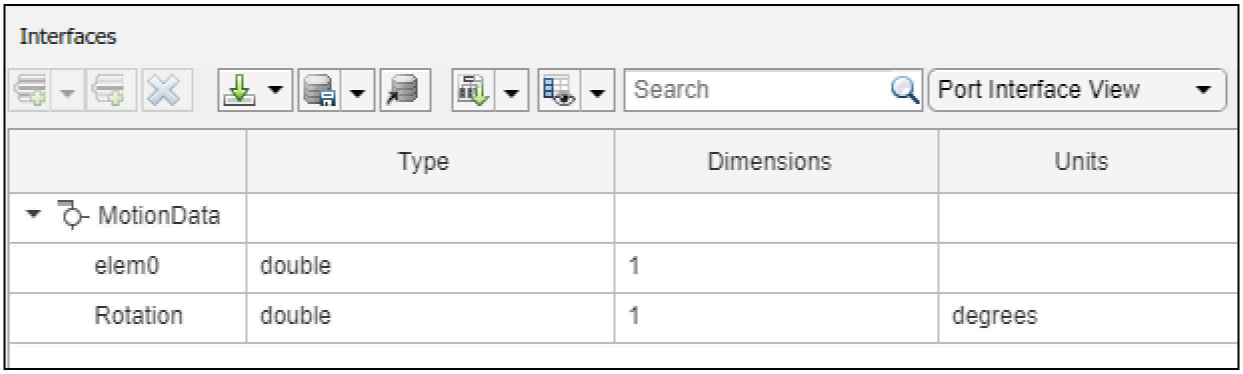
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

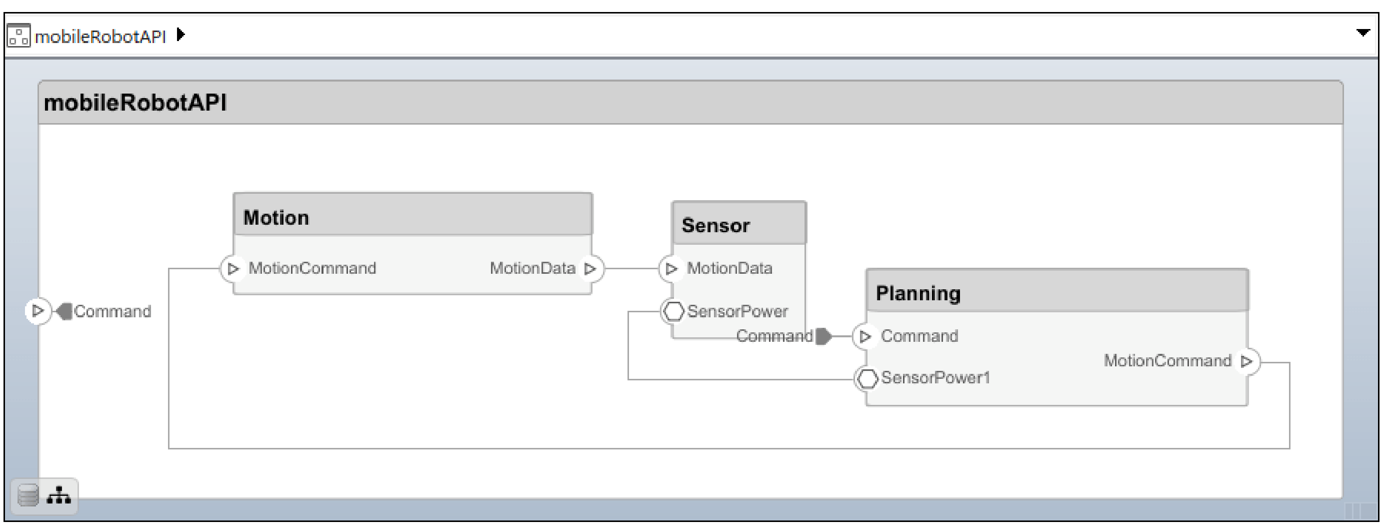
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

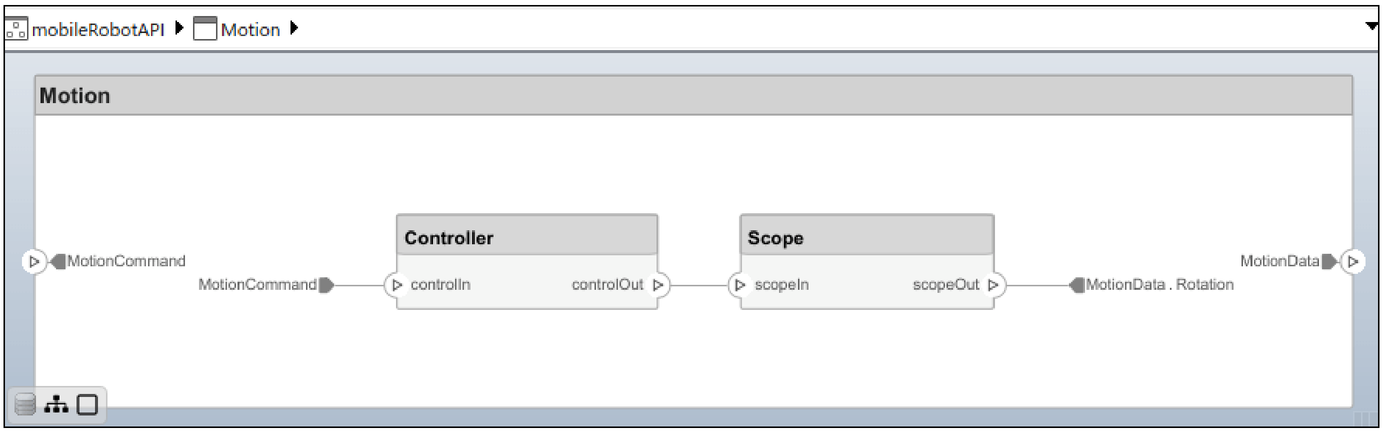
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save
```

```
linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named Motion`Alt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on Motion`Alt`.

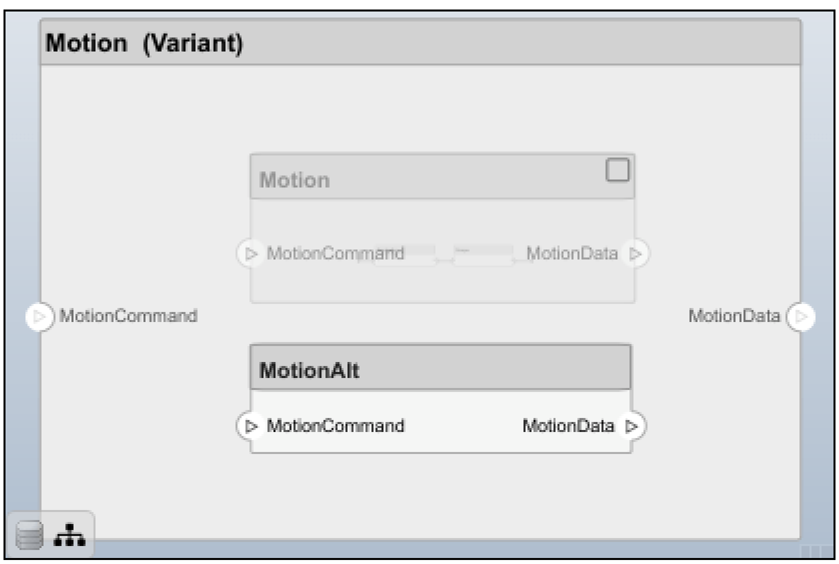
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make Motion`Alt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`createInterface` | `setInterface` | `addInterface` | `getInterface` | `getInterfaceNames` | `removeInterface` | `systemcomposer.ValueType` | `systemcomposer.interface.Dictionary` | `systemcomposer.interface.DataElement`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021b

systemcomposer.interface.Dictionary

Interface data dictionary of architecture model

Description

A `Dictionary` object represents the interface data dictionary of a System Composer model.

Creation

Create an interface data dictionary using the `systemcomposer.createDictionary` function.

```
dictionary = systemcomposer.createDictionary('newDictionary.sldd');
```

Properties

`Interfaces` — Interfaces defined in dictionary
array of interface objects

Interfaces defined in dictionary, specified as an array of `systemcomposer.interface.DataInterface`, `systemcomposer.interface.PhysicalInterface`, or `systemcomposer.interface.ServiceInterface` objects.

`Profiles` — Profiles attached to dictionary
array of profile objects

Profiles attached to dictionary, specified as an array of `systemcomposer.profile.Profile` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for interface data dictionary, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the interface data dictionary and through all operations that preserve the `UUID`.

Data Types: `char`

Object Functions

addValueType	Create named value type in interface dictionary

addInterface	Create named data interface in interface dictionary
addPhysicalInterface	Create named physical interface in interface dictionary
addServiceInterface	Create named service interface in interface dictionary
getInterface	Get object for named interface in interface dictionary
getInterfaceNames	Get names of all interfaces in interface dictionary
removeInterface	Remove named interface from interface dictionary
applyProfile	Apply profile to model
removeProfile	Remove profile from model
save	Save architecture model or data dictionary
saveToDictionary	Save interfaces to dictionary
addReference	Add reference to dictionary
removeReference	Remove reference to dictionary
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

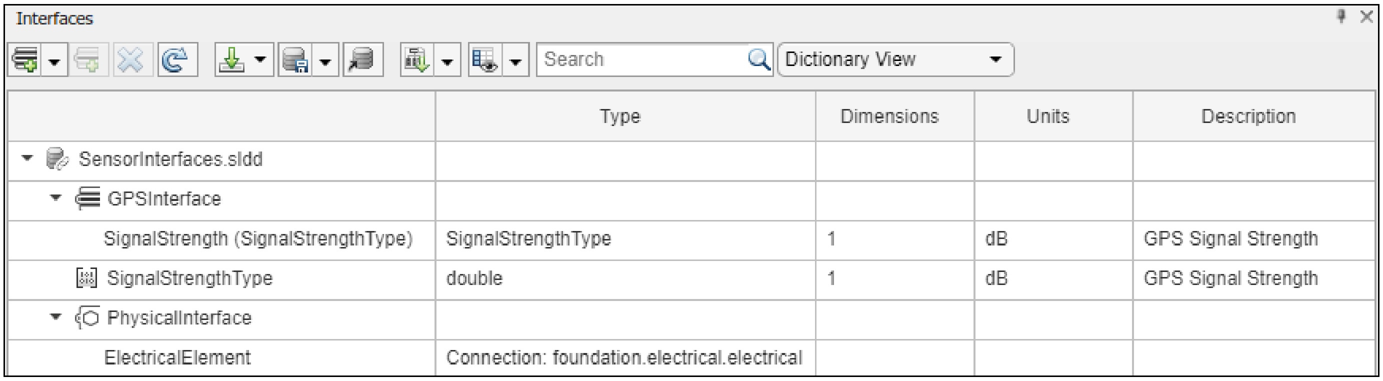
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



	Type	Dimensions	Units	Description
SensorInterfaces.sldd				
GPSInterface				
SignalStrength (SignalStrengthType)	SignalStrengthType	1	dB	GPS Signal Strength
SignalStrengthType	double	1	dB	GPS Signal Strength
PhysicalInterface				
ElectricalElement	Connection: foundation.electrical.electrical			

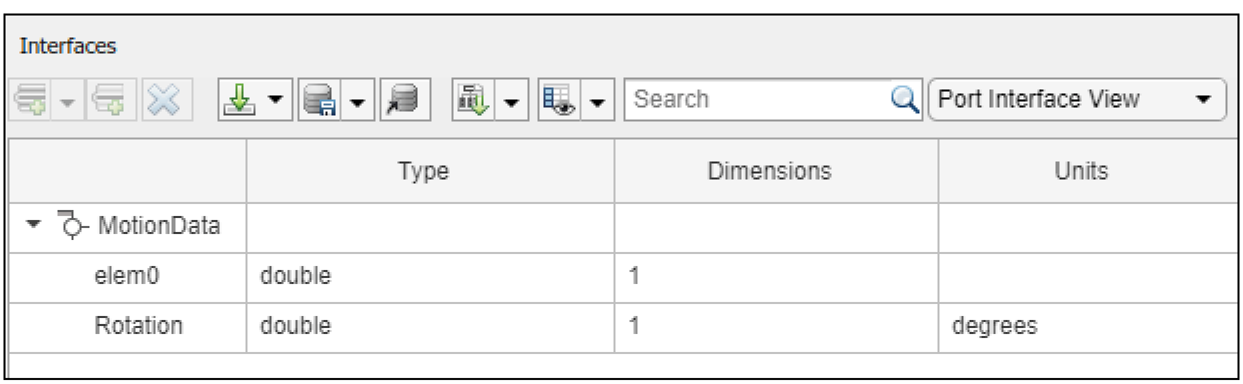
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



	Type	Dimensions	Units
MotionData			
elem0	double	1	
Rotation	double	1	degrees

Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

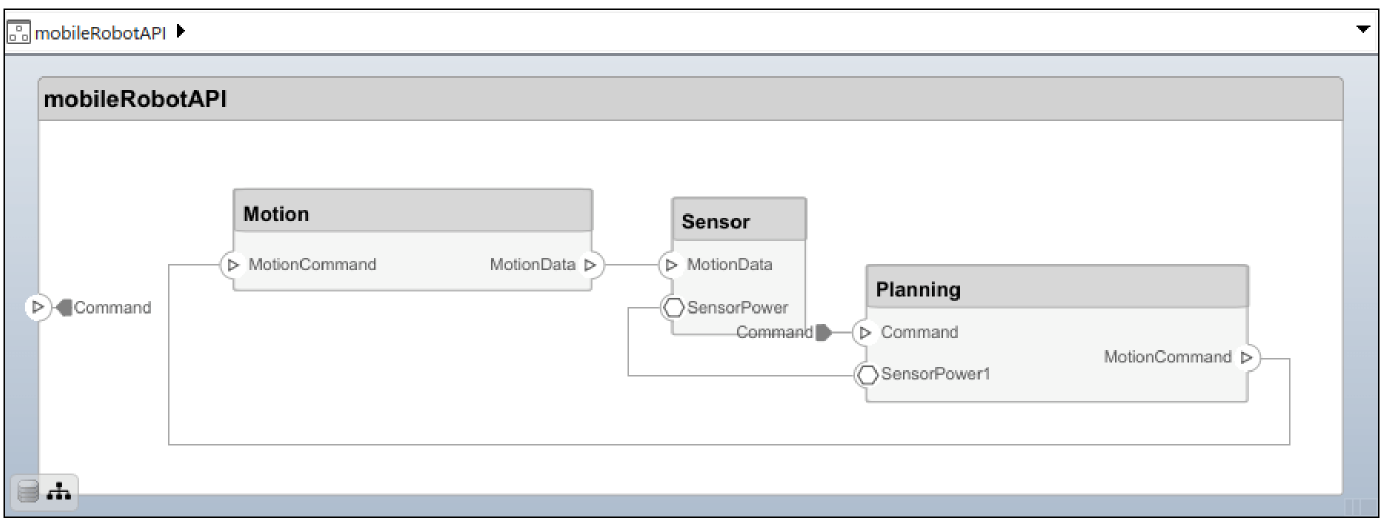
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
```

```
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

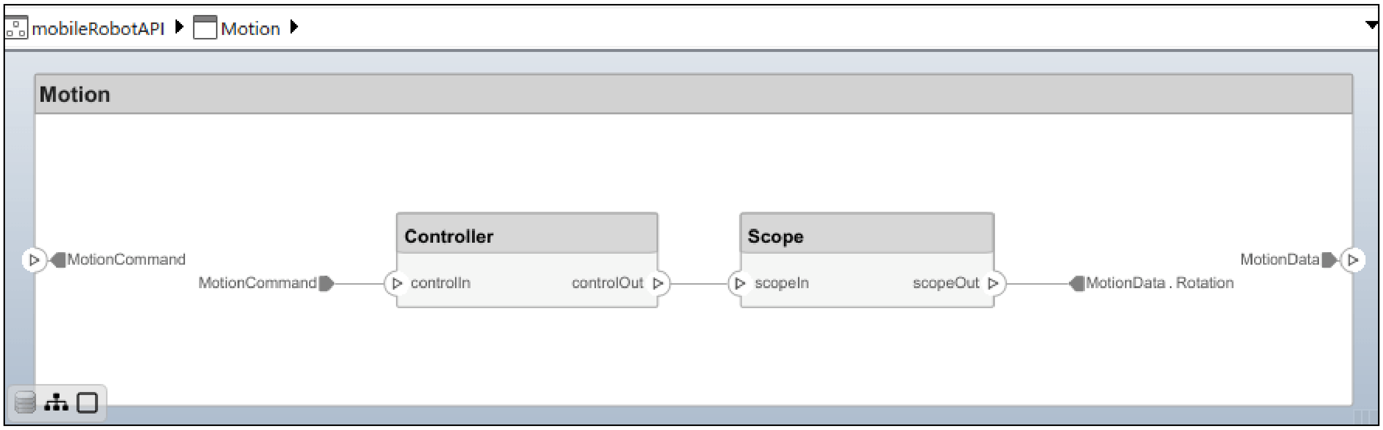
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active

choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

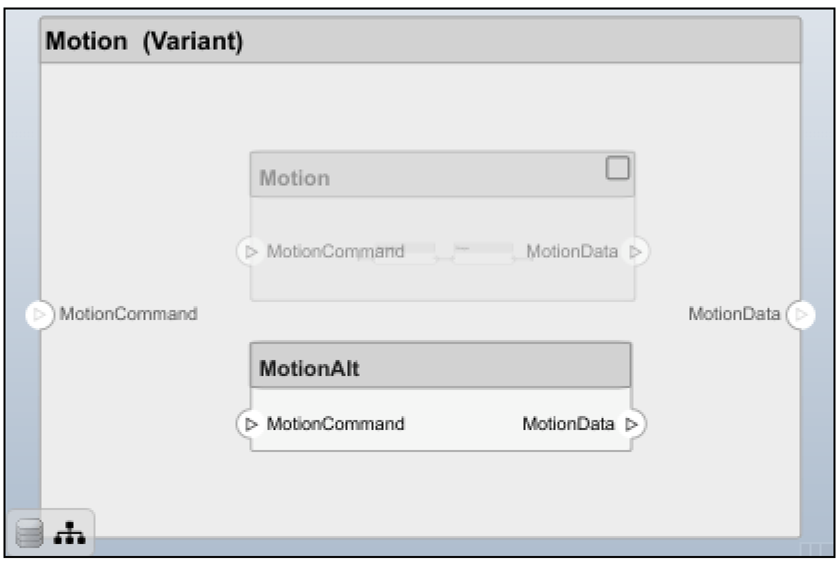
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"

Term	Definition	Application	More Information
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"

Term	Definition	Application	More Information
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	“Modeling the Software Architecture of a Throttle Position Control System”
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	“Author and Extend Functions for Software Architectures”
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	“Class Diagram View of Software Architectures”

See Also

`openDictionary` | `createDictionary` | `saveToDictionary` | `systemcomposer.ValueType` | `systemcomposer.interface.DataElement` | `systemcomposer.interface.DataInterface` | `systemcomposer.interface.PhysicalInterface` | `systemcomposer.interface.PhysicalElement` | `systemcomposer.interface.PhysicalDomain` | `systemcomposer.interface.ServiceInterface` | `systemcomposer.interface.FunctionElement`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”
“Specify Physical Interfaces on Ports”
“Client-Server Interfaces in the Class Diagram View”

Introduced in R2019a

systemcomposer.interface.FunctionArgument

Function argument in function element in client-server interface

Description

A `FunctionArgument` object describes the attributes of an argument in a function element `systemcomposer.interface.FunctionElement`.

Creation

Set a function prototype using the `setFunctionPrototype` function and then get a function argument using the `getFunctionArgument` function.

```
setFunctionPrototype(element,"y=f0(u)")
argument = getFunctionArgument(functionElement,"y")
```

Properties

`Interface` — Parent service interface of function argument
service interface object

Parent service interface of function argument, specified as a `systemcomposer.interface.ServiceInterface` object.

`Name` — Function argument name
character vector | string

Function argument name, specified as a character vector or string.

Example: `"y"`

Data Types: `char` | `string`

`Type` — Type of function argument
value type object

Type of function argument, specified as a `systemcomposer.ValueType` object.

`Dimensions` — Dimensions of function argument
character vector | string

Dimensions of function argument, specified as a character vector or string.

Data Types: `char` | `string`

`Description` — Description of function argument
character vector | string

Description of function argument, specified as a character vector or string.

Data Types: `char` | `string`

UUID — Universal unique identifier
character vector

Universal unique identifier for function argument, specified as a character vector.

Example: '91d5de2c-b14c-4c76-a5d6-5dd0037c52df'

Data Types: char

ExternalUID — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the function argument and through all operations that preserve the UUID.

Data Types: char

Object Functions

setName	Set name for value type, function argument, interface, or element
setType	Set shared type on data element or function argument
setDimensions	Set dimensions for value type
setUnits	Set units for value type
setComplexity	Set complexity for value type
setMinimum	Set minimum for value type
setMaximum	Set maximum for value type
setDescription	Set description for value type
createOwnedType	Create owned value type on data element or function argument
destroy	Remove model element

Examples

Get Function Argument

Create a new model.

```
model = systemcomposer.createModel("archModel","SoftwareArchitecture",true)
```

Create a service interface.

```
interface = addServiceInterface(model.InterfaceDictionary,"newServiceInterface")
```

Create a function element.

```
element = addElement(interface,"newFunctionElement")
```

Set a function prototype to add function arguments.

```
setFunctionPrototype(element,"y=f0(u)")
```

Get a function argument.

```
argument = getFunctionArgument(element,"y")
```

```
argument = 

  FunctionArgument with properties:
```

```
  Interface: [1×1 systemcomposer.interface.ServiceInterface]
    Element: [1×1 systemcomposer.interface.FunctionElement]
       Name: 'y'
       Type: [1×1 systemcomposer.ValueType]
 Dimensions: '1'
Description: ''
       UUID: '018b4e55-fa8f-4250-ac2b-df72bf620feb'
ExternalUID: ''
```

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"

Term	Definition	Application	More Information
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addElement` | `removeElement` | `getElement` | `systemcomposer.interface.Dictionary`

Topics

"Author Service Interfaces for Client-Server Communication"
"Client-Server Interfaces in the Class Diagram View"
"Define Port Interfaces Between Components"

Introduced in R2022a

systemcomposer.interface.FunctionElement

Function in client-server interface

Description

A `FunctionElement` object describes the attributes of a function in a client-server interface `systemcomposer.interface.ServiceInterface`.

Creation

Create a function element using the `addElement` function.

```
element = addElement(serviceInterface,"f0")
```

Properties

`Interface` — Parent service interface of function element
service interface object

Parent service interface of function element, specified as a `systemcomposer.interface.ServiceInterface` object.

`Name` — Function element name
character vector | string

Function element name, specified as a character vector or string.

Example: `"newFunctionElement"`

Data Types: `char` | `string`

`FunctionPrototype` — Function prototype
character vector | string

Function prototype to define input and output arguments, specified as a character vector or string.

Example: `"[y1,y2]=f1(u1,u2)"`

Data Types: `char` | `string`

`FunctionArguments` — Function arguments
array of function argument objects

Function arguments, specified as an array of `systemcomposer.interface.FunctionArgument` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for function element, specified as a character vector.

Example: '91d5de2c-b14c-4c76-a5d6-5dd0037c52df'

Data Types: char

ExternalUID — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the function element and through all operations that preserve the UUID.

Data Types: char

Object Functions

setName	Set name for value type, function argument, interface, or element
setFunctionPrototype	Set prototype for function element
getFunctionArgument	Get function argument on function element
destroy	Remove model element

Examples

Get Function Argument

Create a new model.

```
model = systemcomposer.createModel("archModel","SoftwareArchitecture",true)
```

Create a service interface.

```
interface = addServiceInterface(model.InterfaceDictionary,"newServiceInterface")
```

Create a function element.

```
element = addElement(interface,"newFunctionElement")
```

Set a function prototype to add function arguments.

```
setFunctionPrototype(element,"y=f0(u)")
```

Get a function argument.

```
argument = getFunctionArgument(element,"y")
```

```
argument = 

  FunctionArgument with properties:

      Interface: [1×1 systemcomposer.interface.ServiceInterface]
        Element: [1×1 systemcomposer.interface.FunctionElement]
           Name: 'y'
           Type: [1×1 systemcomposer.ValueType]
     Dimensions: '1'
    Description: ''
```

```
        UUID: '018b4e55-fa8f-4250-ac2b-df72bf620feb'
ExternalUID: ''
```

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addElement` | `removeElement` | `getElement` | `systemcomposer.interface.Dictionary`

Topics

"Author Service Interfaces for Client-Server Communication"
"Client-Server Interfaces in the Class Diagram View"
"Define Port Interfaces Between Components"

Introduced in R2022a

systemcomposer.interface.PhysicalDomain

Physical domain in System Composer

Description

A `PhysicalDomain` object describes a physical domain in System Composer. A physical domain can be used as an owned interface on a port and typed to a physical element on a physical interface.

Creation

Create an owned interface using a physical domain on a port.

```
model = systemcomposer.createModel('archModel',true);
rootArch = get(model,'Architecture');
newComponent = addComponent(rootArch,'newComponent');
newPort = addPort(newComponent.Architecture,'newCompPort','physical');
port = newComponent.getPort('newCompPort');
interface = port.createInterface;
interface.Domain = 'mechanical.rotational.rotational'
```

Properties

`Owner` — Parent of physical domain
architecture port object

Parent of physical domain, specified as a `systemcomposer.arch.ArchitecturePort` object.

`Model` — Parent model
model object

Parent System Composer model of physical domain, specified as a `systemcomposer.arch.Model` object.

`Domain` — Physical domain
character vector | string

Physical domain, specified as a character vector or string of a partial physical domain name. For a list of valid physical domain names, see "Domain-Specific Line Styles" (Simscape).

Data Types: `char` | `string`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for physical domain, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

ExternalUID — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the physical domain and through all operations that preserve the UUID.

Data Types: char

Object Functions

destroy Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

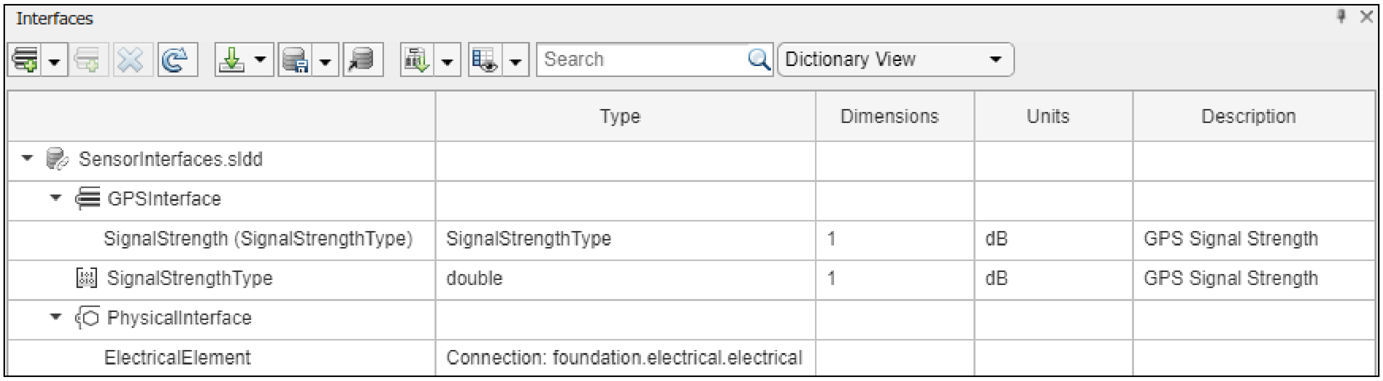
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



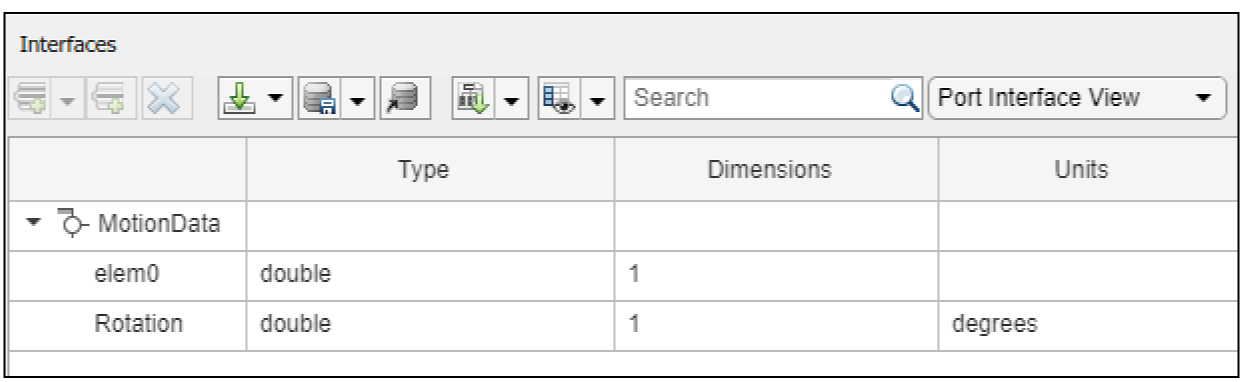
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

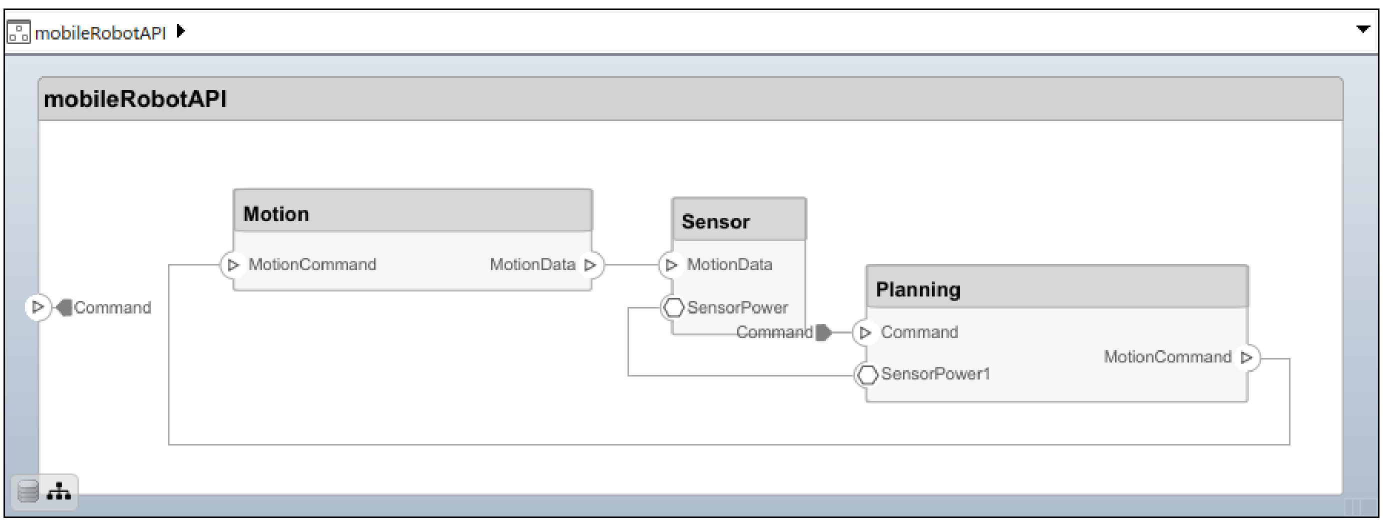
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all
```

```
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contr
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

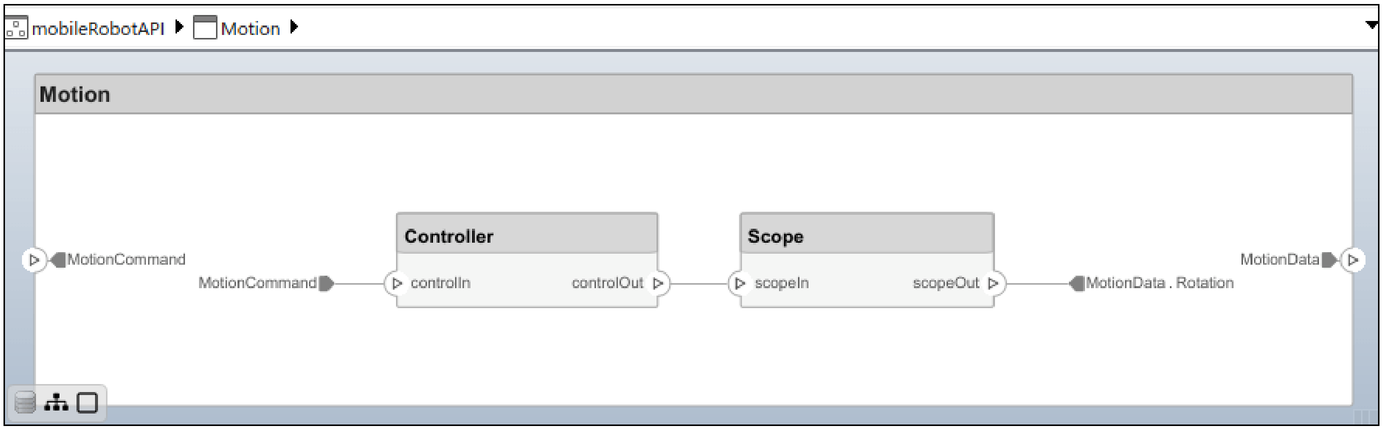
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```

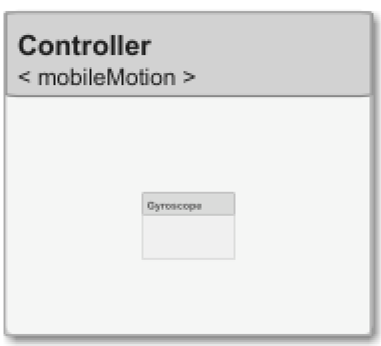


Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```



Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active

choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

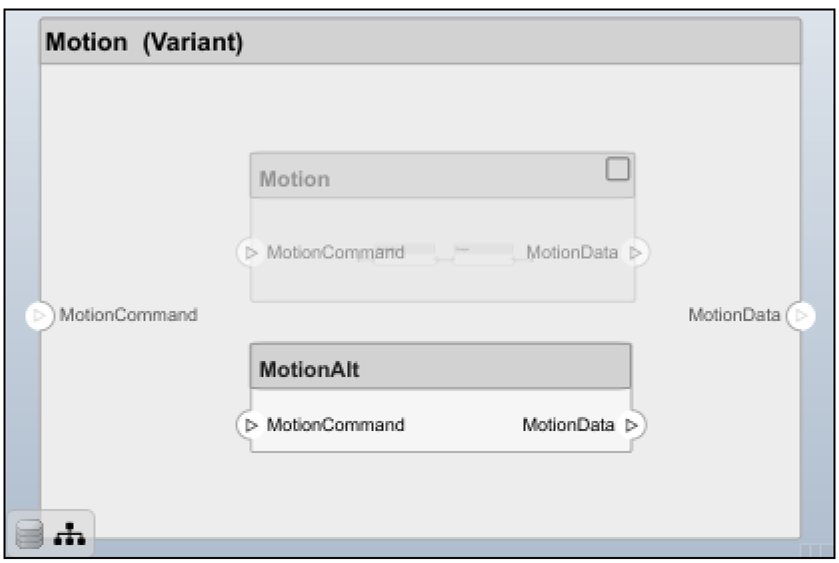
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`createInterface` | `addPhysicalInterface` | `systemcomposer.interface.PhysicalInterface` | `systemcomposer.interface.PhysicalElement` | `systemcomposer.interface.Dictionary`

Topics

"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021b

systemcomposer.interface.PhysicalElement

Physical element in physical interface

Description

A `PhysicalElement` object represents a physical element in a physical interface.

Creation

Create a physical element using the `addElement` function.

```
element = addElement(interface,"newPhysicalElement")
```

Properties

`Interface` — Parent physical interface of physical element
physical interface object

Parent physical interface of physical element, specified as a `systemcomposer.interface.PhysicalInterface` object.

`Name` — Physical element name
character vector | string

Physical element name, specified as a character vector or string.

Example: `"newPhysicalElement"`

Data Types: `char` | `string`

`Type` — Type of physical element
physical interface object | physical domain object | character vector | string

Type of physical element, specified as a `systemcomposer.interface.PhysicalInterface` or `systemcomposer.interface.PhysicalDomain` object or a character vector or string of the partial physical domain name. For a list of valid physical domain names, see “Domain-Specific Line Styles” (Simscape).

`UUID` — Universal unique identifier
character vector

Universal unique identifier for physical element, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the physical element and through all operations that preserve the UUID.

Data Types: char

Object Functions

setName Set name for value type, function argument, interface, or element
destroy Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

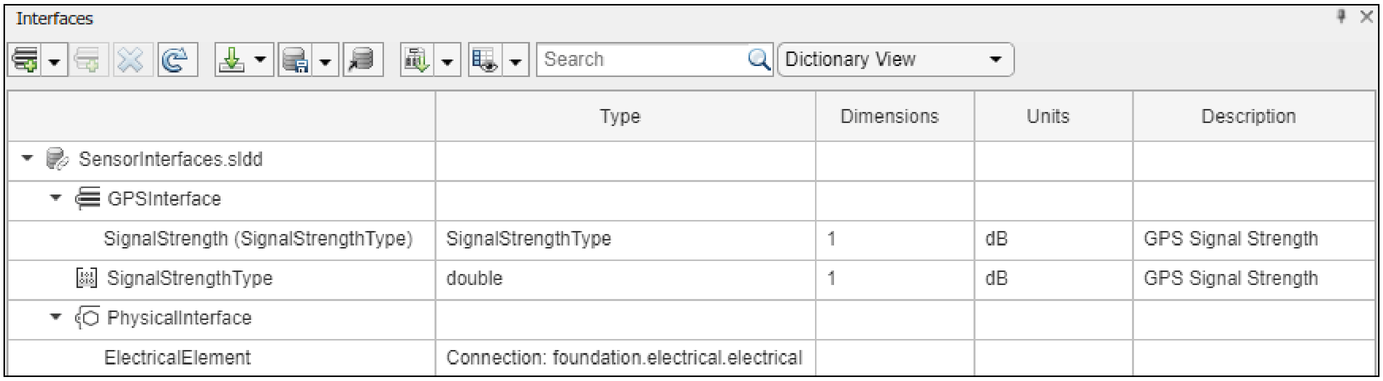
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



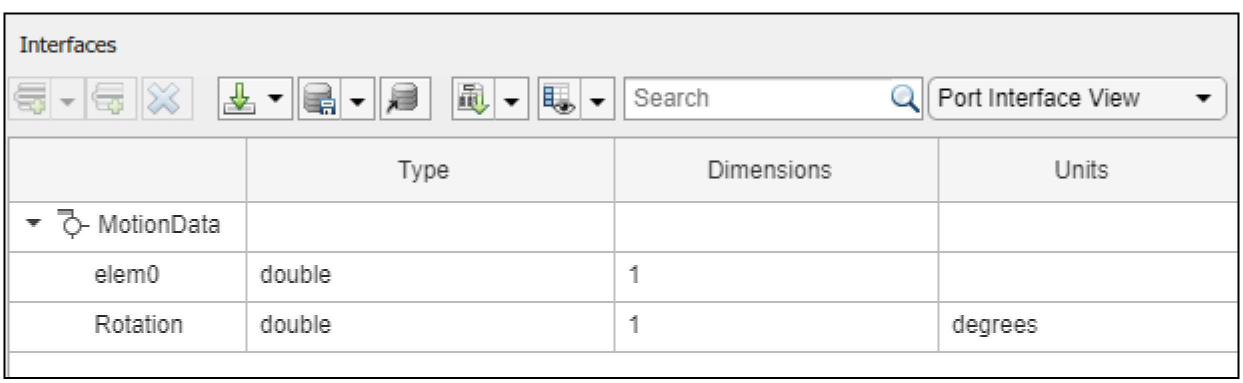
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

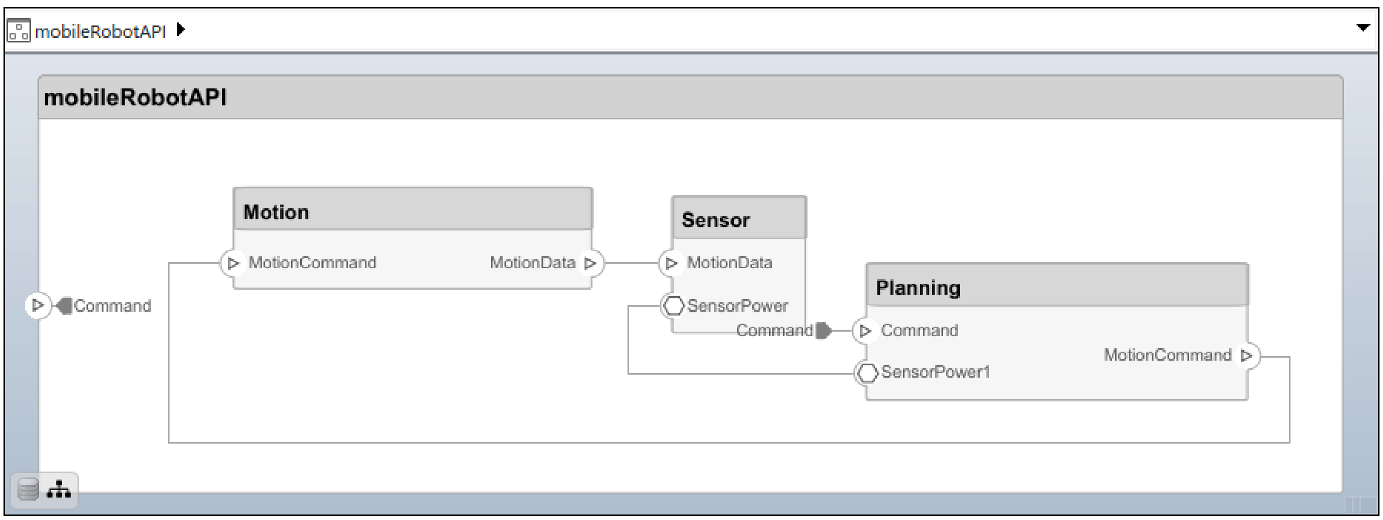
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
```

```
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

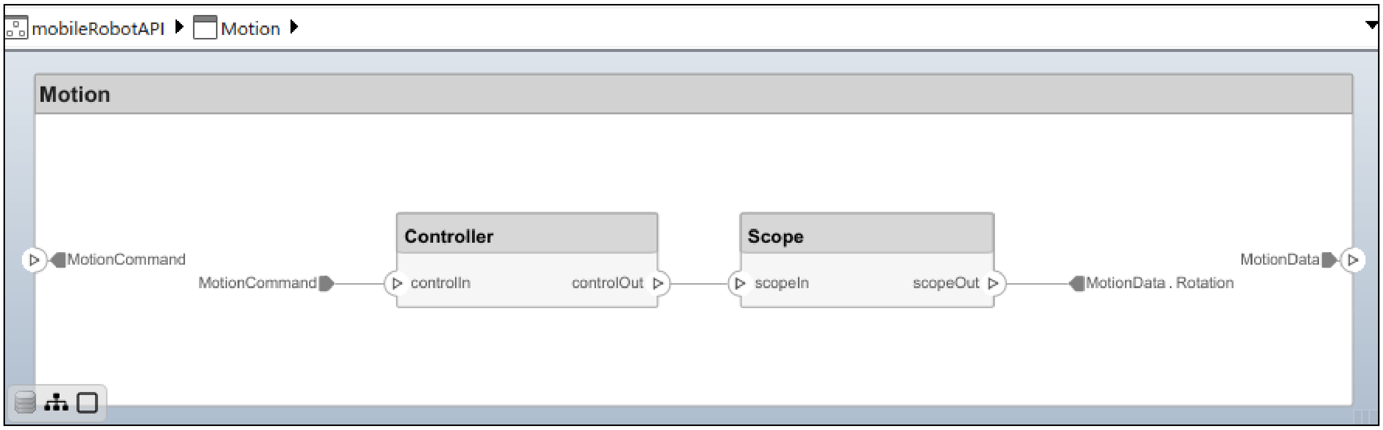
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active

choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

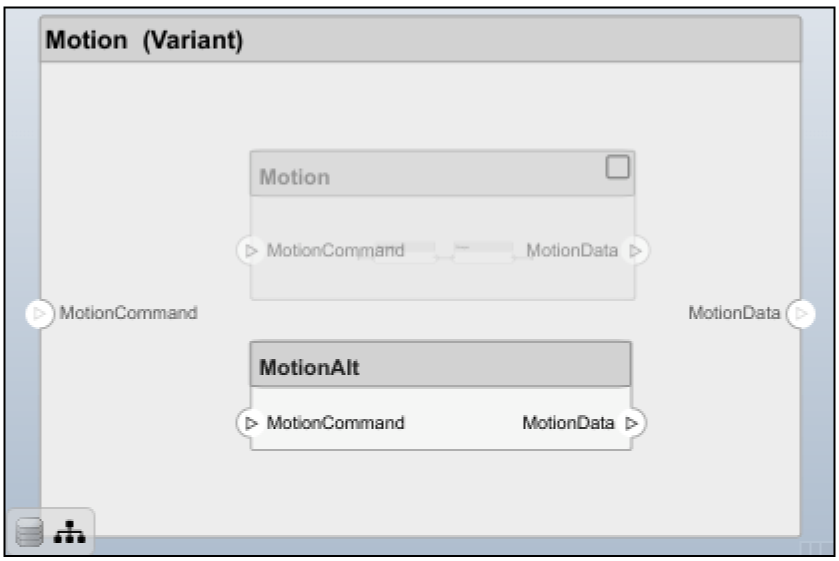
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	“Specify Physical Interfaces on Ports”
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	“Describe Component Behavior Using Simscape”

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addPhysicalInterface` | `addElement` | `removeElement` | `getElement` | `systemcomposer.interface.Dictionary` | `systemcomposer.interface.PhysicalDomain` | `systemcomposer.interface.PhysicalInterface`

Topics

"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021b

systemcomposer.interface.PhysicalInterface

Physical interface

Description

A `PhysicalInterface` object represents the structure of a physical interface.

Creation

Create a physical interface using the `addPhysicalInterface` function.

```
interface = addPhysicalInterface(model.InterfaceDictionary,"newPhysicalInterface")
```

Properties

`Owner` — Parent of physical interface
dictionary object | physical element object | architecture port object

Parent of physical interface, specified as a `systemcomposer.interface.Dictionary`, `systemcomposer.interface.PhysicalElement`, or `systemcomposer.arch.ArchitecturePort` object.

`Model` — Parent model
model object

Parent System Composer model of physical interface, specified as a `systemcomposer.arch.Model` object.

`Name` — Physical interface name
character vector | string

Physical interface name, specified as a character vector or string. This property must be a valid MATLAB identifier.

Example: `"newPhysicalInterface"`

Data Types: `char` | `string`

`Elements` — Elements in interface
array of physical element objects

Elements in interface, specified as an array of `systemcomposer.interface.PhysicalElement` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for physical interface, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the physical interface and through all operations that preserve the `UUID`.

Data Types: `char`

Object Functions

addElement	Add element
getElement	Get object for element
removeElement	Remove element
setName	Set name for value type, function argument, interface, or element
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
getStereotypeProperties	Get stereotype property names on element
removeStereotype	Remove stereotype from model element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
setProperty	Set property value corresponding to stereotype applied to element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

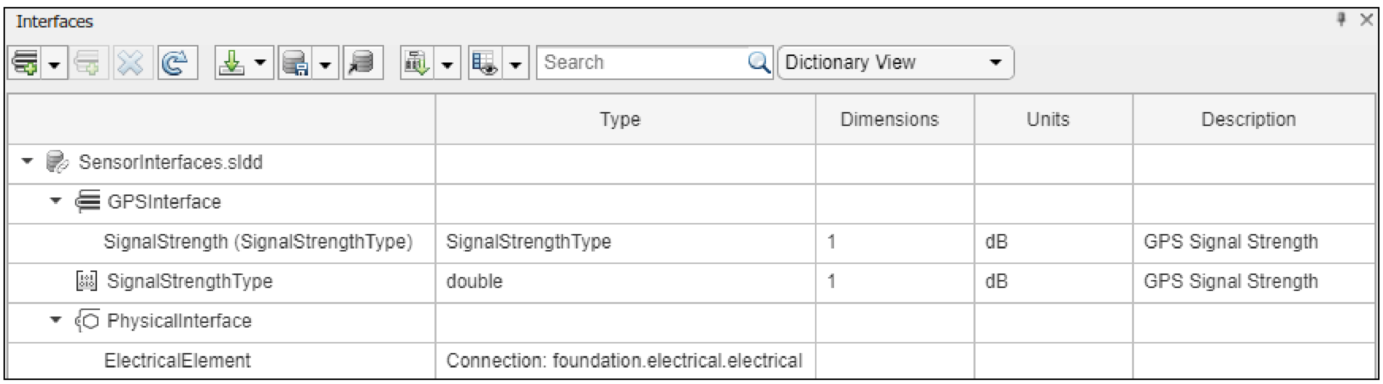
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



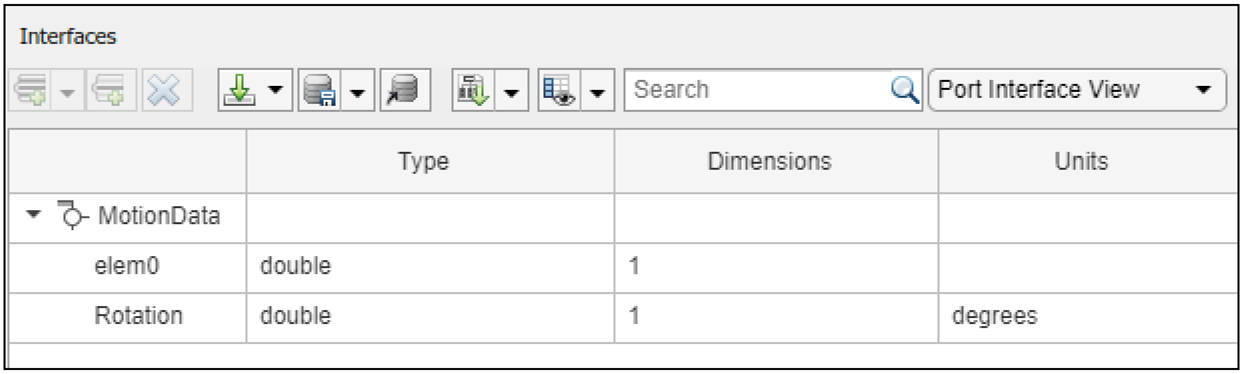
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

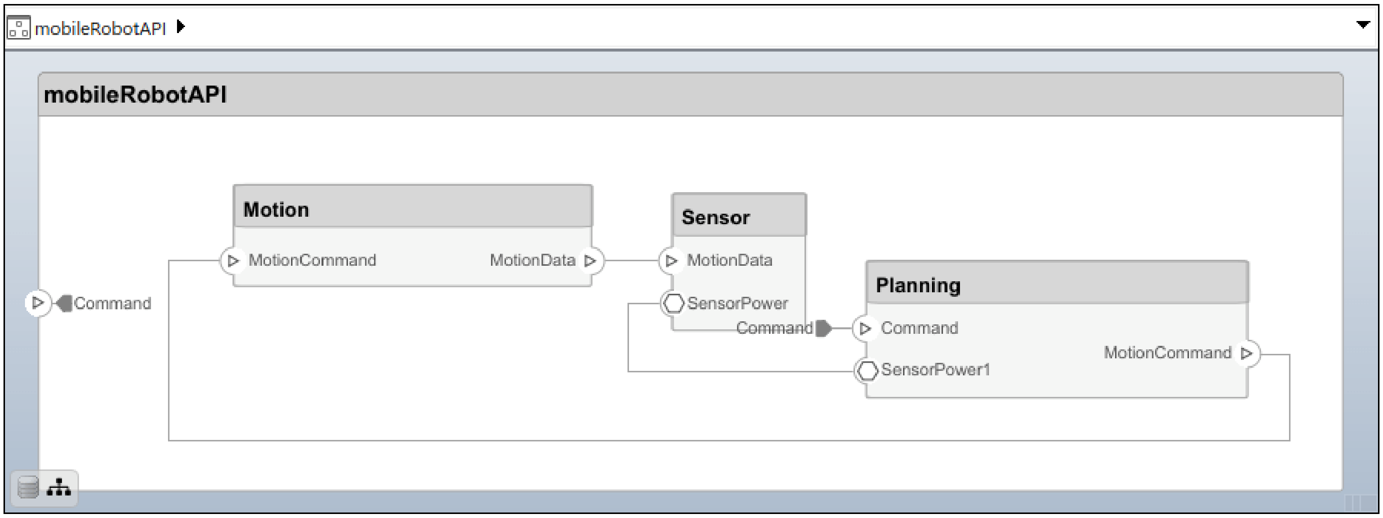
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
```

```
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype.

Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

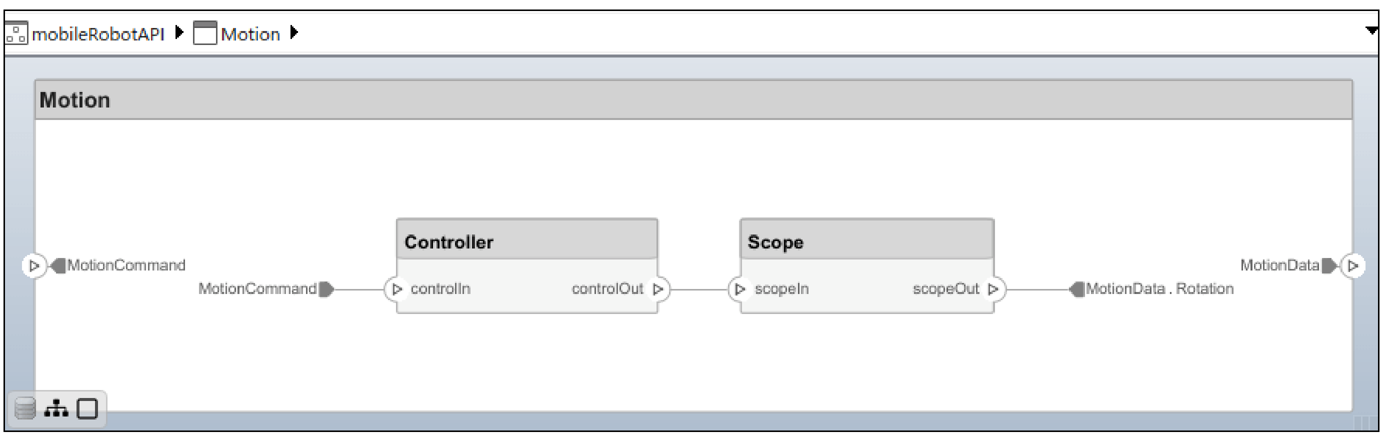
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
```

```
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named Motion`Alt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on Motion`Alt`.

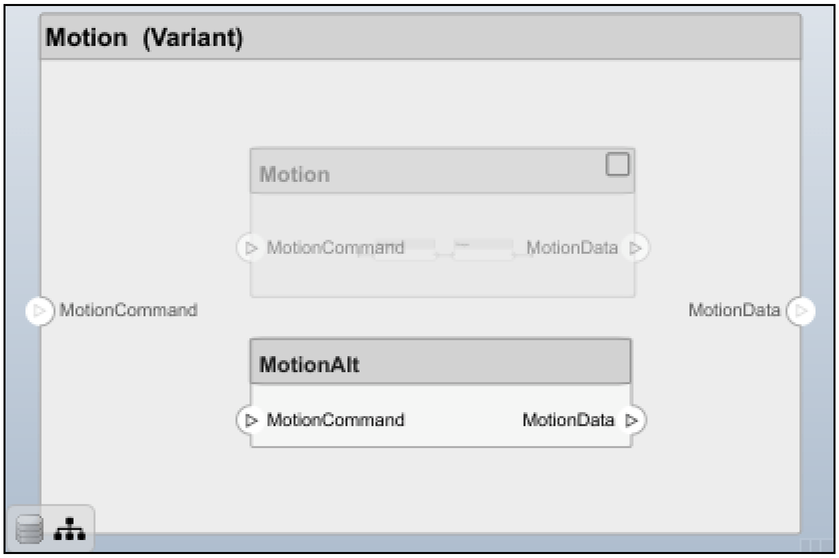
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make Motion`Alt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”

Term	Definition	Application	More Information
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	“Specify Physical Interfaces on Ports”
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	“Describe Component Behavior Using Simscape”

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• “Manage Interfaces with Data Dictionaries” • “Reference Data Dictionaries”

Term	Definition	Application	More Information
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`addPhysicalInterface` | `setInterface` | `getInterface` | `getInterfaceNames` | `removeInterface` | `systemcomposer.interface.Dictionary` | `systemcomposer.interface.PhysicalElement` | `systemcomposer.interface.PhysicalDomain`

Topics

“Specify Physical Interfaces on Ports”
“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

systemcomposer.interface.ServiceInterface

Client-server interface

Description

A `ServiceInterface` object describes the structure and attributes of a client-server interface.

Creation

Create a service interface using the `addServiceInterface` function.

```
interface = addServiceInterface(model.InterfaceDictionary,"newServiceInterface")
```

Properties

`Dictionary` — Dictionary of service interface
dictionary object

Dictionary of service interface, specified as a `systemcomposer.interface.Dictionary` object.

`Model` — Parent model
model object

Parent model of service interface, specified as a `systemcomposer.arch.Model` object.

`Name` — Service interface name
character vector | string

Service interface name, specified as a character vector or string. This property must be a valid MATLAB identifier.

Example: `"newInterface"`

Data Types: `char` | `string`

`Elements` — Elements in interface
array of function element objects

Elements in interface, specified as an array of `systemcomposer.interface.FunctionElement` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for service interface, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

ExternalUID — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the service interface and through all operations that preserve the UUID.

Data Types: char

Object Functions

addElement	Add element
getElement	Get object for element
removeElement	Remove element
setName	Set name for value type, function argument, interface, or element
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
getStereotypeProperties	Get stereotype property names on element
removeStereotype	Remove stereotype from model element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
setProperty	Set property value corresponding to stereotype applied to element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Examples

Get Function Argument

Create a new model.

```
model = systemcomposer.createModel("archModel","SoftwareArchitecture",true)
```

Create a service interface.

```
interface = addServiceInterface(model.InterfaceDictionary,"newServiceInterface")
```

Create a function element.

```
element = addElement(interface,"newFunctionElement")
```

Set a function prototype to add function arguments.

```
setFunctionPrototype(element,"y=f0(u)")
```

Get a function argument.

```
argument = getFunctionArgument(element,"y")
```

```
argument = 

  FunctionArgument with properties:

      Interface: [1×1 systemcomposer.interface.ServiceInterface]
        Element: [1×1 systemcomposer.interface.FunctionElement]
```

```
        Name: 'y'
        Type: [1×1 systemcomposer.ValueType]
  Dimensions: '1'
 Description: ''
        UUID: '018b4e55-fa8f-4250-ac2b-df72bf620feb'
 ExternalUID: ''
```

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"

Term	Definition	Application	More Information
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`setInterface` | `getInterface` | `getInterfaceNames` | `removeInterface` | `systemcomposer.interface.FunctionElement` | `systemcomposer.interface.Dictionary`

Topics

"Author Service Interfaces for Client-Server Communication"
"Client-Server Interfaces in the Class Diagram View"
"Define Port Interfaces Between Components"

Introduced in R2022a

systemcomposer.interface.SignalElement

(Removed) Element in signal interface

Note The `systemcomposer.interface.SignalElement` class has been removed. It has been replaced with the `systemcomposer.interface.DataElement` class. For further details, see "Compatibility Considerations".

Description

A `SignalElement` object represents a signal element in a signal interface.

Properties

`Interface` — Parent interface of element
signal interface object

Parent interface of element, specified as a `systemcomposer.interface.SignalInterface` object.

`Name` — Element name
character vector

Element name, specified as a character vector.

Data Types: `char`

`Dimensions` — Dimensions of element
array of positive integers

Dimensions of element, specified as an array of positive integers.

Data Types: `integer`

`Type` — Data type of element
character vector

Data type of element, specified as a character vector.

Data Types: `char`

`Complexity` — Complexity of element
`'real'` | `'complex'`

Complexity of element, specified as `'real'` or `'complex'`.

Data Types: `char`

`Units` — Units of element
character vector

Units of element, specified as a character vector.

Data Types: `char`

`Minimum` — Minimum value for element
numeric

Minimum value for element, specified as a numeric `double`.

Data Types: `double`

`Maximum` — Maximum value for element
numeric

Maximum value for element, specified as a numeric `double`.

Data Types: `double`

`Description` — Description text for element
character vector

Description text for element, specified as a character vector.

Data Types: `char`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for interface element, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the interface element and through all operations that preserve the `UUID`.

Data Types: `char`

Object Functions

setName	Set name for value type, function argument, interface, or element
setDataType	Set data type for value type
setDimensions	Set dimensions for value type
setUnits	Set units for value type
setComplexity	Set complexity for value type
setMinimum	Set minimum for value type
setMaximum	Set maximum for value type
setDescription	Set description for value type
destroy	Remove model element

Compatibility Considerations

`systemcomposer.interface.SignalElement` class has been removed
Errors starting in R2021b

The `systemcomposer.interface.SignalElement` class is removed in R2021b. Use `systemcomposer.interface.DataElement` instead.

See Also

`systemcomposer.interface.DataInterface` | `systemcomposer.interface.DataElement` | `systemcomposer.interface.Dictionary` | `systemcomposer.ValueType` | `addElement` | `removeElement` | `getElement`

Topics
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

systemcomposer.interface.SignalInterface

(Removed) Signal interface

Note The `systemcomposer.interface.SignalInterface` class has been removed. It has been replaced with the `systemcomposer.interface.DataInterface` class. For further details, see "Compatibility Considerations".

Description

A `SignalInterface` object represents the structure of the signal interface at a given port.

Properties

`Dictionary` — Parent dictionary of interface
interface dictionary object

Parent dictionary of interface, specified as a `systemcomposer.interface.Dictionary` object.

`Name` — Interface name
character vector

Interface name, specified as a character vector.

Example: `'NewInterface'`

Data Types: `char`

`Elements` — Elements in interface
array of interface element objects

Elements in interface, specified as an array of `systemcomposer.interface.SignalElement` objects.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for signal interface, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the signal interface and through all operations that preserve the `UUID`.

Data Types: `char`

`Model` — Parent model
model object

Parent System Composer model of signal interface, specified as a `systemcomposer.arch.Model` object.

Object Functions

addElement	Add element
getElement	Get object for element
removeElement	Remove element
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
getStereotypeProperties	Get stereotype property names on element
removeStereotype	Remove stereotype from model element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
setProperty	Set property value corresponding to stereotype applied to element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Compatibility Considerations

`systemcomposer.interface.SignalInterface` class has been removed
Errors starting in R2021b

The `systemcomposer.interface.SignalInterface` class is removed in R2021b. Use `systemcomposer.interface.DataInterface` instead.

See Also

`systemcomposer.interface.DataInterface` | `systemcomposer.interface.DataElement` | `systemcomposer.interface.Dictionary` | `systemcomposer.ValueType` | `addInterface` | `getInterface` | `removeInterface` | `getInterfaceNames`

Topics
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

systemcomposer.io.ModelBuilder

Model builder for System Composer architecture models

Description

Build System Composer models using a `systemcomposer.io.ModelBuilder` object. Build System Composer models with components and their position in an architecture hierarchy, ports and their mappings to components, connections among components through ports, and interfaces in architecture models and their mappings to ports.

Creation

```
builder = systemcomposer.io.ModelBuilder(profile)
```

Properties

`Components` — Component information
table

Component information, specified as a table containing this information:

- Hierarchical information of components
- Type of component (for example, Component, Reference Component, Variant Component, or Adapter)
- Stereotypes applied on a component
- Ability to set property values of a component

`Ports` — Ports information
table

Ports information, specified as a table. The table contains the information about ports, including their mappings to components and interfaces, and stereotypes applied on them.

`Connections` — Connections information
table

Connections information, specified as a table. The table contains information about the connections between the ports defined in `Ports` table as well as stereotypes applied on connections.

`Interfaces` — Interfaces information
table

Interfaces information, specified as a table. The table contains the definitions of various interfaces and their elements.

Examples

Import System Composer Architecture Using ModelBuilder

Import architecture specifications into System Composer™ using the `systemcomposer.io.ModelBuilder` utility class. These architecture specifications can be defined in an external source, such as an Excel® file.

In System Composer, an architecture is fully defined by four sets of information:

- Components and their position in the architecture hierarchy.
- Ports and their mapping to components.
- Connections among components through ports. In this example, we also import interface data definitions from an external source.
- Interfaces in architecture models and their mapping to ports.

This example uses the `systemcomposer.io.ModelBuilder` class to pass all of the above architecture information and import a System Composer model.

In this example, architecture information of a small UAV system is defined in an Excel spreadsheet and is used to create a System Composer architecture model.

External Source Files

- `Architecture.xlsx` — This Excel file contains hierarchical information of the architecture model. This example maps the external source data to System Composer model elements. This information maps in column names to System Composer model elements.

```
# Element    : Name of the element. Either can be component or port name.
# Parent     : Name of the parent element.
# Class      : Can be either component or port(Input/Output direction of the port).
# Domain     : Mapped as component property. Property "Manufacturer" defined in the
               profile UAVComponent under Stereotype PartDescriptor maps to Domain values in
# Kind       : Mapped as component property. Property "ModelName" defined in the
               profile UAVComponent under Stereotype PartDescriptor maps to Kind values in e
# InterfaceName : If class is of port type. InterfaceName maps to name of the interface link
# ConnectedTo : In case of port type, it specifies the connection to
                other port defined in format "ComponentName::PortName".
```

- `DataDefinitions.xlsx` — This Excel file contains interface data definitions of the model. This example assumes this mapping between the data definitions in the Excel source file and interfaces hierarchy in System Composer.

```
# Name        : Name of the interface or element.
# Parent      : Name of the parent interface Name(Applicable only for elements) .
# Datatype    : Datatype of element. Can be another interface in format
                Bus: InterfaceName
# Dimensions  : Dimensions of the element.
# Units       : Unit property of the element.
# Minimum     : Minimum value of the element.
# Maximum     : Maximum value of the element.
```

Step 1. Instantiate the ModelBuilder Class

You can instantiate the `ModelBuilder` class with a profile name.

```
[stat,fa] = fileattrib(pwd);
if ~fa.UserWrite
```

```
    disp('This script must be run in a writable directory');
    return;
end
```

Specify the name of the model to build.

```
modelName = 'scExampleModelBuider';
```

Specify the name of the profile.

```
profile = 'UAVComponent';
```

Specify the name of the source file to read architecture information.

```
architectureFileName = 'Architecture.xlsx';
```

Instantiate the `ModelBuilder`.

```
builder = systemcomposer.io.ModelBuilder(profile);
```

Step 2. Build Interface Data Definitions

Reading the information in the external source file `DataDefinitions.xlsx` to build the interface data model.

Create MATLAB® tables from the Excel source file.

```
opts = detectImportOptions('DataDefinitions.xlsx');
opts.DataRange = 'A2';
```

Force `readtable` to start reading from the second row.

```
definitionContents = readtable('DataDefinitions.xlsx',opts);
```

The `systemcomposer.io.IdService` class generates unique `ID` for a given key.

```
idService = systemcomposer.io.IdService();

for rowItr =1:numel(definitionContents(:,1))
    parentInterface = definitionContents.Parent{rowItr};
    if isempty(parentInterface)
```

In the case of interfaces, add the interface name to the model builder.

```
        interfaceName = definitionContents.Name{rowItr};
```

Get the unique interface `ID`.

`getID(container,key)` generates or returns (if key is already present) same value for input key within the container.

```
        interfaceID = idService.getID('interfaces',interfaceName);
```

Use `builder.addInterface` to add the interface to the data dictionary.

```
        builder.addInterface(interfaceName,interfaceID);
    else
```

In the case of an element, read the element properties and add the element to the parent interface.

```
        elementName  = definitionContents.Name{rowItr};
        interfaceID = idService.getID('interfaces',parentInterface);
```

The `ElementID` is unique within a interface. Append `E` at the start of an `ID` for uniformity. The generated `ID` for an input element is unique within parent interface name as a container.

```
        elemID = idService.getID(parentInterface,elementName,'E');
```

Set the data type, dimensions, units, minimum, and maximum properties of the element.

```
        datatype = definitionContents.DataType{rowItr};
        dimensions = string(definitionContents.Dimensions(rowItr));
        units = definitionContents.Units(rowItr);
```

Make sure that input to builder utility function is always a string.

```
        if ~ischar(units)
            units = '';
        end
        minimum = definitionContents.Minimum{rowItr};
        maximum = definitionContents.Maximum{rowItr};
```

Use `builder.addElementInInterface` to add an element with properties in the interface.

```
        builder.addElementInInterface(elementName,elemID,interfaceID,datatype,dimensions,units,'
    end
end
```

Step 3. Build Architecture Specifications

Architecture specifications are created by MATLAB tables from the Excel source file.

```
excelContents = readtable(architectureFileName);
```

Iterate over each row in the table.

```
for rowItr =1:numel(excelContents(:,1))
```

Read each row of the Excel file and columns.

```
    class = excelContents.Class(rowItr);
    Parent = excelContents.Parent(rowItr);
    Name = excelContents.Element{rowItr};
```

Populate the contents of the table.

```
    if strcmp(class,'component')
        ID = idService.getID('comp',Name);
```

The `Root ID` is by default set as zero.

```
        if strcmp(Parent,'scExampleSmallUAV')
            parentID = "0";
        else
            parentID = idService.getID('comp',Parent);
        end
```

Use `builder.addComponent` to add a component.

```
        builder.addComponent(Name,ID,parentID);
```

Read the property values.

```
        kind = excelContents.Kind{rowItr};
        domain = excelContents.Domain{rowItr};
```

Use `builder.setComponentProperty` to set stereotype and property values.

```
        builder.setComponentProperty(ID,'StereotypeName','UAVComponent.PartDescriptor','ModelName
    else
```

In this example, concatenation of the port name and parent component name is used as key to generate unique IDs for ports.

```
        portID = idService.getID('port',strcat(Name,Parent));
```

For ports on root architecture, the `compID` is assumed as `0`.

```
        if strcmp(Parent,'scExampleSmallUAV')
            compID = "0";
        else
            compID = idService.getID('comp',Parent);
        end
```

Use `builder.addPort` to add a port.

```
        builder.addPort(Name,class,portID,compID );
```

The `InterfaceName` specifies the name of the interface linked to the port.

```
        interfaceName = excelContents.InterfaceName{rowItr};
```

Get the interface ID.

`getID` will return the same IDs already generated while adding interface in Step 2.

```
        interfaceID = idService.getID('interfaces',interfaceName);
```

Use `builder.addInterfaceToPort` to map interface to port.

```
        builder.addInterfaceToPort(interfaceID,portID);
```

Read the `ConnectedTo` information to build connections between components.

```
        connectedTo = excelContents.ConnectedTo{rowItr};
```

`ConnectedTo` is in the format:

`(DestinationComponentName::DestinationPortName)`

For this example, consider the current port as source of the connection.

```
        if ~isempty(connectedTo)
            connID = idService.getID('connection',connectedTo);
            splits = split(connectedTo,'::');
```

Get the port ID of the connected port.

In this example, port ID is generated by concatenating the port name and the parent component name. If the port ID is already generated, the `getID` function returns the same ID for the input key.

```
            connectedPortID = idService.getID('port',strcat(splits(2),splits(1)));
```

Populate the connection table.

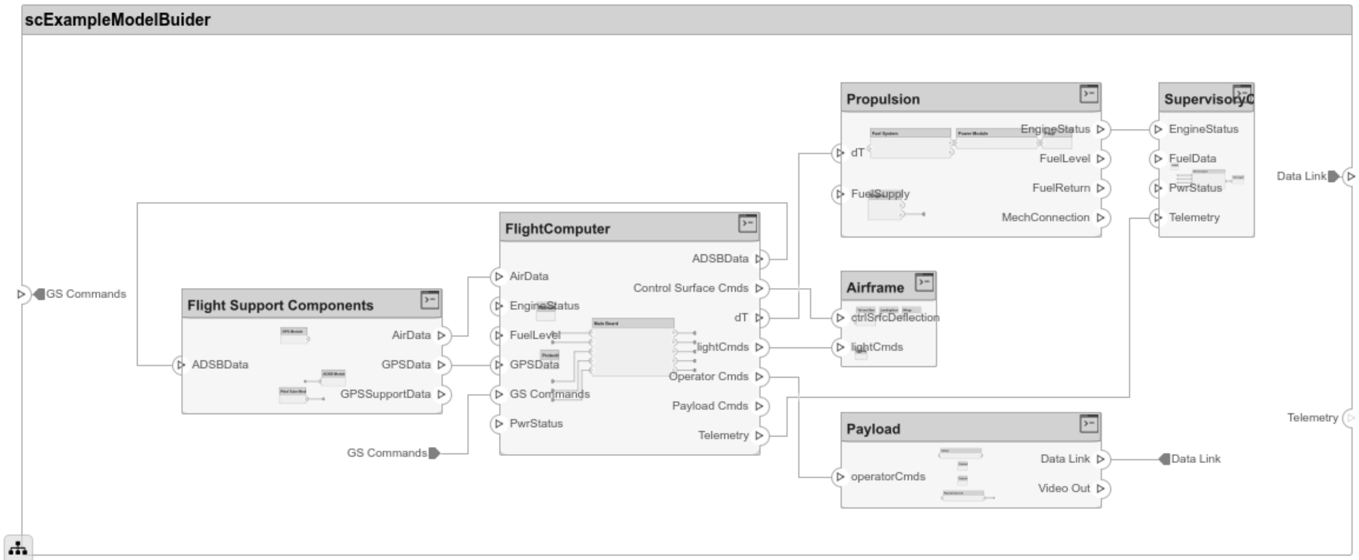
```
            sourcePortID = portID;
            destPortID = connectedPortID;
```

Use `builder.addConnection` to add connections.

```
            builder.addConnection(connectedTo,connID,sourcePortID,destPortID);
        end
    end
end
```

Step 3. Import Model from Populated Tables with `builder.build` Function

```
[model,importReport] = builder.build(modelName);
```



More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Algorithms

Components	Description
addComponent(compName,ID,ParentID)	Add component with name and ID as a child of component with ID as ParentID. In case of root, ParentID is 0.

setComponentProperty(ID,varargin)	Set stereotype on component with ID. Key value pair of property name and value defined in the stereotype can be passed as input. In this example
	`builder.setComponentProperty(ID,'StereotypeName',...`
	`'UAVComponent.PartDescriptor','ModelName',kind,'Manufacturer',doma`
	ModelName and Manufacturer are properties under stereotype PartDescriptor.

Ports	Description
addPort(portName,direction,ID,compID)	Add port with name and ID with direction (either Input or Output) to component with ID as compID.
setPropertyOnPort(ID,varargin)	Set stereotype on port with ID. Key value pair of the property name and the value defined in the stereotype can be passed as input.

Connections	Description
addConnection(connName,ID,sourcePortID,destPortID)	Add connection with name and ID between ports with sourcePortID (direction: Output) and destPortID (direction: Input) defined in the ports table.
setPropertyOnConnection(ID,varargin)	Set stereotype on connection with ID. Key value pair of the property name and the value defined in the stereotype can be passed as input.

Interfaces	Description
addInterface(interfaceName,ID)	Add interface with name and ID to a data dictionary.
addElementInInterface(elementName,ID,interfaceID,datatype,dimensions,units,complexity,Maximum,Minimum)	Add element with name and ID under an interface with ID as interfaceID. Data types, dimensions, units, complexity, and maximum and minimum are properties of an element. These properties are specified as strings.
addAnonymousInterface(ID,datatype,dimensions,units,complexity, Maximum,Minimum)	Add anonymous interface with ID and element properties like data type, dimensions, units, complexity, maximum, and minimum. Data type of an owned interface cannot be another interface name. Owned interfaces do not have elements like other interfaces.

Interfaces and Ports	Description
addInterfaceToPort(interfaceID,portID)	Link an interface with ID specified as InterfaceID to a port with ID specified as PortID.

Models	Description
build(modelName)	Build model with model name passed as input.

Logging and Reporting	Description
getImportErrorLog	Get ErrorLogs generated while importing the model . Called after the build function.
getImportReport	Get a report of the import. Called after the build function.

See Also

importModel | exportModel

Topics

"Import and Export Architecture Models"

Introduced in R2019b

systemcomposer.parameter.ParameterDefinition

Parameter definition in System Composer

Description

A `ParameterDefinition` object describes a parameter definition in System Composer. Set and get the properties of a parameter definition to edit and view the instance-specific parameters specified as model arguments on a referenced model.

Creation

Creating a `ParameterDefinition` object directly is not supported. A `ParameterDefinition` object is returned when you use the `getParameterDefinition` function.

Properties

`Owner` — Element that owns definition
architecture object

Element that owns definition, specified as a `systemcomposer.arch.Architecture` object.

`Name` — Parameter name
character vector | string

Parameter name, specified as a character vector or string. This property must be a valid MATLAB identifier.

Example: `"AirSpeed"`

Data Types: `char` | `string`

`Type` — Parameter data type
character vector | string

Parameter data type, specified as a character vector or string. This property must be a valid MATLAB data type.

Data Types: `char` | `string`

`Dimensions` — Parameter dimensions
character vector | string

Parameter dimensions, specified as a character vector or string.

Data Types: `char` | `string`

`Unit` — Parameter units
character vector | string

Parameter units, specified as a character vector or string.

Data Types: `char` | `string`

`Min` — Parameter minimum
character vector | string

Parameter minimum, specified as a character vector or string.

Data Types: `char` | `string`

`Max` — Parameter maximum
character vector | string

Parameter maximum, specified as a character vector or string.

Data Types: `char` | `string`

Examples

Modify Parameters for Axle Architecture

This example shows a wheel axle architecture model with instance-specific parameters exposed in System Composer™. These parameters are defined as model arguments on the Simulink® reference model used as a model behavior linked to two System Composer components. You can change the values of these parameters independently on each reference component.

Open `mAxleArch` Architecture Model

Open the architecture model of the wheel axle `mAxleArch` to interact with the parameters on the reference components using the Property Inspector.

```
model = systemcomposer.openModel("mAxleArch");
```

Look Up `RightWheel` and `LeftWheel` Components

Look up the `Component` objects for the `RightWheel` and `LeftWheel` components.

```
rightWheelComp = lookup(model,Path="mAxleArch/RightWheel");
leftWheelComp = lookup(model,Path="mAxleArch/LeftWheel");
```

Get Parameter Names on `RightWheel` Component

Get the parameter names for the `RightWheel` component. Since the `LeftWheel` component is linked to the same reference model `mWheel`, the parameters are the same on the `LeftWheel` component.

```
paramNames = rightWheelComp.getParameterNames
```

```
paramNames = 1×3 string
    "Pressure"    "Diameter"    "Wear"
```

Get Parameter Definition on `RightWheel` Component for `Pressure` Parameter

Get the parameter definition for the `Pressure` parameter on the `RightWheel` component architecture.

```
paramDefinition = rightWheelComp.Architecture.getParameterDefinition(paramNames(1))
```

```
paramDefinition =
  ParameterDefinition with properties:

           Name: 'Pressure'
           Type: 'double'
           Unit: 'psi'
     Complexity: 'real'
     Dimensions: '[1  1]'
          Value: '32'
            Min: ''
            Max: ''
    Description: ''
          Owner: [1×1 systemcomposer.arch.Architecture]
```

Get Parameter Values for RightWheel and LeftWheel Components

Get the parameter values for the RightWheel and LeftWheel components.

RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = rightWheelComp.getParameterValue(paramNames(i))
end
```

```
Right Wheel Parameters

paramName =
"Pressure"

paramValue =
'31'

paramUnits =
'psi'

isDefault = logical
   0


paramName =
"Diameter"

paramValue =
'16'

paramUnits =
'in'

isDefault = logical
   1


paramName =
"Wear"

paramValue =
'0.25'
```

```
paramUnits =
'in'

isDefault = logical
   1
```

LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue(paramNames(i))
end
```

```
paramName =
"Pressure"

paramValue =
'32'

paramUnits =
'psi'

isDefault = logical
   1


paramName =
"Diameter"

paramValue =
'15'

paramUnits =
'in'

isDefault = logical
   0


paramName =
"Wear"

paramValue =
'0.23'

paramUnits =
'in'

isDefault = logical
   0
```

Get Evaluated Parameter Values for RightWheel and LeftWheel Components

Get the evaluated parameter values for the RightWheel and LeftWheel components.

Evaluated RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
```

```
    [paramValue,paramUnits] = rightWheelComp.getEvaluatedParameterValue(paramNames(i))
end

paramName = 
"Pressure"

paramValue = 31

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 16

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2500

paramUnits = 
'in'
```

Evaluated `LeftWheel` Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = leftWheelComp.getEvaluatedParameterValue(paramNames(i))
end

paramName = 
"Pressure"

paramValue = 32

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 15

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2300

paramUnits = 
'in'
```

Set Parameter Value and Units for `Pressure` Parameter on `LeftWheel` Component

Set the parameter value and unit for the `PSI` parameter on the `LeftWheel` component.

Current Values for `Pressure` on `LeftWheel`

```
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'32'

paramUnits =
'psi'

isDefault = logical
   1
```

New Values for `Pressure` on `LeftWheel`

```
leftWheelComp.setParameterValue("Pressure","2000")
leftWheelComp.setUnit("Pressure","mbar")
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'2000'

paramUnits =
'mbar'

isDefault = logical
   0
```

Revert `Pressure` Parameter on `LeftWheel` to Default Value

```
leftWheelComp.resetParameterToDefault("Pressure")
```

Save Models

```
model = systemcomposer.loadModel("mWheelArch");
save(model)
```

```
topModel = systemcomposer.loadModel("mAxleArch");
save(topModel)
```

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"

Term	Definition	Application	More Information
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`getEvaluatedParameterValue` | `getParameterDefinition` | `getParameterNames` | `getParameterValue` | `setParameterValue` | `setUnit`

Topics

"Access Model Arguments as Parameters on Reference Components"
"Use Parameters to Store Instance Values with Components"

Introduced in R2022a

systemcomposer.profile.Profile

Profile

Description

A `Profile` object represents a profile for a System Composer model.

Creation

Create a profile using the `systemcomposer.profile.Profile.createProfile` function.

```
profile = systemcomposer.profile.Profile.createProfile("profileName");
```

Properties

`Name` — Name of profile
character vector | string

Name of profile, specified as a character vector or string. This property must be a valid MATLAB identifier.

Data Types: `char` | `string`

`FriendlyName` — Descriptive name of profile
character vector | string

Descriptive name of profile, specified as a character vector or string. This property can contain spaces and special characters, but no new lines.

Data Types: `char` | `string`

`Description` — Description text for profile
multi-line character vector | multi-line string

Description text for profile, specified as a multi-line character vector or string.

Data Types: `char` | `string`

`Stereotypes` — Stereotypes
array of stereotype objects

Stereotypes defined in profile, specified as an array of `systemcomposer.profile.Stereotype` objects.

Data Types: `char`

Object Functions

createProfile	Create profile
addStereotype	Add stereotype to profile

removeStereotype	Remove stereotype from profile
getStereotype	Find stereotype in profile by name
getDefaultStereotype	Get default stereotype for profile
setDefaultStereotype	Set default stereotype for profile
find	Find profile by name
open	Open profile
load	Load profile from file
save	Save profile as file
close	Close profile
closeAll	Close all open profiles
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

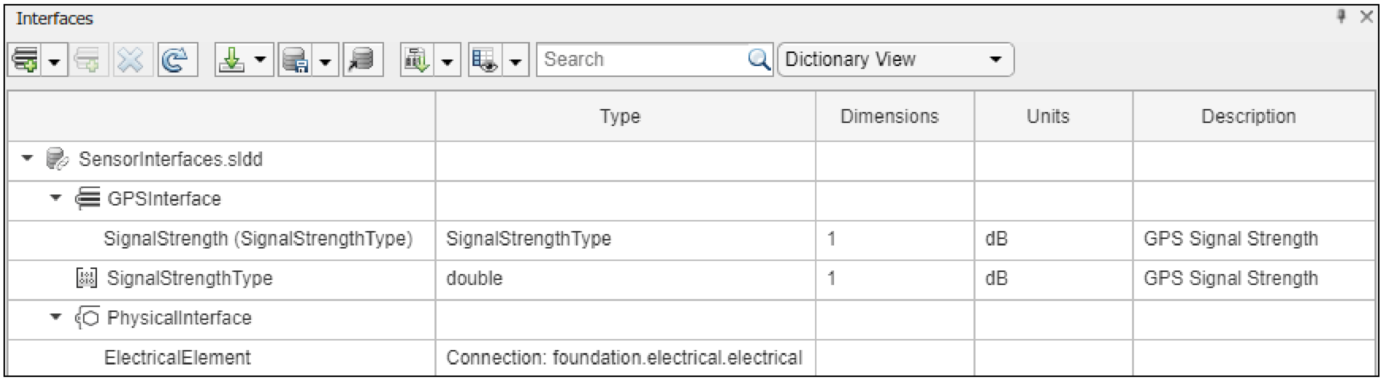
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



	Type	Dimensions	Units	Description
SensorInterfaces.sldd				
GPSInterface				
SignalStrength (SignalStrengthType)	SignalStrengthType	1	dB	GPS Signal Strength
SignalStrengthType	double	1	dB	GPS Signal Strength
PhysicalInterface				
ElectricalElement	Connection: foundation.electrical.electrical			

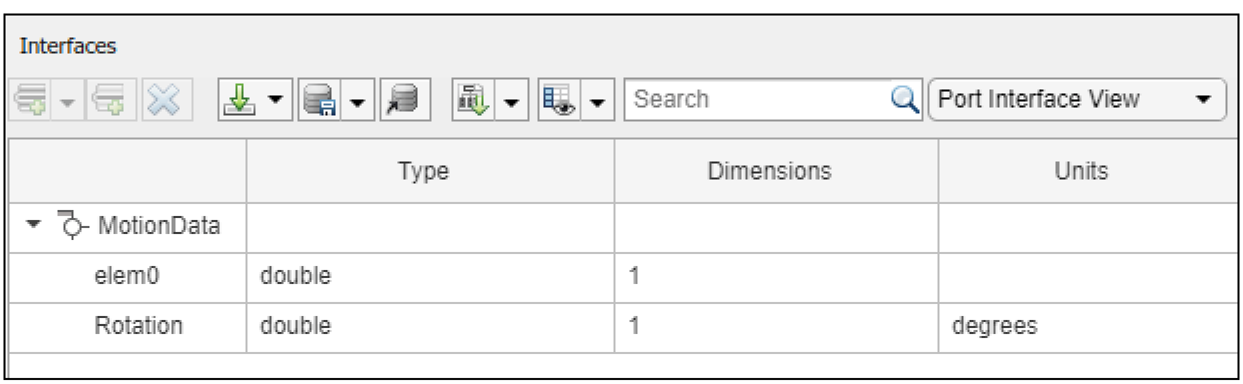
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



	Type	Dimensions	Units
MotionData			
elem0	double	1	
Rotation	double	1	degrees

Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

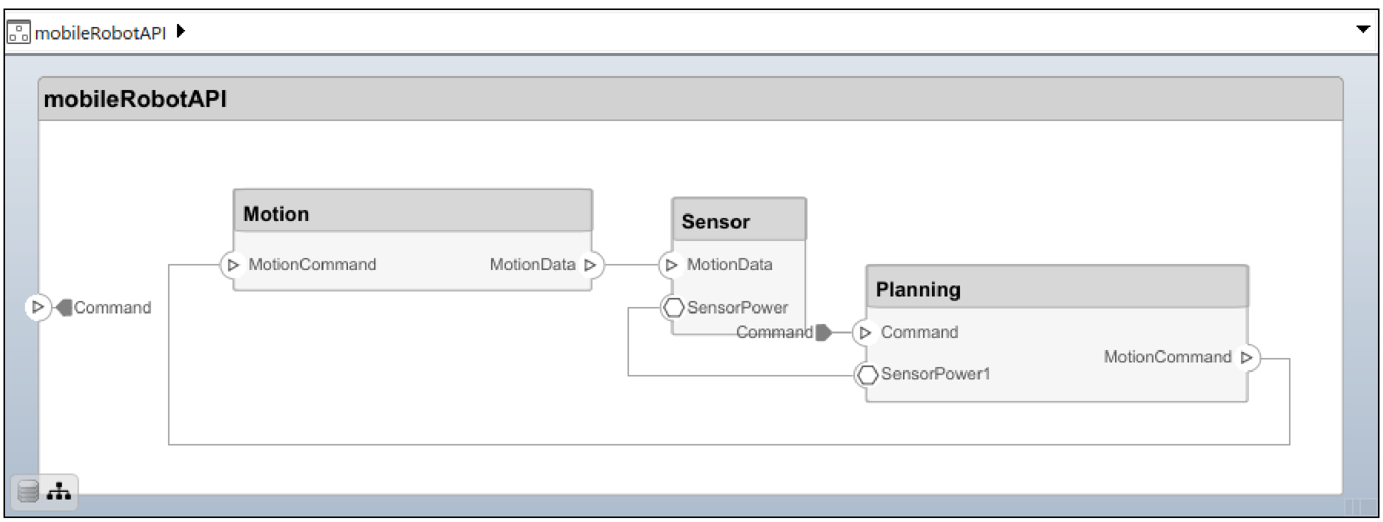
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
```

```
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contr
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

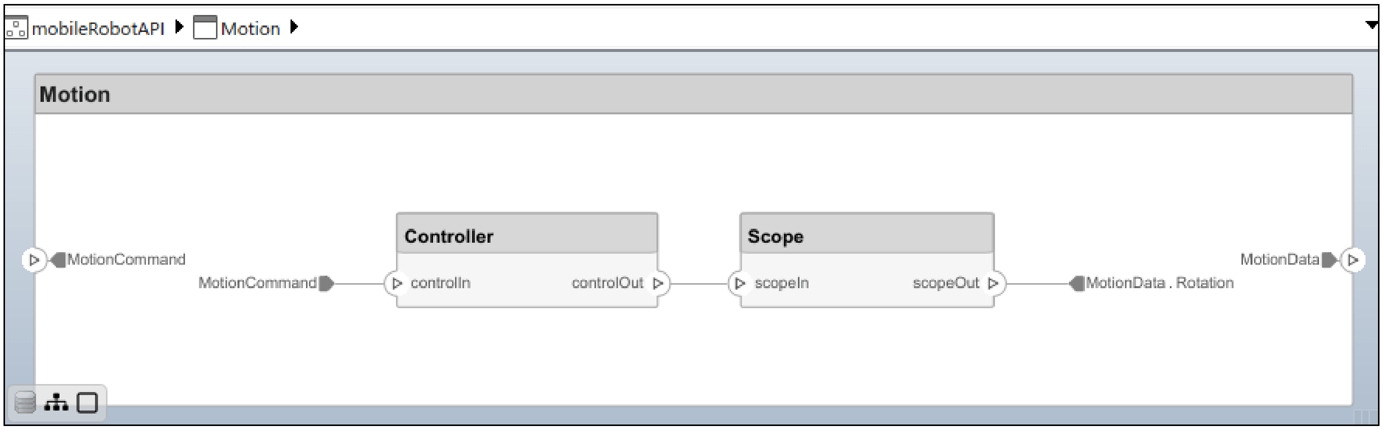
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active

choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

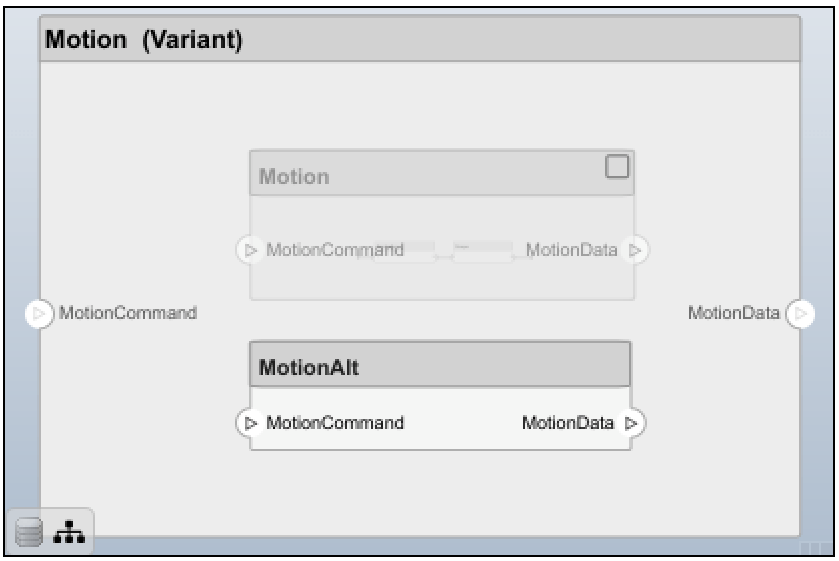
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`editor` | `systemcomposer.profile.Stereotype` | `systemcomposer.profile.Property` | `loadProfile`

Topics

"Define Profiles and Stereotypes"
"Use Stereotypes and Profiles"

Introduced in R2019a

systemcomposer.profile.Property

Property in stereotype

Description

A `Property` object represents properties of a stereotype in a profile for a System Composer model.

Creation

Add a property to a stereotype using the `addProperty` function.

```
profile = systemcomposer.profile.Profile.createProfile("profileName");
stereotype = addStereotype(profile,"stereotypeName");
addProperty(stereotype,"propertyName",'DefaultValue="10")
```

Properties

Name — Name of property
character vector | string

Name of property, specified as a character vector or string. This property must be a valid MATLAB identifier.

Data Types: `char` | `string`

Type — Property data type
character vector | string

Property data type, specified as a character vector or string with a valid data type.

Data Types: `char` | `string`

`Dimensions` — Dimensions of property
positive integer array

Dimensions of property, specified as a positive integer array.

Data Types: `double`

`Min` — Minimum value
numeric

Minimum value, specified as a numeric value.

Data Types: `double`

`Max` — Maximum value
numeric

Maximum value, specified as a numeric value.

Data Types: double

Units — Property units
character vector | string

Property units, specified as a character vector or string.

Data Types: char | string

Index — Property index
numeric

Property index of the order in which the property is shown on model elements, specified as a numeric starting from one.

Data Types: double

DefaultValue — Default value of property
string expression | array of strings

Default value of property, specified as a string expression or an array consisting of a string value and a string unit.

Data Types: string

Stereotype — Owning stereotype
stereotype object

Owning stereotype, specified as a systemcomposer.profile.Stereotype object.

FullyQualifiedName — Qualified name of property
character vector | string

Qualified name of property, specified as a character vector in the form '<profile>.<stereotype>.<property>'.

Data Types: char

Object Functions

destroy Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

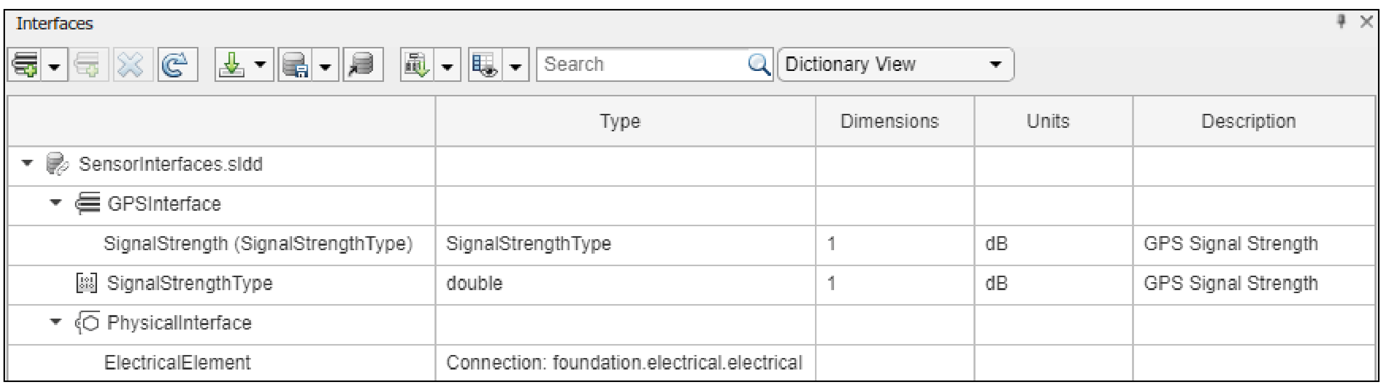
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



	Type	Dimensions	Units	Description
SensorInterfaces.sldd				
GPSInterface				
SignalStrength (SignalStrengthType)	SignalStrengthType	1	dB	GPS Signal Strength
SignalStrengthType	double	1	dB	GPS Signal Strength
PhysicalInterface				
ElectricalElement	Connection: foundation.electrical.electrical			

Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

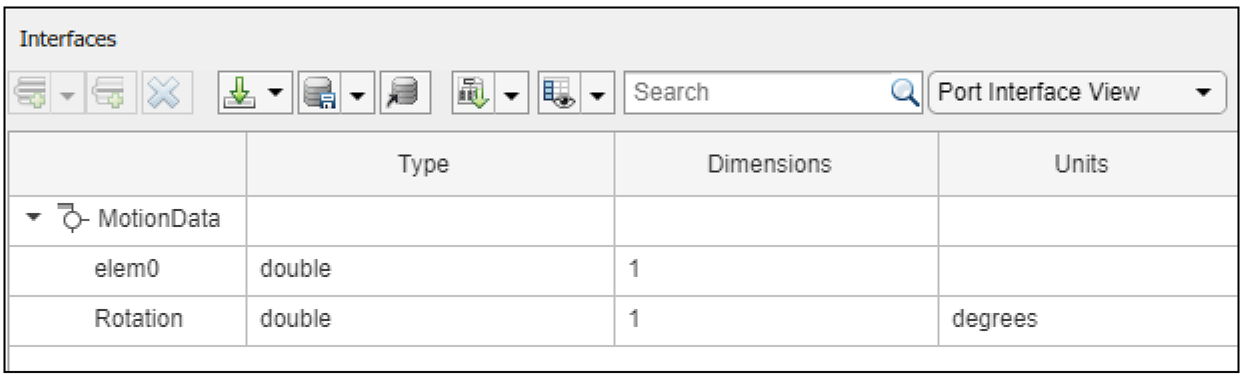
```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
```

```
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

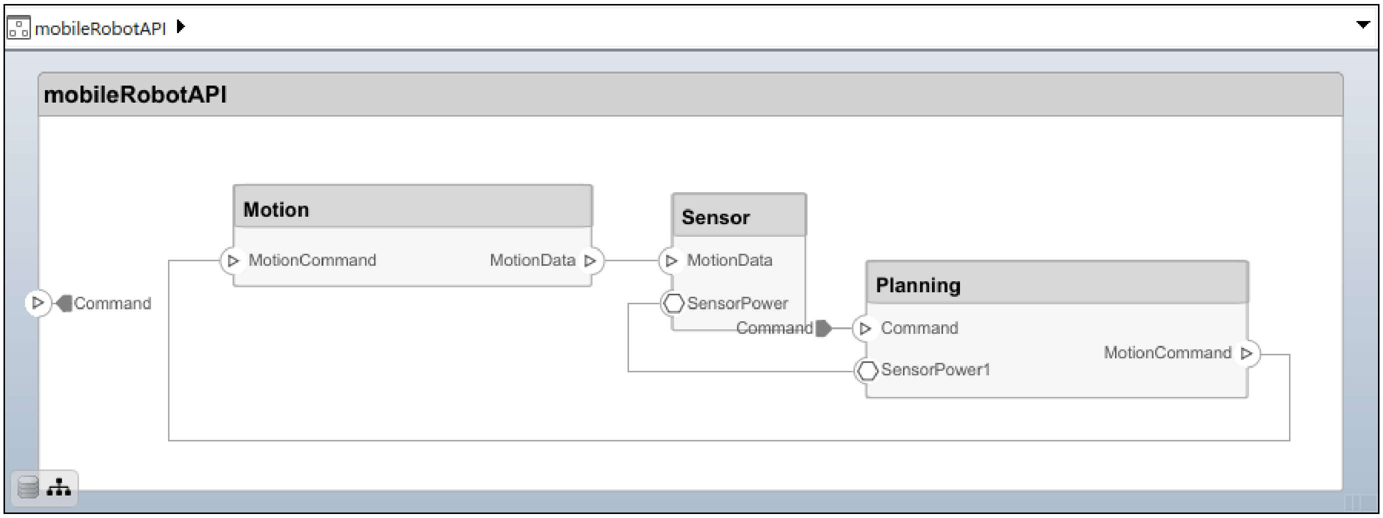
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
```

```
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype.

Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

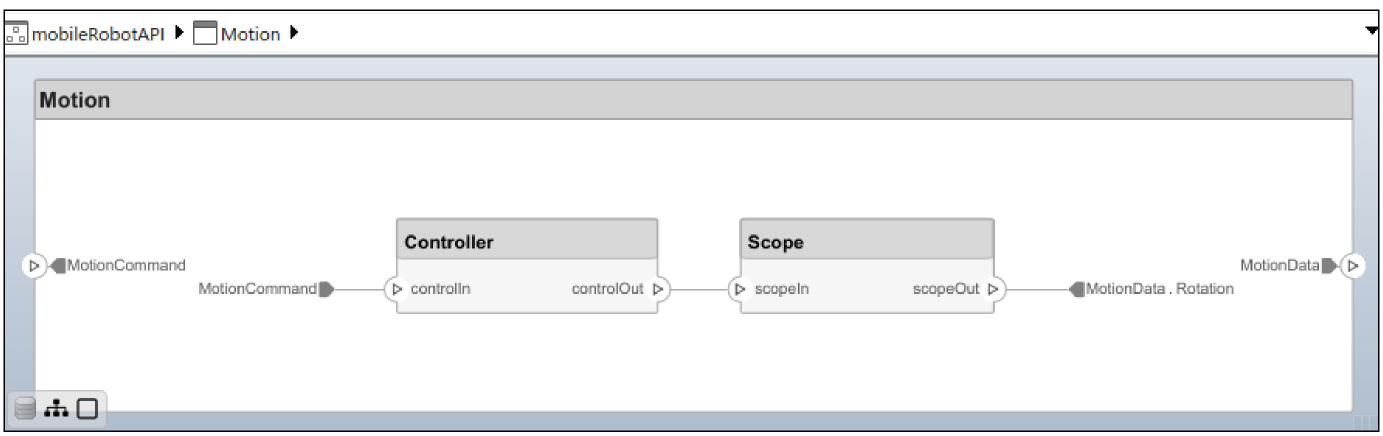
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
```

```
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the Planning component to a variant component using the makeVariant function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

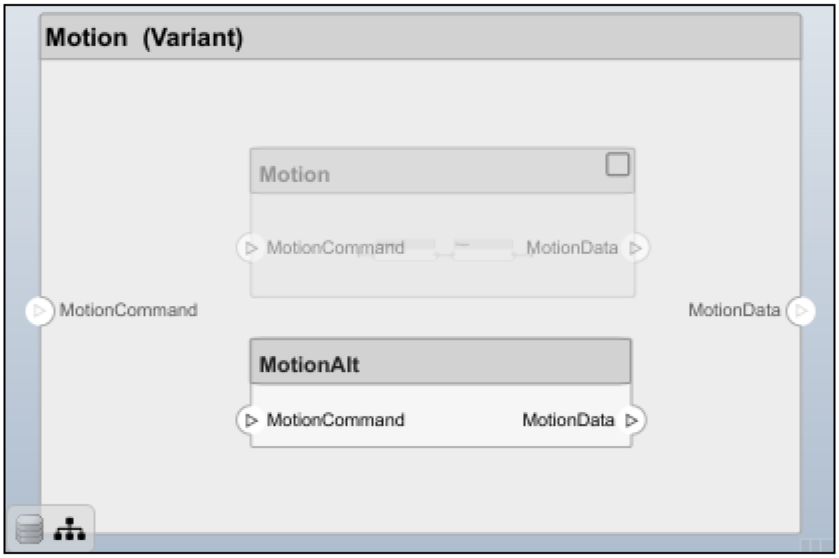
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"

Term	Definition	Application	More Information
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`systemcomposer.profile.Stereotype` | `systemcomposer.profile.Profile` | `removeProperty` | `addProperty`

Topics

"Define Profiles and Stereotypes"
"Use Stereotypes and Profiles"

Introduced in R2019a

systemcomposer.profile.Stereotype

Stereotype in profile

Description

A `Stereotype` object represents stereotypes in a profile for a System Composer model.

Creation

Add a stereotype to a profile using the `addStereotype` function.

```
profile = systemcomposer.profile.Profile.createProfile("profileName");
addStereotype(profile,"stereotypeName");
```

Properties

Name — Name of stereotype
character vector | string

Name of stereotype, specified as a character vector or string. This property must be a valid MATLAB identifier.

Example: `"HardwareComponent"`

Data Types: `char` | `string`

`Description` — Description text for stereotype
character vector | string

Description text for stereotype, specified as a character vector or string.

Data Types: `char` | `string`

`Icon` — Icon name for stereotype
character vector | string

Icon name for stereotype, specified as a character vector or string. Built in options include:

- `"default"`
- `"application"`
- `"channel"`
- `"controller"`
- `"database"`
- `"devicedriver"`
- `"memory"`
- `"network"`

- "plant"
- "sensor"
- "subsystem"
- "transmitter"

This property is only valid for component stereotypes. The element a stereotype applies to is set with the AppliesTo property.

Data Types: char | string

Parent — Stereotype from which stereotype inherits properties
stereotype object

Stereotype from which stereotype inherits properties, specified as a systemcomposer.profile.Stereotype object.

AppliesTo — Element type to which stereotype can be applied
"" (default) | "Component" | "Port" | "Connector" | "Interface" | "Function"

Element type to which stereotype can be applied, specified as one of these options:

- "" to apply stereotype to all element types
- "Component"
- "Port"
- "Connector"
- "Interface"
- "Function", which is only available for software architectures

Data Types: char | string

Abstract — Whether stereotype is abstract
true or 1 | false or 0

Whether stereotype is abstract, specified as a logical. If true, then the stereotype cannot be directly applied on model elements, but instead serves as a parent for other stereotypes.

Data Types: logical

FullyQualifiedName — Qualified name of stereotype
character vector

Qualified name of stereotype, specified as a character vector in the form '<profile>.<stereotype>'.

Data Types: char

ComponentHeaderColor — Component header color
1x3 uint32 row vector

Component header color, specified as a 1x3 uint32 row vector in the form [Red Green Blue].

This property is only valid for component stereotypes. The element a stereotype applies to is set with the AppliesTo property.

Example: [206 232 246]

Data Types: uint32

ConnectorLineColor — Connector line color
1x3 uint32 row vector

Connector line color, specified as a 1x3 uint32 row vector in the form [Red Green Blue].

This property is only valid for connector, port, and interface stereotypes. The element a stereotype applies to is set with the AppliesTo property

Example: [206 232 246]

Data Types: uint32

ConnectorLineStyle — Connector line style
character vector | string

Connector line style, specified as a character vector or string. Options include:

- "Default"
- "Dot"
- "Dash"
- "Dash Dot"
- "Dash Dot Dot"

This property is only valid for connector, port, and interface stereotypes. The element a stereotype applies to is set with the AppliesTo property

Data Types: char | string

Profile — Profile of stereotype
profile object

Profile of stereotype from which stereotype inherits properties, specified as a systemcomposer.profile.Profile object.

Properties — Properties
cell array of character vectors

Properties contained in stereotype and inherited from the stereotype base hierarchy, specified as a cell array of character vectors.

Data Types: char

OwnedProperties — Owned properties
cell array of character vectors | array of strings | array of property objects

Owned properties contained in stereotype, specified as a cell array of character vectors, an array of strings, or an array of systemcomposer.profile.Property objects. The owned properties do not include properties inherited from the stereotype base hierarchy.

Data Types: char | string

Object Functions

addProperty	Define custom property for stereotype
removeProperty	Remove property from stereotype
getDefaultElementStereotype	Get default stereotype for elements
setDefaultElementStereotype	Set default stereotype for elements
find	Find stereotype by name
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

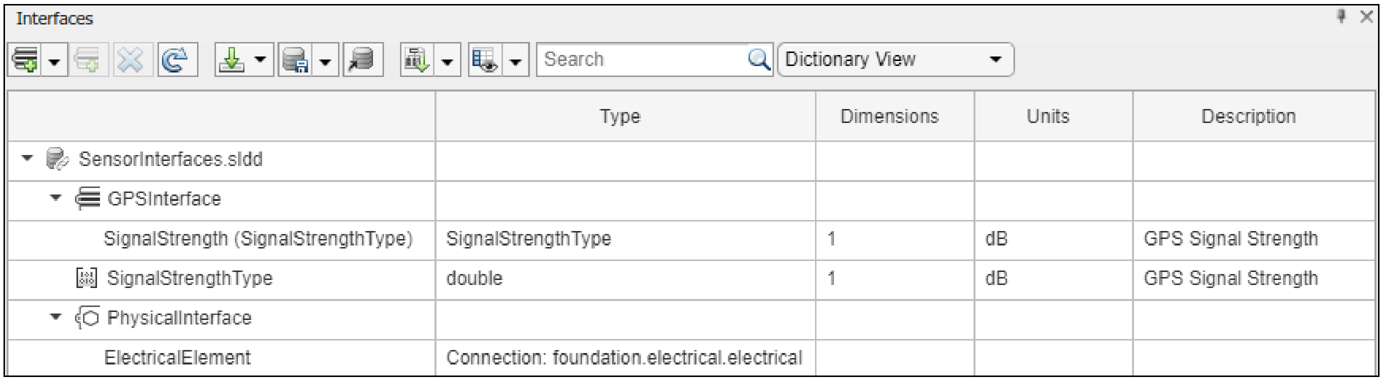
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



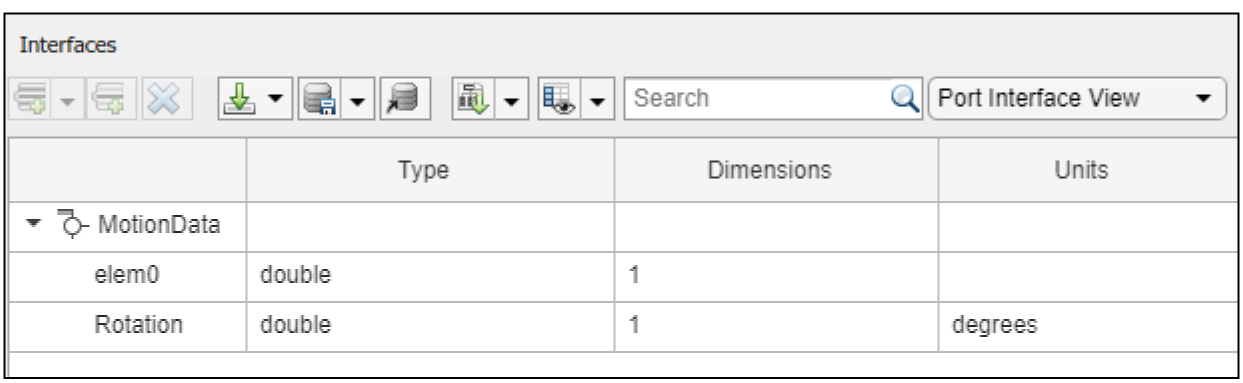
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

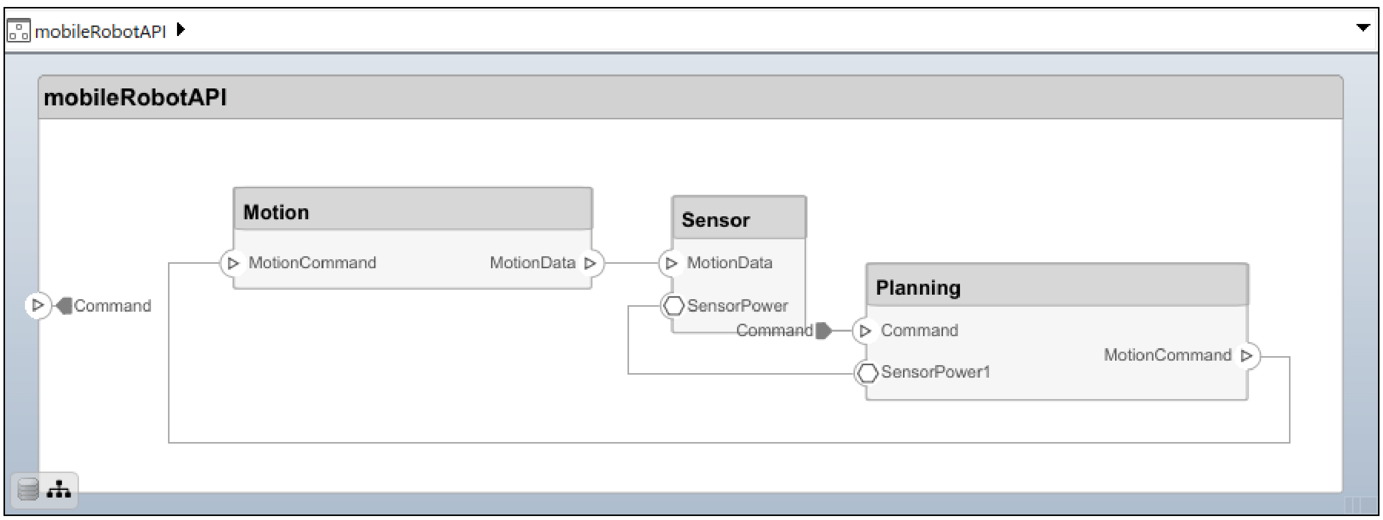
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
```

```
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'})
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

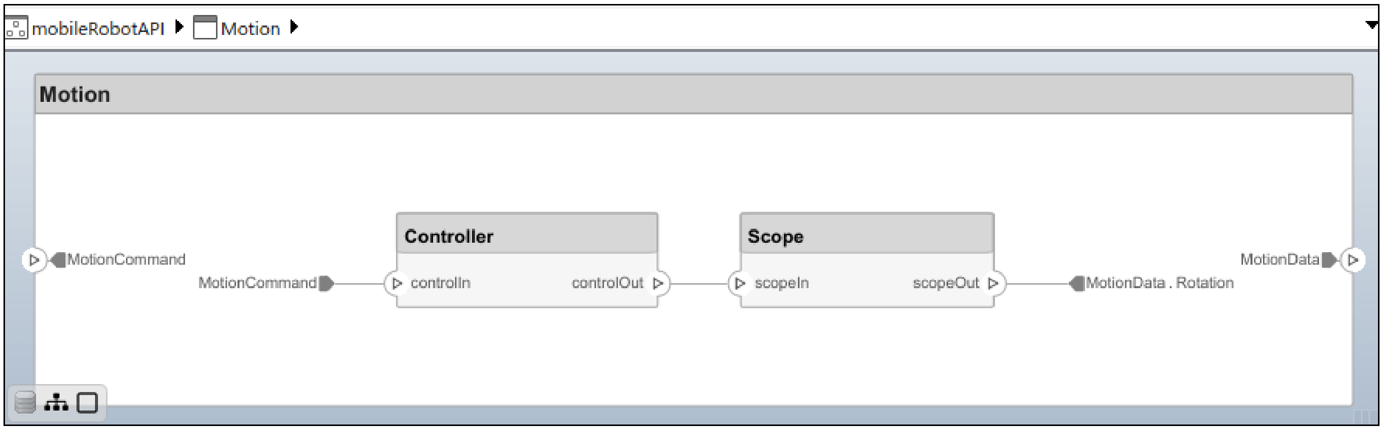
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save

linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active

choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named MotionAlt. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on MotionAlt.

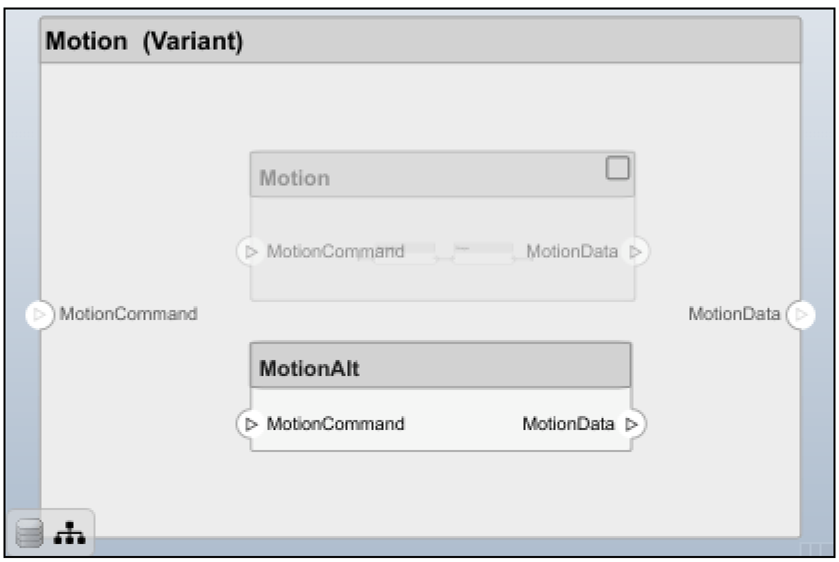
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make MotionAlt the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

```
cleanUpArtifacts
```

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`addStereotype` | `getStereotype` | `removeStereotype` | `systemcomposer.profile.Profile`

Topics

"Define Profiles and Stereotypes"
"Use Stereotypes and Profiles"

Introduced in R2019a

systemcomposer.query.Constraint

Query constraint

Description

The `Constraint` object represents all System Composer query constraints.

Object Functions

AnyComponent	Create query to select all components in model
IsStereotypeDerivedFrom	Create query to select stereotype derived from qualified name
HasStereotype	Create query to select architectural elements with stereotype based on specified sub-constraint
HasPort	Create query to select architectural elements with port on component based on specified sub-constraint
HasInterface	Create query to select architectural elements with interface on port based on specified sub-constraint
HasInterfaceElement	Create query to select architectural elements with interface element on interface based on specified sub-constraint
IsInRange	Create query to select range of property values
Property	Create query to select non-evaluated values for object properties or stereotype properties for elements
PropertyValue	Create query to select property from object or stereotype property and then evaluate property value

Examples

Find Elements in Model Using Queries

Find components in a System Composer model using queries.

Import the package that contains all of the System Composer queries.

```
import systemcomposer.query.*
```

Open the model.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Find all the software components in the system.

```
con1 = HasStereotype(Property("Name") == "SoftwareComponent");
[compPaths,compObjs] = model.find(con1)
```

```
compPaths = 5x1 cell
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Door Lock Controller' }
    {'KeylessEntryArchitecture/FOB Locator System/FOB Locator Module'         }
    {'KeylessEntryArchitecture/Engine Control System/Keyless Start Controller'}
    {'KeylessEntryArchitecture/Lighting System/Lighting Controller'           }
```

```
    {'KeylessEntryArchitecture/Sound System/Sound Controller'                 }
```

```
compObjs=1×5 object
  1x5 Component array with properties:

    IsAdapterComponent
    Architecture
    ReferenceName
    Name
    Parent
    Ports
    OwnedPorts
    OwnedArchitecture
    Position
    Model
    SimulinkHandle
    SimulinkModelHandle
    UUID
    ExternalUID
```

Include reference models in the search.

```
softwareComps = model.find(con1,IncludeReferenceModels=true)
```

```
softwareComps = 9x1 cell
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Door Lock Controller'
    {'KeylessEntryArchitecture/FOB Locator System/FOB Locator Module'
    {'KeylessEntryArchitecture/Engine Control System/Keyless Start Controller'
    {'KeylessEntryArchitecture/Lighting System/Lighting Controller'
    {'KeylessEntryArchitecture/Sound System/Sound Controller'
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Pass Door Lock Sensor/Detect Door Lo
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Driver Door Lock Sensor/Detect Door 
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Pass Door Lock Sensor/Detect Door L
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Driver Door Lock Sensor/Detect Door
```

Find all the base components in the system.

```
con2 = HasStereotype(IsStereotypeDerivedFrom("AutoProfile.BaseComponent"));
baseComps = model.find(con2)
```

```
baseComps = 18x1 cell
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Door Lock Controller'           }
    {'KeylessEntryArchitecture/FOB Locator System/FOB Locator Module'                   }
    {'KeylessEntryArchitecture/Engine Control System/Keyless Start Controller'          }
    {'KeylessEntryArchitecture/Lighting System/Lighting Controller'                     }
    {'KeylessEntryArchitecture/Sound System/Sound Controller'                           }
    {'KeylessEntryArchitecture/Engine Control System/Start//Stop Button'                }
    {'KeylessEntryArchitecture/Sound System/Dashboard Speaker'                          }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Driver Door Lock Sensor'  }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Pass Door Lock Sensor'    }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Driver Door Lock Sensor'   }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Pass Door Lock Sensor'     }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Driver Door Lock Actuator'}
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Pass Door Lock Actuator'  }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Driver Door Lock Actuator' }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Pass Door Lock Actuator'   }
```

```
    {'KeylessEntryArchitecture/FOB Locator System/Center Receiver'                      }
    {'KeylessEntryArchitecture/FOB Locator System/Front Receiver'                       }
    {'KeylessEntryArchitecture/FOB Locator System/Rear Receiver'                        }
```

Find all components using the interface `KeyFOBPosition`.

```
con3 = HasPort(HasInterface(Property("Name") == "KeyFOBPosition"));
con3_a = HasPort(Property("InterfaceName") == "KeyFOBPosition");
keyFOBPosComps = model.find(con3)
```

```
keyFOBPosComps = 10x1 cell
    {'KeylessEntryArchitecture/Door Lock//Unlock System'                      }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Door Lock Controller' }
    {'KeylessEntryArchitecture/Engine Control System'                         }
    {'KeylessEntryArchitecture/Engine Control System/Keyless Start Controller'}
    {'KeylessEntryArchitecture/FOB Locator System'                            }
    {'KeylessEntryArchitecture/FOB Locator System/FOB Locator Module'         }
    {'KeylessEntryArchitecture/Lighting System'                               }
    {'KeylessEntryArchitecture/Lighting System/Lighting Controller'           }
    {'KeylessEntryArchitecture/Sound System'                                  }
    {'KeylessEntryArchitecture/Sound System/Sound Controller'                 }
```

Find all components whose `WCET` is less than or equal to `5 ms`.

```
con4 = PropertyValue("AutoProfile.SoftwareComponent.WCET") <= 5;
model.find(con4)
```

```
ans = 1x1 cell array
    {'KeylessEntryArchitecture/Sound System/Sound Controller'}
```

You can specify units for automatic unit conversion.

```
con5 = PropertyValue("AutoProfile.SoftwareComponent.WCET") <= Value(5,'ms');
query1Comps = model.find(con5)
```

```
query1Comps = 3x1 cell
    {'KeylessEntryArchitecture/Sound System/Sound Controller'        }
    {'KeylessEntryArchitecture/FOB Locator System/FOB Locator Module'}
    {'KeylessEntryArchitecture/Lighting System/Lighting Controller'  }
```

Find all components whose `WCET` is greater than `1 ms` or that have a cost greater than `10 USD`.

```
con6 = PropertyValue("AutoProfile.SoftwareComponent.WCET") > Value(1,'ms') | PropertyValue("AutoI
query2Comps = model.find(con6)
```

```
query2Comps = 2x1 cell
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Door Lock Controller' }
    {'KeylessEntryArchitecture/Engine Control System/Keyless Start Controller'}
```

Close the model.

```
model.close
```

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	“Modeling System Architecture of Keyless Entry System”
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• “Create Architecture Views Interactively” • “Create Architectural Views Programmatically”
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	“Inspect Components in Custom Architecture Views”

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`find` | `createView` | `modifyQuery` | `runQuery` | `removeQuery`

Topics

"Create Architectural Views Programmatically"

Introduced in R2019b

systemcomposer.ValueType

Value type in System Composer

Description

A `ValueType` object describes a value type in System Composer. A value type can be used as a port interface or the type for a data element.

Creation

Add a value type to a dictionary using the `addValueType` function.

```
model = systemcomposer.createModel("archModel",true);
dictionary = model.InterfaceDictionary;
airspeedType = dictionary.addValueType("AirSpeed");
```

Properties

`Owner` — Parent of value type
dictionary object | data element object | architecture port object

Parent of value type, specified as a `systemcomposer.interface.Dictionary`, `systemcomposer.interface.DataElement`, or `systemcomposer.arch.ArchitecturePort` object.

`Model` — Parent model
model object

Parent System Composer model of value type, specified as a `systemcomposer.arch.Model` object.

`Name` — Value type name
character vector | string

Value type name, specified as a character vector or string. This property must be a valid MATLAB identifier.

Example: `"AirSpeed"`

Data Types: `char` | `string`

`DataType` — Value type data type
character vector | string

Value type data type, specified as a character vector or string. This property must be a valid MATLAB data type.

Data Types: `char` | `string`

`Dimensions` — Value type dimensions
character vector | string

Value type dimensions, specified as a character vector or string.

Data Types: `char` | `string`

`Units` — Value type units
character vector | string

Value type units, specified as a character vector or string.

Data Types: `char` | `string`

`Complexity` — Value type complexity
`"real"` | `"complex"` | `"auto"`

Value type complexity, specified as `"real"`, `"complex"`, or `"auto"`.

Data Types: `char` | `string`

`Minimum` — Value type minimum
character vector | string

Value type minimum, specified as a character vector or string.

Data Types: `char` | `string`

`Maximum` — Value type maximum
character vector | string

Value type maximum, specified as a character vector or string.

Data Types: `char` | `string`

`Description` — Value type description
character vector | string

Value type description, specified as a character vector or string.

Data Types: `char` | `string`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for value type, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`ExternalUID` — Unique external identifier
character vector

Unique external identifier, specified as a character vector. The external ID is preserved over the lifespan of the value type and through all operations that preserve the `UUID`.

Data Types: `char`

Object Functions

setName	Set name for value type, function argument, interface, or element

setDataType	Set data type for value type
setDimensions	Set dimensions for value type
setUnits	Set units for value type
setComplexity	Set complexity for value type
setMinimum	Set minimum for value type
setMaximum	Set maximum for value type
setDescription	Set description for value type
applyStereotype	Apply stereotype to architecture model element
getStereotypes	Get stereotypes applied on element of architecture model
removeStereotype	Remove stereotype from model element
setProperty	Set property value corresponding to stereotype applied to element
getProperty	Get property value corresponding to stereotype applied to element
getPropertyValue	Get value of architecture property
getEvaluatedPropertyValue	Get evaluated value of property from element
getStereotypeProperties	Get stereotype property names on element
hasStereotype	Find if element has stereotype applied
hasProperty	Find if element has property
destroy	Remove model element

Examples

Build Architecture Models Programmatically

Build an architecture model programmatically using System Composer™.

Build Model

To build a model, add a data dictionary with data interfaces, data elements, a value type, and a physical interface, then add components, ports, and connections. Create a profile with stereotypes and properties and then apply those stereotypes to model elements. Assign an owned interface to a port. After the model is built, you can create custom views to focus on specific considerations. You can also query the model to collect different model elements according to criteria you specify.

Add Components, Ports, Connections, and Interfaces

Create a model and extract its architecture.

```
model = systemcomposer.createModel("mobileRobotAPI");
arch = model.Architecture;
```

Create an interface data dictionary and add a data interface. Add a data element to the data interface. Add a value type to the interface data dictionary. Assign the type of the data element to the value type. Add a physical interface and physical element with a physical domain type. Link the data dictionary to the model.

```
dictionary = systemcomposer.createDictionary("SensorInterfaces.sldd");
interface = dictionary.addInterface("GPSInterface");
element = interface.addElement("SignalStrength");
valueType = dictionary.addValueType("SignalStrengthType",Units="dB",Description="GPS Signal Stre
element.setType(valueType);
physicalInterface = dictionary.addPhysicalInterface("PhysicalInterface");
physicalElement = addElement(physicalInterface,"ElectricalElement",Type="electrical.electrical")
linkDictionary(model,"SensorInterfaces.sldd");
```

Save the changes to the interface data dictionary.

```
dictionary.save
```

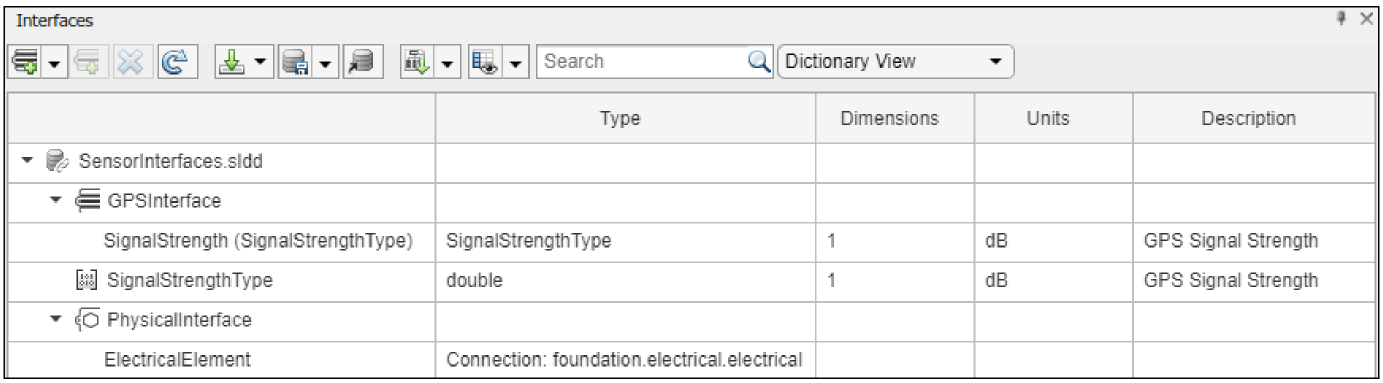
Save the model.

```
model.save
```

Open the model.

```
systemcomposer.openModel("mobileRobotAPI");
```

View the interfaces in the Interface Editor.



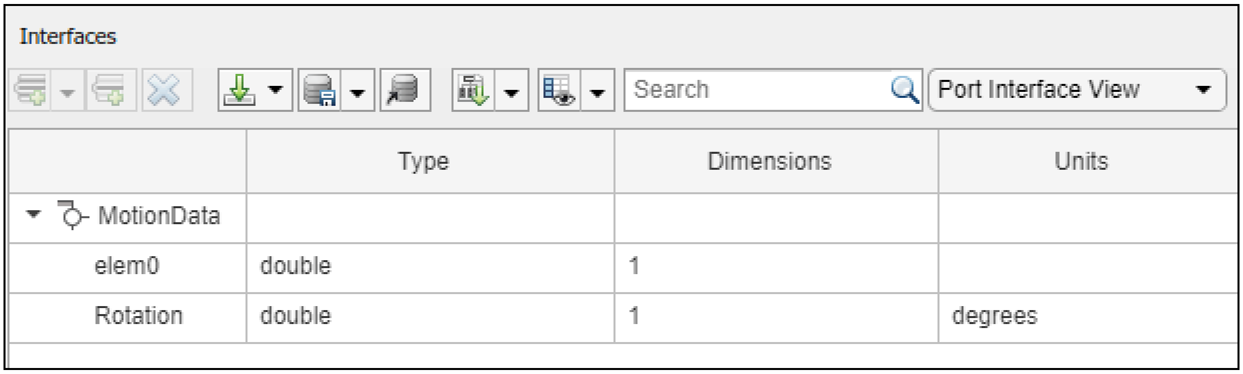
Add components, ports, and connections. Set the physical interface to the physical ports, which you will connect later.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','physical'
sensorPorts(2).setInterface(physicalInterface)

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower1','MotionCommand'
planningPorts(2).setInterface(physicalInterface)

componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Create an owned interface on the `'MotionData'` port. Add an owned data element under the owned data interface. Assign the data element `"Rotation"` to a value type with units set to `degrees`.

```
ownedInterface = motionPorts(2).createInterface("DataInterface");
ownedElement = ownedInterface.addElement("Rotation");
subInterface = ownedElement.createOwnedType(Units="degrees");
```

View the interfaces in the Interface Editor. Select the `'MotionData'` port on the `Motion` component. In the Interface Editor, switch from **Dictionary View** to **Port Interface View**.



Connect components with an interface rule and the default name rule. The interface rule connects ports on components that share the same interface. By default, the name rule connects ports on components that share the same name.

```
c_sensorData = connect(arch,componentSensor,componentPlanning,Rule="interface");
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Add and Connect Architecture Port

Add an architecture port on the architecture.

```
archPort = addPort(arch,"Command","in");
```

The `connect` command requires a component port as an argument. Obtain the component port, then connect.

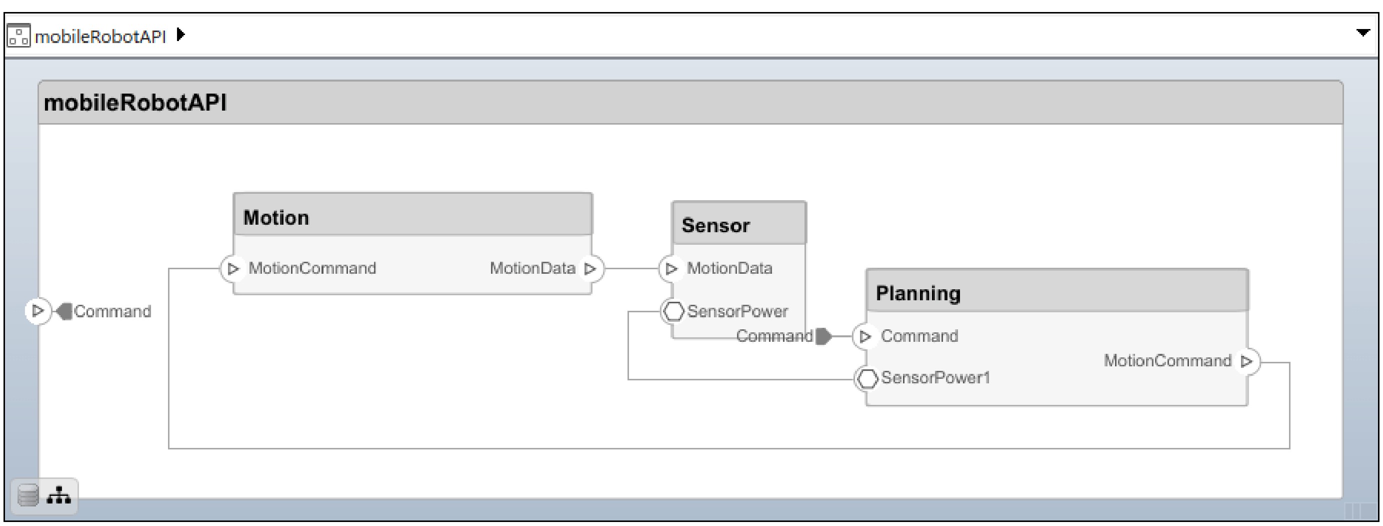
```
compPort = getPort(componentPlanning,"Command");
c_Command = connect(archPort,compPort);
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem("mobileRobotAPI");
```



Create and Apply Profile with Stereotypes

Profiles are XML files that can be applied to any model. You can add stereotypes with properties to profiles and then populate the properties with specific values. Along with the built-in analysis capabilities of System Composer, stereotypes help you optimize your system for performance, cost, and reliability.

Create Profile and Add Stereotypes

Create a profile.

```
profile = systemcomposer.createProfile("GeneralProfile");
```

Create a stereotype that applies to all element types.

```
elemSType = addStereotype(profile,"projectElement");
```

Create stereotypes for different types of components. You can select these types are based on your design needs.

```
pCompSType = addStereotype(profile,"physicalComponent",AppliesTo="Component");
sCompSType = addStereotype(profile,"softwareComponent",AppliesTo="Component");
```

Create a stereotype for connections.

```
sConnSType = addStereotype(profile,"standardConn",AppliesTo="Connector");
```

Add Properties

Add properties to the stereotypes. You can use properties to capture metadata for model elements and analyze nonfunctional requirements. These properties are added to all elements to which the stereotype is applied, in any model that imports the profile.

```
addProperty(elemSType,'ID',Type="uint8");
addProperty(elemSType,'Description',Type="string");
addProperty(pCompSType,'Cost',Type="double",Units="USD");
addProperty(pCompSType,'Weight',Type="double",Units="g");
addProperty(sCompSType,'develCost',Type="double",Units="USD");
addProperty(sCompSType,'develTime',Type="double",Units="hour");
addProperty(sConnSType,'unitCost',Type="double"',Units="USD");
addProperty(sConnSType,'unitWeight',Type="double",Units="g");
addProperty(sConnSType,'length',Type="double",Units="m");
```

Save Profile

```
profile.save;
```

Apply Profile to Model

Apply the profile to the model.

```
applyProfile(model,"GeneralProfile");
```

Apply stereotypes to components. Some components are physical components, while others are software components.

```
applyStereotype(componentPlanning,"GeneralProfile.softwareComponent")
applyStereotype(componentSensor,"GeneralProfile.physicalComponent")
applyStereotype(componentMotion,"GeneralProfile.physicalComponent")
```

Apply the connector stereotype to all connections.

```
batchApplyStereotype(arch,'Connector',"GeneralProfile.standardConn");
```

Apply the general element stereotype to all connectors and ports.

```
batchApplyStereotype(arch,'Component',"GeneralProfile.projectElement");
batchApplyStereotype(arch,'Connector',"GeneralProfile.projectElement");
```

Set properties for each component.

```
setProperty(componentSensor,'GeneralProfile.projectElement.ID','001');
setProperty(componentSensor,'GeneralProfile.projectElement.Description','''Central unit for all s
setProperty(componentSensor,'GeneralProfile.physicalComponent.Cost','200');
setProperty(componentSensor,'GeneralProfile.physicalComponent.Weight','450');
setProperty(componentPlanning,'GeneralProfile.projectElement.ID','002');
setProperty(componentPlanning,'GeneralProfile.projectElement.Description','''Planning computer''
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develCost','20000');
setProperty(componentPlanning,'GeneralProfile.softwareComponent.develTime','300');
setProperty(componentMotion,'GeneralProfile.projectElement.ID','003');
setProperty(componentMotion,'GeneralProfile.projectElement.Description','''Motor and motor contro
setProperty(componentMotion,'GeneralProfile.physicalComponent.Cost','4500');
setProperty(componentMotion,'GeneralProfile.physicalComponent.Weight','2500');
```

Set the properties of connections to be identical.

```
connections = [c_sensorData c_motionData c_motionCommand c_Command];
for k = 1:length(connections)
    setProperty(connections(k),'GeneralProfile.standardConn.unitCost','0.2');
    setProperty(connections(k),'GeneralProfile.standardConn.unitWeight','100');
    setProperty(connections(k),'GeneralProfile.standardConn.length','0.3');
end
```

Add Hierarchy

Add two components named `Controller` and `Scope` inside the `Motion` component. Define the ports. Connect the components to the architecture and to each other, applying a connector stereotype. Hierarchy in an architecture diagram creates an additional level of detail that specifies how components behave internally.

```
motionArch = componentMotion.Architecture;

motionController = motionArch.addComponent('Controller');
controllerPorts = addPort(motionController.Architecture,{'controlIn','controlOut'},{'in','out'});
controllerCompPortIn = motionController.getPort('controlIn');
controllerCompPortOut = motionController.getPort('controlOut');

motionScope = motionArch.addComponent('Scope');
scopePorts = addPort(motionScope.Architecture,{'scopeIn','scopeOut'},{'in','out'});
scopeCompPortIn = motionScope.getPort('scopeIn');
scopeCompPortOut = motionScope.getPort('scopeOut');

c_planningController = connect(motionPorts(1),controllerCompPortIn);
```

For outport connections, the data element must be specified.

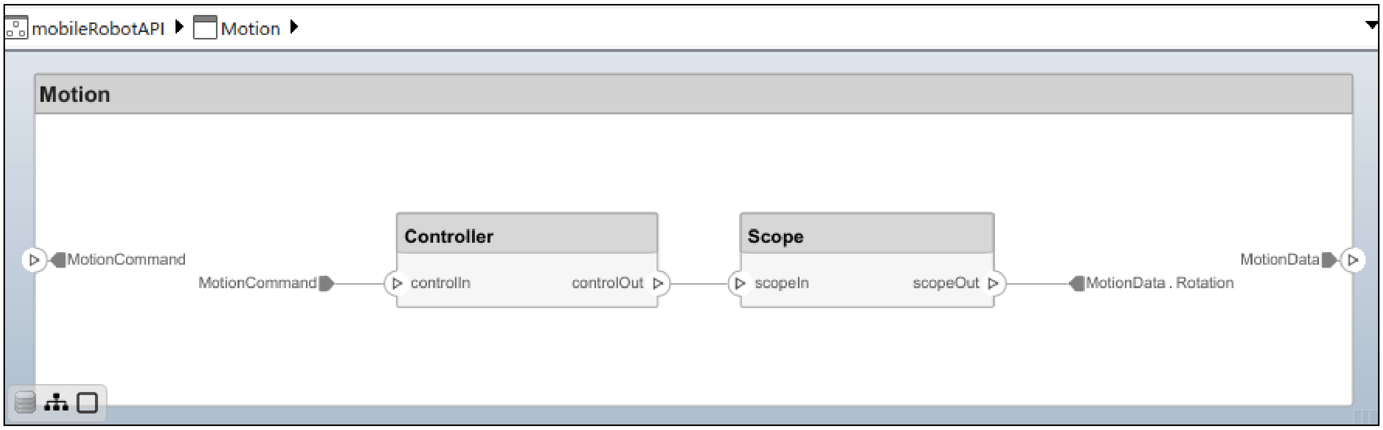
```
c_planningScope = connect(scopeCompPortOut,motionPorts(2),'DestinationElement',"Rotation");
c_planningConnect = connect(controllerCompPortOut,scopeCompPortIn,'GeneralProfile.standardConn')
```

Save the model.

```
model.save
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Motion');
```



Create Model Reference

Model references can help you organize large models hierarchically and define architectures or behaviors once that you can then reuse. When a component references another model, any existing ports on the component are removed, and ports that exist on the referenced model will appear on the component.

Create a new System Composer model. Convert the `Controller` component into a reference component to reference the new model. To add additional ports on the `Controller` component, you must update the referenced model `"mobileMotion"`.

```
referenceModel = systemcomposer.createModel("mobileMotion");
referenceArch = referenceModel.Architecture;
newComponents = addComponent(referenceArch,"Gyroscope");
referenceModel.save
```

```
linkToModel(motionController,"mobileMotion");
```

Save the models.

```
referenceModel.save
model.save
```

Make Variant Component

You can convert the `Planning` component to a variant component using the `makeVariant` function. The original component is embedded within a variant component as one of the available variant choices. You can design other variant choices within the variant component and toggle the active choice. Variant components allow you to choose behavioral designs programmatically in an architecture model to perform trade studies and analysis.

```
[variantComp,choice1] = makeVariant(componentMotion);
```

Add an additional variant choice named Motion`Alt`. The second argument defines the name, and the third argument defines the label. The label identifies the choice. The active choice is controlled by the label.

```
choice2 = addChoice(variantComp,{'MotionAlt'},{'MotionAlt'});
```

Create the necessary ports on Motion`Alt`.

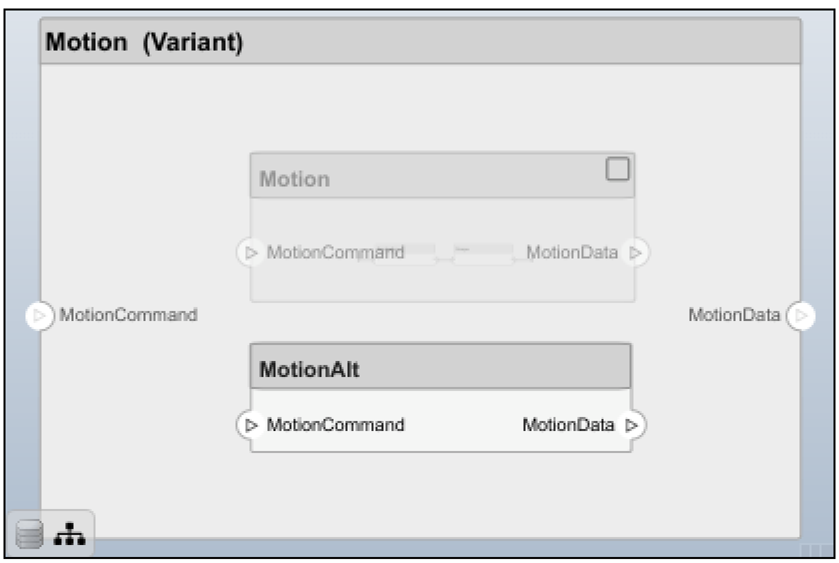
```
motionAltPorts = addPort(choice2.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

Make Motion`Alt` the active variant.

```
setActiveChoice(variantComp,'MotionAlt')
```

Arrange the layout by pressing **Ctrl+Shift+A** or using this command.

```
Simulink.BlockDiagram.arrangeSystem('mobileRobotAPI/Planning');
```



Save the model.

```
model.save
```

Clean Up

Run this script to remove generated artifacts before you run this example again.

`cleanUpArtifacts`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addValueType` | `systemcomposer.interface.DataInterface` | `systemcomposer.interface.Dictionary` | `systemcomposer.interface.DataElement`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021b

systemcomposer.view.BaseViewComponent

(Removed) View components

Note The `systemcomposer.view.BaseViewComponent` class has been removed. It has been replaced with the `systemcomposer.view.View` and the `systemcomposer.view.ElementGroup` classes. For further details, see “Compatibility Considerations”.

Description

The `BaseViewComponent` class inherits from the `systemcomposer.view.ViewElement` class.

Properties

`Name` — Name of view component
character vector

Name of view component, specified as a character vector.

Example: `name = get(objBaseViewComponent,'Name')`

Example: `set(objBaseViewComponent,'Name',name)`

`Parent` — Parent view architecture of component
view architecture object

Parent view architecture of component, specified as a `systemcomposer.view.ViewArchitecture` object.

Example: `parent = get(objBaseViewComponent,'Parent')`

`Architecture` — View architecture of component
view architecture object

View architecture of component, specified as a `systemcomposer.view.ViewArchitecture` object.

Example: `viewArch = get(objBaseViewComponent,'ViewArchitecture')`

Compatibility Considerations

`systemcomposer.view.BaseViewComponent` class has been removed
Errors starting in R2021a

The `systemcomposer.view.BaseViewComponent` class is removed in R2021a with the introduction of new views APIs. For more information on how to create and edit a view using the command line, see “Create Architectural Views Programmatically”.

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics
"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2019b

systemcomposer.view.ComponentOccurrence

(Removed) Shadow of component from composition in view

Note The `systemcomposer.view.ComponentOccurrence` class has been removed. It has been replaced with the `systemcomposer.view.View` and the `systemcomposer.view.ElementGroup` classes. For further details, see "Compatibility Considerations".

Description

The `ComponentOccurrence` class inherits from the `systemcomposer.view.BaseViewComponent` class.

Properties

`Component` — Handle to composition
base component object

Handle to composition component of this occurrence, returned as a `systemcomposer.arch.BaseComponent` object.

Example: `handle = get(object,'Component')`

Compatibility Considerations

`systemcomposer.view.ComponentOccurrence` class has been removed
Errors starting in R2021a

The `systemcomposer.view.ComponentOccurrence` class is removed in R2021a with the introduction of new views programmatic interfaces. For more information on how to create and edit a view using the command line, see "Create Architectural Views Programmatically".

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics
"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2019b

systemcomposer.view.ElementGroup

Architecture view element group

Description

An `ElementGroup` object is used to manage element groups in architecture views for a System Composer model.

Creation

Create a view using the `createView` function and get the `Root` property of the new `systemcomposer.view.View` object. The `Root` property returns the `systemcomposer.view.ElementGroup` that defines the view.

```
objView = createView(objModel);
objElemGroup = objView.Root
```

Properties

`Name` — Name of element group
character vector

Name of element group, specified as a character vector.

Example: `'NewElementGroup'`

Data Types: `char`

`UUID` — Universal unique identifier
character vector

Universal unique identifier for element group, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`Elements` — Elements
array of base component objects

Elements in view, specified as a array of `systemcomposer.arch.BaseComponent` objects.

`SubGroups` — Subgroups
array of element group objects

Subgroups under the parent element group, specified as an array of `systemcomposer.view.ElementGroup` objects.

Object Functions

addElement	Add component to element group of view
removeElement	Remove component from element group of view
createSubGroup	Create subgroup in element group of view
getSubGroup	Get subgroup in element group of view
deleteSubGroup	Delete subgroup in element group of view
destroy	Remove model element

Examples

Create Architecture Views in System Composer with Keyless Entry System

Use a keyless entry system to programmatically create architecture views.

1. Import the package with queries.

```
import systemcomposer.query.*
```

2. Open the Simulink® project file for the Keyless Entry System.

```
scKeylessEntrySystem
```

3. Load the example model into System Composer™.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Example 1: Hardware Component Review Status View

Create a filtered view that selects all hardware components in the architecture model and groups them using the `ReviewStatus` property.

1. Construct a query to select all hardware components.

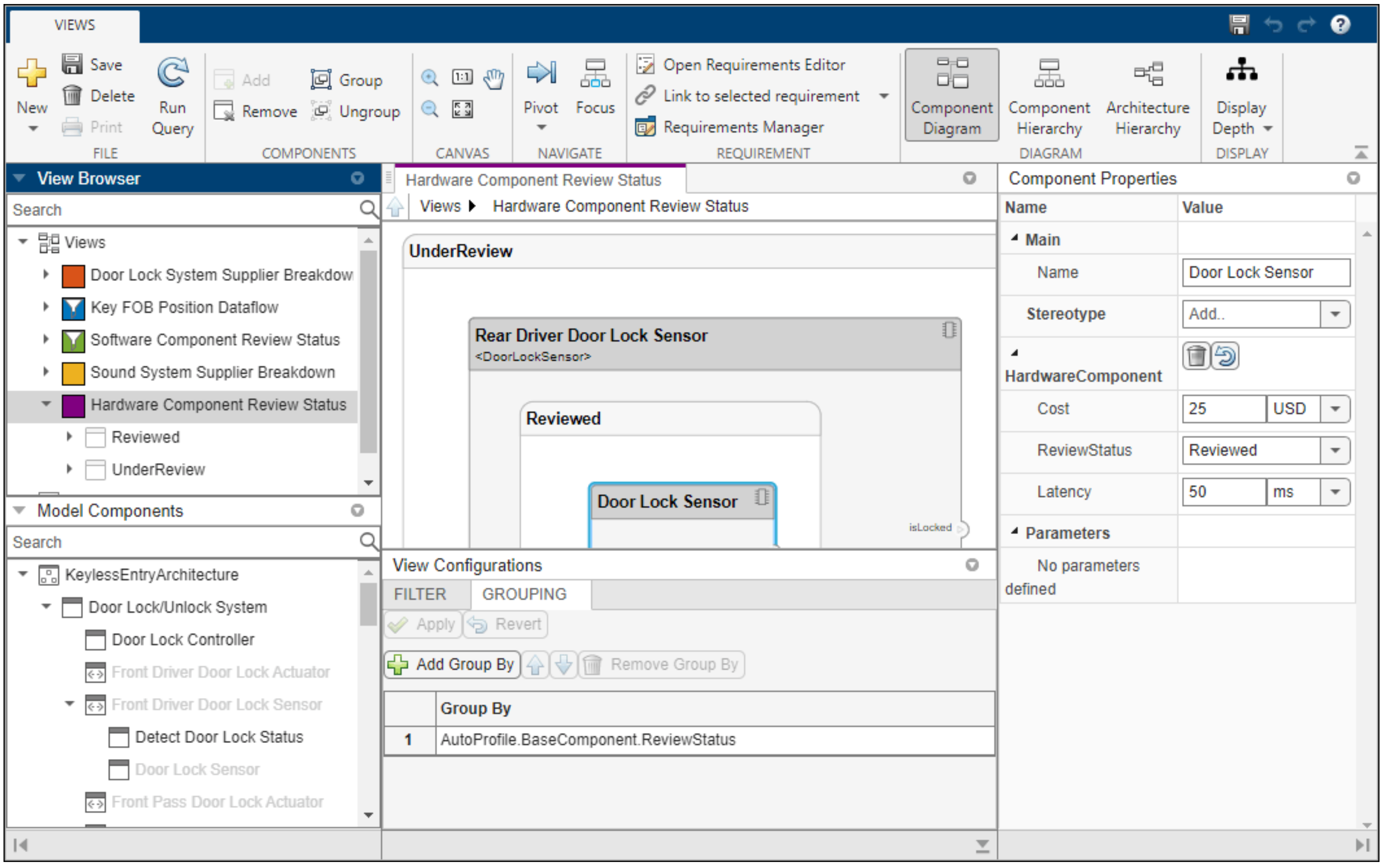
```
hwCompQuery = HasStereotype(IsStereotypeDerivedFrom("AutoProfile.HardwareComponent"));
```

2. Use the query to create a view.

```
model.createView("Hardware Component Review Status",...
 Select=hwCompQuery,...
 GroupBy={'AutoProfile.BaseComponent.ReviewStatus'},...
 IncludeReferenceModels=true,...
 Color="purple");
```

3. To open the Architecture Views Gallery the **Views** section, click **Architecture Views**.

```
model.openViews
```



Example 2: FOB Locator System Supplier View

Create a freeform view that manually pulls the components from the FOB Locator System and groups them using existing and new view components for the suppliers. In this example, you will use *element groups*, groupings of components in a view, to programmatically populate a view.

1. Create a view architecture.

```
fobSupplierView = model.createView("FOB Locator System Supplier Breakdown",...
    Color="lightblue");
```

2. Add a subgroup called `Supplier D`. Add the `FOB Locator Module` to the view element subgroup.

```
supplierD = fobSupplierView.Root.createSubGroup("Supplier D");
supplierD.addElement("KeylessEntryArchitecture/FOB Locator System/FOB Locator Module");
```

3. Create a new subgroup for `Supplier A`.

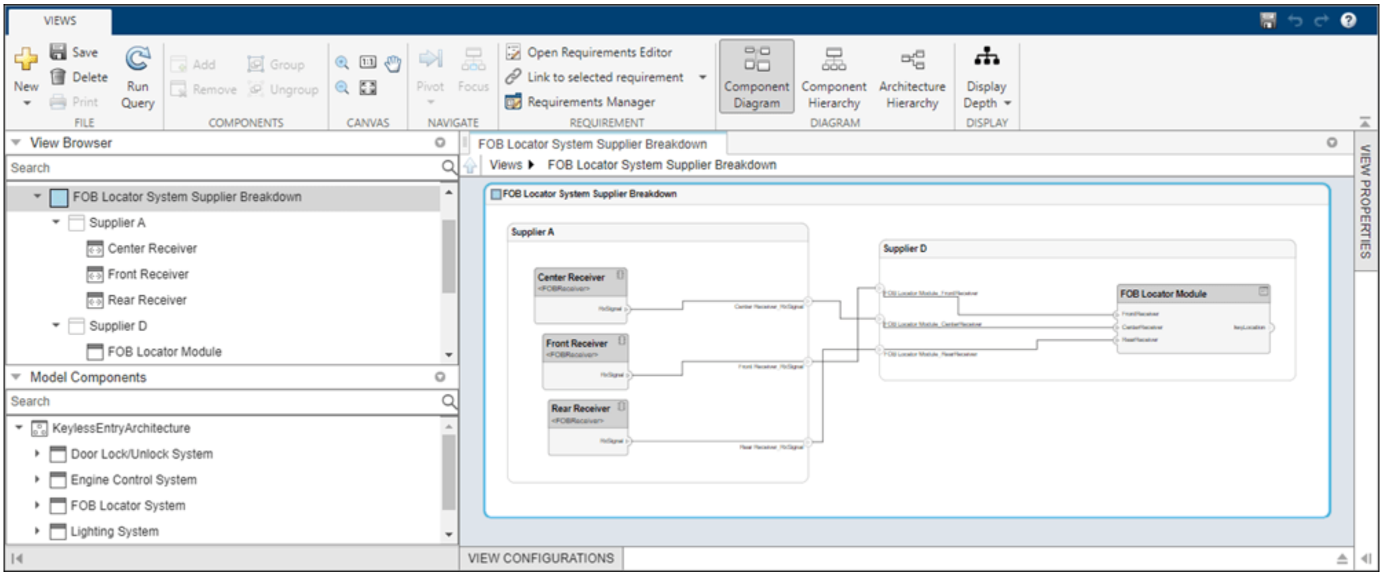
```
supplierA = fobSupplierView.Root.createSubGroup("Supplier A");
```

4. Add each of the FOB Receivers to view element subgroup.

```
FOBLocatorSystem = model.lookup("Path","KeylessEntryArchitecture/FOB Locator System");
```

Find all the components which contain the name `"Receiver"`.

```
receiverCompPaths = model.find(...
    contains(Property("Name"),"Receiver"),...
    FOBLocatorSystem.Architecture);

supplierA.addElement(receiverCompPaths)
```



5. Save the model.

```
model.save
```

More About

Definitions

<table>
<tr><th>Term</th><th>Definition</th><th>Application</th><th>More Information</th></tr>
<tr><td>view</td><td>A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.</td><td>You can use different types of views to represent the system:
Operational views demonstrate how a system will be used and should be integrated with requirements analysis.
Functional views focus on what the system must do to operate.
Physical views show how the system is constructed and configured.
A viewpoint represents a stakeholder perspective that specifies the contents of the view.</td><td>“Modeling System Architecture of Keyless Entry System”</td></tr>
<tr><td>element group</td><td>An element group is a grouping of components in a view.</td><td>Use element groups to programmatically populate a view.</td><td>“Create Architecture Views Interactively”
“Create Architectural Views Programmatically”</td></tr>
<tr><td>query</td><td>A query is a specification that describes certain constraints or criteria to be satisfied by model elements.</td><td>Use queries to search elements with constraint criteria and to filter views.</td><td>“Find Elements in Model Using Queries”</td></tr>
<tr><td>component diagram</td><td>A component diagram represents a view with components, ports, and connectors based on how the model is structured.</td><td>Component diagrams allow you to programmatically or manually add and remove components from the view.</td><td>“Inspect Components in Custom Architecture Views”</td></tr>
</table>

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`openViews` | `createView` | `getView` | `deleteView` | `systemcomposer.view.View`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"
"Display Component Hierarchy and Architecture Hierarchy Using Views"

Introduced in R2021a

systemcomposer.view.View

Architecture view

Description

A `View` object is used to manage architecture views for a System Composer model.

Creation

Create a view using the `createView` function.

```
objView = createView(objModel)
```

Properties

`Name` — Name of view
character vector

Name of view, specified as a character vector.

Example: `'NewView'`

Data Types: `char`

`Root` — Root element group
element group object

Root element group that defines view, specified as a `systemcomposer.view.ElementGroup` object.

`Model` — Architecture model
model object

Architecture model where view belongs, specified as a `systemcomposer.arch.Model` object.

`UUID` — Universal unique identifier
character vector

Universal unique identifier for view, specified as a character vector.

Example: `'91d5de2c-b14c-4c76-a5d6-5dd0037c52df'`

Data Types: `char`

`Select` — Selection query
constraint object

Selection query associated with view, specified as a `systemcomposer.query.Constraint` object.

`GroupBy` — Grouping criteria
string array of properties

Grouping criteria, specified as a string array of properties in the form '<profile>.<stereotype>.<property>'.

Example: {"AutoProfile.MechanicalComponent.mass","AutoProfile.MechanicalComponent.cost"}

Color — Color of view architecture
character vector

Color of view architecture, specified as a character vector. The color can be the name 'blue', 'black', or 'green', or it can be an RGB value encoded in a hexadecimal string: '#FF00FF' or '#DDDDDD'. An invalid color results in an error.

Example: `color = get(objViewArchitecture,'Color')`

Description — Description of view architecture
character vector

Description of view architecture, specified as a character vector.

Example: `description = get(objView,'Description')`

Example: `set(objView,'Description',description)`

Data Types: `char`

IncludeReferenceModels — Whether to include referenced models
`true` or 1 | `false` or 0

Whether to include referenced models, specified as a logical.

Example: `included = get(objView,'IncludeReferenceModels')`

Data Types: `logical`

Object Functions

modifyQuery	Modify architecture view query and property groupings
runQuery	Re-run architecture view query on model
removeQuery	Remove architecture view query
destroy	Remove model element

Examples

Create Architecture Views in System Composer with Keyless Entry System

Use a keyless entry system to programmatically create architecture views.

1. Import the package with queries.

```
import systemcomposer.query.*
```

2. Open the Simulink® project file for the Keyless Entry System.

```
scKeylessEntrySystem
```

3. Load the example model into System Composer™.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Example 1: Hardware Component Review Status View

Create a filtered view that selects all hardware components in the architecture model and groups them using the `ReviewStatus` property.

1. Construct a query to select all hardware components.

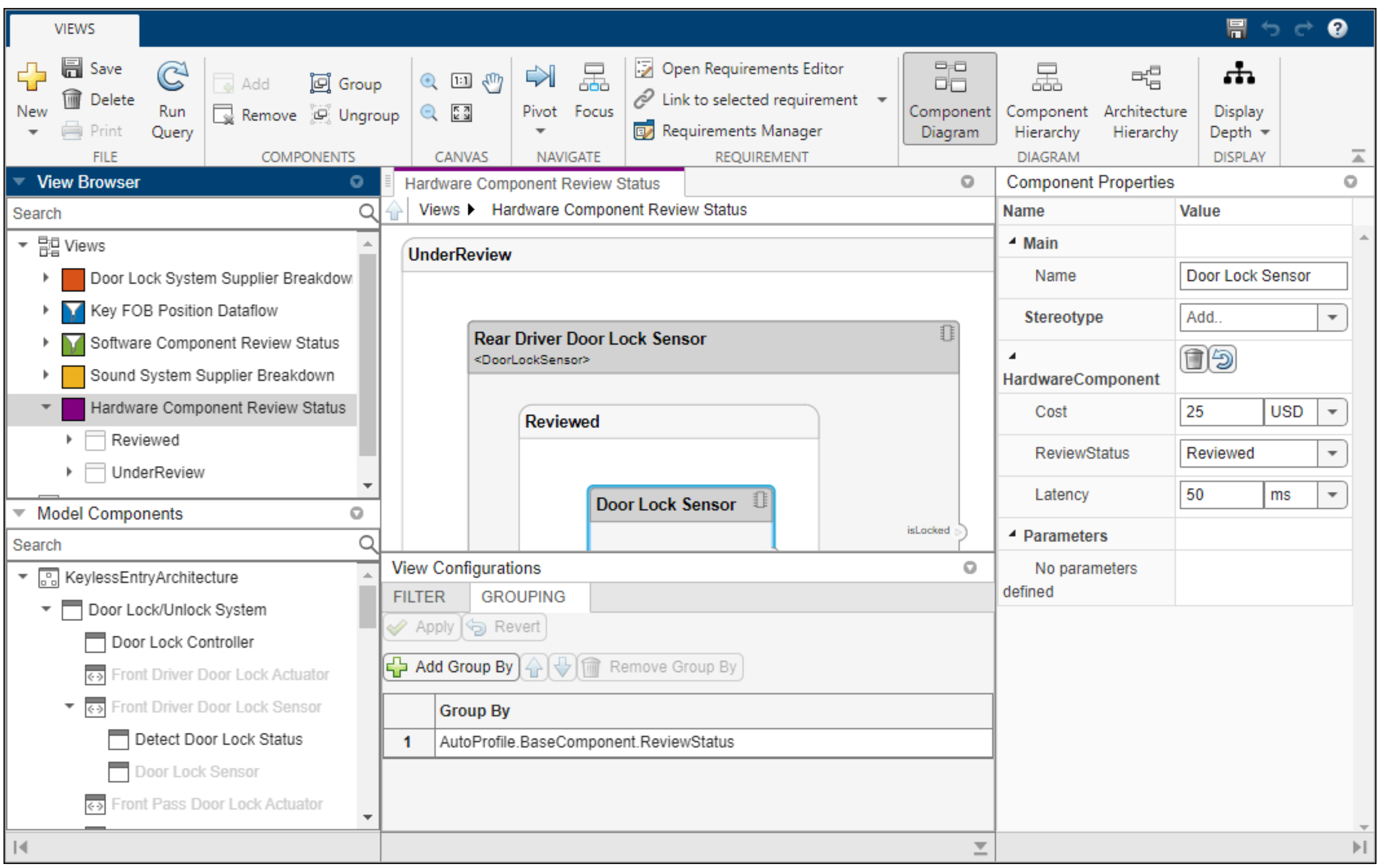
```
hwCompQuery = HasStereotype(IsStereotypeDerivedFrom("AutoProfile.HardwareComponent"));
```

2. Use the query to create a view.

```
model.createView("Hardware Component Review Status",...
 Select=hwCompQuery,...
 GroupBy={'AutoProfile.BaseComponent.ReviewStatus'},...
 IncludeReferenceModels=true,...
 Color="purple");
```

3. To open the Architecture Views Gallery the **Views** section, click **Architecture Views**.

```
model.openViews
```



Example 2: FOB Locator System Supplier View

Create a freeform view that manually pulls the components from the FOB Locator System and groups them using existing and new view components for the suppliers. In this example, you will use *element groups*, groupings of components in a view, to programmatically populate a view.

1. Create a view architecture.

```
fobSupplierView = model.createView("FOB Locator System Supplier Breakdown",...
    Color="lightblue");
```

2. Add a subgroup called `Supplier D`. Add the `FOB Locator Module` to the view element subgroup.

```
supplierD = fobSupplierView.Root.createSubGroup("Supplier D");
supplierD.addElement("KeylessEntryArchitecture/FOB Locator System/FOB Locator Module");
```

3. Create a new subgroup for `Supplier A`.

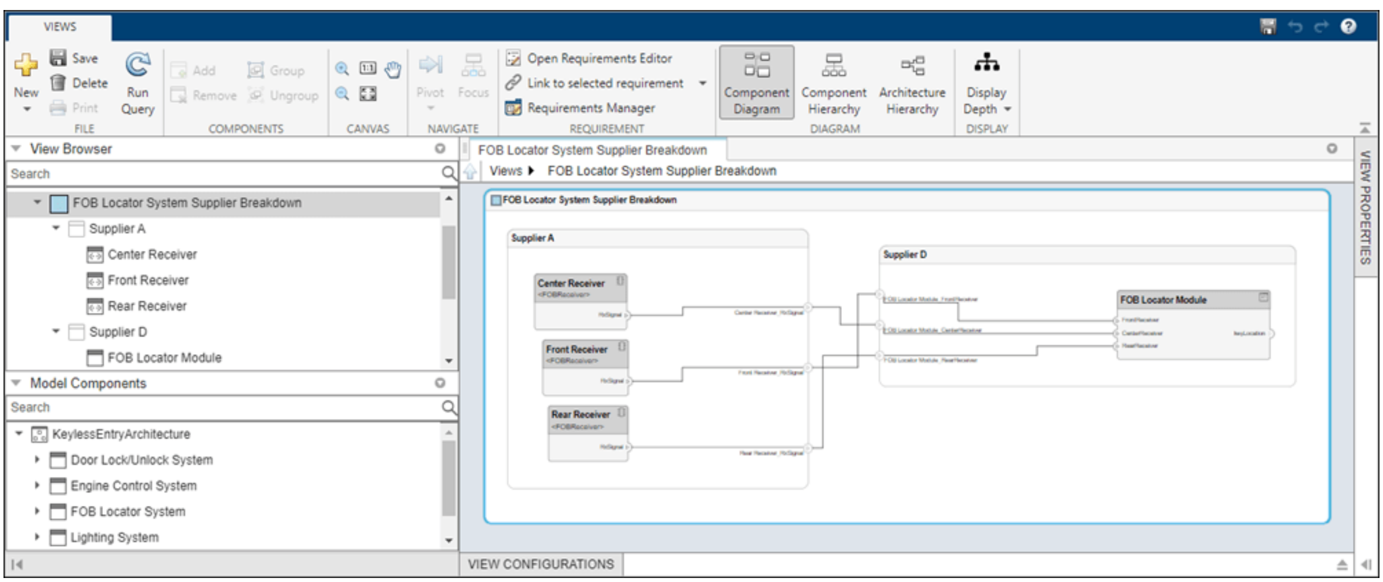
```
supplierA = fobSupplierView.Root.createSubGroup("Supplier A");
```

4. Add each of the FOB Receivers to view element subgroup.

```
FOBLocatorSystem = model.lookup("Path","KeylessEntryArchitecture/FOB Locator System");
```

Find all the components which contain the name `"Receiver"`.

```
receiverCompPaths = model.find(...
    contains(Property("Name"),"Receiver"),...
    FOBLocatorSystem.Architecture);

supplierA.addElement(receiverCompPaths)
```



5. Save the model.

```
model.save
```

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	“Display Component Hierarchy and Architecture Hierarchy Using Views”

See Also

`openViews` | `createView` | `getView` | `deleteView` | `systemcomposer.view.ElementGroup`

Topics

“Create Architecture Views Interactively”
“Create Architectural Views Programmatically”
“Display Component Hierarchy and Architecture Hierarchy Using Views”

Introduced in R2021a

systemcomposer.view.ViewArchitecture

(Removed) Set of view components in architecture view

Note The systemcomposer.view.ViewArchitecture class has been removed. It has been replaced with the systemcomposer.view.View and the systemcomposer.view.ElementGroup classes. For further details, see "Compatibility Considerations".

Description

A ViewArchitecture object describes a set of view components that make up a view. This class inherits from the systemcomposer.view.ViewElement class.

Properties

Name — Name of architecture
character vector

Name of architecture derived from the parent component or model name to which the architecture belongs, returned as a character vector.

Example: `name = get(objViewArchitecture,'Name')`

Data Types: `char`

IncludeReferenceModels — Control inclusion of referenced models
`true` or 1 | `false` or 0

Control inclusion of referenced models, returned as a logical with values 1 (`true`) or 0 (`false`).

Example: `included = get(objViewArchitecture,'IncludeReferenceModels')`

Data Types: `logical`

Color — Color of view architecture
character vector

Color of view architecture, returned as a character vector as a name `'blue'`, `'black'`, or `'green'` or as a RGB value encoded in a hexadecimal string `'#FF00FF'` or `'#DDDDDD'`. An invalid color string results in an error.

Example: `color = get(objViewArchitecture,'Color')`

Description — Description of view architecture
character vector

Description of view architecture, returned as a character vector.

Example: `description = get(objViewArchitecture,'Description')`

Example: `set(objViewArchitecture,'Description',description)`

Data Types: `char`

`Parent` — Component that owns view architecture
base view component object

Component that owns view architecture, returned as a `systemcomposer.view.BaseViewComponent` object. For a root view architecture, returns an empty handle.

Example: `parentComponent = get(objViewArchitecture,'Parent')`

`Components` — Array of handles to child components
array of base view component objects

Array of handles to the set of child components of this view architecture, returned as an array of `systemcomposer.view.BaseViewComponent` objects.

Example: `childComponents = get(objViewArchitecture,'Components')`

Methods

addComponent	(Removed) Add component to view given path
removeComponent	(Removed) Remove component from view
createViewComponent	(Removed) Create view component

Compatibility Considerations

`systemcomposer.view.ViewArchitecture` class has been removed
Errors starting in R2021a

The `systemcomposer.view.ViewArchitecture` class is removed in R2021a with the introduction of new views programmatic interfaces. For more information on how to create and edit a view using the command line, see "Create Architectural Views Programmatically".

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2019b

systemcomposer.view.ViewComponent

(Removed) View component within architecture view

Note The `systemcomposer.view.ViewComponent` class has been removed. It has been replaced with the `systemcomposer.view.View` and the `systemcomposer.view.ElementGroup` classes. For further details, see "Compatibility Considerations".

Description

A `ViewComponent` object is a component that exists only in the view in which it is created. These components do not exist in the composition. This class inherits from the `systemcomposer.view.BaseViewComponent` class.

Compatibility Considerations

`systemcomposer.view.ViewComponent` class has been removed
Errors starting in R2021a

The `systemcomposer.view.ViewComponent` class is removed in R2021a with the introduction of new views programmatic interfaces. For more information on how to create and edit a view using the command line, see "Create Architectural Views Programmatically".

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics
"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2019b

systemcomposer.view.ViewElement

(Removed) All view elements

Note The `systemcomposer.view.ViewElement` class has been removed. It has been replaced with the `systemcomposer.view.View` and the `systemcomposer.view.ElementGroup` classes. For further details, see “Compatibility Considerations”.

Description

Base class of all view elements.

Properties

`ZCIdentifier` — Identifier of object
character vector

Identifier of object. This property is used by Simulink Requirements™.

Example: `identifier = get(objViewElement,'ZCIdentifier')`

Data Types: `char`

Compatibility Considerations

`systemcomposer.view.ViewElement` class has been removed
Errors starting in R2021a

The `systemcomposer.view.ViewElement` class is removed in R2021a with the introduction of new views programmatic interfaces. For more information on how to create and edit a view using the command line, see “Create Architectural Views Programmatically”.

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics
“Create Architecture Views Interactively”
“Create Architectural Views Programmatically”

Introduced in R2009b

3

Functions

addChoice

Package: systemcomposer.arch

Add variant choices to variant component

Syntax

```
compList = addChoice(variantComponent,choices)
compList = addChoice(variantComponent,choices,labels)
```

Description

`compList = addChoice(variantComponent,choices)` creates variant choices specified in `choices` in the specified variant component and returns their handles.

`compList = addChoice(variantComponent,choices,labels)` creates variant choices specified in `choices` with labels `labels` in the specified variant component and returns their handles.

Examples

Add Variant Choices

Create a model, get the root architecture, create one variant component, and add two choices for the variant component.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
variant = addVariantComponent(arch,"Component1");
compList = addChoice(variant,["Choice1","Choice2"]);
```

Input Arguments

`variantComponent` — Variant component
variant component object

Variant component, specified as a `systemcomposer.arch.VariantComponent` object.

`choices` — Variant choice names
cell array of character vectors | array of strings

Variant choice names, specified as a cell array of character vectors or an array of strings. The length of `choices` must be the same as `labels`.

Data Types: `char` | `string`

`labels` — Variant choice labels
cell array of character vectors | array of strings

Variant choice labels, specified as a cell array of character vectors or an array of strings. The length of `labels` must be the same as `choices`.

Data Types: `char` | `string`

Output Arguments

`compList` — Created components
array of components

Created components, returned as an array of `systemcomposer.arch.Component` objects. This array is the same size as `choices` and `labels`.

More About

Definitions

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	"Create Variants"
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	"Set Variant Control Condition" on page 3-603

See Also

`getActiveChoice` | `getChoices` | `makeVariant` | `addVariantComponent` | Variant Component

Topics

"Create Variants"

Introduced in R2019a

addComponent

Package: `systemcomposer.arch`

Add components to architecture

Syntax

```
components = addComponent(architecture,compNames)
components = addComponent(architecture,compNames,stereotypes)
```

Description

`components = addComponent(architecture,compNames)` adds a set of components specified by the names `compNames`.

To remove a component, use the `destroy` function.

`components = addComponent(architecture,compNames,stereotypes)` applies stereotypes specified in `stereotypes` to the new components.

Examples

Create Model with Two Components

Create a model, get the root architecture, and create components. Arrange the layout to view both components.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
names = ["Component1","Component2"];
comps = addComponent(arch,names);
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Input Arguments

`architecture` — Parent architecture
architecture object

Parent architecture to add component to, specified as a `systemcomposer.arch.Architecture` object.

`compNames` — Names of components
cell array of character vectors | array of strings

Name of components, specified as a cell array of character vectors or an array of strings. The length of `compNames` must be the same as `stereotypes`.

Data Types: `char` | `string`

`stereotypes` — Stereotypes to apply to components
cell array of character vectors | array of strings

Stereotypes to apply to components, specified as a cell array of character vectors or an array of strings. Each element is the qualified stereotype name for the corresponding component in the form `"<profile>.<stereotype>"`.

Data Types: `char` | `string`

Output Arguments

`components` — Created components
array of component objects

Created components, returned as an array of `systemcomposer.arch.Component` objects.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`addPort` | `connect` | Component

Topics

"Components"

Introduced in R2019a

addComponent

Package: systemcomposer.view

(Removed) Add component to view given path

Note The addComponent function has been removed. You can create a view using the createView function and add a component using the addElement function. For further details, see “Compatibility Considerations”.

Syntax

viewComp = addComponent(object,compPath)

Description

viewComp = addComponent(object,compPath) adds the component with the specified path.

addComponent is a method for the class systemcomposer.view.ViewArchitecture.

Examples

Add Component to View

Create a model, extract its architecture, and add three components.

```
model = systemcomposer.createModel('mobileRobotAPI');
arch = model.Architecture;
components = addComponent(arch,{'Sensor','Planning','Motion'});
```

Create a view architecture, a view component, and add a component. Open the **Architecture Views Gallery** to view the component.

```
view = model.createViewArchitecture('NewView');
viewComp = fobSupplierView.createViewComponent('ViewComp');
viewComp.Architecture.addComponent('mobileRobotAPI/Motion');
openViews(model);
```

Input Arguments

object — View architecture
view architecture object

View architecture, specified as a systemcomposer.view.ViewArchitecture object.

compPath — Path to component
character vector

Path to component, including the name of the top-level model, specified as a character vector.

Example: `'mobileRobotAPI/Motion'`

Data Types: `char`

Output Arguments

`viewComp` — View component
view component object

View component, returned as a `systemcomposer.view.ViewComponent` object.

Compatibility Considerations

`addComponent` function has been removed
Errors starting in R2021a

The `addComponent` function is removed in R2021a with the introduction of new views APIs. For more information on how to create and edit a view programmatically, see “Create Architectural Views Programmatically”.

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics
“Create Architecture Views Interactively”
“Create Architectural Views Programmatically”

Introduced in R2019b

addElement

Package: `systemcomposer.interface`

Add element

Syntax

```
element = addElement(interface,name)
element = addElement(interface,name,Name,Value)
```

Description

`element = addElement(interface,name)` adds an element to an interface with default properties.

To remove an element from an interface, use the `removeElement` function.

`element = addElement(interface,name,Name,Value)` sets the properties of the element using name-value arguments.

Examples

Add Data Interface and Data Element

Create a new model `newModel`. Add a data interface `newInterface` to the interface dictionary of the model. Then, add a data element `newElement` with data type `double`.

```
arch = systemcomposer.createModel("newModel",true);
interface = addInterface(arch.InterfaceDictionary,"newInterface");
element = addElement(interface,"newElement",DataType="double")
```

```
element = 

  DataElement with properties:

      Interface: [1×1 systemcomposer.interface.DataInterface]
           Name: 'newElement'
           Type: [1×1 systemcomposer.ValueType]
           UUID: '2d267175-33c2-43a9-be41-a1be2774a3cf'
    ExternalUID: ''
```

Add Physical Interface and Physical Element

Create a new model named `'newModel'`. Add a physical interface `'newInterface'` to the interface dictionary of the model. Then, add a physical element `'newElement'` with type `'electrical.electrical'`. Change the physical domain type to `'electrical.six_phase'`.

```
arch = systemcomposer.createModel('newModel',true);
interface = addPhysicalInterface(arch.InterfaceDictionary,'newInterface');
```

```
element = addElement(interface,'newElement','Type','electrical.electrical');
element.Type = 'electrical.six_phase';
element
```

```
element = 

  PhysicalElement with properties:

           Name: 'newElement'
           Type: [1×1 systemcomposer.interface.PhysicalDomain]
      Interface: [1×1 systemcomposer.interface.PhysicalInterface]
           UUID: '32e4c51e-e567-42f1-b44a-2d2fcdbb5c25'
    ExternalUID: ''
```

Input Arguments

`interface` — Interface

data interface object | physical interface object | service interface object

Interface, specified as a `systemcomposer.interface.DataInterface`, `systemcomposer.interface.PhysicalInterface`, or `systemcomposer.interface.ServiceInterface` object.

name — Element name

character vector | string

Element name, specified as a character vector or string. An element name must be a valid MATLAB variable name.

Data Types: `char` | `string`

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `addElement(interface,"newElement",DataType="double",Dimensions="2",Units="m/s",Complexity="complex",Minimum="0",Maximum="100",Description="Maintain altitude")`

`DataType` — Data type

character vector | string

Data type, specified as a character vector or string for a valid MATLAB data type. The default value is `double`.

Example: `addElement(interface,"newElement",DataType="double")`

Data Types: `char` | `string`

`Dimensions` — Dimensions

character vector | string

Dimensions, specified as a character vector or string. The default value is `1`.

Example: `addElement(interface,"newElement",Dimensions="2")`

Data Types: `char` | `string`

`Units` — Units
character vector | string

Units, specified as a character vector or string.

Example: `addElement(interface,"newElement",Units="m/s")`

Data Types: `char` | `string`

`Complexity` — Complexity
character vector | string

Complexity, specified as a character vector or string. The default value is `real`. Other possible values are `complex` and `auto`.

Example: `addElement(interface,"newElement",Complexity="complex")`

Data Types: `char` | `string`

`Minimum` — Minimum
character vector | string

Minimum, specified as a character vector or string.

Example: `addElement(interface,"newElement",Minimum="0")`

Data Types: `char` | `string`

`Maximum` — Maximum
character vector | string

Maximum, specified as a character vector or string.

Example: `addElement(interface,"newElement",Maximum="100")`

Data Types: `char` | `string`

`Description` — Description
character vector | string

Description, specified as a character vector or string.

Example: `addElement(interface,"newElement",Description="Maintain altitude")`

Data Types: `char` | `string`

`Type` — Physical domain
character vector | string

Physical domain of physical element, specified as a character vector or string of a partial physical domain name. For a list of valid physical domain names, see "Domain-Specific Line Styles" (Simscape).

Example: `addElement(interface,"newElement",Type="electrical.six_phase")`

Data Types: `char` | `string`

Output Arguments

`element` — Element
data element object | physical element object | function element object

Element, returned as a `systemcomposer.interface.DataElement`, `systemcomposer.interface.PhysicalElement`, or `systemcomposer.interface.FunctionElement` object.

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`removeElement` | `getElement` | `getInterfaceNames` | `getInterface` | `setType` | `addInterface` | `addValueType` | `addPhysicalInterface` | `addServiceInterface`

Topics

"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

addElement

Package: `systemcomposer.view`

Add component to element group of view

Syntax

`addElement(elementGroup,component)`

Description

`addElement(elementGroup,component)` adds the component `component` to the element group `elementGroup` of an architecture view.

Note This function cannot be used when a selection query or grouping is defined on the view. To remove the query, run `removeQuery`.

Examples

Add Elements to View

Open the keyless entry system example and create a view, `newView`.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("newView");
```

Open the Architecture Views Gallery to see `newView`.

```
model.openViews
```

Add an element to the view by path.

```
view.Root.addElement("KeylessEntryArchitecture/Lighting System/Headlights")
```

Add an element to the view by object.

```
component = model.lookup(Path="KeylessEntryArchitecture/Lighting System/Cabin Lights");
view.Root.addElement(component)
```

Input Arguments

`elementGroup` — Element group
element group object

Element group for view, specified as a `systemcomposer.view.ElementGroup` object.

`component` — Component
component object | variant component object | array of component objects | array of variant component objects | path to component | cell array of component paths

Component to remove from view, specified as a `systemcomposer.arch.Component` object, a `systemcomposer.arch.VariantComponent` object, an array of `systemcomposer.arch.Component` objects, an array of `systemcomposer.arch.VariantComponent` objects, the path to a component, or a cell array of component paths.

Example: `"KeylessEntryArchitecture/Lighting System/Headlights"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	“Modeling System Architecture of Keyless Entry System”
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• “Create Architecture Views Interactively” • “Create Architectural Views Programmatically”
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”

Term	Definition	Application	More Information
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`lookup` | `openViews` | `createView` | `getView` | `deleteView` | `systemcomposer.view.ElementGroup` | `systemcomposer.view.View` | `removeElement` | `getSubGroup` | `deleteSubGroup` | `createSubGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

addInterface

Package: `systemcomposer.interface`

Create named data interface in interface dictionary

Syntax

```
interface = addInterface(dictionary,name)
interface = addInterface(dictionary,name,'SimulinkBus',busObject)
```

Description

`interface = addInterface(dictionary,name)` adds the data interface specified by name `name` to the interface dictionary `dictionary`.

To remove an interface, use the `removeInterface` function.

`interface = addInterface(dictionary,name,'SimulinkBus',busObject)` constructs a data interface that mirrors an existing Simulink bus object.

Examples

Add Data Interface

Create a data dictionary, then add a data interface `newInterface`.

```
dictionary = systemcomposer.createDictionary("new_dictionary.sldd");
interface = addInterface(dictionary,"newInterface")
```

Create a new model and link the data dictionary. Then, open the **Interface Editor** to view the new interface.

```
arch = systemcomposer.createModel("newModel",true);
linkDictionary(arch,"new_dictionary.sldd");
```

Add Simulink Bus Mirrored Data Interface

Create a dictionary, create a Simulink bus object, populate the bus object with two elements, and add the named data interface that mirrors the Simulink bus object to the dictionary.

```
dictionary = systemcomposer.createDictionary("new_dictionary.sldd");

busObj = Simulink.Bus;
elems(1) = Simulink.BusElement;
elems(1).Name = 'element_1';
elems(2) = Simulink.BusElement;
elems(2).Name = 'element_2';
busObj.Elements = elems;

interface = addInterface(dictionary,"newInterface",SimulinkBus=busObj);
```

Create a new model, link the data dictionary, and open the **Interface Editor**.

```
arch = systemcomposer.createModel("newModel",true);
linkDictionary(arch,"new_dictionary.sldd");
```

Input Arguments

`dictionary` — Data dictionary
dictionary object

Data dictionary, specified as a `systemcomposer.interface.Dictionary` object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then `dictionary` must be the dictionary that carries interface definitions. For information on how to create a dictionary, see `createDictionary`.

`name` — Name of new data interface
character vector | string

Name of new data interface, specified as a character vector or string. This name must be a valid MATLAB identifier.

Example: `"newInterface"`

Data Types: `char` | `string`

`busObject` — Simulink bus object that new data interface mirrors
bus object

Simulink bus object that new data interface mirrors, specified as a Simulink bus object.

Output Arguments

`interface` — New data interface
data interface object

New data interface, returned as a `systemcomposer.interface.DataInterface` object.

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`addElement` | `createDictionary` | `getInterface` | `getInterfaceNames` | `removeInterface` | `linkDictionary` | Adapter | `addPhysicalInterface` | `addValueType`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2019a

addPhysicalInterface

Package: systemcomposer.interface

Create named physical interface in interface dictionary

Syntax

`interface = addPhysicalInterface(dictionary,name)`

Description

`interface = addPhysicalInterface(dictionary,name)` adds the physical interface specified by the name `name` to the interface dictionary `dictionary`.

To remove an interface, use the `removeInterface` function.

Examples

Add Physical Interface

Create a data dictionary, then add a physical interface `newInterface`.

```
dictionary = systemcomposer.createDictionary("new_dictionary.sldd");
interface = addPhysicalInterface(dictionary,"newInterface")
```

Create a new model and link the data dictionary. Then, open the **Interface Editor** to view the new interface.

```
arch = systemcomposer.createModel("newModel",true);
linkDictionary(arch,"new_dictionary.sldd");
```

Input Arguments

`dictionary` — Data dictionary
dictionary object

Data dictionary, specified as a `systemcomposer.interface.Dictionary` object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then `dictionary` must be the dictionary that carries interface definitions. For information on how to create a dictionary, see `createDictionary`.

`name` — Name of new physical interface
character vector | string

Name of new physical interface, specified as a character vector or string. This name must be a valid MATLAB identifier.

Example: `"newInterface"`

Data Types: `char` | `string`

Output Arguments

`interface` — New physical interface
physical interface object

New physical interface, returned as a `systemcomposer.interface.PhysicalInterface` object.

More About

Definitions

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"

Term	Definition	Application	More Information
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addElement` | `createDictionary` | `addInterface` | `getInterface` | `getInterfaceNames` | `removeInterface` | `linkDictionary` | Adapter | `addValueType`

Topics

"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021b

addFunction

Package: `systemcomposer.arch`

Add functions to architecture of software component

Syntax

`functions = addFunction(architecture,functionNames)`

Description

`functions = addFunction(architecture,functionNames)` adds a set of functions with the names specified, `functionNames` to the software architecture component architecture.

To remove a function, use the `destroy` function.

Examples

Add Functions to Software Architecture Component

Create a model named `mySoftwareArchitecture` and get the root architecture.

```
model = systemcomposer.createModel("mySoftwareArchitecture","SoftwareArchitecture");
rootArch = model.Architecture
```

```
Architecture with properties:

                   Name: 'mySoftwareArchitecture'
             Definition: Composition
                 ...
            ExternalUID: ''
              Functions: []
```

Create a software component and two functions.

```
newComp = rootArch.addComponent("C1");
newFuncs = newComp.Architecture.addFunction({'f1','f2'});
rootArch
```

```
rootArch = 

  Architecture with properties:

                   Name: 'mySoftwareArchitecture'
             Definition: Composition
                ...
            ExternalUID: ''
```

```
    Functions: [1x2 systemcomposer.arch.Function]
```

Input Arguments

`architecture` — Software architecture
architecture object

Software architecture, specified as a `systemcomposer.arch.Architecture` object. The `addfunction` function adds functions to the software architecture of a component. Use `<component>.Architecture` to access the architecture of a component.

`functionNames` — Names of functions
cell array of character vectors | array of strings

Names of functions, specified as a cell array of character vectors or an array of strings.

Data Types: `char` | `string`

Output Arguments

`functions` — Handles to created functions
array of function objects

Created functions, returned as an array of `systemcomposer.arch.Function` objects.

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• “Author Software Architectures” • “Simulate and Deploy Software Architectures”
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• “Implement Behaviors for Architecture Model Simulation” • “Create Software Architecture from Component”

Term	Definition	Application	More Information
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	“Modeling the Software Architecture of a Throttle Position Control System”
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	“Author and Extend Functions for Software Architectures”
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	“Class Diagram View of Software Architectures”

See Also

`addComponent` | `systemcomposer.arch.Function`

Topics

“Author and Extend Functions for Software Architectures”

Introduced in R2022a

addPort

Package: `systemcomposer.arch`

Add ports to architecture

Syntax

```
ports = addPort(architecture,portNames,portTypes)
ports = addPort(architecture,portNames,portTypes,stereotypes)
```

Description

`ports = addPort(architecture,portNames,portTypes)` adds a set of ports with specified names `portNames` and types `portTypes`.

To remove a port, use the `destroy` function.

`ports = addPort(architecture,portNames,portTypes,stereotypes)` also applies stereotypes specified in `stereotypes` to a set of new ports.

Examples

Add Port to Architecture

Create a model, get the root architecture, add a component, and add a port.

```
model = systemcomposer.createModel("archModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"NewComponent");
newPort = addPort(newComponent.Architecture,"NewCompPort","in")
```

```
newPort = 

  ArchitecturePort with properties:

                 Parent: [1×1 systemcomposer.arch.Architecture]
                   Name: 'NewCompPort'
              Direction: Input
          InterfaceName: ''
              Interface: [0×0 systemcomposer.interface.DataInterface]
             Connectors: [0×0 systemcomposer.arch.Connector]
              Connected: 0
                  Model: [1×1 systemcomposer.arch.Model]
         SimulinkHandle: 57.0018
    SimulinkModelHandle: 10.0018
```

```
              UUID: 'f3dd03e1-af14-47ed-88c8-0ce301b2da5f'
       ExternalUID: ''
```

Input Arguments

architecture — Architecture
architecture object

Architecture, specified as a `systemcomposer.arch.Architecture` object. The `addPort` function adds ports to the architecture of a component or the root architecture of the model. Use `<component>.Architecture` to access the architecture of a component.

portNames — Names of ports
cell array of character vectors | array of strings | character vector | string

Names of ports, specified as a cell array of character vectors or an array of strings. If necessary, System Composer appends a number to the port name to ensure uniqueness. The size of `portNames`, `portTypes`, and `stereotypes` must be the same.

Data Types: `char` | `string`

portTypes — Port types
cell array of character vectors | array of strings | character vector | string

Port types, specified as a cell array of character vectors or an array of strings. Available port types follow:

- `"in"`
- `"out"`
- `"physical"`
- `"client"` for software architectures
- `"server"` for software architectures

Data Types: `char` | `string`

stereotypes — Stereotypes to apply to ports
array of stereotype objects

Stereotypes to apply to ports, specified as an array of `systemcomposer.profile.Stereotype` objects. Each stereotype in the array must either be a stereotype that applies to all element types or a port stereotype.

Output Arguments

ports — Created ports
array of ports

Created ports, returned as an array of `systemcomposer.arch.ArchitecturePort` objects.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"

Term	Definition	Application	More Information
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`destroy` | `systemcomposer.arch.BasePort` | `addComponent` | `connect` | Component

Topics

"Ports"

Introduced in R2019a

addProperty

Package: `systemcomposer.profile`

Define custom property for stereotype

Syntax

```
property = addProperty(stereotype,name)
property = addProperty(stereotype,name,Name,Value)
```

Description

`property = addProperty(stereotype,name)` returns a new `property` definition with `name` that is contained in `stereotype`.

To remove a property, use the `removeProperty` function.

`property = addProperty(stereotype,name,Name,Value)` returns a `property` definition that is configured with specified property values.

Examples

Add Property

Add a component stereotype and add a `VoltageRating` property with value `5`.

```
profile = systemcomposer.profile.Profile.createProfile("myProfile");
stereotype = addStereotype(profile,"electricalComponent",AppliesTo="Component");
property = addProperty(stereotype,"VoltageRating",DefaultValue="5");
```

Input Arguments

`stereotype` — Stereotype
stereotype object

Stereotype, specified as a `systemcomposer.profile.Stereotype` object.

name — Name of property
character vector | string

Name of property unique within the stereotype, specified as a character vector or string.

Data Types: `char` | `string`

Name-Value Pair Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `addProperty(stereotype,"Amount",Type="double")`

Type — Property data type
`double` (default) | `single` | `int64` | `int32` | `int16` | `int8` | `uint64` | `uint32` | `uint8` | `boolean` | `string` | enumeration class name

Type of this property. One of valid data types or the name of a MATLAB class that defines an enumeration. For more information, see "Use Enumerated Data in Simulink Models".

Example: `addProperty(stereotype,"Color",Type="BasicColors")`

Data Types: `char` | `string`

Dimensions — Dimensions of property
positive integer array

Dimensions of property, specified as a positive integer array. Empty implies no restriction.

Example: `addProperty(stereotype,"Amount",Dimensions=2)`

Data Types: `double`

Min — Minimum value
numeric

Optional minimum value of this property. To set both `'Min'` and `'Max'` together, use the `setMinAndMax` method.

Example: `setMinAndMax(property,min,max)`

Example: `addProperty(stereotype,"Amount",Min="0")`

Data Types: `double`

Max — Maximum value
numeric

Optional maximum value of this property. To set both `'Min'` and `'Max'` together, use the `setMinAndMax` method.

Example: `setMinAndMax(property,min,max)`

Example: `addProperty(stereotype,"Amount",Max="100")`

Data Types: `double`

Units — Property units
character vector | string

Units of the property value, specified as a character vector or string. If specified, all values of this property on model elements are checked for consistency with these units according to Simulink unit checking rules. For more information, see "Unit Consistency Checking and Propagation".

Example: `addProperty(stereotype,"Amount",Units="kg")`

Data Types: `char` | `string`

DefaultValue — Default value
character vector | string

Default value of this property, specified as a character vector or string that can be evaluated depending on the `Type`.

Data Types: `char` | `string`

Output Arguments

`property` — Created property
property object

Created property, returned as a `systemcomposer.profile.Property` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also
`getProperty` | `setProperty` | `removeProperty`

Topics
"Define Profiles and Stereotypes"
"Set Properties for Analysis"

Introduced in R2019a

addReference

Package: systemcomposer.interface

Add reference to dictionary

Syntax

addReference(dictionary,reference,collisionResolutionOption)

Description

addReference(dictionary,reference,collisionResolutionOption) adds a referenced dictionary to a dictionary in a System Composer model.

Examples

Add Referenced Dictionary

Add a data interface newInterface to the local interface dictionary of the model. Save the local interface dictionary to a shared dictionary as an SLDD file.

```
arch = systemcomposer.createModel("newModel",true);
addInterface(arch.InterfaceDictionary,"newInterface");
saveToDictionary(arch,"TopDictionary")
topDictionary = systemcomposer.openDictionary("TopDictionary.sldd");
```

Create a new dictionary and add it as a reference to the existing dictionary.

```
refDictionary = systemcomposer.createDictionary("ReferenceDictionary.sldd");
addReference(topDictionary,"ReferenceDictionary.sldd")
```

Input Arguments

dictionary — Data dictionary
dictionary object

Data dictionary, specified as a systemcomposer.interface.Dictionary object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then dictionary must be the dictionary that carries interface definitions. For information on how to create a dictionary, see createDictionary.

reference — Referenced dictionary
character vector | string

Referenced dictionary, specified as a character vector or string of the name of the referenced dictionary with the .sldd extension.

Example: "ReferenceDictionary.sldd"

Data Types: char | string

collisionResolutionOption — Collision resolution option
"Unspecified" (default) | "KeepTop" | "KeepReference'"

Collision resolution option if there is a conflict between two interfaces with the same name in the dictionaries, specified as one of the following:

- "KeepTop" to keep the interface from the top dictionary and remove the one in the reference dictionary.
- "KeepReference" to keep the interface from the reference dictionary and remove the one in the top dictionary.
- "Unspecified", which will error if any conflicts exist when creating the reference.

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`saveToDictionary` | `createDictionary` | `openDictionary` | `linkDictionary` | `unlinkDictionary` | `removeReference`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021a

addServiceInterface

Package: systemcomposer.interface

Create named service interface in interface dictionary

Syntax

```
interface = addServiceInterface(dictionary,name)
```

Description

`interface = addServiceInterface(dictionary,name)` adds the service interface specified by the name `name` to the interface dictionary `dictionary`.

To remove an interface, use the `removeInterface` function.

Examples

Add Service Interface

Create a data dictionary, then add a service interface named `newInterface`.

```
dictionary = systemcomposer.createDictionary("new_dictionary.sldd");
interface = addServiceInterface(dictionary,"newInterface")
```

Create a new model and link the data dictionary. Then, open the **Interface Editor** to view the new interface.

```
arch = systemcomposer.createModel("newModel",true);
linkDictionary(arch,"new_dictionary.sldd");
```

Input Arguments

dictionary — Data dictionary
dictionary object

Data dictionary, specified as a `systemcomposer.interface.Dictionary` object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then `dictionary` must be the dictionary that carries interface definitions. For information on how to create a dictionary, see `createDictionary`.

name — Name of new service interface
character vector | string

Name of new service interface, specified as a character vector or string. This name must be a valid MATLAB identifier.

Example: `"newInterface"`

Data Types: `char` | `string`

Output Arguments

`interface` — New service interface
service interface object

New service interface, returned as a `systemcomposer.interface.ServiceInterface` object.

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"

Term	Definition	Application	More Information
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addElement` | `createDictionary` | `addInterface` | `getInterface` | `getInterfaceNames` | `removeInterface` | `linkDictionary` | Adapter | `addValueType` | `getFunctionArgument` | `setFunctionPrototype`

Topics

"Author Service Interfaces for Client-Server Communication"
"Client-Server Interfaces in the Class Diagram View"
"Define Port Interfaces Between Components"

Introduced in R2022a

addStereotype

Package: `systemcomposer.profile`

Add stereotype to profile

Syntax

```
stereotype = addStereotype(profile,name)
stereotype = addStereotype( ___ ,Name,Value)
```

Description

`stereotype = addStereotype(profile,name)` adds a new stereotype with a specified name `name` to a profile `profile`.

`stereotype = addStereotype( ___ ,Name,Value)` adds a new stereotype with the previous input arguments and specifies properties for the stereotype.

Examples

Add Component Stereotype

Add a component stereotype to a profile.

```
profile = systemcomposer.profile.Profile.createProfile('LatencyProfile');
stereotype = addStereotype(profile,'electricalComponent','AppliesTo','Component')
```

```
stereotype = 
  Stereotype with properties:

                  Name: 'electricalComponent'
           Description: ''
                Parent: [0x0 systemcomposer.profile.Stereotype]
             AppliesTo: 'Component'
              Abstract: 0
                  Icon: 'default'
  ComponentHeaderColor: [210 210 210]
    ConnectorLineColor: [168 168 168]
    ConnectorLineStyle: 'Default'
    FullyQualifiedName: 'LatencyProfile.electricalComponent'
               Profile: [1x1 systemcomposer.profile.Profile]
       OwnedProperties: [0x0 systemcomposer.profile.Property]
            Properties: [0x0 systemcomposer.profile.Property]
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

name — Stereotype name
character vector | string

Stereotype name, specified as a character vector or string. The name of the stereotype must be unique within the profile.

Data Types: `char` | `string`

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `addStereotype(profile,'electricalComponent',AppliesTo="Component")`

`Description` — Description text for stereotype
character vector | string

Description text for stereotype, specified as a character vector or string.

Example: `addStereotype(profile,'electricalComponent',Description="These components are electrical")`

Data Types: `char` | `string`

`Icon` — Icon name for stereotype
character vector | string

Icon name for stereotype, specified as a character vector or string. Built in options include:

- `"default"`
- `"application"`
- `"channel"`
- `"controller"`
- `"database"`
- `"devicedriver"`
- `"memory"`
- `"network"`
- `"plant"`
- `"sensor"`
- `"subsystem"`
- `"transmitter"`

This name-value argument is only valid for component stereotypes. The element a stereotype applies to is set with the `AppliesTo` name-value argument.

Example: `addStereotype(profile,"electricalComponent",Icon="default")`

Data Types: `char` | `string`

Parent — Stereotype from which stereotype inherits properties
stereotype object

Stereotype from which stereotype inherits properties, specified as a `systemcomposer.profile.Stereotype` object.

Example: `addStereotype(profile,"electricalComponent",Parent=baseStereotype)`

AppliesTo — Element type to which stereotype can be applied
`""` (default) | `"Component"` | `"Port"` | `"Connector"` | `"Interface"` | `"Function"`

Element type to which stereotype can be applied, specified one of these options:

- `""` to apply stereotype to all element types
- `"Component"`
- `"Port"`
- `"Connector"`
- `"Interface"`
- `"Function"`, which is only available for software architectures

Example: `addStereotype(profile,"electricalComponent",AppliesTo="Port")`

Data Types: `char` | `string`

Abstract — Whether stereotype is abstract
`false`or 0 (default) | `true` or 1

Whether stereotype is abstract, specified as a logical. If `true`, then the stereotype cannot be directly applied on model elements, but instead serves as a parent for other stereotypes.

Example: `addStereotype(profile,'electricalComponent','Abstract',true)`

Data Types: `logical`

ComponentHeaderColor — Component header color
1x3 `uint32` row vector

Component header color, specified as a 1x3 `uint32` row vector in the form `[Red Green Blue]`.

This name-value argument is only valid for component stereotypes. The element a stereotype applies to is set with the `AppliesTo` name-value argument.

Example: `addStereotype(profile,'electricalComponent','ComponentHeaderColor',[206 232 246])`

Data Types: `uint32`

ConnectorLineColor — Connector line color
1x3 `uint32` row vector

Connector line color, specified as a 1x3 `uint32` row vector in the form `[Red Green Blue]`.

This name-value argument is only valid for connector, port, and interface stereotypes. The element a stereotype applies to is set with the `AppliesTo` name-value argument.

Example: `addStereotype(profile,'electricalComponent','ConnectorLineColor',[206 232 246])`

Data Types: `uint32`

`ConnectorLineStyle` — Connector line style
character vector | string

Connector line style name, specified as a character vector or string. Options include:

- `"Default"`
- `"Dot"`
- `"Dash"`
- `"Dash Dot"`
- `"Dash Dot Dot"`

This name-value argument is only valid for connector, port, and interface stereotypes. The element a stereotype applies to is set with the `AppliesTo` name-value argument.

Data Types: `char` | `string`

Output Arguments

`stereotype` — Created stereotype
stereotype object

Created stereotype, returned as a `systemcomposer.profile.Stereotype` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	“Extend Architectural Design Using Stereotypes”

Term	Definition	Application	More Information
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`getStereotype` | `getDefaultStereotype` | `setDefaultStereotype` | `removeStereotype`

Topics

"Define Profiles and Stereotypes"
"Use Stereotypes and Profiles"

Introduced in R2019a

addValueType

Package: `systemcomposer.interface`

Create named value type in interface dictionary

Syntax

```
valueType = addValueType(dictionary,name)
valueType = addValueType(dictionary,name,Name,Value)
```

Description

`valueType = addValueType(dictionary,name)` adds a named value type to a specified interface dictionary.

To remove a value type, use the `destroy` function.

`valueType = addValueType(dictionary,name,Name,Value)` adds a named value type to a specified interface dictionary with additional options.

Examples

Add Value Type

Create a data dictionary and add a value type `airSpeed`.

```
dictionary = systemcomposer.createDictionary("new_dictionary.sldd");
airSpeedType = addValueType(dictionary,"airSpeed")
```

Create a new model, link the data dictionary to the model, and view the Interface Editor to confirm the existence of the new value type `airSpeed`.

```
arch = systemcomposer.createModel("newModel",true);
linkDictionary(arch,"new_dictionary.sldd");
```

Input Arguments

`dictionary` — Data dictionary
dictionary object

Data dictionary, specified as a `systemcomposer.interface.Dictionary` object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then `dictionary` must be the dictionary that carries interface definitions. For information on how to create a dictionary, see `createDictionary`.

name — Name of new value type
character vector | string

Name of new value type, specified as a character vector or string. This name must be a valid MATLAB identifier.

Example: `"airSpeed"`

Data Types: `char` | `string`

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example:
`addValueType(dictionary,"airSpeed",DataType="double",Dimensions="2",Units="m/s",Complexity="complex",Minimum="0",Maximum="100",Description="Maintain altitude")`

`DataType` — Data type of value type
character vector | string

Data type of value type, specified as a character vector or string for a valid MATLAB data type. The default value is `double`.

Example: `addValueType(dictionary,"airSpeed",DataType="double")`

Data Types: `char` | `string`

`Dimensions` — Dimensions of value type
character vector | string

Dimensions of value type, specified as a character vector or string. The default value is `1`.

Example: `addValueType(dictionary,"airSpeed",Dimensions="2")`

Data Types: `char` | `string`

`Units` — Units of value type
character vector | string

Units of value type, specified as a character vector or string.

Example: `addValueType(dictionary,"airSpeed",Units="m/s")`

Data Types: `char` | `string`

`Complexity` — Complexity of value type
character vector | string

Complexity of value type, specified as a character vector or string. The default value is `real`. Other possible values are `complex` and `auto`.

Example: `addValueType(dictionary,"airSpeed",Complexity="complex")`

Data Types: `char` | `string`

`Minimum` — Minimum of value type
character vector | string

Minimum of value type, specified as a character vector or string.

Example: `addValueType(dictionary,"airSpeed",Minimum="0")`

Data Types: `char` | `string`

`Maximum` — Maximum of value type
character vector | string

Maximum of value type, specified as a character vector or string.

Example: `addValueType(dictionary,"airSpeed",Maximum="100")`

Data Types: `char` | `string`

`Description` — Description of value type
character vector | string

Description of value type, specified as a character vector or string.

Example: `addValueType(dictionary,"airSpeed",Description="Maintain altitude")`

Data Types: `char` | `string`

Output Arguments

`valueType` — Value type
value type object

Value type, returned as a `systemcomposer.ValueType` object.

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• “Manage Interfaces with Data Dictionaries” • “Reference Data Dictionaries”

Term	Definition	Application	More Information
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`addElement` | `createDictionary` | `getInterface` | `getInterfaceNames` | `removeInterface` | `linkDictionary` | Adapter | `addPhysicalInterface` | `addInterface`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

addVariantComponent

Package: systemcomposer.arch

Add variant components to architecture

Syntax

```
variantList = addVariantComponent(architecture,variantComponents)
variantList = addVariantComponent(architecture,variantComponents,'Position',
position)
```

Description

`variantList = addVariantComponent(architecture,variantComponents)` adds a set of variant components specified by the array of names.

To remove a variant component, use the `destroy` function.

`variantList = addVariantComponent(architecture,variantComponents,'Position', position)` creates variant components in the architecture at a given position.

Examples

Create Variant Components

Create a model, get its root architecture, and create two variant components.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
names = ["Component1","Component2"];
variantComps = addVariantComponent(arch,names)
```

```
variantComps=1×2 object
  1x2 VariantComponent array with properties:

    Architecture
    Name
    Parent
    Ports
    OwnedPorts
    OwnedArchitecture
    Position
    Model
    SimulinkHandle
    SimulinkModelHandle
    UUID
    ExternalUID
```

Input Arguments

`architecture` — Parent architecture
architecture object

Parent architecture, specified as a `systemcomposer.arch.Architecture` object.

`variantComponents` — Names of variant components
cell array of character vectors | array of strings

Names of variant components, specified as a cell array of character vectors or an array of strings.

Data Types: `char` | `string`

`position` — Vector that specifies location of top corner and bottom corner of component
`1x4` numeric array

Vector that specifies location of top corner and bottom corner of component, specified as a `1x4` numeric array. The array denotes the top corner in terms of its x and y coordinates followed by the `x` and `y` coordinates of the bottom corner. When adding more than one variant component, a matrix of size `[Nx4]` may be specified where `N` is the number of variant components being added.

Data Types: `double`

Output Arguments

`variantList` — Variant components
array of components

Variant components, returned as an array of `systemcomposer.arch.VariantComponent` objects. This array is the same size as `variantComponents`.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	"Create Variants"
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	"Set Variant Control Condition" on page 3-603

See Also

`addPort` | `connect` | `addChoice` | `getActiveChoice` | `setActiveChoice` | Variant Component

Topics

"Create Variants"

Introduced in R2019a

allocate

Package: `systemcomposer.allocation`

Create new allocation

Syntax

`allocation = allocate(allocScenario,sourceElement,targetElement)`

Description

`allocation = allocate(allocScenario,sourceElement,targetElement)` creates a new allocation between the source element `sourceElement` and target element `targetElement`.

Examples

Create Allocation Set and Allocate Elements Between Models

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Save the allocation set.

```
allocSet.save
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

`allocScenario` — Allocation scenario
allocation scenario object

Allocation scenario , specified as a `systemcomposer.allocation.AllocationScenario` object.

`sourceElement` — Source element
element object

Source element, specified as a `systemcomposer.arch.Element` object.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

`targetElement` — Target element
element object

Target element, specified as a `systemcomposer.arch.Element` object.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

Output Arguments

`allocation` — Allocation
allocation object

Allocation between source and target element, returned as a `systemcomposer.allocation.Allocation` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"

Term	Definition	Application	More Information
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`getAllocation` | `getAllocatedFrom` | `getAllocatedTo` | `deallocate` | `destroy` | `getScenario` | `createAllocationSet`

Topics

“Create and Manage Allocations”

Introduced in R2020b

AnyComponent

Package: `systemcomposer.query`

Create query to select all components in model

Syntax

`query = AnyComponent`

Description

`query = AnyComponent` creates a query `query` that the `find` and `createView` functions use to select all components in the model.

Examples

Select All Components in Model

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query to find all components and list the second component.

```
constraint = AnyComponent;
components = find(model,constraint,Recurse=true,IncludeReferenceModels=true);
comp = components(2)
```

```
comp = 1x1 cell array
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Door Lock Controller'}
```

Output Arguments

query — Query
query constraint object

Query, returned as a `systemcomposer.query.Constraint` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`createView` | `find` | `systemcomposer.query.Constraint`

Topics

"Create Architectural Views Programmatically"
"Modeling System Architecture of Keyless Entry System"

Introduced in R2019b

applyProfile

Package: `systemcomposer.arch`

Apply profile to model

Syntax

`applyProfile(model,profileFile)`

Description

`applyProfile(model,profileFile)` applies a profile to an architecture model and makes all the constituent stereotypes available.

Examples

Apply Profile

Create a model.

```
model = systemcomposer.createModel("archModel",true);
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

`profileFile` — Name of profile
character vector | string

Name of profile, specified as a character vector or string.

Example: `"SystemProfile"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`removeProfile` | `createProfile`

Topics

"Define Profiles and Stereotypes"

Introduced in R2019a

applyStereotype

Package: `systemcomposer.arch`

Apply stereotype to architecture model element

Syntax

`applyStereotype(element,stereotype)`

Description

`applyStereotype(element,stereotype)` applies a stereotype to an architecture model element if the stereotype is not already applied to a model element. Stereotypes can be applied to architecture, component, port, connector, interface, and function model elements. The function model element is only available in software architectures.

Examples

Apply Stereotype

Create a model with a component.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Apply the stereotype to the component and get the stereotypes on the component.

```
comp.applyStereotype("LatencyProfile.LatencyBase");
stereotypes = getStereotypes(comp)
```

```
stereotypes =

  1×1 cell array
```

```
{'LatencyProfile.LatencyBase'}
```

Input Arguments

`element` — Architectural element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.ServiceInterface`, or `systemcomposer.arch.Function` object.

`stereotype` — Name of stereotype
character vector | string

Name of stereotype, specified as a character vector or string in the form `"<profile>.<stereotype>"`. The profile must already be applied to the model.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"

Term	Definition	Application	More Information
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	“Specify Physical Interfaces on Ports”
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	“Describe Component Behavior Using Simscape”

See Also
`batchApplyStereotype` | `removeStereotype` | `getStereotypes` | `getStereotypeProperties`

Topics
“Use Stereotypes and Profiles”

Introduced in R2019a

batchApplyStereotype

Package: systemcomposer.arch

Apply stereotype to all elements in architecture

Syntax

```
batchApplyStereotype(architecture,elementType,stereotype)
batchApplyStereotype(architecture,elementType,stereotype,'Recurse',flag)
```

Description

batchApplyStereotype(architecture,elementType,stereotype) applies the stereotype stereotype to all elements that match the element type elementType within the architecture architecture.

batchApplyStereotype(architecture,elementType,stereotype,'Recurse',flag) applies the stereotype stereotype to all elements that match the element type elementType within the architecture architecture and recursively to its sub-architectures according to the value of flag.

Examples

Apply Stereotype to All Connectors

Create a profile, add a connector stereotype, and add a property with a default value. Open the Profile Editor to inspect the profile.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
stereotype = addStereotype(profile,"standardConn",AppliesTo="Connector");
stereotype.addProperty("latency",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
```

Create a model with three components, ports, and connectors between them. Improve the model layout.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
rootArch = get(arch,"Architecture");
names = ["Component1","Component2","Component3"];
newComponents = addComponent(rootArch,names);
outPort1 = addPort(newComponents(1).Architecture,"testSig1","out");
inPort1 = addPort(newComponents(2).Architecture,"testSig1","in");
outPort2 = addPort(newComponents(2).Architecture,"testSig2","out");
inPort2 = addPort(newComponents(3).Architecture,"testSig2","in");
conn1 = connect(newComponents(1),newComponents(2));
conn2 = connect(newComponents(2),newComponents(3));
Simulink.BlockDiagram.arrangeSystem(modelName)
```

Apply the profile to the model.

```
arch.applyProfile("LatencyProfile");
```

Apply the connector stereotype to all the connectors in the architecture `rootArch`. Inspect the connectors in the Property Inspector to confirm the applied stereotypes.

```
batchApplyStereotype(rootArch,"Connector","LatencyProfile.standardConn")
```

Input Arguments

`architecture` — Architecture model element
architecture object

Architecture model element, specified as a `systemcomposer.arch.Architecture` object. Parent architecture layer for all components to attach the stereotype.

`elementType` — Element type
`"Component"` | `"Port"` | `"Connector"` | `"Interface"` | `"Function"`

Element type, specified as `"Component"`, `"Port"`, `"Connector"`, `"Interface"`, or `"Function"`. The element type `"Function"` is only available for software architectures.

Data Types: `char` | `string`

`stereotype` — Stereotype to apply
character vector | string

Stereotype to apply, specified as a character vector or string in the form `"<profile>.<stereotype>"`. This stereotype must be applicable for the element type.

Data Types: `char` | `string`

`flag` — Whether to apply stereotype recursively
`false` or 0 (default) | `true` or 1

Whether to apply stereotype recursively, specified as a logical. If `flag` is 1 (`true`), the stereotype is applied to the elements in the architecture and its sub-architectures.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`removeStereotype` | `applyStereotype` | `getStereotypes`

Topics

"Use Stereotypes and Profiles"

Introduced in R2019a

close

Package: `systemcomposer.profile`

Close profile

Syntax

`close(profile,force)`

Description

`close(profile,force)` closes the profile and deletes it from the workspace. If there are any unsaved changes, you will receive an error unless the argument `force` is set to `true`.

Tip Use `closeAll` to force close all loaded profiles.

Examples

Close Profile

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Force close profile and attempt to inspect it.

```
profile.close(true)
profile
```

```
profile =

  handle to deleted Profile
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

`force` — Whether to force close profile
`false` or 0 (default) | `true` or 1

Whether to force close profile, specified as a logical 1 (`true`) to close the profile without saving or 0 (`false`) to be prompted to save the profile before closing.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`systemcomposer.profile.Profile` | `open` | `editor` | `load` | `find` | `closeAll` | `save`

Topics

"Define Profiles and Stereotypes"

Introduced in R2019a

close

Package: `systemcomposer.arch`

Close architecture model

Syntax

`close(model)`

Description

`close(model)` closes the specified model in System Composer.

Examples

Create, Open, and Close Model

```
model = systemcomposer.createModel("modelName");
open(model)
close(model)
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also
`createModel` | `save` | `loadModel`

Topics
"Create Architecture Model"

Introduced in R2019a

close

Package: systemcomposer.allocation

Close allocation set

Syntax

close(allocSet,force)

Description

close(allocSet,force) closes the allocation set allocSet. If there are any unsaved changes, you will receive an error unless the argument force is true.

Tip Use closeAll to close all loaded allocation sets.

Examples

Close Allocation Set Without Saving

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set MyNewAllocation.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Close the allocation set without saving.

```
allocSet.close(true)
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

allocSet — Allocation set
allocation set object

Allocation set, specified as a `systemcomposer.allocation.AllocationSet` object.

`force` — Force close
`false` or 0 (default) | `true` or 1

Force close allocation set, specified as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also

`createScenario` | `deleteScenario` | `getScenario` | `load` | `closeAll` | `synchronizeChanges`

Topics

"Create and Manage Allocations"

Introduced in R2020b

systemcomposer.allocation.AllocationSet.closeAll

Close all open allocation sets

Syntax

`systemcomposer.allocation.AllocationSet.closeAll`

Description

`systemcomposer.allocation.AllocationSet.closeAll` closes all allocation sets without saving.

Tip Use `close` to close one allocation set.

Examples

Close All Allocation Sets Without Saving

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Close all allocation sets without saving.

```
systemcomposer.allocation.AllocationSet.closeAll
```

Open the **Allocation Editor**.

`systemcomposer.allocation.editor`

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also

`createScenario` | `deleteScenario` | `getScenario` | `load` | `close` | `synchronizeChanges` | `find`

Topics

"Create and Manage Allocations"

Introduced in R2020b

systemcomposer.profile.Profile.closeAll

Close all open profiles

Syntax

`systemcomposer.profile.Profile.closeAll()`

Description

`systemcomposer.profile.Profile.closeAll()` force closes all open profiles without saving and deletes them from the workspace.

Tip Use `close` to close one open profile.

Examples

Close All Profiles

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Close all open profiles and attempt to inspect one.

```
systemcomposer.profile.Profile.closeAll
profile
```

```
profile = 

  handle to deleted Profile
```

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`systemcomposer.profile.Profile` | `load` | `editor` | `open` | `find` | `close` | `save`

Topics

"Define Profiles and Stereotypes"

Introduced in R2019a

connect

Package: `systemcomposer.arch`

Create architecture model connections

Syntax

```
connectors = connect(srcComponent,destComponent)
connectors = connect(architecture,[srcComponent,srcComponent,...],[
destComponent,destComponent,...])
connectors = connect(architecture,[],destComponent)
connectors = connect(architecture,srcComponent,[])
connectors = connect(srcPort,destPort)
connectors = connect(srcPort,destPort,stereotype)
connectors = connect( ___ ,Name,Value)
```

Description

`connectors = connect(srcComponent,destComponent)` connects the unconnected output ports of the source component `srcComponent` to the unconnected input ports of the destination component `destComponent` based on matching port names, and returns a handle to the connector. For physical connections, the connectors are nondirectional so the source and destination components can be interchanged.

To remove a connector, use the `destroy` function.

`connectors = connect(architecture,[srcComponent,srcComponent,...],[ destComponent,destComponent,...])` connects arrays of components in the architecture.

`connectors = connect(architecture,[],destComponent)` connects a parent architecture input port to a destination child component.

`connectors = connect(architecture,srcComponent,[])` connects a source child component to a parent architecture output port.

`connectors = connect(srcPort,destPort)` connects a source port and a destination port, or connects two nondirectional physical ports.

`connectors = connect(srcPort,destPort,stereotype)` connects two ports and applies a stereotype to the connector.

`connectors = connect( ___ ,Name,Value)` specifies options using one or more name-value arguments in addition to the input arguments in previous syntaxes.

Examples

Connect System Composer Components

Create and connect two components.

Create a top-level architecture model.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
rootArch = get(arch,"Architecture");
```

Create two new components.

```
names = ["Component1","Component2"];
newComponents = addComponent(rootArch,names);
```

Add ports to the components.

```
outPort1 = addPort(newComponents(1).Architecture,"testSig","out");
inPort1 = addPort(newComponents(2).Architecture,"testSig","in");
```

Connect the components.

```
conns = connect(newComponents(1),newComponents(2));
```

Improve the model layout.

```
Simulink.BlockDiagram.arrangeSystem(modelName)
```

Connect System Composer Ports

Create and connect two ports.

Create a top-level architecture model.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
rootArch = get(arch,"Architecture");
```

Create two new components.

```
names = ["Component1","Component2"];
newComponents = addComponent(rootArch,names);
```

Add ports to the components.

```
outPort1 = addPort(newComponents(1).Architecture,"testSig","out");
inPort1 = addPort(newComponents(2).Architecture,"testSig","in");
```

Extract the component ports.

```
srcPort = getPort(newComponents(1),"testSig");
destPort = getPort(newComponents(2),"testSig");
```

Connect the ports.

```
conns = connect(srcPort,destPort);
```

Improve the model layout.

```
Simulink.BlockDiagram.arrangeSystem(modelName)
```

Connect by Selecting Destination Element

Create and connect a destination architecture port interface element to a component.

Create a top-level architecture model.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
rootArch = get(arch,"Architecture");
```

Create a new component.

```
newComponent = addComponent(rootArch,"Component1");
```

Add destination architecture ports to the component and the architecture.

```
outPortComp = addPort(newComponent.Architecture,"testSig","out");
outPortArch = addPort(rootArch,"testSig","out");
```

Extract corresponding port objects.

```
compSrcPort = getPort(newComponent,"testSig");
archDestPort = getPort(rootArch,"testSig");
```

Add an interface and an interface element, and associate the interface with the architecture port.

```
interface = arch.InterfaceDictionary.addInterface("interface");
interface.addElement("x");
archDestPort.setInterface(interface);
```

Select an element on the architecture port and establish a connection.

```
conns = connect(compSrcPort,archDestPort,DestinationElement="x");
```

Improve the model layout.

```
Simulink.BlockDiagram.arrangeSystem(modelName)
```

Input Arguments

`architecture` — Architecture
architecture object

Architecture, specified as a `systemcomposer.arch.Architecture` object. The architecture is the interface and underlying structural definition of the model or component.

`srcComponent` — Source component
component object | variant component object

Source component, specified as a `systemcomposer.arch.Component` or `systemcomposer.arch.VariantComponent` object.

`destComponent` — Destination component
component object | variant component object

Destination component, specified as a `systemcomposer.arch.Component` or `systemcomposer.arch.VariantComponent` object.

srcPort — Source port
port object

Source port to connect, specified as a systemcomposer.arch.ComponentPort or systemcomposer.arch.ArchitecturePort object.

destPort — Destination port
port object

Destination port to connect, specified as a systemcomposer.arch.ComponentPort or systemcomposer.arch.ArchitecturePort object.

stereotype — Stereotype
character vector | string

Stereotype to apply to the connection, specified in the form "<profile>.<stereotype>".

Data Types: char | string

Name-Value Arguments

Specify optional pairs of arguments as Name1=Value1,...,NameN=ValueN, where Name is the argument name and Value is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose Name *in quotes.*

Example: connect(archPort,compPort,SourceElement="a")

Stereotype — Option to apply stereotype to connector
character vector | string

Option to apply stereotype to connector, specified in the form "<profile>.<stereotype>".

This name-value argument applies only when you connect components.

Example: conns = connect(srcComp,destComp,Stereotype="GeneralProfile.ConnStereotype")

Data Types: char | string

Rule — Option to specify rule for connections
"name" (default) | "interface"

Option to specify rule for connections, specified as either "name" based on the name of ports or "interface" based on the interface name on ports.

This name-value argument applies only when you connect components.

Example: conns = connect([srcComp1,srcComp2], [destComp1,destComp2],Rule="interface")

Data Types: char | string

MultipleOutputConnectors — Option to allow multiple destination components
false or 0 (default) | true or 1

Option to allow multiple destination components for the same source component, specified as a logical.

This name-value argument applies only when you connect components.

Example: `conns = connect(srcComp, [destComp1,destComp2],MultipleOutputConnectors=true)`

Data Types: `logical`

`SourceElement` — Option to select source element for connection
character vector | string

Option to select source element for connection, specified as a character vector or string of the name of the data element.

This name-value argument applies only when you connect ports.

Example: `conns = connect(archSrcPort,compDestPort,SourceElement="x")`

Data Types: `char` | `string`

`DestinationElement` — Option to select destination element for connection
character vector | string

Option to select destination element for connection, specified as a character vector or string of the name of the data element.

This name-value argument applies only when you connect ports.

Example: `conns = connect(compSrcPort,archDestPort,DestinationElement="x")`

Data Types: `char` | `string`

`Routing` — Option to specify type of automatic line routing
`"smart"` (default) | `"on"` | `"off"`

Option to specify type of automatic line routing, specified as one of the following:

- `"smart"` — Use automatic line routing that takes the best advantage of the blank spaces on the canvas and avoids overlapping other lines and labels.
- `"on"` — Use automatic line routing.
- `"off"` — Use no automatic line routing.

Example: `conns = connect(srcPort,destPort,Routing="on")`

Data Types: `char` | `string`

Output Arguments

`connectors` — Created connections
array of connections

Created connections, returned as an array of `systemcomposer.arch.Connector` or `systemcomposer.arch.PhysicalConnector` objects.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"

Term	Definition	Application	More Information
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also

`openModel` | `createModel` | `addPort` | `getPort` | `addComponent` | `addElement` | `addInterface` | `setInterface` | `getSourceElement` | `getDestinationElement` | Component

Topics

"Connections"
"Build Architecture Models Programmatically"

Introduced in R2019a

systemcomposer.allocation.createAllocationSet

Create new allocation set

Syntax

allocSet = systemcomposer.allocation.createAllocationSet(name,sourceModel,
targetModel)

Description

allocSet = systemcomposer.allocation.createAllocationSet(name,sourceModel,
targetModel) creates a new allocation set with the given name in which the source and target models are provided.

Examples

Create Allocation Set and Open in Allocation Editor

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set MyNewAllocation.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Save the allocation set.

```
allocSet.save
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

name — Name of allocation set
character vector | string

Name of allocation set, specified as a character vector or string.

Example: "MyNewAllocation"

Data Types: char | string

sourceModel — Source model for allocation
model object | character vector | string

Source model for allocation, specified as a `systemcomposer.arch.Model` object or the name of a model as a character vector or string.

Data Types: `char` | `string`

`targetModel` — Target model for allocation
model object | character vector | string

Target model for allocation, specified as a `systemcomposer.arch.Model` object or the name of a model as a character vector or string.

Data Types: `char` | `string`

Output Arguments

`allocSet` — Allocation set
allocation set object

Allocation set created, returned as a `systemcomposer.allocation.AllocationSet` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also

`load` | `open` | `closeAll`

Topics

"Create and Manage Allocations"

Introduced in R2020b

createAnonymousInterface

Package: `systemcomposer.arch`

(To be removed) Create and set anonymous interface for port

Note The `createAnonymousInterface` function is not recommended in R2021b. It has been replaced with the `createInterface` function. For further details, see “Compatibility Considerations”.

Syntax

`interface = createAnonymousInterface(port)`

Description

`interface = createAnonymousInterface(port)` creates and sets an anonymous interface for the specified port `port`.

Input Arguments

`port` — Port
port object

Port, specified as a `systemcomposer.arch.ArchitecturePort` or `systemcomposer.arch.ComponentPort` object.

Output Arguments

`interface` — Data interface
data interface object

Data interface, returned as a `systemcomposer.interface.DataInterface` object.

Compatibility Considerations

`createAnonymousInterface` function is not recommended

The `createAnonymousInterface` function is not recommended in R2021b. Use `createInterface` instead.

See Also

Component | `createInterface` | `addValueType` | `systemcomposer.ValueType` | `addInterface` | `removeInterface`

Topics
“Create Interfaces”

“Manage Interfaces with Data Dictionaries”

Introduced in R2019a

createArchitectureModel

Package: `systemcomposer.arch`

Create architecture model from component

Syntax

```
createArchitectureModel(component,modelName)
createArchitectureModel(component,modelName,modelType)
```

Description

`createArchitectureModel(component,modelName)` creates an architecture model from the component `component` that references the model `modelName`.

Note Components with physical ports cannot be saved as architecture models, model references, software architectures, or Stateflow chart behaviors. Components with physical ports can only be saved as subsystem references or subsystem component behaviors.

`createArchitectureModel(component,modelName,modelType)` creates an architecture model of type `modelType` from the component `component` that references the model `modelName`.

Examples

Create Architecture Model from Component

Save a component `robotComp` in `Robot.slx` and reference the model.

Create a model `archModel.slx`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components named `"electricComp"` and `"robotComp"` to the model.

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
```

Save the `robotComp` component in an architecture model so the component references the model `Robot.slx`.

```
createArchitectureModel(comp(2),"Robot");
```

Create Software Architecture Model from Component

Save a component `electricComp` in `RobotSoftware.slx` and reference the model.

Create a model `archModel.slx`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components named `'electricComp'` and `'robotComp'` to the model.

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
```

Save the `electricComp` component in a software architecture model so the component references the model `RobotSoftware.slx`.

```
createArchitectureModel(comp(1),"RobotSoftware","SoftwareArchitecture");
```

Input Arguments

component — Component
component object

Component, specified as a `systemcomposer.arch.Component` object. The component must have an architecture with definition type `composition`. For other definition types, this function gives an error.

modelName — Model name
character vector | string

Model name, specified as a character vector or string.

Example: `"Robot"`

Data Types: `char` | `string`

modelType — Type of model
`"Architecture"` (default) | `"SoftwareArchitecture"`

Type of model to save, specified as `"Architecture"` for an architecture model or `"SoftwareArchitecture"` for a software architecture model.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"

Term	Definition	Application	More Information
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"

Term	Definition	Application	More Information
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

See Also

`inlineComponent` | `createSimulinkBehavior` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `linkToModel` | `isReference` | Reference Component

Topics

"Describe Component Behavior Using Simulink"
"Decompose and Reuse Components"
"Describe Component Behavior Using Stateflow Charts"
"Create Simulink Subsystem Behavior Using Subsystem Component"
"Simulate and Deploy Software Architectures"

Introduced in R2021b

systemcomposer.createDictionary

Create data dictionary

Syntax

```
dictionary = systemcomposer.createDictionary(dictionaryName)
```

Description

`dictionary = systemcomposer.createDictionary(dictionaryName)` creates a new Simulink data dictionary to hold interfaces and returns the `systemcomposer.interface.Dictionary` object.

Examples

Create New Dictionary

```
dictionary = systemcomposer.createDictionary("new_dictionary.sldd")
```

Input Arguments

`dictionaryName` — Name of new data dictionary
character vector | string

Name of new data dictionary, specified as a character vector or string. The name must include the `.sldd` extension and must be a valid MATLAB identifier.

Example: `"new_dictionary.sldd"`

Data Types: `char` | `string`

Output Arguments

`dictionary` — Dictionary
dictionary object

Dictionary, returned as a `systemcomposer.interface.Dictionary` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addValueType` | `addInterface` | `linkDictionary` | `saveToDictionary` | `unlinkDictionary` | `openDictionary` | `addReference` | `removeReference`

Topics

"Define Port Interfaces Between Components"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

createInterface

Package: `systemcomposer.arch`

Create and set owned interface for port

Syntax

`interface = createInterface(port,kind)`

Description

`interface = createInterface(port,kind)` creates and sets an owned interface for a port.

Examples

Create Owned Interface as Value Type

Create an architecture model `archModel`. Get the root architecture, then add a new component `newComponent` and a new port `newCompPort`. Create an owned interface for the port as a `ValueType`.

```
model = systemcomposer.createModel("archModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
newPort = addPort(newComponent.Architecture,"newCompPort","in");
interface = newPort.createInterface("ValueType")
```

```
interface = 

  ValueType with properties:

           Name: ''
       DataType: 'double'
     Dimensions: '1'
          Units: ''
     Complexity: 'real'
        Minimum: '[]'
        Maximum: '[]'
    Description: ''
          Owner: [1×1 systemcomposer.arch.ArchitecturePort]
          Model: [1×1 systemcomposer.arch.Model]
           UUID: 'd23669e1-f26c-4c64-a482-a27a33ac6541'
    ExternalUID: ''
```

Create Owned Interface as Data Interface and Remove Owned Interface

Create an architecture model `archModel`. Get the root architecture, then add a new component `newComponent` and a new port `newCompPort`. Create an owned interface for the port as a `DataInterface`.

```
model = systemcomposer.createModel("archModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
newPort = addPort(newComponent.Architecture,"newCompPort","in");
interface = newPort.createInterface("DataInterface");
```

Remove the owned interface from the port.

```
newPort.setInterface("");
```

Create Owned Interface for Physical Port as Physical Domain

Create an architecture model `archModel`. Get the root architecture, then add a new component `newComponent` and a new physical port `newCompPort`. Create an owned interface for the physical port and set the physical domain `Domain` property.

```
model = systemcomposer.createModel("archModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
newPort = addPort(newComponent.Architecture,"newCompPort","physical");
port = newComponent.getPort("newCompPort");
interface = port.createInterface("PhysicalDomain");
interface.Domain = "rotational.rotational"
```

```
interface = 

  PhysicalDomain with properties:

         Domain: 'foundation.mechanical.rotational.rotational'
          Owner: [1×1 systemcomposer.arch.ArchitecturePort]
          Model: [1×1 systemcomposer.arch.Model]
           UUID: '65f143cb-ed3a-49e1-bbc9-de89e84aa8e6'
    ExternalUID: ''
```

Input Arguments

port — Port
port object

Port, specified as a `systemcomposer.arch.ArchitecturePort` or `systemcomposer.arch.ComponentPort` object.

kind — Kind of interface
`"DataInterface"` | `"ValueType"` | `"PhysicalDomain"`

Kind of interface, specified as one of these options:

- `"DataInterface"`
- `"ValueType"`
- `"PhysicalDomain"`

Data Types: `char` | `string`

Output Arguments

`interface` — Interface

data interface object | value type object | physical domain object

Interface, returned as a `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, or `systemcomposer.interface.PhysicalDomain` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"

Term	Definition	Application	More Information
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”

Term	Definition	Application	More Information
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also
`addValueType` | `createModel` | `addInterface` | `setType` | `createOwnedType` | `addPhysicalInterface` | `removeInterface`

Topics
"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021b

createOwnedType

Package: `systemcomposer.interface`

Create owned value type on data element or function argument

Syntax

```
ownedType = createOwnedType(dataElement)
ownedType = createOwnedType(dataElement,Name,Value)
```

Description

`ownedType = createOwnedType(dataElement)` creates an owned value type on a data element or function argument.

`ownedType = createOwnedType(dataElement,Name,Value)` creates an owned value type on a data element or function argument with additional options.

Examples

Create Owned Value Type on Data Element on Architecture Port

```
model = systemcomposer.createModel("archModel",true);

port = model.Architecture.addPort("inPort","in");
interface = port.createInterface("DataInterface");
element = interface.addElement("newElement");
subInterface = element.createOwnedType
```

```
subInterface = 

  ValueType with properties:

           Name: ''
       DataType: 'double'
     Dimensions: '1'
          Units: ''
     Complexity: 'real'
        Minimum: '[]'
        Maximum: '[]'
    Description: ''
          Owner: [1×1 systemcomposer.interface.DataElement]
          Model: [1×1 systemcomposer.arch.Model]
           UUID: 'd184ab90-2be9-4acc-9d94-ed62d0cf2827'
     ExternalUID: ''
```

Select the architecture port `inPort` on the architecture model and open the Property Inspector from the **Modeling > Design** menu. Under **Open in Interface Editor**, select the `edit` link. In the

Interface Editor, enter the `Port Interface View`. Observe the new data element `newElement` under the port `inPort`.

Input Arguments

`dataElement` — Data element or function argument

data element object | function argument object

Data element or function argument, specified as a `systemcomposer.interface.DataElement` or `systemcomposer.interface.FunctionArgument` object.

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `createOwnedType(dataElement,DataType="double",Dimensions="2",Units="m/s",Complexity="complex",Minimum="0",Maximum="100",Description="Maintain altitude")`

`DataType` — Data type

character vector | string

Data type, specified as a character vector or string for a valid MATLAB data type. The default value is `double`.

Example: `createOwnedType(dataElement,DataType="double")`

Data Types: `char` | `string`

`Dimensions` — Dimensions of value type

character vector | string

Dimensions of value type, specified as a character vector or string. The default value is `1`.

Example: `createOwnedType(dataElement,Dimensions="2")`

Data Types: `char` | `string`

`Units` — Units of value type

character vector | string

Units of value type, specified as a character vector or string.

Example: `createOwnedType(dataElement,Units="m/s")`

Data Types: `char` | `string`

`Complexity` — Complexity of value type

character vector | string

Complexity of value type, specified as a character vector or string. The default value is `real`. Other possible values are `complex` and `auto`.

Example: `createOwnedType(dataElement,Complexity="complex")`

Data Types: `char` | `string`

`Minimum` — Minimum of value type
character vector | string

Minimum of value type, specified as a character vector or string.

Example: `createOwnedType(dataElement,Minimum="0")`

Data Types: `char` | `string`

`Maximum` — Maximum of value type
character vector | string

Maximum of value type, specified as a character vector or string.

Example: `createOwnedType(dataElement,Maximum="100")`

Data Types: `char` | `string`

`Description` — Description of value type
character vector | string

Description of value type, specified as a character vector or string.

Example: `createOwnedType(dataElement,Description="Maintain altitude")`

Data Types: `char` | `string`

Output Arguments

ownedType — Owned value type
value type object

Owned value type, returned as a `systemcomposer.ValueType` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

<table>
<tr><th>Term</th><th>Definition</th><th>Application</th><th>More Information</th></tr>
<tr><td>adapter</td><td>An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.</td><td>With an adapter, you can perform functions on the “Interface Adapter” dialog:
Create and edit mappings between input and output interfaces.
Apply an interface conversion <code>UnitDelay</code> to break an algebraic loop.
Apply an interface conversion <code>RateTransition</code> to reconcile different sample time rates for reference models.
When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.</td><td>“Interface Adapter”
Adapter</td></tr>
</table>

See Also

`addValueType` | `createModel` | `addInterface` | `setType` | `addServiceInterface` | `createInterface` | `removeInterface`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

systemcomposer.createModel

Create System Composer model

Syntax

```
model = systemcomposer.createModel(modelName)
model = systemcomposer.createModel(modelName,openFlag)
model = systemcomposer.createModel(modelName,modelType,openFlag)
```

Description

`model = systemcomposer.createModel(modelName)` creates a System Composer model with name `modelName` and returns the `systemcomposer.arch.Model` object.

`createModel` is the constructor method for the class `systemcomposer.arch.Model`.

`model = systemcomposer.createModel(modelName,openFlag)` creates a System Composer model with name `modelName` and returns the `systemcomposer.arch.Model` object. This function opens the model according to the value of the optional argument `openFlag`.

`model = systemcomposer.createModel(modelName,modelType,openFlag)` creates a System Composer model with name `modelName` and type `modelType` and returns the `systemcomposer.arch.Model` object. This function opens the model according to the value of optional argument `openFlag`.

Examples

Create Model

Create a model, open it, and display its properties.

```
model = systemcomposer.createModel("model_name",true)
```

```
model = 

  model with properties:

                   Name: 'model_name'
           Architecture: [1×1 systemcomposer.arch.Architecture]
         SimulinkHandle: 2.0005
                  Views: [0×0 systemcomposer.view.ViewArchitecture]
               Profiles: [0×0 systemcomposer.profile.Profile]
    InterfaceDictionary: [1×1 systemcomposer.interface.Dictionary]
```

Input Arguments

`modelName` — Name of new model
character vector | string

Name of new model, specified as a character vector or string. This name must be a valid MATLAB identifier.

Example: `"model_name"`

Data Types: `char` | `string`

`openFlag` — Whether to open model
`false` or 0 (default) | `true` or 1

Whether to open model upon creation, specified as a logical.

Data Types: `logical`

`modelType` — Type of model
`"Architecture"` (default) | `"SoftwareArchitecture"`

Type of model to create, specified as `"Architecture"` for an architecture model or `"SoftwareArchitecture"` for a software architecture model.

Data Types: `char` | `string`

Output Arguments

`model` — Architecture model
model object

Architecture model, returned as a `systemcomposer.arch.Model` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

See Also

`open` | `loadModel` | `save`

Topics

"Compose Architecture Visually"

Introduced in R2019a

systemcomposer.profile.Profile.createProfile

Create profile

Syntax

```
profile = systemcomposer.profile.Profile.createProfile(profileName,dirPath)
profile = systemcomposer.profile.Profile.createProfile(profileName)
```

Description

`profile = systemcomposer.profile.Profile.createProfile(profileName,dirPath)` creates a new profile object `systemcomposer.profile.Profile` to add a set of stereotypes. The `dirPath` argument specifies the directory in which the profile is to be created.

`profile = systemcomposer.profile.Profile.createProfile(profileName)` creates a new profile with name `profileName`.

Examples

Create Profile

Create a model.

```
model = systemcomposer.createModel("archModel");
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Save the profile in a file in the current directory as `LatencyProfile.xml`.

```
path = profile.save;
```

Input Arguments

`profileName` — Name of profile
character vector | string

Name of new profile, specified as a character vector or string. This name must be a valid MATLAB identifier.

Example: `"LatencyProfile"`

Data Types: `char` | `string`

dirPath — Directory path
character vector | string

Directory path where the profile will be saved, specified as a character vector or string.

Example: `"C:\Temp\MATLAB"`

Data Types: `char` | `string`

Output Arguments

profile — Profile
profile object

Profile created, returned as a `systemcomposer.profile.Profile` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	“Extend Architectural Design Using Stereotypes”
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• “Set Properties” • “Add Properties with Stereotypes” • “Set Properties for Analysis”

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`applyProfile` | `loadProfile` | `editor` | `removeProfile` | `save` | `load` | `open` | `find`

Topics

"Create a Profile and Add Stereotypes"

Introduced in R2019a

createScenario

Package: systemcomposer.allocation

Create new empty allocation scenario

Syntax

```
scenario = createScenario(allocSet,name)
```

Description

`scenario = createScenario(allocSet,name)` creates a new empty allocation scenario in the allocation set `allocSet` with the given name `name`.

Examples

Create Allocation Set and Create New Scenario

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Create a new allocation scenario.

```
newScenario = allocSet.createScenario("Scenario 2");
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

allocSet — Allocation set
allocation set object

Allocation set, specified as a `systemcomposer.allocation.AllocationSet` object.

name — Name of allocation scenario
character vector | string

Name of allocation scenario, specified as a character vector or string.

Example: "Scenario 1"

Data Types: char | string

Output Arguments

scenario — New empty allocation scenario
allocation scenario object

New empty allocation scenario, returned as a systemcomposer.allocation.AllocationScenario object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called Scenario 1.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

deleteScenario | getScenario | synchronizeChanges | load | closeAll | find | close

Topics

“Create and Manage Allocations”

Introduced in R2020b

createSimulinkBehavior

Package: `systemcomposer.arch`

Create Simulink behavior and link to component

Syntax

```
createSimulinkBehavior(component,modelName)
createSimulinkBehavior(component,modelName,"Type",type)
createSimulinkBehavior(component,"Type",type)
createSimulinkBehavior(component,modelName,"BehaviorType",behavior)
```

Description

`createSimulinkBehavior(component,modelName)` creates a new Simulink model, `modelName`, with the same interfaces as the component `component` and links the component to the new model. The component must have no children.

Note Components with physical ports cannot be saved as architecture models, model references, software architectures, or Stateflow chart behaviors. Components with physical ports can only be saved as subsystem references or subsystem component behaviors.

If no functions are present in software architectures, this syntax creates a rate-based behavior. If functions are present, the syntax creates an export-function behavior.

`createSimulinkBehavior(component,modelName,"Type",type)` creates a new Simulink model or subsystem behavior, `modelName`, with the same interfaces as the component `component` and links the component to the new model. For more information, see “Create Referenced Simulink Behavior Model”.

Use this syntax to convert a subsystem component to a subsystem reference.

`createSimulinkBehavior(component,"Type",type)` creates a subsystem component behavior that is part of the parent model. The connections, interfaces, requirement links, and stereotypes of the component are preserved. The component must have no subcomponents and must not already be linked to a model. For more information, see “Create Simulink Subsystem Behavior Using Subsystem Component”.

`createSimulinkBehavior(component,modelName,"BehaviorType",behavior)` creates a new Simulink rate-based or export-function behavior, `modelName`, and links the software component to the new model. You can create rate-based or export-function behaviors for software architectures.

Examples

Create Simulink Model and Link to Component

Create a Simulink model behavior for the component `robotComp` in `Robot.slx` and link the model file to the component.

Create a model `archModel`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components to the model `electricComp` and `robotComp`. Rearrange the model.

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
Simulink.BlockDiagram.arrangeSystem("archModel")
```

Create a Simulink behavior model for the `robotComp` component so the component references the Simulink model `Robot.slx`.

```
createSimulinkBehavior(comp(2),"Robot")
```

Create Subsystem Reference Component

Create a Simulink subsystem behavior for the component `robotComp` in `Robot.slx` and link the subsystem file to the component.

Create a model `archModel`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components to the model `electricComp` and `robotComp`. Rearrange the model.

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
Simulink.BlockDiagram.arrangeSystem("archModel")
```

Create a Simulink subsystem reference behavior for the `robotComp` component so the component references the Simulink subsystem `Robot.slx`.

```
createSimulinkBehavior(comp(2),"Robot",Type="SubsystemReference")
```

Create Subsystem Component Behavior and Convert to Subsystem Reference

Create a Simulink subsystem behavior for the component `robotComp` in `Robot.slx` and link the subsystem file to the component.

Create a model `archModel`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components to the model `electricComp` and `robotComp`. Rearrange the model.

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
Simulink.BlockDiagram.arrangeSystem("archModel")
```

Create a Simulink subsystem component behavior for the `robotComp` component that is part of the parent model.

```
createSimulinkBehavior(comp(2),Type="Subsystem")
```

Convert the subsystem component to a subsystem reference component behavior so the component references the Simulink subsystem `Robot.slx`.

```
createSimulinkBehavior(comp(2),"Robot",Type="SubsystemReference")
```

Create Simulink Model with Export-Function Behavior and Link to Software Component

Create a Simulink model with export-function behavior `myBehaviorModel.slx` for the software component named `C1` and link the model to the component.

Create a software architecture model named `mySoftwareModel`.

```
model=systemcomposer.createModel("mySoftwareModel","SoftwareArchitecture",true);
arch = get(model,"Architecture");
```

Add a component `C1` to the model.

```
comp = addComponent(arch,"C1");
```

Create a Simulink model with an export-function behavior named `myBeheaviorModel.slx` that is referenced by the component `C1`.

```
createSimulinkBehavior(comp,"myBehaviorModel",BehaviorType="ExportFunction")
```

Input Arguments

`component` — System or software architecture component
component object

System or software architecture component with no children, specified as a `systemcomposer.arch.Component` object. This component can also be specified as a subsystem component to be converted to a subsystem reference.

`modelName` — Model name
character vector | string

Model name of the Simulink model to be created, specified as a character vector or string.

Example: `"Robot"`

Data Types: `char` | `string`

`behavior` — Component behavior
`"RateBased"` | `"ExportFunction"`

Component behavior, specified as one of these values:

- "RateBased" to create a rate-based component behavior
- "ExportFunction" to create an export-function component behavior

Data Types: char | string

type — Component behavior
"ModelReference" | "SubsystemReference" | "Subsystem"

Component behavior, specified as one of these values:

- "ModelReference" to create a Simulink model reference component behavior
- "SubsystemReference" to create a Simulink subsystem reference component behavior
- "Subsystem" to create a Simulink subsystem component behavior

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• “Describe Component Behavior Using Simulink” • “Create Reference Architecture”
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	“Access Model Arguments as Parameters on Reference Components”
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	“Use Parameters to Store Instance Values with Components”
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• “Create Simulink Subsystem Behavior Using Subsystem Component” • “Create Simulink Subsystem Component”

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"

Term	Definition	Application	More Information
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

See Also

`inlineComponent` | `createArchitectureModel` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `linkToModel` | `isReference` | Reference Component

Topics

"Describe Component Behavior Using Simulink"
"Decompose and Reuse Components"
"Describe Component Behavior Using Stateflow Charts"
"Create Simulink Subsystem Behavior Using Subsystem Component"
"Simulate and Deploy Software Architectures"

Introduced in R2019a

createStateflowChartBehavior

Package: `systemcomposer.arch`

Add Stateflow chart behavior to component

Syntax

`createStateflowChartBehavior(component)`

Description

`createStateflowChartBehavior(component)` adds Stateflow Chart behavior to a component `component`. The connections, interfaces, requirement links, and stereotypes are preserved. The component must have no subcomponents and must not already be linked to a model.

Note Components with physical ports cannot be saved as architecture models, model references, software architectures, or Stateflow chart behaviors. Components with physical ports can only be saved as subsystem references or subsystem component behaviors.

Examples

Add Stateflow Chart Behavior to Component

Add Stateflow chart behavior to the component named `"robotComp"` within the current model.

Create a model named `"archModel"`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components to the model with the names `"electricComp"` and `"robotComp"`. Rearrange the model.

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
Simulink.BlockDiagram.arrangeSystem("archModel")
```

Add Stateflow chart behavior to the `robotComp` component.

```
createStateflowChartBehavior(comp(2));
```

Input Arguments

`component` — Component
component object

Component with no subcomponents, specified as a `systemcomposer.arch.Component` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"

Term	Definition	Application	More Information
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`inlineComponent` | `createSimulinkBehavior` | `createArchitectureModel` | `extractArchitectureFromSimulink` | `linkToModel` | `isReference` | Reference Component

Topics

"Describe Component Behavior Using Simulink"
"Decompose and Reuse Components"
"Describe Component Behavior Using Stateflow Charts"
"Create Simulink Subsystem Behavior Using Subsystem Component"
"Simulate and Deploy Software Architectures"

Introduced in R2021a

createSubsystemBehavior

Package: `systemcomposer.arch`

Add subsystem behavior to component

Note The `createSubsystemBehavior` function is not recommended. Use the `createSimulinkBehavior` function instead. For more information, see "Compatibility Considerations".

Syntax

`createSubsystemBehavior(component)`

Description

`createSubsystemBehavior(component)` adds subsystem behavior to the component `component`. The connections, interfaces, requirement links, and stereotypes of the component are preserved. The component must have no subcomponents and must not already be linked to a model.

Input Arguments

`component` — Component
component object

Component with no subcomponents, specified as a `systemcomposer.arch.Component` object.

Compatibility Considerations

`createSubsystemBehavior` function is not recommended
Not recommended starting in R2022a_plus

The `createSubsystemBehavior` function is not recommended. Use the `createSimulinkBehavior` function instead.

See Also

`inlineComponent` | `createSimulinkBehavior` | `createArchitectureModel` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `linkToModel` | `isReference` | Reference Component

Topics
"Describe Component Behavior Using Simulink"
"Decompose and Reuse Components"
"Describe Component Behavior Using Stateflow Charts"
"Create Simulink Subsystem Behavior Using Subsystem Component"
"Simulate and Deploy Software Architectures"

Introduced in R2021b

createSubGroup

Package: systemcomposer.view

Create subgroup in element group of view

Syntax

subGroup = createSubGroup(elementGroup,subGroupName)

Description

subGroup = createSubGroup(elementGroup,subGroupName) creates a new subgroup subGroup, named subGroupName within the element group elementGroup of an architecture view.

Note This function cannot be used when a selection query or grouping is defined on the view. To remove the query, run removeQuery.

Examples

Create Subgroup in View

Open the keyless entry system example and create a view newView.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("newView");
```

Open the Architecture Views Gallery to see the new view newView.

```
model.openViews
```

Create a subgroup myGroup.

```
group = view.Root.createSubGroup("myGroup")
```

```
group = 
  ElementGroup with properties:

         Name: 'myGroup'
         UUID: '64b1848c-f593-4987-99cd-3c4ed6605f1f'
     Elements: []
    SubGroups: [0x0 systemcomposer.view.ElementGroup]
```

Input Arguments

elementGroup — Element group
element group object

Element group for view, specified as a `systemcomposer.view.ElementGroup` object.

`subGroupName` — Name of subgroup
character vector | string

Name of subgroup, specified as a character vector or string.

Example: `"myGroup"`

Data Types: `char` | `string`

Output Arguments

`subGroup` — Subgroup
element group object

Subgroup, returned as a `systemcomposer.view.ElementGroup` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"

Term	Definition	Application	More Information
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`openViews` | `createView` | `getView` | `deleteView` | `systemcomposer.view.ElementGroup` | `systemcomposer.view.View` | `getSubGroup` | `deleteSubGroup` | `addElement` | `removeElement`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

createView

Package: `systemcomposer.arch`

Create architecture view

Syntax

```
view = createView(model,name)
view = createView( ___ ,Name,Value)
```

Description

`view = createView(model,name)` creates a new architecture view `view` for the System Composer model `model` with the specified name `name`.

To delete a view, use the `deleteView` function.

`view = createView( ___ ,Name,Value)` creates a new view with additional options.

Examples

Create View with Query and Group By

Open the keyless entry system example and create a view. Specify the color as light blue and the query as all components, and group by the review status.

```
scKeylessEntrySystem
import systemcomposer.query.*
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("All Components Grouped by Review Status",...
    Color="lightblue",Select=AnyComponent,...
    GroupBy="AutoProfile.BaseComponent.ReviewStatus");
```

Open the Architecture Views Gallery to see the new view named All Components Grouped by Review Status.

```
model.openViews
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

`name` — Name of view
character vector | string

Name of view, specified as a character vector or string.

Example: `"All Components Grouped by Review Status"`

Data Types: `char` | `string`

Name-Value Pair Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `view = model.createView("All Components Grouped by Review Status",Color="lightblue",Select=AnyComponent(),GroupBy="AutoProfile.BaseComponent.ReviewStatus")`

`Select` — Selection query

constraint object

Selection query to use to populate the view, specified as a `systemcomposer.query.Constraint` object.

A constraint can contain a sub-constraint that can be joined with another constraint using `AND` or `OR`. A constraint can be negated using `NOT`.

Example: `view = model.createView("All Components Grouped by Review Status",Select=HasStereotype(IsStereotypeDerivedFrom("AutoProfile.HardwareComponent")))`

Query Objects and Conditions for Constraints

Query Object	Condition
`Property`	A non-evaluated value for the given property or stereotype property.
`PropertyValue`	An evaluated property value from a System Composer object or a stereotype property.
`HasPort`	A component has a port that satisfies the given sub-constraint.
`HasInterface`	A port has an interface that satisfies the given sub-constraint.
`HasInterfaceElement`	An interface has an interface element that satisfies the given sub-constraint.
`HasStereotype`	An architecture element has a stereotype that satisfies the given sub-constraint.
`IsInRange`	A property value is within the given range.
`AnyComponent`	An element is a component and not a port or connector.
`IsStereotypeDerivedFrom`	A stereotype is derived from the given stereotype.

`GroupBy` — Grouping criteria

cell array of character vectors | array of strings

Grouping criteria, specified as a cell array of character vectors or an array of strings in the form "<profile>.<stereotype>.<property>". The order of the cell array dictates the order of the grouping.

Example: view = model.createView("All Components Grouped by Review Status",GroupBy=["AutoProfile.MechanicalComponent.mass","AutoProfile.MechanicalComponent.cost"])

Data Types: char | string

IncludeReferenceModels — Whether to search for reference architectures
true or 1 (default) | false or 0

Whether to search for reference architectures, specified as a logical.

Example: view = model.createView("All Components Grouped by Review Status",IncludeReferenceModels=false)

Data Types: logical

Color — Color of view
character vector | string

Color of view, specified as a character vector or string that contains the name of the color or an RGB hexadecimal value.

Example: view = model.createView("All Components Grouped by Review Status",Color="blue")

Example: view = model.createView("All Components Grouped by Review Status",Color="#FF00FF")

Data Types: char | string

Output Arguments

view — Architecture view
view object

Architecture view, returned as a systemcomposer.view.View object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"

Term	Definition	Application	More Information
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`systemcomposer.view.View` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

createViewArchitecture

Package: `systemcomposer.arch`

(Removed) Create view

Note The `createViewArchitecture` function has been removed. You can create a view using the `createView` function. For further details, see "Compatibility Considerations".

Syntax

```
view = createViewArchitecture(model,name)
view = createViewArchitecture(model,name,constraint)
view = createViewArchitecture(model,name,constraint,groupBy)
view = createViewArchitecture( ___ ,Name,Value)
```

Description

`view = createViewArchitecture(model,name)` creates an empty view with the given `name` and default color `'blue'`.

`view = createViewArchitecture(model,name,constraint)` creates a view with the given `name` where the contents are populated by finding all components in the model that satisfy the provided query.

`view = createViewArchitecture(model,name,constraint,groupBy)` creates a view with the given `name` where the contents are populated by finding all components in the model that satisfy the provided query. The selected components are then grouped by the fully qualified property name.

`view = createViewArchitecture( ___ ,Name,Value)` creates a view with additional options.

Examples

Create View Based on Query and Group By Review Status

```
scKeylessEntrySystem;
m = systemcomposer.openModel('KeylessEntryArchitecture');

import systemcomposer.query.*;
myQuery = HasStereotype(IsStereotypeDerivedFrom('AutoProfile.SoftwareComponent'));

view = m.createViewArchitecture('Software Review Status',myQuery,...
'AutoProfile.BaseComponent.ReviewStatus','Color','red');

m.openViews;
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

name — Name of view
character vector

Name of view, specified as a character vector.

Data Types: `char`

`constraint` — Query
query constraint object

Query, specified as a `systemcomposer.query.Constraint` object representing specific conditions.

A constraint can contain a sub-constraint that can be joined with another constraint using `AND` or `OR`. A constraint can be negated using `NOT`.

Query Objects and Conditions for Constraints

Query Object	Condition
`Property`	A non-evaluated value for the given property or stereotype property.
`PropertyValue`	An evaluated property value from a System Composer object or a stereotype property.
`HasPort`	A component has a port that satisfies the given sub-constraint.
`HasInterface`	A port has an interface that satisfies the given sub-constraint.
`HasInterfaceElement`	An interface has an interface element that satisfies the given sub-constraint.
`HasStereotype`	An architecture element has a stereotype that satisfies the given sub-constraint.
`IsInRange`	A property value is within the given range.
`AnyComponent`	An element is a component and not a port or connector.
`IsStereotypeDerivedFrom`	A stereotype is derived from the given stereotype.

groupBy — User-defined property
enumeration

User-defined property, specified as an enumeration by which to group components.

Data Types: `enum`

Name-Value Pair Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `createViewArchitecture(model,'Software Review Status',myQuery,'AutoProfile.BaseComponent.ReviewStatus','Color','red','IncludeReferenceModels',true)`

`IncludeReferenceModels` — Whether to search for reference architectures
`false` or 0 (default) | `true` or 1

Whether to search for reference architectures, or to not include referenced architectures, specified as the comma-separated pair consisting of `'IncludeReferenceModels'` and a logical 0 (`false`) to not include referenced architectures and 1 (`true`) to search for referenced architectures.

Example: `'IncludeReferenceModels',true`

Data Types: `logical`

`Color` — Color of view
character array

Color of view, specified as the comma-separated pair consisting of `'Color'` and a character array that contains the name of the color or an RGB hexadecimal value.

Example: `'Color','blue'`

Example: `'Color,'#FF00FF'`

Data Types: `char`

Output Arguments

`view` — Model architecture view
view architecture object

Model architecture view created based on the specified query and properties, returned as a `systemcomposer.view.ViewArchitecture` object.

Compatibility Considerations

`createViewArchitecture` function has been removed
Errors starting in R2021a

The `createViewArchitecture` function is removed in R2021a with the introduction of a new set of views API. For more information on how to create and edit a view using the command line, see “Create Architectural Views Programmatically”.

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics
“Create Architecture Views Interactively”
“Create Architectural Views Programmatically”

Introduced in R2019b

createViewComponent

Package: systemcomposer.view

(Removed) Create view component

Note The createViewComponent function has been removed. You can create a view using the createView function and then add a component using the addElement function. Add a subgroup with the createSubGroup function. For further details, see “Compatibility Considerations”.

Syntax

viewComp = createViewComponent(object,name)

Description

viewComp = createViewComponent(object,name) creates a new view component with the provided name.

createViewComponent is a method for the class systemcomposer.view.ViewArchitecture.

Examples

Create View Component

Create view component with context view.

```
scKeylessEntrySystem
zcModel = systemcomposer.loadModel('KeylessEntryArchitecture');
fobSupplierView = zcModel.createViewArchitecture("FOB Locator System Supplier Breakdown",...
    "Color","lightblue");
supplierD = fobSupplierView.createViewComponent("Supplier D");
```

Input Arguments

object — View architecture
view architecture object

View architecture, specified as a systemcomposer.view.ViewArchitecture object.

name — Name of component
character vector

Name of component, specified as a character vector.

Data Types: char

Output Arguments

`viewComp` — View component
view component object

View component, returned as a `systemcomposer.view.ViewComponent` object.

Compatibility Considerations

`createViewComponent` function has been removed
Errors starting in R2021a

The `createViewComponent` function is removed in R2021a with the introduction of a new set of views API. For more information on how to create and edit a view using the command line, see “Create Architectural Views Programmatically”.

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics
“Create Architecture Views Interactively”
“Create Architectural Views Programmatically”

Introduced in R2019b

deallocate

Package: systemcomposer.allocation

Delete allocation

Syntax

deallocate(allocScenario,sourceElement,targetElement)

Description

deallocate(allocScenario,sourceElement,targetElement) deletes allocation, if one exists, between the source element sourceElement and the target element targetElement.

Examples

Create Allocation Set and Deallocate Elements Between Models

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set MyNewAllocation.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Deallocate components between models.

```
defaultScenario.deallocate(sourceComp,targetComp);
```

Save the allocation set.

```
allocSet.save
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

allocScenario — Allocation scenario

allocation scenario object

Allocation scenario , specified as a `systemcomposer.allocation.AllocationScenario` object.

`sourceElement` — Source element
element object

Source element, specified as a `systemcomposer.arch.Element` object.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

`targetElement` — Target element
element object

Target element, specified as a `systemcomposer.arch.Element` object.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`getAllocation` | `getAllocatedFrom` | `allocate` | `getAllocatedTo` | `destroy` | `getScenario` | `createAllocationSet`

Topics

"Create and Manage Allocations"

Introduced in R2020b

decreaseExecutionOrder

Package: `systemcomposer.arch`

Change function execution order to earlier

Syntax

```
decreaseExecutionOrder(functionObj)
```

Description

`decreaseExecutionOrder(functionObj)` decreases execution order of the specified function `functionObj` by 1. If the function is at the minimum execution order, the `decreaseExecutionOrder` method will fail with a warning.

Examples

Change Execution Order of Software Functions

This example shows the software architecture of a throttle position control system and how to schedule the execution order of the root level functions.

```
model = systemcomposer.openModel("ThrottleControlComposition");
```

Simulate the model to populate it with functions.

```
sim("ThrottleControlComposition");
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'Controller_run_5ms'    }
    {'TPS_Primary_read_5ms'  }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

Decrease the execution order of the third function.

```
decreaseExecutionOrder(model.Architecture.Functions(3))
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'TPS_Primary_read_5ms'  }
```

```
    {'Controller_run_5ms'    }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

The third function is now moved up in execution order, executing earlier.

Increase the execution order of the second function.

```
increaseExecutionOrder(model.Architecture.Functions(2))
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'Controller_run_5ms'    }
    {'TPS_Primary_read_5ms'  }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

The second function is now moved down in execution order, executing later.

Input Arguments

`functionObj` — Function
function object

Function, specified as a `systemcomposer.arch.Function` object.

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"

Term	Definition	Application	More Information
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

See Also

`systemcomposer.createModel` | `createArchitectureModel` | `increaseExecutionOrder`

Topics

"Modeling the Software Architecture of a Throttle Position Control System"
"Simulate and Deploy Software Architectures"
"Author Software Architectures"

Introduced in R2021b

systemcomposer.analysis.deleteInstance

Delete architecture instance

Syntax

`systemcomposer.analysis.deleteInstance(instance)`

Description

`systemcomposer.analysis.deleteInstance(instance)` deletes an existing instance.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element by element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Delete Architecture Instance

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Instantiate all stereotypes in the profile.

```
model = systemcomposer.createModel("archModel",true);
instance = instantiate(model.Architecture,"LatencyProfile","NewInstance");
```

Delete the architecture instance.

```
systemcomposer.analysis.deleteInstance(instance);
```

Input Arguments

`instance` — Architecture instance
architecture instance object

Architecture instance to be deleted, specified as a `systemcomposer.analysis.ArchitectureInstance` object.

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

See Also
`instantiate` | `systemcomposer.analysis.Instance` | `loadInstance` | `save` | `refresh` | `update`

Topics
"Write Analysis Function"

Introduced in R2019a

deleteScenario

Package: `systemcomposer.allocation`

Delete allocation scenario

Syntax

`deleteScenario(allocSet,name)`

Description

`deleteScenario(allocSet,name)` deletes the allocation scenario in the set `allocSet` with the given name `name`.

Examples

Create Allocation Set and Delete Scenario

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Create a new allocation scenario.

```
newScenario = allocSet.createScenario("Scenario 2");
```

Delete the default allocation scenario.

```
allocSet.deleteScenario("Scenario 1");
```

Save the allocation set.

```
allocSet.save
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

`allocSet` — Allocation set
allocation set object

Allocation set, specified as a `systemcomposer.allocation.AllocationSet` object.

name — Name of allocation scenario
character vector | string

Name of allocation scenario, specified as a character vector or string.

Example: `"Scenario 1"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`getScenario` | `createScenario` | `synchronizeChanges` | `load` | `closeAll` | `find` | `close`

Topics
“Create and Manage Allocations”

Introduced in R2020b

deleteSubGroup

Package: systemcomposer.view

Delete subgroup in element group of view

Syntax

```
deleteSubGroup(elementGroup,subGroupName)
```

Description

`deleteSubGroup(elementGroup,subGroupName)` deletes the subgroup named `subGroupName` within the element group `elementGroup` of an architecture view.

Examples

Create and Delete Subgroup in View

Open the keyless entry system example and create a view `newView`.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("newView");
```

Open the Architecture Views Gallery to see the new view `newView`.

```
model.openViews
```

Create a subgroup `myGroup`.

```
group = view.Root.createSubGroup("myGroup");
```

Delete the subgroup `myGroup`.

```
view.Root.deleteSubGroup("myGroup");
```

Input Arguments

`elementGroup` — Element group
element group object

Element group for view, specified as a `systemcomposer.view.ElementGroup` object.

`subGroupName` — Name of subgroup
character vector | string

Name of subgroup, specified as a character vector or string.

Example: `"myGroup"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`openViews` | `createView` | `getView` | `deleteView` | `systemcomposer.view.ElementGroup` | `systemcomposer.view.View` | `getSubGroup` | `createSubGroup` | `removeElement` | `addElement`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

deleteView

Package: `systemcomposer.arch`

Delete architecture view

Syntax

```
deleteView(model,name)
```

Description

`deleteView(model,name)` deletes the view `name`, if it exists, in the specified model `model`.

Examples

Create and Delete View

Open the keyless entry system example and create a view, `newView`.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("newView");
```

Open the Architecture Views Gallery to see `newView`.

```
model.openViews
```

Delete the view and see that it has been deleted.

```
model.deleteView("newView")
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

`name` — Name of view
character vector | string

Name of view, specified as a character vector or string.

Example: `"All Components Grouped by Review Status"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"

Term	Definition	Application	More Information
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	“Inspect Components in Custom Architecture Views”
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	“Display Component Hierarchy and Architecture Hierarchy Using Views”

See Also

`systemcomposer.view.View` | `openViews` | `getView` | `createView` | `systemcomposer.view.ElementGroup`

Topics

“Create Architecture Views Interactively”
“Create Architectural Views Programmatically”

Introduced in R2021a

destroy

Package: `systemcomposer.arch`

Remove model element

Syntax

`destroy(element)`

Description

`destroy(element)` removes and destroys the architecture model element `element`.

Examples

Destroy Component

Create a component, `newComponent`, then remove it from the model.

```
model = systemcomposer.createModel("newModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
destroy(newComponent)
```

Input Arguments

`element` — Architecture model element
component object | variant component object | architecture port object | connector object | physical connector object | function object | value type object | data interface object | data element object | physical domain object | physical interface object | physical element object | function argument object | service interface object | function element object | property object | view object | element group object

Architecture model element, specified as one of these objects:

- `systemcomposer.arch.Component`
- `systemcomposer.arch.VariantComponent`
- `systemcomposer.arch.ArchitecturePort`
- `systemcomposer.arch.Connector`
- `systemcomposer.arch.PhysicalConnector`
- `systemcomposer.arch.Function`
- `systemcomposer.ValueType`
- `systemcomposer.interface.DataInterface`
- `systemcomposer.interface.DataElement`
- `systemcomposer.interface.PhysicalDomain`

- `systemcomposer.interface.PhysicalInterface`
- `systemcomposer.interface.PhysicalElement`
- `systemcomposer.interface.FunctionArgument`
- `systemcomposer.interface.ServiceInterface`
- `systemcomposer.interface.FunctionElement`
- `systemcomposer.profile.Property`
- `systemcomposer.view.View`
- `systemcomposer.view.ElementGroup`

See Also

Component | Variant Component | `removeElement` | `removeElement` | `removeInterface` | `deleteView` | `deleteSubGroup` | `deleteInstance` | `removeProfile` | `removeProperty` | `removeStereotype` | `removeStereotype`

Introduced in R2019a

destroy

Package: `systemcomposer.allocation`

Remove allocation scenario or allocation

Syntax

```
destroy(allocScenario)
destroy(allocation)
```

Description

`destroy(allocScenario)` removes and destroys the existing allocation scenario `allocScenario` in an allocation set.

`destroy(allocation)` removes and destroys the existing allocation `allocation` in an allocation scenario.

Examples

Destroy Allocation Scenario

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Destroy an allocation scenario in an allocation set

```
defaultScenario.destroy
```

Save the allocation set.

```
allocSet.save
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

`allocScenario` — Allocation scenario
allocation scenario object

Allocation scenario , specified as a `systemcomposer.allocation.AllocationScenario` object.

`allocation` — Allocation
allocation object

Allocation, specified as a `systemcomposer.allocation.Allocation` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also

`allocate` | `deallocate` | `createScenario` | `deleteScenario` | `getScenario` | `createAllocationSet`

Topics

"Create and Manage Allocations"

Introduced in R2020b

systemcomposer.allocation.editor

Open allocation editor

Syntax

`systemcomposer.allocation.editor`

Description

`systemcomposer.allocation.editor` opens the **Allocation Editor**.

Examples

Create Allocation Set and Open in Allocation Editor

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Save the allocation set.

```
allocSet.save
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”

Term	Definition	Application	More Information
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`createAllocationSet` | `systemcomposer.allocation.AllocationSet`

Topics

“Create and Manage Allocations”

Introduced in R2020b

systemcomposer.profile.editor

Open Profile Editor

Syntax

```
systemcomposer.profile.editor
systemcomposer.profile.editor(profile)
systemcomposer.profile.editor(profileName)
```

Description

`systemcomposer.profile.editor` opens the System Composer **Profile Editor**.

`systemcomposer.profile.editor(profile)` opens the **Profile Editor** and selects the profile object `profile`.

`systemcomposer.profile.editor(profileName)` opens the **Profile Editor** and selects the profile `profileName`.

Examples

Open Profile Editor

Create and save a profile, then open the **Profile Editor** with that profile selected.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
profile.save
systemcomposer.profile.editor(profile)
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

`profileName` — Profile name
character vector | string

Profile name, specified as a character vector or string.

Example: `systemcomposer.profile.editor("LatencyProfile")`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`systemcomposer.profile.Profile` | `loadProfile` | `open` | `load` | `find` | `save` | `closeAll` | `createProfile`

Topics

"Define Profiles and Stereotypes"

Introduced in R2019a

systemcomposer.exportModel

Export model information as MATLAB tables

Syntax

```
[exportedSet] = systemcomposer.exportModel(modelName)
[exportedSet,errorLog] = systemcomposer.exportModel(modelName)
```

Description

`[exportedSet] = systemcomposer.exportModel(modelName)` exports model information for components, ports, connectors, port interfaces, and requirement links, with a domain field to be imported into MATLAB tables. For software architectures, the programmatic interface exports function information. The exported tables have prescribed formats to specify model element relationships, stereotypes, and properties. For more information on the import structure, see the `importModel` function and “Import and Export Architecture Models”.

`[exportedSet,errorLog] = systemcomposer.exportModel(modelName)` exports model information to be imported into MATLAB tables with output arguments `exportedSet` with a structure of exported tables and `errorLog` to display export error information.

Examples

Export System Composer Model

To export a model, pass the model name as an argument to the `exportModel` function. The function returns a structure containing five tables: `components`, `ports`, `connections`, `portInterfaces`, and `requirementLinks`, with a `domain` field returned as `'System'` for architecture models and `'Software'` for software architecture models.

```
exportedSet = systemcomposer.exportModel('exMobileRobot')

exportedSet = 

  struct with fields:

          components: [3×4 table]
               ports: [3×5 table]
         connections: [1×4 table]
      portInterfaces: [3×9 table]
    requirementLinks: [4×15 table]
              domain: 'System'
```

Export A Software Architecture Model

To export a software architecture model, pass the model name as an argument to the `exportModel` function. The function returns a structure containing seven tables: `components`, `ports`, `connections`, `portInterfaces`, `requirementLinks`, `domain` as `'Software'`, and `functions`.

```
exportedSet = systemcomposer.exportModel('mySoftwareArchitectureModel')

exportedSet = 

  struct with fields:

          components: [2×5 table]
               ports: [0×4 table]
         connections: [0×4 table]
      portInterfaces: [0×9 table]
    requirementLinks: [0×15 table]
              domain: 'Software'
           functions: [1×4 table]
```

Input Arguments

`modelName` — Name of model to be exported
character vector | string

Name of model to be exported, specified as a character vector or string.

Example: `'exMobileRobot'`

Data Types: `char` | `string`

Output Arguments

`exportedSet` — Model tables
structure

Model tables, returned as a structure containing tables for `components`, `ports`, `connections`, `portInterfaces`, and `requirementLinks`, with a `domain` field returned as `'System'` for architecture models, and `'Software'` for software architecture models. For software architectures, model tables include a `functions` table for exported function information.

Data Types: `struct`

`errorLog` — Errors reported during export process
string array

Errors reported during export process, returned as a string array. You can obtain the error text by calling the `disp` method on the array of strings. For example, `disp(exportLog)` is used to obtain the errors reported as strings in a readable format.

Data Types: `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

Term	Definition	Application	More Information
requirements	Requirements are a collection of statements describing the desired behavior and characteristics of a system. Requirements ensure system design integrity and are achievable, verifiable, unambiguous, and consistent with each other. Each level of design should have appropriate requirements.	To enhance traceability of requirements, link system, functional, customer, performance, or design requirements to components and ports. Link requirements to each other to represent derived or allocated requirements. Manage requirements from the Requirements Manager on an architecture model or through custom views. Assign test cases to requirements using the **Test Manager** for verification and validation.	“Link and Trace Requirements”
requirement set	A requirement set is a collection of requirements. You can structure the requirements hierarchically and link them to components or ports.	Use the **Requirements Editor** to edit and refine requirements in a requirement set. Requirement sets are stored in `SLREQX` files. You can create a new requirement set and author requirements using Requirements Toolbox, or import requirements from supported third-party tools.	“Manage Requirements”
requirement link	A link is an object that relates two model-based design elements. A requirement link is a link where the destination is a requirement. You can link requirements to components or ports.	View links using the Requirements Perspective in System Composer. Select a requirement in the Requirements Browser to highlight the component or the port to which the requirement is assigned. Links are stored externally as `SLMX` files.	• “Create Architecture Model with Interfaces and Requirement Links” • “Update Reference Requirement Links from Imported File” on page 3-695

Term	Definition	Application	More Information
test harness	A test harness is a model that isolates the component under test with inputs, outputs, and verification blocks configured for testing scenarios. You can create a test harness for a model component or for a full model. A test harness gives you a separate testing environment for a model or a model component.	Create a test harness for a System Composer component to validate simulation results and verify design. The **Interface Editor** is accessible in System Composer test harness models to enable behavior testing and implementation-independent interface testing.	• "Verify and Validate Requirements Using Test Harnesses" • "Create a Test Harness" (Simulink Test)

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"

Term	Definition	Application	More Information
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also
`importModel`

Topics
"Import and Export Architecture Models"

Introduced in R2019a

systemcomposer.extractArchitectureFromSimulink

Extract architecture from Simulink model

Syntax

```
systemcomposer.extractArchitectureFromSimulink(model,name)
systemcomposer.extractArchitectureFromSimulink(model,name,Name,Value)
```

Description

`systemcomposer.extractArchitectureFromSimulink(model,name)` exports the Simulink model `model` to an architecture model `name` and saves it in the current directory.

`systemcomposer.extractArchitectureFromSimulink(model,name,Name,Value)` exports the Simulink model `model` to an architecture model `name` and saves it in the current directory with additional options.

Examples

Extract Architecture of Simulink Model Using System Composer

Export an existing Simulink® model to a System Composer™ architecture model. The algorithmic sections of the original model are removed and structural information is preserved during this process. Requirements links, if any, are also preserved.

Convert Simulink Model to System Composer Architecture

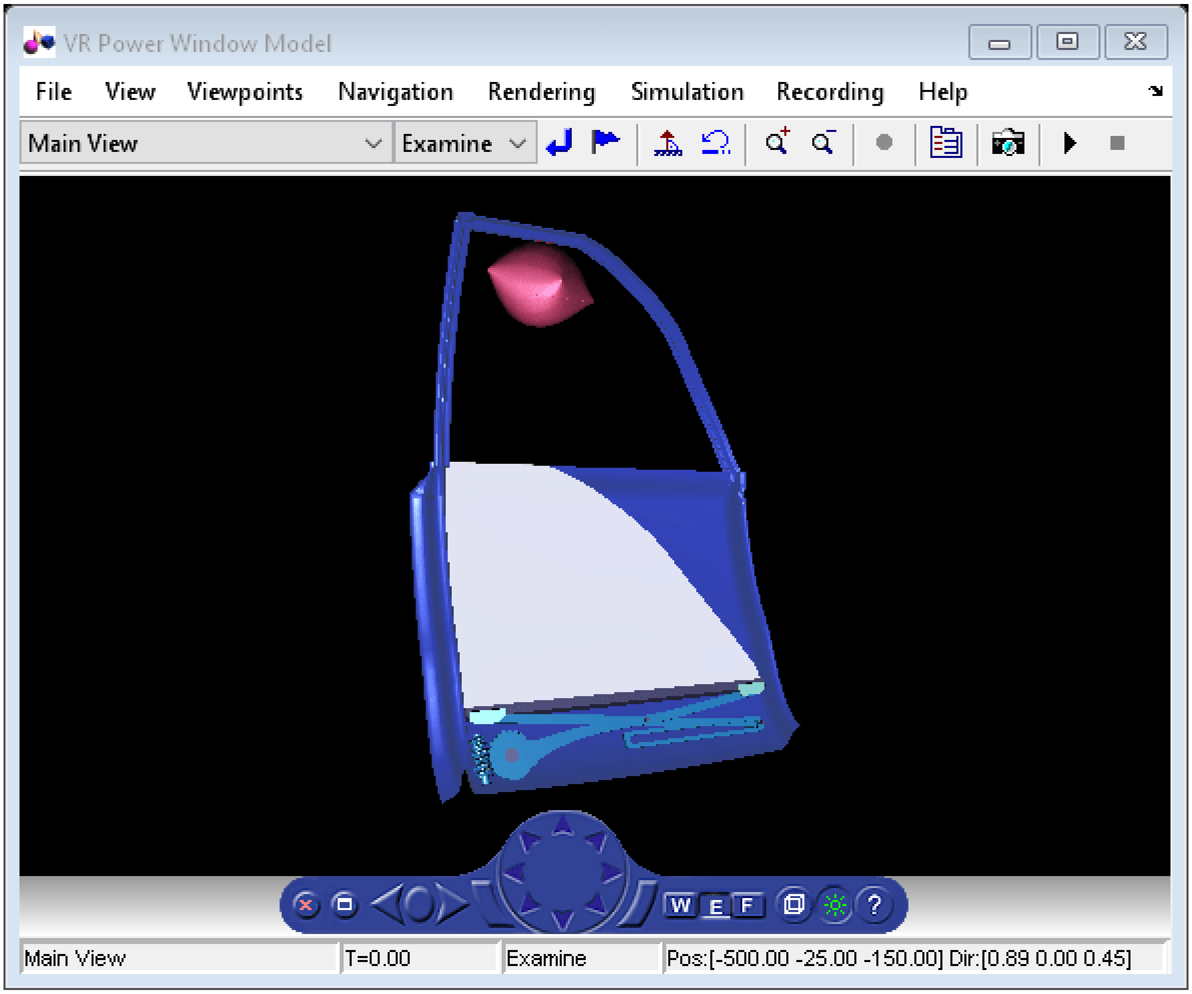
System Composer converts structural constructs in a Simulink model to equivalent architecture model constructs:

- Subsystems to components
- Variant subsystems to variant components
- Bus objects to interfaces
- Referenced models to reference components

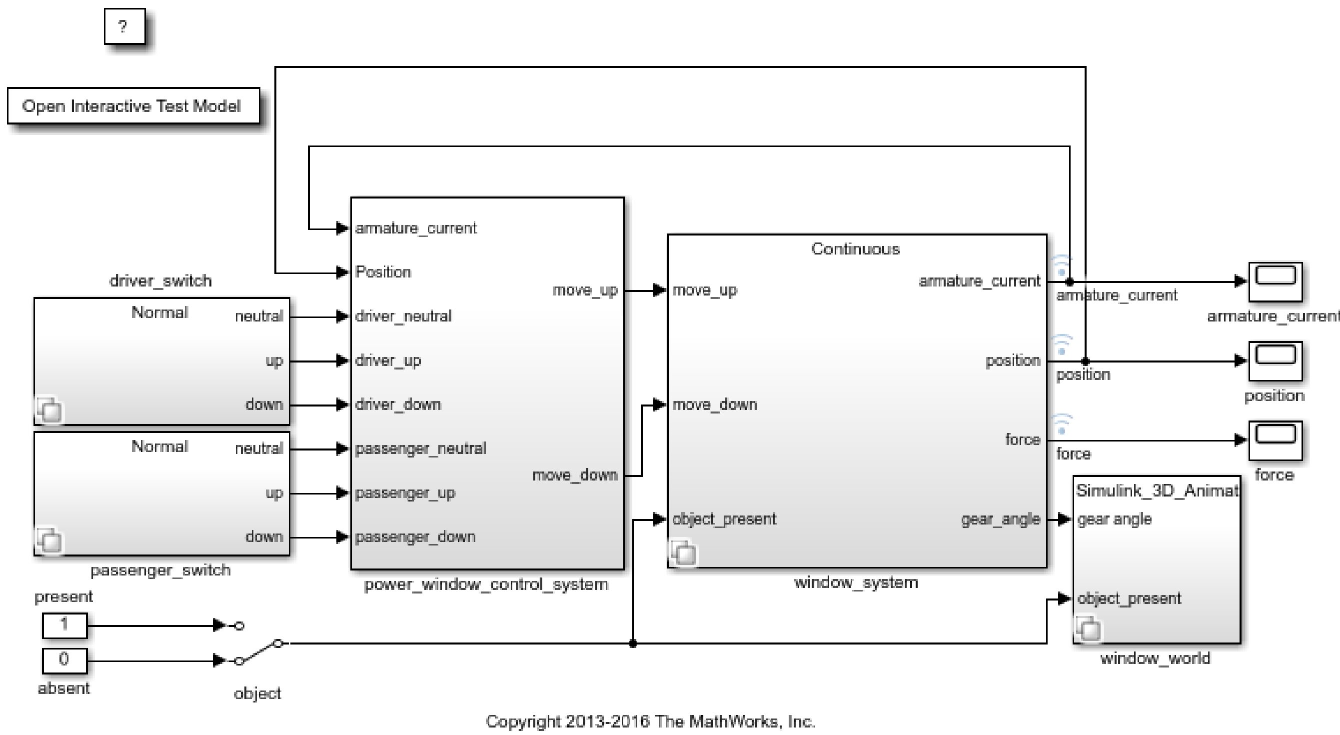
Open the Model

Open the Simulink model of the VR Power Window Model.

```
slexPowerWindowStart
```



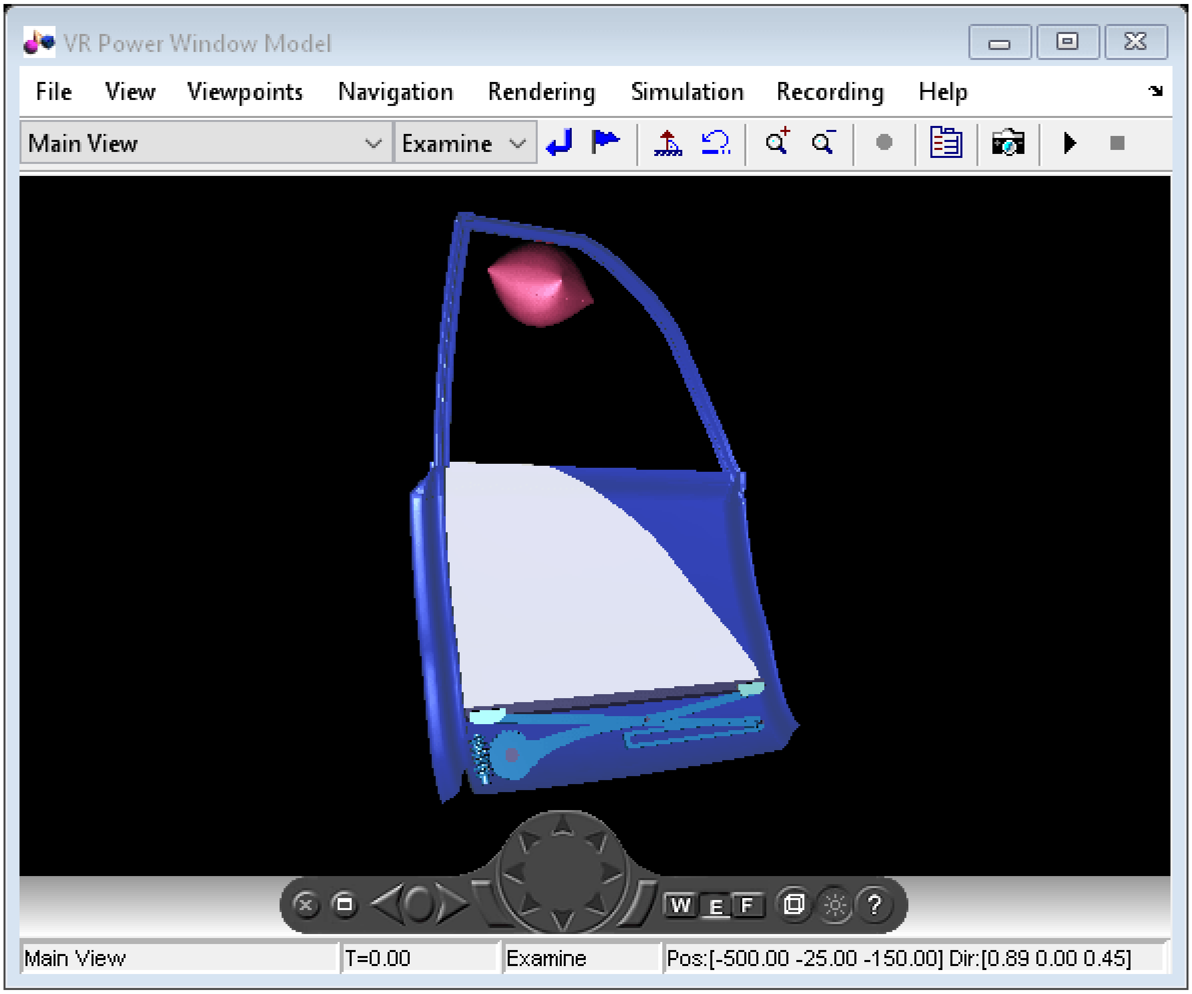

```
open_system('slexPowerWindowExample');
```



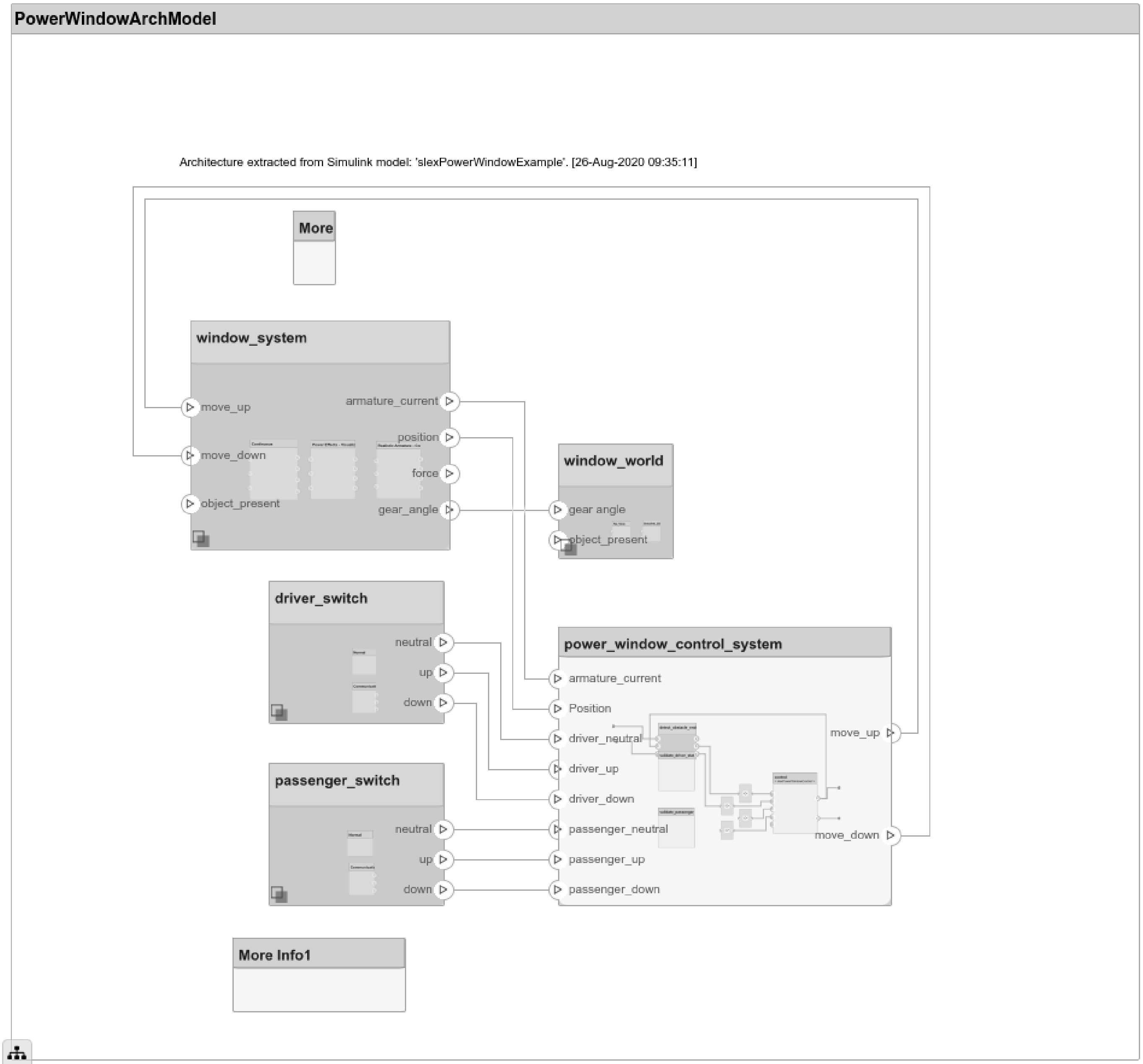
Export the Model

Extract an architecture model from the original model.

```
systemcomposer.extractArchitectureFromSimulink('slexPowerWindowExample','PowerWindowArchModel');
```




```
Simulink.BlockDiagram.arrangeSystem('PowerWindowArchModel');
systemcomposer.openModel('PowerWindowArchModel');
```



Input Arguments

`model` — Simulink model name
character vector | string

Simulink model name from which to extract the architecture, specified as a character vector or string. The model must be on the path.

Example: `"slexPowerWindowExample"`

Data Types: `char` | `string`

name — Architecture model name
character vector | string

Architecture model name, specified as a character vector or string. This model is saved in the current directory.

Example: "PowerWindowArchModel"

Data Types: char | string

Name-Value Arguments

Specify optional pairs of arguments as Name1=Value1,...,NameN=ValueN, where Name is the argument name and Value is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose Name *in quotes.*

Example:
systemcomposer.extractArchitectureFromSimulink("slexPowerWindowExample","PowerWindowArchModel",AutoArrange=false,ShowProgress=true)

AutoArrange — Whether to auto-arrange architecture model
true or 1 (default) | false or 0

Whether to auto-arrange architecture model, specified as a logical.

Example:
systemcomposer.extractArchitectureFromSimulink("slexPowerWindowExample","PowerWindowArchModel",AutoArrange=false)

Data Types: logical

ShowProgress — Whether to show progress bar
false or 0 (default) | true or 1

Whether to show progress bar, specified as a logical. This option is useful for larger models.

Example:
systemcomposer.extractArchitectureFromSimulink("slexPowerWindowExample","PowerWindowArchModel",ShowProgress=true)

Data Types: logical

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`inlineComponent` | `createSimulinkBehavior` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `linkToModel` | `isReference` | Reference Component

Topics

"Extract Architecture from Simulink Model"
"Describe Component Behavior Using Simulink"
"Decompose and Reuse Components"
"Describe Component Behavior Using Stateflow Charts"
"Create Simulink Subsystem Behavior Using Subsystem Component"

Introduced in R2019a

find

Package: `systemcomposer.arch`

Find architecture model elements using query

Syntax

```
[paths] = find(model,constraint,Name,Value)
[paths, elements] = find( ___ )
[elements] = find( ___ )
[paths] = find(model,constraint,rootArch,Name,Value)
```

Description

`[paths] = find(model,constraint,Name,Value)` finds all element paths starting from the root architecture of the model that satisfy the `constraint` query, with additional options specified by one or more name-value arguments.

`[paths, elements] = find( ___ )` returns the component elements `elements` and their `paths` that satisfy the `constraint` query. Follow the syntax above for input arguments. If `rootArch` is not provided, then the function finds model elements in the root architecture of the model. The output argument `paths` contains a fully qualified named path for each component in `elements` from the given root architecture.

`[elements] = find( ___ )` finds all component, port, or connector elements `elements`, that satisfy the `constraint` query, with additional options specified by one or more name-value arguments, which must include `'Port'` or `'Connector'` for `'ElementType'`.

`[paths] = find(model,constraint,rootArch,Name,Value)` finds all element paths starting from the specified root architecture `rootArch` that satisfy the `constraint` query, with additional options specified by one or more name-value arguments.

Examples

Find Model Element Paths that Satisfy Query

Import a model and run a query to select architectural elements that have a stereotype based on the specified sub-constraint.

```
import systemcomposer.query.*;
scKeylessEntrySystem
modelObj = systemcomposer.openModel("KeylessEntryArchitecture");
find(modelObj,HasStereotype(IsStereotypeDerivedFrom("AutoProfile.BaseComponent")),...
 Recurse=true,IncludeReferenceModels=true)
```

Create a query to find components that contain the letter `c` in their `Name` property.

```
constraint = contains(systemcomposer.query.Property("Name"),"c");
find(modelObj,constraint,Recurse=true,IncludeReferenceModels=true)
```

Find Elements in Architecture Model

Find elements in an architecture model based on a System Composer™ query.

Create Model

Create an architecture model with two components.

```
m = systemcomposer.createModel("exModel");
comps = m.Architecture.addComponent(["c1","c2"]);
```

Create Profile and Stereotypes

Create a profile and stereotypes for your architecture model.

```
pf = systemcomposer.profile.Profile.createProfile("mProfile");
b = pf.addStereotype("BaseComp",AppliesTo="Component",Abstract=true);
s = pf.addStereotype("sComp",Parent=b);
```

Apply Profile and Stereotypes

Apply the profile and stereotypes to your architecture model.

```
m.Architecture.applyProfile(pf.Name)
comps(1).applyStereotype(s.FullyQualifiedName)
```

Find the Element

Find the element in your architecture model based on a query.

```
import systemcomposer.query.*
[p, elem] = find(m, HasStereotype(IsStereotypeDerivedFrom("mProfile.BaseComp")),...
Recurse=true,IncludeReferenceModels=true)
```

```
p = 1x1 cell array
    {'exModel/c1'}


elem =
  Component with properties:

     IsAdapterComponent: 0
           Architecture: [1x1 systemcomposer.arch.Architecture]
                   Name: 'c1'
                 Parent: [1x1 systemcomposer.arch.Architecture]
                  Ports: [0x0 systemcomposer.arch.ComponentPort]
             OwnedPorts: [0x0 systemcomposer.arch.ComponentPort]
      OwnedArchitecture: [1x1 systemcomposer.arch.Architecture]
               Position: [15 15 65 76]
                  Model: [1x1 systemcomposer.arch.Model]
         SimulinkHandle: 2.0226
    SimulinkModelHandle: 0.0045
                   UUID: '35d5b2b3-5801-4615-95f2-4df22ddb79be'
            ExternalUID: ''
```

Clean Up

Remove the model and the profile.

```
cleanUpFindElementsInModel
```

Find Ports in Architecture Model

Create a model to query and create two components.

```
m = systemcomposer.createModel("exModel");
comps = m.Architecture.addComponent(["c1","c2"]);
port = comps(1).Architecture.addPort("cport1","in");
```

Create a query to find ports that contain the letter `c` in their `Name` property.

```
constraint = contains(systemcomposer.query.Property("Name"),"c");
find(m,constraint,Recurse=true,IncludeReferenceModels=true,ElementType="Port")
```

Find Architectural Element Paths That Satisfy Query

```
import systemcomposer.query.*;
scKeylessEntrySystem
modelObj = systemcomposer.openModel("KeylessEntryArchitecture");
find(modelObj,HasStereotype(IsStereotypeDerivedFrom("AutoProfile.BaseComponent")),...
 modelObj.Architecture,Recurse=true,IncludeReferenceModels=true)
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

`constraint` — Query
query constraint object

Query, specified as a `systemcomposer.query.Constraint` object representing specific conditions.

A constraint can contain a sub-constraint that can be joined with another constraint using `AND` or `OR`. A constraint can be negated using `NOT`.

Query Objects and Conditions for Constraints

Query Object	Condition
`Property`	A non-evaluated value for the given property or stereotype property.
`PropertyValue`	An evaluated property value from a System Composer object or a stereotype property.
`HasPort`	A component has a port that satisfies the given sub-constraint.
`HasInterface`	A port has an interface that satisfies the given sub-constraint.
`HasInterfaceElement`	An interface has an interface element that satisfies the given sub-constraint.
`HasStereotype`	An architecture element has a stereotype that satisfies the given sub-constraint.
`IsInRange`	A property value is within the given range.
`AnyComponent`	An element is a component and not a port or connector.
`IsStereotypeDerivedFrom`	A stereotype is derived from the given stereotype.

`rootArch` — Root architecture of model

architecture object | `Architecture` property of model object

Root architecture of model, specified as a `systemcomposer.arch.Architecture` object or the `Architecture` property of a `systemcomposer.arch.Model` object.

Example: `modelObj.Architecture`

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `find(model,constraint,Recurse=true,IncludeReferenceModels=true)`

`Recurse` — Option to recursively search model

`true` or 1 (default) | `false` or 0

Option to recursively search model or only search a specific layer, specified as 1 (`true`) to recursively search or 0 (`false`) to only search the specific layer.

Example: `find(model,constraint,Recurse=true)`

Data Types: `logical`

`IncludeReferenceModels` — Option to search for reference architectures

`false` or 0 (default) | `true` or 1

Option to search for reference architectures or not, specified as 0 (`false`) to not search for referenced architectures or 1 (`true`) to search for referenced architectures.

Example: `find(model,constraint,IncludeReferenceModels=true)`

Data Types: `logical`

`ElementType` — Option to search by type
`"Component"` (default) | `"Port"` | `"Connector"`

Option to search by type, specified as one of these types

- `"Component"` to find components to satisfy the query
- `"Port"` to find ports to satisfy the query
- `"Connector'` to find connectors to satisfy the query

Example: `find(model,constraint,ElementType="Port")`

Data Types: `char` | `string`

Output Arguments

`paths` — Element paths
cell array of character vectors

Element paths, returned as a cell array of character vectors that satisfy `constraint`.

Data Types: `char`

`elements` — Elements
element objects

Elements, returned as `systemcomposer.arch.Element` objects that satisfy `constraint`.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`systemcomposer.query.Constraint` | `createView` | `lookup`

Topics

"Create Architectural Views Programmatically"

Introduced in R2019a

systemcomposer.profile.Stereotype.find

Find stereotype by name

Syntax

```
stereotype = systemcomposer.profile.Stereotype.find(name)
```

Description

`stereotype = systemcomposer.profile.Stereotype.find(name)` finds a stereotype by name.

Examples

Find Stereotype

Find a stereotype in the small UAV (unmanned aerial vehicle) model.

```
scExampleSmallUAV
stereotype = systemcomposer.profile.Stereotype.find("UAVComponent.OnboardElement")
```

```
stereotype = 
  Stereotype with properties:

                    Name: 'OnboardElement'
             Description: 'Represents the base component of UAVComponent'
                  Parent: [0x0 systemcomposer.profile.Stereotype]
               AppliesTo: 'Component'
                Abstract: 0
                    Icon: 'network'
    ComponentHeaderColor: [210 210 210]
      ConnectorLineColor: [168 168 168]
      ConnectorLineStyle: 'Default'
      FullyQualifiedName: 'UAVComponent.OnboardElement'
                 Profile: [1x1 systemcomposer.profile.Profile]
         OwnedProperties: [1x3 systemcomposer.profile.Property]
              Properties: [1x3 systemcomposer.profile.Property]
```

Input Arguments

name — Name of stereotype
character vector | string

Name of stereotype, specified as a character vector or string in the form `"<profile>.<stereotype>"`.

Data Types: `char` | `string`

Output Arguments

`stereotype` — Found stereotype
stereotype object

Found stereotype, returned as a `systemcomposer.profile.Stereotype` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	“Extend Architectural Design Using Stereotypes”
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• “Set Properties” • “Add Properties with Stereotypes” • “Set Properties for Analysis”
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• “Define Profiles and Stereotypes” • “Use Stereotypes and Profiles”

See Also

`addStereotype` | `removeStereotype` | `getStereotype` | `getDefaultStereotype` | `setDefaultStereotype`

Topics
"Define Profiles and Stereotypes"
"Use Stereotypes and Profiles"
"Modeling System Architecture of Small UAV"

Introduced in R2019a

systemcomposer.profile.Profile.find

Find profile by name

Syntax

```
profile = systemcomposer.profile.Profile.find
profile = systemcomposer.profile.Profile.find(name)
```

Description

`profile = systemcomposer.profile.Profile.find` finds all open profiles.

`profile = systemcomposer.profile.Profile.find(name)` finds a profile by the specified name, `name`.

Examples

Find Profile

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Find the profile by name.

```
profileFound =  systemcomposer.profile.Profile.find("LatencyProfile")
```

```
profileFound = 

  Profile with properties:

            Name: 'LatencyProfile'
    FriendlyName: ''
```

```
    Description: ''
    Stereotypes: [1×5 systemcomposer.profile.Stereotype]
```

Input Arguments

name — Name of profile
character vector | string

Name of profile to find, specified as a character vector or string.

Example: `"LatencyProfile"`

Data Types: `char` | `string`

Output Arguments

`profile` — Found profile
profile object | array of profile objects

Found profile or profiles, returned as a `systemcomposer.profile.Profile` object or an array of `systemcomposer.profile.Profile` objects.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"

Term	Definition	Application	More Information
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• “Set Properties” • “Add Properties with Stereotypes” • “Set Properties for Analysis”
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• “Define Profiles and Stereotypes” • “Use Stereotypes and Profiles”

See Also

`systemcomposer.profile.Profile` | `open` | `editor` | `save` | `close` | `closeAll` | `load` | `createProfile`

Topics

“Define Profiles and Stereotypes”
“Use Stereotypes and Profiles”

Introduced in R2019a

systemcomposer.allocation.AllocationSet.find

Find loaded allocation set

Syntax

```
allocSet = systemcomposer.allocation.AllocationSet.find(name)
```

Description

`allocSet = systemcomposer.allocation.AllocationSet.find(name)` finds a loaded allocation set in the global name space with the given name `name`.

Examples

Create Allocation Set and Find the Allocation Set

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Find the allocation set.

```
allocSetFind = systemcomposer.allocation.AllocationSet.find("MyNewAllocation")
```

```
allocSetFind = 

  AllocationSet with properties:

            Name: 'MyNewAllocation'
     Description: ''
       Scenarios: [1×1 systemcomposer.allocation.AllocationScenario]
           Dirty: 1
    NeedsRefresh: 0
            UUID: '96e34f0d-fceb-4fb0-872d-2e588308d0e9'
     SourceModel: [1×1 systemcomposer.arch.Model]
     TargetModel: [1×1 systemcomposer.arch.Model]
```

Input Arguments

name — Name of allocation set
character vector | string

Name of allocation set, specified as a character vector or string.

Example: `"MyNewAllocation"`

Data Types: `char` | `string`

Output Arguments

`allocSet` — Allocation set
allocation set object

Allocation set, returned as a `systemcomposer.allocation.AllocationSet` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also
`save` | `load` | `close` | `closeAll` | `synchronizeChanges` | `getScenario` | `createScenario` | `deleteScenario`

Topics
"Create and Manage Allocations"

Introduced in R2020b

getActiveChoice

Package: `systemcomposer.arch`

Get active choice on variant component

Syntax

`choice = getActiveChoice(variantComponent)`

Description

`choice = getActiveChoice(variantComponent)` finds which choice is active for the variant component.

Examples

Get Active Variant Choice

Create a model, get the root architecture, create one variant component, add two choices for the variant component, set the active choice, and get the active choice.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
variant = addVariantComponent(arch,"Component1");
compList = addChoice(variant,["Choice1","Choice2"]);
setActiveChoice(variant,compList(2));
comp = getActiveChoice(variant)
```

```
comp =
  Component with properties:

     IsAdapterComponent: 0
           Architecture: [1x1 systemcomposer.arch.Architecture]
                   Name: 'Choice2'
                 Parent: [1x1 systemcomposer.arch.Architecture]
                  Ports: [0x0 systemcomposer.arch.ComponentPort]
             OwnedPorts: [0x0 systemcomposer.arch.ComponentPort]
      OwnedArchitecture: [1x1 systemcomposer.arch.Architecture]
               Position: [15 15 65 76]
                  Model: [1x1 systemcomposer.arch.Model]
         SimulinkHandle: 74.0043
    SimulinkModelHandle: 0.0052
                   UUID: '499317c9-f892-49e4-be23-456e1c91cebe'
            ExternalUID: ''
```

Input Arguments

`variantComponent` — Variant component
variant component object

Variant component, specified as a `systemcomposer.arch.VariantComponent` object.

Output Arguments

`choice` — Chosen variant
component object

Chosen variant, returned as a `systemcomposer.arch.Component` object.

More About

Definitions

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	"Create Variants"
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	"Set Variant Control Condition" on page 3-603

See Also

`addChoice` | `getChoices` | `setActiveChoice` | Variant Component

Topics

"Create Variants"

Introduced in R2019a

getAllocatedFrom

Package: systemcomposer.allocation

Get allocation source

Syntax

`sourceElements = getAllocatedFrom(allocScenario,targetElement)`

Description

`sourceElements = getAllocatedFrom(allocScenario,targetElement)` gets all allocated source elements from which a target element `targetElement` is allocated.

Examples

Allocate from Source Component

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Get allocated from source component allocated to target component.

```
sourceElement = defaultScenario.getAllocatedFrom(targetComp)
```

```
sourceElement = 

  Component with properties:

     IsAdapterComponent: 0
           Architecture: [1×1 systemcomposer.arch.Architecture]
                   Name: 'Source_Component'
                 Parent: [1×1 systemcomposer.arch.Architecture]
                  Ports: [0×0 systemcomposer.arch.ComponentPort]
             OwnedPorts: [0×0 systemcomposer.arch.ComponentPort]
      OwnedArchitecture: [1×1 systemcomposer.arch.Architecture]
               Position: [15 15 65 76]
```

```
              Model: [1×1 systemcomposer.arch.Model]
     SimulinkHandle: 2.0001
SimulinkModelHandle: 1.2207e-04
               UUID: 'c5ab7c89-3ebc-4a19-934b-9b0f473a0737'
        ExternalUID: ''
```

Input Arguments

`allocScenario` — Allocation scenario
allocation scenario object

Allocation scenario , specified as a `systemcomposer.allocation.AllocationScenario` object.

`targetElement` — Target element
element object

Target element, specified as a `systemcomposer.arch.Element` object.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

Output Arguments

`sourceElements` — Source elements
array of element objects

Source elements from which specified target element is allocated, returned as an array of `systemcomposer.arch.Element` objects.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"

Term	Definition	Application	More Information
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`getAllocatedTo` | `allocate` | `deallocate`

Topics

“Create and Manage Allocations”

Introduced in R2020b

getAllocatedTo

Package: `systemcomposer.allocation`

Get allocation target

Syntax

`targetElements = getAllocatedTo(allocScenario,sourceElement)`

Description

`targetElements = getAllocatedTo(allocScenario,sourceElement)` gets all allocated target elements to which the specified source element `sourceElement` is allocated.

Examples

Allocate to Target Component

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Get allocated to target component allocated from source component.

```
targetElement = defaultScenario.getAllocatedTo(sourceComp)
```

```
targetElement = 

  Component with properties:

     IsAdapterComponent: 0
           Architecture: [1×1 systemcomposer.arch.Architecture]
                   Name: 'Target_Component'
                 Parent: [1×1 systemcomposer.arch.Architecture]
                  Ports: [0×0 systemcomposer.arch.ComponentPort]
             OwnedPorts: [0×0 systemcomposer.arch.ComponentPort]
      OwnedArchitecture: [1×1 systemcomposer.arch.Architecture]
               Position: [15 15 65 76]
```

```
                 Model: [1×1 systemcomposer.arch.Model]
        SimulinkHandle: 5.0001
   SimulinkModelHandle: 3.0001
                  UUID: '15b4e0ba-f236-4f59-9d30-b46cf170cbda'
           ExternalUID: ''
```

Input Arguments

allocScenario — Allocation scenario
allocation scenario object

Allocation scenario , specified as a systemcomposer.allocation.AllocationScenario object.

sourceElement — Source element
element object

Source element, specified as a systemcomposer.arch.Element object.

An element object translates to a systemcomposer.arch.Component, systemcomposer.arch.VariantComponent, systemcomposer.arch.ComponentPort, systemcomposer.arch.ArchitecturePort, systemcomposer.arch.Connector, or systemcomposer.arch.PhysicalConnector object.

Output Arguments

targetElements — Target elements
array of element objects

Target elements to which source element is allocated, specified as an array of systemcomposer.arch.Element objects.

An element object translates to a systemcomposer.arch.Component, systemcomposer.arch.VariantComponent, systemcomposer.arch.ComponentPort, systemcomposer.arch.ArchitecturePort, systemcomposer.arch.Connector, or systemcomposer.arch.PhysicalConnector object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"

Term	Definition	Application	More Information
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also

`allocate` | `getAllocatedFrom` | `deallocate`

Topics

"Create and Manage Allocations"

Introduced in R2020b

getAllocation

Package: systemcomposer.allocation

Get allocation between source and target elements

Syntax

```
allocation = getAllocation(allocScenario,sourceElement,targetElement)
```

Description

`allocation = getAllocation(allocScenario,sourceElement,targetElement)` gets the allocation, if one exists, between the source element `sourceElement` and the target element `targetElement`.

Examples

Get Allocation Between Source and Target Components

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Get the allocation between the source component and the target component.

```
allocation = defaultScenario.getAllocation(sourceComp,targetComp)
```

```
allocation = 

  Allocation with properties:

      Source: [1×1 systemcomposer.arch.Component]
      Target: [1×1 systemcomposer.arch.Component]
```

```
    Scenario: [1×1 systemcomposer.allocation.AllocationScenario]
        UUID: 'd83d692d-03fa-4186-977c-ce31b9de9630'
```

Input Arguments

`allocScenario` — Allocation scenario
allocation scenario object

Allocation scenario , specified as a `systemcomposer.allocation.AllocationScenario` object.

`sourceElement` — Source element
element object

Source element, specified as a `systemcomposer.arch.Element` object.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

`targetElement` — Target element
element object

Target element, specified as a `systemcomposer.arch.Element` object.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

Output Arguments

`allocation` — Allocation
allocation object

Allocation between source element and target element, returned as a `systemcomposer.allocation.Allocation` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"

Term	Definition	Application	More Information
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`getAllocatedTo` | `getAllocatedFrom` | `deallocate` | `allocate`

Topics

“Create and Manage Allocations”

Introduced in R2020b

getChoices

Package: systemcomposer.arch

Get available choices in variant component

Syntax

```
compList = getChoices(variantComponent)
```

Description

`compList = getChoices(variantComponent)` returns the list of choices available for a variant component.

Examples

Get First Variant Choice

Create a model, get the root architecture, create a one variant component, add two choices for the variant component, and get the first choice.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
variant = addVariantComponent(arch,"Component1");
compList = addChoice(variant,["Choice1","Choice2"]);
choices = getChoices(variant);
variantChoice = choices(1)
```

```
variantChoice = 
  Component with properties:

     IsAdapterComponent: 0
           Architecture: [1x1 systemcomposer.arch.Architecture]
                   Name: 'Choice1'
                 Parent: [1x1 systemcomposer.arch.Architecture]
                  Ports: [0x0 systemcomposer.arch.ComponentPort]
             OwnedPorts: [0x0 systemcomposer.arch.ComponentPort]
      OwnedArchitecture: [1x1 systemcomposer.arch.Architecture]
               Position: [15 15 65 76]
                  Model: [1x1 systemcomposer.arch.Model]
         SimulinkHandle: 73.0043
    SimulinkModelHandle: 0.0054
                   UUID: '20be12bd-3c87-4a05-9bde-29062bda9723'
            ExternalUID: ''
```

Input Arguments

`variantComponent` — Variant component
variant component object

Variant component, specified as a `systemcomposer.arch.VariantComponent` object.

Output Arguments

`compList` — Choices available for variant component
array of component objects

Choices available for variant component, returned as an array of `systemcomposer.arch.Component` objects.

More About

Definitions

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	“Create Variants”
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	“Set Variant Control Condition” on page 3-603

See Also

`addChoice` | `getActiveChoice` | `setActiveChoice` | Variant Component

Topics

“Create Variants”

Introduced in R2019a

getCondition

Package: `systemcomposer.arch`

Return variant control on choice within variant component

Syntax

```
expression = getCondition(variantComponent,choice)
```

Description

`expression = getCondition(variantComponent,choice)` gets the variant control condition for a choice on the variant component to choose the active variant choice. If the condition is met on a variant choice, that variant choice becomes the active choice on the variant component.

Examples

Get Variant Control Condition

Create a model, get the root architecture, create on variant component, add two choices for the variant component, set a condition on one variant choice to choose the active variant choice, and get the condition.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
mode = 1;
variant = addVariantComponent(arch,"Component1");
compList = addChoice(variant,["Choice1","Choice2"]);
setCondition(variant,compList(2),"mode == 2");
exp = getCondition(variant,compList(2))
```

```
exp =
'mode == 2'
```

Input Arguments

`variantComponent` — Variant component
variant component object

Variant component, specified as a `systemcomposer.arch.VariantComponent` object.

`choice` — Choice in variant component
component object

Choice in variant component, specified by a `systemcomposer.arch.Component` object.

Output Arguments

`expression` — Control string

character vector

Control string that controls the selection of the particular `choice`, returned as a character vector.

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	"Create Variants"
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	"Set Variant Control Condition" on page 3-603

See Also

`makeVariant` | `setActiveChoice` | `setCondition` | `addVariantComponent` | Variant Component

Topics

"Create Variants"

Introduced in R2019a

getDefaultElementStereotype

Package: `systemcomposer.profile`

Get default stereotype for elements

Syntax

`stereotype = getDefaultElementStereotype(stereotype,elementType)`

Description

`stereotype = getDefaultElementStereotype(stereotype,elementType)` gets the default stereotype `stereotype` of the child elements whose parent element of type `elementType` has the stereotype `stereotype` applied.

Examples

Get Default Component Stereotype

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Set the default component stereotype.

```
nodeLatency.setDefaultElementStereotype("Component","LatencyProfile.NodeLatency");
```

Get the default component stereotype on `nodeLatency`.

```
stereotype = getDefaultElementStereotype(nodeLatency,"Component")
```

```
stereotype = 

  Stereotype with properties:

                    Name: 'NodeLatency'
```

```
             Description: ''
                  Parent: [1×1 systemcomposer.profile.Stereotype]
               AppliesTo: 'Component'
                Abstract: 0
                    Icon: 'default'
    ComponentHeaderColor: [210 210 210]
      ConnectorLineColor: [168 168 168]
      ConnectorLineStyle: 'Default'
      FullyQualifiedName: 'LatencyProfile.NodeLatency'
                 Profile: [1×1 systemcomposer.profile.Profile]
         OwnedProperties: [1×1 systemcomposer.profile.Property]
              Properties: [1×3 systemcomposer.profile.Property]
```

Input Arguments

`elementType` — Element type
`"Component"` | `"Port"` | `"Connector"` | `"Interface"` | `"Function"`

Element type, specified as `"Component"`, `"Port"`, `"Connector"`, `"Interface"`, or `"Function"`. The element type `"Function"` is only available for software architectures.

Data Types: `char` | `string`

`stereotype` — Stereotype
stereotype object

Stereotype, specified as a `systemcomposer.profile.Stereotype` object.

Output Arguments

`stereotype` — Default stereotype
stereotype object

Default stereotype, returned as a `systemcomposer.profile.Stereotype` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`applyStereotype` | `removeStereotype` | `setDefaultElementStereotype`

Topics

"Define Profiles and Stereotypes"

Introduced in R2021b

getDefaultStereotype

Package: `systemcomposer.profile`

Get default stereotype for profile

Syntax

`stereotype = getDefaultStereotype(profile)`

Description

`stereotype = getDefaultStereotype(profile)` gets the default stereotype for a profile.

Examples

Get Default Stereotype

Create a profile for latency characteristics.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfileA");

connLatency = profile.addStereotype("ConnectorLatency",AppliesTo="Connector");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",AppliesTo="Component");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",AppliesTo="Port");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");
```

Set the default stereotype, then get the default stereotype.

```
profile.setDefaultStereotype("NodeLatency");
default = getDefaultStereotype(profile)
```

```
default = 
  Stereotype with properties:

                   Name: 'NodeLatency'
            Description: ''
                 Parent: [0x0 systemcomposer.profile.Stereotype]
              AppliesTo: 'Component'
               Abstract: 0
                   Icon: 'default'
   ComponentHeaderColor: [210 210 210]
     ConnectorLineColor: [168 168 168]
     ConnectorLineStyle: 'Default'
     FullyQualifiedName: 'LatencyProfileA.NodeLatency'
                Profile: [1x1 systemcomposer.profile.Profile]
```

```
        OwnedProperties: [1x1 systemcomposer.profile.Property]
             Properties: [1x1 systemcomposer.profile.Property]
```

Close the profile to rerun this example.

```
profile.close(true)
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

Output Arguments

`stereotype` — Default stereotype
stereotype object

Default stereotype, returned as a `systemcomposer.profile.Stereotype` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"

Term	Definition	Application	More Information
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`createProfile` | `setDefaultStereotype` | `addStereotype` | `getStereotype` | `removeStereotype`

Topics

"Create a Profile and Add Stereotypes"

Introduced in R2019a

getDestinationElement

Package: `systemcomposer.arch`

Gets data elements selected on destination port for connection

Syntax

`selectedElems = getDestinationElement(connector)`

Description

`selectedElems = getDestinationElement(connector)` gets the selected data elements on a destination port for a connection.

Examples

Get Data Element on Destination Port of Connection

Get the selected element on the destination port for a connection.

Create a model and get its root architecture.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
rootArch = get(arch,"Architecture");
```

Add a component, create an output port on the component, create an output port on the architecture. and extract both component port objects.

```
newComponent = addComponent(rootArch,"Component2");
outPortComp = addPort(newComponent.Architecture,...
"testSig2","out");
outPortArch = addPort(rootArch,"testSig2","out");
compSrcPort = getPort(newComponent,"testSig2");
archDestPort = getPort(rootArch,"testSig2");
```

Add data interface, create data element, and set the data interface on the architecture port.

```
interface = arch.InterfaceDictionary.addInterface("interface2");
interface.addElement("x");
archDestPort.setInterface(interface);
```

Connect the ports and get the destination element of the connector.

```
conns = connect(compSrcPort,archDestPort,DestinationElement="x");
elem = getDestinationElement(conns)
```

```
elem =

  1×1 cell array
```

```
{'x'}
```

Input Arguments

`connector` — Connection between ports
connector object

Connection between ports, specified as a `systemcomposer.arch.Connector` object.

Output Arguments

`selectedElems` — Selected data element names
character vector

Selected data element names, returned as a character vector.

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`createModel` | `addPort` | `getPort` | `addComponent` | `addElement` | `addInterface` | `setInterface` | `connect` | `getSourceElement` | Component

Topics

“Specify Source Element or Destination Element for Ports”

Introduced in R2020b

getElement

Package: systemcomposer.interface

Get object for element

Syntax

```
element = getElement(interface,name)
```

Description

element = getElement(interface,name) gets the object for the element with name name in the interface specified by interface.

Examples

Get Object for Named Data Element

Add a data interface newInterface to the interface dictionary of the model. Add a data element newElement with data type double. Then, get the object for the data element.

```
arch = systemcomposer.createModel("newModel",true);
interface = addInterface(arch.InterfaceDictionary,"newInterface");
addElement(interface,"newElement",DataType="double");
element = getElement(interface,"newElement")
```

```
element = 

  DataElement with properties:

      Interface: [1×1 systemcomposer.interface.DataInterface]
           Name: 'newElement'
           Type: [1×1 systemcomposer.ValueType]
           UUID: '2d267175-33c2-43a9-be41-a1be2774a3cf'
    ExternalUID: ''
```

Get Object for Named Physical Element

Add a physical interface newInterface to the interface dictionary of the model. Add a physical element newElement with domain type electrical.electrical. Then, get the object for the physical element.

```
arch = systemcomposer.createModel("newModel",true);
interface = addPhysicalInterface(arch.InterfaceDictionary,"newInterface");
addElement(interface,"newElement",Type="electrical.electrical");
element = getElement(interface,"newElement")
```

```
element = 

  PhysicalElement with properties:
```

```
          Name: 'newElement'
          Type: [1×1 systemcomposer.interface.PhysicalDomain]
     Interface: [1×1 systemcomposer.interface.PhysicalInterface]
          UUID: '25b71628-e904-451a-96ff-f185c5ec60a4'
   ExternalUID: ''
```

Input Arguments

interface — Interface
data interface object | physical interface object | service interface object

Interface, specified as a `systemcomposer.interface.DataInterface`, `systemcomposer.interface.PhysicalInterface`, or `systemcomposer.interface.ServiceInterface` object.

name — Element name
character vector | string

Element name, specified as a character vector or string. An element name must be a valid MATLAB variable name.

Data Types: `char` | `string`

Output Arguments

element — Element
data element object | physical element object | function element object

Element, returned as a `systemcomposer.interface.DataElement`, `systemcomposer.interface.PhysicalElement`, or `systemcomposer.interface.FunctionElement` object.

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"

Term	Definition	Application	More Information
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addElement` | `removeElement` | `createDictionary` | `getInterfaceNames` | `getInterface` | `linkDictionary` | `getSourceElement` | `getDestinationElement` | `unlinkDictionary`

Topics

"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

getEvaluatedParameterValue

Package: `systemcomposer.arch`

Get evaluated value of parameter from element

Syntax

`[value,unit] = getEvaluatedParameterValue(element,paramName)`

Description

`[value,unit] = getEvaluatedParameterValue(element,paramName)` gets the evaluated value of the parameter, and, optionally, units `unit` specified on the architectural element, `element`.

Examples

Modify Parameters for Axle Architecture

This example shows a wheel axle architecture model with instance-specific parameters exposed in System Composer™. These parameters are defined as model arguments on the Simulink® reference model used as a model behavior linked to two System Composer components. You can change the values of these parameters independently on each reference component.

Open `mAxleArch` Architecture Model

Open the architecture model of the wheel axle `mAxleArch` to interact with the parameters on the reference components using the Property Inspector.

```
model = systemcomposer.openModel("mAxleArch");
```

Look Up `RightWheel` and `LeftWheel` Components

Look up the `Component` objects for the `RightWheel` and `LeftWheel` components.

```
rightWheelComp = lookup(model,Path="mAxleArch/RightWheel");
leftWheelComp = lookup(model,Path="mAxleArch/LeftWheel");
```

Get Parameter Names on `RightWheel` Component

Get the parameter names for the `RightWheel` component. Since the `LeftWheel` component is linked to the same reference model `mWheel`, the parameters are the same on the `LeftWheel` component.

```
paramNames = rightWheelComp.getParameterNames
```

```
paramNames = 1×3 string
    "Pressure"    "Diameter"    "Wear"
```

Get Parameter Definition on RightWheel Component for Pressure Parameter

Get the parameter definition for the Pressure parameter on the RightWheel component architecture.

```
paramDefinition = rightWheelComp.Architecture.getParameterDefinition(paramNames(1))
```

```
paramDefinition = 
  ParameterDefinition with properties:

           Name: 'Pressure'
           Type: 'double'
           Unit: 'psi'
     Complexity: 'real'
     Dimensions: '[1  1]'
          Value: '32'
            Min: ''
            Max: ''
    Description: ''
          Owner: [1×1 systemcomposer.arch.Architecture]
```

Get Parameter Values for RightWheel and LeftWheel Components

Get the parameter values for the RightWheel and LeftWheel components.

RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = rightWheelComp.getParameterValue(paramNames(i))
end
```

```
Right Wheel Parameters

paramName = 
"Pressure"

paramValue = 
'31'

paramUnits = 
'psi'

isDefault = logical
   0


paramName = 
"Diameter"

paramValue = 
'16'

paramUnits = 
'in'

isDefault = logical
   1
```

```
paramName = 
"Wear"

paramValue = 
'0.25'

paramUnits = 
'in'

isDefault = logical
   1
```

LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 
'32'

paramUnits = 
'psi'

isDefault = logical
   1


paramName = 
"Diameter"

paramValue = 
'15'

paramUnits = 
'in'

isDefault = logical
   0


paramName = 
"Wear"

paramValue = 
'0.23'

paramUnits = 
'in'

isDefault = logical
   0
```

Get Evaluated Parameter Values for RightWheel and LeftWheel Components

Get the evaluated parameter values for the RightWheel and LeftWheel components.

Evaluated RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = rightWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 31

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 16

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2500

paramUnits = 
'in'
```

Evaluated LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = leftWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 32

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 15

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2300
```

```
paramUnits =
'in'
```

Set Parameter Value and Units for Pressure Parameter on LeftWheel Component

Set the parameter value and unit for the PSI parameter on the LeftWheel component.

Current Values for Pressure on LeftWheel

```
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'32'

paramUnits =
'psi'

isDefault = logical
   1
```

New Values for Pressure on LeftWheel

```
leftWheelComp.setParameterValue("Pressure","2000")
leftWheelComp.setUnit("Pressure","mbar")
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'2000'

paramUnits =
'mbar'

isDefault = logical
   0
```

Revert Pressure Parameter on LeftWheel to Default Value

```
leftWheelComp.resetParameterToDefault("Pressure")
```

Save Models

```
model = systemcomposer.loadModel("mWheelArch");
save(model)
topModel = systemcomposer.loadModel("mAxleArch");
save(topModel)
```

Input Arguments

element — Architectural element
architecture object | component object

Architectural element, specified as a systemcomposer.arch.Architecture, systemcomposer.arch.Component, or systemcomposer.arch.VariantComponent object.

paramName — Parameter name
character vector | string

Parameter name, specified as a character vector or string.

Example: `"GainArg"`

Data Types: `char` | `string`

Output Arguments

`value` — Parameter value
`double` (default) | `single` | `int64` | `int32` | `int16` | `int8` | `uint64` | `uint32` | `uint8` | `boolean` | `string` | enumeration class name

Parameter value, returned as a data type that depends on how the parameter is defined in the model arguments.

`unit` — Units of parameter
character vector

Units of parameter, returned as a character vector.

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`getParameterDefinition` | `getParameterNames` | `getParameterValue` | `setParameterValue` | `setUnit` | `resetParameterToDefault`

Topics

"Access Model Arguments as Parameters on Reference Components"
"Use Parameters to Store Instance Values with Components"

Introduced in R2022a

getEvaluatedPropertyValue

Package: `systemcomposer.arch`

Get evaluated value of property from element

Syntax

`value = getEvaluatedPropertyValue(element,property)`

Description

`value = getEvaluatedPropertyValue(element,property)` gets the evaluated value of a property specified on the architectural element.

Examples

Get Evaluated Property Value

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Create a model with a component.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Apply the profile to the model and apply the stereotype to the component.

```
model.applyProfile("LatencyProfile");
comp.applyStereotype("LatencyProfile.electricalComponent");
```

Get the property value

```
value = getEvaluatedPropertyValue(comp,"LatencyProfile.electricalComponent.latency")
```

```
value =

    10
```

Input Arguments

`element` — Architectural element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.ServiceInterface`, or `systemcomposer.arch.Function` object.

`property` — Property name
character vector | string

Property name, specified as a character vector or string in the form `"<profile>.<stereotype>.<property>"`.

Data Types: `char` | `string`

Output Arguments

`value` — Property value
`double` (default) | `single` | `int64` | `int32` | `int16` | `int8` | `uint64` | `uint32` | `uint8` | `boolean` | `string` | enumeration class name

Property value, returned as a data type that depends on how the property is defined in the profile.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`setProperty` | `getProperty` | `getStereotypeProperties` | `getPropertyValue`

Topics

"Write Analysis Function"

Introduced in R2019a

getFunctionArgument

Package: `systemcomposer.interface`

Get function argument on function element

Syntax

```
arg = getFunctionArgument(functionElem,argName)
```

Description

`arg = getFunctionArgument(functionElem,argName)` gets the function argument `argName` specified by a function prototype from a function defined by the function element `functionElem`.

Examples

Get Function Argument

Create a new model.

```
model = systemcomposer.createModel("archModel","SoftwareArchitecture",true)
```

Create a service interface.

```
interface = addServiceInterface(model.InterfaceDictionary,"newServiceInterface")
```

Create a function element.

```
element = addElement(interface,"newFunctionElement")
```

Set a function prototype to add function arguments.

```
setFunctionPrototype(element,"y=f0(u)")
```

Get a function argument.

```
argument = getFunctionArgument(element,"y")
```

```
argument = 

  FunctionArgument with properties:

      Interface: [1×1 systemcomposer.interface.ServiceInterface]
        Element: [1×1 systemcomposer.interface.FunctionElement]
           Name: 'y'
           Type: [1×1 systemcomposer.ValueType]
     Dimensions: '1'
    Description: ''
```

```
        UUID: '018b4e55-fa8f-4250-ac2b-df72bf620feb'
 ExternalUID: ''
```

Input Arguments

`functionElem` — Function element
function element object

Function element, specified as a `systemcomposer.interface.FunctionElement` object.

`argName` — Argument name
character vector | string

Argument name, specified as a character vector or string.

Example: `"y"`

Data Types: `char` | `string`

Output Arguments

`arg` — Function argument
function argument object

Function argument, returned as a `systemcomposer.interface.FunctionArgument` object.

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"

Term	Definition	Application	More Information
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

addElement | createDictionary | addServiceInterface | getInterface | getInterfaceNames | removeInterface | linkDictionary | Adapter | addValueType | setFunctionPrototype

Topics

"Author Service Interfaces for Client-Server Communication"
"Client-Server Interfaces in the Class Diagram View"
"Define Port Interfaces Between Components"

Introduced in R2022a

getInterface

Package: systemcomposer.interface

Get object for named interface in interface dictionary

Syntax

```
interface = getInterface(dictionary,name)
interface = getInterface(dictionary,name,Name,Value)
```

Description

`interface = getInterface(dictionary,name)` gets the object for a named interface in the interface dictionary.

`interface = getInterface(dictionary,name,Name,Value)` gets the object for a named interface in the interface dictionary with additional options.

Examples

Add Data Interface and Get Data Interface

Add a data interface `newInterface` to the interface dictionary of the model. Obtain the data interface object. Confirm by opening the **Interface Editor**.

```
arch = systemcomposer.createModel("newModel",true);
addInterface(arch.InterfaceDictionary,"newInterface");
interface = getInterface(arch.InterfaceDictionary,"newInterface")
```

```
interface = 

  DataInterface with properties:

          Owner: [1×1 systemcomposer.interface.Dictionary]
           Name: 'newInterface'
       Elements: [0×0 systemcomposer.interface.DataElement]
          Model: [1×1 systemcomposer.arch.Model]
           UUID: '205cdd2f-12bc-4bbb-a4a7-75d0ab18adb8'
    ExternalUID: ''
```

Add Physical Interface and Get Physical Interface

Add a physical interface `newInterface` to the interface dictionary of the model. Obtain the physical interface object. Confirm by opening the **Interface Editor**.

```
arch = systemcomposer.createModel("newModel",true);
addPhysicalInterface(arch.InterfaceDictionary,"newInterface");
interface = getInterface(arch.InterfaceDictionary,"newInterface")
```

```
interface = 

  PhysicalInterface with properties:

          Owner: [1×1 systemcomposer.interface.Dictionary]
           Name: 'newInterface'
       Elements: [0×0 systemcomposer.interface.PhysicalElement]
          Model: [1×1 systemcomposer.arch.Model]
           UUID: '6110207d-2d6d-470e-9bf5-f0e6f6914685'
    ExternalUID: ''
```

Input Arguments

`dictionary` — Data dictionary
dictionary object

Data dictionary, specified as a `systemcomposer.interface.Dictionary` object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then `dictionary` must be the dictionary that carries interface definitions. For information on how to create a dictionary, see `createDictionary`.

`name` — Name of interface
character vector | string

Name of interface, specified as a character vector or string.

Example: `"newInterface"`

Data Types: `char` | `string`

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `getInterface(dict,"newInterface",ReferenceDictionary="")`

`ReferenceDictionary` — Reference dictionary
character vector | string

Reference dictionary to search for interfaces, specified as a character vector or string with the `.sldd` extension. Enter an empty character vector or string to include all referenced dictionaries in the search.

Example:
`getInterface(dict,"newInterface",ReferenceDictionary="referenceDictionary.sldd")`

Data Types: `char` | `string`

Output Arguments

`interface` — Interface
data interface object | physical interface object | service interface object | value type object

Interface, returned as a `systemcomposer.interface.DataInterface`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.ServiceInterface`, or `systemcomposer.ValueType` object.

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

<table>
<tr><th>Term</th><th>Definition</th><th>Application</th><th>More Information</th></tr>
<tr><td>value type</td><td>A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.</td><td>You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the Interface Editor so that you can reuse the value types as interfaces or data elements.</td><td>“Create Value Types as Interfaces”</td></tr>
<tr><td>owned interface</td><td>An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.</td><td>Create an owned interface to represent a value type or data interface that is local to a port.</td><td>“Define Owned Interfaces Local to Ports”</td></tr>
<tr><td>adapter</td><td>An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.</td><td>With an adapter, you can perform functions on the “Interface Adapter” dialog:
Create and edit mappings between input and output interfaces.
Apply an interface conversion <code>UnitDelay</code> to break an algebraic loop.
Apply an interface conversion <code>RateTransition</code> to reconcile different sample time rates for reference models.
When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.</td><td>“Interface Adapter”
Adapter</td></tr>
</table>

See Also

`addElement` | `getInterfaceNames` | `removeElement` | `addInterface` | `addValueType` | `addPhysicalInterface` | `addServiceInterface` | Adapter

Topics

“Specify Physical Interfaces on Ports”
“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2019a

getInterfaceNames

Package: `systemcomposer.interface`

Get names of all interfaces in interface dictionary

Syntax

`interfaceNames = getInterfaceNames(dictionary)`

Description

`interfaceNames = getInterfaceNames(dictionary)` gets the names of all interfaces in the interface dictionary.

Examples

Get Interface Names

Create a model, add three data interfaces, and get interface names. Confirm by opening the **Interface Editor**.

```
arch = systemcomposer.createModel("newModel",true);
addInterface(arch.InterfaceDictionary,"newInterfaceA");
addInterface(arch.InterfaceDictionary,"newInterfaceB");
addInterface(arch.InterfaceDictionary,"newInterfaceC");
interfaceNames = getInterfaceNames(arch.InterfaceDictionary)
```

```
interfaceNames =

  1×3 cell array

    {'newInterfaceA'}    {'newInterfaceB'}    {'newInterfaceC'}
```

Input Arguments

`dictionary` — Data dictionary
dictionary object

Data dictionary, specified as a `systemcomposer.interface.Dictionary` object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then `dictionary` must be the dictionary that carries interface definitions. For information on how to create a dictionary, see `createDictionary`.

Output Arguments

`interfaceNames` — Interface names
cell array of character vectors

Interface names, returned as a cell array of character vectors.

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	“Create Value Types as Interfaces”
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`addInterface` | `getInterface` | `removeInterface` | `addValueType` | `addServiceInterface` | `addPhysicalInterface` | Adapter

Topics

“Specify Physical Interfaces on Ports”
“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2019a

getParameterDefinition

Package: `systemcomposer.arch`

Get instance-specific parameter definition

Syntax

```
paramDef = getParameterDefinition(arch,paramName)
```

Description

`paramDef = getParameterDefinition(arch,paramName)` gets the instance-specific parameter definition object for a given architecture, `arch`, and parameter name, `paramName`.

Examples

Modify Parameters for Axle Architecture

This example shows a wheel axle architecture model with instance-specific parameters exposed in System Composer™. These parameters are defined as model arguments on the Simulink® reference model used as a model behavior linked to two System Composer components. You can change the values of these parameters independently on each reference component.

Open `mAxleArch` Architecture Model

Open the architecture model of the wheel axle `mAxleArch` to interact with the parameters on the reference components using the Property Inspector.

```
model = systemcomposer.openModel("mAxleArch");
```

Look Up `RightWheel` and `LeftWheel` Components

Look up the `Component` objects for the `RightWheel` and `LeftWheel` components.

```
rightWheelComp = lookup(model,Path="mAxleArch/RightWheel");
leftWheelComp = lookup(model,Path="mAxleArch/LeftWheel");
```

Get Parameter Names on `RightWheel` Component

Get the parameter names for the `RightWheel` component. Since the `LeftWheel` component is linked to the same reference model `mWheel`, the parameters are the same on the `LeftWheel` component.

```
paramNames = rightWheelComp.getParameterNames
```

```
paramNames = 1×3 string
    "Pressure"    "Diameter"    "Wear"
```

Get Parameter Definition on RightWheel Component for Pressure Parameter

Get the parameter definition for the Pressure parameter on the RightWheel component architecture.

```
paramDefinition = rightWheelComp.Architecture.getParameterDefinition(paramNames(1))
```

```
paramDefinition = 
  ParameterDefinition with properties:

           Name: 'Pressure'
           Type: 'double'
           Unit: 'psi'
     Complexity: 'real'
     Dimensions: '[1  1]'
          Value: '32'
            Min: ''
            Max: ''
    Description: ''
          Owner: [1×1 systemcomposer.arch.Architecture]
```

Get Parameter Values for RightWheel and LeftWheel Components

Get the parameter values for the RightWheel and LeftWheel components.

RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = rightWheelComp.getParameterValue(paramNames(i))
end
```

```
Right Wheel Parameters

paramName = 
"Pressure"

paramValue = 
'31'

paramUnits = 
'psi'

isDefault = logical
   0


paramName = 
"Diameter"

paramValue = 
'16'

paramUnits = 
'in'

isDefault = logical
   1
```

```
paramName = 
"Wear"

paramValue = 
'0.25'

paramUnits = 
'in'

isDefault = logical
   1
```

LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 
'32'

paramUnits = 
'psi'

isDefault = logical
   1


paramName = 
"Diameter"

paramValue = 
'15'

paramUnits = 
'in'

isDefault = logical
   0


paramName = 
"Wear"

paramValue = 
'0.23'

paramUnits = 
'in'

isDefault = logical
   0
```

Get Evaluated Parameter Values for RightWheel and LeftWheel Components

Get the evaluated parameter values for the RightWheel and LeftWheel components.

Evaluated RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = rightWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 31

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 16

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2500

paramUnits = 
'in'
```

Evaluated LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = leftWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 32

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 15

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2300
```

```
paramUnits = 
'in'
```

Set Parameter Value and Units for Pressure Parameter on LeftWheel Component

Set the parameter value and unit for the PSI parameter on the LeftWheel component.

Current Values for Pressure on LeftWheel

```
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue = 
'32'

paramUnits = 
'psi'

isDefault = logical
   1
```

New Values for Pressure on LeftWheel

```
leftWheelComp.setParameterValue("Pressure","2000")
leftWheelComp.setUnit("Pressure","mbar")
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue = 
'2000'

paramUnits = 
'mbar'

isDefault = logical
   0
```

Revert Pressure Parameter on LeftWheel to Default Value

```
leftWheelComp.resetParameterToDefault("Pressure")
```

Save Models

```
model = systemcomposer.loadModel("mWheelArch");
save(model)
topModel = systemcomposer.loadModel("mAxleArch");
save(topModel)
```

Input Arguments

arch — Architecture
architecture object | <component>.Architecture

Architecture, specified as a systemcomposer.arch.Architecture object or the architecture of a component <component>.Architecture.

paramName — Parameter name
character vector | string

Parameter name, specified as a character vector or string.

Example: `"GainArg"`

Data Types: `char` | `string`

Output Arguments

`paramDef` — Parameter definition
parameter definition object

Parameter definition, returned as a `systemcomposer.parameter.ParameterDefinition` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`getEvaluatedParameterValue` | `getParameterNames` | `getParameterValue` | `setParameterValue` | `setUnit` | `resetParameterToDefault`

Topics

"Access Model Arguments as Parameters on Reference Components"
"Use Parameters to Store Instance Values with Components"

Introduced in R2022a

getParameterNames

Package: `systemcomposer.arch`

Get parameter names on element

Syntax

```
paramNames = getParameterNames(element)
```

Description

`paramNames = getParameterNames(element)` gets the names of the parameters available on the specified architectural element, `element`.

Examples

Modify Parameters for Axle Architecture

This example shows a wheel axle architecture model with instance-specific parameters exposed in System Composer™. These parameters are defined as model arguments on the Simulink® reference model used as a model behavior linked to two System Composer components. You can change the values of these parameters independently on each reference component.

Open `mAxleArch` Architecture Model

Open the architecture model of the wheel axle `mAxleArch` to interact with the parameters on the reference components using the Property Inspector.

```
model = systemcomposer.openModel("mAxleArch");
```

Look Up `RightWheel` and `LeftWheel` Components

Look up the `Component` objects for the `RightWheel` and `LeftWheel` components.

```
rightWheelComp = lookup(model,Path="mAxleArch/RightWheel");
leftWheelComp = lookup(model,Path="mAxleArch/LeftWheel");
```

Get Parameter Names on `RightWheel` Component

Get the parameter names for the `RightWheel` component. Since the `LeftWheel` component is linked to the same reference model `mWheel`, the parameters are the same on the `LeftWheel` component.

```
paramNames = rightWheelComp.getParameterNames
```

```
paramNames = 1×3 string
    "Pressure"    "Diameter"    "Wear"
```

Get Parameter Definition on RightWheel Component for Pressure Parameter

Get the parameter definition for the Pressure parameter on the RightWheel component architecture.

```
paramDefinition = rightWheelComp.Architecture.getParameterDefinition(paramNames(1))
```

```
paramDefinition = 
  ParameterDefinition with properties:

           Name: 'Pressure'
           Type: 'double'
           Unit: 'psi'
     Complexity: 'real'
     Dimensions: '[1  1]'
          Value: '32'
            Min: ''
            Max: ''
    Description: ''
          Owner: [1×1 systemcomposer.arch.Architecture]
```

Get Parameter Values for RightWheel and LeftWheel Components

Get the parameter values for the RightWheel and LeftWheel components.

RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = rightWheelComp.getParameterValue(paramNames(i))
end
```

```
Right Wheel Parameters

paramName = 
"Pressure"

paramValue = 
'31'

paramUnits = 
'psi'

isDefault = logical
   0


paramName = 
"Diameter"

paramValue = 
'16'

paramUnits = 
'in'

isDefault = logical
   1
```

```
paramName = 
"Wear"

paramValue = 
'0.25'

paramUnits = 
'in'

isDefault = logical
   1
```

LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 
'32'

paramUnits = 
'psi'

isDefault = logical
   1


paramName = 
"Diameter"

paramValue = 
'15'

paramUnits = 
'in'

isDefault = logical
   0


paramName = 
"Wear"

paramValue = 
'0.23'

paramUnits = 
'in'

isDefault = logical
   0
```

Get Evaluated Parameter Values for RightWheel and LeftWheel Components

Get the evaluated parameter values for the RightWheel and LeftWheel components.

Evaluated RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = rightWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName =
"Pressure"

paramValue = 31

paramUnits =
'psi'

paramName =
"Diameter"

paramValue = 16

paramUnits =
'in'

paramName =
"Wear"

paramValue = 0.2500

paramUnits =
'in'
```

Evaluated LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = leftWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName =
"Pressure"

paramValue = 32

paramUnits =
'psi'

paramName =
"Diameter"

paramValue = 15

paramUnits =
'in'

paramName =
"Wear"

paramValue = 0.2300
```

```
paramUnits =
'in'
```

Set Parameter Value and Units for Pressure Parameter on LeftWheel Component

Set the parameter value and unit for the PSI parameter on the LeftWheel component.

Current Values for Pressure on LeftWheel

```
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'32'

paramUnits =
'psi'

isDefault = logical
   1
```

New Values for Pressure on LeftWheel

```
leftWheelComp.setParameterValue("Pressure","2000")
leftWheelComp.setUnit("Pressure","mbar")
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'2000'

paramUnits =
'mbar'

isDefault = logical
   0
```

Revert Pressure Parameter on LeftWheel to Default Value

```
leftWheelComp.resetParameterToDefault("Pressure")
```

Save Models

```
model = systemcomposer.loadModel("mWheelArch");
save(model)
topModel = systemcomposer.loadModel("mAxleArch");
save(topModel)
```

Input Arguments

element — Architectural element
architecture object | component object

Architectural element, specified as a systemcomposer.arch.Architecture, systemcomposer.arch.Component, or systemcomposer.arch.VariantComponent object.

Output Arguments

`paramNames` — Parameter names
array of strings

Parameter names, returned as an array of strings.

Data Types: `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`getEvaluatedParameterValue` | `getParameterDefinition` | `getParameterValue` | `setParameterValue` | `setUnit` | `resetParameterToDefault`

Topics

"Access Model Arguments as Parameters on Reference Components"
"Use Parameters to Store Instance Values with Components"

Introduced in R2022a

getParameterValue

Package: systemcomposer.arch

Get value of parameter

Syntax

`[value,unit,isDefault] = getParameterValue(element,paramName)`

Description

`[value,unit,isDefault] = getParameterValue(element,paramName)` gets the non-evaluated parameter value of the parameter specified by `paramName` for the provided architectural element, `element`.

Examples

Modify Parameters for Axle Architecture

This example shows a wheel axle architecture model with instance-specific parameters exposed in System Composer™. These parameters are defined as model arguments on the Simulink® reference model used as a model behavior linked to two System Composer components. You can change the values of these parameters independently on each reference component.

Open `mAxleArch` Architecture Model

Open the architecture model of the wheel axle `mAxleArch` to interact with the parameters on the reference components using the Property Inspector.

```
model = systemcomposer.openModel("mAxleArch");
```

Look Up `RightWheel` and `LeftWheel` Components

Look up the `Component` objects for the `RightWheel` and `LeftWheel` components.

```
rightWheelComp = lookup(model,Path="mAxleArch/RightWheel");
leftWheelComp = lookup(model,Path="mAxleArch/LeftWheel");
```

Get Parameter Names on `RightWheel` Component

Get the parameter names for the `RightWheel` component. Since the `LeftWheel` component is linked to the same reference model `mWheel`, the parameters are the same on the `LeftWheel` component.

```
paramNames = rightWheelComp.getParameterNames
```

```
paramNames = 1×3 string
    "Pressure"    "Diameter"    "Wear"
```

Get Parameter Definition on RightWheel Component for Pressure Parameter

Get the parameter definition for the Pressure parameter on the RightWheel component architecture.

```
paramDefinition = rightWheelComp.Architecture.getParameterDefinition(paramNames(1))
```

```
paramDefinition = 
  ParameterDefinition with properties:

           Name: 'Pressure'
           Type: 'double'
           Unit: 'psi'
     Complexity: 'real'
     Dimensions: '[1  1]'
          Value: '32'
            Min: ''
            Max: ''
    Description: ''
          Owner: [1×1 systemcomposer.arch.Architecture]
```

Get Parameter Values for RightWheel and LeftWheel Components

Get the parameter values for the RightWheel and LeftWheel components.

RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = rightWheelComp.getParameterValue(paramNames(i))
end
```

```
Right Wheel Parameters

paramName = 
"Pressure"

paramValue = 
'31'

paramUnits = 
'psi'

isDefault = logical
   0


paramName = 
"Diameter"

paramValue = 
'16'

paramUnits = 
'in'

isDefault = logical
   1
```

```
paramName = 
"Wear"

paramValue = 
'0.25'

paramUnits = 
'in'

isDefault = logical
   1
```

LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 
'32'

paramUnits = 
'psi'

isDefault = logical
   1


paramName = 
"Diameter"

paramValue = 
'15'

paramUnits = 
'in'

isDefault = logical
   0


paramName = 
"Wear"

paramValue = 
'0.23'

paramUnits = 
'in'

isDefault = logical
   0
```

Get Evaluated Parameter Values for RightWheel and LeftWheel Components

Get the evaluated parameter values for the RightWheel and LeftWheel components.

Evaluated RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = rightWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 31

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 16

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2500

paramUnits = 
'in'
```

Evaluated LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = leftWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 32

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 15

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2300
```

```
paramUnits =
'in'
```

Set Parameter Value and Units for `Pressure` Parameter on `LeftWheel` Component

Set the parameter value and unit for the `PSI` parameter on the `LeftWheel` component.

Current Values for `Pressure` on `LeftWheel`

```
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'32'

paramUnits =
'psi'

isDefault = logical
   1
```

New Values for `Pressure` on `LeftWheel`

```
leftWheelComp.setParameterValue("Pressure","2000")
leftWheelComp.setUnit("Pressure","mbar")
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'2000'

paramUnits =
'mbar'

isDefault = logical
   0
```

Revert `Pressure` Parameter on `LeftWheel` to Default Value

```
leftWheelComp.resetParameterToDefault("Pressure")
```

Save Models

```
model = systemcomposer.loadModel("mWheelArch");
save(model)
topModel = systemcomposer.loadModel("mAxleArch");
save(topModel)
```

Input Arguments

`element` — Architectural element
architecture object | component object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, or `systemcomposer.arch.VariantComponent` object.

`paramName` — Parameter name
character vector | string

Parameter name, specified as a character vector or string.

Example: "GainArg"

Data Types: char | string

Output Arguments

value — Parameter value
character vector

Parameter value, returned as a character vector.

Data Types: char

unit — Units of parameter
character vector

Units of parameter, returned as a character vector.

Data Types: char

isDefault — Whether parameter value is default
true or 1 | false or 0

Whether parameter value is default, returned as a logical.

Data Types: logical

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`getEvaluatedParameterValue` | `getParameterDefinition` | `getParameterNames` | `setParameterValue` | `setUnit` | `resetParameterToDefault`

Topics

"Access Model Arguments as Parameters on Reference Components"
"Use Parameters to Store Instance Values with Components"

Introduced in R2022a

getPort

Package: systemcomposer.arch

Get port from component

Syntax

```
port = getPort(compObj,portName)
```

Description

`port = getPort(compObj,portName)` gets the port on the component `compObj` with a specified name `portName`.

Examples

Connect Ports

Create and connect two ports in System Composer.

Create a top-level architecture model.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
rootArch = get(arch,"Architecture");
```

Create two new components.

```
names = ["Component1","Component2"];
newComponents = addComponent(rootArch,names);
```

Add ports to the components.

```
outPort1 = addPort(newComponents(1).Architecture,"testSig","out");
inPort1 = addPort(newComponents(2).Architecture,"testSig","in");
```

Extract the component ports.

```
srcPort = getPort(newComponents(1),"testSig");
destPort = getPort(newComponents(2),"testSig");
```

Connect the ports.

```
conns = connect(srcPort,destPort);
```

View the model.

```
systemcomposer.openModel(modelName);
```

Improve the model layout.

```
Simulink.BlockDiagram.arrangeSystem(modelName)
```

Input Arguments

`compObj` — Component
component object

Component to get port from, specified as a `systemcomposer.arch.Component` or `systemcomposer.arch.VariantComponent` object.

`portName` — Name of port
character vector | string

Name of port, specified as a character vector or string.

Example: `"testSig"`

Data Types: `char` | `string`

Output Arguments

`port` — Component port
component port

Component port, returned as a `systemcomposer.arch.ComponentPort` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

See Also
`createModel` | `addPort` | `addComponent` | `connect` | Component

Introduced in R2019a

getProperty

Package: `systemcomposer.arch`

Get property value corresponding to stereotype applied to element

Syntax

```
[propertyValue,propertyUnits] = getProperty(element,propertyName)
```

Description

`[propertyValue,propertyUnits] = getProperty(element,propertyName)` obtains the value and units of the property specified in the `propertyName` argument. Get the property corresponding to an applied stereotype by qualified name `"<profile>.<stereotype>.<property>"`.

Examples

Get Property from Component

Get the `weight` property from a component with `sysComponent` stereotype applied.

Create a model with a component called `Component`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Create a profile with a stereotype with a property, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("sysProfile");
base = profile.addStereotype("sysComponent");
base.addProperty("weight",Type="double",DefaultValue="10",Units="g");
model.applyProfile("sysProfile");
```

Apply the stereotype to the component, and set a new weight property.

```
applyStereotype(comp,"sysProfile.sysComponent")
setProperty(comp,"sysProfile.sysComponent.weight","5","g")
```

Get the weight property with units.

```
[val,units] = getProperty(comp,"sysProfile.sysComponent.weight")
```

```
val =

    '5'

units =
```

'g'

Input Arguments

`element` — Architectural element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.ServiceInterface`, or `systemcomposer.arch.Function` object.

`propertyName` — Name of property
character vector | string

Name of property, specified as a character vector or string in the form `"<profile>.<stereotype>.<property>"`.

Data Types: `char` | `string`

Output Arguments

`propertyValue` — Value of property
character vector

Value of property, returned as a character vector.

Data Types: `char`

`propertyUnits` — Units of property
character vector

Units of property to interpret property values, returned as a character vector.

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"

Term	Definition	Application	More Information
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a Simulink.ConnectionElement object.	Define the Type of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also

setProperty | removeProperty | addProperty | getStereotypeProperties

Topics

"Set Properties for Analysis"

Introduced in R2019a

getPropertyValue

Package: systemcomposer.arch

Get value of architecture property

Syntax

```
value = getPropertyValue(element,property)
```

Description

`value = getPropertyValue(element,property)` gets the non-evaluated property value for the provided architectural element.

Examples

Get Property Value

Create a profile, add a component stereotype, and add a property with a default value.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
stereotype = addStereotype(profile,"electricalComponent",AppliesTo="Component");
stereotype.addProperty("latency",Type="double",DefaultValue="10");
```

Create a model with a component.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Apply the profile to the model and apply the stereotype to the component. Open the **Profile Editor**.

```
model.applyProfile("LatencyProfile")
comp.applyStereotype("LatencyProfile.electricalComponent")
systemcomposer.profile.editor(profile)
```

Get the property value.

```
value = getPropertyValue(comp,"LatencyProfile.electricalComponent.latency")
```

```
value =

    '10'
```

Input Arguments

element — Architectural element

architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, systemcomposer.arch.ComponentPort, systemcomposer.arch.ArchitecturePort, systemcomposer.arch.Connector, systemcomposer.arch.PhysicalConnector, systemcomposer.interface.DataInterface, systemcomposer.ValueType, systemcomposer.interface.PhysicalInterface, systemcomposer.interface.ServiceInterface, or systemcomposer.arch.Function object.

property — Property name
character vector | string

Property name, specified as a character vector or string in the form "<profile>.<stereotype>.<property>".

Data Types: char | string

Output Arguments

value — Property value
character vector

Property value, returned as a character vector.

Data Types: char

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	“Extend Architectural Design Using Stereotypes”
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• “Set Properties” • “Add Properties with Stereotypes” • “Set Properties for Analysis”
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• “Define Profiles and Stereotypes” • “Use Stereotypes and Profiles”

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”

Term	Definition	Application	More Information
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also

`setProperty` | `getStereotypeProperties` | `getProperty` | `getEvaluatedPropertyValue`

Topics

"Write Analysis Function"

Introduced in R2019a

getScenario

Package: systemcomposer.allocation

Get allocation scenario

Syntax

```
scenario = getScenario(allocSet,name)
```

Description

`scenario = getScenario(allocSet,name)` gets the allocation scenario in the allocation set `allocSet` with the given name `name`, if one exists.

Examples

Create Allocation Set and Get Default Scenario

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1")
```

```
defaultScenario = 

  AllocationScenario with properties:

             Name: 'Scenario 1'
      Description: ''
    AllocationSet: [1×1 systemcomposer.allocation.AllocationSet]
      Allocations: [0×0 systemcomposer.allocation.Allocation]
             UUID: '6cde23e8-7c72-4fa0-8f51-e65290208564'
```

Input Arguments

allocSet — Allocation set
allocation set object

Allocation set, specified as a `systemcomposer.allocation.AllocationSet` object.

name — Name of allocation scenario
character vector | string

Name of allocation scenario, specified as a character vector or string.

Example: `"Scenario 1"`

Data Types: `char` | `string`

Output Arguments

`scenario` — Allocation scenario
allocation scenario object

Allocation scenario, returned as a `systemcomposer.allocation.AllocationScenario` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also

`createScenario` | `deleteScenario` | `close` | `load` | `save` | `synchronizeChanges` | `find` | `closeAll`

Topics

"Create and Manage Allocations"

Introduced in R2020b

getSourceElement

Package: `systemcomposer.arch`

Gets data elements selected on source port for connection

Syntax

`selectedElems = getSourceElement(connector)`

Description

`selectedElems = getSourceElement(connector)` gets the selected data elements on a source port for a connection.

Examples

Get Data Element on Source Port of Connection

Get the selected data element on the source port for a connection.

Create a model and get its root architecture.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
rootArch = get(arch,"Architecture");
```

Add a component, create an input port on the component, create an input port on the architecture. and extract both component port objects.

```
newComponent = addComponent(rootArch,"Component1");
inPortComp = addPort(newComponent.Architecture,...
"testSig1","in");
inPortArch = addPort(rootArch,"testSig1","in");
compDestPort = getPort(newComponent,"testSig1");
archSrcPort = getPort(rootArch,"testSig1");
```

Add data interface, create data element, and set the data interface on the architecture port.

```
interface = arch.InterfaceDictionary.addInterface("interface1");
interface.addElement("x");
archSrcPort.setInterface(interface);
```

Connect the ports and get the source element of the connector.

```
conns = connect(archSrcPort,compDestPort,SourceElement="x");
elem = getSourceElement(conns)
```

```
elem =

  1×1 cell array
```

```
{'x'}
```

Input Arguments

`connector` — Connection between ports
connector object

Connection between ports, specified as a `systemcomposer.arch.Connector` object.

Output Arguments

`selectedElems` — Selected data element names
character vector

Selected data element names, returned as a character vector.

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`createModel` | `addPort` | `getPort` | `addComponent` | `addElement` | `addInterface` | `setInterface` | `connect` | `getDestinationElement` | Component

Topics

"Specify Source Element or Destination Element for Ports"

Introduced in R2020b

getStereotype

Package: `systemcomposer.profile`

Find stereotype in profile by name

Syntax

`stereotype = getStereotype(profile,name)`

Description

`stereotype = getStereotype(profile,name)` finds a stereotype in a profile by name.

Examples

Get Stereotype by Name

Create a profile for latency characteristics.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfileB");

connLatency = profile.addStereotype("ConnectorLatency",AppliesTo="Connector");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",AppliesTo="Component");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",AppliesTo="Port");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");
```

Get the stereotype `ConnectorLatency` in the profile.

```
stereotype = getStereotype(profile,"ConnectorLatency")
```

```
stereotype = 
  Stereotype with properties:

                    Name: 'ConnectorLatency'
             Description: ''
                  Parent: [0x0 systemcomposer.profile.Stereotype]
               AppliesTo: 'Connector'
                Abstract: 0
                    Icon: 'default'
    ComponentHeaderColor: [210 210 210]
      ConnectorLineColor: [168 168 168]
      ConnectorLineStyle: 'Default'
      FullyQualifiedName: 'LatencyProfileB.ConnectorLatency'
                 Profile: [1x1 systemcomposer.profile.Profile]
         OwnedProperties: [1x2 systemcomposer.profile.Property]
```

```
            Properties: [1x2 systemcomposer.profile.Property]
```

Close the profile to rerun this example.

```
profile.close(true)
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

`name` — Stereotype name
character vector | string

Stereotype name, specified as a character vector or string. The name of the stereotype must be unique within the profile.

Data Types: `char` | `string`

Output Arguments

`stereotype` — Stereotype
stereotype object

Stereotype found, returned as a `systemcomposer.profile.Stereotype` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"

Term	Definition	Application	More Information
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`addStereotype` | `removeStereotype` | `getDefaultStereotype` | `setDefaultStereotype`

Topics

"Define Profiles and Stereotypes"
"Use Stereotypes and Profiles"

Introduced in R2019a

getStereotypeProperties

Package: `systemcomposer.arch`

Get stereotype property names on element

Syntax

`propNames = getStereotypeProperties(archElement)`

Description

`propNames = getStereotypeProperties(archElement)` returns an array of stereotype property names on the specified architecture of an element.

Examples

Get Stereotype Properties

Create a profile, add a component stereotype, and add properties with default values.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
stereotype = addStereotype(profile,"electricalComponent",AppliesTo="Component");
stereotype.addProperty("latency",Type="double",DefaultValue="10");
stereotype.addProperty("mass",Type="double",DefaultValue="20");
```

Create a model with a component.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Apply the profile to the model and apply the stereotype to the component. Open the **Profile Editor**.

```
model.applyProfile("LatencyProfile");
comp.applyStereotype("LatencyProfile.electricalComponent");
systemcomposer.profile.editor(profile)
```

Get stereotype properties on the architecture of the component.

```
properties = getStereotypeProperties(comp.Architecture)
```

```
properties =

    1×2 string array

    "LatencyProfile.electricalComponent.latency"    "LatencyProfile.electricalComponent.mass"
```

Input Arguments

`archElement` — Model element architecture

architecture object | architecture port object | connector object | physical connector object | function object | data interface object | value type object | physical interface object | service interface object

Model element architecture, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.arch.Function`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, `systemcomposer.interface.PhysicalInterface`, or `systemcomposer.interface.ServiceInterface` object. You can also use the `Architecture` property of the `systemcomposer.arch.Component` object or the `ArchitecturePort` property of the `systemcomposer.arch.ComponentPort` object.

Example: `arch`

Example: `comp.Architecture`

Example: `conn`

Example: `compPort.ArchitecturePort`

Output Arguments

`propNames` — Property names
string array

Property names, returned as a string array, each in the form `"<profile>.<stereotype>.<property>"`.

Data Types: `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"

Term	Definition	Application	More Information
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also

`setProperty` | `getProperty` | `getEvaluatedPropertyValue` | `getPropertyValue`

Topics

"Write Analysis Function"

Introduced in R2019a

getStereotypes

Package: systemcomposer.arch

Get stereotypes applied on element of architecture model

Syntax

```
stereotypes = getStereotypes(element)
```

Description

`stereotypes = getStereotypes(element)` gets an array of fully qualified stereotype names that have been applied on an element of an architecture model.

Examples

Get Stereotypes

Create a model with a component.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Apply the stereotype to the component and get the stereotypes on the component.

```
comp.applyStereotype("LatencyProfile.LatencyBase");
stereotypes = getStereotypes(comp)
```

```
stereotypes =

  1×1 cell array

    {'LatencyProfile.LatencyBase'}
```

Input Arguments

`element` — Architectural element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.ServiceInterface`, or `systemcomposer.arch.Function` object.

Output Arguments

`stereotypes` — List of stereotypes
cell array of character vectors

List of stereotypes, returned as a cell array of character vectors in the form `"<profile>.<stereotype>"`.

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	“Extend Architectural Design Using Stereotypes”
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• “Set Properties” • “Add Properties with Stereotypes” • “Set Properties for Analysis”
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• “Define Profiles and Stereotypes” • “Use Stereotypes and Profiles”

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• “Manage Interfaces with Data Dictionaries” • “Reference Data Dictionaries”

Term	Definition	Application	More Information
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"

Term	Definition	Application	More Information
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	“Specify Physical Interfaces on Ports”
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	“Describe Component Behavior Using Simscape”

See Also
`applyStereotype` | `removeStereotype` | `batchApplyStereotype` | `getStereotypeProperties`

Topics

“Use Stereotypes and Profiles”

Introduced in R2019a

getSubGroup

Package: `systemcomposer.view`

Get subgroup in element group of view

Syntax

```
subGroup = getSubGroup(elementGroup,subGroupName)
```

Description

`subGroup = getSubGroup(elementGroup,subGroupName)` gets a subgroup, `subGroup`, named `subGroupName` within the element group `elementGroup` of an architecture view.

Examples

Create and Get Subgroup in View

Open the keyless entry system example and create a view `newView`.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("newView");
```

Open the Architecture Views Gallery to see the new view `newView`.

```
model.openViews
```

Create a subgroup `myGroup`.

```
group = view.Root.createSubGroup("myGroup");
```

Get the subgroup `myGroup`.

```
getGroup = view.Root.getSubGroup("myGroup")
```

```
getGroup =
  ElementGroup with properties:

         Name: 'myGroup'
         UUID: '6adb1ac0-5a8b-40ed-97c0-36e9da5e9d46'
     Elements: []
    SubGroups: [0x0 systemcomposer.view.ElementGroup]
```

Input Arguments

`elementGroup` — Element group
element group object

Element group for view, specified as a `systemcomposer.view.ElementGroup` object.

`subGroupName` — Name of subgroup
character vector | string

Name of subgroup, specified as a character vector or string.

Example: `"myGroup"`

Data Types: `char` | `string`

Output Arguments

`subGroup` — Subgroup
element group object

Subgroup, returned as a `systemcomposer.view.ElementGroup` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"

Term	Definition	Application	More Information
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`openViews` | `createView` | `getView` | `deleteView` | `systemcomposer.view.ElementGroup` | `systemcomposer.view.View` | `createSubGroup` | `deleteSubGroup` | `addElement` | `removeElement`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

getValue

Package: systemcomposer.analysis

Get value of property from element instance

Syntax

```
[value,unit] = getValue(instance,property)
```

Description

`[value,unit] = getValue(instance,property)` obtains the property `property` of the instance `instance` and assigns it to the specified value `value`.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Get Mass Property Value

Load the small unmanned aerial vehicle (UAV) model, create an architecture instance, and get the mass property value of a nested component.

```
scExampleSmallUAV
model = systemcomposer.loadModel("scExampleSmallUAVModel");
instance = instantiate(model.Architecture,"UAVComponent","NewInstance");
[massValue,unit] = getValue(instance.Components(1).Components(1),...
"UAVComponent.OnboardElement.Mass")
```

```
massValue = 1.7000

unit =
'kg'
```

Input Arguments

`instance` — Element instance
architecture instance | component instance | port instance | connector instance

Element instance, specified as a `systemcomposer.analysis.ArchitectureInstance`, `systemcomposer.analysis.ComponentInstance`, `systemcomposer.analysis.PortInstance`, or `systemcomposer.analysis.ConnectorInstance` object.

`property` — Property
character vector | string

Property, specified in the form `"<profile>.<stereotype>.<property>"`.

Data Types: `char` | `string`

Output Arguments

`value` — Property value
`double` (default) | `single` | `int64` | `int32` | `int16` | `int8` | `uint64` | `uint32` | `uint8` | `boolean` | `string` | enumeration class name

Property value, returned as a data type that depends on how the property is defined in the profile.

`unit` — Property unit
character vector

Property unit, returned as a character vector that describes the unit of the property as defined in the profile.

Example: `'kg'`

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"

Term	Definition	Application	More Information
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a MAT file, of a System Composer architecture model for analysis.	“Run Analysis Function”
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	“Create a Model Instance for Analysis”

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	“Extend Architectural Design Using Stereotypes”
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• “Set Properties” • “Add Properties with Stereotypes” • “Set Properties for Analysis”

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`setValue` | `hasValue` | `systemcomposer.analysis.Instance`

Topics

"Write Analysis Function"
"Modeling System Architecture of Small UAV"

Introduced in R2019a

getQualifiedName

Package: `systemcomposer.arch`

Get model element qualified name

Syntax

`getQualifiedName(element)`

Description

`getQualifiedName(element)` gets the qualified name of the architecture model element `element`.

Examples

Get Qualified Name of Component

Create a component, `newComponent`, then get its qualified name.

```
model = systemcomposer.createModel("newModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
name = getQualifiedName(newComponent)
```

```
name = 

    'newModel/newComponent'
```

Input Arguments

`element` — Architecture model element
element object

Architecture model element, specified as a `systemcomposer.arch.Element` object.

An element object translates to a `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, or `systemcomposer.arch.PhysicalConnector` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"

Term	Definition	Application	More Information
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	“Specify Physical Interfaces on Ports”
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	“Describe Component Behavior Using Simscape”

See Also

Component | Variant Component | `lookup`

Topics

“Compose Architecture Visually”
“Decompose and Reuse Components”
“Describe Component Behavior Using Simscape”

Introduced in R2019a

getView

Package: `systemcomposer.arch`

Find architecture view

Syntax

`view = getView(model,name)`

Description

`view = getView(model,name)` finds the view `view` in the architecture model `model` with view name `name`.

Examples

Create and Get View

Open the keyless entry system example and create a view, `newView`.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("newView");
```

Open the Architecture Views Gallery to see `newView`.

```
model.openViews
```

Find the view.

```
foundView = model.getView("newView")
```

```
foundView = 
  View with properties:

                     Name: 'newView'
                     Root: [1x1 systemcomposer.view.ElementGroup]
                    Model: [1x1 systemcomposer.arch.Model]
                     UUID: 'c9c56ddb-27d8-4dda-aa3d-bc7d5d469a0f'
                   Select: []
                  GroupBy: {}
                    Color: '#0072bd'
              Description: ''
    IncludeReferenceModels: 1
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

name — Name of view
character vector | string

Name of view, specified as a character vector or string.

Example: `"All Components Grouped by Review Status"`

Data Types: `char` | `string`

Output Arguments

`view` — Architecture view
view object

Architecture view found, returned as a `systemcomposer.view.View` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`systemcomposer.view.View` | `createView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

HasInterface

Package: systemcomposer.query

Create query to select architectural elements with interface on port based on specified sub-constraint

Syntax

```
query = HasInterface(sub-constraint)
```

Description

`query = HasInterface(sub-constraint)` creates a query `query` that the `find` and `createView` functions use to select architectural elements with an interface that satisfies the given sub-constraint `sub-constraint`.

Examples

Construct Query to Select All Port Interfaces

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query for all the interfaces in a port with `KeyFOBPosition` in the `Name` and run the query.

```
constraint = HasPort(HasInterface(contains(Property("Name"),"KeyFOBPosition")));
portInterfaces = find(model,constraint,Recurse=true,IncludeReferenceModels=true)
```

```
portInterfaces = 10x1 cell
    {'KeylessEntryArchitecture/Door Lock//Unlock System'                      }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Door Lock Controller' }
    {'KeylessEntryArchitecture/Engine Control System'                         }
    {'KeylessEntryArchitecture/Engine Control System/Keyless Start Controller'}
    {'KeylessEntryArchitecture/FOB Locator System'                            }
    {'KeylessEntryArchitecture/FOB Locator System/FOB Locator Module'         }
    {'KeylessEntryArchitecture/Lighting System'                               }
    {'KeylessEntryArchitecture/Lighting System/Lighting Controller'           }
    {'KeylessEntryArchitecture/Sound System'                                  }
    {'KeylessEntryArchitecture/Sound System/Sound Controller'                 }
```

Input Arguments

`sub-constraint` — Condition restricting the query
query constraint object

Condition restricting the query, specified as a `systemcomposer.query.Constraint` object.

Output Arguments

`query` — Query
query constraint object

Query, returned as a `systemcomposer.query.Constraint` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	“Modeling System Architecture of Keyless Entry System”
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• “Create Architecture Views Interactively” • “Create Architectural Views Programmatically”
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”

Term	Definition	Application	More Information
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	“Inspect Components in Custom Architecture Views”
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	“Display Component Hierarchy and Architecture Hierarchy Using Views”

See Also

`createView` | `find` | `systemcomposer.query.Constraint` | `HasPort` | `HasInterfaceElement`

Topics

“Create Architectural Views Programmatically”
“Modeling System Architecture of Keyless Entry System”

Introduced in R2019b

HasInterfaceElement

Package: `systemcomposer.query`

Create query to select architectural elements with interface element on interface based on specified sub-constraint

Syntax

```
query = HasInterfaceElement(sub-constraint)
```

Description

`query = HasInterfaceElement(sub-constraint)` creates a query `query` that the `find` and `createView` functions use to select architectural elements with an interface element that satisfies the given sub-constraint `sub-constraint`.

Examples

Construct Query to Select All Interface Elements

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query for all the interface elements with `c` in the `Name` and run the query.

```
constraint = HasPort(HasInterface(HasInterfaceElement(contains(Property("Name"),"c"))));
elements = find(model,constraint,Recurse=true,IncludeReferenceModels=true)
```

```
elements =

  0x0 empty cell array
```

Input Arguments

`sub-constraint` — Condition restricting the query
query constraint object

Condition restricting the query, specified as a `systemcomposer.query.Constraint` object.

Output Arguments

query — Query
query constraint object

Query, returned as a `systemcomposer.query.Constraint` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	“Modeling System Architecture of Keyless Entry System”
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• “Create Architecture Views Interactively” • “Create Architectural Views Programmatically”
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	“Inspect Components in Custom Architecture Views”

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`createView` | `find` | `systemcomposer.query.Constraint` | `HasInterface` | `HasPort`

Topics

"Create Architectural Views Programmatically"
"Modeling System Architecture of Keyless Entry System"

Introduced in R2019b

HasPort

Package: `systemcomposer.query`

Create query to select architectural elements with port on component based on specified sub-constraint

Syntax

```
query = HasPort(sub-constraint)
```

Description

`query = HasPort(sub-constraint)` creates a query `query` that the `find` and `createView` functions use to select architectural elements with a port that satisfies the given sub-constraint `sub-constraint`.

Examples

Construct Query to Select All Sensor Component Ports

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query for all the elements with ports containing `Sensor` in the `Name` and run the query.

```
constraint = HasPort(contains(Property("Name"),"Sensor"));
sensorComp = find(model,constraint,Recurse=true,IncludeReferenceModels=true)
```

```
sensorComp = 1x1 cell array
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Door Lock Controller'}
```

Input Arguments

`sub-constraint` — Condition restricting the query
query constraint object

Condition restricting the query, specified as a `systemcomposer.query.Constraint` object.

Output Arguments

`query` — Query
query constraint object

Query, returned as a `systemcomposer.query.Constraint` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`createView` | `find` | `systemcomposer.query.Constraint` | `HasInterface` | `HasInterfaceElement`

Topics

"Create Architectural Views Programmatically"
"Modeling System Architecture of Keyless Entry System"

Introduced in R2019b

hasProperty

Package: systemcomposer.arch

Find if element has property

Syntax

```
result = hasProperty(element,property)
```

Description

`result = hasProperty(element,property)` returns `true` if the property `property` has been added on the model element `element`.

Examples

Find Property on Component

Get the `weight` property from a component with the `sysComponent` stereotype applied.

Create a model with a component called `Component`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Create a profile with a stereotype and a property, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("sysProfile");
base = profile.addStereotype("sysComponent");
base.addProperty("weight",Type="double",DefaultValue="10",Units="g");
model.applyProfile("sysProfile")
```

Apply the stereotype to the component, then set a new weight property.

```
applyStereotype(comp,"sysProfile.sysComponent")
setProperty(comp,"sysProfile.sysComponent.weight","5","g")
```

Find if the weight property exists on the component.

```
result = hasProperty(comp,"sysProfile.sysComponent.weight")
```

```
result =

  logical
```

```
1
```

Input Arguments

element — Architectural element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a systemcomposer.arch.Architecture, systemcomposer.arch.Component, systemcomposer.arch.VariantComponent, systemcomposer.arch.ComponentPort, systemcomposer.arch.ArchitecturePort, systemcomposer.arch.Connector, systemcomposer.arch.PhysicalConnector, systemcomposer.interface.DataInterface, systemcomposer.ValueType, systemcomposer.interface.PhysicalInterface, systemcomposer.interface.ServiceInterface, or systemcomposer.arch.Function object.

property — Property
character vector | string

Property, specified as a character vector or string in the form "<profile>.<stereotype>.<property>".

Data Types: char | string

Output Arguments

result — Query result
true or 1 | false or 0

Query result, returned as a logical.

Data Types: logical

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"

Term	Definition	Application	More Information
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also
`addProperty` | `removeProperty` | `hasStereotype`

Topics
"Use Stereotypes and Profiles"

Introduced in R2021a

hasStereotype

Package: `systemcomposer.arch`

Find if element has stereotype applied

Syntax

```
result = hasStereotype(element,stereotype)
```

Description

`result = hasStereotype(element,stereotype)` returns `true` if the stereotype `stereotype` has been applied on the model element `element`.

Examples

Apply Stereotype and Find Applied Stereotypes

Create a model with a component.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Apply the stereotype to the component. Find if the stereotypes are applied on the component.

```
comp.applyStereotype("LatencyProfile.LatencyBase");
result = hasStereotype(comp,"LatencyProfile.LatencyBase")
```

```
result =

  logical

   1
```

Input Arguments

`element` — Architectural element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.ServiceInterface`, or `systemcomposer.arch.Function` object.

`stereotype` — Stereotype
character vector | string | stereotype object

Stereotype, specified as a character vector or string in the form `"<profile>.<stereotype>"` or a `systemcomposer.profile.Stereotype` object.

Data Types: `char` | `string`

Output Arguments

`result` — Query result
`true` or 1 | `false` or 0

Query result, returned as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"

Term	Definition	Application	More Information
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”

Term	Definition	Application	More Information
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also
`removeStereotype` | `applyStereotype` | `hasProperty` | `getStereotypes`

Topics
"Use Stereotypes and Profiles"

Introduced in R2021a

HasStereotype

Package: `systemcomposer.query`

Create query to select architectural elements with stereotype based on specified sub-constraint

Syntax

`query = HasStereotype(sub-constraint)`

Description

`query = HasStereotype(sub-constraint)` creates a query `query` that the `find` and `createView` functions use to select architectural elements with a stereotype that satisfies the given sub-constraint `sub-constraint`.

Examples

Construct Query to Select All Hardware Components

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query for all the hardware components and run the query, displaying one of them.

```
constraint = HasStereotype(IsStereotypeDerivedFrom("AutoProfile.HardwareComponent"));
hwComp = find(model,constraint,Recurse=true,IncludeReferenceModels=true);
comp = hwComp(16)
```

```
comp = 1x1 cell array
    {'KeylessEntryArchitecture/FOB Locator System/Front Receiver'}
```

Input Arguments

`sub-constraint` — Condition restricting the query
query constraint object

Condition restricting the query, specified as a `systemcomposer.query.Constraint` object.

Output Arguments

`query` — Query
query constraint object

Query, returned as a `systemcomposer.query.Constraint` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	“Modeling System Architecture of Keyless Entry System”
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• “Create Architecture Views Interactively” • “Create Architectural Views Programmatically”
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	“Inspect Components in Custom Architecture Views”

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`createView` | `find` | `systemcomposer.query.Constraint` | `IsStereotypeDerivedFrom`

Topics

"Create Architectural Views Programmatically"
"Modeling System Architecture of Keyless Entry System"

Introduced in R2019b

hasValue

Package: systemcomposer.analysis

Find if element instance has property value

Syntax

```
result = hasValue(instance,property)
```

Description

`result = hasValue(instance,property)` queries whether the instance `instance` has the given property `property`.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Query Whether Instance Has Property

Load the small unmanned aerial vehicle (UAV) model, create an architecture instance, and query whether an instance element has a property included.

```
scExampleSmallUAV
model = systemcomposer.loadModel("scExampleSmallUAVModel");
instance = instantiate(model.Architecture,"UAVComponent","NewInstance");
queryResult = hasValue(instance.Components(1).Components(1),...
"UAVComponent.OnboardElement.Mass")
```

```
queryResult = logical
   1
```

Input Arguments

`instance` — Element instance
architecture instance | component instance | port instance | connector instance

Element instance, specified as a `systemcomposer.analysis.ArchitectureInstance`, `systemcomposer.analysis.ComponentInstance`, `systemcomposer.analysis.PortInstance`, or `systemcomposer.analysis.ConnectorInstance` object.

`property` — Property
character vector | string

Property, specified in the form `"<profile>.<stereotype>.<property>"`.

Data Types: `char` | `string`

Output Arguments

`result` — Query result
`true` or 1 | `false` or 0

Query result, returned as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"

Term	Definition	Application	More Information
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`setValue` | `getValue` | `systemcomposer.analysis.Instance`

Topics

"Write Analysis Function"
"Modeling System Architecture of Small UAV"

Introduced in R2019a

systemcomposer.importModel

Import model information from MATLAB tables

Syntax

```
archModel = systemcomposer.importModel(modelName,components,ports,
connections,portInterfaces,requirementLinks)
archModel = systemcomposer.importModel(modelName,importStruct)
[archModel,idMappingTable,importLog,errorLog] = systemcomposer.importModel(
___ )
```

Description

`archModel = systemcomposer.importModel(modelName,components,ports, connections,portInterfaces,requirementLinks)` creates a new architecture model based on MATLAB tables that specify components, ports, connections, port interfaces, and requirement links. The only required input arguments are `modelName` and the `components` table. For empty table input arguments, enter `table.empty`. However, trailing empty tables are ignored and do not need to be entered. To import a basic architecture model, see "Define Basic Architecture". To import `requirementLinks`, you need a Requirements Toolbox license.

`archModel = systemcomposer.importModel(modelName,importStruct)` creates a new architecture model based on a structure of MATLAB tables that have prescribed formats to specify model element relationships, stereotypes, and properties. For more information on the import structure, see "Import and Export Architecture Models".

`[archModel,idMappingTable,importLog,errorLog] = systemcomposer.importModel( ___ )` creates a new architecture model with output arguments `idMappingTable` with table information, `importLog` to display import information, and `errorLog` to display import error information. All previous syntax descriptions are included.

Examples

Import and Export Architectures

In System Composer™, an architecture is fully defined by three sets of information:

- Component information
- Port information
- Connection information

You can import an architecture into System Composer when this information is defined in or converted into MATLAB® tables.

In this example, the architecture information of a simple unmanned aerial vehicle (UAV) system is defined in a Microsoft® Excel® spreadsheet and is used to create a System Composer architecture model. It also links elements to the specified system level requirement. You can modify the files in this example to import architectures defined in external tools, when the data includes the required information. The example also shows how to export this architecture information from System Composer architecture model to an Excel spreadsheet.

Architecture Definition Data

You can characterize the architecture as a network of components and import by defining components, ports, connections, interfaces and requirement links in MATLAB tables. The `components` table must include name, unique ID, and parent component ID for each component. The spreadsheet can also include other relevant information required to construct the architecture hierarchy for referenced model, and stereotype qualifier names. The `ports` table must include port name, direction, component, and port ID information. Port interface information may also be required to assign ports to components. The `connections` table includes information to connect ports. At a minimum, this table must include the connection ID, source port ID, and destination port ID.

The `systemcomposer.importModel(importModelName)` function:

- Reads stereotype names from the `components` table and loads the profiles
- Creates components and attaches ports
- Creates connections using the connection map
- Sets interfaces on ports
- Links elements to specified requirements (requires a Requirements Toolbox™ license)
- Saves referenced models
- Saves the architecture model

Instantiate adapter class to read from Excel.

```
modelName = "simpleUAVArchitecture";
```

`ImportModelFromExcel` function reads the Excel file and creates the MATLAB tables.

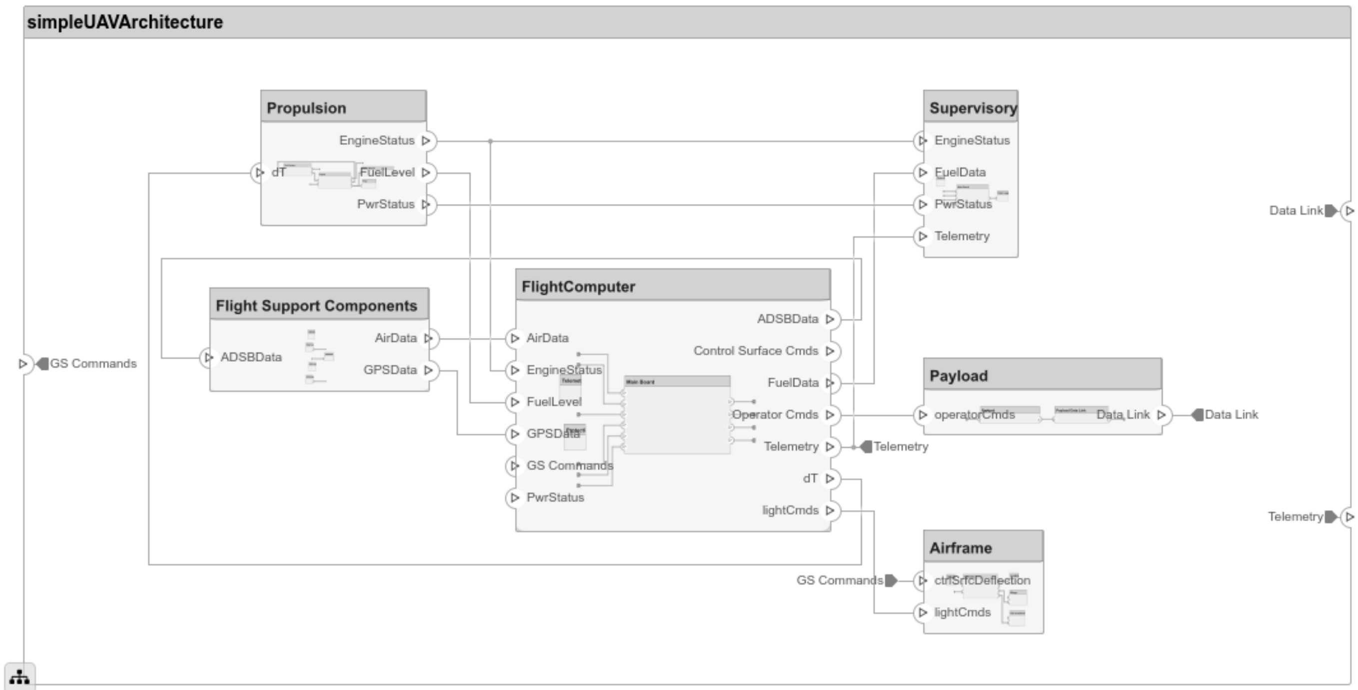
```
importAdapter = ImportModelFromExcel("SmallUAVModel.xls","Components", ...
    "Ports","Connections","PortInterfaces","RequirementLinks");
importAdapter.readTableFromExcel();
```

Import an Architecture

```
model = systemcomposer.importModel(modelName,importAdapter.Components, ...
    importAdapter.Ports,importAdapter.Connections,importAdapter.Interfaces, ...
    importAdapter.RequirementLinks);
```

Auto-arrange blocks in the generated model.

```
Simulink.BlockDiagram.arrangeSystem(modelName)
```



Export an Architecture

You can export an architecture to MATLAB tables and then convert the tables to an external file.

```
exportedSet = systemcomposer.exportModel(modelName);
```

The output of the function is a structure that contains the component table, port table, connection table, the interface table, and the requirement links table. Save this structure to an Excel file.

```
SaveToExcel("ExportedUAVModel",exportedSet);
```

Input Arguments

`modelName` — Name of model

character vector | string

Name of model to be created, specified as a character vector or string.

Example: `'importedModel'`

Data Types: `char` | `string`

`components` — Model component information

MATLAB table

Model component information, specified as a MATLAB table. The component table must include the columns `Name`, `ID`, and `ParentID`. To specify `ComponentType` as `Variant`, `Composition` (default), `StateflowBehavior`, or `Behavior` (reference components and subsystem components) and to set a `ReferenceModelName`, see “Import Variant Components, Stateflow Behaviors, or Reference Components”. To apply stereotypes using `StereotypeNames` and set property values to components, see “Apply Stereotypes and Set Property Values on Imported Model”.

Data Types: `table`

`ports` — Model port information
MATLAB table

Model port information, specified as a MATLAB table. The ports table must include the columns `Name`, `Direction`, `ID`, and `CompID`. The `Direction` column can have values `Input`, `Output`, or `Physical`. The optional column `InterfaceID` specifies the interface. `portInterfaces` information may also be required to assign interfaces to ports.

Data Types: `table`

`connections` — Model connections information
MATLAB table

Model connections information, specified as a MATLAB table. The connections table must include the columns `Name`, `ID`, `SourcePortID`, and `DestPortID`. To specify `SourceElement` or `DestinationElement` on an architecture port, see "Specify Elements on Architecture Port". Assign a stereotype using the optional column `StereotypeNames`. The optional `Kind` column can be specified as the default `Data` or `Physical` for physical connections.

Data Types: `table`

`portInterfaces` — Model port interfaces information
MATLAB table

Model port interfaces information, specified as a MATLAB table. The port interfaces table must include the columns `Name`, `ID`, `ParentID`, `DataType`, `Dimensions`, `Units`, `Complexity`, `Minimum`, and `Maximum`. To import interfaces and map ports to interfaces, see "Import Data Interfaces and Map Ports to Interfaces". Add a description using the option column `Description`. Assign a stereotype using the optional column `StereotypeNames`.

Data Types: `table`

`requirementLinks` — Model requirement links information
MATLAB table

Model requirement links information, specified as a MATLAB table. The requirement links table must include the columns `Label`, `ID`, `SourceID`, `DestinationType`, `DestinationID`, and `Type`. For an example, see "Assign Requirement Links on Imported Model". To update reference requirement links from an imported file and integrate them into the model, see "Update Reference Requirement Links from Imported File" on page 3-695. Optional columns include: `DestinationArifact`, `SourceArtifact`, `ReferencedReqID`, `Keywords`, `CreatedOn`, `CreatedBy`, `ModifiedOn`, `ModifiedBy`, and `Revision`. A Requirements Toolbox license is required to import the `requirementLinks` table to a System Composer architecture model.

Data Types: `table`

`importStruct` — Model tables
structure

Model tables, specified as a structure containing the tables `components`, `ports`, `connections`, `portInterfaces`, and `requirementLinks`, and a field `domain`. Only the `components` table is required. Possible values for `domain` are the default `"System"` for architecture models and `"Software"` for software architecture models. For software architecture models, to import a model with functions, the `importStruct` can have a `functions` field that contains function information.

For more information on the import structure, see “Import and Export Architecture Models”.

Data Types: `struct`

Output Arguments

`archModel` — Handle to architecture model
architecture object

Handle to architecture model, specified as a `systemcomposer.arch.Architecture` object.

`idMappingTable` — Mapping of custom IDs and internal UUIDs of elements
structure

Mapping of custom IDs and internal UUIDs of elements, returned as a `struct` of MATLAB tables.

Data Types: `struct`

`importLog` — Confirmation that elements were imported
cell array of character vectors

Confirmation that elements were imported, returned as a cell array of character vectors.

Data Types: `char`

`errorLog` — Errors reported during import process
cell array of message objects

Errors reported during import process, returned as a cell array of `message` objects. You can obtain the error text by calling the `getString` method on each `message` object. For example, `errorLog.getString` is used to obtain the errors reported as a string.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

Term	Definition	Application	More Information
requirements	Requirements are a collection of statements describing the desired behavior and characteristics of a system. Requirements ensure system design integrity and are achievable, verifiable, unambiguous, and consistent with each other. Each level of design should have appropriate requirements.	To enhance traceability of requirements, link system, functional, customer, performance, or design requirements to components and ports. Link requirements to each other to represent derived or allocated requirements. Manage requirements from the Requirements Manager on an architecture model or through custom views. Assign test cases to requirements using the **Test Manager** for verification and validation.	“Link and Trace Requirements”

Term	Definition	Application	More Information
requirement set	A requirement set is a collection of requirements. You can structure the requirements hierarchically and link them to components or ports.	Use the **Requirements Editor** to edit and refine requirements in a requirement set. Requirement sets are stored in `SLREQX` files. You can create a new requirement set and author requirements using Requirements Toolbox, or import requirements from supported third-party tools.	"Manage Requirements"
requirement link	A link is an object that relates two model-based design elements. A requirement link is a link where the destination is a requirement. You can link requirements to components or ports.	View links using the Requirements Perspective in System Composer. Select a requirement in the Requirements Browser to highlight the component or the port to which the requirement is assigned. Links are stored externally as `SLMX` files.	• "Create Architecture Model with Interfaces and Requirement Links" • "Update Reference Requirement Links from Imported File" on page 3-695
test harness	A test harness is a model that isolates the component under test with inputs, outputs, and verification blocks configured for testing scenarios. You can create a test harness for a model component or for a full model. A test harness gives you a separate testing environment for a model or a model component.	Create a test harness for a System Composer component to validate simulation results and verify design. The **Interface Editor** is accessible in System Composer test harness models to enable behavior testing and implementation-independent interface testing.	• "Verify and Validate Requirements Using Test Harnesses" • "Create a Test Harness" (Simulink Test)

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"

Term	Definition	Application	More Information
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	“Specify Physical Interfaces on Ports”
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	“Describe Component Behavior Using Simscape”

See Also

`exportModel` | `systemcomposer.updateLinksToReferenceRequirements` | Component | Variant Component | Reference Component

Topics

“Import and Export Architecture Models”

Introduced in R2019a

increaseExecutionOrder

Package: `systemcomposer.arch`

Change function execution order to later

Syntax

`increaseExecutionOrder(functionObj)`

Description

`increaseExecutionOrder(functionObj)` increases execution order of the specified function `functionObj` by 1. If the function is at the maximum execution order, the `increaseExecutionOrder` method will fail with a warning.

Examples

Change Execution Order of Software Functions

This example shows the software architecture of a throttle position control system and how to schedule the execution order of the root level functions.

```
model = systemcomposer.openModel("ThrottleControlComposition");
```

Simulate the model to populate it with functions.

```
sim("ThrottleControlComposition");
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'Controller_run_5ms'    }
    {'TPS_Primary_read_5ms'  }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

Decrease the execution order of the third function.

```
decreaseExecutionOrder(model.Architecture.Functions(3))
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'TPS_Primary_read_5ms'  }
```

```
    {'Controller_run_5ms'    }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

The third function is now moved up in execution order, executing earlier.

Increase the execution order of the second function.

```
increaseExecutionOrder(model.Architecture.Functions(2))
```

View the function names ordered by execution order.

```
functions = {model.Architecture.Functions.Name}'
```

```
functions = 6x1 cell
    {'Actuator_output_5ms'   }
    {'Controller_run_5ms'    }
    {'TPS_Primary_read_5ms'  }
    {'TPS_Secondary_read_5ms'}
    {'TP_Monitor_D1'         }
    {'APP_Sensor_read_10ms'  }
```

The second function is now moved down in execution order, executing later.

Input Arguments

`functionObj` — Function
function object

Function, specified as a `systemcomposer.arch.Function` object.

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• “Author Software Architectures” • “Simulate and Deploy Software Architectures”

Term	Definition	Application	More Information
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

See Also

`systemcomposer.createModel` | `createArchitectureModel` | `decreaseExecutionOrder`

Topics

"Modeling the Software Architecture of a Throttle Position Control System"
"Simulate and Deploy Software Architectures"
"Author Software Architectures"

Introduced in R2021b

inlineComponent

Package: systemcomposer.arch

Remove reference architecture or behavior from component

Syntax

```
componentObj = inlineComponent(component,inlineFlag)
```

Description

componentObj = inlineComponent(component,inlineFlag) retains the contents of the architecture model referenced by the specified component and breaks the link to the reference model. If inlineFlag is set to 0 (false), then the contents of the architecture model are removed and only interfaces remain. You can also use inlineComponent to remove Stateflow chart and Simulink behaviors from a component or to remove Simulink model or subsystem behaviors referenced by a component.

Examples

Reuse Component and Remove Architecture Reference

Save the component robotComp in the architecture model Robot.slx and reference it from another component, electricComp, so that the electricComp component uses the architecture of the robotComp component. Remove the architecture reference from the robotComp component so that its architecture can be edited independently.

Create a model archModel.slx.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components to the model with the names "electricComp" and "robotComp".

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
```

Save the robotComp component in the Robot.slx model so the component references the model.

```
saveAsModel(comp(2),"Robot");
```

Link the electricComp component to the same model Robot.slx so it uses the architecture of the original robotComp component and references the architecture model Robot.slx.

```
linkToModel(comp(1),"Robot");
```

Remove the architecture reference from the robotComp component while retaining the contents, so that its architecture can be edited independently, breaking the link to the referenced model.

```
inlineComponent(comp(2),true);
```

Clean up the model.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Add Stateflow Behavior to Component and Remove

Add a Stateflow chart behavior to the component named `robotComp` within the current model. Then, remove the behavior.

Create a model `archModel.slx`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components to the model with the names `"electricComp"` and `"robotComp"`.

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
```

Add Stateflow chart behavior model to the `robotComp` component.

```
createStateflowChartBehavior(comp(2));
```

Remove Stateflow chart behavior from the `robotComp` component and remove all contents of the Stateflow chart.

```
inlineComponent(comp(2),false);
```

Clean up the model.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Input Arguments

`component` — Component
component object

Component linked to an architecture model, specified as a `systemcomposer.arch.Component` object.

`inlineFlag` — Control of contents of component
`true` or 1 | `false` or 0

Control of contents of component, specified as a logical 1 (`true`) if contents of the referenced architecture model are copied to the component architecture and 0 (`false`) if the contents are not copied and only ports and interfaces are preserved.

Data Types: `logical`

Output Arguments

`componentObj` — Component
component object

Component with referenced architecture or behavior removed, returned as a `systemcomposer.arch.Component` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"

Term	Definition	Application	More Information
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`createSimulinkBehavior` | `createArchitectureModel` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `isReference` | Reference Component

Topics

"Describe Component Behavior Using Simulink"
"Decompose and Reuse Components"
"Describe Component Behavior Using Stateflow Charts"
"Create Simulink Subsystem Behavior Using Subsystem Component"
"Simulate and Deploy Software Architectures"

Introduced in R2019a

instantiate

Package: systemcomposer.arch

Create analysis instance from specification

Syntax

```
instance = instantiate(model,properties,name)
instance = instantiate(model,profile,name)
instance = instantiate( ___ ,Name,Value)
```

Description

`instance = instantiate(model,properties,name)` creates an instance `instance` named `name` of a model architecture `model` with properties `properties` for analysis.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

`instance = instantiate(model,profile,name)` creates an instance `instance` named `name` of a model architecture `model` with all stereotypes in a profile `profile` for analysis.

`instance = instantiate( ___ ,Name,Value)` creates an instance of a model architecture for analysis with additional arguments.

Examples

Instantiate All Properties of Stereotypes in Profile

Instantiate all properties of stereotypes in a profile that will be applied to specific elements during instantiation.

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
```

```
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Create a new model and apply the profile to the model.

```
model = systemcomposer.createModel("archModel",true);
model.applyProfile("LatencyProfile");
```

Specify type of elements each stereotype can be applied on.

```
NodeLatency = struct("elementKinds",["Component"]);
ConnectorLatency = struct("elementKinds",["Connector"]);
LatencyBase = struct("elementKinds",["Connector","Port","Component"]);
PortLatency = struct("elementKinds",["Port"]);
```

Create the analysis structure.

```
LatencyAnalysis = struct("NodeLatency",NodeLatency, ...
                "ConnectorLatency",ConnectorLatency, ...
                "PortLatency",PortLatency, ...
                "LatencyBase",LatencyBase);
```

Create the properties structure.

```
properties = struct("LatencyProfile",LatencyAnalysis);
```

Instantiate all properties of stereotypes in the profile.

```
instance = instantiate(model.Architecture,properties,"NewInstance")
```

Instantiate Specific Properties of Stereotypes in Profile

Instantiate specific properties of stereotypes in a profile that will be applied to specific elements during instantiation.

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Create a new model and apply the profile to the model.

```
model = systemcomposer.createModel("archModel",true);
model.applyProfile("LatencyProfile");
```

Specify some properties of the stereotypes in the profile.

```
NodeLatency = struct("elementKinds",["Component"], ...
                "properties",struct("resources",true));
ConnectorLatency = struct("elementKinds",["Connector"], ...
                "properties",struct("secure",true,"linkDistance",true));
LatencyBase = struct("elementKinds",[], ...
                "properties",struct("dataRate",true,"latency",false));
PortLatency = struct('elementKinds',["Port"], ...
                "properties",struct("queueDepth",true));

LatencyAnalysis = struct("NodeLatency",NodeLatency, ...
                "ConnectorLatency",ConnectorLatency, ...
                "PortLatency",PortLatency, ...
                "LatencyBase",LatencyBase);
```

Create the properties structure.

```
properties = struct("LatencyProfile",LatencyAnalysis);
```

Instantiate some properties of stereotypes in the profile.

```
instance = instantiate(model.Architecture,properties,"NewInstance")
```

Instantiate All Stereotypes in Profile

Instantiate all stereotypes already in a profile that will be applied to elements during instantiation.

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Create a new model and apply the profile to the model.

```
model = systemcomposer.createModel("archModel",true);
model.applyProfile("LatencyProfile");
```

Instantiate all stereotypes in a profile.

```
instance = instantiate(model.Architecture,"LatencyProfile","NewInstance")
```

Analyze Latency Characteristics

Create an instantiation for analysis for a system with latency in its wiring. The materials used are copper, fiber, and WiFi.

Create Latency Profile with Stereotypes and Properties

Create a System Composer profile with a base, connector, component, and port stereotype. Add properties with default values to each stereotype as needed for analysis.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfileC");
```

Add a base stereotype with properties.

```
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
```

Add a connector stereotype with properties.

```
connLatency = profile.addStereotype("ConnectorLatency",...
    Parent="LatencyProfileC.LatencyBase");
connLatency.addProperty("secure",Type="boolean",DefaultValue="true");
connLatency.addProperty("linkDistance",Type="double");
```

Add a component stereotype with properties.

```
nodeLatency = profile.addStereotype("NodeLatency",...
    Parent="LatencyProfileC.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");
```

Add a port stereotype with properties.

```
portLatency = profile.addStereotype("PortLatency",...
    Parent="LatencyProfileC.LatencyBase");
portLatency.addProperty("queueDepth",Type="double",DefaultValue="4.29");
portLatency.addProperty("dummy",Type="int32");
```

Instantiate Using Analysis Function

Create a new model and apply the profile. Create components, ports, and connections in the model. Apply stereotypes to the model elements. Finally, instantiate using the analysis function.

```
model = systemcomposer.createModel("archModel",true);
arch = model.Architecture;
```

Apply profile to model.

```
model.applyProfile("LatencyProfileC");
```

Create components, ports, and connections.

```
componentSensor = addComponent(arch,"Sensor");
sensorPorts = addPort(componentSensor.Architecture,{'MotionData','SensorPower'},{'in','out'});

componentPlanning = addComponent(arch,"Planning");
planningPorts = addPort(componentPlanning.Architecture,{'Command','SensorPower','MotionCommand'}
componentMotion = addComponent(arch,"Motion");
motionPorts = addPort(componentMotion.Architecture,{'MotionCommand','MotionData'},{'in','out'});
```

```
c_sensorData = connect(arch,componentSensor,componentPlanning);
c_motionData = connect(arch,componentMotion,componentSensor);
c_motionCommand = connect(arch,componentPlanning,componentMotion);
```

Clean up the canvas.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Batch apply stereotypes to model elements.

```
batchApplyStereotype(arch,"Component","LatencyProfileC.NodeLatency");
batchApplyStereotype(arch,"Port","LatencyProfileC.PortLatency");
batchApplyStereotype(arch,"Connector","LatencyProfileC.ConnectorLatency");
```

Instantiate using the analysis function.

```
instance = instantiate(model.Architecture,"LatencyProfileC","NewInstance",...
    Function=@calculateLatency,Arguments="3", ...
    Strict=true,NormalizeUnits=false,Direction="PreOrder")
```

```
instance = 
  ArchitectureInstance with properties:

        Specification: [1x1 systemcomposer.arch.Architecture]
             IsStrict: 1
       NormalizeUnits: 0
     AnalysisFunction: @calculateLatency
    AnalysisDirection: PreOrder
    AnalysisArguments: '3'
      ImmediateUpdate: 0
           Components: [1x3 systemcomposer.analysis.ComponentInstance]
                Ports: [0x0 systemcomposer.analysis.PortInstance]
           Connectors: [1x3 systemcomposer.analysis.ConnectorInstance]
                 Name: 'NewInstance'
```

Inspect Component, Port, and Connector Instances

Get properties from component, port, and connector instances.

```
defaultResources = instance.Components(1).getValue("LatencyProfileC.NodeLatency.resources")
```

```
defaultResources = 1
```

```
defaultSecure = instance.Connectors(1).getValue("LatencyProfileC.ConnectorLatency.secure")
```

```
defaultSecure = logical
   1
```

```
defaultQueueDepth = instance.Components(1).Ports(1).getValue("LatencyProfileC.PortLatency.queueDe
```

```
defaultQueueDepth = 4.2900
```

Input Arguments

model — Model architecture
architecture object

Model architecture from which instance is generated, specified as a `systemcomposer.arch.Architecture` object.

Example: `model.Architecture`

`properties` — Stereotype properties
structure

Stereotype properties, specified as a structure containing profile, stereotype, and property information. Use `properties` to specify which stereotypes and properties need to be instantiated.

Data Types: `struct`

`name` — Name of instance
character vector | string

Name of instance generated from the model, specified as a character vector or string.

Example: `"NewInstance"`

Data Types: `char` | `string`

`profile` — Profile name
character vector | string

Profile name, specified as a character vector or string.

Example: `'LatencyProfile'`

Data Types: `char` | `string`

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example:

```
instantiate(model.Architecture,"LatencyProfile","NewInstance",Function=@calcu
lateLatency,Arguments="3",Strict=true,NormalizeUnits=false,Direction="PreOrde
r")
```

`NormalizeUnits` — Whether to normalize value based on units
`false` or 0 (default) | `true` or 1

Whether to normalize value based on units, if any, specified in property definition upon instantiation, specified as a logical.

Example:

```
instantiate(model.Architecture,'LatencyProfile','NewInstance','NormalizeUnits
',true)
```

Data Types: `logical`

`Function` — Analysis function
function handle

Analysis function, specified as the MATLAB function handle to be executed when analysis is run.

`Arguments` — Analysis arguments
cell array of character vectors | array of strings | character vector | string

Analysis arguments, specified as a character vector, string, array of strings, or a cell array of character vectors of optional arguments to the analysis function.

Data Types: `char` | `string`

`Direction` — Iteration type
`"PreOrder"` | `"PostOrder"` | `"TopDown"` | `"BottomUp"`

Iteration type, specified as `"PreOrder"`, `"PostOrder"`, `"TopDown"`, or `"BottomUp"`.

- `Pre-order` — Start from the top level, move to a child component, and process the subcomponents of that component recursively before moving to a sibling component.
- `Top-Down` — Like pre-order, but process all sibling components before moving to their subcomponents.
- `Post-order` — Start from components with no subcomponents, process each sibling, and then move to parent.
- `Bottom-up` — Like post-order, but process all subcomponents at the same depth before moving to their parents.

Data Types: `char` | `string`

`Strict` — Condition for instances getting properties
`false` or 0 (default) | `true` or 1

Condition for instances getting properties only if the specification of the instance has the stereotype applied, specified as a logical.

Data Types: `logical`

Output Arguments

`instance` — Architecture instance
architecture instance object

Architecture instance, returned as a `systemcomposer.analysis.ArchitectureInstance` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

See Also

`systemcomposer.analysis.Instance` | `deleteInstance` | `loadInstance` | `save` | `update` | `iterate`

Topics
"Write Analysis Function"

Introduced in R2019a

isArchitecture

Package: systemcomposer.analysis

Find if instance is architecture instance

Syntax

flag = isArchitecture(instance)

Description

flag = isArchitecture(instance) finds whether the instance specified as instance is an architecture instance.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The instance refers to the element instance on which the iteration is being performed.

Examples

Query Architecture Instance

Load the small unmanned aerial vehicle (UAV) model, create an architecture instance, and query whether the instance is an architecture instance.

```
scExampleSmallUAV
model = systemcomposer.loadModel("scExampleSmallUAVModel");
instance = instantiate(model.Architecture,"UAVComponent","NewInstance");
flag = isArchitecture(instance)
```

```
flag = logical
   1
```

Input Arguments

instance — Element instance
architecture instance | component instance | port instance | connector instance

Element instance, specified as a systemcomposer.analysis.ArchitectureInstance, systemcomposer.analysis.ComponentInstance, systemcomposer.analysis.PortInstance, or systemcomposer.analysis.ConnectorInstance object.

Output Arguments

flag — Whether instance is architecture instance
true or 1 | false or 0

Whether instance is architecture instance `systemcomposer.analysis.ArchitectureInstance`, returned as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`systemcomposer.analysis.Instance` | `isComponent` | `isConnector` | `isPort`

Topics

"Write Analysis Function"
"Modeling System Architecture of Small UAV"

Introduced in R2019a

isComponent

Package: `systemcomposer.analysis`

Find if instance is component instance

Syntax

`flag = isComponent(instance)`

Description

`flag = isComponent(instance)` finds whether the instance specified by `instance` is a component instance.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Query Component Instance

Load the small unmanned aerial vehicle (UAV) model, create an architecture instance, and query whether the instance modified by the `Components` property is a component instance.

```
scExampleSmallUAV
model = systemcomposer.loadModel("scExampleSmallUAVModel");
instance = instantiate(model.Architecture,"UAVComponent","NewInstance");
flag = isComponent(instance.Components(1))
```

```
flag = logical
   1
```

Input Arguments

`instance` — Element instance
architecture instance | component instance | port instance | connector instance

Element instance, specified as a `systemcomposer.analysis.ArchitectureInstance`, `systemcomposer.analysis.ComponentInstance`, `systemcomposer.analysis.PortInstance`, or `systemcomposer.analysis.ConnectorInstance` object.

Output Arguments

`flag` — Whether instance is component instance
`true` or 1 | `false` or 0

Whether instance is component instance `systemcomposer.analysis.ComponentInstance`, returned as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`isArchitecture` | `isConnector` | `isPort` | `systemcomposer.analysis.Instance`

Topics

"Write Analysis Function"
"Modeling System Architecture of Small UAV"

Introduced in R2019a

isConnector

Package: `systemcomposer.analysis`

Find if instance is connector instance

Syntax

`flag = isConnector(instance)`

Description

`flag = isConnector(instance)` finds whether the instance specified by `instance` is a connector instance.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Query Connector Instance

Load the small unmanned aerial vehicle (UAV) model, create an architecture instance, and query whether the instance modified by the `Connectors` property is a connector instance.

```
scExampleSmallUAV
model = systemcomposer.loadModel("scExampleSmallUAVModel");
instance = instantiate(model.Architecture,"UAVComponent","NewInstance");
flag = isConnector(instance.Connectors(1))
```

```
flag = logical
   1
```

Input Arguments

`instance` — Element instance

architecture instance | component instance | port instance | connector instance

Element instance, specified as a `systemcomposer.analysis.ArchitectureInstance`, `systemcomposer.analysis.ComponentInstance`, `systemcomposer.analysis.PortInstance`, or `systemcomposer.analysis.ConnectorInstance` object.

Output Arguments

`flag` — Whether instance is connector instance

`true` or 1 | `false` or 0

Whether instance is connector instance `systemcomposer.analysis.ConnectorInstance`, returned as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`systemcomposer.analysis.Instance` | `isArchitecture` | `isComponent` | `isPort`

Topics

"Write Analysis Function"
"Modeling System Architecture of Small UAV"

Introduced in R2019a

IsInRange

Package: systemcomposer.query

Create query to select range of property values

Syntax

```
query = IsInRange(name,beginRangeValue,endRangeValue)
```

Description

`query = IsInRange(name,beginRangeValue,endRangeValue)` creates a query `query` that the `find` and `createView` functions use to select a range of values from `beginRangeValue` to `endRangeValue` for a specified property name `name`.

Examples

Find Model Elements that Satisfy Property Range

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query to find components with values from `10 ms` to `40 ms` for the `Latency` property.

```
constraint = IsInRange(PropertyValue("AutoProfile.BaseComponent.Latency"),...
Value(10,"ms"),Value(40,"ms"));
latency = find(model,constraint,Recurse=true,IncludeReferenceModels=true)
```

```
latency = 5x1 cell
    {'KeylessEntryArchitecture/Sound System/Dashboard Speaker'                      }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Driver Door Lock Actuator'}
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Pass Door Lock Actuator'  }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Driver Door Lock Actuator' }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Pass Door Lock Actuator'   }
```

Input Arguments

name — Property name
character vector | string

Property name for model element, specified in the form "<profile>.<stereotype>.<property>" or any property on the designated class.

Example: "Name"

Example: "AutoProfile.BaseComponent.Latency"

Data Types: char

beginRangeValue — Beginning range value
value object

Beginning range value for propertyName, specified as a systemcomposer.query.Value object.

Example: Value(20)

Example: Value(5,"ms")

endRangeValue — Ending range value
value object

Ending range value for propertyName, specified as a systemcomposer.query.Value object.

Example: Value(100)

Example: Value(20,"ms")

Output Arguments

query — Query
query constraint object

Query, returned as a systemcomposer.query.Constraint object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`createView` | `find` | `systemcomposer.query.Constraint`

Topics

"Create Architectural Views Programmatically"
"Modeling System Architecture of Keyless Entry System"

Introduced in R2019b

isPort

Package: `systemcomposer.analysis`

Find if instance is port instance

Syntax

`flag = isPort(instance)`

Description

`flag = isPort(instance)` finds whether the instance specified by `instance` is a port instance.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Query Port Instance

Load the small unmanned aerial vehicle (UAV) model, create an architecture instance, and query whether the instance modified by the `Ports` property is a port instance.

```
scExampleSmallUAV
model = systemcomposer.loadModel("scExampleSmallUAVModel");
instance = instantiate(model.Architecture,"UAVComponent","NewInstance");
flag = isPort(instance.Ports(1))

flag = logical
   1
```

Input Arguments

`instance` — Element instance
architecture instance | component instance | port instance | connector instance

Element instance, specified as a `systemcomposer.analysis.ArchitectureInstance`, `systemcomposer.analysis.ComponentInstance`, `systemcomposer.analysis.PortInstance`, or `systemcomposer.analysis.ConnectorInstance` object.

`flag` — Whether instance is port instance
`true` or 1 | `false` or 0

Whether instance is port instance `systemcomposer.analysis.PortInstance`, returned as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• “Analyze Architecture Model with Analysis Function” • “Analyze Architecture”
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• “Analysis Function Constructs” • “Write Analysis Function”
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	“Run Analysis Function”
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	“Create a Model Instance for Analysis”

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`isArchitecture` | `isComponent` | `isConnector` | `systemcomposer.analysis.Instance`

Topics

"Write Analysis Function"
"Modeling System Architecture of Small UAV"

Introduced in R2019a

isProtected

Package: `systemcomposer.arch`

Find if component reference model is protected

Syntax

`flag = isProtected(compObj)`

Description

`flag = isProtected(compObj)` returns whether or not the referenced model on the component is protected. A protected model is saved with an `SLXP` extension.

Examples

Find If Component Reference Model is Protected

Find whether or not the referenced model on the component is protected.

Create a new System Composer model and add a new component.

```
model = systemcomposer.createModel("archModel");
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
```

Create new Simulink reference model and save.

```
newRef = new_system("newReference","Model");
save_system(newRef);
```

Protect the Simulink model reference.

```
Simulink.ModelReference.protect(newRef);
```

Link the Simulink model to the component `newComponent`.

```
linkToModel(newComponent,"newReference.slxp");
```

Verify that the reference model linked to the component is protected.

```
flag = isProtected(newComponent)
```

```
flag =

  logical

   1
```

Input Arguments

`compObj` — Component
component object | variant component object

Component, specified as a `systemcomposer.arch.Component` or `systemcomposer.arch.VariantComponent` object.

Output Arguments

`flag` — Whether referenced model on component is protected
`true` or 1 | `false` or 0

Whether referenced model on component is protected, returned as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`inlineComponent` | `createSimulinkBehavior` | `createArchitectureModel` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `linkToModel` | `isReference` | Reference Component

Topics

"Describe Component Behavior Using Simulink"
"Decompose and Reuse Components"
"Describe Component Behavior Using Stateflow Charts"
"Create Simulink Subsystem Behavior Using Subsystem Component"
"Simulate and Deploy Software Architectures"

Introduced in R2021b

isReference

Package: systemcomposer.arch

Find if component is referenced to another model

Syntax

`flag = isReference(compObj)`

Description

`flag = isReference(compObj)` returns whether or not the component is a reference to another model.

Examples

Find If Component Is Reference

Find whether or not the component is a reference to another model.

This component is not a reference.

```
model = systemcomposer.createModel("archModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
flag = isReference(newComponent)
```

```
flag =

  logical

   0
```

This component is a reference.

```
model = systemcomposer.createModel("archModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
createSimulinkBehavior(newComponent,"newModel");
flag = isReference(newComponent)
```

```
flag =

  logical

   1
```

Input Arguments

`compObj` — Component
component object | variant component object

Component, specified as a `systemcomposer.arch.Component` or `systemcomposer.arch.VariantComponent` object.

Output Arguments

`flag` — Whether component is reference

`true` or 1 | `false` or 0

Whether component is reference, returned as a logical.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• “Implement Behaviors for Architecture Model Simulation” • “Describe Component Behavior Using Stateflow Charts”

See Also

`inlineComponent` | `createSimulinkBehavior` | `createArchitectureModel` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `linkToModel` | Reference Component

Topics

“Describe Component Behavior Using Simulink”
“Decompose and Reuse Components”
“Describe Component Behavior Using Stateflow Charts”
“Create Simulink Subsystem Behavior Using Subsystem Component”
“Simulate and Deploy Software Architectures”

Introduced in R2019a

IsStereotypeDerivedFrom

Package: `systemcomposer.query`

Create query to select stereotype derived from qualified name

Syntax

```
query = IsStereotypeDerivedFrom(name)
```

Description

`query = IsStereotypeDerivedFrom(name)` creates a query `query` that the `find` and `createView` functions use to select a stereotype from the qualified name `name`.

Examples

Construct Query to Select All Hardware Components

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query for all the hardware components and run the query, displaying one of them.

```
constraint = HasStereotype(IsStereotypeDerivedFrom("AutoProfile.HardwareComponent"));
hwComp = find(model,constraint,Recurse=true,IncludeReferenceModels=true);
comp = hwComp(16)
```

```
comp = 1x1 cell array
    {'KeylessEntryArchitecture/FOB Locator System/Front Receiver'}
```

Input Arguments

name — Stereotype name
character vector | string

Stereotype name, specified in the form `"<profile>.<stereotype>"`.

Example: `"AutoProfile.BaseComponent"`

Data Types: `char` | `string`

Output Arguments

query — Query
query constraint object

Query, returned as a `systemcomposer.query.Constraint` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`createView` | `find` | `systemcomposer.query.Constraint` | `HasStereotype`

Topics

"Create Architectural Views Programmatically"
"Modeling System Architecture of Keyless Entry System"

Introduced in R2019b

iterate

Package: systemcomposer.arch

Iterate over model elements

Syntax

```
iterate(architecture,iterType,iterFunction)
iterate( ___ ,Name,Value)
iterate( ___ ,additionalArgs)
```

Description

`iterate(architecture,iterType,iterFunction)` iterates over components in the architecture `architecture` in the order specified by `iterType` and invokes the function specified by the function handle `iterFunction` on each component.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

`iterate( ___ ,Name,Value)` iterates over components in the architecture, with additional options.

`iterate( ___ ,additionalArgs)` passes all trailing arguments, specified as `additionalArgs`, as arguments to `iterFunction`.

Examples

Compute Battery Capacity

For more information on the battery sizing example, see “Battery Sizing and Automotive Electrical System Analysis”.

```
openExample("systemcomposer/BatterySizingAndAutomotiveAnalysisExample")
archModel = systemcomposer.openModel("scExampleAutomotiveElectricalSystemAnalysis");
% Instantiate battery sizing class used by analysis function to store
% analysis results.
objcomputeBatterySizing = computeBatterySizing;
% Run the analysis using the iterator
iterate(archModel,"TopDown",@computeLoad,objcomputeBatterySizing);
```

Input Arguments

architecture — Architecture over which to iterate

architecture object | architecture instance object

Architecture over which to iterate, specified as an `systemcomposer.arch.Architecture` or `systemcomposer.analysis.ArchitectureInstance` object.

iterType — Iteration type
"PreOrder" | "PostOrder" | "TopDown" | "BottomUp"

Iteration type, specified as "PreOrder", "PostOrder", "TopDown", or "BottomUp".

- Pre-order — Start from the top level, move to a child component, and process the subcomponents of that component recursively before moving to a sibling component.
- Top-Down — Like pre-order, but process all sibling components before moving to their subcomponents.
- Post-order — Start from components with no subcomponents, process each sibling, and then move to parent.
- Bottom-up — Like post-order, but process all subcomponents at the same depth before moving to their parents.

Data Types: char | string

iterFunction — Iteration function
function handle

Iteration function, specified as a function handle to be iterated on each component.

additionalArgs — Additional function arguments
comma-separated list of function arguments

Additional function arguments, specified as a comma-separated list of arguments to be passed to iterFunction.

Name-Value Arguments

Specify optional pairs of arguments as Name1=Value1,...,NameN=ValueN, where Name is the argument name and Value is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose Name *in quotes.*

Example:
iterate(archModel,'Topdown',@computeLoad,objcomputeBatterySizing,Recurse=true
)

Recurse — Option to recursively iterate through model components
true or 1 (default) | false or 0

Option to recursively iterate through model components, specified as a logical 1 (true) to recursively iterate or 0 (false) to iterate over components only in this architecture and not navigate into the architectures of child components.

Recurse does not apply to a systemcomposer.analysis.ArchitectureInstance object. The architecture model is flattened.

Data Types: logical

IncludePorts — Option to iterate over components and architecture ports
false or 0 (default) | true or 1

Option to iterate over components and architecture ports, specified as a logical 0 (`false`) to only iterate over components or 1 (`true`) to iterate over components and architecture ports.

Data Types: `logical`

`IncludeConnectors` — Option to iterate over components and connectors
`false` or 0 (default) | `true` or 1

Option to iterate over components and connectors, specified as a logical 0 (`false`) to only iterate over components or 1 (`true`) to iterate over components and connectors.

Data Types: `logical`

`FollowConnectivity` — Option to ensure iteration order
`false` or 0 (default) | `true` or 1

Option to ensure iteration order according to how components are connected from source to destination, specified as a logical 0 (`false`) or 1 (`true`). If this option is specified as 1 (`true`), iteration type has to be either `'TopDown'` or `'BottomUp'`. If any other option is specified, iteration defaults to `'TopDown'`.

`'FollowConnectivity'` does not apply to a `systemcomposer.analysis.ArchitectureInstance` object.

Data Types: `logical`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

See Also
`instantiate` | `lookup` | `systemcomposer.analysis.Instance`

Topics

"Analyze Architecture"

Introduced in R2019a

linkDictionary

Package: `systemcomposer.arch`

Link data dictionary to architecture model

Syntax

`linkDictionary(model,dictionaryFile)`

Description

`linkDictionary(model,dictionaryFile)` associates the specified Simulink data dictionary with the model. The model cannot have locally defined interfaces.

Examples

Link Data Dictionary

Link a data dictionary to a model.

```
model = systemcomposer.createModel("newModel",true);
dictionary = systemcomposer.createDictionary("newDictionary.sldd");
linkDictionary(model,"newDictionary.sldd");
save(dictionary);
save(model);
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

`dictionaryFile` — Dictionary file name
character vector | string

Dictionary file name with the `.sldd` extension, specified as a character vector or string. If a dictionary with this name does not exist, one will be created.

Example: `"dict_name.sldd"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`createDictionary` | `saveToDictionary` | `unlinkDictionary` | `openDictionary` | `addReference` | `removeReference`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

linkToModel

Package: systemcomposer.arch

Link component to model

Syntax

```
modelHandle = linkToModel(component,modelName)
modelHandle = linkToModel(component,modelFileName)
```

Description

`modelHandle = linkToModel(component,modelName)` links from the component to a model or subsystem.

`modelHandle = linkToModel(component,modelFileName)` links from the component to a model or subsystem defined by its full file name with an SLX or SLXP extension.

Examples

Reuse Component

Save the component named `robotComp` in the architecture model `Robot.slx` and reference it from another component named `electricComp` so that the component `electricComp` uses the architecture of the component `robotComp`.

Create a model `archModel.slx`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
```

Add two components to the model with the names `electricComp` and `robotComp`.

```
names = ["electricComp","robotComp"];
comp = addComponent(arch,names);
```

Save `robotComp` in the `Robot.slx` model so the component references the model.

```
saveAsModel(comp(2),"Robot");
```

Link the `electricComp` component to the same model `Robot.slx` so it uses the architecture of the original `robotComp` component and references the architecture model `Robot.slx`.

```
linkToModel(comp(1),"Robot");
```

Clean up the model.

```
Simulink.BlockDiagram.arrangeSystem("archModel");
```

Input Arguments

`component` — Component
component object

Component with no sub-components, specified as a `systemcomposer.arch.Component` object.

`modelName` — Model or subsystem name
character vector | string

Model or subsystem name for an existing model or subsystem that defines the architecture or behavior of the component, specified as a character vector or string. Models or subsystems of the same name prioritize protected models with the `SLXP` extension.

Example: `"Robot"`

Data Types: `char` | `string`

`modelFileName` — Model or subsystem file name
character vector | string

Model or subsystem file name for an existing model or subsystem that defines the architecture or behavior of the component, specified as a character vector or string.

Example: `"Model.slx"`

Example: `"ProtectedModel.slxp"`

Data Types: `char` | `string`

Output Arguments

`modelHandle` — Handle to linked model or subsystem
numeric value

Handle to linked model or subsystem, returned as a numeric value.

Data Types: `double`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"

Term	Definition	Application	More Information
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	“Use Parameters to Store Instance Values with Components”
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• “Create Simulink Subsystem Behavior Using Subsystem Component” • “Create Simulink Subsystem Component”
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• “Implement Behaviors for Architecture Model Simulation” • “Describe Component Behavior Using Stateflow Charts”

See Also

`inlineComponent` | `createSimulinkBehavior` | `createArchitectureModel` | `createStateflowChartBehavior` | `extractArchitectureFromSimulink` | `isReference` | Reference Component

Topics

“Describe Component Behavior Using Simulink”
“Decompose and Reuse Components”
“Describe Component Behavior Using Stateflow Charts”
“Create Simulink Subsystem Behavior Using Subsystem Component”
“Simulate and Deploy Software Architectures”

Introduced in R2019a

systemcomposer.allocation.load

Load allocation set

Syntax

`allocSet = systemcomposer.allocation.load(name)`

Description

`allocSet = systemcomposer.allocation.load(name)` loads the allocation set with the given name, if it exists on the MATLAB path.

Examples

Load Allocation Set and Open in Allocation Editor

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Save the allocation set.

```
allocSet.save
```

Close the allocation set.

```
allocSet.close
```

Load the allocation set `MyNewAllocation.mldatx`.

```
allocSet = systemcomposer.allocation.load("MyNewAllocation");
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

`name` — Name of allocation set
character vector | string

Name of allocation set, specified as a character vector or string.

Example: `"MyNewAllocation"`

Data Types: `char` | `string`

Output Arguments

`allocSet` — Allocation set
allocation set object

Allocation set, returned as a `systemcomposer.allocation.AllocationSet` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`createAllocationSet` | `open` | `closeAll`

Topics
“Create and Manage Allocations”

Introduced in R2020b

systemcomposer.profile.Profile.load

Load profile from file

Syntax

```
profile = systemcomposer.profile.Profile.load(fileName)
```

Description

`profile = systemcomposer.profile.Profile.load(fileName)` loads a profile from a file name.

Examples

Load Profile

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Load the profile into another variable.

```
newProfile = systemcomposer.profile.Profile.load("LatencyProfile")
```

```
newProfile = 

  Profile with properties:

            Name: 'LatencyProfile'
    FriendlyName: ''
     Description: ''
     Stereotypes: [1×5 systemcomposer.profile.Stereotype]
```

Input Arguments

`fileName` — File name for profile
character vector | string

File name for profile, specified as a character vector or string. Profile must be available on the MATLAB path.

Example: `"LatencyProfile"`

Data Types: `char` | `string`

Output Arguments

`profile` — Loaded profile
profile object

Loaded profile, returned as a `systemcomposer.profile.Profile` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`systemcomposer.profile.Profile` | `open` | `editor` | `save` | `find` | `closeAll` | `close` | `createProfile`

Topics

"Define Profiles and Stereotypes"

Introduced in R2019a

systemcomposer.analysis.loadInstance

Load architecture instance

Syntax

`instance = systemcomposer.analysis.loadInstance(fileName,overwrite)`

Description

`instance = systemcomposer.analysis.loadInstance(fileName,overwrite)` loads an architecture instance from a MAT-file.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Load Architecture Instance from MAT-File

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Instantiate all stereotypes in the profile.

```
model = systemcomposer.createModel("archModel",true);
instance = instantiate(model.Architecture,"LatencyProfile","NewInstance");
```

Save the architecture instance.

```
instance.save("InstanceFile");
```

Delete the architecture instance.

```
systemcomposer.analysis.deleteInstance(instance);
```

Load the architecture instance.

```
loadedInstance = systemcomposer.analysis.loadInstance("InstanceFile");
```

Input Arguments

fileName — MAT-file that contains architecture instance
character vector | string

MAT-file that contains architecture instance, specified as a character vector or string.

Data Types: char | string

overwrite — Whether to overwrite instance if it already exists in workspace
true or 1 | false or 0

Whether to overwrite instance if it already exists in workspace, specified as a logical 1 (true) so the load operation overwrites duplicate instances in the workspace or 0 (false) if not.

Output Arguments

instance — Loaded architecture instance
architecture instance object

Loaded architecture instance, returned as a systemcomposer.analysis.ArchitectureInstance object.

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"

Term	Definition	Application	More Information
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a MAT file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

See Also

`instantiate` | `systemcomposer.analysis.Instance` | `deleteInstance` | `save` | `refresh` | `update`

Topics

"Write Analysis Function"

Introduced in R2019a

systemcomposer.loadModel

Load System Composer model

Syntax

`model = systemcomposer.loadModel(modelName)`

Description

`model = systemcomposer.loadModel(modelName)` loads the architecture model with name `modelName` and returns the `systemcomposer.arch.Model` object. The loaded model is not displayed.

Examples

Load Model

Create, save, and load a model. Display the model's properties.

```
model = systemcomposer.createModel("new_arch",true);
model.save;
loadedModel = systemcomposer.loadModel("new_arch")
```

```
loadedModel = 

  model with properties:

                   Name: 'new_arch'
           Architecture: [1×1 systemcomposer.arch.Architecture]
         SimulinkHandle: 2.0005
                  Views: [0×0 systemcomposer.view.ViewArchitecture]
               Profiles: [0×0 systemcomposer.profile.Profile]
    InterfaceDictionary: [1×1 systemcomposer.interface.Dictionary]
```

Input Arguments

`modelName` — Name of architecture model
character vector | string

Name of architecture model, specified as a character vector or string. The architecture model must exist on the MATLAB path.

Example: `"new_arch"`

Data Types: `char` | `string`

Output Arguments

`model` — Architecture model
model object

Architecture model, returned as a `systemcomposer.arch.Model` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`save` | `open` | `systemcomposer.createModel`

Topics

"Create Architecture Model"

Introduced in R2019a

systemcomposer.loadProfile

Load profile by name

Syntax

`profile = systemcomposer.loadProfile(profileName)`

Description

`profile = systemcomposer.loadProfile(profileName)` loads a profile with the specified file name.

Examples

Load Profile

Create a model.

```
model = systemcomposer.createModel("archModel",true);
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Save the profile and load the profile. In this example, `profileNew` is equal to `profile`.

```
save(profile);
profileNew = systemcomposer.loadProfile("LatencyProfile");
```

Input Arguments

`profileName` — Name of profile
character vector | string

Name of profile, specified as a character vector or string. Profile must be available on the MATLAB path with an `.xml` extension.

Example: `"new_profile"`

Data Types: `char` | `string`

Output Arguments

`profile` — Profile
profile object

Profile, returned as a `systemcomposer.profile.Profile` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`applyProfile` | `createProfile` | `editor` | `systemcomposer.profile.Profile`

Topics

"Define Profiles and Stereotypes"

Introduced in R2019a

lookup

Package: systemcomposer.arch

Search for architectural element

Syntax

```
element = lookup(object,Name,Value)
instance = lookup(object,Name,Value)
```

Description

`element = lookup(object,Name,Value)` finds an architectural element based on its universal unique identifier (UUID) or full path.

`instance = lookup(object,Name,Value)` finds an architectural element instance based on its universal unique identifier (UUID) or full path.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Look Up Component by Path

This example shows how to find a component by path in a robot model.

```
arch = systemcomposer.loadModel("Robot");
component = lookup(arch,Path="Robot/Sensor")
```

```
component = 
  Component with properties:

     IsAdapterComponent: 0
           Architecture: [1x1 systemcomposer.arch.Architecture]
                   Name: 'Sensor'
                 Parent: [1x1 systemcomposer.arch.Architecture]
                  Ports: [1x2 systemcomposer.arch.ComponentPort]
             OwnedPorts: [1x2 systemcomposer.arch.ComponentPort]
      OwnedArchitecture: [1x1 systemcomposer.arch.Architecture]
               Position: [349 74 469 174]
                  Model: [1x1 systemcomposer.arch.Model]
         SimulinkHandle: 10.0048
    SimulinkModelHandle: 0.0061
                   UUID: 'cfd62628-d365-47e4-8492-62cfeaa8dc15'
            ExternalUID: ''
```

Input Arguments

`object` — Architecture model or instance object
model object | architecture instance object

Architecture model or instance object to look up, specified as a `systemcomposer.arch.Model` or `systemcomposer.analysis.ArchitectureInstance` object.

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `lookup(arch,Path="Robot/Sensor")`

`UUID` — UUID
character vector | string

UUID to use for search, specified as a character vector or string of the `UUID`.

Example: `lookup(arch,UUID="f43c9d51-9dc6-43fc-b3af-95d458b81248")`

Data Types: `char` | `string`

`SimulinkHandle` — Simulink handle
double

Simulink handle to use for search, specified as the `SimulinkHandle` value.

Example: `lookup(arch,SimulinkHandle=9.0002)`

Data Types: `double`

`Path` — Full path
character vector | string

Full path, specified as a character vector or string.

Example: `lookup(arch,Path="Robot/Sensor")`

Data Types: `char` | `string`

Output Arguments

`element` — Model element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object

Model element, returned as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, or `systemcomposer.interface.PhysicalInterface` object.

`instance` — Element instance
component instance | port instance | connector instance

Element instance, returned as a `systemcomposer.analysis.ComponentInstance`, `systemcomposer.analysis.PortInstance`, or `systemcomposer.analysis.ConnectorInstance` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• “Analyze Architecture Model with Analysis Function” • “Analyze Architecture”

Term	Definition	Application	More Information
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• “Analysis Function Constructs” • “Write Analysis Function”
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.	“Run Analysis Function”
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	“Create a Model Instance for Analysis”

See Also

`find` | `createView` | `getQualifiedName` | `systemcomposer.view.ElementGroup` | `systemcomposer.analysis.Instance` | `iterate` | `instantiate`

Topics

“Analyze Architecture”
“Create Architectural Views Programmatically”

Introduced in R2019a

makeOwnedInterfaceShared

Package: `systemcomposer.arch`

Convert owned interface to shared interface

Syntax

`makeOwnedInterfaceShared(archPort,newInterfaceName)`

Description

`makeOwnedInterfaceShared(archPort,newInterfaceName)` converts an owned interface on the port `archPort` into a shared interface with name `newInterfaceName` in the interface data dictionary used in the architecture model.

Examples

Make Owned Interface Shared

Create an architecture port on a component in an architecture model.

```
modelName = "archModel";
model = systemcomposer.createModel(modelName,true);
comp = model.Architecture.addComponent("Component1");
inport = comp.Architecture.addPort("InBus","in");
```

Add a shared interface to the model.

```
interfaceDict = model.InterfaceDictionary;
SharedInterface = interfaceDict.addInterface("SharedInterface");
SharedInterface.addElement("SharedElem_X");
SharedInterface.addElement("SharedElem_Y");
```

Create an owned interface on the architecture port.

```
ownedInterface = inport.createInterface("DataInterface");
ownedInterface.removeElement("elem0");
elemA = ownedInterface.addElement("A");
ownedInterface.addElement("B",DataType="single",Dimensions="1",...
Units="m",Complexity="real",Maximum="200",Minimum="0",...
Description="Length value");
```

Convert the owned interface to a shared interface.

```
convertedInterface = inport.makeOwnedInterfaceShared("convertedInterface")
```

```
convertedInterface = 

  DataInterface with properties:

         Owner: [1×1 systemcomposer.interface.Dictionary]
          Name: 'convertedInterface'
      Elements: [1×2 systemcomposer.interface.DataElement]
         Model: [1×1 systemcomposer.arch.Model]
```

```
        UUID: '59a41ae1-e04d-479c-81e6-881230bad662'
ExternalUID: ''
```

Input Arguments

`archPort` — Architecture port

architecture port object

Architecture port, specified as a `systemcomposer.arch.ArchitecturePort` object.

`newInterfaceName` — New interface name

character vector | string

New interface name, specified as a character vector or string.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also
`createModel` | `createInterface` | `addElement` | `addInterface` | `addValueType`

Topics
"Define Port Interfaces Between Components"
"Assign Interfaces to Ports"
"Manage Interfaces with Data Dictionaries"

Introduced in R2022a

makeVariant

Package: systemcomposer.arch

Convert component to variant choice

Syntax

```
[variantComp,choices] = makeVariant(component)
[variantComp,choices] = makeVariant(component,Name,Value)
```

Description

`[variantComp,choices] = makeVariant(component)` converts the component `component` to a variant choice component and returns the parent variant component and available variant choice components.

`[variantComp,choices] = makeVariant(component,Name,Value)` converts the component `component` to a variant choice component with additional options and returns the parent variant component and available variant choice components.

Examples

Make Variant Component

Create a top-level architecture model.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
rootArch = get(arch,"Architecture");
```

Create a new component.

```
newComponent = addComponent(rootArch,"Component");
```

Add ports to the component.

```
inPort = addPort(newComponent.Architecture,"testSig","in");
outPort = addPort(newComponent.Architecture,"testSig","out");
```

Make the component into a variant component.

```
[variantComp,choices] = makeVariant(newComponent)
```

```
variantComp =
  VariantComponent with properties:

           Architecture: [1x1 systemcomposer.arch.Architecture]
                   Name: 'Component'
                 Parent: [1x1 systemcomposer.arch.Architecture]
                  Ports: [1x2 systemcomposer.arch.ComponentPort]
             OwnedPorts: [1x2 systemcomposer.arch.ComponentPort]
```

```
      OwnedArchitecture: [1x1 systemcomposer.arch.Architecture]
               Position: [15 15 65 83]
                  Model: [1x1 systemcomposer.arch.Model]
         SimulinkHandle: 63.0048
    SimulinkModelHandle: 0.0062
                   UUID: '9b04a137-1f29-4545-b5c6-704a2287206f'
            ExternalUID: ''


choices = 
  Component with properties:

     IsAdapterComponent: 0
           Architecture: [1x1 systemcomposer.arch.Architecture]
                   Name: 'Component'
                 Parent: [1x1 systemcomposer.arch.Architecture]
                  Ports: [1x2 systemcomposer.arch.ComponentPort]
             OwnedPorts: [1x2 systemcomposer.arch.ComponentPort]
      OwnedArchitecture: [1x1 systemcomposer.arch.Architecture]
               Position: [50 20 100 80]
                  Model: [1x1 systemcomposer.arch.Model]
         SimulinkHandle: 2.0414
    SimulinkModelHandle: 0.0062
                   UUID: '213ec619-625a-4025-a402-8c84f764428a'
            ExternalUID: ''
```

Input Arguments

`component` — Component
component object

Component to be converted to variant choice component, specified as a `systemcomposer.arch.Component` object.

Name-Value Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example: `[variantComp,choices] = makeVariant(newComponent,Name="NewVariantComponent",Label="NewVariantChoice",Choices=["NewVariantChoiceA","NewVariantChoiceB","NewVariantChoiceC"],ChoiceLabels=["Choice A","Choice B","Choice C"])`

`Name` — Name of variant component
character vector | string

Name of variant component, specified as a character vector or string.

Example: `[variantComp,choices] = makeVariant(newComponent,Name="NewVariantComponent")`

Data Types: `char` | `string`

`Label` — Label of variant choice
character vector | string

Label of variant choice from converted component, specified as a character vector or string.

Example: `[variantComp,choices] = makeVariant(newComponent,Name="NewVariantComponent",Label="NewVariantChoice")`

Data Types: `char` | `string`

`Choices` — Variant choice names
cell array of character vectors | array of strings

Variant choice names, specified as a cell array of character vectors or an array of strings. Additional variant choices are also added to the new variant component, along with the active choice from the converted component.

Example: `[variantComp,choices] = makeVariant(newComponent,Choices=["NewVariantChoiceA","NewVariantChoiceB","NewVariantChoiceC"])`

Data Types: `char` | `string`

`ChoiceLabels` — Variant choice labels
cell array of character vectors | array of strings

Variant choice labels, specified as a cell array of character vectors or an array of strings.

Example: `[variantComp,choices] = makeVariant(newComponent,Choices=["NewVariantChoiceA","NewVariantChoiceB","NewVariantChoiceC"],ChoiceLabels=["Choice A","Choice B","Choice C"])`

Data Types: `char` | `string`

Output Arguments

`variantComp` — Variant component
variant component object

Variant component, returned as a `systemcomposer.arch.VariantComponent` object.

`choices` — Variant choices
array of component objects

Variant choices, returned as an array of `systemcomposer.arch.Component` objects.

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	"Create Variants"
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	"Set Variant Control Condition" on page 3-603

See Also

`addChoice` | `getChoices` | Variant Component | `addVariantComponent`

Topics

"Create Variants"

Introduced in R2019a

modifyQuery

Package: `systemcomposer.view`

Modify architecture view query and property groupings

Syntax

```
modifyQuery(view,select)
modifyQuery(view,select,groupBy)
```

Description

`modifyQuery(view,select)` modifies the query `select` on the view `view`.

`modifyQuery(view,select,groupBy)` modifies the query `select` on the view `view` and the property based groupings `groupBy`.

Examples

Modify Query and Remove Groupings

Open the keyless entry system example and create a view. Specify the color as light blue, the query as all components, and group by the review status.

```
import systemcomposer.query.*

scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("All Components Grouped by Review Status",...
   Color="lightblue",Select=AnyComponent,...
    GroupBy="AutoProfile.BaseComponent.ReviewStatus");
```

Open the Architecture Views Gallery to see the new view `All Components Grouped by Review Status`.

```
model.openViews
```

Create a new query for all hardware components. Use the new query to modify the existing query on the view. Remove the property based groupings by passing in an empty cell array `{}`. Observe the change in your view.

```
constraint = HasStereotype(IsStereotypeDerivedFrom("AutoProfile.HardwareComponent"));
view.modifyQuery(constraint,{})
```

Input Arguments

`view` — Architecture view
view object

Architecture view, specified as a `systemcomposer.view.View` object.

`select` — Query
constraint object

Query to use to populate view, specified as a `systemcomposer.query.Constraint` object.

A constraint can contain a sub-constraint that can be joined with another constraint using `AND` or `OR`. A constraint can be negated using `NOT`.

Example:
`HasStereotype(IsStereotypeDerivedFrom("AutoProfile.HardwareComponent"))`

Query Objects and Conditions for Constraints

Query Object	Condition
`Property`	A non-evaluated value for the given property or stereotype property.
`PropertyValue`	An evaluated property value from a System Composer object or a stereotype property.
`HasPort`	A component has a port that satisfies the given sub-constraint.
`HasInterface`	A port has an interface that satisfies the given sub-constraint.
`HasInterfaceElement`	An interface has an interface element that satisfies the given sub-constraint.
`HasStereotype`	An architecture element has a stereotype that satisfies the given sub-constraint.
`IsInRange`	A property value is within the given range.
`AnyComponent`	An element is a component and not a port or connector.
`IsStereotypeDerivedFrom`	A stereotype is derived from the given stereotype.

`groupBy` — Grouping criteria
cell array of character vectors | empty cell array

Grouping criteria, specified as a cell array of character vectors in the form `'<profile>.<stereotype>.<property>'`. The order of the cell array dictates the order of the grouping. If an empty cell array `{}` is passed into `groupBy`, all the groupings are removed.

Example:
`{'AutoProfile.MechanicalComponent.mass','AutoProfile.MechanicalComponent.cost'}`

Data Types: `char`

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `runQuery` | `removeQuery` | `systemcomposer.view.ElementGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

open

Package: `systemcomposer.profile`

Open profile

Syntax

`open(profile)`

Description

`open(profile)` opens a profile in the **Profile Editor**.

Examples

Open Profile

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Open the profile in the **Profile Editor**.

```
open(profile)
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	“Extend Architectural Design Using Stereotypes”
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• “Set Properties” • “Add Properties with Stereotypes” • “Set Properties for Analysis”
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• “Define Profiles and Stereotypes” • “Use Stereotypes and Profiles”

See Also

`createProfile` | `find` | `editor` | `save` | `load` | `close` | `closeAll`

Topics

“Define Profiles and Stereotypes”

Introduced in R2019a

systemcomposer.allocation.open

Open allocation set in Allocation Editor

Syntax

`allocSet = systemcomposer.allocation.open(name)`

Description

`allocSet = systemcomposer.allocation.open(name)` opens allocation set specified by `name` in the **Allocation Editor**. The allocation set must be on the MATLAB path.

Examples

Create and Open Allocation Set

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Save the allocation set.

```
allocSet.save
```

Open the **Allocation Editor** with the allocation set highlighted.

```
systemcomposer.allocation.open(allocSet);
```

Input Arguments

name — Name of allocation set
allocation set object | character vector | string

Name of allocation set, specified as an `systemcomposer.allocation.AllocationSet` object, character vector, or string.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`createAllocationSet` | `load`

Topics

“Create and Manage Allocations”

Introduced in R2020b

open

Package: systemcomposer.arch

Open architecture model

Syntax

`open(model)`

Description

`open(model)` opens the specified model in System Composer.

Examples

Create and Open Model

```
model = systemcomposer.createModel("modelName");
open(model)
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also
`createModel` | `openModel`

Topics
"Create Architecture Model"

Introduced in R2019a

systemcomposer.openDictionary

Open data dictionary

Syntax

`dictionary = systemcomposer.openDictionary(dictionaryName)`

Description

`dictionary = systemcomposer.openDictionary(dictionaryName)` opens an existing Simulink data dictionary to hold interfaces and returns the `systemcomposer.interface.Dictionary` object.

Examples

Open Existing Dictionary

Create a dictionary and open the dictionary.

```
systemcomposer.createDictionary("my_dictionary.sldd");
dictionary = systemcomposer.openDictionary("my_dictionary.sldd");
```

Input Arguments

`dictionaryName` — Name of existing data dictionary
character vector | string

Name of existing data dictionary, specified as a character vector or string. The name must include the `.sldd` extension.

Example: `"my_dictionary.sldd"`

Data Types: `char` | `string`

Output Arguments

`dictionary` — Dictionary
dictionary object

Dictionary, returned as a `systemcomposer.interface.Dictionary` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`linkDictionary` | `saveToDictionary` | `unlinkDictionary` | `createDictionary` | `addReference` | `removeReference`

Topics

"Define Port Interfaces Between Components"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

systemcomposer.openModel

Open System Composer model

Syntax

`model = systemcomposer.openModel(modelName)`

Description

`model = systemcomposer.openModel(modelName)` opens the architecture model with name `modelName` for editing and returns the `systemcomposer.arch.Model` object.

Examples

Open Model

Create, save, and close a model. Open the model and display the model's properties.

```
model = systemcomposer.createModel("new_arch");
model.close;
model.save;
openedModel = systemcomposer.openModel("new_arch")
```

```
openedModel = 

  model with properties:

                   Name: 'new_arch'
           Architecture: [1×1 systemcomposer.arch.Architecture]
         SimulinkHandle: 2.0005
                  Views: [0×0 systemcomposer.view.ViewArchitecture]
               Profiles: [0×0 systemcomposer.profile.Profile]
    InterfaceDictionary: [1×1 systemcomposer.interface.Dictionary]
```

Input Arguments

`modelName` — Name of model
character vector | string

Name of architecture model to open, specified as a character vector or string. The model must exist on the MATLAB path.

Example: `"new_arch"`

Data Types: `char` | `string`

Output Arguments

`model` — Architecture model
model object

Architecture model, returned as a `systemcomposer.arch.Model` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

`open` | `close`

Topics

"Create Architecture Model"

Introduced in R2019a

openViews

Package: `systemcomposer.arch`

Open Architecture Views Gallery

Syntax

`openViews(model)`

Description

`openViews(model)` opens the **Architecture Views Gallery** for the specified model, `model`. If the model is already open, `openViews` will bring the views to the front.

Examples

Open Views Editor

Open the keyless entry system example and create a view. Open the Architecture Views Gallery for the model.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
fobSupplierView = model.createView("FOB Locator System Supplier Breakdown",...
    Color="lightblue");
openViews(model)
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"

Term	Definition	Application	More Information
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `systemcomposer.view.ElementGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2019b

Property

Package: `systemcomposer.query`

Create query to select non-evaluated values for object properties or stereotype properties for elements

Syntax

```
query = Property(name)
```

Description

`query = Property(name)` creates a query `query` that the `find` and `createView` functions use to select non-evaluated values for object properties or stereotype properties for elements based on a specified property name `name`.

Examples

Find Model Elements that Satisfy Property

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query to find components that contain `Sensor` in their `Name` property and run the query, displaying the first.

```
constraint = contains(Property("Name"),"Sensor");
sensors = find(model,constraint,Recurse=true,IncludeReferenceModels=true);
query = sensors(1)
```

```
query = 1x1 cell array
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Driver Door Lock Sensor'}
```

Input Arguments

name — Property name
character vector | string

Property name for model element, specified in the form `"<profile>.<stereotype>.<property>"` or any property on the designated class.

Example: `"Name"`

Example: `"AutoProfile.BaseComponent.Latency"`

Data Types: `char`

Output Arguments

`query` — Query
query constraint object

Query, returned as a `systemcomposer.query.Constraint` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	“Modeling System Architecture of Keyless Entry System”
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• “Create Architecture Views Interactively” • “Create Architectural Views Programmatically”
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”

Term	Definition	Application	More Information
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	“Inspect Components in Custom Architecture Views”
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	“Display Component Hierarchy and Architecture Hierarchy Using Views”

See Also

`createView` | `find` | `systemcomposer.query.Constraint` | `PropertyValue`

Topics

“Create Architectural Views Programmatically”
“Modeling System Architecture of Keyless Entry System”

Introduced in R2019b

PropertyValue

Package: `systemcomposer.query`

Create query to select property from object or stereotype property and then evaluate property value

Syntax

```
query = PropertyValue(name)
```

Description

`query = PropertyValue(name)` creates a query `query` that the `find` and `createView` functions use to select object properties or stereotype properties for elements based on specified property name `name` and then evaluate the property value.

Examples

Find Model Elements that Satisfy Property Value

Import the package that contains all of the System Composer™ queries.

```
import systemcomposer.query.*
```

Open the Simulink® project file for the keyless entry system.

```
scKeylessEntrySystem
```

Load the architecture model.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
```

Create a query to find components with a `Latency` property value of `30` and run the query.

```
constraint = PropertyValue("AutoProfile.BaseComponent.Latency")==30;
latency = find(model,constraint,Recurse=true,IncludeReferenceModels=true)
```

```
latency = 4x1 cell
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Driver Door Lock Actuator'}
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Front Pass Door Lock Actuator'  }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Driver Door Lock Actuator' }
    {'KeylessEntryArchitecture/Door Lock//Unlock System/Rear Pass Door Lock Actuator'   }
```

Input Arguments

name — Property name
character vector | string

Property name for model element, specified in the form `"<profile>.<stereotype>.<property>"` or any property on the designated class.

Example: `"Name"`

Example: `"AutoProfile.BaseComponent.Latency"`

Data Types: `char`

Output Arguments

`query` — Query
query constraint object

Query, returned as a `systemcomposer.query.Constraint` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	“Modeling System Architecture of Keyless Entry System”
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• “Create Architecture Views Interactively” • “Create Architectural Views Programmatically”
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”

Term	Definition	Application	More Information
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`createView` | `find` | `systemcomposer.query.Constraint` | `Property`

Topics

"Create Architectural Views Programmatically"
"Modeling System Architecture of Keyless Entry System"

Introduced in R2019b

refresh

Package: systemcomposer.analysis

Refresh architecture instance

Syntax

refresh(instance)

Description

refresh(instance) refreshes an architecture instance instance to mirror the changes in the specification model. The refresh method is part of the systemcomposer.analysis.ArchitectureInstance class.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The instance refers to the element instance on which the iteration is being performed.

Examples

Refresh Architecture Instance

Refresh an architecture instance to mirror the changes in the specification model.

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Instantiate all stereotypes in a profile.

```
model = systemcomposer.createModel("archModel",true);
instance = instantiate(model.Architecture,"LatencyProfile","NewInstance");
```

Apply the profile to the model. Apply the stereotype to the architecture.

```
model.applyProfile("LatencyProfile");
model.Architecture.applyStereotype("LatencyProfile.LatencyBase");
```

Refresh the architecture instance according to the specification model. Get the default value for the `"dataRate"` property on the architecture instance.

```
instance.refresh;
value = instance.getValue("LatencyProfile.LatencyBase.dataRate")
```

```
value =

    10
```

Input Arguments

`instance` — Architecture instance

architecture instance object

Architecture instance to be refreshed, specified as a `systemcomposer.analysis.ArchitectureInstance` object.

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"

Term	Definition	Application	More Information
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a MAT file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

See Also

`instantiate` | `systemcomposer.analysis.Instance` | `loadInstance` | `deleteInstance` | `update` | `save` | `lookup` | `iterate`

Topics

"Write Analysis Function"

Introduced in R2019a

removeComponent

Package: `systemcomposer.view`

(Removed) Remove component from view

Note The `removeComponent` function has been removed. You can create a view using the `createView` function with a selection query, remove the query using the `removeQuery` function, and remove a component using the `removeElement` function. For further details, see "Compatibility Considerations".

Syntax

`removeComponent(object,compPath)`

Description

`removeComponent(object,compPath)` removes the component with the specified path.

`removeComponent` is a method from the class `systemcomposer.view.ViewArchitecture`.

Examples

Remove Component from View

Create a model, extract its architecture, and add three components.

```
model = systemcomposer.createModel('mobileRobotAPI');
arch = model.Architecture;
components = addComponent(arch,{'Sensor','Planning','Motion'});
```

Create a view architecture, a view component, and add a component. Open the **Architecture Views Gallery** to view the component.

```
view = model.createViewArchitecture('NewView');
viewComp = fobSupplierView.createViewComponent('ViewComp');
viewComp.Architecture.addComponent('mobileRobotAPI/Motion');
openViews(model);
```

Remove the component from the view and check the **Architecture Views Gallery**.

```
viewComp.Architecture.removeComponent('mobileRobotAPI/Motion');
```

Input Arguments

`object` — View architecture
view architecture object

View architecture, specified as a `systemcomposer.view.ViewArchitecture` object.

`compPath` — Path to component
character vector

Path to component, including the name of the top-level model, specified as a character vector.

Data Types: `char`

Compatibility Considerations

`removeComponent` function has been removed
Errors starting in R2021a

The `removeComponent` function is removed in R2021a with the introduction of new views APIs. For more information on how to create and edit a view programmatically, see "Create Architectural Views Programmatically".

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `systemcomposer.view.ElementGroup`

Topics
"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2019b

removeElement

Package: systemcomposer.interface

Remove element

Syntax

removeElement(interface,name)

Description

removeElement(interface,name) removes an element with name name from an interface interface.

Examples

Remove Data Element from Data Interface

Add a data interface newInterface to the interface dictionary of the model. Add a data element newElement with data type double to the data interface, then remove the data element.

```
arch = systemcomposer.createModel("newModel",true);
interface = addInterface(arch.InterfaceDictionary,"newInterface");
element = addElement(interface,"newElement",DataType="double");
removeElement(interface,"newElement")
```

Remove Physical Element from Physical Interface

Add a physical interface newPhysicalInterface to the interface dictionary of the model. Add a physical element newElement with domain type electrical.electrical to the physical interface, then remove the physical element.

```
arch = systemcomposer.createModel("newModel",true);
interface = addPhysicalInterface(arch.InterfaceDictionary,"newPhysicalInterface");
element = addElement(interface,"newElement",Type="electrical.electrical");
removeElement(interface,"newElement")
```

Input Arguments

interface — Interface
data interface object | physical interface object | service interface object

Interface, specified as a systemcomposer.interface.DataInterface, systemcomposer.interface.PhysicalInterface, or systemcomposer.interface.ServiceInterface object.

name — Element name
character vector | string

Element name, specified as a character vector or string. An element name must be a valid MATLAB variable name.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`addElement` | `createDictionary` | `getElement` | `getInterfaceNames` | `getInterface` | `linkDictionary` | `getSourceElement` | `getDestinationElement` | `unlinkDictionary`

Topics

"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

removeElement

Package: `systemcomposer.view`

Remove component from element group of view

Syntax

`removeElement(elementGroup,component)`

Description

`removeElement(elementGroup,component)` adds the component `component` to the element group `elementGroup` of an architecture view.

Note This function cannot be used when a selection query or grouping is defined on the view. To remove the query, run `removeQuery`.

Examples

Add Elements to View and Remove Elements from View

Open the keyless entry system example and create a view, `newView`.

```
scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("newView");
```

Open the Architecture Views Gallery to see `newView`.

```
model.openViews
```

Add an element to the view by path.

```
view.Root.addElement("KeylessEntryArchitecture/Lighting System/Headlights")
```

Add an element to the view by object.

```
component = model.lookup(Path="KeylessEntryArchitecture/Lighting System/Cabin Lights");
view.Root.addElement(component)
```

Remove an element to the view by path.

```
view.Root.removeElement("KeylessEntryArchitecture/Lighting System/Headlights")
```

Remove an element to the view by object.

```
view.Root.removeElement(component)
```

Input Arguments

`elementGroup` — Element group
element group object

Element group for view, specified as a `systemcomposer.view.ElementGroup` object.

`component` — Component
component object | variant component object | array of component objects | array of variant component objects | path to component | cell array of component paths

Component to remove from view, specified as a `systemcomposer.arch.Component` object, a `systemcomposer.arch.VariantComponent` object, an array of `systemcomposer.arch.Component` objects, an array of `systemcomposer.arch.VariantComponent` objects, the path to a component, or a cell array of component paths.

Example: `"KeylessEntryArchitecture/Lighting System/Headlights"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"

Term	Definition	Application	More Information
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`lookup` | `openViews` | `createView` | `getView` | `deleteView` | `systemcomposer.view.ElementGroup` | `systemcomposer.view.View` | `addElement` | `getSubGroup` | `deleteSubGroup` | `createSubGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

removeInterface

Package: `systemcomposer.interface`

Remove named interface from interface dictionary

Syntax

```
removeInterface(dictionary,name)
```

Description

`removeInterface(dictionary,name)` removes the interface specified by `name` from the interface dictionary `dictionary`.

Examples

Remove Interface

Create a new model. Add a data interface `newInterface` to the interface dictionary of the model.

```
arch = systemcomposer.createModel("archModel");
addInterface(arch.InterfaceDictionary,"newInterface");
```

Open the model, then open the **Interface Editor**. Confirm that an interface `newInterface` exists.

```
open(arch)
```

Remove the interface.

```
removeInterface(arch.InterfaceDictionary,"newInterface");
```

View the **Interface Editor**. Confirm that `newInterface` is removed.

Input Arguments

`dictionary` — Data dictionary

dictionary object

Data dictionary, specified as a `systemcomposer.interface.Dictionary` object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then `dictionary` must be the dictionary that carries interface definitions. For information on how to create a dictionary, see `createDictionary`.

name — Name of interface

character vector | string

Name of interface to be removed, specified as a character vector or string.

Example: `"newInterface"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”

Term	Definition	Application	More Information
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also

`addInterface` | `addValueType` | `addPhysicalInterface` | `addServiceInterface` | `getInterface` | `getInterfaceNames` | Adapter

Topics

"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

removeProfile

Package: `systemcomposer.arch`

Remove profile from model

Syntax

`removeProfile(model,profileName)`

Description

`removeProfile(model,profileName)` removes the profile from a model.

Examples

Remove Profile

Create a model.

```
model = systemcomposer.createModel("archModel",true);
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Remove the profile from the model.

```
model.removeProfile("LatencyProfile");
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

`profileName` — Name of profile
character vector | string

Name of profile, specified as a character vector or string.

Example: `"SystemProfile"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	“Extend Architectural Design Using Stereotypes”
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• “Set Properties” • “Add Properties with Stereotypes” • “Set Properties for Analysis”

Term	Definition	Application	More Information
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`applyProfile` | `createProfile`

Topics

"Define Profiles and Stereotypes"

Introduced in R2019a

removeProperty

Package: systemcomposer.profile

Remove property from stereotype

Syntax

removeProperty(stereotype,propertyName)

Description

removeProperty(stereotype,propertyName) removes a property from the stereotype.

Examples

Remove Property

Add a component stereotype and add a VoltageRating property with value 5. Then remove the property.

```
profile = systemcomposer.profile.Profile.createProfile("myProfile");
stereotype = addStereotype(profile,"electricalComponent",AppliesTo="Component")
property = addProperty(stereotype,"VoltageRating",DefaultValue="5");
removeProperty(stereotype,"VoltageRating")
```

Input Arguments

stereotype — Stereotype
stereotype object

Stereotype, specified as a systemcomposer.profile.Stereotype object.

propertyName — Name of property
character vector | string

Name of property to be removed, specified as a character vector or string.

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also
`addProperty` | `setProperty` | `getProperty`

Topics
"Define Profiles and Stereotypes"

Introduced in R2019a

removeQuery

Package: systemcomposer.view

Remove architecture view query

Syntax

`removeQuery(view,keepContents)`

Description

`removeQuery(view,keepContents)` removes the selection query and groupings on the view `view` with the option to keep contents (`keepContents`), which leaves the elements that were selected in the view. `removeQuery` allows for manually editing the view element by element. If `keepContents` is `true`, any property-based groupings are kept intact in the diagram but removed from `GroupBy`.

Examples

Remove Query From View and Keep Contents

Open the keyless entry system example and create a view. Specify the color as light blue, the query as all components, and group by the review status.

```
import systemcomposer.query.*

scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = model.createView("All Components Grouped by Review Status",...
   Color="lightblue",Select=AnyComponent,...
    GroupBy="AutoProfile.BaseComponent.ReviewStatus");
```

Open the Architecture Views Gallery to see the new view `All Components Grouped by Review Status`.

```
model.openViews
```

Remove the query and keep the contents. The view is now manually editable element by element, and the groupings are preserved.

```
view.removeQuery(true)
```

Input Arguments

view — Architecture view
view object

Architecture view, specified as a `systemcomposer.view.View` object.

`keepContents` — Whether to keep contents in view
`true` or 1 (default) | `false` or 0

Whether to keep contents in view, specified as a logical 1 (`true`) to keep contents specified by the removed selection query and property-based groupings or 0 (`false`) to remove all contents from the view.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	"Modeling System Architecture of Keyless Entry System"
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• "Create Architecture Views Interactively" • "Create Architectural Views Programmatically"
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	"Find Elements in Model Using Queries"
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	"Inspect Components in Custom Architecture Views"

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `runQuery` | `modifyQuery` | `systemcomposer.view.ElementGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

removeReference

Package: systemcomposer.interface

Remove reference to dictionary

Syntax

removeReference(dictionary,reference)

Description

removeReference(dictionary,reference) removes a referenced dictionary from a dictionary in a System Composer model.

Examples

Remove Referenced Dictionary

Add a data interface newInterface to the local interface dictionary of the model. Save the local interface dictionary to a shared dictionary as an SLDD file.

```
arch = systemcomposer.createModel("newModel",true);
addInterface(arch.InterfaceDictionary,"newInterface");
saveToDictionary(arch,"TopDictionary")
topDictionary = systemcomposer.openDictionary("TopDictionary.sldd");
```

Create a new dictionary and add it as a reference to the existing dictionary.

```
refDictionary = systemcomposer.createDictionary("ReferenceDictionary.sldd");
addReference(topDictionary,"ReferenceDictionary.sldd")
```

Remove the referenced dictionary. Confirm in **Model Explorer**.

```
removeReference(topDictionary,"ReferenceDictionary.sldd")
```

Input Arguments

dictionary — Data dictionary

dictionary object

Data dictionary, specified as a systemcomposer.interface.Dictionary object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then dictionary must be the dictionary that carries interface definitions. For information on how to create a dictionary, see createDictionary.

reference — Referenced dictionary

character vector | string

Referenced dictionary, specified as a character vector or string of the name of the referenced dictionary with the .sldd extension.

Example: `"ReferenceDictionary.sldd"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

Term	Definition	Application	More Information
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`saveToDictionary` | `createDictionary` | `openDictionary` | `linkDictionary` | `unlinkDictionary` | `addReference`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021a

removeStereotype

Package: `systemcomposer.profile`

Remove stereotype from profile

Syntax

`removeStereotype(profile,stereotype)`

Description

`removeStereotype(profile,stereotype)` removes a stereotype from the specified profile.

Examples

Remove Component Stereotype

Create a profile, add a component stereotype to the profile, open the **Profile Editor**, and remove the stereotype from the profile.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
stereotype = addStereotype(profile,"electricalComponent",AppliesTo="Component");
systemcomposer.profile.editor
profile.removeStereotype("electricalComponent")
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

`stereotype` — Stereotype to remove
character vector | string | stereotype object

Stereotype to remove, specified as a `systemcomposer.profile.Stereotype` object or by name as a character vector or string.

Example: `"electricalComponent"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`getStereotype` | `addStereotype` | `getDefaultStereotype` | `setDefaultStereotype`

Topics

"Create a Profile and Add Stereotypes"

Introduced in R2019a

removeStereotype

Package: `systemcomposer.arch`

Remove stereotype from model element

Syntax

`removeStereotype(element,stereotype)`

Description

`removeStereotype(element,stereotype)` removes a specified stereotype applied to a model element from the model element.

Examples

Remove Stereotype

Create a model with a component called `Component`.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Apply the stereotype to the component, remove the stereotype from the component, and get the stereotypes on the component.

```
comp.applyStereotype("LatencyProfile.LatencyBase");
comp.removeStereotype("LatencyProfile.LatencyBase");
stereotypes = getStereotypes(comp)
```

```
stereotypes =

  1×0 empty cell array
```

Input Arguments

`element` — Architectural element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.ServiceInterface`, or `systemcomposer.arch.Function` object.

`stereotype` — Stereotype
character vector | string

Stereotype, specified as a character vector or string in the form `"<profile>.<stereotype>"`. The profile must already be applied to the model.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"

Term	Definition	Application	More Information
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	“Describe Component Behavior Using Simscape”
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	“Define Physical Ports on Component”
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	“Architecture Model with Simscape Behavior for a DC Motor”

Term	Definition	Application	More Information
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also
`applyStereotype` | `batchApplyStereotype` | `getStereotypes` | `getStereotypeProperties`

Topics
"Remove Stereotypes"

Introduced in R2019a

renameProfile

Package: systemcomposer.arch

Rename profile in model

Syntax

```
renameProfile(modelName,oldProfileName,newProfileName)
```

Description

renameProfile(modelName,oldProfileName,newProfileName) renames a profile on a model from oldProfileName to newProfileName to make it consistent if the name of the profile was changed in the file explorer.

Examples

Rename Profile

Create a model.

```
model = systemcomposer.createModel("archModel",true);
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Save the model and close the model. Close the **Profile Editor**.

```
save(model)
close(model)
```

Save the profile.

```
save(profile)
```

Rename the profile in the file explorer to LatencyProfileNew.xml.

Load the model. Run the renameProfile API to update the model to refer to the correct renamed profile in the current directory.

```
model = systemcomposer.loadModel("archModel");
model.renameProfile("LatencyProfile","LatencyProfileNew");
```

Input Arguments

modelName — Model
model object | character vector | string

Model, specified as a `systemcomposer.arch.Model` object or a character vector or string as the name of the model.

Example: `"myModel"`

Example: `archModel`

Data Types: `char` | `string`

`oldProfileName` — Old profile name
character vector | string

Old profile name, specified as a character vector or string.

Example: `"MyProfile"`

Data Types: `char` | `string`

`newProfileName` — New profile name
character vector | string

New profile name, specified as a character vector or string.

Example: `"MyProfileNew"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`close` | `open` | `save`

Topics

"Define Profiles and Stereotypes"

Introduced in R2020b

resetParameterToDefault

Package: systemcomposer.arch

Reset parameter on component to default value

Syntax

```
resetParameterToDefault(element,paramName)
```

Description

resetParameterToDefault(element,paramName) resets parameter specified by paramName on the architectural element element to the default value and units, if applicable.

Examples

Modify Parameters for Axle Architecture

This example shows a wheel axle architecture model with instance-specific parameters exposed in System Composer™. These parameters are defined as model arguments on the Simulink® reference model used as a model behavior linked to two System Composer components. You can change the values of these parameters independently on each reference component.

Open mAxleArch Architecture Model

Open the architecture model of the wheel axle mAxleArch to interact with the parameters on the reference components using the Property Inspector.

```
model = systemcomposer.openModel("mAxleArch");
```

Look Up RightWheel and LeftWheel Components

Look up the Component objects for the RightWheel and LeftWheel components.

```
rightWheelComp = lookup(model,Path="mAxleArch/RightWheel");
leftWheelComp = lookup(model,Path="mAxleArch/LeftWheel");
```

Get Parameter Names on RightWheel Component

Get the parameter names for the RightWheel component. Since the LeftWheel component is linked to the same reference model mWheel, the parameters are the same on the LeftWheel component.

```
paramNames = rightWheelComp.getParameterNames
```

```
paramNames = 1×3 string
    "Pressure"    "Diameter"    "Wear"
```

Get Parameter Definition on RightWheel Component for Pressure Parameter

Get the parameter definition for the Pressure parameter on the RightWheel component architecture.

```
paramDefinition = rightWheelComp.Architecture.getParameterDefinition(paramNames(1))
```

```
paramDefinition = 
  ParameterDefinition with properties:

           Name: 'Pressure'
           Type: 'double'
           Unit: 'psi'
     Complexity: 'real'
     Dimensions: '[1  1]'
          Value: '32'
            Min: ''
            Max: ''
    Description: ''
          Owner: [1×1 systemcomposer.arch.Architecture]
```

Get Parameter Values for RightWheel and LeftWheel Components

Get the parameter values for the RightWheel and LeftWheel components.

RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = rightWheelComp.getParameterValue(paramNames(i))
end
```

```
Right Wheel Parameters

paramName = 
"Pressure"

paramValue = 
'31'

paramUnits = 
'psi'

isDefault = logical
   0


paramName = 
"Diameter"

paramValue = 
'16'

paramUnits = 
'in'

isDefault = logical
   1
```

```
paramName = 
"Wear"

paramValue = 
'0.25'

paramUnits = 
'in'

isDefault = logical
   1
```

LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 
'32'

paramUnits = 
'psi'

isDefault = logical
   1


paramName = 
"Diameter"

paramValue = 
'15'

paramUnits = 
'in'

isDefault = logical
   0


paramName = 
"Wear"

paramValue = 
'0.23'

paramUnits = 
'in'

isDefault = logical
   0
```

Get Evaluated Parameter Values for RightWheel and LeftWheel Components

Get the evaluated parameter values for the RightWheel and LeftWheel components.

Evaluated RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = rightWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 31

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 16

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2500

paramUnits = 
'in'
```

Evaluated LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = leftWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 32

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 15

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2300
```

```
paramUnits =
'in'
```

Set Parameter Value and Units for `Pressure` Parameter on `LeftWheel` Component

Set the parameter value and unit for the `PSI` parameter on the `LeftWheel` component.

Current Values for `Pressure` on `LeftWheel`

```
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'32'

paramUnits =
'psi'

isDefault = logical
   1
```

New Values for `Pressure` on `LeftWheel`

```
leftWheelComp.setParameterValue("Pressure","2000")
leftWheelComp.setUnit("Pressure","mbar")
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'2000'

paramUnits =
'mbar'

isDefault = logical
   0
```

Revert `Pressure` Parameter on `LeftWheel` to Default Value

```
leftWheelComp.resetParameterToDefault("Pressure")
```

Save Models

```
model = systemcomposer.loadModel("mWheelArch");
save(model)
topModel = systemcomposer.loadModel("mAxleArch");
save(topModel)
```

Input Arguments

`element` — Architectural element
architecture object | component object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, or `systemcomposer.arch.VariantComponent` object.

`paramName` — Parameter name
character vector | string

Parameter name, specified as a character vector or string.

Example: `"GainArg"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• "Describe Component Behavior Using Simulink" • "Create Reference Architecture"
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	"Access Model Arguments as Parameters on Reference Components"
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	"Use Parameters to Store Instance Values with Components"
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• "Create Simulink Subsystem Behavior Using Subsystem Component" • "Create Simulink Subsystem Component"

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`getEvaluatedParameterValue` | `getParameterDefinition` | `getParameterNames` | `setParameterValue` | `getParameterValue` | `setUnit`

Topics

"Access Model Arguments as Parameters on Reference Components"
"Use Parameters to Store Instance Values with Components"

Introduced in R2022a

runQuery

Package: `systemcomposer.view`

Re-run architecture view query on model

Syntax

`runQuery(view)`

Description

`runQuery(view)` re-runs the existing query on the view `view`. This function removes elements that no longer match the query and adds elements that now match the query.

Examples

Rerun Query on View

Open the keyless entry system example and create a view. Specify the color as light blue, and the query as all components.

```
import systemcomposer.query.*

scKeylessEntrySystem
model = systemcomposer.loadModel("KeylessEntryArchitecture");
view = createView(model,"All Components",...
   Color="lightblue",Select=AnyComponent);
```

Open the Architecture Views Gallery to see the new view `All Components`.

```
openViews(model)
```

Add components to the model. Rerun the query.

```
runQuery(view)
```

Input Arguments

view — Architecture view
view object

Architecture view, specified as a `systemcomposer.view.View` object.

More About

Definitions

Term	Definition	Application	More Information
view	A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.	You can use different types of views to represent the system: • *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis. • *Functional views* focus on what the system must do to operate. • *Physical views* show how the system is constructed and configured. A viewpoint represents a stakeholder perspective that specifies the contents of the view.	“Modeling System Architecture of Keyless Entry System”
element group	An element group is a grouping of components in a view.	Use element groups to programmatically populate a view.	• “Create Architecture Views Interactively” • “Create Architectural Views Programmatically”
query	A query is a specification that describes certain constraints or criteria to be satisfied by model elements.	Use queries to search elements with constraint criteria and to filter views.	“Find Elements in Model Using Queries”
component diagram	A component diagram represents a view with components, ports, and connectors based on how the model is structured.	Component diagrams allow you to programmatically or manually add and remove components from the view.	“Inspect Components in Custom Architecture Views”

Term	Definition	Application	More Information
hierarchy diagram	You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.	There are two types of hierarchy diagrams: • *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used. • *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.	"Display Component Hierarchy and Architecture Hierarchy Using Views"

See Also

`systemcomposer.view.View` | `createView` | `getView` | `deleteView` | `openViews` | `removeQuery` | `modifyQuery` | `systemcomposer.view.ElementGroup`

Topics

"Create Architecture Views Interactively"
"Create Architectural Views Programmatically"

Introduced in R2021a

save

Package: systemcomposer.profile

Save profile as file

Syntax

```
filePath = save(profile,dirPath)
```

Description

`filePath = save(profile,dirPath)` saves a profile to disk as a file with an `.xml` extension. This function saves the file to the current directory if the optional input `dirPath` is left blank.

Examples

Save Profile

Create a profile named `newProfile` and save it in the current directory.

```
profile = systemcomposer.profile.Profile.createProfile("newProfile");
path = save(profile);
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

`dirPath` — Path to save
character vector | string

Path to save, specified as a character vector or string. The current directory is the default if no path is specified.

Example: `"C:\Temp\MATLAB"`

Data Types: `char` | `string`

Output Arguments

`filePath` — File path
character vector

File path where profile is saved, returned as a character vector.

More About

Definitions

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`createProfile` | `find` | `editor` | `open` | `load` | `close` | `closeAll`

Topics

"Define Profiles and Stereotypes"

Introduced in R2019a

save

Package: systemcomposer.allocation

Save allocation set as file

Syntax

`save(allocSet,dirPath)`

Description

`save(allocSet,dirPath)` saves the allocation set `allocSet` to disk as a file with an `.mldatx` extension. This function saves the file to the current directory if the optional input `dirPath` is left blank.

Examples

Create and Save Allocation Set

Create two new models with a component each.

```
mSource = systemcomposer.createModel("Source_Model_Allocation",true);
sourceComp = mSource.Architecture.addComponent("Source_Component");
mTarget = systemcomposer.createModel("Target_Model_Allocation",true);
targetComp = mTarget.Architecture.addComponent("Target_Component");
```

Create the allocation set `MyNewAllocation`.

```
allocSet = systemcomposer.allocation.createAllocationSet("MyNewAllocation",...
     "Source_Model_Allocation","Target_Model_Allocation");
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario("Scenario 1");
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Save the allocation set.

```
allocSet.save
```

Open the **Allocation Editor**.

```
systemcomposer.allocation.editor
```

Input Arguments

allocSet — Allocation set

allocation set object

Allocation set, specified as a `systemcomposer.allocation.AllocationSet` object.

`dirPath` — Path to save
character vector | string

Path to save, specified as a character vector or string. The current directory is the default if no path is specified.

Example: `'C:\Temp\MATLAB'`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	“Allocate Architectures in Tire Pressure Monitoring System”
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	“Create and Manage Allocations”
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	“Systems Engineering Approach for SoC Applications”

See Also

`createAllocationSet` | `createScenario` | `deleteScenario` | `getScenario` | `load` | `closeAll` | `close` | `find`

Topics

“Create and Manage Allocations”

Introduced in R2020b

save

Package: `systemcomposer.arch`

Save architecture model or data dictionary

Syntax

```
save(model)
save(dictionary)
```

Description

`save(model)` saves the architecture model to a file specified in its `Name` property.

`save(dictionary)` saves the data dictionary.

Examples

Save Model and Data Dictionary

```
arch = systemcomposer.createModel("newModel");
save(arch);
save(arch.InterfaceDictionary);
dictionary = systemcomposer.createDictionary("modelInterfaces.sldd");
dictionary.save;
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

`dictionary` — Data dictionary
dictionary object

Data dictionary attached to the architecture model, specified as a `systemcomposer.interface.Dictionary` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also
`loadModel` | `close` | `systemcomposer.createModel`

Topics
"Create Architecture Model"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

save

Package: systemcomposer.analysis

Save architecture instance

Syntax

save(instance,fileName)

Description

save(instance,fileName) saves an architecture instance to a MAT-file. The save method is part of the systemcomposer.analysis.ArchitectureInstance class.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The instance refers to the element instance on which the iteration is being performed.

Examples

Save Architecture Instance to MAT-File

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Instantiate all stereotypes in a profile.

```
model = systemcomposer.createModel("archModel",true);
instance = instantiate(model.Architecture,"LatencyProfile","NewInstance");
```

Save the architecture instance.

```
instance.save("InstanceFile")
```

Input Arguments

`instance` — Architecture instance

architecture instance object

Architecture instance to be saved, specified as a `systemcomposer.analysis.ArchitectureInstance` object.

`fileName` — MAT-file to save instance

character vector | string

MAT-file to save instance, specified as a character vector or string.

Example: `"InstanceFile"`

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"

Term	Definition	Application	More Information
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a MAT file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

See Also

`instantiate` | `systemcomposer.analysis.Instance` | `loadInstance` | `deleteInstance` | `refresh` | `update` | `lookup` | `iterate`

Topics

"Write Analysis Function"

Introduced in R2019a

saveAsModel

Package: systemcomposer.arch

(Not recommended) Save architecture of component to separate model

Note The saveAsModel function is not recommended. Use the createArchitectureModel function instead. For more information, see "Compatibility Considerations".

Syntax

saveAsModel(component,modelName)

Description

saveAsModel(component,modelName) saves the architecture of the component to a separate architecture model and references the model from this component.

Input Arguments

component — Architecture component
component object

Architecture component, specified as a systemcomposer.arch.Component object. The component must have an architecture with definition type composition. For other definition types, this function gives an error.

modelName — Model name
character vector | string

Model name, specified as a character vector or string.

Data Types: char | string

Compatibility Considerations

saveAsModel function is not recommended
Not recommended starting in R2021b_plus

The saveAsModel function is not recommended. Use the createArchitectureModel function instead.

See Also

linkToModel | isReference | createArchitectureModel | inlineComponent | Reference Component

Topics
"Describe Component Behavior Using Simulink"
"Decompose and Reuse Components"

Introduced in R2019a

saveToDictionary

Package: `systemcomposer.arch`

Save interfaces to dictionary

Syntax

```
saveToDictionary(model,dictionaryName)
saveToDictionary(dictionary,dictionaryName)
saveToDictionary( ___ ,Name,Value)
```

Description

`saveToDictionary(model,dictionaryName)` saves all locally defined interfaces to a shared dictionary, and links the model to the shared dictionary with an `SLDD` extension.

`saveToDictionary(dictionary,dictionaryName)` saves all locally defined interfaces to a shared dictionary with an `SLDD` extension.

`saveToDictionary( ___ ,Name,Value)` saves all locally defined interfaces to a shared dictionary with additional options.

Examples

Save to Dictionary

Create a model and a shared dictionary. Add an interface to the model's interface dictionary, and add an element. Save all interfaces defined in the model to the shared dictionary.

```
arch = systemcomposer.createModel("newModel",true);
dictionary = systemcomposer.createDictionary("myInterfaces.sldd");
interface = addInterface(arch.InterfaceDictionary,"newSignal");
element = addElement(interface,"newElement",Type="double");
saveToDictionary(arch,"myInterfaces")
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

`dictionary` — Data dictionary
dictionary object

Data dictionary, specified as a `systemcomposer.interface.Dictionary` object. You can specify the default data dictionary that defines local interfaces or an external data dictionary that carries interface definitions. If the model links to multiple data dictionaries, then `dictionary` must be the dictionary that carries interface definitions. For information on how to create a dictionary, see `createDictionary`.

`dictionaryName` — Dictionary name
character vector | string

Dictionary name, specified as a character vector or string. If a dictionary with this name does not exist, one will be created.

Example: `"myInterfaces"`

Data Types: `char` | `string`

Name-Value Pair Arguments

Specify optional pairs of arguments as `Name1=Value1,...,NameN=ValueN`, where `Name` is the argument name and `Value` is the corresponding value. Name-value arguments must appear after other arguments, but the order of the pairs does not matter.

Before R2021a, use commas to separate each name and value, and enclose `Name` *in quotes.*

Example:
`saveToDictionary(arch,"MyInterfaces",CollisionResolutionOption=systemcomposer.interface.CollisionResolution.USE_MODEL)`

`CollisionResolutionOption` — Option to resolve interface collisions using model or dictionary
`systemcomposer.interface.CollisionResolution.USE_MODEL` (default) |
`systemcomposer.interface.CollisionResolution.USE_DICTIONARY`

Option to resolve collisions using model or dictionary, specified as one of the following:

- `systemcomposer.interface.CollisionResolution.USE_MODEL` to prioritize interface duplicates using the local interfaces defined in the model.
- `systemcomposer.interface.CollisionResolution.USE_DICTIONARY` to prioritize interface duplicates using the interfaces defined in the saved dictionary.

Example:
`saveToDictionary(arch,"MyInterfaces",CollisionResolutionOption=systemcomposer.interface.CollisionResolution.USE_DICTIONARY)`

Data Types: `enum`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`createDictionary` | `linkDictionary` | `unlinkDictionary` | `openDictionary` | `addReference` | `removeReference`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019b

setActiveChoice

Package: systemcomposer.arch

Set active choice on variant component

Syntax

setActiveChoice(variantComponent,choice)

Description

setActiveChoice(variantComponent,choice) sets the active choice on the variant component.

Examples

Set Active Variant Choice

Create a model, get the root architecture, create one variant component, add two choices for the variant component, and set the active choice.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
variant = addVariantComponent(arch,"Component1");
compList = addChoice(variant,["Choice1","Choice2"]);
setActiveChoice(variant,compList(2));
```

Input Arguments

variantComponent — Variant component
variant component object

Variant component, specified as a systemcomposer.arch.VariantComponent object.

choice — Active choice in a variant component
component object | character vector | string

Active choice in a variant component, specified as a systemcomposer.arch.Component object or label of the variant choice as a character vector or string.

Example: "Choice2"

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	“Create Variants”
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	“Set Variant Control Condition” on page 3-603

See Also

`addChoice` | `getActiveChoice` | `getChoices` | `addVariantComponent` | Variant Component

Topics

“Create Variants”

Introduced in R2019a

setComplexity

Package: systemcomposer

Set complexity for value type

Syntax

`setComplexity(valueType,complexity)`

Description

`setComplexity(valueType,complexity)` sets the complexity for the designated value type.

Examples

Set Complexity for Value Type

Create a model `archModel`.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
```

Add a value type `airSpeed` to the interface dictionary of the model.

```
airSpeedType = arch.InterfaceDictionary.addValueType("airSpeed");
```

Set the complexity for the value type as `complex`.

```
airSpeedType.setComplexity("complex")
```

Input Arguments

valueType — Value type, data element, or function argument
value type object | data element object | function argument object

Value type, data element, or function argument, specified as a `systemcomposer.ValueType`, `systemcomposer.interface.DataElement`, or `systemcomposer.interface.FunctionArgument` object.

complexity — Complexity
`"real"` (default) | `"complex"` | `"auto"`

Complexity, specified as `"real"`, `"complex"`, or `"auto"`.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`createModel` | `addElement` | `addInterface` | `addValueType` | `createInterface` | `createOwnedType`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021b

setCondition

Package: `systemcomposer.arch`

Set condition on variant choice

Syntax

`setCondition(variantComponent,choice,expression)`

Description

`setCondition(variantComponent,choice,expression)` sets the variant control condition for a choice on the variant component to choose the active variant choice. If the condition is met on a variant choice, that variant choice becomes the active choice on the variant component.

Examples

Set Variant Control Condition

Create a model, get the root architecture, create one variant component, add two choices for the variant component, and set a condition on one variant choice to choose the active variant choice.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
mode = 1;
variant = addVariantComponent(arch,"Component1");
compList = addChoice(variant,["Choice1","Choice2"]);
setCondition(variant,compList(2),"mode == 2");
```

Input Arguments

`variantComponent` — Variant component
variant component object

Variant component, specified as a `systemcomposer.arch.VariantComponent` object.

`choice` — Choice in variant component
component object

Choice in variant component, specified by a `systemcomposer.arch.Component` object.

`expression` — Control string
character vector | string

Control string that controls the selection of `choice`, specified as a character vector or string.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
variant	A variant is one of many structural or behavioral choices in a variant component.	Use variants to quickly swap different architectural designs for a component while performing analysis.	“Create Variants”
variant control	A variant control is a string that controls the active variant choice.	Set the variant control to programmatically control which variant is active.	“Set Variant Control Condition” on page 3-603

See Also

`makeVariant` | `getCondition` | `addVariantComponent` | `addChoice` | `getActiveChoice` | `setActiveChoice` | Variant Component

Topics

“Create Variants”

Introduced in R2019a

setDataType

Package: `systemcomposer`

Set data type for value type

Syntax

`setDataType(valueType,type)`

Description

`setDataType(valueType,type)` sets the data type for the designated value type.

Examples

Set Data Type for Value Type

Create a model `archModel`.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
```

Add a value type `airSpeed` to the interface dictionary of the model.

```
airSpeedType = arch.InterfaceDictionary.addValueType("airSpeed");
```

Set the data type for the value type as `single`.

```
airSpeedType.setDataType("single")
```

Input Arguments

valueType — Value type
value type object

Value type, specified as a `systemcomposer.ValueType` object.

type — Data type
character vector | string

Data type, specified as a character vector or string for a valid MATLAB data type.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`createModel` | `addValueType` | `addElement` | `addInterface` | `createInterface` | `createOwnedType`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

setDefaultComponentStereotype

Package: systemcomposer.profile

(Removed) Set default stereotype for components

Note The setDefaultComponentStereotype function has been removed. You can set a default component stereotype using the function setDefaultElementStereotype. For further details, see "Compatibility Considerations".

Syntax

```
setDefaultComponentStereotype(stereotype,stereotypeName)
```

Description

setDefaultComponentStereotype(stereotype,stereotypeName) specifies the default stereotype stereotypeName of the child components whose parent component has stereotype applied.

Input Arguments

stereotype — Stereotype
stereotype object

Stereotype, specified as a systemcomposer.profile.Stereotype object.

stereotypeName — Default stereotype name
character vector | string

Default stereotype name for child components, specified as a character vector or string in the form '<profile>.<stereotype>'.

Data Types: char | string

Compatibility Considerations

setDefaultComponentStereotype function has been removed
Errors starting in R2021b

The setDefaultComponentStereotype function has been removed in R2021b. Use setDefaultElementStereotype instead.

See Also

applyStereotype | removeStereotype | setDefaultElementStereotype

Topics
"Define Profiles and Stereotypes"

Introduced in R2019a

setDefaultConnectorStereotype

Package: systemcomposer.profile

(Removed) Set default stereotype for connectors

Note The setDefaultConnectorStereotype function has been removed. You can set a default connector stereotype using the function setDefaultElementStereotype. For further details, see “Compatibility Considerations”.

Syntax

```
setDefaultConnectorStereotype(stereotype,stereotypeName)
```

Description

setDefaultConnectorStereotype(stereotype,stereotypeName) specifies the default stereotype stereotypeName of the connectors within a parent component that has stereotype applied.

Input Arguments

stereotype — Stereotype
stereotype object

Stereotype, specified as a systemcomposer.profile.Stereotype object.

stereotypeName — Default stereotype name
character vector | string

Default stereotype name for connectors, specified as a character vector or string in the form '<profile>.<stereotype>'.

Data Types: char | string

Compatibility Considerations

setDefaultConnectorStereotype function has been removed
Errors starting in R2021b

The setDefaultConnectorStereotype function has been removed in R2021b. Use setDefaultElementStereotype instead.

See Also

applyStereotype | removeStereotype | setDefaultElementStereotype

Topics
“Define Profiles and Stereotypes”

Introduced in R2019a

setDefaultElementStereotype

Package: `systemcomposer.profile`

Set default stereotype for elements

Syntax

`setDefaultElementStereotype(stereotype,elementType,stereotypeName)`

Description

`setDefaultElementStereotype(stereotype,elementType,stereotypeName)` specifies the default stereotype `stereotypeName` of the child elements whose parent element of type `elementType` has the stereotype `stereotype` applied.

Examples

Set Default Component Stereotype

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Set the default component stereotype.

```
nodeLatency.setDefaultElementStereotype("Component","LatencyProfile.NodeLatency")
```

Create a model, apply the profile to the model, and add a parent component. Apply the parent component stereotype on the parent component. Then, open the **Profile Editor**.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
arch.applyProfile("LatencyProfile");
newComponent = addComponent(arch.Architecture,"Component");
newComponent.applyStereotype("LatencyProfile.NodeLatency");
systemcomposer.profile.editor(profile)
```

Create a child component and get the stereotypes on the child component.

```
childComponent = addComponent(newComponent.Architecture,"Child");
stereotypes = getStereotypes(childComponent)
```

```
stereotypes = 

  1×1 cell array

    {'LatencyProfile.NodeLatency'}
```

Set Default Port Stereotype

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Set the default port stereotype.

```
nodeLatency.setDefaultElementStereotype("Port","LatencyProfile.PortLatency");
```

Create a model, apply the profile to the model, and add a parent component. Apply the parent component stereotype on the parent component. Then, open the **Profile Editor**.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
arch.applyProfile("LatencyProfile");
newComponent = addComponent(arch.Architecture,"Component");
newComponent.applyStereotype("LatencyProfile.NodeLatency");
systemcomposer.profile.editor(profile)
```

Create an architecture port on the component and get the stereotypes on the port.

```
port = addPort(newComponent.Architecture,"testSig","out");
stereotypes = getStereotypes(port)
```

```
stereotypes = 

  1×1 cell array

    {'LatencyProfile.PortLatency'}
```

Set Default Connector Stereotype

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Set the default connector stereotype.

```
nodeLatency.setDefaultElementStereotype('Connector','LatencyProfile.ConnectorLatency');
```

Create a model, apply the profile to the model, and add a parent component. Apply the parent component stereotype on the parent component. Then, open the **Profile Editor**.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
arch.applyProfile("LatencyProfile");
newComponent = addComponent(arch.Architecture,"Component");
newComponent.applyStereotype("LatencyProfile.NodeLatency");
systemcomposer.profile.editor(profile)
```

Create two child components. Add ports. Then, create a connection between the ports and get stereotypes on the connector.

```
childComponent1 = addComponent(newComponent.Architecture,"Child1");
childComponent2 = addComponent(newComponent.Architecture,"Child2");

outPort1 = addPort(childComponent1.Architecture,"testSig","out");
inPort1 = addPort(childComponent2.Architecture,"testSig","in");
srcPort = getPort(childComponent1,"testSig");
destPort = getPort(childComponent2,"testSig");

connector = connect(srcPort,destPort);
stereotypes = getStereotypes(connector)
```

```
stereotypes =

  1×1 cell array

    {'LatencyProfile.ConnectorLatency'}
```

Input Arguments

stereotype — Stereotype
stereotype object

Stereotype, specified as a `systemcomposer.profile.Stereotype` object.

`elementType` — Element type
`"Component"` | `"Port"` | `"Connector"` | `"Interface"` | `"Function"`

Element type, specified as `"Component"`, `"Port"`, `"Connector"`, `"Interface"`, or `"Function"`. The element type `"Function"` is only available for software architectures.

Data Types: `char` | `string`

`stereotypeName` — Default stereotype name
character vector | string

Default stereotype name for child elements, specified as a character vector or string in the form `"<profile>.<stereotype>"`.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`applyStereotype` | `getDefaultElementStereotype` | `removeStereotype`

Topics

"Define Profiles and Stereotypes"

Introduced in R2021b

setDefaultPortStereotype

Package: systemcomposer.profile

(Removed) Set default stereotype for ports

Note The setDefaultPortStereotype function has been removed. You can set a default port stereotype using the function setDefaultElementStereotype. For further details, see "Compatibility Considerations".

Syntax

```
setDefaultPortStereotype(stereotype,stereotypeName)
```

Description

setDefaultPortStereotype(stereotype,stereotypeName) specifies the default stereotype stereotypeName of the ports on the architecture of a parent component that has stereotype applied.

Input Arguments

stereotype — Stereotype
stereotype object

Stereotype, specified as a systemcomposer.profile.Stereotype object.

stereotypeName — Default stereotype name
character vector | string

Default stereotype name for ports, specified as a character vector or string in the form '<profile>.<stereotype>'.

Data Types: char | string

Compatibility Considerations

setDefaultPortStereotype function has been removed
Errors starting in R2021b

The setDefaultPortStereotype function has been removed in R2021b. Use setDefaultElementStereotype instead.

See Also

applyStereotype | removeStereotype | setDefaultElementStereotype

Topics
"Define Profiles and Stereotypes"

Introduced in R2019a

setDefaultStereotype

Package: systemcomposer.profile

Set default stereotype for profile

Syntax

setDefaultStereotype(profile,name)

Description

setDefaultStereotype(profile,name) sets the default stereotype with name name for a profile profile. The stereotype must apply to components.

Examples

Set Default Stereotype

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Set the default stereotype.

```
profile.setDefaultStereotype("NodeLatency")
```

Create a model and apply the profile to the model. Open the **Profile Editor**.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
arch.applyProfile(LatencyProfile);
systemcomposer.profile.editor
```

Get stereotypes on the root architecture.

```
stereotypes = getStereotypes(arch.Architecture)
```

```
stereotypes =
```

```
1×1 cell array

  {'LatencyProfile.NodeLatency'}
```

Input Arguments

`profile` — Profile
profile object

Profile, specified as a `systemcomposer.profile.Profile` object.

`name` — Stereotype name
character vector | string

Stereotype name, specified as a character vector or string. The name of the stereotype must be unique within the profile.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`createProfile` | `getDefaultStereotype` | `addStereotype` | `getStereotype` | `removeStereotype`

Topics

"Create a Profile and Add Stereotypes"

Introduced in R2019a

setDescription

Package: systemcomposer

Set description for value type

Syntax

`setDescription(valueType,description)`

Description

`setDescription(valueType,description)` sets the description for the designated value type.

Examples

Set Description for Value Type

Create a model `archModel`.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
```

Add a value type `airSpeed` to the interface dictionary of the model.

```
airSpeedType = arch.InterfaceDictionary.addValueType("airSpeed");
```

Set the description for the value type as `Maintain altitude`.

```
airSpeedType.setDescription("Maintain altitude")
```

Input Arguments

valueType — Value type, data element, or function argument
value type object | data element object | function argument object

Value type, data element, or function argument, specified as a `systemcomposer.ValueType`, `systemcomposer.interface.DataElement`, or `systemcomposer.interface.FunctionArgument` object.

description — Description
character vector | string

Description, specified as a character vector or string.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`createModel` | `addValueType` | `addElement` | `addInterface` | `createInterface` | `createOwnedType`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2021b

setDimensions

Package: `systemcomposer`

Set dimensions for value type

Syntax

`setDimensions(valueType,dimensions)`

Description

`setDimensions(valueType,dimensions)` sets the dimensions for the designated value type.

Examples

Set Dimensions for Value Type

Create a model `archModel`.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
```

Add a value type `airSpeed` to the interface dictionary of the model.

```
airSpeedType = arch.InterfaceDictionary.addValueType("airSpeed");
```

Set the dimensions for the value type as `2`.

```
airSpeedType.setDimensions("2")
```

Input Arguments

`valueType` — Value type, data element, or function argument
value type object | data element object | function argument object

Value type, data element, or function argument, specified as a `systemcomposer.ValueType`, `systemcomposer.interface.DataElement`, or `systemcomposer.interface.FunctionArgument` object.

`dimensions` — Dimensions
character vector | string

Dimensions, specified as a character vector or string.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`createModel` | `addValueType` | `addElement` | `addInterface` | `createInterface` | `createOwnedType`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

setFunctionPrototype

Package: `systemcomposer.interface`

Set prototype for function element

Syntax

```
setFunctionPrototype(functionElem,prototype)
```

Description

`setFunctionPrototype(functionElem,prototype)` sets the prototype `prototype` for a function represented by the function element object `functionElem`. Use prototypes to add, remove, and rename the arguments of a function element.

Examples

Set Function Prototype

Create a new model.

```
model = systemcomposer.createModel("archModel","SoftwareArchitecture",true)
```

Create a service interface.

```
interface = addServiceInterface(model.InterfaceDictionary,"newServiceInterface")
```

Create a function element.

```
element = addElement(interface,"f0")
```

Set the function prototype.

```
setFunctionPrototype(element,"y=f0(u)")
```

Input Arguments

`functionElem` — Function element
function element object

Function element, specified as a `systemcomposer.interface.FunctionElement` object.

`prototype` — Prototype
character vector | string

Prototype, specified as a character vector or string in the form `[y1,y2]=f0(u1,u2)` where `y1` and `y2` are output arguments, `u1` and `u2` are input arguments, and f0 is the name of the `functionElem` object.

Example: `"y=f0(u1,u2)"`

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
software architecture	A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.	Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.	• "Author Software Architectures" • "Simulate and Deploy Software Architectures"
software component	A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.	Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.	• "Implement Behaviors for Architecture Model Simulation" • "Create Software Architecture from Component"
software composition	A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.	Encapsulate functionality by aggregating or nesting multiple software components or compositions.	"Modeling the Software Architecture of a Throttle Position Control System"
software function	A software function is an entry point that can be defined in a software component.	You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.	"Author and Extend Functions for Software Architectures"
class diagram	A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.	Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.	"Class Diagram View of Software Architectures"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"

Term	Definition	Application	More Information
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`addElement` | `createDictionary` | `addServiceInterface` | `getInterface` | `getInterfaceNames` | `removeInterface` | `linkDictionary` | Adapter | `addValueType` | `getFunctionArgument`

Topics

“Author Service Interfaces for Client-Server Communication”
“Client-Server Interfaces in the Class Diagram View”
“Define Port Interfaces Between Components”

Introduced in R2022a

setInterface

Package: systemcomposer.arch

Set interface for port

Syntax

setInterface(port,interface)

Description

setInterface(port,interface) sets the interface for a port.

Examples

Set Interface for Port and Remove Interface on Port

Create a model and get the root architecture.

```
model = systemcomposer.createModel("archModel",true);
rootArch = get(model,"Architecture");
```

Add a component and add a port to the component.

```
newComponent = addComponent(rootArch,"newComponent");
newPort = addPort(newComponent.Architecture,"newPort","in");
```

Add a data interface and set the interface for the port.

```
newInterface = addInterface(model.InterfaceDictionary,"newInterface");
setInterface(newPort,newInterface)
```

Remove the data interface on the port.

```
newPort.setInterface("")
```

Input Arguments

port — Port
port object

Port, specified as a systemcomposer.arch.ArchitecturePort or systemcomposer.arch.ComponentPort object.

interface — Interface
data interface object | value type object | physical interface object | service interface object | empty string | empty character vector

Interface to set, specified as a systemcomposer.interface.DataInterface, systemcomposer.ValueType, systemcomposer.interface.PhysicalInterface, or systemcomposer.interface.ServiceInterface object. Passing in an empty string or character vector removes the interface on the port.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`createModel` | `addValueType` | `addElement` | `addInterface` | `addPhysicalInterface` | `addServiceInterface`

Topics

"Specify Physical Interfaces on Ports"
"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

setMaximum

Package: `systemcomposer`

Set maximum for value type

Syntax

`setMaximum(valueType,maximum)`

Description

`setMaximum(valueType,maximum)` sets the maximum for the designated value type.

Examples

Set Maximum for Value Type

Create a model `archModel`.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
```

Add a value type `airSpeed` to the interface dictionary of the model.

```
airSpeedType = arch.InterfaceDictionary.addValueType("airSpeed");
```

Set the maximum for the value type as `100`.

```
airSpeedType.setMaximum("100")
```

Input Arguments

`valueType` — Value type, data element, or function argument
value type object | data element object | function argument object

Value type, data element, or function argument, specified as a `systemcomposer.ValueType`, `systemcomposer.interface.DataElement`, or `systemcomposer.interface.FunctionArgument` object.

`maximum` — Maximum
character vector | string

Maximum, specified as a character vector or string.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`createModel` | `addValueType` | `addElement` | `addInterface` | `createInterface` | `createOwnedType`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

setMinimum

Package: systemcomposer

Set minimum for value type

Syntax

setMinimum(valueType,minimum)

Description

setMinimum(valueType,minimum) sets the minimum for the designated value type.

Examples

Set Minimum for Value Type

Create a model archModel.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
```

Add a value type airSpeed to the interface dictionary of the model.

```
airSpeedType = arch.InterfaceDictionary.addValueType("airSpeed");
```

Set the minimum for the value type as 0.

```
airSpeedType.setMinimum("0")
```

Input Arguments

valueType — Value type, data element, or function argument
value type object | data element object | function argument object

Value type, data element, or function argument, specified as a systemcomposer.ValueType, systemcomposer.interface.DataElement, or systemcomposer.interface.FunctionArgument object.

minimum — Minimum
character vector | string

Minimum, specified as a character vector or string.

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`createModel` | `addValueType` | `addElement` | `addInterface` | `createInterface` | `createOwnedType`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

setName

Package: systemcomposer.arch

Set name for port

Syntax

setName(port,name)

Description

setName(port,name) sets the name for the designated port.

Examples

Set New Name for Port

Create a model, get the root architecture, add a component, add a port, and set a new name for the port.

```
model = systemcomposer.createModel("archModel",true);
rootArch = get(model,"Architecture");
newComponent = addComponent(rootArch,"newComponent");
newPort = addPort(newComponent.Architecture,"newCompPort","in");
setName(newPort,"compPort")
```

Input Arguments

port — Port
port object

Port, specified as a systemcomposer.arch.ArchitecturePort or systemcomposer.arch.ComponentPort object.

name — Name of port
character vector | string

Name of port, specified as a character vector or string.

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

See Also

Component | `systemcomposer.arch.ArchitecturePort` | `systemcomposer.arch.ComponentPort`

Introduced in R2019a

setName

Package: `systemcomposer.interface`

Set name for value type, function argument, interface, or element

Syntax

`setName(interfaceElem,name)`

Description

`setName(interfaceElem,name)` sets the name for the designated value type, interface, element, or function argument.

Examples

Set Name for Data Element

Create a model `archModel`.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
```

Add a data interface, then create an data element `x`.

```
interface = arch.InterfaceDictionary.addInterface("interface");
elem = interface.addElement("x");
```

Set a new name for the data element as `newName`.

```
setName(elem,"newName");
```

Input Arguments

`interfaceElem` — Value type, function argument, interface, or element
data interface object | data element object | physical interface object | physical element object | value type object | service interface object | function element object | function argument object

Value type, function argument, interface, or element to be named, specified as a `systemcomposer.interface.DataInterface`, `systemcomposer.interface.DataElement`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.PhysicalElement`, `systemcomposer.ValueType`, `systemcomposer.interface.ServiceInterface`, `systemcomposer.interface.FunctionElement`, or `systemcomposer.interface.FunctionArgument` object.

name — Name
character vector | string

Name of value type, function argument, interface, or element, specified as a character vector or string. This name must be a valid MATLAB identifier.

Example: "newName"

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"

<table>
<tr><th>Term</th><th>Definition</th><th>Application</th><th>More Information</th></tr>
<tr><td>value type</td><td>A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.</td><td>You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the Interface Editor so that you can reuse the value types as interfaces or data elements.</td><td>“Create Value Types as Interfaces”</td></tr>
<tr><td>owned interface</td><td>An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.</td><td>Create an owned interface to represent a value type or data interface that is local to a port.</td><td>“Define Owned Interfaces Local to Ports”</td></tr>
<tr><td>adapter</td><td>An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.</td><td>With an adapter, you can perform functions on the “Interface Adapter” dialog:
Create and edit mappings between input and output interfaces.
Apply an interface conversion <code>UnitDelay</code> to break an algebraic loop.
Apply an interface conversion <code>RateTransition</code> to reconcile different sample time rates for reference models.
When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.</td><td>“Interface Adapter”
Adapter</td></tr>
</table>

See Also

`createModel` | `addElement` | `addInterface` | `addPhysicalInterface` | `addValueType` | `addServiceInterface`

Topics

“Specify Physical Interfaces on Ports”
“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2019a

setParameterValue

Package: `systemcomposer.arch`

Set value of parameter

Syntax

`setParameterValue(element,paramName,value,unit)`

Description

`setParameterValue(element,paramName,value,unit)` sets the parameter value specified by `value` and, optionally, the parameter units `unit` for a specified parameter name, `paramName`, on an architectural element, `element`.

Examples

Modify Parameters for Axle Architecture

This example shows a wheel axle architecture model with instance-specific parameters exposed in System Composer™. These parameters are defined as model arguments on the Simulink® reference model used as a model behavior linked to two System Composer components. You can change the values of these parameters independently on each reference component.

Open `mAxleArch` Architecture Model

Open the architecture model of the wheel axle `mAxleArch` to interact with the parameters on the reference components using the Property Inspector.

```
model = systemcomposer.openModel("mAxleArch");
```

Look Up `RightWheel` and `LeftWheel` Components

Look up the `Component` objects for the `RightWheel` and `LeftWheel` components.

```
rightWheelComp = lookup(model,Path="mAxleArch/RightWheel");
leftWheelComp = lookup(model,Path="mAxleArch/LeftWheel");
```

Get Parameter Names on `RightWheel` Component

Get the parameter names for the `RightWheel` component. Since the `LeftWheel` component is linked to the same reference model `mWheel`, the parameters are the same on the `LeftWheel` component.

```
paramNames = rightWheelComp.getParameterNames
```

```
paramNames = 1×3 string
    "Pressure"    "Diameter"    "Wear"
```

Get Parameter Definition on `RightWheel` Component for `Pressure` Parameter

Get the parameter definition for the `Pressure` parameter on the `RightWheel` component architecture.

```
paramDefinition = rightWheelComp.Architecture.getParameterDefinition(paramNames(1))
```

```
paramDefinition = 
  ParameterDefinition with properties:

           Name: 'Pressure'
           Type: 'double'
           Unit: 'psi'
     Complexity: 'real'
     Dimensions: '[1  1]'
          Value: '32'
            Min: ''
            Max: ''
    Description: ''
          Owner: [1×1 systemcomposer.arch.Architecture]
```

Get Parameter Values for `RightWheel` and `LeftWheel` Components

Get the parameter values for the `RightWheel` and `LeftWheel` components.

`RightWheel` Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = rightWheelComp.getParameterValue(paramNames(i))
end
```

```
Right Wheel Parameters

paramName = 
"Pressure"

paramValue = 
'31'

paramUnits = 
'psi'

isDefault = logical
   0


paramName = 
"Diameter"

paramValue = 
'16'

paramUnits = 
'in'

isDefault = logical
   1
```

```
paramName = 
"Wear"

paramValue = 
'0.25'

paramUnits = 
'in'

isDefault = logical
   1
```

LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 
'32'

paramUnits = 
'psi'

isDefault = logical
   1


paramName = 
"Diameter"

paramValue = 
'15'

paramUnits = 
'in'

isDefault = logical
   0


paramName = 
"Wear"

paramValue = 
'0.23'

paramUnits = 
'in'

isDefault = logical
   0
```

Get Evaluated Parameter Values for RightWheel and LeftWheel Components

Get the evaluated parameter values for the RightWheel and LeftWheel components.

Evaluated RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = rightWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 31

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 16

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2500

paramUnits = 
'in'
```

Evaluated LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = leftWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 32

paramUnits = 
'psi'

paramName = 
"Diameter"

paramValue = 15

paramUnits = 
'in'

paramName = 
"Wear"

paramValue = 0.2300
```

```
paramUnits =
'in'
```

Set Parameter Value and Units for `Pressure` Parameter on `LeftWheel` Component

Set the parameter value and unit for the `PSI` parameter on the `LeftWheel` component.

Current Values for `Pressure` on `LeftWheel`

```
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'32'

paramUnits =
'psi'

isDefault = logical
   1
```

New Values for `Pressure` on `LeftWheel`

```
leftWheelComp.setParameterValue("Pressure","2000")
leftWheelComp.setUnit("Pressure","mbar")
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'2000'

paramUnits =
'mbar'

isDefault = logical
   0
```

Revert `Pressure` Parameter on `LeftWheel` to Default Value

```
leftWheelComp.resetParameterToDefault("Pressure")
```

Save Models

```
model = systemcomposer.loadModel("mWheelArch");
save(model)
topModel = systemcomposer.loadModel("mAxleArch");
save(topModel)
```

Input Arguments

`element` — Architectural element
architecture object | component object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, or `systemcomposer.arch.VariantComponent` object.

`paramName` — Parameter name
character vector | string

Parameter name, specified as a character vector or string.

Example: `"GainArg"`

Data Types: `char` | `string`

`value` — Parameter value
character vector | string

Parameter value, specified as a character vector or string.

Data Types: `char` | `string`

`unit` — Units of parameter
character vector | string

Units of parameter, specified as a character vector or string. You can change the units of a parameter only if the parameter definition specifies a unit.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"

Term	Definition	Application	More Information
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• “Describe Component Behavior Using Simulink” • “Create Reference Architecture”
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	“Access Model Arguments as Parameters on Reference Components”
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	“Use Parameters to Store Instance Values with Components”
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• “Create Simulink Subsystem Behavior Using Subsystem Component” • “Create Simulink Subsystem Component”

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`getEvaluatedParameterValue` | `getParameterDefinition` | `getParameterNames` | `getParameterValue` | `setUnit` | `resetParameterToDefault`

Topics

"Access Model Arguments as Parameters on Reference Components"
"Use Parameters to Store Instance Values with Components"

Introduced in R2022a

setProperty

Package: systemcomposer.arch

Set property value corresponding to stereotype applied to element

Syntax

```
setProperty(element,propertyName,propertyValue,propertyUnits)
```

Description

setProperty(element,propertyName,propertyValue,propertyUnits) sets the value and units of the property specified in the propertyName argument. Set the property corresponding to an applied stereotype by qualified name "<profile>.<stereotype>.<property>".

Examples

Apply a Stereotype and Set Numeric Property Value

In this example, weight is a property of the stereotype sysComponent.

Create a model with a component called "Component".

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Create a profile with a stereotype and properties, open the **Profile Editor**, then apply the profile to the model.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");
latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");
systemcomposer.profile.editor(profile)
model.applyProfile("LatencyProfile");
```

Apply the stereotype to the component, and set a new weight property.

```
applyStereotype(comp,"sysProfile.sysComponent")
setProperty(comp,"sysProfile.sysComponent.weight","5","g")
```

Apply a Stereotype and Set String Property Value

In this example, description is a property of the stereotype sysComponent.

Create a model with a component called Component.

```
model = systemcomposer.createModel("archModel",true);
arch = get(model,"Architecture");
comp = addComponent(arch,"Component");
```

Create a profile with a stereotype, then apply the profile to the model. Open the **Profile Editor**.

```
profile = systemcomposer.profile.Profile.createProfile("sysProfile");
base = profile.addStereotype("sysComponent");
base.addProperty("description",Type="string");
model.applyProfile("sysProfile");
systemcomposer.profile.editor
```

Apply the stereotype to the component, and set a new description property.

```
applyStereotype(comp,"sysProfile.sysComponent")
expression = sprintf("'%s'","component description")
setProperty(comp,"sysProfile.sysComponent.description",expression)
```

Set Property Value on Existing Component

Set the `AutoProfile.System.Cost` property on the `FOB Locator System` component.

Launch the keyless entry system project.

```
scKeylessEntrySystem
```

Load the model and find the `FOB Locator System` component.

```
model = systemcomposer.loadModel("KeylessEntryArchitecture");
comp = lookup(model,Path="KeylessEntryArchitecture/FOB Locator System");
```

Set the `Cost` property on the component.

```
setProperty(comp,"AutoProfile.System.Cost","200","USD")
```

Input Arguments

`element` — Architectural element
architecture object | component object | port object | connector object | physical connector object | data interface object | value type object | physical interface object | service interface object | function object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, `systemcomposer.arch.VariantComponent`, `systemcomposer.arch.ComponentPort`, `systemcomposer.arch.ArchitecturePort`, `systemcomposer.arch.Connector`, `systemcomposer.arch.PhysicalConnector`, `systemcomposer.interface.DataInterface`, `systemcomposer.ValueType`, `systemcomposer.interface.PhysicalInterface`, `systemcomposer.interface.ServiceInterface`, or `systemcomposer.arch.Function` object.

`propertyName` — Name of property
character vector | string

Name of property, specified as a character vector or string in the form `'<profile>.<stereotype>.<property>'`.

Data Types: `char` | `string`

`propertyValue` — Value of property
character vector | string

Value of property, specified as a character vector or string. Specify string values in the form `sprintf("'%s'",'<contents of string>')`. For more information, see “Apply a Stereotype and Set String Property Value” on page 3-660.

Data Types: `char` | `string`

`propertyUnits` — Units of property
character vector | string

Units of property to interpret property values, specified as a character vector or string.

Data Types: `char` | `string`

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	“Compose Architecture Visually”
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	“Create Architecture Model with Interfaces and Requirement Links”

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	“Components”
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	“Ports”
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	“Connections”

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

Term	Definition	Application	More Information
physical subsystem	A physical subsystem is a Simulink subsystem with Simscape connections.	A physical subsystem with Simscape connections uses a physical network approach suited for simulating systems with real physical components and represents a mathematical model.	"Describe Component Behavior Using Simscape"
physical port	A physical port represents a Simscape physical modeling connector port called a Connection Port.	Use physical ports to connect components in an architecture model or to enable physical systems in a Simulink subsystem.	"Define Physical Ports on Component"

Term	Definition	Application	More Information
physical connector	A physical connector can represent a nondirectional conserving connection of a specific physical domain. Connectors can also represent physical signals.	Use physical connectors to connect physical components that represent features of a system to simulate mathematically.	"Architecture Model with Simscape Behavior for a DC Motor"
physical interface	A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.	Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.	"Specify Physical Interfaces on Ports"
physical element	A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.	Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.	"Describe Component Behavior Using Simscape"

See Also

`getProperty` | `addProperty` | `removeProperty`

Topics

"Set Properties for Analysis"

Introduced in R2019a

setType

Package: systemcomposer.interface

Set shared type on data element or function argument

Syntax

```
setType(dataElement,type)
```

Description

`setType(dataElement,type)` sets a type on a data element or a function argument.

Examples

Set Value Type on Data Element

```
model = systemcomposer.createModel("archModel",true);
dictionary = model.InterfaceDictionary;
airspeedType = dictionary.addValueType("AirSpeed");
port = model.Architecture.addPort("inPort","in");
interface = port.createInterface("DataInterface");
element = interface.addElement("newElement");
element.setType(airspeedType)
```

Open the **Interface Editor** from the **Modeling > Design** menu. Observe the new value type `AirSpeed` under the model `archModel.slx` interface dictionary. Switch from `Dictionary View` to `Port Interface View` on the right. Observe the owned data element on the port interface `inPort` called `newElement` with `Type` defined as `AirSpeed`.

Input Arguments

`dataElement` — Data element or function argument
data element object | function argument object

Data element, specified as a `systemcomposer.interface.DataElement` or `systemcomposer.interface.FunctionArgument` object.

`type` — Type
data interface object | value type object

Type, specified as a `systemcomposer.interface.DataInterface`, for data elements only, or `systemcomposer.ValueType` object.

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`addValueType` | `createModel` | `addInterface` | `createOwnedType` | `createInterface` | `removeInterface`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

setUnit

Package: `systemcomposer.arch`

Set units on parameter value

Syntax

```
setUnit(element,paramName,unit)
```

Description

`setUnit(element,paramName,unit)` sets the units specified by `unit` on the parameter value for the parameter specified by `paramName` for the architectural element, `element`.

Examples

Modify Parameters for Axle Architecture

This example shows a wheel axle architecture model with instance-specific parameters exposed in System Composer™. These parameters are defined as model arguments on the Simulink® reference model used as a model behavior linked to two System Composer components. You can change the values of these parameters independently on each reference component.

Open `mAxleArch` Architecture Model

Open the architecture model of the wheel axle `mAxleArch` to interact with the parameters on the reference components using the Property Inspector.

```
model = systemcomposer.openModel("mAxleArch");
```

Look Up `RightWheel` and `LeftWheel` Components

Look up the `Component` objects for the `RightWheel` and `LeftWheel` components.

```
rightWheelComp = lookup(model,Path="mAxleArch/RightWheel");
leftWheelComp = lookup(model,Path="mAxleArch/LeftWheel");
```

Get Parameter Names on `RightWheel` Component

Get the parameter names for the `RightWheel` component. Since the `LeftWheel` component is linked to the same reference model `mWheel`, the parameters are the same on the `LeftWheel` component.

```
paramNames = rightWheelComp.getParameterNames
```

```
paramNames = 1×3 string
    "Pressure"    "Diameter"    "Wear"
```

Get Parameter Definition on RightWheel Component for Pressure Parameter

Get the parameter definition for the Pressure parameter on the RightWheel component architecture.

```
paramDefinition = rightWheelComp.Architecture.getParameterDefinition(paramNames(1))
```

```
paramDefinition = 
  ParameterDefinition with properties:

           Name: 'Pressure'
           Type: 'double'
           Unit: 'psi'
     Complexity: 'real'
     Dimensions: '[1  1]'
          Value: '32'
            Min: ''
            Max: ''
    Description: ''
          Owner: [1×1 systemcomposer.arch.Architecture]
```

Get Parameter Values for RightWheel and LeftWheel Components

Get the parameter values for the RightWheel and LeftWheel components.

RightWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = rightWheelComp.getParameterValue(paramNames(i))
end
```

```
Right Wheel Parameters

paramName = 
"Pressure"

paramValue = 
'31'

paramUnits = 
'psi'

isDefault = logical
   0


paramName = 
"Diameter"

paramValue = 
'16'

paramUnits = 
'in'

isDefault = logical
   1
```

```
paramName = 
"Wear"

paramValue = 
'0.25'

paramUnits = 
'in'

isDefault = logical
   1
```

LeftWheel Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue(paramNames(i))
end
```

```
paramName = 
"Pressure"

paramValue = 
'32'

paramUnits = 
'psi'

isDefault = logical
   1


paramName = 
"Diameter"

paramValue = 
'15'

paramUnits = 
'in'

isDefault = logical
   0


paramName = 
"Wear"

paramValue = 
'0.23'

paramUnits = 
'in'

isDefault = logical
   0
```

Get Evaluated Parameter Values for `RightWheel` and `LeftWheel` Components

Get the evaluated parameter values for the `RightWheel` and `LeftWheel` components.

Evaluated `RightWheel` Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = rightWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName =
"Pressure"

paramValue = 31

paramUnits =
'psi'

paramName =
"Diameter"

paramValue = 16

paramUnits =
'in'

paramName =
"Wear"

paramValue = 0.2500

paramUnits =
'in'
```

Evaluated `LeftWheel` Parameters

```
for i = 1:length(paramNames)
    paramName = paramNames(i)
    [paramValue,paramUnits] = leftWheelComp.getEvaluatedParameterValue(paramNames(i))
end
```

```
paramName =
"Pressure"

paramValue = 32

paramUnits =
'psi'

paramName =
"Diameter"

paramValue = 15

paramUnits =
'in'

paramName =
"Wear"

paramValue = 0.2300
```

```
paramUnits =
'in'
```

Set Parameter Value and Units for `Pressure` Parameter on `LeftWheel` Component

Set the parameter value and unit for the `PSI` parameter on the `LeftWheel` component.

Current Values for `Pressure` on `LeftWheel`

```
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'32'

paramUnits =
'psi'

isDefault = logical
   1
```

New Values for `Pressure` on `LeftWheel`

```
leftWheelComp.setParameterValue("Pressure","2000")
leftWheelComp.setUnit("Pressure","mbar")
[paramValue,paramUnits,isDefault] = leftWheelComp.getParameterValue("Pressure")
```

```
paramValue =
'2000'

paramUnits =
'mbar'

isDefault = logical
   0
```

Revert `Pressure` Parameter on `LeftWheel` to Default Value

```
leftWheelComp.resetParameterToDefault("Pressure")
```

Save Models

```
model = systemcomposer.loadModel("mWheelArch");
save(model)
topModel = systemcomposer.loadModel("mAxleArch");
save(topModel)
```

Input Arguments

`element` — Architectural element

architecture object | component object

Architectural element, specified as a `systemcomposer.arch.Architecture`, `systemcomposer.arch.Component`, or `systemcomposer.arch.VariantComponent` object.

`paramName` — Parameter name

character vector | string

Parameter name, specified as a character vector or string.

Example: "GainArg"

Data Types: char | string

unit — Units of parameter
character vector | string

Units of parameter, specified as a character vector or string. You can change the units of a parameter only if the parameter definition specifies a unit.

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"

Term	Definition	Application	More Information
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
reference component	A reference component is a component whose definition is a separate architecture model, Simulink behavior model, or Simulink subsystem behavior. A reference component represents a logical hierarchy of other compositions.	You can reuse compositions in the model using reference components. There are three types of reference components: • *Model references* are Simulink models. • *Subsystem references* are Simulink subsystems. • *Architecture references* are System Composer architecture models.	• “Describe Component Behavior Using Simulink” • “Create Reference Architecture”
parameter definition	A parameter definition is the definition of a property that has instance semantics. A parameter definition specifies attributes such as name, data type, default value, and units.	Parameter definitions can be specified as model arguments on a Simulink model or a System Composer architecture model.	“Access Model Arguments as Parameters on Reference Components”
parameter	A parameter is an instance-specific value of a parameter definition. A parameter captures instance-specific values and units.	Parameters are available for each component linking to a model reference or architecture reference that specifies model arguments. You can specify independent values for a parameter on each component.	“Use Parameters to Store Instance Values with Components”
subsystem component	A subsystem component is a Simulink subsystem that is part of the parent System Composer architecture model.	Add Simulink subsystem behavior to a component to author a subsystem component in System Composer. You cannot synchronize and reuse subsystem components as Reference Component blocks because the component is part of the parent model.	• “Create Simulink Subsystem Behavior Using Subsystem Component” • “Create Simulink Subsystem Component”

Term	Definition	Application	More Information
state chart	A state chart diagram demonstrates the state-dependent behavior of a component throughout its state lifecycle and the events that can trigger a transition between states.	Add Stateflow chart behavior to describe a component using state machines. You cannot synchronize and reuse Stateflow chart behaviors as Reference Component blocks because the component is part of the parent model.	• "Implement Behaviors for Architecture Model Simulation" • "Describe Component Behavior Using Stateflow Charts"

See Also

`getEvaluatedParameterValue` | `getParameterDefinition` | `getParameterNames` | `getParameterValue` | `setParameterValue` | `resetParameterToDefault`

Topics

"Access Model Arguments as Parameters on Reference Components"
"Use Parameters to Store Instance Values with Components"

Introduced in R2022a

setUnits

Package: systemcomposer

Set units for value type

Syntax

setUnits(valueType,units)

Description

setUnits(valueType,units) sets the units for the designated value type.

Examples

Set Units for Value Type

Create a model archModel.

```
modelName = "archModel";
arch = systemcomposer.createModel(modelName,true);
```

Add a value type airSpeed to the interface dictionary of the model.

```
airSpeedType = arch.InterfaceDictionary.addValueType("airSpeed");
```

Set the units for the value type as m/s.

```
airSpeedType.setUnits("m/s")
```

Input Arguments

valueType — Value type, data element, or function argument
value type object | data element object | function argument object

Value type, data element, or function argument, specified as a systemcomposer.ValueType, systemcomposer.interface.DataElement, or systemcomposer.interface.FunctionArgument object.

units — Units
character vector | string

Units, specified as a character vector or string.

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"

Term	Definition	Application	More Information
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	“Define Owned Interfaces Local to Ports”
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the “Interface Adapter” dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• “Interface Adapter” • Adapter

See Also

`createModel` | `addValueType` | `addElement` | `addInterface` | `createInterface` | `createOwnedType`

Topics

“Create Interfaces”
“Manage Interfaces with Data Dictionaries”

Introduced in R2021b

setValue

Package: systemcomposer.analysis

Set value of property for element instance

Syntax

setValue(instance,property,value)

Description

setValue(instance,property,value) sets the property property of the instance instance to the value specified by value.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The instance refers to the element instance on which the iteration is being performed.

Examples

Set Mass Property Value

Load the small unmanned aerial vehicle (UAV) model, create an architecture instance, and set the mass property value of a nested component. Get the new value to confirm the change.

```
scExampleSmallUAV
model = systemcomposer.loadModel("scExampleSmallUAVModel");
instance = instantiate(model.Architecture,"UAVComponent","NewInstance");
setValue(instance.Components(1).Components(1),...
"UAVComponent.OnboardElement.Mass",2);
[massValue,unit] = getValue(instance.Components(1).Components(1),...
"UAVComponent.OnboardElement.Mass")
```

```
massValue = 2

unit =
'kg'
```

Input Arguments

instance — Element instance

architecture instance | component instance | port instance | connector instance

Element instance, specified as a systemcomposer.analysis.ArchitectureInstance, systemcomposer.analysis.ComponentInstance, systemcomposer.analysis.PortInstance, or systemcomposer.analysis.ConnectorInstance object.

property — Property
character vector | string

Property, specified in the form "<profile>.<stereotype>.<property>".

Data Types: char | string

value — Property value
double (default) | single | int64 | int32 | int16 | int8 | uint64 | uint32 | uint8 | boolean | string | enumeration class name

Property value, specified as a data type that depends on how the property is defined in the profile.

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a MAT file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

Term	Definition	Application	More Information
stereotype	A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.	Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.	"Extend Architectural Design Using Stereotypes"
property	A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.	Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.	• "Set Properties" • "Add Properties with Stereotypes" • "Set Properties for Analysis"
profile	A profile is a package of stereotypes to create a self-consistent domain of element types.	Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.	• "Define Profiles and Stereotypes" • "Use Stereotypes and Profiles"

See Also

`getValue` | `hasValue` | `systemcomposer.analysis.Instance`

Topics

"Write Analysis Function"
"Modeling System Architecture of Small UAV"

Introduced in R2019a

synchronizeChanges

Package: systemcomposer.allocation

Synchronize changes of models in allocation set

Syntax

synchronizeChanges(allocSet)

Description

synchronizeChanges(allocSet) synchronizes any changes that have been made in the source or target models of the allocation set.

Examples

Synchronize Changes from Models in Allocation Set

This example shows how to synchronize changes for models used in an allocation set.

Create two new models with a component each.

```
mSource = systemcomposer.createModel('Source_Model_Allocation',true);
sourceComp = mSource.Architecture.addComponent('Source_Component');
mTarget = systemcomposer.createModel('Target_Model_Allocation',true);
targetComp = mTarget.Architecture.addComponent('Target_Component');
```

Create the allocation set with name MyAllocation.

```
allocSet = systemcomposer.allocation.createAllocationSet('MyAllocation',...
     'Source_Model_Allocation','Target_Model_Allocation');
```

Get the default allocation scenario.

```
defaultScenario = allocSet.getScenario('Scenario 1');
```

Allocate components between models.

```
allocation = defaultScenario.allocate(sourceComp,targetComp);
```

Update the models with new components.

```
sourceComp2 = mSource.Architecture.addComponent('Source_Component_2');
targetComp2 = mTarget.Architecture.addComponent('Target_Component_2');
```

Synchronize changes from models in allocation set

```
synchronizeChanges(allocSet)
```

Allocate new components between models

```
allocation2 = defaultScenario.allocate(sourceComp2,targetComp2);
```

Open the allocation editor.

```
systemcomposer.allocation.editor
```

Arrange the models so the components appear on the canvas.

```
Simulink.BlockDiagram.arrangeSystem('Source_Model_Allocation')
Simulink.BlockDiagram.arrangeSystem('Target_Model_Allocation')
```

Save the models and allocation set.

```
save(mSource)
save(mTarget)
save(allocSet)
```

Input Arguments

`allocSet` — Allocation set
allocation set object

Allocation set, specified as a `systemcomposer.allocation.AllocationSet` object.

More About

Definitions

Term	Definition	Application	More Information
allocation	An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.	Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.	"Allocate Architectures in Tire Pressure Monitoring System"
allocation scenario	An allocation scenario contains a set of allocations between a source and a target model.	Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.	"Create and Manage Allocations"
allocation set	An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.	Create an allocation set with allocation scenarios in the **Allocation Editor**.	"Systems Engineering Approach for SoC Applications"

See Also

`createScenario` | `deleteScenario` | `getScenario` | `load` | `systemcomposer.allocation.AllocationSet.find` | `closeAll` | `close`

Topics

"Create and Manage Allocations"

Introduced in R2020b

unlinkDictionary

Package: `systemcomposer.arch`

Unlink data dictionary from architecture model

Syntax

`unlinkDictionary(model)`

Description

`unlinkDictionary(model)` removes the association of the model from its data dictionary.

Examples

Unlink Data Dictionary

Unlink a data dictionary from a model.

```
model = systemcomposer.createModel("newModel",true);
dictionary = systemcomposer.createDictionary("newDictionary.sldd");
linkDictionary(model,"newDictionary.sldd")
save(dictionary)
save(model)
unlinkDictionary(model)
```

Input Arguments

`model` — Architecture model
model object

Architecture model, specified as a `systemcomposer.arch.Model` object.

More About

Definitions

Term	Definition	Application	More Information
architecture	A System Composer architecture represents a system of components and how they interface with each other structurally and behaviorally. You can represent specific architectures using alternate views.	Different types of architectures describe different aspects of systems: • *Functional architecture* describes the flow of data in a system. • *Logical architecture* describes the intended operation of a system. • *Physical architecture* describes the platform or hardware in a system.	"Compose Architecture Visually"
model	A System Composer model is the file that contains architectural information, including components, ports, connectors, interfaces, and behaviors.	Perform operations on a model: • Extract the root-level architecture contained in the model. • Apply profiles. • Link interface data dictionaries. • Generate instances from model architecture. A System Composer model is stored as an SLX file.	"Create Architecture Model with Interfaces and Requirement Links"
component	A component is a nontrivial, nearly independent, and replaceable part of a system that fulfills a clear function in the context of an architecture. A component defines an architectural element, such as a function, a system, hardware, software, or other conceptual entity. A component can also be a subsystem or subfunction.	Represented as a block, a component is a part of an architecture model that can be separated into reusable artifacts.	"Components"

Term	Definition	Application	More Information
port	A port is a node on a component or architecture that represents a point of interaction with its environment. A port permits the flow of information to and from other components or systems.	There are different types of ports: • *Component ports* are interaction points on the component to other components. • *Architecture ports* are ports on the boundary of the system, whether the boundary is within a component or the overall architecture model.	"Ports"
connector	Connectors are lines that provide connections between ports. Connectors describe how information flows between components or architectures.	A connector allows two components to interact without defining the nature of the interaction. Set an interface on a port to define how the components interact.	"Connections"

Term	Definition	Application	More Information
interface data dictionary	An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.	Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.	• "Manage Interfaces with Data Dictionaries" • "Reference Data Dictionaries"
data interface	A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.	Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.	• "Create Architecture Model with Interfaces and Requirement Links" • "Define Port Interfaces Between Components"

Term	Definition	Application	More Information
data element	A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.	Data interfaces are decomposed into data elements: • Pins or wires in a connector or harness. • Messages transmitted across a bus. • Data structures shared between components.	• "Create Interfaces" • "Assign Interfaces to Ports"
value type	A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.	You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.	"Create Value Types as Interfaces"
owned interface	An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.	Create an owned interface to represent a value type or data interface that is local to a port.	"Define Owned Interfaces Local to Ports"
adapter	An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.	With an adapter, you can perform functions on the "Interface Adapter" dialog: • Create and edit mappings between input and output interfaces. • Apply an interface conversion `UnitDelay` to break an algebraic loop. • Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models. • When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.	• "Interface Adapter" • Adapter

See Also

`linkDictionary` | `saveToDictionary` | `createDictionary` | `addReference` | `removeReference`

Topics

"Create Interfaces"
"Manage Interfaces with Data Dictionaries"

Introduced in R2019a

update

Package: `systemcomposer.analysis`

Update architecture model

Syntax

`update(instance)`

Description

`update(instance)` updates a specification model to mirror the changes in the architecture instance `instance`. The `update` method is part of the `systemcomposer.analysis.ArchitectureInstance` class.

Note This function is part of the instance programmatic interfaces that you can use to analyze the model iteratively, element-by-element. The `instance` refers to the element instance on which the iteration is being performed.

Examples

Update Specification Model

Update the specification model to mirror the changes in the architecture instance.

Create a profile for latency characteristics and save it.

```
profile = systemcomposer.profile.Profile.createProfile("LatencyProfile");

latencybase = profile.addStereotype("LatencyBase");
latencybase.addProperty("latency",Type="double");
latencybase.addProperty("dataRate",Type="double",DefaultValue="10");

connLatency = profile.addStereotype("ConnectorLatency",...
Parent="LatencyProfile.LatencyBase");
connLatency.addProperty("secure",Type="boolean");
connLatency.addProperty("linkDistance",Type="double");

nodeLatency = profile.addStereotype("NodeLatency",...
Parent="LatencyProfile.LatencyBase");
nodeLatency.addProperty("resources",Type="double",DefaultValue="1");

portLatency = profile.addStereotype("PortLatency",...
Parent="LatencyProfile.LatencyBase");
portLatency.addProperty("queueDepth",Type="double");
portLatency.addProperty("dummy",Type="int32");

profile.save
```

Create a new model. Apply the profile to the model. Apply the stereotype to the architecture. Instantiate all stereotypes in a profile.

```
model = systemcomposer.createModel("archModel",true);
model.applyProfile("LatencyProfile");
```

```
model.Architecture.applyStereotype("LatencyProfile.LatencyBase");
instance = instantiate(model.Architecture,"LatencyProfile","NewInstance");
```

Set a new value for the `"dataRate"` property on the architecture instance.

```
instance.setValue("LatencyProfile.LatencyBase.dataRate",5);
```

Update the specification model according to the architecture instance.

```
instance.update
```

Get the new value of the `"dataRate"` property on the architecture.

```
value = model.Architecture.getPropertyValue("LatencyProfile.LatencyBase.dataRate")
```

```
value =

    '5'
```

Input Arguments

`instance` — Architecture instance
architecture instance object

Architecture instance for which specification model is updated, specified as a `systemcomposer.analysis.ArchitectureInstance` object.

More About

Definitions

Term	Definition	Application	More Information
analysis	Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.	Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.	• "Analyze Architecture Model with Analysis Function" • "Analyze Architecture"
analysis function	An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.	Use an analysis function to calculate the result of an analysis.	• "Analysis Function Constructs" • "Write Analysis Function"

Term	Definition	Application	More Information
instance model	An instance model is a collection of instances.	You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a MAT file, of a System Composer architecture model for analysis.	"Run Analysis Function"
instance	An instance is an occurrence of an architecture model element at a given point in time.	An instance freezes the active variant or model reference of the component in the instance model.	"Create a Model Instance for Analysis"

See Also

`instantiate` | `systemcomposer.analysis.Instance` | `loadInstance` | `deleteInstance` | `save` | `lookup` | `iterate` | `refresh`

Topics

"Write Analysis Function"

Introduced in R2019a

systemcomposer.updateLinksToReferenceRequirements

Update requirement links to model reference requirements

Syntax

`systemcomposer.updateLinksToReferenceRequirements(modelName,linkDomain, documentPathOrID)`

Description

`systemcomposer.updateLinksToReferenceRequirements(modelName,linkDomain, documentPathOrID)` imports the external requirement document into Requirements Toolbox as a reference requirement and updates the requirement links to point to the imported set. You can use the `systemcomposer.updateLinksToReferenceRequirements` function in System Composer to make the requirement links point to imported referenced requirements instead of external documents.

Examples

Update Reference Requirement Links from Imported File

After importing requirement links from a file, update links to reference requirements for the model to make full use of the Requirements Toolbox™ functionality.

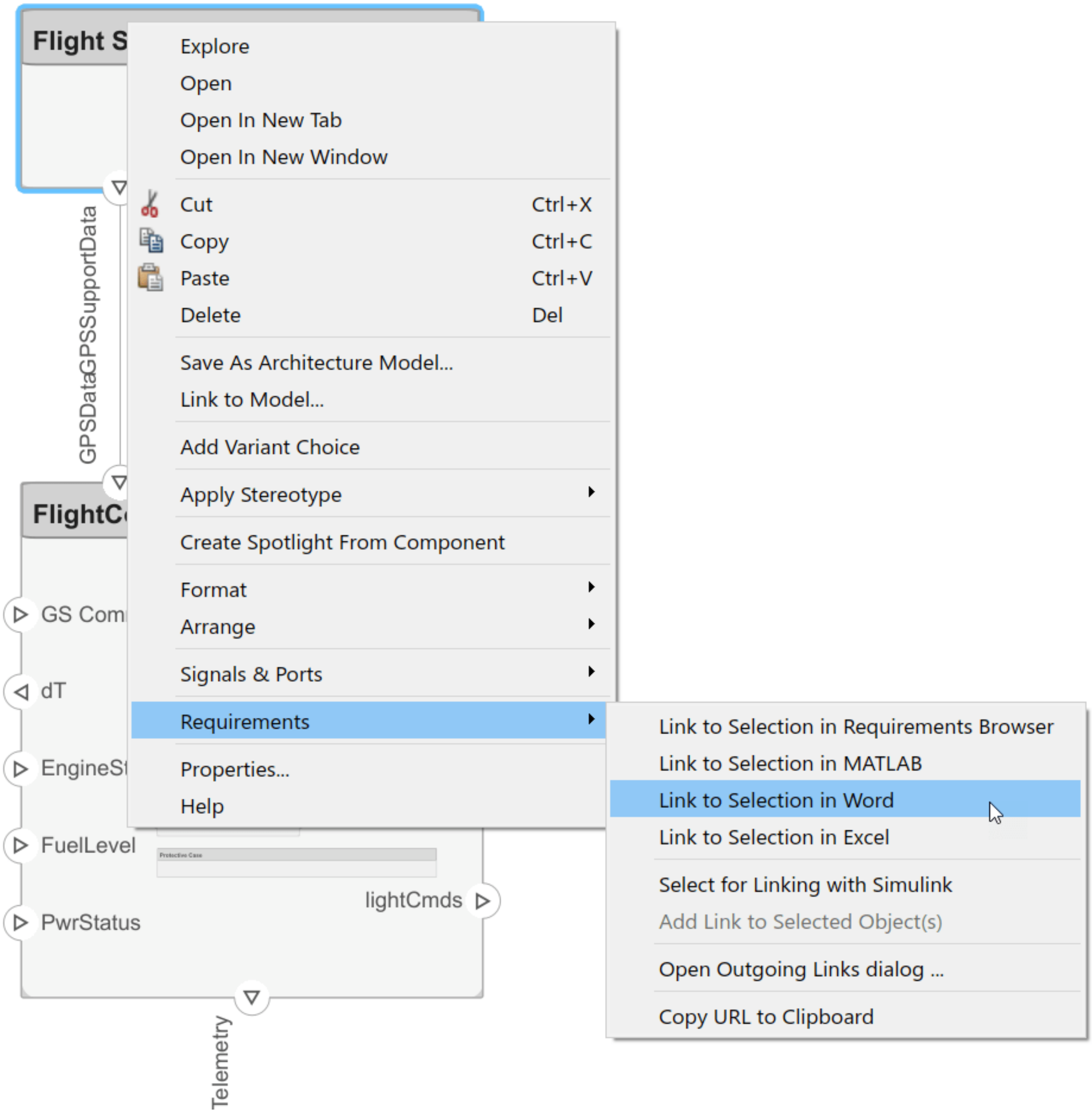
```
model = systemcomposer.openModel("reqImportExample");
```

Note: Importing or linking requirements may not work with a web-based Microsoft® Office file stored in SharePoint or OneDrive. Use a local copy of the file.

Import Requirement Links from Word File

Open the Microsoft® Word file `Functional_Requirements.docx` with the requirements listed. Highlight the requirement to link.

In the model, select the component to which to link the requirement. Right-click the component and select **Requirements > Link to Selection in Word**.



Export Model and Save to External File

Export the model and save to an external file.

```
exportedSet = systemcomposer.exportModel("reqImportExample");
SaveToExcel("exportedModel",exportedSet);
```

Import Requirement Links from File and Import to Model

Use the external file to import requirement links into another model.

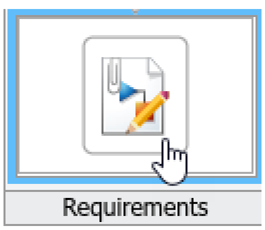
```
structModel = ImportModelFromExcel("exportedModel.xls","Components","Ports", ...
"Connections","PortInterfaces","RequirementLinks");
structModel.readTableFromExcel

systemcomposer.importModel("reqNewExample",structModel.Components, ...
structModel.Ports,structModel.Connections,structModel.Interfaces,structModel.RequirementLinks);
```

Update Links to Reference Requirements

To integrate the requirement links to the model, update references within the model.

```
systemcomposer.updateLinksToReferenceRequirements("reqNewExample","linktype_rmi_word","Functiona
```

Open the **Requirements** perspective from the bottom right corner of the model palette to view the requirements.



Input Arguments

modelName — Name of model
character vector | string

Name of model, specified as a character vector or string.

Data Types: char | string

linkDomain — Link domain
character vector | string

Link domain, specified as a character vector or string. See "Custom Link Types" (Requirements Toolbox) for more information on identifying your link type or generating custom link types.

Example: "linktype_rmi_word"

Data Types: char | string

documentPathOrID — Full document path
character vector | string

Full document path, specified as a character vector or string.

Example: "Functional_Requirements.docx"

Data Types: char | string

More About

Definitions

Term	Definition	Application	More Information
requirements	Requirements are a collection of statements describing the desired behavior and characteristics of a system. Requirements ensure system design integrity and are achievable, verifiable, unambiguous, and consistent with each other. Each level of design should have appropriate requirements.	To enhance traceability of requirements, link system, functional, customer, performance, or design requirements to components and ports. Link requirements to each other to represent derived or allocated requirements. Manage requirements from the Requirements Manager on an architecture model or through custom views. Assign test cases to requirements using the **Test Manager** for verification and validation.	"Link and Trace Requirements"
requirement set	A requirement set is a collection of requirements. You can structure the requirements hierarchically and link them to components or ports.	Use the **Requirements Editor** to edit and refine requirements in a requirement set. Requirement sets are stored in `SLREQX` files. You can create a new requirement set and author requirements using Requirements Toolbox, or import requirements from supported third-party tools.	"Manage Requirements"
requirement link	A link is an object that relates two model-based design elements. A requirement link is a link where the destination is a requirement. You can link requirements to components or ports.	View links using the Requirements Perspective in System Composer. Select a requirement in the Requirements Browser to highlight the component or the port to which the requirement is assigned. Links are stored externally as `SLMX` files.	• "Create Architecture Model with Interfaces and Requirement Links" • "Update Reference Requirement Links from Imported File" on page 3-695

Term	Definition	Application	More Information
test harness	A test harness is a model that isolates the component under test with inputs, outputs, and verification blocks configured for testing scenarios. You can create a test harness for a model component or for a full model. A test harness gives you a separate testing environment for a model or a model component.	Create a test harness for a System Composer component to validate simulation results and verify design. The **Interface Editor** is accessible in System Composer test harness models to enable behavior testing and implementation-independent interface testing.	• "Verify and Validate Requirements Using Test Harnesses" • "Create a Test Harness" (Simulink Test)

See Also

`importModel` | `exportModel`

Topics

"Link and Trace Requirements"
"Manage Requirements"
"Import and Export Architecture Models"
"Custom Link Types" (Requirements Toolbox)

Introduced in R2020b

4

Tools and Apps

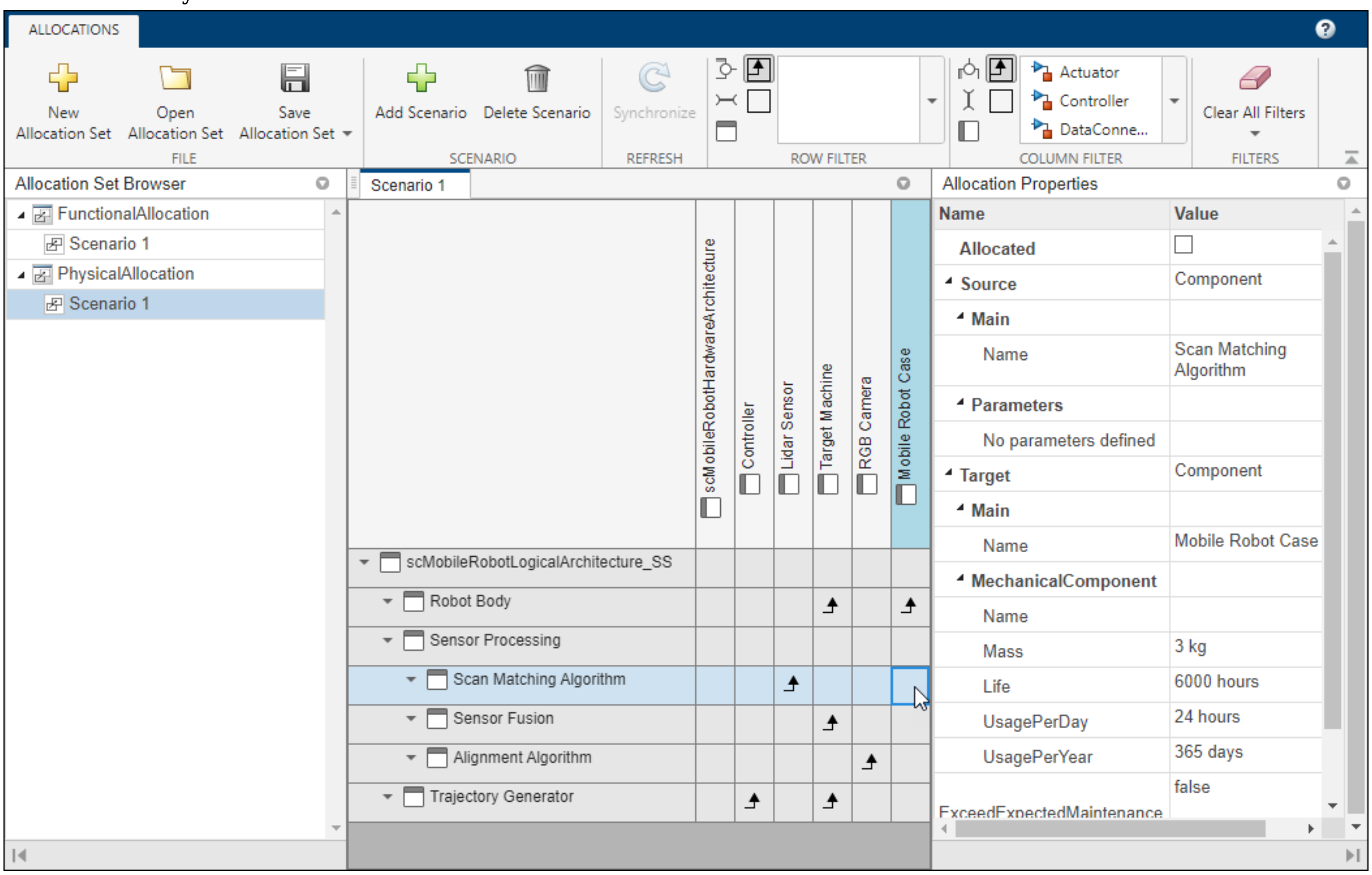
Allocation Editor

Create and manage model-to-model allocations

Description

Use the **Allocation Editor** in System Composer to establish traceable and directed relationships between architectural elements. Allocate components, ports, and connectors in a source model to architectural elements in a target model.

You can use allocations to establish relationships from software components to hardware components and to indicate deployment strategies. Allocate different instances of components, ports, and connectors and use allocations to perform various analyses, for example, resource-based allocation analysis.



Open the Allocation Editor

- System Composer toolstrip: Navigate to **Modeling** > **Allocation Editor**.
- MATLAB Command Window: Enter `systemcomposer.allocation.editor`.

Examples

- "Create and Manage Allocations"
- "Allocate Architectures in Tire Pressure Monitoring System"
- "Systems Engineering Approach for SoC Applications"

Parameters

`New Allocation Set` — Create new allocation set
button

Create a new allocation set saved as an MLDATX file. Within the allocation set, add allocation scenarios.

`Add Scenario` — Add allocation scenario
button

Add an allocation scenario in the selected allocation set. Within the allocation scenario, allocate elements between two architecture models.

`Synchronize` — Synchronize changes of models in allocation set
button

This button synchronizes any changes that have been made in the source or target models of the allocation set. To synchronize changes programmatically, see `synchronizeChanges`.

`Filters` — Row filter and column filter
button

Choose a row filter and a column filter. Filter all allocation scenarios by a combination of the following options:

- `Port`
- `Connector`
- `Component`
- `Allocated`
- `Un-Allocated`

You can also filter by one or more stereotypes.

Select **Clear All Filters** to clear every filter, **Clear Row Filters** to clear row filters, or **Clear Column Filters** to clear column filters.

Programmatic Use

`systemcomposer.allocation.editor` opens the **Allocation Editor** from the MATLAB Command Window.

More About

Allocation

An allocation establishes a directed relationship from architectural elements — components, ports, and connectors — in one model to architectural elements in another model.

Resource-based allocation allows you to allocate functional architectural elements to logical architectural elements and logical architectural elements to physical architectural elements.

Allocation Scenario

An allocation scenario contains a set of allocations between a source and a target model.

Allocate between model elements within an allocation in an allocation scenario. The default allocation scenario is called `Scenario 1`.

Allocation Set

An allocation set consists of one or more allocation scenarios that describe various allocations between a source and a target model.

Create an allocation set with allocation scenarios in the **Allocation Editor**.

See Also

`systemcomposer.allocation.AllocationScenario` | `systemcomposer.allocation.AllocationSet` | `editor` | `getScenario` | `allocate` | `synchronizeChanges`

Topics

"Create and Manage Allocations"
"Allocate Architectures in Tire Pressure Monitoring System"
"Systems Engineering Approach for SoC Applications"

Introduced in R2020b

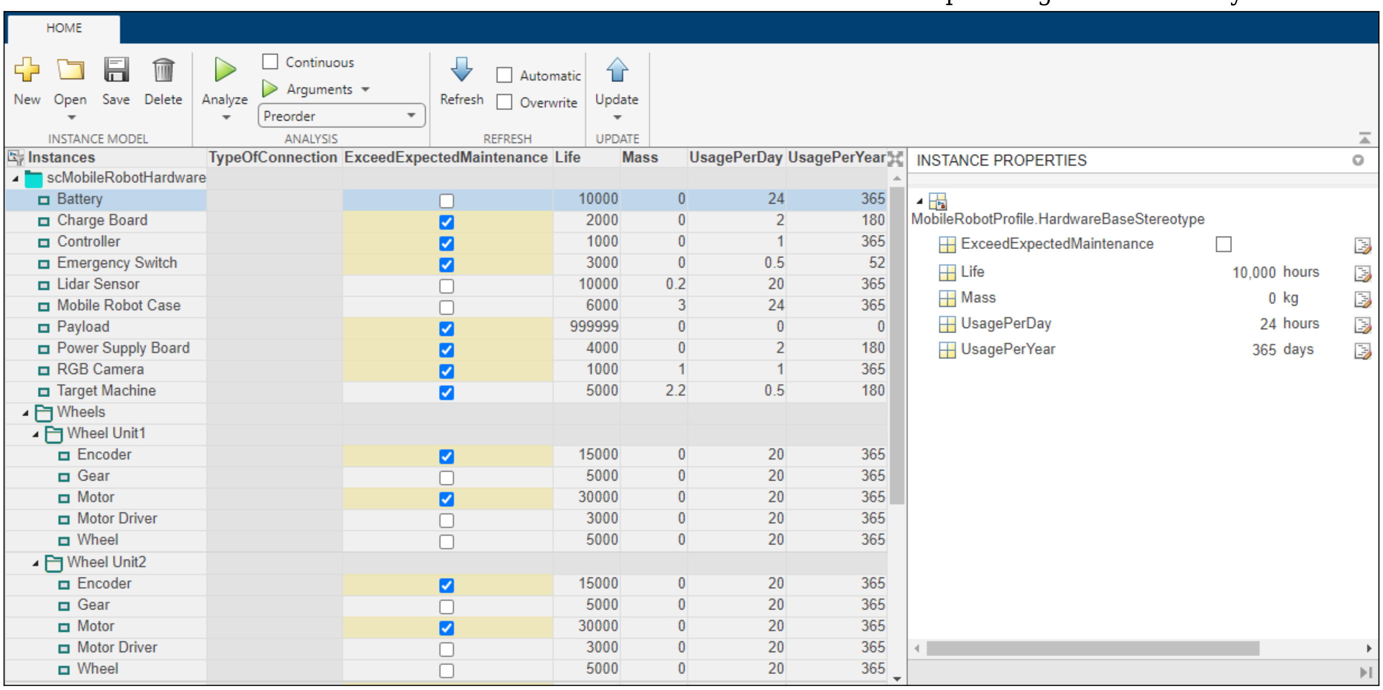
Analysis Viewer

View and edit analysis instance model and analyze using analysis function

Description

The **Analysis Viewer** shows an instantiated architecture.

The Analysis Viewer shows all elements in the first column. The other columns show properties for all stereotypes chosen for the current instance. If a property is not part of a stereotype applied to an element, that field is greyed out. You can use the **Filter** button to hide properties for certain stereotypes. When you select an element, Instance Properties shows the stereotypes and property values of the element. You can save an instance in a MAT-file and open it again in the Analysis Viewer.



Open the Analysis Viewer

- System Composer toolstrip: Navigate to **Modeling** > **Analysis Model** > **Analysis Viewer**.
- In the **Instantiate Architecture Model** tool, select **Instantiate**.

Examples

- "Analyze Architecture"
- "Analysis Function Constructs"
- "Define Stereotypes and Perform Analysis"
- "Calculate Endurance Using Quadcopter Architectural Design"

- “Design Insulin Infusion Pump Using Model-Based Systems Engineering”

Parameters

`Analyze` — Analyze architecture instance
button

Analyze the architecture instance using an analysis function.

`Arguments` — Analysis arguments
comma-separated values

Comma-separated values of optional arguments to the analysis function.

`Iteration Order` — Iteration type
`Preorder` | `Postorder` | `TopDown` | `BottomUp`

Iteration type to specify how to process instances while using the analysis function. Select one of these options from the list:

- `Pre-order` — Start from the top level, move to a child component, and process the subcomponents of that component recursively before moving to a sibling component.
- `Top-Down` — Like pre-order, but process all sibling components before moving to their subcomponents.
- `Post-order` — Start from components with no subcomponents, process each sibling, and then move to parent.
- `Bottom-up` — Like post-order, but process all subcomponents at the same depth before moving to their parents.

`Update` — Push changes from instance to model
button

Push the changes from the architecture instance to the architecture model.

`Refresh` — Pull changes to instance from model
button

Pull changes to the architecture instance from the architecture model.

`Continuous` — Whether continuous analysis is enabled when values change
off (default) | on

Select this check box to enable continuous analysis when values change.

`Automatic` — Whether instance automatically refreshes when composition changes
off (default) | on

Select this check box to automatically refresh the instance when the composition changes.

`Overwrite` — Whether to overwrite entire instance model from composition model
off (default) | on

Select this check box to overwrite the entire instance model from the composition model.

Programmatic Use

`systemcomposer.analysis.loadInstance` loads a saved architecture instance object from a saved MAT-file that can be later opened in the **Analysis Viewer**.

More About

Analysis

Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.

Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.

Analysis Function

An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.

Use an analysis function to calculate the result of an analysis.

Instance Model

An instance model is a collection of instances.

You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.

Instance

An instance is an occurrence of an architecture model element at a given point in time.

An instance freezes the active variant or model reference of the component in the instance model.

See Also

`instantiate` | `iterate` | `lookup` | `save` | `update` | `refresh` | `systemcomposer.analysis.loadInstance` | `systemcomposer.analysis.deleteInstance` | `getValue` | `setValue` | `hasValue` | `isArchitecture` | `isComponent` | `isConnector` | `isPort`

Topics

"Analyze Architecture"
"Analysis Function Constructs"
"Define Stereotypes and Perform Analysis"
"Calculate Endurance Using Quadcopter Architectural Design"
"Design Insulin Infusion Pump Using Model-Based Systems Engineering"

Introduced in R2019a

Architecture Views Gallery

Create and manage architecture views and sequence diagrams

Description

The **Architecture Views Gallery** allows you to create filtered and freeform architecture views and author sequence diagrams.

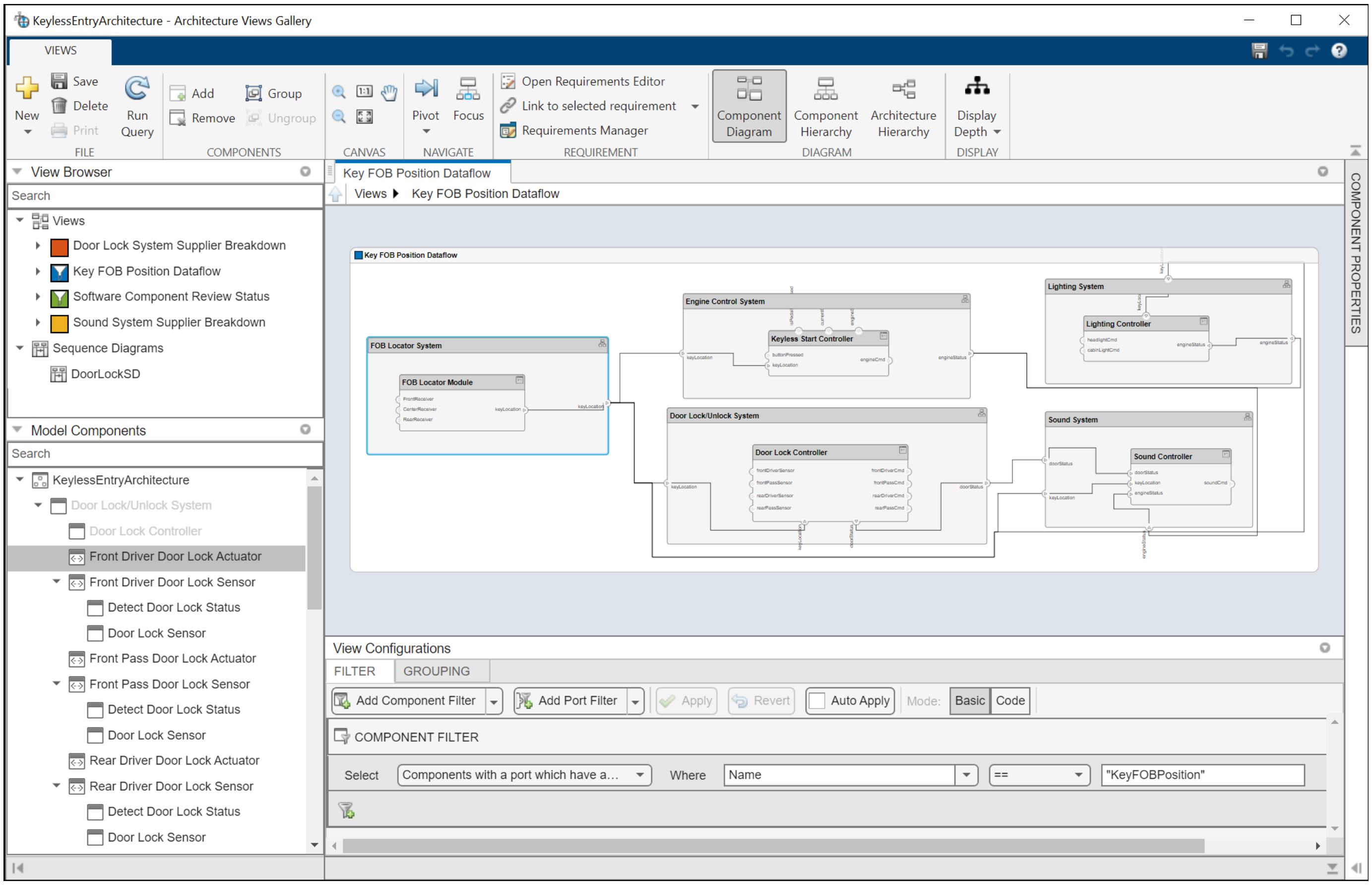
Use the **View Configurations** options to specify component and port filters for views, and to specify grouping criteria. Click and drag components from the **Model Components** browser to specify the contents of a freeform view. Select views from the **View Browser** and use the **Component Properties** options to specify a name, color, and description for a view.

Switch between these types of view diagrams:

- **Component Diagram** — Display components, ports, and connectors based on how the model is structured.
- **Component Hierarchy** — Display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used.
- **Architecture Hierarchy** — Display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.
- **Class Diagram** — Display unique architecture types of the software components optionally with software methods and properties, only available for software architecture models.

You can also link and edit requirements for views through the **Architecture Views Gallery**.

To create a new sequence diagram, click **New > Sequence Diagram**. Select existing sequence diagrams from the **View Browser** and use the **Sequence Diagram Properties** options to specify a name for the sequence diagram. To add a lifeline, click and drag from the **Model Components** browser. Alternatively, select **Component > Add Lifeline** from the menu and click the down arrow to select a component to be represented by the lifeline. Click and drag from the vertical dotted lines coming down from one lifeline to another to author a message that represents a connection between two ports. To confirm the consistency of the sequence diagram, click **Check Consistency**. Then, either push changes to the architecture by clicking **Create in Architecture**, or pull changes in from the architecture to the sequence diagram by clicking **Repair**.



Open the Architecture Views Gallery

- System Composer toolstrip: Navigate to **Modeling** > **Architecture Views**.
- System Composer toolstrip: Navigate to **Modeling** > **Sequence Diagram**.
- MATLAB Command Window: Enter `openViews` with a `systemcomposer.arch.Model` object as the input argument.

Examples

- "Modeling System Architecture of Keyless Entry System"
- "Create Architectural Views Programmatically"
- "Create Architecture Views Interactively"
- "Display Component Hierarchy and Architecture Hierarchy Using Views"
- "Class Diagram View of Software Architectures"
- "Describe System Behavior Using Sequence Diagrams"

Parameters

`New` — Create new view or sequence diagram
button

Create a new view by default by clicking **New**, or click the drop-down arrow to choose **New** > **View**. Create a new sequence diagram by selecting **New** > **Sequence Diagram**.

`Save` — Save views, sequence diagrams, and model
button

Save all views, sequence diagrams, and the architecture model.

`Delete` — Delete currently selected diagram
button

Delete the currently selected view or sequence diagram.

`Print` — Print sequence diagram
button

Print the currently selected sequence diagram to a file.

`Run Query` — Refresh currently selected view
button

Refresh the currently selected view with changes in the composition and rerun the corresponding filter, if it exists.

`Add` — Add selected component to view
button

Add the selected component in the **Model Components** browser to the current view diagram.

If the view is a filtered view, a prompt appears to convert the filtered view to a freeform view.

`Remove` — Remove selected component from view
button

Remove a selected component in a view from the current view diagram.

If the view is a filtered view, a prompt appears to convert the filtered view to a freeform view.

`Group` — Group selected components in view
button

Group the selected components in a view.

`Ungroup` — Ungroup selected components in view
button

Ungroup the selected components in a view.

`Pivot` — Pivot to other views selected component appears in
button

Pivot to other views in which the selected component appears. Select the view to pivot to using the drop-down list.

`Display Depth` — Modify number of levels of hierarchy to display

Deep (default) | **Shallow**

Modify the number of levels of hierarchy to display. **Deep** includes more levels and **Shallow** includes fewer levels.

`Add Lifeline` — Insert new lifeline into sequence diagram

button

Create a new lifeline after the selected lifeline by default by clicking **Add Lifeline**, or click the drop-down arrow to choose **Add Lifeline** > **Insert After**. Create a new lifeline before the selected lifeline by selecting **Add Lifeline** > **Insert Before**. Create a new lifeline nested under the selected lifeline by selecting **Add Lifeline** > **Add Child**.

`Add Operand` — Insert new operand into sequence diagram

button

Create a new operand after the selected operand by default by clicking **Add Operand**, or click the drop-down arrow to choose **Add Operand** > **Insert After**. Create a new operand before the selected operand by selecting **Add Operand** > **Insert Before**.

`Check Consistency` — Check whether elements in sequence diagram are consistent with architecture model

button

Check that all the elements in the current sequence diagram are consistent with the architecture model. If any of the elements in the sequence diagram are inconsistent, clicking **Check Consistency** highlights those elements in yellow.

`Architecture Element` — Specify different associated element in architecture model for selected elements in sequence diagram

component | port

Specify a different associated element in the architecture model for the selected elements in the sequence diagram.

`Create in Architecture` — Create elements in architecture model

button

Create elements in the architecture model for each of the selected inconsistent elements in the sequence diagram.

`Repair` — Update selected elements so sequence diagram is consistent with architecture model

button

Update the selected inconsistent elements in the sequence diagram so the sequence diagram is consistent with the architecture model.

Programmatic Use

`openViews(model)` opens the **Architecture Views Gallery** from the MATLAB Command Window.

More About

View

A view shows a customizable subset of elements in a model. Views can be filtered based on stereotypes or names of components, ports, and interfaces, along with the name, type, or units of an interface element. Create views by adding elements manually. Views create a simplified way to work with complex architectures by focusing on certain parts of the architectural design.

You can use different types of views to represent the system:

- *Operational views* demonstrate how a system will be used and should be integrated with requirements analysis.
- *Functional views* focus on what the system must do to operate.
- *Physical views* show how the system is constructed and configured.

Element Group

An element group is a grouping of components in a view.

Use element groups to programmatically populate a view.

Query

A query is a specification that describes certain constraints or criteria to be satisfied by model elements.

Use queries to search elements with constraint criteria and to filter views.

Component Diagram

A component diagram represents a view with components, ports, and connectors based on how the model is structured.

Component diagrams allow you to programmatically or manually add and remove components from the view.

Hierarchy Diagram

You can visualize a hierarchy diagram as a view with components, ports, reference types, component stereotypes, and stereotype properties.

There are two types of hierarchy diagrams:

- *Component hierarchy diagrams* display components in tree form with parents above children. In a component hierarchy view, each referenced model is represented as many times as it is used.
- *Architecture hierarchy diagrams* display unique component architecture types and their relationships using composition connections. In an architecture hierarchy view, each referenced model is represented only once.

Class Diagram

A class diagram is a graphical representation of a static structural model that displays unique architecture types of the software components optionally with software methods and properties.

Class diagrams capture one instance of each referenced model and show relationships between them. Any component diagram view can be optionally represented as a class diagram for a software architecture model.

Sequence Diagram

A sequence diagram is a behavior diagram that represents the interaction between structural elements of an architecture as a sequence of message exchanges.

Use sequence diagrams to describe how the parts of a static system interact.

Lifeline

A lifeline is represented by a head and a timeline that proceeds down a vertical dotted line.

The head of a lifeline represents a component in an architecture model.

Message

A message includes a send event and a receive event. You can draw messages from one lifeline to another on the vertical dotted lines in a sequence diagram. Messages are clarified with a message label.

A message label has a trigger and a constraint. A trigger determines whether the message occurs. A constraint determines whether the message is valid.

Fragment

A fragment indicates how a group of messages within are executed or interact in a sequence diagram.

A fragment is used to model complex sequences, such as alternatives, in a message-based behavior diagram.

Operand

An operand is a region in a fragment. Fragments have one or more operands depending on the kind of fragment. Operands can contain messages and additional fragments.

Each operand can include a constraint to specify whether the messages inside the operand execute. You can express the precondition of an operand as a MATLAB Boolean expression using the inputs of any lifeline.

See Also

`find` | `lookup` | `systemcomposer.query.Constraint` | `createView` | `getView` | `openViews` | `deleteView` | `systemcomposer.view.View` | `systemcomposer.view.ElementGroup`

Topics

“Modeling System Architecture of Keyless Entry System”
“Create Architectural Views Programmatically”
“Create Architecture Views Interactively”

“Display Component Hierarchy and Architecture Hierarchy Using Views”
“Class Diagram View of Software Architectures”
“Describe System Behavior Using Sequence Diagrams”

Introduced in R2019b

Comparison Tool

View differences between two architecture models

Description

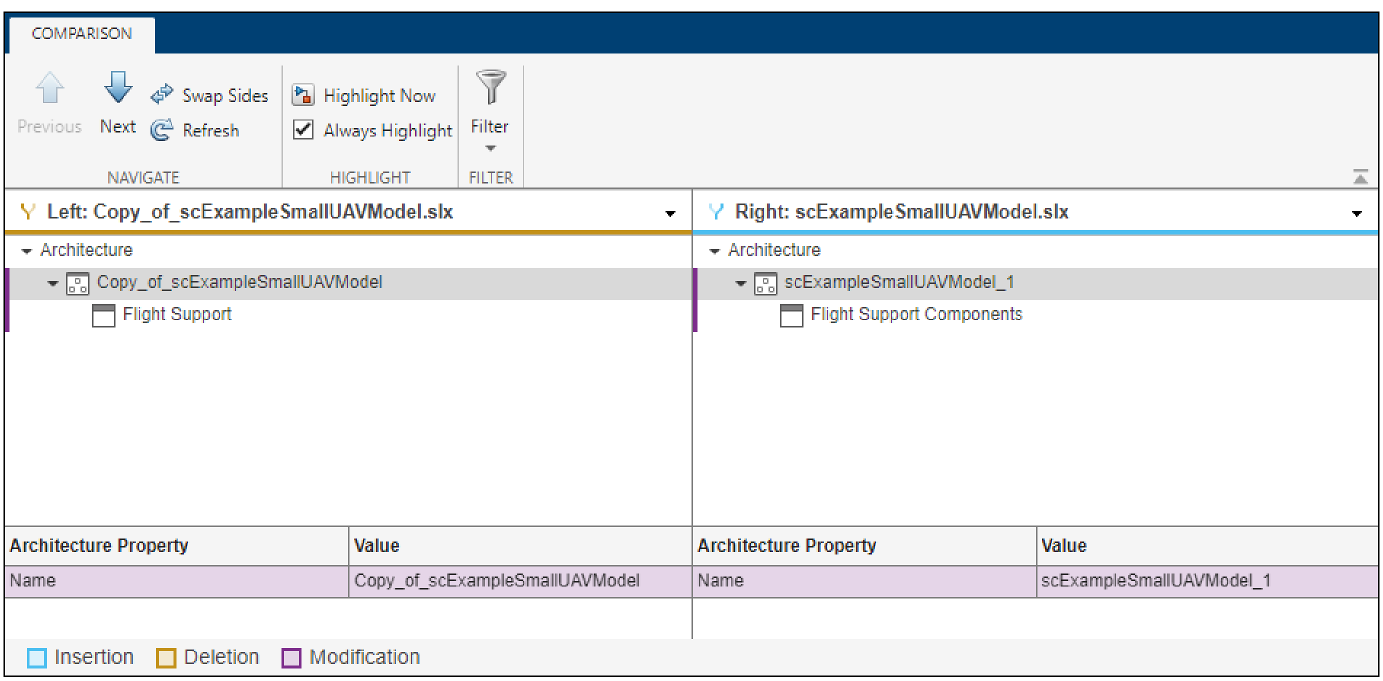
The **Comparison Tool** in System Composer shows differences between two architecture models.

The tool shows differences for these types of architectural data:

- Model structural differences (components, ports, and connectors)
- Different types of supported components and ports
- Interfaces on model data dictionaries
- Owned port interfaces
- Applied stereotypes and property value changes on model elements
- Architecture views
- Parameters
- Simulink properties

Rows in the comparison report are highlighted according to the type of difference:

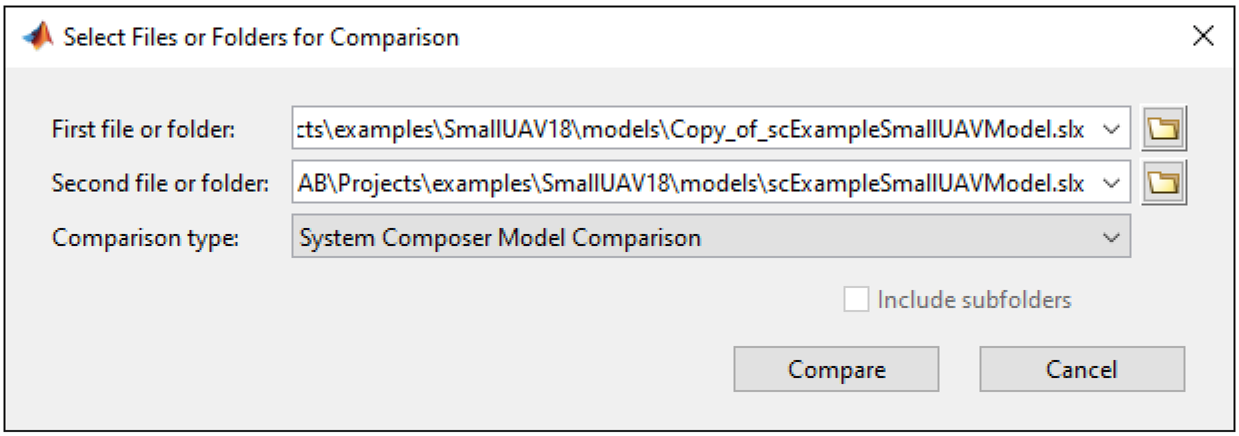
- Insertion — Added elements to the right side that did not exist on the left side
- Deletion — Removed elements that did exist on the left side but not on the right side
- Modification — Changes to existing elements that exist on both the left and right sides



Open the Comparison Tool

- Open the **Comparison Tool** from the System Composer toolstrip.

  1. Navigate to **Modeling** > **Compare**.
  2. In the Select Files or Folders for Comparison dialog box, select the second file against which to compare.
  3. Set the comparison type as `System Composer Model Comparison`.
  4. Click **Compare**.



- Open the **Comparison Tool** from the MATLAB® file manager by selecting one architecture model.

  1. In the MATLAB® file manager, right-click an architecture model.
  2. Select `Compare Against` and then `Choose`.
  3. In the Select Files or Folders for Comparison dialog box, select the second file against which to compare.
  4. Set the comparison type as `System Composer Model Comparison`.
  5. Click **Compare**.
- Open the **Comparison Tool** from the MATLAB® file manager by selecting two architecture models.

  1. In the MATLAB® file manager, select two architecture models.
  2. Right-click and select `Compare Selected Files/Folders`.

Examples

- "Compare Model Differences Using System Composer Comparison Tool"
- "Compose Architecture Visually"
- "Define Port Interfaces Between Components"
- "Define Profiles and Stereotypes"
- "Create Architecture Views Interactively"
- "Describe Component Behavior Using Simulink"

Parameters

`Swap Sides` — Switch left and right comparison models
button

Swap sides of the two models being compared on the comparison report.

`Refresh` — Pull changes from architecture models to comparison report
button

When the architecture models are out of sync, pull in the changes to the comparison report. You must save both architecture models first before clicking `Refresh`.

`Highlight Now` — Highlight currently selected report node
button

When `Always Highlight` is turned off, you can click `Highlight Now` to highlight the currently selected comparison report node in the architecture models.

`Always Highlight` — Whether to always highlight differences in models
on (default) | off

By default, the two models being compared display to the right of the comparison report, with the model corresponding to the left side of the report on top and the model corresponding to the right side appearing below. Turn `Always Highlight` off to use the `Highlight Now` button and control highlighting in the models.

`Hide Graphical Changes` — Whether to hide graphical changes from comparison models
on (default) | off

Access this check box from the **Filter** menu. When selected, graphical changes such as component positioning and resizing are ignored from the comparison report.

Programmatic Use

`visdiff("scMobileRobot.slx","scMobileRobotEdited.slx")` opens the **Comparison Tool** from the MATLAB Command Window.

See Also

`visdiff`

Topics
"Compare Model Differences Using System Composer Comparison Tool"
"Compose Architecture Visually"
"Define Port Interfaces Between Components"
"Define Profiles and Stereotypes"
"Create Architecture Views Interactively"
"Describe Component Behavior Using Simulink"

Introduced in R2022a

Functions Editor

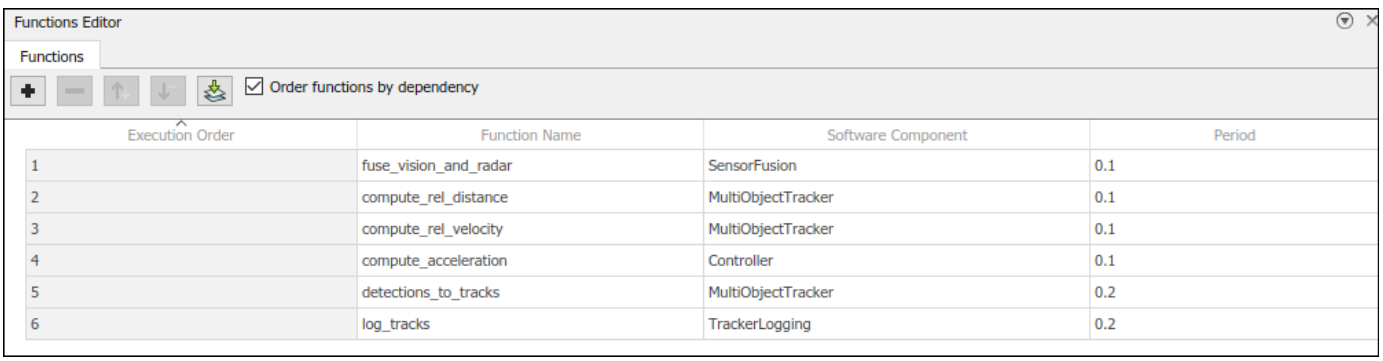
Visualize and author component functions in software architectures

Description

The **Functions Editor** allows you to author functions in the architecture level for inline components. You can then implement Simulink behaviors for your authored functions. For reference components, the functions are automatically created from the referenced behavior Simulink models.

Use the **Functions Editor** to:

- Author and visualize functions.
  - Add and delete functions.
  - Change the execution order of the functions.
  - Change the name of a function.
  - Change the period of a function.
- Implement behaviors for functions.
- Add custom properties to functions using stereotypes.



Open the Functions Editor

- System Composer toolstrip: Navigate to **Modeling** > **Functions Editor**.

Examples

- "Authoring Functions for Software Components of an Adaptive Cruise Control"
- "Author and Extend Functions for Software Architectures"
- "Define Profiles and Stereotypes"

Parameters

`Add function` — Add function to software component
button

Add a function to a software component by clicking .

`Remove function` — Remove function from software component
button

Remove a function from a software component by clicking .

`Increase execution order` — Increase execution order of function
button

Increase the execution order of a function by clicking .

This option is only available if **Order functions by dependency** is unchecked.

`Decrease execution order` — Decrease execution order of function
button

Decrease the execution order of a function by clicking .

This option is only available if **Order functions by dependency** is unchecked.

`Update diagram` — Update diagram to refresh functions
button

Update the software architecture diagram to refresh the functions in the **Functions Editor** by clicking .

`Order functions by dependency` — Whether to order functions by dependency
off (default) | on

Select this check box to order functions in the **Functions Editor** by dependency.

You can order functions automatically based on their data dependencies. This functionality is available for functions from behavior models. To enable automatic sorting, select the **Order functions by dependency** check box or enable `OrderFunctionsByDependency` on the architecture model.

Programmatic Use

Use the `addFunction` function to author functions. Use the `createSimulinkBehavior` function to create new Simulink rate-based or export-function behaviors and link the software component to the new model.

More About

Software Architecture

A software architecture is a specialization of an architecture for software-based systems, including the description of software compositions, component functions, and their scheduling.

Use software architectures in System Composer to author software architecture models composed of software components, ports, and interfaces. Design your software architecture model, define the execution order of your component functions, simulate your design in the architecture level, and generate code.

Software Component

A software component is a specialization of a component for software entities, including its functions (entry points) and interfaces.

Implement a Simulink export-function, rate-based, or JMAAB model as a software component, simulate the software architecture model, and generate code.

Software Composition

A software composition is a diagram of software components and connectors that represents a composite software entity, such as a module or application.

Encapsulate functionality by aggregating or nesting multiple software components or compositions.

Software Function

A software function is an entry point that can be defined in a software component.

You can apply stereotypes to software functions, edit sample times, and specify the function period using the **Functions Editor**.

See Also

`systemcomposer.arch.Function` | `systemcomposer.interface.ServiceInterface` | `systemcomposer.interface.FunctionElement` | `systemcomposer.interface.FunctionArgument` | `addFunction` | `decreaseExecutionOrder` | `increaseExecutionOrder` | `addServiceInterface` | `setFunctionPrototype` | `getFunctionArgument`

Topics

"Authoring Functions for Software Components of an Adaptive Cruise Control"
"Author and Extend Functions for Software Architectures"
"Define Profiles and Stereotypes"

Introduced in R2021b

Instantiate Architecture Model

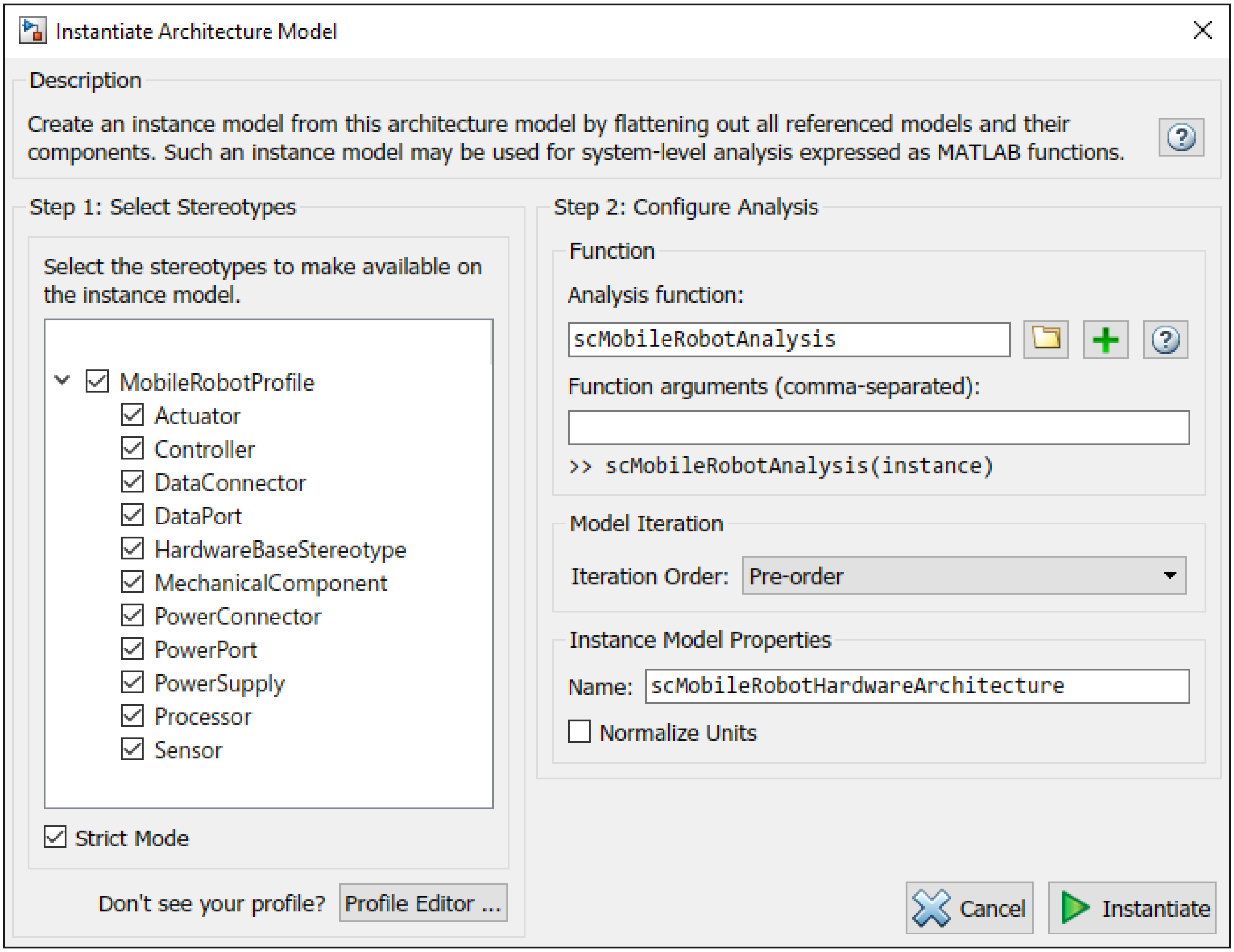
Create an instance of the architecture model that you can use for analysis

Description

Instantiate Architecture Model creates an instance of an architecture model for analysis.

The **Select Stereotypes** tree lists the stereotypes of all profiles that have been loaded in the current session and allows you to select those whose properties should be available in the instance model. You can browse for an analysis function, create a new analysis function, or skip analysis at this point. If the analysis function requires inputs other than elements in the model, such as an exchange rate to compute cost, enter it in **Function arguments**. Select a mode for iterating through model elements, for example, `Bottom-up` to move from the leaves of the tree to the root. **Strict Mode** ensures instances get properties only if the corresponding element in the composition model has the stereotype applied.

Click **Instantiate** to open the **Analysis Viewer**.



Open the Instantiate Architecture Model

- System Composer toolstrip: Navigate to **Modeling** > **Analysis Model**.

Examples

- “Analyze Architecture”
- “Analysis Function Constructs”
- “Define Stereotypes and Perform Analysis”
- “Calculate Endurance Using Quadcopter Architectural Design”
- “Design Insulin Infusion Pump Using Model-Based Systems Engineering”

Parameters

`Analysis Function` — Analysis function
M-file

Analysis function, specified as the MATLAB function handle to be executed when analysis is run. For more information, see "Analysis Function Constructs".

`Function arguments` — Analysis arguments
comma-separated values

Comma-separated values of optional arguments to the analysis function.

`Iteration Order` — Iteration type
`Pre-order` | `Post-order` | `Top-Down` | `Bottom-up`

Iteration type to specify how to process instances while using the analysis function. Select one of these options from the list:

- `Pre-order` — Start from the top level, move to a child component, and process the subcomponents of that component recursively before moving to a sibling component.
- `Top-Down` — Like pre-order, but process all sibling components before moving to their subcomponents.
- `Post-order` — Start from components with no subcomponents, process each sibling, and then move to parent.
- `Bottom-up` — Like post-order, but process all subcomponents at the same depth before moving to their parents.

`Normalize Units` — Whether to normalize value based on units
off (default) | on

Whether to normalize value based on units, if any, specified in property definition upon instantiation.

`Strict Mode` — Condition for instances getting properties
off (default) | on

Condition for instances getting properties only if the corresponding element in the composition model has the stereotype applied.

Programmatic Use

Use the `instantiate` function or the `iterate` function for programmatic analyses.

More About

Analysis

Analysis is a method for quantitatively evaluating an architecture for certain characteristics. Static analysis analyzes the structure of the system. Static analysis uses an analysis function and parametric values of properties captured in the system model.

Use analyses to calculate overall reliability, mass roll-up, performance, or thermal characteristics of a system, or to perform a SWaP analysis.

Analysis Function

An analysis function is a MATLAB function that computes values necessary to evaluate the architecture using the properties of each element in the model instance.

Use an analysis function to calculate the result of an analysis.

Instance Model

An instance model is a collection of instances.

You can update an instance model with changes to a model, but the instance model will not update with changes in active variants or model references. You can use an instance model, saved in a `MAT` file, of a System Composer architecture model for analysis.

Instance

An instance is an occurrence of an architecture model element at a given point in time.

An instance freezes the active variant or model reference of the component in the instance model.

See Also

`instantiate` | `iterate` | `lookup` | `save` | `update` | `refresh` | `systemcomposer.analysis.loadInstance` | `systemcomposer.analysis.deleteInstance` | `getValue` | `setValue` | `hasValue` | `isArchitecture` | `isComponent` | `isConnector` | `isPort`

Topics

"Analyze Architecture"
"Analysis Function Constructs"
"Define Stereotypes and Perform Analysis"
"Calculate Endurance Using Quadcopter Architectural Design"
"Design Insulin Infusion Pump Using Model-Based Systems Engineering"

Introduced in R2019a

Interface Editor

Create and author interfaces in local and shared interface data dictionaries

Description

The **Interface Editor** allows you to define interfaces in System Composer that might contain attributes. In System Composer architecture models, interfaces are necessary to specify information that flows through ports between components.

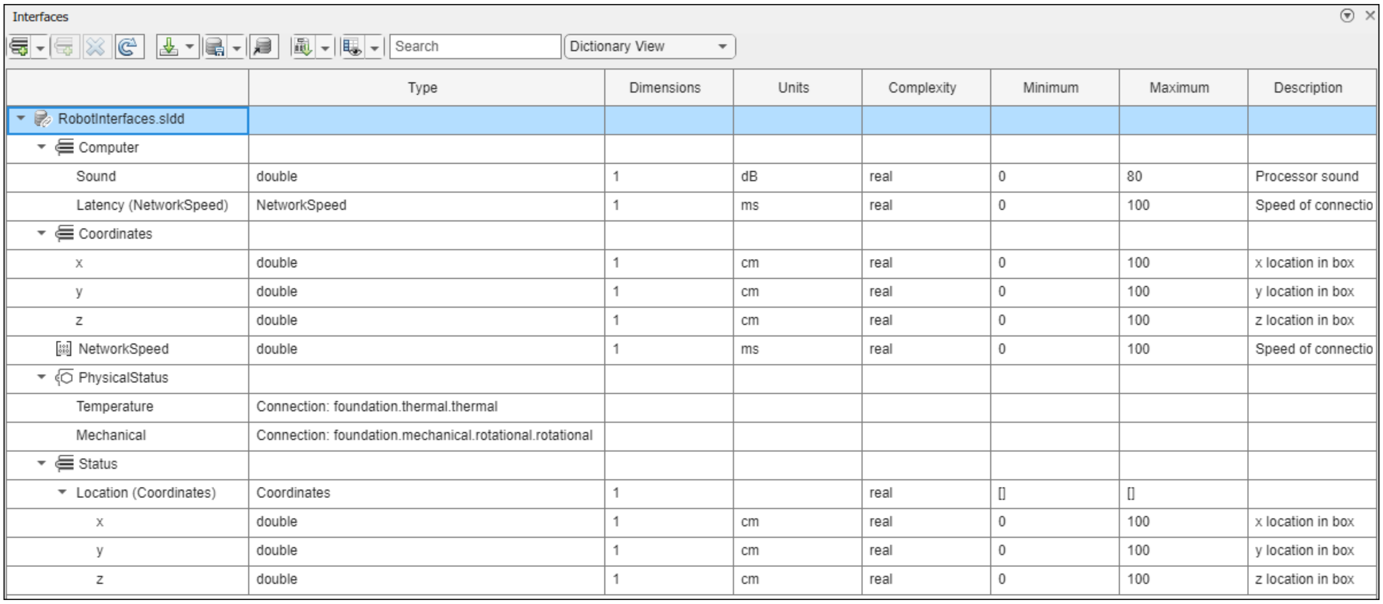
Types of interfaces include:

- **Composite Data Interface** — Represents the information that is shared through a connector and enters or exits a component through a port, A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.
- **Value Type** — Can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description. You can also assign the type of data elements in data interfaces to value types.
- **Physical Interface** — Defines the kind of information that flows through a physical port, The same interface can be assigned to multiple ports. A physical interface bundles physical elements to describe a physical model using at least one physical domain
- **Service Interface** — Defines service elements with function arguments for a client-server port. This interface is only available for software architectures.

You can save a locally defined model data dictionary as a shared data dictionary to reuse interface definitions across architecture models. Apply a profile to your interface dictionary to assign stereotypes to interfaces. These interfaces typed by a stereotype now contain metadata, and you can set the property values for each interface independently.

You can toggle the view for the **Interface Editor** depending on the locality of the interfaces:

- **Dictionary View** — Shows shared interfaces across the model that can be reused on multiple ports
- **Port Interface View** — Shows owned interfaces locally defined on a single port



	Type	Dimensions	Units	Complexity	Minimum	Maximum	Description
RobotInterfaces.sldd							
Computer							
Sound	double	1	dB	real	0	80	Processor sound
Latency (NetworkSpeed)	NetworkSpeed	1	ms	real	0	100	Speed of connectio
Coordinates							
x	double	1	cm	real	0	100	x location in box
y	double	1	cm	real	0	100	y location in box
z	double	1	cm	real	0	100	z location in box
NetworkSpeed	double	1	ms	real	0	100	Speed of connectio
PhysicalStatus							
Temperature	Connection: foundation.thermal.thermal						
Mechanical	Connection: foundation.mechanical.rotational.rotational						
Status							
Location (Coordinates)	Coordinates	1		real	[]	[]	
x	double	1	cm	real	0	100	x location in box
y	double	1	cm	real	0	100	y location in box
z	double	1	cm	real	0	100	z location in box

Open the Interface Editor

- System Composer toolstrip: Navigate to **Modeling** > **Interface Editor**.

Examples

- "Modeling System Architecture of Small UAV"
- "Define Port Interfaces Between Components"
- "Specify Physical Interfaces on Ports"
- "Author Service Interfaces for Client-Server Communication"

Parameters

`Add data interface` — Add new data interface
button

Add a new data interface by clicking  or select one of these options from the drop-down list:

- **Composite Data Interface** — Represents the information that is shared through a connector and enters or exits a component through a port, A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.
- **Value Type** — Can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description. You can also assign the type of data elements in data interfaces to value types.
- **Physical Interface** — Defines the kind of information that flows through a physical port, The same interface can be assigned to multiple ports. A physical interface bundles physical elements to describe a physical model using at least one physical domain

- **Service Interface** — Defines service elements with function arguments for a client-server port. This interface is only available for software architectures.

`Add element to selected interface` — Add new element
button

Add a new element by clicking . If the selected interface is one of these, the new element added is one of these types:

- **Composite Data Interface** — **Data Element**
- **Physical Interface** — **Physical Element**
- **Service Interface** — **Service Element** — **Function Arguments**, which are only available for software architectures

`Delete selected interface or element` — Delete interface or element
button

Delete the selected interface or element in the **Interface Editor**.

`Refresh rows for reference dictionaries` — Synchronize editor with changes from reference dictionaries
button

Synchronize the rows on the **Interface Editor** to represent the updated interfaces in reference dictionaries or a hierarchy of reference dictionaries.

`Import interfaces` — Import interface definitions
button

Import interfaces from these locations:

- **Base Workspace**
- **MAT-file**

`Save interfaces and/or link dictionary` — Save interfaces or link dictionary
button

Click this button to save interfaces on the current dictionary. Select a specific option from the drop-down list:

- **Save dictionary**
- **Save to new dictionary**
- **Link existing dictionary**

`Import profile` — Choose profile to import into data dictionary
button

Choose a profile XML file to import into the currently selected data dictionary.

`Show Hide Columns` — Show and hide columns in editor
button

Show and hide columns on the **Interface Editor** by checking the corresponding boxes:

- **Type**
- **Dimensions**
- **Units**
- **Complexity**
- **Minimum**
- **Maximum**
- **Description**

`View` — Choose editor view
Dictionary View (default) | **Port Interface View**

Choose a view for the **Interface Editor** to display interfaces:

- **Dictionary View** — Shows shared interfaces across the model that can be reused on multiple ports
- **Port Interface View** — Shows owned interfaces locally defined on a single port

More About

Interface Data Dictionary

An interface data dictionary is a consolidated list of all the interfaces and value types in an architecture and where they are used.

Local interfaces on a System Composer model can be saved in an interface data dictionary using the **Interface Editor**. Interface dictionaries can be reused between models that need to use a given set of interfaces, elements, and value types. Data dictionaries are stored in separate SLDD files.

Data Interface

A data interface defines the kind of information that flows through a port. The same interface can be assigned to multiple ports. A data interface can be composite, meaning that it can include data elements that describe the properties of an interface signal.

Data interfaces represent the information that is shared through a connector and enters or exits a component through a port. Use the **Interface Editor** to create and manage data interfaces and data elements and store them in an interface data dictionary for reuse between models.

Data Element

A data element describes a portion of an interface, such as a communication message, a calculated or measured parameter, or other decomposition of that interface.

Data interfaces are decomposed into data elements:

- Pins or wires in a connector or harness.
- Messages transmitted across a bus.
- Data structures shared between components.

Value Type

A value type can be used as a port interface to define the atomic piece of data that flows through that port and has a top-level type, dimension, unit, complexity, minimum, maximum, and description.

You can also assign the type of data elements in data interfaces to value types. Add value types to data dictionaries using the **Interface Editor** so that you can reuse the value types as interfaces or data elements.

Owned Interface

An owned interface is an interface that is local to a specific port and not shared in a data dictionary or the model dictionary.

Create an owned interface to represent a value type or data interface that is local to a port.

Adapter

An adapter helps connect two components with incompatible port interfaces by mapping between the two interfaces. An adapter can act as a unit delay or rate transition. You can also use an adapter for bus creation. Use the Adapter block to implement an adapter.

With an adapter, you can perform functions on the “Interface Adapter” dialog:

- Create and edit mappings between input and output interfaces.
- Apply an interface conversion `UnitDelay` to break an algebraic loop.
- Apply an interface conversion `RateTransition` to reconcile different sample time rates for reference models.
- When output interfaces are undefined, you can use input interfaces in bus creation mode to author owned output interfaces.

Physical Interface

A physical interface defines the kind of information that flows through a physical port. The same interface can be assigned to multiple ports. A physical interface is a composite interface equivalent to a `Simulink.ConnectionBus` object that specifies any number of `Simulink.ConnectionElement` objects.

Use a physical interface to bundle physical elements to describe a physical model using at least one physical domain.

Physical Element

A physical element describes the decomposition of a physical interface. A physical element is equivalent to a `Simulink.ConnectionElement` object.

Define the `Type` of a physical element as a physical domain to enable use of that domain in a physical model.

See Also

`addInterface` | `removeInterface` | `addElement` | `removeElement` | `connect` | `setInterface` | `addValueType` | `connect` | `getDestinationElement` | `getSourceElement` | `createInterface` | `createOwnedType` | Adapter | `createDictionary` | `openDictionary` | `saveToDictionary` | `linkDictionary` | `unlinkDictionary` | `addReference` | `removeReference`

Topics

“Modeling System Architecture of Small UAV”
“Define Port Interfaces Between Components”
“Specify Physical Interfaces on Ports”
“Author Service Interfaces for Client-Server Communication”

Introduced in R2019a

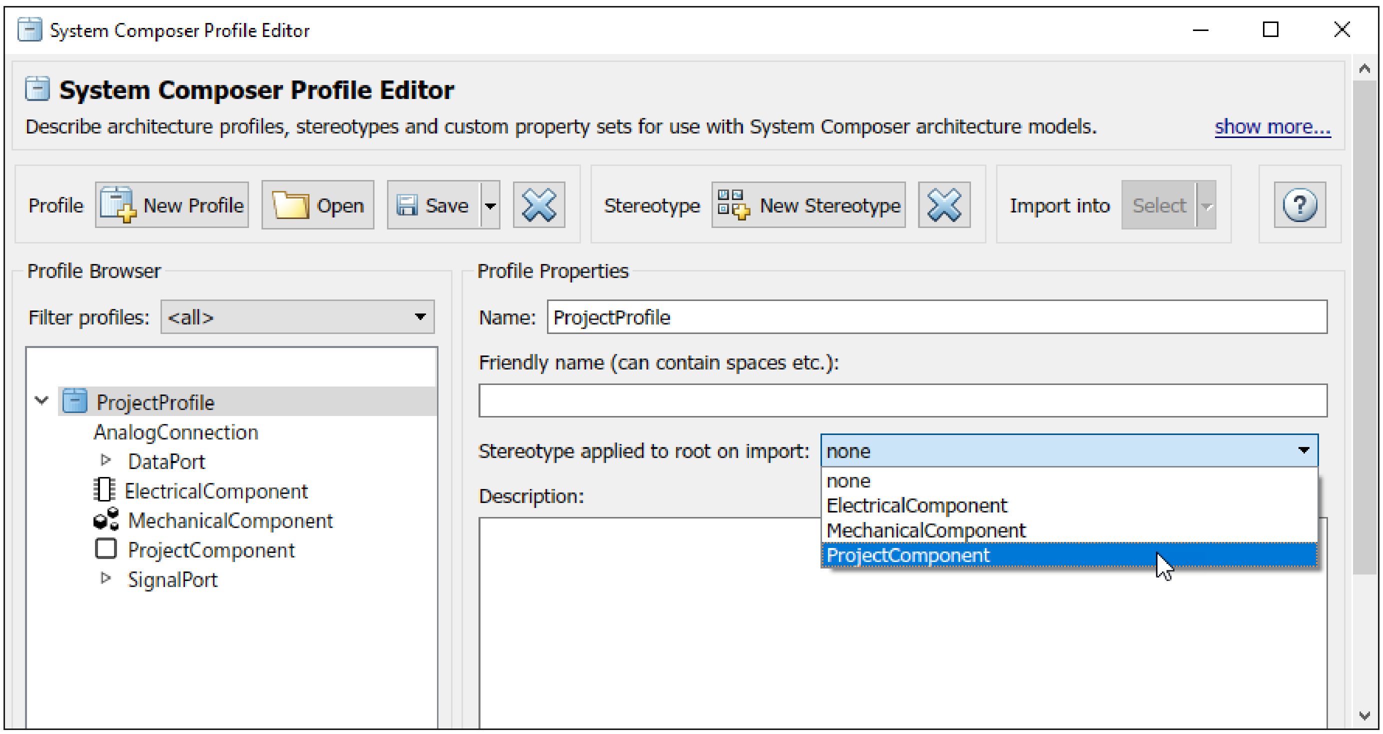
Profile Editor

Create and manage profiles with stereotypes and properties

Description

The **Profile Editor** allows you to define a profile in System Composer that contains stereotypes with properties. In System Composer architecture models, stereotyping is necessary to define custom metadata on model elements typed by the stereotype.

Apply a profile to your model or interface dictionary. Then, use stereotypes in the model to type model elements such as components, connectors, ports, interfaces, and functions. Functions only apply to software architectures. You can define custom property values on each element using the stereotyped template.



Open the Profile Editor

- System Composer toolstrip: Navigate to **Modeling** > **Profile Editor**.
- MATLAB Command Window: Enter `systemcomposer.profile.editor`.

Examples

- “Define Stereotypes and Perform Analysis”
- “Define Profiles and Stereotypes”

- “Use Stereotypes and Profiles”
- “Apply Stereotypes to Functions of Software Architectures”

Parameters

`Stereotype applied to root on import` — Root stereotype
<none> (default) | stereotype

Stereotype to be applied to root architecture after importing profile into a model. Choose from a list of available stereotypes. The root architecture is at the system boundary of the top-level model separating the contents of the model from the environment.

`Applies to` — Element type to which stereotype can be applied
`<all>` (default) | `Component` | `Port` | `Connector` | `Interface` | `Function`

Element type to which stereotype can be applied.

`Base stereotype` — Stereotype from which stereotype inherits properties
<none> (default) | stereotype

Stereotype from which stereotype inherits properties. Choose from a list of available stereotypes.

`Abstract stereotype` — Whether stereotype is abstract
off (default) | on

Select this check box to indicate an abstract stereotype. An abstract stereotype is a stereotype that is not intended to be applied directly to a model element. You can use abstract stereotypes only as the base stereotype for other stereotypes.

`Show inherited properties` — Whether to show properties inherited from base stereotype
off (default) | on

Select this check box to indicate whether to display read-only properties inherited from a base stereotype.

Programmatic Use

`systemcomposer.profile.editor` opens the **Profile Editor** from the MATLAB Command Window.

More About

Profile

A profile is a package of stereotypes to create a self-consistent domain of element types.

Author profiles and apply profiles to a model using the **Profile Editor**. You can store stereotypes for a project in one profile or in several. When you save profiles, they are stored in XML files.

Stereotype

A stereotype is a custom extension of the modeling language. Stereotypes provide a mechanism to extend the architecture language elements by adding domain-specific metadata.

Apply stereotypes to model elements such as root-level architecture, component architecture, connectors, ports, data interfaces, value types, and functions. Functions only apply to software architectures. A model element can have multiple stereotypes. Stereotypes provide model elements with a common set of property fields, such as mass, cost, and power.

Property

A property is a field in a stereotype. You can specify property values for each element to which the stereotype is applied.

Use properties to store quantitative characteristics, such as weight or speed, that are associated with a model element. Properties can also be descriptive or represent a status. You can view and edit the properties of each element in the architecture model using the Property Inspector.

See Also

`systemcomposer.profile.Profile` | `systemcomposer.profile.Stereotype` | `systemcomposer.profile.Property` | `systemcomposer.profile.Profile.createProfile` | `addStereotype` | `addProperty`

Topics

"Define Stereotypes and Perform Analysis"
"Define Profiles and Stereotypes"
"Use Stereotypes and Profiles"
"Apply Stereotypes to Functions of Software Architectures"

Introduced in R2019a

Sequence Viewer

Visualize messages, events, states, transitions, and functions

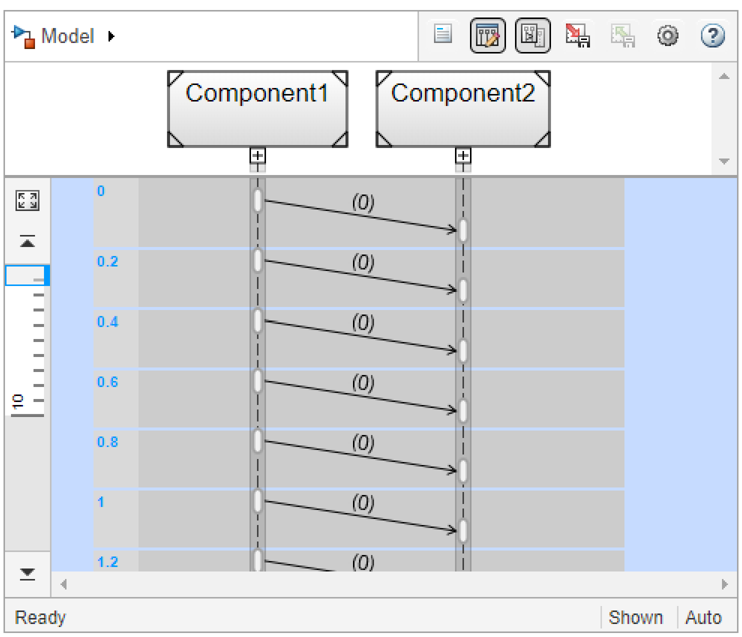
Description

The Sequence Viewer visualizes message flow, function calls, and state transitions.

Use the Sequence Viewer to see the interchange of messages, events, function calls in Simulink models, Simulink behavior models in System Composer and between Stateflow charts in Simulink models.

In the Sequence Viewer window, you can view event data related to Stateflow chart execution and the exchange of messages between Stateflow charts. The Sequence Viewer window shows messages as they are created, sent, forwarded, received, and destroyed at different times during model execution. The Sequence Viewer window also displays state activity, transitions, and function calls to Stateflow graphical functions, Simulink functions, and MATLAB functions. For more information, see "Use the Sequence Viewer to Visualize Messages, Events, and Entities".

Note The Sequence Viewer does not display function calls generated by MATLAB Function blocks and S-functions.



Open the Sequence Viewer

- Simulink Toolstrip: On the **Simulation** tab, in the **Review Results** section, click **Sequence Viewer**.

Examples

Using the Sequence Viewer Tool

1. To activate logging events, in the Simulink Toolstrip, under the **Simulation** tab, in the **Prepare** section, click **Log Events**.
2. Simulate your model.
3. To open the tool, in the Simulink Toolstrip, under the **Simulation** tab, in the **Review Results** section, click **Sequence Viewer**.

- “Use the Sequence Viewer to Visualize Messages, Events, and Entities”
- “Simulink Messages Overview”

Parameters

`Time Precision for Variable Step` — Digits for time increment precision
`3` (default) | scalar

Number of digits for time increment precision. When using a variable step solver, change this parameter to adjust the time precision for the sequence viewer. By default the block supports `3` digits of precision. Minimum and maximum precision are `1` and `16`, respectively.

Suppose the block displays two events that occur at times `0.1215` and `0.1219`. Displaying these two events precisely requires `4` digits of precision. If the precision is `3`, then the block displays two events at time `0.121`.

Programmatic Use
Block Parameter: `SequenceViewerTimePrecision`
Type: character vector
Values: `'3'` | scalar
Default: `'3'`

`History` — Maximum number of previous events to display
`1000` (default) | scalar

Total number of events before the last event to display. Minimum and maximum number of events are `0` and `25000`, respectively.

For example, if **History** is `5` and there are `10` events in your simulation, then the block displays `6` events, including the last event and the five events prior the last event. Earlier events are not displayed. The time ruler is greyed to indicate the time between the beginning of the simulation and the time of the first displayed event.

Each send, receive, drop, or function call event is counted as one event, even if they occur at the same simulation time.

Programmatic Use
Block Parameter: `SequenceViewerHistory`
Type: character vector
Values: `'1000'` | scalar
Default: `'1000'`

See Also

Topics
"Use the Sequence Viewer to Visualize Messages, Events, and Entities"
"Simulink Messages Overview"

Introduced in R2020b