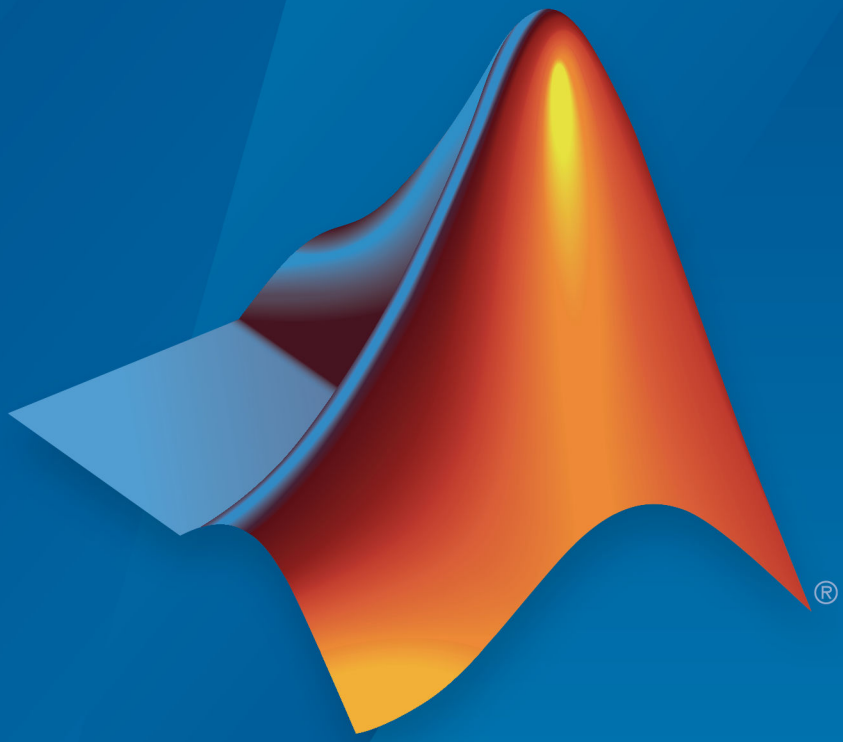
AUTOSAR Blockset

Reference



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The MathWorks, Inc.
1 Apple Hill Drive
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AUTOSAR Blockset Reference

Revision History

March 2019	Online only	New for Version 2.0 (Release 2019a)
September 2019	Online only	Revised for Version 2.1 (Release 2019b)

Contents

Functions — Alphabetical List

add

Package: `autosar.api`

Add property to AUTOSAR element

Syntax

```
add(arProps,parentPath,property,name)
add(arProps,parentPath,property,name,childproperty,value)
```

Description

`add(arProps,parentPath,property,name)` adds a composite child element with the specified `name` to the AUTOSAR element at `parentPath`, under the specified `property`.

`add(arProps,parentPath,property,name,childproperty,value)` sets the value of a specified property of the added child property element.

Examples

Add Data Element to Sender Interface

Add data element `DE3` to sender interface `Interface1`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
arProps=autosar.api.getAUTOSARProperties(hModel);
add(arProps,'Interface1','DataElements','DE3');
get(arProps,'Interface1','DataElements')

ans =
    {'Interface1/DE1'}    {'Interface1/DE2'}    {'Interface1/DE3'}
```

Add Mode Group to Mode-Switch Interface

Using a fully qualified path, add a mode-switch interface and set the `IsService` property to `true`. Add mode group `mgModes` to the mode-switch interface using the composite property `ModeGroup`.

```
addpath(fullfile(matlabroot,'/help/toolbox/autosar/examples'));
hModel = 'mAutosarMsConfigAfter';
open_system(hModel);
arProps=autosar.api.getAUTOSARProperties(hModel);
addPackageableElement(arProps,'ModeSwitchInterface','/pkg/if','Interface3',...
  'IsService',true);
ifPaths=find(arProps,[],'ModeSwitchInterface','PathType','FullyQualified')
```

```
ifPaths =
    {'/pkg/if/myMsIf'}    {'/pkg/if/MsIf2'}    {'/pkg/if/Interface3'}
```

```
add(arProps,'/pkg/if/Interface3','ModeGroup','mgModes');
```

Input Arguments

`arProps` — AUTOSAR properties information for a model

handle

AUTOSAR properties information for a model, previously returned by *`arProps`* `= autosar.api.getAUTOSARProperties(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

`parentPath` — Path to a parent AUTOSAR element

character vector | string scalar

Path to a parent AUTOSAR element to which to add a specified child property element.

Example: `'Input'`

`property` — Type of property

character vector | string scalar

Type of property to add, among valid properties for the AUTOSAR element.

Example: `'DataElements'`

`name` — Name of child property element

character vector | string scalar

Name of the child property element to add.

Example: `'DE1'`

`childproperty,value` — Child property and value
name (character vector or string scalar), value

Child property to set, and its value. Table “Properties of AUTOSAR Elements” lists properties that are associated with AUTOSAR elements.

Example: `'Name','event1'`

See Also

`delete`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

addPackageableElement

Package: `autosar.api`

Add element to AUTOSAR package in model

Syntax

```
addPackageableElement(arProps,category,package,name)
addPackageableElement(arProps,category,package,name,property,value)
```

Description

`addPackageableElement(arProps,category,package,name)` adds element `name` of the specified `category` to the specified AUTOSAR `package` in a model configured for AUTOSAR.

`addPackageableElement(arProps,category,package,name,property,value)` sets the value of a specified property of the added element.

Examples

Add Sender-Receiver Interface to Package and Set IsService Property

Using a fully qualified path, add a sender-receiver interface to an interface package and set the `IsService` property to `true`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
arProps=autosar.api.getAUTOSARProperties(hModel);
addPackageableElement(arProps,'SenderReceiverInterface','/pkg/if','Interface3',...
  'IsService',true);
ifPaths=find(arProps,[],'SenderReceiverInterface',...
  'IsService',true,'PathType','FullyQualified')
```

```
ifPaths =
    {'/pkg/if/Interface3'}
```

Input Arguments

arProps — AUTOSAR properties information for a model

handle

AUTOSAR properties information for a model, previously returned by *`arProps`* = `autosar.api.getAUTOSARProperties(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

category — Element category

character vector | string scalar

Category of element to add. Valid category values are `'ClientServerInterface'`, `'DataTypeMappingSet'`, `'ModeDeclarationGroup'`, `'ModeSwitchInterface'`, `'Package'`, `'ParameterComponent'`, `'ParameterInterface'`, `'SenderReceiverInterface'`, `'SwAddrMethod'`, and `'SystemConst'`.

Example: `'SenderReceiverInterface'`

package — Package path

character vector | string scalar

Fully-qualified path to the element package.

Example: `'/pkg/if'`

name — Element name

character vector | string scalar

Name of the element to add.

Example: `'Interface3'`

property,value — Element property and value

name (character vector or string scalar), value

Property/value pairs for setting values of element properties. Table “Properties of AUTOSAR Elements” lists properties that are associated with AUTOSAR elements.

Example: `'IsService',true`

See Also

`delete`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2014b

arxml.importer

Import AUTOSAR component XML

Description

Use `arxml.importer` functions to import AUTOSAR components into Simulink® in a controlled manner. For example, you can parse an AUTOSAR software component description XML file exported by an AUTOSAR authoring tool, and then import the component into a Simulink model. After importing the component, use the Simulink representation of the component for further configuration, algorithm development, C/C++ code generation, and `arxml` export.

Creation

Syntax

```
ar = arxml.importer(filename)
ar = arxml.importer({filename1,filename2,...,filenameN})
```

Description

`ar = arxml.importer(filename)` creates object `ar`, which represents the AUTOSAR information in XML file `filename`.

`ar = arxml.importer({filename1,filename2,...,filenameN})` creates object `ar`, which represents the AUTOSAR information in the specified XML files.

Tip If you enter the `arxml.importer` function call without a terminating semicolon (;), the importer lists the AUTOSAR content of the specified XML file or files. The information includes paths to software components in the AUTOSAR package structure, which you can specify in calls to `createComponentAsModel` and `createCompositionAsModel`.

Input Arguments

`filename` — AUTOSAR XML filename

character vector | string scalar

Name of XML file containing AUTOSAR information.

Example: `'mySWC.arxml'`

`filename1,filename2,...,filenameN` — AUTOSAR XML filenames

cell array of character vectors | string array

Cell array of names of XML files containing AUTOSAR information.

Example: `{'mySWC.arxml','DataTypes.arxml','MiscDefs.arxml'}`

Object Functions

createComponentAsModel	Create Simulink representation of AUTOSAR arxml atomic software component
createCompositionAsModel	Create Simulink representation of AUTOSAR arxml software composition
getComponentNames	Get AUTOSAR software component names from arxml files
updateAUTOSARProperties	Update model with arxml definitions of AUTOSAR elements
updateModel	Update AUTOSAR model with arxml changes

Examples

Create `arxml.importer` Object from AUTOSAR XML File

Call the `arxml.importer` function to create object `ar`, which represents the AUTOSAR information in XML file `mySWC.arxml`. Use the returned object to import AUTOSAR software component `/pkg/swc` and create an initial Simulink representation of the component.

```
ar = arxml.importer('mySWC.arxml')
createComponentAsModel(ar,'/pkg/swc','ModelPeriodicRunnablesAs','AtomicSubsystem')
```

Create `arxml.importer` Object from Multiple AUTOSAR XML Files

Call the `arxml.importer` function to create object `ar`, which represents the AUTOSAR information in XML files `mySWC.arxml`, `DataTypes.arxml`, and `MiscDefs.arxml`. Use the returned object to import AUTOSAR software component `/pkg/swc` and create an initial Simulink representation of the component.

```
ar = arxml.importer({'mySWC.arxml','DataTypes.arxml','MiscDefs.arxml'})
createComponentAsModel(ar,'/pkg/swc','ModelPeriodicRunnablesAs','AtomicSubsystem')
```

See Also

Topics

“Import AUTOSAR Software Component”
“Import AUTOSAR Adaptive Software Descriptions”
“AUTOSAR arxml Importer”
“Round-Trip Preservation of AUTOSAR XML File Structure and Element Information”
“Import AUTOSAR Software Component Updates”
“Reuse AUTOSAR Element Descriptions”

Introduced in R2008a

autosar.api.create

Create or update mapped AUTOSAR component model

Syntax

```
autosar.api.create(model)
autosar.api.create(model,mode)
autosar.api.create(model,mode,Name,Value)
```

Description

`autosar.api.create(model)` creates or updates mapped AUTOSAR software component model `model`. The default function behavior depends on the mapping state of the model.

- If the model is not mapped to an AUTOSAR software component, the function creates a Simulink to AUTOSAR mapping in `default` mode. In this mapping, Simulink inports and outports are mapped to AUTOSAR ports with default AUTOSAR properties.
- If the model is already mapped to an AUTOSAR software component, the function updates the existing mapping in `incremental` mode. The function finds and maps unmapped model elements, and updates the AUTOSAR Dictionary for deleted model elements.

`autosar.api.create(model,mode)` additionally specifies a mapping `mode` — `default`, `init`, or `incremental`.

`autosar.api.create(model,mode,Name,Value)` specifies additional options for mapping with one or more `Name,Value` pair arguments.

Examples

Create Default AUTOSAR Properties and Mapping

Create AUTOSAR properties and Simulink to AUTOSAR mapping for an Embedded Coder® model in which the model configuration parameter **System target file** has been

changed from `ert.tlc` to `autosar.tlc` or `autosar_adaptive.tlc`. Map model inports and outports to AUTOSAR ports with default AUTOSAR properties.

```
open_system('rtwdemo_counter');
set_param('rtwdemo_counter','SystemTargetFile','autosar.tlc');
autosar.api.create('rtwdemo_counter');
```

Incrementally Update Mapped AUTOSAR Component for Model Changes

For a mapped AUTOSAR software component model, update the mapping to account for incremental model changes. Find and map unmapped model elements and update the AUTOSAR Dictionary for deleted model elements.

```
open_system('autosar_swc');
autosar.api.create('autosar_swc','incremental');
```

Map Submodel Referenced From AUTOSAR Component Model

Create AUTOSAR properties and Simulink to AUTOSAR mapping for a submodel referenced from an AUTOSAR component model.

```
open_system('mAutosarSubModel');
autosar.api.create(hModel,'default','ReferencedFromComponentModel',true);
```

Input Arguments

`model` — Model for which to create or update AUTOSAR properties and mapping

handle | character vector | string scalar

Model for which to create or update AUTOSAR properties and Simulink to AUTOSAR mapping, specified as a handle, character vector, or string scalar representing the model name.

Example: `'my_model'`

`mode` — Mode in which to map model elements

`default` | `init` | `incremental`

The default mode value depends on the mapping state of the model — `default` for an unmapped model or `incremental` for a mapped model.

Specify `default` to create AUTOSAR properties and Simulink to AUTOSAR mapping for a model. As part of the mapping, the function maps model inports and outports to AUTOSAR ports with default AUTOSAR properties. If the model is already mapped, the function overwrites the existing mapping.

Specify `init` to create AUTOSAR properties and Simulink to AUTOSAR mapping for a model. As part of the mapping, the function does *not* map model inports and outports. If the model is already mapped, the function overwrites the existing mapping.

Specify `incremental` to update the existing mapping in a mapped AUTOSAR software component model. The function finds and maps unmapped model elements and updates the AUTOSAR Dictionary for deleted model elements.

Example: `'default'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'ReferencedFromComponentModel',true` maps a model as a referenced submodel.

`ReferencedFromComponentModel` — Designate whether the model is referenced from a component model
`false` (default) | `true`

Specify whether the model is a submodel referenced from an AUTOSAR software component model. In a mapped submodel, you can use the Code Mappings editor to configure the submodel internal data for calibration.

Example: `'ReferencedFromComponentModel',true`

See Also

`autosar.api.delete` | `autosar_ui_launch` | `updateAUTOSARProperties`

Topics

“Incrementally Update AUTOSAR Mapping After Model Changes”

“Map Calibration Data for Submodels Referenced from AUTOSAR Component Models”
“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

createEnumeration

Package: `autosar.api`

Create Simulink enumeration data type definition to work with imported AUTOSAR element

Syntax

```
createEnumeration(arProps,name,applicationDataTypePath)
createEnumeration(arProps,name,compuMethodPath,
implementationDataTypePath)
createEnumeration(arProps,compuMethodPath)
```

Description

`createEnumeration(arProps,name,applicationDataTypePath)` creates Simulink Enumeration from its application data type that can be used to work with imported AUTOSAR elements.

`createEnumeration(arProps,name,compuMethodPath, implementationDataTypePath)` creates Simulink Enumeration from its implementation data type and CompuMethod.

`createEnumeration(arProps,compuMethodPath)` creates family of Simulink enumerations from its CompuMethod.

Examples

Create an Enumeration Data Type from its Application Data Type

Create a Simulink enumeration data type definition with the name `myEnum` from the application data type at path `'/AUTOSAR_PlatformTypes/ApplicationDataTypes/MyAppType'`.

```
dataObj = ...
 autosar.api.getAUTOSARProperties(mdlName);
 createEnumeration(dataObj, 'myEnum',...
   '/AUTOSAR_PlatformTypes/ApplicationDataTypes/MyAppType');
```

Create an Enumeration Data Type from its Implementation Data Type and CompuMethod

Create a Simulink enumeration data type definition with the name `myEnum` from the implementation data type at path `'/AUTOSAR_PlatformTypes/ImplementationDataTypes/uint16'by` using the computation method from path `'/a/b/myCM'`.

```
dataObj = ...
autosar.api.getAUTOSARProperties(mdlName);
createEnumeration(dataObj, 'myEnum', '/a/b/myCM', ...
  '/AUTOSAR_PlatformTypes/ImplementationDataTypes/uint16');
```

Input Arguments

`arProps` — AUTOSAR properties information for a model

handle (default)

AUTOSAR properties information for a model, previously returned by *`arProps`* = `autosar.api.getAUTOSARProperties(`*`model`*`)`. The parameter *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

Data Types: `function_handle`

`name` — Name of Simulink enumeration data type

character vector (default) | string scalar

Name of enumeration data type created for Simulink representation of an AUTOSAR element.

In the Simulink environment, this enumeration data type is mapped to both an application data type and an implementation data type. The application data type for the enumeration provides application-level physical attributes such as real-world range of values, data

structure, and physical semantics. The implementation data type provides implementation-level attributes, such as stored-integer minimum and maximum specifications and primitive type (for example, integer).

Example: `'myEnum'`

Data Types: `char` | `string`

`applicationDataTypePath` — Path to enumeration application data type
character vector (default) | string scalar

Path to application data type for created Simulink enumeration data type. The application data type for the enumeration provides application-level physical attributes such as real-world range of values, data structure, and physical semantics. The application data type is used in simulation.

Example: `'/AUTOSAR_PlatformTypes/ApplicationDataTypes/MyAppType'`

Data Types: `char` | `string`

`compuMethodPath` — Path to CompuMethod used to convert enumeration data types
character vector (default) | string scalar

Path to the CompuMethod. This method converts the enumeration implementation data type to the enumeration application data type.

Example: `'/a/b/myCM'`

Data Types: `char` | `string`

`implementationDataTypePath` — Path to enumeration implementation data type
character vector (default) | string scalar

Path to Simulink enumeration implementation data type. The implementation data type provides implementation-level attributes, such as stored-integer minimum and maximum specifications and primitive type (for example, integer). Implementation data types are used in code generation.

Example: `'/AUTOSAR_PlatformTypes/ImplementationDataTypes/uint16'`

Data Types: `char` | `string`

See Also

`createNumericType`

Topics

“AUTOSAR Component Configuration”
“Model AUTOSAR Data Types”

Introduced in R2019a

createNumericType

Package: `autosar.api`

Create Simulink numeric data type definition to work with imported AUTOSAR element

Syntax

```
createNumericType(arProps,name,applicationDataTypePath)
createNumericType(arProps,name,compuMethodPath,
implementationDataTypePath)
```

Description

`createNumericType(arProps,name,applicationDataTypePath)` creates a `Simulink.NumericType` object from its application data type that can be used to work with imported AUTOSAR elements.

`createNumericType(arProps,name,compuMethodPath,
implementationDataTypePath)` creates a `Simulink.NumericType` object from its implementation data type and CompuMethod.

Examples

Create a Numeric Data Type from its Application Data Type

Create a Simulink numeric data type with the name `myDataType` from its application data type at path `'/AUTOSAR_PlatformTypes/ApplicationDataTypes/MyAppType'`.

```
dataObj = ...
  autosar.api.getAUTOSARProperties(mdlName);
  createNumericType(dataObj, 'myDataType',...
    '/AUTOSAR_PlatformTypes/ApplicationDataTypes/MyAppType');
```

Create a Numeric Data Type from its Implementation Data Type and CompuMethod

Create a Simulink numeric data type with the name `myDataType` from the implementation data type at path `'/AUTOSAR_PlatformTypes/ImplementationDataTypes/uint32'` by using the computation method from path `'/a/b/myCM'`.

```
dataObj = ...
  autosar.api.getAUTOSARProperties(mdlName);
  createNumericType(dataObj, 'myDataType', '/a/b/myCM', ...
    '/AUTOSAR_PlatformTypes/ImplementationDataTypes/uint32');
```

Input Arguments

arProps — AUTOSAR properties information for a model

handle (default)

AUTOSAR properties information for a model, previously returned by *`arProps`* `=` `autosar.api.getAUTOSARProperties(`*`model`*`)`.The parameter *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

Data Types: `function_handle`

name — Name of Simulink numeric data type

character vector (default) | string scalar

Name of numeric data type created for Simulink representation of an AUTOSAR element.

In the Simulink environment, this numeric data type is mapped to both an application data type and an implementation data type. The application data type provides application-level physical attributes such as real-world range of values, data structure, and physical semantics. The implementation data type provides implementation-level attributes, such as stored-integer minimum and maximum specifications and primitive type (for example, integer).

Example: `'myDataType'`

Data Types: `char` | `string`

`applicationDataTypePath` — Path to numeric application data type
character vector (default) | string scalar

Path to application data type for created Simulink numeric data type. The application data type provides application-level physical attributes such as real-world range of values, data structure, and physical semantics. The application data type is used in simulation.

Example: `'/AUTOSAR_PlatformTypes/ApplicationDataTypes/MyAppType'`

Data Types: `char` | `string`

`compuMethodPath` — Path to CompuMethod used to convert numeric data types
character vector (default) | string scalar

Path to the CompuMethod. This method converts the numeric implementation data type to the numeric application data type.

Example: `'/a/b/myCM'`

Data Types: `char` | `string`

`implementationDataTypePath` — Path to numeric implementation data type
character vector (default) | string scalar

Path to Simulink numeric implementation data type. The numeric data type provides implementation-level attributes, such as stored-integer minimum and maximum specifications and primitive type (for example, integer). Implementation data types are used in code generation.

Example: `'/AUTOSAR_PlatformTypes/ImplementationDataTypes/uint32'`

Data Types: `char` | `string`

See Also

`createEnumeration`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2019a

autosar.api.delete

Delete AUTOSAR properties and mapping for Simulink model

Syntax

```
autosar.api.delete(model)
```

Description

`autosar.api.delete(model)` deletes AUTOSAR properties and Simulink to AUTOSAR mapping for `model`. The resulting model does not represent and map an AUTOSAR software component.

Examples

Remove AUTOSAR Component Representation from Model

Delete AUTOSAR properties and Simulink to AUTOSAR mapping for a model.

```
hModel = 'autosar_swc_counter';
open_system(hModel);
autosar.api.delete(hModel);
```

Input Arguments

`model` — Model for which to delete AUTOSAR properties and mapping

handle | character vector | string scalar

Model for which to delete AUTOSAR properties and Simulink to AUTOSAR mapping, specified as a handle, character vector, or string scalar representing the model name.

Example: `'my_model'`

See Also

`autosar.api.create`

Topics

“AUTOSAR Component Configuration”

Introduced in R2017b

autosar.api.export

Export AUTOSAR XML and generate component code from architecture model

Syntax

```
autosar.api.export(systemPath)
autosar.api.export(systemPath,Name,Value)
```

Description

`autosar.api.export(systemPath)` exports `arxml` descriptions from a specified root architecture model, composition, or component in the context of an open AUTOSAR architecture model. The function also generates code for referenced component models in the specified system path.

`autosar.api.export(systemPath,Name,Value)` specifies additional export options with one or more `Name,Value` pair arguments. For example, you can specify a zip file in which generated files are packaged.

Examples

Generate `arxml` Descriptions and Code for Architecture Model

Export composition XML descriptions and generate component code for an AUTOSAR architecture model. In the system path argument, specify the name of the root architecture model.

```
hModel = 'autosar_tpc_composition';
open_system(hModel);
autosar.api.export(hModel);
```

Generate `arxml` Descriptions and Code for Component

Export XML descriptions and generate code for component `Ctrl` in an AUTOSAR architecture model. In the system path argument, specify the path to the component block.

```
open_system('autosar_tpc_composition');
autosar.api.export('autosar_tpc_composition/Ctrl');
```

Generate `arxml` Descriptions and Code In Zip File for Nested Composition

Export XML descriptions and generate component code for a composition nested in an AUTOSAR architecture model. In the system path argument, specify the path to the nested composition block. In the `PackageCodeAndArxml` value argument, specify the name of a zip file in which to package the generated files.

```
open_system('autosar_tpc_composition');
autosar.api.export('autosar_tpc_composition/Sensors',...
    'PackageCodeAndARXML','SensorsComposition.zip');
```

Input Arguments

`systemPath` — Path to architecture model, composition block, or component block

character vector | string scalar

Path to a root architecture model, composition, or component for which to export AUTOSAR XML descriptions and generate component code.

Example: `'autosar_tpc_composition/Sensors/Monitor'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'PackageCodeAndARXML','SensorsComposition.zip'` specifies the name of a zip file that packages the generated files.

`ExportedARXMLFolder` — Folder location for exported `arxml` files
character vector | string scalar

Full path to a folder in which to place exported `arxml` description files.

Example: `'ExportedARXMLFolder','C:\temp\arxml'`

`PackageCodeAndARXML` — Name of zip file in which to package generated files
character vector | string scalar

Name of a zip file in which to package the generated files, including generated code and exported `arxml` descriptions.

Example: `'PackageCodeAndARXML','SensorsComposition.zip'`

See Also

Topics

“Generate and Package AUTOSAR Composition XML Descriptions and Component Code”

Introduced in R2019b

autosar.api.getAUTOSARProperties

Configure AUTOSAR software component elements and properties

Description

In an AUTOSAR software component model, use AUTOSAR property functions to configure AUTOSAR elements from an AUTOSAR component perspective. You can add AUTOSAR elements, find elements, get and set properties of elements, delete elements, and define `arxml` packaging of elements.

Creation

Syntax

```
arProps = autosar.api.getAUTOSARProperties(model)
```

Description

`arProps = autosar.api.getAUTOSARProperties(model)` creates object `arProps`, which represents AUTOSAR properties information for `model`. The specified model must be open.

Input Arguments

`model` — AUTOSAR model
handle | character vector | string scalar

Model for which to create AUTOSAR properties object, specified as a handle, character vector, or string scalar representing the model name.

Example: `'my_model'`

Object Functions

add	Add property to AUTOSAR element
addPackageableElement	Add element to AUTOSAR package in model
createEnumeration	Create Simulink enumeration data type definition to work with imported AUTOSAR element
createNumericType	Create Simulink numeric data type definition to work with imported AUTOSAR element
delete	Delete AUTOSAR element
deleteUnmappedComponents	Delete unmapped AUTOSAR components from model
find	Find AUTOSAR elements
get	Get property of AUTOSAR element
set	Set property of AUTOSAR element

Examples

Create AUTOSAR Properties Object and Set IsService Property

Call the `autosar.api.getAUTOSARProperties` function to create object `arProps`, which represents AUTOSAR properties information for model `autosar_swc_slfcns`. Use the returned object to set the `IsService` property for client-server interface `CSIf` to `true` (1), indicating that the port interface is used for AUTOSAR services.

```
hModel = 'autosar_swc_slfcns';
open_system(hModel);
arProps = autosar.api.getAUTOSARProperties(hModel);
set(arProps,'CSIf','IsService',true);
isService = get(arProps,'CSIf','IsService')
```

```
isService =
  logical
   1
```

See Also

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Property and Map Function Examples”
“AUTOSAR Component Configuration”

Introduced in R2013b

autosar.api.getSimulinkMapping

Map Simulink elements to AUTOSAR elements

Description

In an AUTOSAR software component model, use AUTOSAR map functions to map model elements to AUTOSAR component elements from a Simulink model perspective. For example, you can:

- Map a Simulink entry-point function to an AUTOSAR runnable and optional software address methods.
- Map a Simulink inport or outport to an AUTOSAR receiver or sender port and a sender-receiver data element.
- Map a Simulink model workspace parameter to an AUTOSAR component internal parameter.
- Map a Simulink data store to an AUTOSAR variable.
- Map a Simulink block signal or state to an AUTOSAR variable.
- Map a Simulink data transfer line to an AUTOSAR inter-runnable variable (IRV).
- Map a Simulink function caller to an AUTOSAR client port and a client-server operation.

Creation

Syntax

```
slMap = autosar.api.getSimulinkMapping(model)
```

Description

`slMap = autosar.api.getSimulinkMapping(model)` creates object `slMap`, which represents AUTOSAR mapping information for `model`. The specified model must be open.

Input Arguments

`model` — AUTOSAR model

handle | character vector | string scalar

Model for which to create AUTOSAR mapping object, specified as a handle, character vector, or string scalar representing the model name.

Example: `'my_model'`

Object Functions

getDataStore	Get AUTOSAR mapping information for Simulink data store
getDataTransfer	Get AUTOSAR mapping information for Simulink data transfer
getFunction	Get AUTOSAR mapping information for Simulink entry-point function
getFunctionCaller	Get AUTOSAR mapping information for Simulink function-caller block
getInport	Get AUTOSAR mapping information for Simulink inport
getOutport	Get AUTOSAR mapping information for Simulink outport
getParameter	Get AUTOSAR mapping information for Simulink model workspace parameter
getSignal	Get AUTOSAR mapping information for Simulink block signal
getState	Get AUTOSAR mapping information for Simulink block state
mapDataStore	Map Simulink data store to AUTOSAR variable
mapDataTransfer	Map Simulink data transfer to AUTOSAR inter-runnable variable
mapFunction	Map Simulink entry-point function to AUTOSAR runnable and software address methods
mapFunctionCaller	Map Simulink function-caller block to AUTOSAR client port and operation
mapInport	Map Simulink inport to AUTOSAR port
mapOutport	Map Simulink outport to AUTOSAR port
mapParameter	Map Simulink model workspace parameter to AUTOSAR component internal parameter
mapSignal	Map Simulink block signal to AUTOSAR variable
mapState	Map Simulink block state to AUTOSAR variable

Examples

Create AUTOSAR Mapping Object and Map Entry-Point Function to AUTOSAR Runnable

Call the `autosar.api.getSimulinkMapping` function to create object `slMap`, which represents AUTOSAR mapping information for model `autosar_swc`. Use the returned object to map the Simulink initialize entry-point function to AUTOSAR runnable `Runnable_Init`.

```
hModel = 'autosar_swc';
open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);
mapFunction(slMap,'InitializeFunction','Runnable_Init');
arRunnableName = getFunction(slMap,'InitializeFunction')
```

```
arRunnableName =
    'Runnable_Init'
```

See Also

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Property and Map Function Examples”
“AUTOSAR Component Configuration”

Introduced in R2013b

autosar.api.syncModel

Update Simulink to AUTOSAR mapping of model with Simulink modifications

Syntax

```
autosar.api.syncModel(model)
```

Description

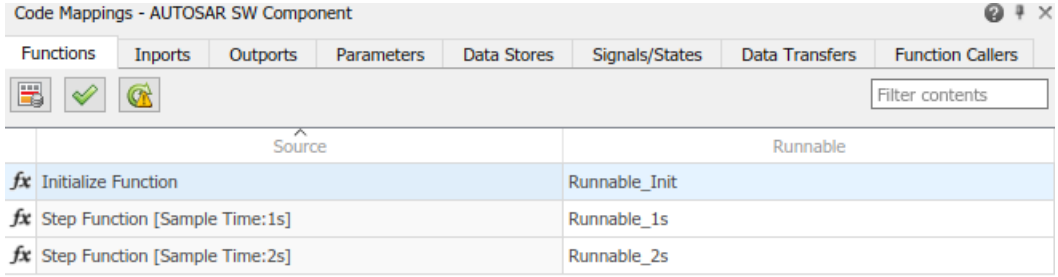
`autosar.api.syncModel(model)` updates the Simulink to AUTOSAR mapping of `model` with modifications made to Simulink elements, such as data transfers, entry-point functions, and function callers.

This function is equivalent to using the **Update** button  in the Code Mappings editor view of an AUTOSAR component model.

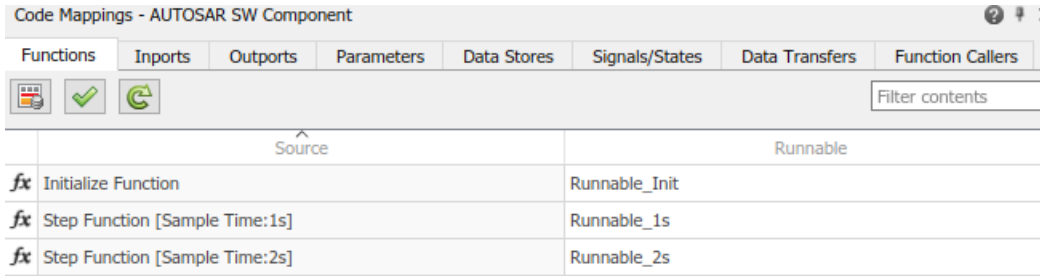
Examples

Update Simulink to AUTOSAR Mapping of Model

When you create or modify an AUTOSAR model, Simulink to AUTOSAR mapping potentially is not current with the model content. For example, the **Update** button in this Code Mappings editor display indicates that Simulink elements need loading or updating.



This example opens and updates a model. After calling `autosar.api.syncModel`, the Simulink to AUTOSAR mapping reflects the current model content.




```
hModel = 'autosar_swc';
open_system(hModel);
autosar.api.syncModel(hModel)
```

Input Arguments

`model` — Model to update

handle | character vector | string scalar

Loaded or open model for which to update Simulink to AUTOSAR mapping with model changes, specified as a handle, character vector, or string scalar representing the model name.

Example: `'my_model'`

See Also

`autosar.api.validateModel`

Topics

"AUTOSAR Property and Map Function Examples"
"AUTOSAR Component Configuration"

Introduced in R2016a

autosar.api.validateModel

Validate AUTOSAR properties and mapping of Simulink model

Syntax

`autosar.api.validateModel(model)`

Description

`autosar.api.validateModel(model)` validates the AUTOSAR properties and Simulink to AUTOSAR mapping of `model`.

This function is equivalent to using the **Validate** button  in the Code Mappings editor view of an AUTOSAR component model.

Examples

Validate AUTOSAR Properties and Mapping of Model

This example opens a model in which a Simulink inport is not mapped to an AUTOSAR port and data element. Initial validation reports the error and fails. After the inport is mapped, validation succeeds.

```
hModel = 'autosar_model_with_unmapped_port';
load_system(hModel);

% Initial validation fails
try
    autosar.api.validateModel(hModel)
catch validationErr
    throw(validationErr)
end
```

```
Block 'autosar_model_with_unmapped_port/Input' is not mapped to an AUTOSAR port element.
```

```
% Map the unmapped port
slMap=autosar.api.getSimulinkMapping(hModel);
mapInport(slMap,'Input','Input','Input','ImplicitReceive');
```

```
% Second validation succeeds
autosar.api.validateModel(hModel)
```

Input Arguments

`model` — Model to validate

handle | character vector | string scalar

Loaded or open model for which to validate AUTOSAR properties and Simulink to AUTOSAR mapping, specified as a handle, character vector, or string scalar representing the model name.

Example: `'my_model'`

See Also

`autosar.api.syncModel`

Topics

“AUTOSAR Property and Map Function Examples”
“AUTOSAR Component Configuration”

Introduced in R2016a

autosar_ui_close

Close AUTOSAR Dictionary dialog box

Syntax

```
autosar_ui_close(model)
```

Description

`autosar_ui_close(model)` closes the AUTOSAR Dictionary dialog box for the specified open model.

Examples

Close AUTOSAR Dictionary Dialog Box for Example Model

Open the AUTOSAR Dictionary dialog box with settings for an AUTOSAR example model, and then close the dialog box.

```
hModel = 'autosar_swc';
open_system(hModel)
autosar_ui_launch(hModel)
autosar_ui_close(hModel)
```

Input Arguments

`model` — Model for which to close the AUTOSAR Dictionary dialog box

handle | character vector | string scalar

Model for which to close the AUTOSAR Dictionary dialog box, specified as a handle, character vector, or string scalar representing the model name.

Example: `'autosar_swc'`

See Also

`autosar.api.create` | `autosar_ui_launch`

Topics

"AUTOSAR Component Configuration"

Introduced in R2014b

autosar_ui_launch

Open AUTOSAR Dictionary dialog box

Syntax

```
autosar_ui_launch(model)
```

Description

`autosar_ui_launch(model)` opens the AUTOSAR Dictionary dialog box with settings for the specified open model.

Examples

Open AUTOSAR Dictionary Dialog Box for Example Model

Open the AUTOSAR Dictionary dialog box with settings for an AUTOSAR example model.

```
hModel = 'autosar_swc';
open_system(hModel)
autosar_ui_launch(hModel)
```

Input Arguments

`model` — Model for which to open the AUTOSAR Dictionary dialog box

handle | character vector | string scalar

Model for which to open the AUTOSAR Dictionary dialog box, specified as a handle, character vector, or string scalar representing the model name.

Example: `'autosar_swc'`

See Also

`autosar.api.create` | `autosar_ui_close`

Topics

"AUTOSAR Component Configuration"

Introduced in R2013b

createComponentAsModel

Package: `arxml`

Create Simulink representation of AUTOSAR `arxml` atomic software component

Syntax

```
createComponentAsModel(ar,ComponentName)
[mdl, sts] = createComponentAsModel(ar,ComponentName,Name,Value)
```

Description

`createComponentAsModel(ar,ComponentName)` creates a Simulink model corresponding to AUTOSAR atomic software component `ComponentName`. The component description is part of AUTOSAR information previously imported from AUTOSAR XML files, which is represented by `arxml.importer` object `ar`.The importer creates an initial Simulink representation of the imported AUTOSAR component, with an initial, default mapping of Simulink model elements to AUTOSAR component elements. The initial representation provides a starting point for further AUTOSAR configuration and Model-Based Design. For more information, see “AUTOSAR arxml Importer”.

The initial representation of AUTOSAR component behavior in the created model depends on the XML description:

- If the XML description of the component does not describe component behavior, the importer creates a model with a default representation of AUTOSAR runnables and ports.
- If the XML description of the component describes component behavior, the importer creates a model based on AUTOSAR elements that are accessed in the component.

  For example, AUTOSAR ports must be accessed by runnables in order to generate the corresponding Simulink elements. If a sender-receiver or client-server port in XML code is not accessed by a runnable, the importer does not create the corresponding inports, outports, or Simulink functions.

`[mdl, sts] = createComponentAsModel(ar,ComponentName,Name,Value)` specifies additional options for Simulink model creation with one or more `Name,Value` pair arguments.

Examples

Import AUTOSAR Component and Model Periodic Runnables as Atomic Subsystems

Import AUTOSAR software component `/pkg/swc` from XML file `mySWC.arxml` and create an initial Simulink representation of the component. Model AUTOSAR periodic runnables as atomic subsystems with periodic rates.

```
ar = arxml.importer('mySWC.arxml')
createComponentAsModel(ar,'/pkg/swc','ModelPeriodicRunnablesAs','AtomicSubsystem')
```

Import AUTOSAR Component and Model Periodic Runnables as Function-Call Subsystems

Import AUTOSAR software component `/pkg/swc` from XML file `mySWC.arxml` and create an initial Simulink representation of the component. Model AUTOSAR periodic runnables as function-call subsystems with periodic rates.

```
ar = arxml.importer('mySWC.arxml')
createComponentAsModel(ar,'/pkg/swc','ModelPeriodicRunnablesAs','FunctionCallSubsystem')
```

Import AUTOSAR Component and Use Data Dictionary

Import AUTOSAR software component `/pkg/swc` from XML file `mySWC.arxml` and create an initial Simulink representation of the component. Place Simulink data objects corresponding to AUTOSAR data types into data dictionary `ardata.sldd`.

```
ar = arxml.importer('mySWC.arxml')
createComponentAsModel(ar,'/pkg/swc','ModelPeriodicRunnablesAs','AtomicSubsystem',...
  'DataDictionary','ardata.sldd')
```

Import AUTOSAR Component and Designate Initialization Runnable

Import AUTOSAR software component `/pkg/swc` from XML file `mySWC.arxml` and create an initial Simulink representation of the component. Configure AUTOSAR runnable `Runnable_Init` as the initialization runnable for the component.

```
ar = arxml.importer('mySWC.arxml')
createComponentAsModel(ar,'/pkg/swc','ModelPeriodicRunnablesAs','AtomicSubsystem',...
  'InitializationRunnable','Runnable_Init')
```

Import AUTOSAR Component and Use `PredefinedVariant` to Resolve Variation Points

Import AUTOSAR software component `/pkg/swc` from XML file `mySWC.arxml` and create an initial Simulink representation of the component. Use `PredefinedVariant` Senior to resolve variation points in the component at model creation time.

```
ar = arxml.importer('mySWC.arxml')
createComponentAsModel(ar,'/pkg/swc','ModelPeriodicRunnablesAs','AtomicSubsystem',...
  'PredefinedVariant','/pkg/body/Variants/Senior');
```

Import AUTOSAR Component and Use `SwSystemconstantValueSets` to Resolve Variation Points

Import AUTOSAR software component `/pkg/swc` from XML file `mySWC.arxml` and create an initial Simulink representation of the component. Use `SwSystemconstantValueSets` A and B to resolve variation points in the component at model creation time.

```
ar = arxml.importer('mySWC.arxml')
createComponentAsModel(ar,'/pkg/swc','ModelPeriodicRunnablesAs','AtomicSubsystem',...
  'SystemConstValueSets',{'/pkg/body/SystemConstantValues/A','/pkg/body/SystemConstantValues/B'});
```

Input Arguments

`ar` — `arxml.importer` object
object

AUTOSAR information previously imported from XML files, specified as an `arxml.importer` object.

`ComponentName` — Component path
character vector | string scalar

Absolute short-name path of the atomic software component.

Example: `'/Company/Powertrain/Components/ASWC'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'ModelPeriodicRunnablesAs','AtomicSubsystem'` directs the importer to model AUTOSAR periodic runnables as atomic subsystems with periodic rates.

`DataDictionary` — Simulink data dictionary
character vector | string scalar

Simulink data dictionary into which to import data objects corresponding to AUTOSAR data types in the XML file. If the specified dictionary does not already exist, the importer creates it. The model is then associated with that data dictionary.

Example: `'DataDictionary','ardata.sldd'`

`InitializationRunnable` — Initialization runnable
character vector | string scalar

Name of an existing AUTOSAR runnable to select as the initialization runnable for the component.

Example: `'InitializationRunnable','Runnable_Init'`

`ModelPeriodicRunnablesAs` — Subsystem type for periodic runnables
`'AtomicSubsystem'` (default) | `'FunctionCallSubsystem'` | `'Auto'`

By default, `createComponentAsModel` imports AUTOSAR periodic runnables found in `arxml` files and models them as atomic subsystems with periodic rates. If conditions prevent use of atomic subsystems, the importer throws an error.

To model periodic runnables as function-call subsystems with periodic rates, specify `FunctionCallSubsystem`.

If you specify `Auto`, the importer attempts to model periodic runnables as atomic subsystems. If conditions prevent use of atomic subsystems, the importer models periodic runnables as function-call subsystems.

For more information, see “Import AUTOSAR Software Component with Multiple Runnables”.

Example: `'ModelPeriodicRunnablesAs','AtomicSubsystem'`

Data Types: `char`

`PredefinedVariant` — Path to AUTOSAR predefined variant
character vector | string scalar

Path to a `PredefinedVariant` defined in the AUTOSAR XML file. A `PredefinedVariant` describes a combination of system constant values among potentially multiple valid combinations to apply to an AUTOSAR software component. Use this property to resolve variation points in the AUTOSAR software component at model creation time. If specified, the importer uses the `PredefinedVariant` to initialize `SwSystemconst` data that serves as input to control variation points.

For more information, see “Control AUTOSAR Variants with Predefined Value Combinations”.

Example: `'PredefinedVariant','/pkg/body/Variants/Senior'`

`SystemConstValueSets` — Paths to one or more AUTOSAR system constant value sets
cell array of character vectors | string array

Paths to one or more `SystemConstValueSet`s defined in the AUTOSAR XML file. A `SystemConstValueSet` specifies a set of system constant values to apply to an AUTOSAR software component. Use this property to resolve variation points in the AUTOSAR software component at model creation time. If specified, the importer uses the `SystemConstValueSet`s to initialize `SwSystemconst` data that serves as input to control variation points.

For more information, see “Control AUTOSAR Variants with Predefined Value Combinations”.

Example: `'SystemConstValueSets','{'/pkg/body/SystemConstantValues/A','/pkg/body/SystemConstantValues/B'}'`

Output Arguments

`mdl` — Model handle
handle

Variable that returns a handle to created model.

`sts` — Success or failure
true or false

Variable that returns true if the import is successful. Otherwise, returns false.

Tips

- If you enter the `arxml.importer` object function call without a terminating semicolon (;), the importer lists the AUTOSAR content of the specified XML file or files. The information includes paths to software components in the AUTOSAR package structure, which you can specify in calls to `createComponentAsModel` and `createCompositionAsModel`.
- When importing an AUTOSAR software component into a model, it is recommended that you explicitly specify the `ModelPeriodicRunnablesAs` property. This property determines how the importer models AUTOSAR periodic runnables in the created model. See the property description under “Name-Value Pair Arguments” on page 1-44.

See Also

`arxml.importer`

Topics

“Import AUTOSAR Software Component”
“Import AUTOSAR Component to Simulink”
“Import AUTOSAR Adaptive Software Descriptions”
“Import AUTOSAR Adaptive Components to Simulink”
“AUTOSAR arxml Importer”
“Control AUTOSAR Variants with Predefined Value Combinations”

Introduced in R2008a

createCompositionAsModel

Package: `arxml`

Create Simulink representation of AUTOSAR `arxml` software composition

Syntax

```
createCompositionAsModel(ar,CompositionName)
[mdl, sts] = createCompositionAsModel(ar,CompositionName,Name,Value)
```

Description

`createCompositionAsModel(ar,CompositionName)` creates a Simulink model corresponding to AUTOSAR software composition `CompositionName`. The composition description is part of AUTOSAR information previously imported from AUTOSAR XML files, which is represented by `arxml.importer` object `ar`.The importer creates an initial Simulink representation of the imported AUTOSAR composition. The initial representation provides a starting point for further AUTOSAR configuration and Model-Based Design. For more information, see “AUTOSAR arxml Importer”.

`[mdl, sts] = createCompositionAsModel(ar,CompositionName,Name,Value)` specifies additional options for Simulink model creation with one or more `Name,Value` pair arguments.

Examples

Import AUTOSAR Composition

Import AUTOSAR software composition `/pkg/rootComposition` from XML file `mySWCs.arxml` and create an initial Simulink representation of the composition.

```
ar = arxml.importer('mySWCs.arxml')
createCompositionAsModel(ar,'/pkg/rootComposition')
```

Import AUTOSAR Composition and Include Existing Component Models

Import AUTOSAR software composition `/pkg/rootComposition` from XML file `mySWCs.arxml` and create an initial Simulink representation of the composition. For components `mySwc1` and `mySwc2` contained within the composition, use existing Simulink component models rather than creating new ones.

```
ar = arxml.importer('mySWCs.arxml')
createCompositionAsModel(ar,'/pkg/rootComposition','ComponentModels',{'mySwc1','mySwc2'})
```

Import AUTOSAR Composition and Use Data Dictionary

Import AUTOSAR software composition `/pkg/rootComposition` from XML file `mySWCs.arxml` and create an initial Simulink representation of the composition. Place Simulink data objects corresponding to AUTOSAR data types into data dictionary `ardata.sldd`.

```
ar = arxml.importer('mySWCs.arxml')
createCompositionAsModel(ar,'/pkg/rootComposition','DataDictionary','ardata.sldd')
```

Import AUTOSAR Composition and Model Periodic Runnables as Function-Call Subsystems

Import AUTOSAR software composition `/pkg/rootComposition` from XML file `mySWCs.arxml` and create an initial Simulink representation of the composition. Model AUTOSAR periodic runnables as function-call subsystems with periodic rates.

```
ar = arxml.importer('mySWCs.arxml')
createCompositionAsModel(ar,'/pkg/rootComposition',...
  'ModelPeriodicRunnablesAs','FunctionCallSubsystem')
```

Import AUTOSAR Composition and Use `PredefinedVariant` to Resolve Variation Points

Import AUTOSAR software composition `/pkg/rootComposition` from XML file `mySWCs.arxml` and create an initial Simulink representation of the composition. Use `PredefinedVariant` Senior to resolve variation points in components at model creation time.

```
ar = arxml.importer('mySWCs.arxml')
createCompositionAsModel(ar,'/pkg/rootComposition',...
  'PredefinedVariant','/pkg/body/Variants/Senior');
```

Import AUTOSAR Composition and Use SwSystemconstantValueSets to Resolve Variation Points

Import AUTOSAR software composition `/pkg/rootComposition` from XML file `mySWCs.arxml` and create an initial Simulink representation of the composition. Use `SwSystemconstantValueSets` A and B to resolve variation points in components at model creation time.

```
ar = arxml.importer('mySWCs.arxml')
createCompositionAsModel(ar,'/pkg/rootComposition',...
  'SystemConstValueSets',{'/pkg/body/SystemConstantValues/A','/pkg/body/SystemConstantValues/B'});
```

Input Arguments

`ar` — `arxml.importer` object
object

AUTOSAR information previously imported from XML files, specified as an `arxml.importer` object.

`CompositionName` — Composition path
character vector | string scalar

Absolute short-name path of the software composition.

Example: `'/Company/Powertrain/Components/RootComposition'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'ModelPeriodicRunnablesAs','AtomicSubsystem'` directs the importer to model AUTOSAR periodic runnables as atomic subsystems with periodic rates.

`ComponentModels` — Simulink component models
cell array of character vectors | string array

Names of existing atomic software component models to use when creating a Simulink representation of the composition. The function incorporates the specified existing component models in the composition model instead of creating new ones.

Example: `'ComponentModels',{'mySwc1','mySwc2'}`

`DataDictionary` — Simulink data dictionary
character vector | string scalar

Simulink data dictionary into which to import data objects corresponding to AUTOSAR data types in the XML file. If the specified dictionary does not already exist, the importer creates it. The model is then associated with that data dictionary.

Example: `'DataDictionary','ardata.sldd'`

`ModelPeriodicRunnablesAs` — Subsystem type for periodic runnables
`'Auto'` (default) | `'AtomicSubsystem'` | `'FunctionCallSubsystem'`

By default, `createCompositionAsModel` imports AUTOSAR periodic runnables found in `arxml` files and attempts to model them as atomic subsystems with periodic rates. If conditions prevent use of atomic subsystems, the function models the periodic runnables as function-call subsystems with periodic rates.

To model periodic runnables only as atomic subsystems, specify `AtomicSubsystem`. If conditions prevent use of atomic subsystems, the function throws an error.

To model periodic runnables only as function-call subsystems, specify `FunctionCallSubsystem`.

For more information, see “Import AUTOSAR Software Component with Multiple Runnables”.

Example: `'ModelPeriodicRunnablesAs','AtomicSubsystem'`

Data Types: `char`

`PredefinedVariant` — Path to AUTOSAR predefined variant
character vector | string scalar

Path to a `PredefinedVariant` defined in the AUTOSAR XML file. A `PredefinedVariant` describes a combination of system constant values among potentially multiple valid combinations to apply to AUTOSAR software components. Use this property to resolve variation points in AUTOSAR software components at model

creation time. If specified, the importer uses the `PredefinedVariant` to initialize `SwSystemconst` data that serves as input to control variation points.

For more information, see “Control AUTOSAR Variants with Predefined Value Combinations”.

Example: `'PredefinedVariant','/pkg/body/Variants/Senior'`

`SystemConstValueSets` — Paths to one or more AUTOSAR system constant value sets
cell array of character vectors | string array

Paths to one or more `SystemConstValueSets` defined in the AUTOSAR XML file. A `SystemConstValueSet` specifies a set of system constant values to apply to AUTOSAR software components. Use this property to resolve variation points in AUTOSAR software components at model creation time. If specified, the importer uses the `SystemConstValueSets` to initialize `SwSystemconst` data that serves as input to control variation points.

For more information, see “Control AUTOSAR Variants with Predefined Value Combinations”.

Example: `'SystemConstValueSets','{'/pkg/body/SystemConstantValues/A','/pkg/body/SystemConstantValues/B'}'`

Output Arguments

`mdl` — Model handle
handle

Variable that returns a handle to created model.

`sts` — Success or failure
true or false

Variable that returns true if the import is successful. Otherwise, returns false.

Tip

If you enter the `arxml.importer` object function call without a terminating semicolon (;), the importer lists the AUTOSAR content of the specified XML file or files. The

information includes paths to software components in the AUTOSAR package structure, which you can specify in calls to `createCompositionAsModel` and `createComponentAsModel`.

See Also

`arxml.importer`

Topics

“Import AUTOSAR Software Component”
“Import AUTOSAR Composition to Simulink”
“AUTOSAR arxml Importer”
“Control AUTOSAR Variants with Predefined Value Combinations”

Introduced in R2017b

delete

Package: `autosar.api`

Delete AUTOSAR element

Syntax

```
delete(arProps,elementPath)
```

Description

`delete(arProps,elementPath)` deletes the AUTOSAR element at `elementPath`.

Examples

Delete Sender-Receiver Interface

Delete the sender-receiver interface `Interface1` from the AUTOSAR configuration for a model.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
arProps = autosar.api.getAUTOSARProperties(hModel);

% Add Interface3
addPackageableElement(arProps,'SenderReceiverInterface','/pkg/if','Interface3');
ifPaths=find(arProps,[],'SenderReceiverInterface','PathType','FullyQualified')

ifPaths =
    {'/pkg/if/Interface1'}    {'/pkg/if/Interface2'}    {'/pkg/if/Interface3'}

% Find AUTOSAR DataReceiverPort and change its interface from Interface1 to Interface3
arPortType = 'DataReceiverPort';
aswcPath = find(arProps,[],'AtomicComponent','PathType','FullyQualified');
rPorts=find(arProps,aswcPath{1},arPortType,'PathType','FullyQualified');
rPort=rPorts{1};
set(arProps,rPort,'Interface','Interface3')

% Delete Interface1
```

```
delete(arProps,'Interface1');
ifPaths=find(arProps,[],'SenderReceiverInterface','PathType','FullyQualified')
```

```
ifPaths =
    {'/pkg/if/Interface2'}    {'/pkg/if/Interface3'}
```

Input Arguments

`arProps` — AUTOSAR properties information for a model

handle

AUTOSAR properties information for a model, previously returned by *`arProps`* `= autosar.api.getAUTOSARProperties(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

`elementPath` — Path to AUTOSAR element

character vector | string scalar

Path to the AUTOSAR element to delete.

Example: `'Input'`

See Also

`add`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

deleteUnmappedComponents

Package: `autosar.api`

Delete unmapped AUTOSAR components from model

Syntax

```
deleteUnmappedComponents(arProps)
```

Description

`deleteUnmappedComponents(arProps)` deletes atomic software components that are not mapped to the model. Use this to remove unused imported components that you do not want preserved in the model and exported in `arxml` code. This function does not remove calibration components.

Examples

Remove Unmapped Atomic Software Components From AUTOSAR Model

After importing AUTOSAR information from `arxml` files and configuring a model for AUTOSAR, remove atomic software components that were imported but are not mapped to the model. This prevents unmapped components from being exported back to `arxml`.

```
arProps=autosar.api.getAUTOSARProperties('my_autosar_model');
deleteUnmappedComponents(arProps);
```

Input Arguments

`arProps` — AUTOSAR properties information for a model

handle

AUTOSAR properties information for a model, previously returned by `arProps = autosar.api.getAUTOSARProperties(model)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

See Also

`arxml.importer`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“Import AUTOSAR Software Component”
“AUTOSAR Component Configuration”

Introduced in R2014b

find

Package: `autosar.api`

Find AUTOSAR elements

Syntax

```
paths=find(arProps,rootPath,category)
paths=find(arProps,rootPath,category,'PathType',value)
paths=find(arProps,rootPath,category,property,value)
```

Description

`paths=find(arProps,rootPath,category)` returns `paths` to AUTOSAR elements matching `category`, starting at path `rootPath`.

`paths=find(arProps,rootPath,category,'PathType',value)` specifies whether the returned `paths` are fully qualified or partially qualified.

`paths=find(arProps,rootPath,category,property,value)` specifies a constraining value on a property of the specified `category` of elements, narrowing the search.

Examples

Find Sender-Receiver Interfaces That Are Not Services

For a model, find sender-receiver interfaces for which the property `IsService` is `false` and return fully qualified paths.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
arProps=autosar.api.getAUTOSARProperties(hModel);
ifPaths=find(arProps,[],'SenderReceiverInterface',...
  'IsService',false,'PathType','FullyQualified')
```

```
ifPaths =
    {'/pkg/if/Interface1'}    {'/pkg/if/Interface2'}
```

Find Mode-Switch Interface Paths

For a model, add a mode-switch interface and then use `find` to list paths for mode-switch interfaces in the model.

```
addpath(fullfile(matlabroot,'/help/toolbox/autosar/examples'));
hModel = 'mAutosarMsConfigAfter';
open_system(hModel);
arProps=autosar.api.getAUTOSARProperties(hModel);
addPackageableElement(arProps,'ModeSwitchInterface','/pkg/if','Interface3',...
  'IsService',true);
ifPaths=find(arProps,[],'ModeSwitchInterface','PathType','FullyQualified')
```

```
ifPaths =
    {'/pkg/if/myMsIf'}    {'/pkg/if/MsIf2'}    {'/pkg/if/Interface3'}
```

Input Arguments

`arProps` — AUTOSAR properties information for a model

handle

AUTOSAR properties information for a model, previously returned by *`arProps`* `= autosar.api.getAUTOSARProperties(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

`rootPath` — Starting point of the search

character vector | string scalar | `[ ]`

Path specifying the starting point at which to look for the specified type of AUTOSAR elements. `[ ]` indicates the root of the component.

Example: `[ ]`

`category` — Type of AUTOSAR element

character vector | string scalar

Type of AUTOSAR element for which to return paths.

Example: `'SenderReceiverInterface'`

`'PathType',value` — Whether the returned paths are fully qualified or partially qualified
`'PartiallyQualified'` (default) | `'FullyQualified'`

Specify `FullyQualified` to return fully qualified paths.

Example: `'PathType','FullyQualified'`

`property,value` — Property and value
name (character vector or string scalar), value

Valid property of the specified category of elements, and a value to match for that property in the search. Table “Properties of AUTOSAR Elements” lists properties that are associated with AUTOSAR elements.

Example: `'IsService',true`

Output Arguments

`paths` — Paths to AUTOSAR elements
cell array of character vectors

Variable that returns paths to AUTOSAR elements.

Example: `ifPaths`

See Also
`add` | `delete` | `get` | `set`

Topics
“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

get

Package: `autosar.api`

Get property of AUTOSAR element

Syntax

```
pValue=get(arProps,elementPath,property)
```

Description

`pValue=get(arProps,elementPath,property)` returns the value of the property of the AUTOSAR element at `elementPath`.

Examples

Get Value of IsService Property of Sender-Receiver Interface

For a model, get the value of the `IsService` property for the sender-receiver interface `Interface1`. The variable `IsService` returns `false` (0), indicating that the sender-receiver interface is not a service.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
arProps=autosar.api.getAUTOSARProperties(hModel);
isService=get(arProps,'Interface1','IsService')
```

```
isService =
  logical
   0
```

Input Arguments

`arProps` — AUTOSAR properties information for a model

handle

AUTOSAR properties information for a model, previously returned by `arProps = autosar.api.getAUTOSARProperties(model)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

`elementPath` — Path to AUTOSAR element
character vector | string scalar

Path to the AUTOSAR element for which to return the value of a property.

Example: `'Input'`

`property` — Type of property
character vector | string scalar

Type of property to add for which to return a value, among valid properties for the AUTOSAR element.

Example: `'IsService'`

Output Arguments

`pValue` — Property value or path
value of property | path to composite property or property that references other properties

Variable that returns the value of the specified AUTOSAR property. For composite properties or properties that reference other properties, the return value is the path to the property.

Example: `ifPaths`

See Also

`set`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

getComponentNames

Package: `arxml`

Get AUTOSAR software component names from `arxml` files

Syntax

```
names = getComponentNames(ar)
names = getComponentNames(ar,compKind)
```

Description

`names = getComponentNames(ar)` returns the names of AUTOSAR software components found in the XML files associated with `arxml.importer` object `ar`. By default, the function returns the names of atomic software components, including application, sensor/actuator, complex device driver, ECU abstraction, and service proxy software components.

`names = getComponentNames(ar,compKind)` uses the `compKind` argument to specify the type of software component to return. You can narrow the search to a specific type of atomic software component, such as `'Application'` or `'SensorActuator'`, or specify a nonatomic component, such as `'Composition'` or `'Parameter'`.

Examples

Get AUTOSAR Atomic Software Component Names from `arxml` Files

Get the names of AUTOSAR atomic software components present in `arxml` files.

```
addpath(fullfile(matlabroot,'examples','autosarblockset'));
ar = arxml.importer('ThrottlePositionControlComposition.arxml');
names = getComponentNames(ar)
```

```
names =
    {'/Company/Components/Controller'                    }
```

```
    {'/Company/Components/ThrottlePositionMonitor'        }
    {'/Company/Components/AccelerationPedalPositionSensor'}
    {'/Company/Components/ThrottlePositionActuator'       }
    {'/Company/Components/ThrottlePositionSensor'         }
```

Get AUTOSAR Sensor-Actuator Software Component Names from `arxml` Files

Get the names of AUTOSAR sensor-actuator software components present in `arxml` files.

```
addpath(fullfile(matlabroot,'examples','autosarblockset'));
ar = arxml.importer('ThrottlePositionControlComposition.arxml');
names = getComponentNames(ar,'SensorActuator')
```

```
names =
    {'/Company/Components/AccelerationPedalPositionSensor'}
    {'/Company/Components/ThrottlePositionActuator'       }
    {'/Company/Components/ThrottlePositionSensor'         }
```

Input Arguments

`ar` — `arxml.importer` object
object

AUTOSAR information previously imported from XML files, specified as an `arxml.importer` object.

`compKind` — Component type
`'Atomic'` (default) | `'Application'` | `'ComplexDeviceDriver'` | `'Composition'` | `'EcuAbstraction'` | `'Parameter'` | `'SensorActuator'` | `'ServiceProxy'`

Type of software component to return.

Output Argument

`names` — Names array
cell array of character vectors

Variable that returns an array of component names. Each array element is the absolute short-name path of an AUTOSAR software component.

Example: `{'/pkg/swc/tpSensor','/pkg/swc/tpActuator'}`

See Also

`arxml.importer`

Topics

“Import AUTOSAR Software Component”
“AUTOSAR arxml Importer”

Introduced in R2008a

getDataStore

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink data store

Syntax

```
arValue=getDataStore(slMap,slBlockHandle)
arValue=getDataStore(slMap,slBlockHandle,arProperty)
```

Description

`arValue=getDataStore(slMap,slBlockHandle)` returns the type of AUTOSAR variable mapped to Simulink data store memory block `slBlockHandle`. AUTOSAR variable types include `ArTypedPerInstanceMemory` and `StaticMemory`.

`arValue=getDataStore(slMap,slBlockHandle,arProperty)` returns the value of property `arProperty` for the AUTOSAR variable that the Simulink data store is mapped to.

Examples

Get AUTOSAR Mapping Information for Simulink Data Stores

Get AUTOSAR mapping and property information for Simulink data store memory block `Data Store Memory` in example model `autosar_bsw_sensor1`.

```
hModel = 'autosar_bsw_sensor1';
hBlock = 'autosar_bsw_sensor1/Data Store Memory';

open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);
mapDataStore(slMap,hBlock,'ArTypedPerInstanceMemory','NeedsNVRAMAccess','true');
arMappedTo = getDataStore(slMap,hBlock)
arNvram = getDataStore(slMap,hBlock,'NeedsNVRAMAccess')
```

```
arMappedTo =
    'ArTypedPerInstanceMemory'

arNvram =
    'true'
```

Input Arguments

slMap — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *slMap* = `autosar.api.getSimulinkMapping(`*model*`)`. *model* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

slBlockHandle — Simulink data store memory block handle

handle

Name or handle of Simulink data store memory block for which to return AUTOSAR mapping information.

Example: `'autosar_bsw_sensor1/Data Store Memory'`

arProperty — AUTOSAR property

character vector | string scalar

Name of AUTOSAR variable property. Valid property names include `ShortName`, `SwAddrMethod`, `SwCalibrationAccess`, and `DisplayFormat`. For `ArTypedPerInstancememory`, you can specify `NeedsNVRAMAccess`. For `StaticMemory`, you can specify C type qualifier properties `IsVolatile` or `Qualifier` (AUTOSAR additional native type qualifier). For property descriptions, see `mapDataStore`.

Example: `'SwCalibrationAccess'`

Output Arguments

arValue — Value of AUTOSAR variable type or property

character vector

Variable that returns either the type of the mapped AUTOSAR variable or the value of a variable property.

Example: `arValue`

See Also

Data Store Memory | `mapDataStore`

Topics

“Map Data Stores to AUTOSAR Variables”
“Configure AUTOSAR Per-Instance Memory”
“Configure AUTOSAR Static Memory”
“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2019a

getDataTransfer

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink data transfer

Syntax

```
[arIrvName,arDataAccessMode]=getDataTransfer(slMap,slDataTransfer)
```

Description

`[arIrvName,arDataAccessMode]=getDataTransfer(slMap,slDataTransfer)` returns the values of the AUTOSAR inter-runnable variable `arIrvName` and AUTOSAR data access mode `arDataAccessMode` that are mapped to Simulink data transfer line or Rate Transition block `slDataTransfer`.

Examples

Get AUTOSAR Mapping Information for Simulink Data Transfer Line

Get AUTOSAR mapping information for a data transfer line in the example model `autosar_swc_expfcns`. The model has data transfer lines named `irv1`, `irv2`, `irv3`, and `irv4`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
[arIrvName,arDataAccessMode]=getDataTransfer(slMap,'irv4')
```

```
arIrvName =
    'IRV4'
arDataAccessMode =
    'Implicit'
```

Get AUTOSAR Mapping Information for Rate Transition Block

Get AUTOSAR mapping information for a Rate Transition block in the example model `mMultitasking_4rates`. The model has Rate Transition blocks named `RateTransition`, `RateTransition1`, and `RateTransition2`, which are located at the top level of the model.

```
addpath(fullfile(matlabroot,'/help/toolbox/autosar/examples'));
hModel = 'mMultitasking_4rates';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
[arIrvName,arDataAccessMode]=getDataTransfer(slMap,'mMultitasking_4rates/RateTransition')
```

```
arIrvName =
    'IRV1'
arDataAccessMode =
    'Implicit'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slDataTransfer` — Simulink data transfer line name or Rate Transition full block path

character vector | string scalar

Name of the Simulink data transfer line or full block path to the Rate Transition block for which to return AUTOSAR mapping information.

Example: `'irv4'`

Example: `'myModel/RateTransition2'`

Output Arguments

`arIrvName` — Name of AUTOSAR inter-runnable variable

character vector

Variable that returns the name of AUTOSAR inter-runnable variable mapped to the specified Simulink data transfer.

Example: `arIrvName`

`arDataAccessMode` — Value of AUTOSAR data access mode
character vector

Variable that returns the value of the AUTOSAR data access mode mapped to the specified Simulink data transfer. The value is `Implicit` or `Explicit`.

Example: `arDataAcessMode`

See Also

`mapDataTransfer`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

getFunction

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink entry-point function

Syntax

```
arRunnableName = getFunction(slMap,slFcnName)
[arRunnableName,arRunnableSwAddrMethod,arInternalDataSwAddrMethod] =
getFunction(slMap,slFcnName)
```

Description

`arRunnableName = getFunction(slMap,slFcnName)` returns the name of the AUTOSAR runnable `arRunnableName` mapped to Simulink entry-point function `slFcnName`.

`[arRunnableName,arRunnableSwAddrMethod,arInternalDataSwAddrMethod] = getFunction(slMap,slFcnName)` returns the names of function and internal data software address methods (`SwAddrMethod`s) defined for the mapped AUTOSAR runnable. If a `SwAddrMethod` is not defined, the function returns `'<None>'`.

Examples

Get AUTOSAR Runnable Name for Simulink Entry-Point Function

Get the name of the AUTOSAR runnable mapped to a Simulink entry-point function in the example model `autosar_swc`. The model has an initialize entry-point function named `Runnable_Init` and rate-based entry-point functions named `Runnable_1s` and `Runnable_2s`.

```
hModel = 'autosar_swc';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
arRunnableName=getFunction(slMap,'InitializeFunction')
```

```
arRunnableName =
    'Runnable_Init'
```

Get AUTOSAR SwAddrMethod Names for Simulink Entry-Point Function

Get AUTOSAR SwAddrMethod names for a Simulink entry-point function in the example model autosar_swc_counter. The model has a rate-based entry-point step function.

```
hModel = 'autosar_swc_counter';
open_system(hModel);

% Add SwAddrMethods myCODE and myVAR to the AUTOSAR component
arProps = autosar.api.getAUTOSARProperties(hModel);
addPackageableElement(arProps,'SwAddrMethod',...
    '/Company/Powertrain/DataTypes/SwAddrMethods','myCODE',...
    'SectionType','Code')
swAddrPaths = find(arProps,[],'SwAddrMethod','PathType','FullyQualified',...
    'SectionType','Code')
addPackageableElement(arProps,'SwAddrMethod',...
    '/Company/Powertrain/DataTypes/SwAddrMethods','myVAR',...
    'SectionType','Var')
swAddrPaths = find(arProps,[],'SwAddrMethod','PathType','FullyQualified',...
    'SectionType','Var')

% Set code generation parameter for runnable internal data SwAddrMethods
set_param(hModel,'GroupInternalDataByFunction','on')

% Map step runnable function and internal data to myCODE and myVAR SwAddrMethods
slMap = autosar.api.getSimulinkMapping(hModel);
mapFunction(slMap,'StepFunction','Runnable_Step',...
    'SwAddrMethod','myCODE','SwAddrMethodForInternalData','myVAR')

% Return AUTOSAR mapping information for step function
[arRunnableName,arRunnableSwAddrMethod,arInternalDataSwAddrMethod] = ...
    getFunction(slMap,'StepFunction')

swAddrPaths =
    {'/Company/Powertrain/DataTypes/SwAddrMethods/CODE'}
    {'/Company/Powertrain/DataTypes/SwAddrMethods/myCODE'}

swAddrPaths =
    {'/Company/Powertrain/DataTypes/SwAddrMethods/VAR'}
    {'/Company/Powertrain/DataTypes/SwAddrMethods/myVAR'}

arRunnableName =
    'Runnable_Step'

arRunnableSwAddrMethod =
    'myCODE'
```

```
arInternalDataSwAddrMethod =
    'myVAR'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slFcnName` — Name of Simulink entry-point function

character vector | string scalar

Name of the Simulink entry-point function to return AUTOSAR mapping information for, specified as follows:

- For an initialize function, `'InitializeFunction'`.
- For a reset function, a model-wide reset event name. For example, `'reset'`.
- For a terminate function, `'TerminateFunction'`.
- For a rate-based function, `'StepFunction'` for the base-rate task or `'StepFunction`*`N`*`'` for a subrate task, where *`N`* is the task identifier.
- For an exported function, `'`*`FunctionCallName`*`'`, where *`FunctionCallName`* is the name of the Inport block that drives the control port of the function-call subsystem. For example, `'Trigger_1s'` in example model `autosar_swc_slfcns` or `'FunctionTrigger'` in example model `autosar_swc_fcncalls`.
- For a global Simulink function in a client-server configuration, `'`*`SlFunctionName`*`'`, where *`SlFunctionName`* is the name of a Simulink function for which Trigger block parameter **Function visibility** is set to `global`. For example, `'readData'` in the example model in “Configure AUTOSAR Server”.

Example: `'StepFunction2'`

Output Arguments

`arRunnableName` — Name of AUTOSAR runnable
character vector

Variable that returns the name of the AUTOSAR runnable mapped to the specified Simulink entry-point function.

Example: `arRunnableName`

`arRunnableSwAddrMethod` — Name of function `SwAddrMethod`
character vector

Variable that returns the name of the `SwAddrMethod` defined for the AUTOSAR runnable function.

Example: `arRunnableSwAddrMethod`

`arInternalDataSwAddrMethod` — Name of internal data `SwAddrMethod`
character vector

Variable that returns the name of the `SwAddrMethod` defined for the AUTOSAR runnable internal data.

Example: `arInternalDataSwAddrMethod`

See Also

`mapFunction`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

getFunctionCaller

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink function-caller block

Syntax

```
[arPortName,arOperationName] = getFunctionCaller(slMap,slFcnName)
```

Description

`[arPortName,arOperationName] = getFunctionCaller(slMap,slFcnName)` returns the value of the AUTOSAR client port `arPortName` and AUTOSAR operation `arOperationName` mapped to the Simulink function caller block for Simulink function `slFcnName`.

Examples

Get AUTOSAR Mapping Information for Function Caller Block

Get AUTOSAR mapping information for a function-caller block in a model in which AUTOSAR client function invocation is being modeled. The model has a function-caller block for Simulink function `readData`.

```
addpath(fullfile(matlabroot,'/help/toolbox/autosar/examples'));
hModel = 'mControllerWithInterface_client';
open_system(hModel);
slMapC = autosar.api.getSimulinkMapping(hModel);
mapFunctionCaller(slMapC,'readData','cPort','readData');
[arPort,arOp] = getFunctionCaller(slMapC,'readData')
```

```
arPort =
cPort
```

```
arOp =
readData
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slFcnName` — Name of Simulink function

character vector | string scalar

Name of the Simulink function for the function-caller block for which to return AUTOSAR mapping information.

Example: `'readData'`

Output Arguments

`arPortName` — Name of AUTOSAR client port

character vector

Variable that returns the name of the AUTOSAR client port mapped to the specified function-caller block.

Example: `arPort`

`arOperationName` — Name of AUTOSAR operation

character vector

Variable that returns the name of the AUTOSAR operation mapped to the specified function-caller block.

Example: `arOp`

See Also

`mapFunctionCaller`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2014b

getInport

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink inport

Syntax

```
[arPortName,arDataElementName,arDataAccessMode]=getInport(slMap,
slPortName)
```

Description

`[arPortName,arDataElementName,arDataAccessMode]=getInport(slMap, slPortName)` returns the values of the AUTOSAR port `arPortName`, AUTOSAR data element `arDataElementName`, and AUTOSAR data access mode `arDataAccessMode` mapped to Simulink inport `slPortName`.

Examples

Get AUTOSAR Mapping Information for Model Inport

Get AUTOSAR mapping information for a model inport in the example model `autosar_swc_expfcns`. The model has an inport named `RPort_DE1`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
[arPortName,arDataElementName,arDataAccessMode]=getInport(slMap,'RPort_DE1')

arPortName =
RPort

arDataElementName =
DE1
```

```
arDataAccessMode =
ImplicitReceive
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slPortName` — Name of model inport

character vector | string scalar

Name of the model inport for which to return AUTOSAR mapping information.

Example: `'Input'`

Output Arguments

`arPortName` — Name of AUTOSAR port

character vector

Variable that returns the name of the AUTOSAR port mapped to the specified Simulink inport.

Example: `arPortName`

`arDataElementName` — Name of AUTOSAR data element

character vector

Variable that returns the name of the AUTOSAR data element mapped to the specified Simulink inport.

Example: `arDataElementName`

`arDataAccessMode` — Value of AUTOSAR data access mode

character vector

Variable that returns the value of the AUTOSAR data access mode mapped to the specified Simulink inport. The value can be `ImplicitReceive`, `ExplicitReceive`, `QueuedExplicitReceive`, `ErrorStatus`, `ModeReceive`, `IsUpdated`, `EndToEndRead`, or `ExplicitReceiveByVal`

Example: `arDataAccessMode`

See Also

`mapInport`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

getOutport

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink outport

Syntax

```
[arPortName,arDataElementName,arDataAccessMode]=getOutport(slMap,
slPortName)
```

Description

`[arPortName,arDataElementName,arDataAccessMode]=getOutport(slMap, slPortName)` returns the values of the AUTOSAR provider port `arPortName`, AUTOSAR data element `arDataElementName`, and AUTOSAR data access mode `arDataAccessMode` mapped to Simulink outport `slPortName`.

Examples

Get AUTOSAR Mapping Information for Model Outport

Get AUTOSAR mapping information for a model outport in the example model `autosar_swc_expfcns`. The model has an outport named `PPort_DE1`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
[arPortName,arDataElementName,arDataAccessMode]=getOutport(slMap,'PPort_DE1')

arPortName =
PPort

arDataElementName =
DE1
```

```
arDataAccessMode =
ImplicitSend
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slPortName` — Name of model outport

character vector | string scalar

Name of the model outport for which to return AUTOSAR mapping information.

Example: `'Output'`

Output Arguments

`arPortName` — Name of AUTOSAR port

character vector

Variable that returns the name of the AUTOSAR port mapped to the specified Simulink outport.

Example: `arPortName`

`arDataElementName` — Name of AUTOSAR data element

character vector

Variable that returns the name of the AUTOSAR data element mapped to the specified Simulink outport.

Example: `arDataElementName`

`arDataAccessMode` — Value of AUTOSAR data access mode

character vector

Variable that returns the value of the AUTOSAR data access mode mapped to the specified Simulink outport. The value can be `ImplicitSend`, `ImplicitSendByRef`, `ExplicitSend`, `EndToEndWrite`, or `ModeSend`.

Example: `arDataAcessMode`

See Also

`mapOutport`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

getParameter

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink model workspace parameter

Syntax

```
arValue=getParameter(slMap,slParameter)
arValue=getParameter(slMap,slParameter,arProperty)
```

Description

`arValue=getParameter(slMap,slParameter)` returns the type of AUTOSAR parameter mapped to Simulink model workspace parameter `slParameter`. AUTOSAR parameter types include `SharedParameter`, `PerInstanceParameter`, and `ConstantMemory`.

`arValue=getParameter(slMap,slParameter,arProperty)` returns the value of property `arProperty` for the AUTOSAR parameter to which model workspace parameter `slParameter` is mapped.

Examples

Get AUTOSAR Mapping Information for Simulink Model Workspace Parameters

Get AUTOSAR mapping and property information for Simulink model workspace parameters K and INC in example model `autosar_swc_counter`.

```
hModel = 'autosar_swc_counter';
open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);

mapParameter(slMap,'K','SharedParameter')
arMappedTo = getParameter(slMap,'K')
arValue = getParameter(slMap,'K','SwCalibrationAccess')
```

```
mapParameter(slMap,'INC','ConstantMemory','SwCalibrationAccess','ReadOnly')
arMappedTo = getParameter(slMap,'INC')
arValue = getParameter(slMap,'INC','SwCalibrationAccess')

arMappedTo =
    'SharedParameter'

arValue =
    'ReadWrite'

arMappedTo =
    'ConstantMemory'

arValue =
    'ReadOnly'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slParameter` — Simulink model workspace parameter

character vector | string scalar

Name of Simulink model workspace parameter to return AUTOSAR mapping information for.

Example: `'INC'`

`arProperty` — AUTOSAR property

character vector | string scalar

Name of AUTOSAR parameter property. Valid property names include `SwAddrMethod`, `SwCalibrationAccess`, and `DisplayFormat`. For `ConstantMemory`, you can also specify C type qualifier properties `IsConst`, `IsVolatile`, or `Qualifier` (AUTOSAR additional native type qualifier). For property descriptions, see `mapParameter`.

Example: `'SwCalibrationAccess'`

Output Arguments

`arValue` — Value of AUTOSAR parameter type or property
character vector

Variable that returns either the type of the mapped AUTOSAR component internal parameter or the value of a parameter property.

Example: `arValue`

See Also

`mapParameter`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2018b

getSignal

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink block signal

Syntax

```
arValue=getSignal(slMap,slPortHandle)
arValue=getSignal(slMap,slPortHandle,arProperty)
```

Description

`arValue=getSignal(slMap,slPortHandle)` returns the type of AUTOSAR variable mapped to the named or test-pointed Simulink block signal associated with outport port handle `slPortHandle`. AUTOSAR variable types include `ArTypedPerInstanceMemory` and `StaticMemory`.

`arValue=getSignal(slMap,slPortHandle,arProperty)` returns the value of property `arProperty` for the AUTOSAR variable to which the Simulink block signal is mapped.

Examples

Get AUTOSAR Mapping Information for Simulink Block Signals

Get AUTOSAR mapping and property information for the Simulink block signals for blocks `RelOpt` and `Sum` in example model `autosar_swc_counter`.

```
hModel = 'autosar_swc_counter';
open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);

portHandles = get_param('autosar_swc_counter/RelOpt','portHandles');
outportHandle = portHandles.Outport;
mapSignal(slMap,outportHandle,'StaticMemory')
arMappedTo = getSignal(slMap,outportHandle)
```

```
arValue = getSignal(slMap,outportHandle,'SwCalibrationAccess')

portHandles = get_param('autosar_swc_counter/Sum','portHandles');
outportHandle = portHandles.Outport;
mapSignal(slMap,outportHandle,'ArTypedPerInstanceMemory',...
    'SwCalibrationAccess','ReadWrite')
arMappedTo = getSignal(slMap,outportHandle)
arValue = getSignal(slMap,outportHandle,'SwCalibrationAccess')

arMappedTo =
    'StaticMemory'

arValue =
    'ReadOnly'

arMappedTo =
    'ArTypedPerInstanceMemory'

arValue =
    'ReadWrite'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slPortHandle` — Simulink outport port handle for a block signal

handle

Outport port handle for a named or test-pointed Simulink block signal to return AUTOSAR mapping information for. Use MATLAB® commands to construct the outport port handle. For example, for a Relational Operator block named `RelOpt`:

```
portHandles = get_param('autosar_swc_counter/RelOpt','portHandles');
outportHandle = portHandles.Outport;
```

Example: `outportHandle`

`arProperty` — AUTOSAR property

character vector | string scalar

Name of AUTOSAR variable property. Valid property names include `ShortName`, `SwAddrMethod`, `SwCalibrationAccess`, and `DisplayFormat`. For `StaticMemory`, you can also specify C type qualifier properties `IsVolatile` or `Qualifier` (AUTOSAR additional native type qualifier). For property descriptions, see `mapSignal`.

Example: `'SwCalibrationAccess'`

Output Arguments

`arValue` — Value of AUTOSAR variable type or property

character vector

Variable that returns either the type of the mapped AUTOSAR variable or the value of a variable property.

Example: `arValue`

See Also

`mapSignal`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2018b

getState

Package: `autosar.api`

Get AUTOSAR mapping information for Simulink block state

Syntax

```
arValue=getState(slMap,slStateOwnerBlock)
arValue=getState(slMap,slStateOwnerBlock,slState)
arValue=getState(slMap,slStateOwnerBlock,slState,arProperty)
```

Description

`arValue=getState(slMap,slStateOwnerBlock)` returns the type of AUTOSAR variable mapped to the Simulink block state associated with state owner block `slStateOwnerBlock`. AUTOSAR variable types include `ArTypedPerInstanceMemory` and `StaticMemory`.

`arValue=getState(slMap,slStateOwnerBlock,slState)` returns the type of AUTOSAR variable mapped to Simulink state `slState` associated with state owner block `slStateOwnerBlock`. Specify a nonempty `slState` argument only for blocks with multiple states.

`arValue=getState(slMap,slStateOwnerBlock,slState,arProperty)` returns the value of property `arProperty` for the AUTOSAR variable to which the Simulink block state is mapped.

Examples

Get AUTOSAR Mapping Information for Simulink Block State

Get AUTOSAR mapping and property information for the Simulink block state for Unit Delay block X in example model `autosar_swc_counter`. The state owner block has one state.

```
hModel = 'autosar_swc_counter';
open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);

mapState(slMap,'autosar_swc_counter/X','','ArTypedPerInstanceMemory',...
    'SwCalibrationAccess','ReadWrite')
arMappedTo = getState(slMap,'autosar_swc_counter/X')
arValue = getState(slMap,'autosar_swc_counter/X','','SwCalibrationAccess')

arMappedTo =
    'ArTypedPerInstanceMemory'

arValue =
    'ReadWrite'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slStateOwnerBlock` — Simulink state owner block handle or path

handle | character vector | string scalar

Handle or path to Simulink state owner block to return AUTOSAR mapping information for.

Example: `'autosar_swc_counter/X'`

`slState` — Simulink state

character vector | string scalar

Name of Simulink state associated with state owner block `slStateOwnerBlock`. Specify a nonempty state name only for blocks with multiple states. If `slState` is empty, the function returns mapping information for the first state in the block.

Example: `''`

`arProperty` — AUTOSAR property

character vector | string scalar

Name of AUTOSAR variable property. Valid property names include `ShortName`, `SwAddrMethod`, `SwCalibrationAccess`, and `DisplayFormat`. For `StaticMemory`, you can also specify C type qualifier properties `IsVolatile` or `Qualifier` (AUTOSAR additional native type qualifier). For property descriptions, see `mapState`.

Example: `'SwCalibrationAccess'`

Output Arguments

`arValue` — Value of AUTOSAR variable type or property

character vector

Variable that returns either the type of the mapped AUTOSAR variable or the value of a variable property.

Example: `arValue`

See Also

`mapState`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2018b

mapDataStore

Package: `autosar.api`

Map Simulink data store to AUTOSAR variable

Syntax

```
mapDataStore(slMap,slBlockHandle,arVarType)
mapDataStore(slMap,slBlockHandle,arVarType,Name,Value)
```

Description

`mapDataStore(slMap,slBlockHandle,arVarType)` maps Simulink data store memory block `slBlockHandle` to an AUTOSAR variable of type `arVarType` for AUTOSAR run-time calibration. AUTOSAR variable types include `ArTypedPerInstanceMemory` and `StaticMemory`.

`mapDataStore(slMap,slBlockHandle,arVarType,Name,Value)` specifies additional properties for an AUTOSAR `ArTypedPerInstanceMemory` or `StaticMemory` variable by using one or more `Name,Value` pair arguments.

Examples

Set AUTOSAR Mapping Information for Simulink Data Stores

Set AUTOSAR mapping and property information for Simulink data store memory block `Data Store Memory` in example model `autosar_bsw_sensor1`.

```
hModel = 'autosar_bsw_sensor1';
hBlock = 'autosar_bsw_sensor1/Data Store Memory';

open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);
mapDataStore(slMap,hBlock,'ArTypedPerInstanceMemory','NeedsNVRAMAccess','true');
arMappedTo = getDataStore(slMap,hBlock)
arNvram = getDataStore(slMap,hBlock,'NeedsNVRAMAccess')
```

```
arMappedTo =
    'ArTypedPerInstanceMemory'

arNvram =
    'true'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slBlockHandle` — Simulink data store memory block handle

handle

Name or handle of Simulink data store memory block that you set AUTOSAR mapping information for.

Example: `'autosar_bsw_sensor1/Data Store Memory'`

`arVarType` — Type of AUTOSAR variable

character vector | string scalar

Type of AUTOSAR variable that you want to map the specified Simulink data store to. Valid AUTOSAR variable types include `ArTypedPerInstanceMemory`, `StaticMemory`, and `Auto`. To accept software mapping defaults, specify `Auto`.

Example: `'StaticMemory'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'SwCalibrationAccess','ReadWrite'` specifies read-write access to the variable for run-time calibration.

`DisplayFormat` — Calibration display format
character vector | string scalar

Specify display format for the AUTOSAR variable. AUTOSAR display format specifications control the width and precision display for measurement and calibration data. For more information, see “Configure DisplayFormat”.

Example: `'DisplayFormat','%2.6f'`

`IsVolatile` — C `volatile` type qualifier flag (`StaticMemory` only)
character vector | string scalar

Specify whether to include C type qualifier `volatile` in generated code for the AUTOSAR variable.

Example: `'IsVolatile','true'`

`NeedsNVRAMAccess` — `NeedsNVRAMAccess` flag (`ArTypedPerInstanceMemory` only)
character vector | string scalar

Specify whether the AUTOSAR variable needs access to nonvolatile RAM on a processor. Specify `true` to configure the per-instance memory to be a mirror block for a specific NVRAM block.

Example: `'NeedsNVRAMAccess','true'`

`Qualifier` — C `AdditionalNativeTypeQualifier` flag (`StaticMemory` only)
character vector | string scalar

Optionally specify an AUTOSAR additional native type qualifier to include in generated code for the AUTOSAR variable.

Example: `'Qualifier','test_qualifier'`

`ShortName` — Variable short name
character vector | string scalar

Specify short name for the AUTOSAR variable. If unspecified, `arxml` export automatically generates a short name, which can differ from the data store name.

Example: `'ShortName','LowSetPoint'`

`SwAddrMethod` — Name of variable `SwAddrMethod`
character vector | string scalar

Specify a `SwAddrMethod` name that is valid for the AUTOSAR variable. Code generation uses the `SwAddrMethod` name to group AUTOSAR variables in a memory section for access by measurement and calibration tools. For a list of valid `SwAddrMethod` values for the variable, see the Code Mappings editor, **Data Stores** tab. For more information, see "Configure SwAddrMethod".

Example: `'SwAddrMethod','VAR'`

`SwCalibrationAccess` — Calibration access mode
character vector | string scalar

Specify how measurement and calibration tools can access the AUTOSAR variable. Valid access values include `ReadOnly`, `ReadWrite`, and `NotAccessible`. For more information, see "Configure SwCalibrationAccess".

Example: `'SwCalibrationAccess','ReadWrite'`

See Also

Data Store Memory | `getDataStore`

Topics

"Map Data Stores to AUTOSAR Variables"
"Configure AUTOSAR Per-Instance Memory"
"Configure AUTOSAR Static Memory"
"Configure and Map AUTOSAR Component Programmatically"
"AUTOSAR Component Configuration"

Introduced in R2019a

mapDataTransfer

Package: `autosar.api`

Map Simulink data transfer to AUTOSAR inter-runnable variable

Syntax

```
mapDataTransfer(slMap,slDataTransfer,arIrvName,arDataAccessMode)
```

Description

`mapDataTransfer(slMap,slDataTransfer,arIrvName,arDataAccessMode)` maps the Simulink data transfer line or Rate Transition block `slDataTransfer` to AUTOSAR inter-runnable variable `arIrvName` and AUTOSAR data access mode `arDataAccessMode`.

Examples

Set AUTOSAR Mapping Information for Simulink Data Transfer Line

Set AUTOSAR mapping information for a data transfer line in the example model `autosar_swc_expfcns`. The model has data transfer lines named `irv1`, `irv2`, `irv3`, and `irv4`. This example changes the AUTOSAR data access mode for `irv4` from `Implicit` to `Explicit`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
mapDataTransfer(slMap,'irv4','IRV4','Explicit');
[arIrvName,arDataAccessMode]=getDataTransfer(slMap,'irv4')
```

```
arIrvName =
IRV4

arDataAccessMode =
Explicit
```

Set AUTOSAR Mapping Information for Rate Transition Block

Set AUTOSAR mapping information for a Rate Transition block in the example model `mMultitasking_4rates`. The model has Rate Transition blocks named `RateTransition`, `RateTransition1`, and `RateTransition2`, which are located at the top level of the model. This example changes the AUTOSAR data access mode for `RateTransition` from `Implicit` to `Explicit`.

```
addpath(fullfile(matlabroot,'/help/toolbox/autosar/examples'));
hModel = 'mMultitasking_4rates';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
mapDataTransfer(slMap,'mMultitasking_4rates/RateTransition','IRV1','Explicit');
[arIrvName,arDataAccessMode]=getDataTransfer(slMap,'mMultitasking_4rates/RateTransition')

arIrvName =
IRV1

arDataAccessMode =
Explicit
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slDataTransfer` — Simulink data transfer line name or Rate Transition full block path

character vector | string scalar

Name of the Simulink data transfer line or full block path to the Rate Transition block for which to set AUTOSAR mapping information.

Example: `'irv4'`

Example: `'myModel/RateTransition2'`

`arIrvName` — Name of AUTOSAR inter-runnable variable

character vector | string scalar

Name of the AUTOSAR inter-runnable variable to which to map the specified Simulink data transfer.

Example: `'IRV4'`

`arDataAccessMode` — Value of AUTOSAR data access mode
character vector | string scalar

Value of the AUTOSAR data access mode to which to map the specified Simulink data transfer. The value can be `Implicit` or `Explicit`.

Example: `'Explicit'`

See Also

`getDataTransfer`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

mapFunction

Package: `autosar.api`

Map Simulink entry-point function to AUTOSAR runnable and software address methods

Syntax

```
mapFunction(slMap,slFcnName,arRunnableName)
mapFunction(slMap,slFcnName,arRunnableName,Name,Value)
```

Description

`mapFunction(slMap,slFcnName,arRunnableName)` maps Simulink entry-point function `slFcnName` to AUTOSAR runnable `arRunnableName`.

`mapFunction(slMap,slFcnName,arRunnableName,Name,Value)` specifies additional properties for the AUTOSAR runnable by using one or more `Name,Value` pair arguments. You can specify software address methods (`SwAddrMethod`s) for runnable function code and internal data.

Examples

Set AUTOSAR Mapping Information for Simulink Entry-Point Function

Set AUTOSAR mapping information for a Simulink entry-point function in the example model `autosar_swc`. The model has an initialize entry-point function named `Runnable_Init` and rate-based entry-point functions named `Runnable_1s` and `Runnable_2s`.

```
hModel = 'autosar_swc';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
mapFunction(slMap,'InitializeFunction','Runnable_Init');
arRunnableName=getFunction(slMap,'InitializeFunction')
```

```
arRunnableName =
    'Runnable_Init'
```

Set AUTOSAR SwAddrMethods for Simulink Entry-Point Function

Set AUTOSAR SwAddrMethods for a Simulink entry-point function in the example model autosar_swc_counter. The model has a rate-based entry-point step function.

```
hModel = 'autosar_swc_counter';
open_system(hModel);

% Add SwAddrMethods myCODE and myVAR to the AUTOSAR component
arProps = autosar.api.getAUTOSARProperties(hModel);
addPackageableElement(arProps,'SwAddrMethod',...
    '/Company/Powertrain/DataTypes/SwAddrMethods','myCODE',...
    'SectionType','Code')
swAddrPaths = find(arProps,[],'SwAddrMethod','PathType','FullyQualified',...
    'SectionType','Code')
addPackageableElement(arProps,'SwAddrMethod',...
    '/Company/Powertrain/DataTypes/SwAddrMethods','myVAR',...
    'SectionType','Var')
swAddrPaths = find(arProps,[],'SwAddrMethod','PathType','FullyQualified',...
    'SectionType','Var')

% Set code generation parameter for runnable internal data SwAddrMethods
set_param(hModel,'GroupInternalDataByFunction','on')

% Map step runnable function and internal data to myCODE and myVAR SwAddrMethods
slMap = autosar.api.getSimulinkMapping(hModel);
mapFunction(slMap,'StepFunction','Runnable_Step',...
    'SwAddrMethod','myCODE','SwAddrMethodForInternalData','myVAR')

% Return AUTOSAR mapping information for step function
[arRunnableName,arRunnableSwAddrMethod,arInternalDataSwAddrMethod] = ...
    getFunction(slMap,'StepFunction')

swAddrPaths =
    {'/Company/Powertrain/DataTypes/SwAddrMethods/CODE'}
    {'/Company/Powertrain/DataTypes/SwAddrMethods/myCODE'}

swAddrPaths =
    {'/Company/Powertrain/DataTypes/SwAddrMethods/VAR'}
    {'/Company/Powertrain/DataTypes/SwAddrMethods/myVAR'}

arRunnableName =
    'Runnable_Step'

arRunnableSwAddrMethod =
    'myCODE'
```

```
arInternalDataSwAddrMethod =
    'myVAR'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slFcnName` — Name of Simulink entry-point function

character vector | string scalar

Name of the Simulink entry-point function to set AUTOSAR mapping information for, specified as follows:

- For an initialize function, `'InitializeFunction'`.
- For a reset function, a model-wide reset event name. For example, `'reset'`.
- For a terminate function, `'TerminateFunction'`.
- For a rate-based function, `'StepFunction'` for the base-rate task or `'StepFunction`*`N`*`'` for a subrate task, where *`N`* is the task identifier.
- For an exported function, `'`*`FunctionCallName`*`'`, where *`FunctionCallName`* is the name of the Inport block that drives the control port of the function-call subsystem. For example, `'Trigger_1s'` in example model `autosar_swc_slfcns` or `'FunctionTrigger'` in example model `autosar_swc_fcncalls`.
- For a global Simulink function in a client-server configuration, `'`*`SlFunctionName`*`'`, where *`SlFunctionName`* is the name of a Simulink function for which Trigger block parameter **Function visibility** is set to `global`. For example, `'readData'` in the example model used in “Configure AUTOSAR Server”.

Example: `'StepFunction2'`

`arRunnableName` — Name of AUTOSAR runnable

character vector | string scalar

Name of AUTOSAR runnable to map the specified Simulink entry-point function to.

Example: `'Runnable2'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'SwAddrMethod','CODE'` specifies `SwAddrMethod` `CODE` for an AUTOSAR runnable function.

`SwAddrMethod` — Name of function `SwAddrMethod`
character vector | string scalar

Specify a `SwAddrMethod` name that is valid for the AUTOSAR function. Code generation uses the `SwAddrMethod` name to group AUTOSAR runnable functions in a memory section. For a list of valid `SwAddrMethod` values for the function, see the Code Mappings editor, **Entry-Point Functions** tab. For more information, see “Configure SwAddrMethod”.

Example: `'SwAddrMethod','CODE'`

`SwAddrMethodForInternalData` — Name of internal data `SwAddrMethod`
character vector | string scalar

Specify a `SwAddrMethod` name that is valid for the AUTOSAR internal data. Code generation uses the `SwAddrMethod` name to group AUTOSAR runnable internal data in a memory section. For a list of valid `SwAddrMethod` values for the internal data, see the Code Mappings editor, **Entry-Point Functions** tab. For more information, see “Configure SwAddrMethod”.

Code generation for runnable internal data `SwAddrMethod`s requires setting the model configuration option **Code Generation** > **Interface** > **Generate separate internal data per entry-point function** (`GroupInternalDataByFunction`) to `on`.

Example: `'SwAddrMethodForInternalData','VAR'`

See Also

`getFunction`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

mapFunctionCaller

Package: `autosar.api`

Map Simulink function-caller block to AUTOSAR client port and operation

Syntax

```
mapFunctionCaller(slMap,slFcnName,arPortName,arOperationName)
```

Description

`mapFunctionCaller(slMap,slFcnName,arPortName,arOperationName)` maps the Simulink function-caller block for Simulink function `slFcnName` to AUTOSAR client port `arPortName` and AUTOSAR operation `arOperationName`.

If your model has multiple callers of Simulink function `slFcnName`, this function maps all of them to the AUTOSAR client port and operation.

Examples

Set AUTOSAR Mapping Information for Function Caller Block

Set AUTOSAR mapping information for a function-caller block in a model in which AUTOSAR client function invocation is being modeled. The model has a function-caller block for Simulink function `readData`.

```
addpath(fullfile(matlabroot,'/help/toolbox/autosar/examples'));
hModel = 'mControllerWithInterface_client';
open_system(hModel);
slMapC = autosar.api.getSimulinkMapping(hModel);
mapFunctionCaller(slMapC,'readData','cPort','readData');
[arPort,arOp] = getFunctionCaller(slMapC,'readData')
```

```
arPort =
cPort
```

```
arOp =
readData
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slFcnName` — Name of Simulink function

character vector | string scalar

Name of the Simulink function for the function-caller block for which to set AUTOSAR mapping information.

Example: `'readData'`

`arPortName` — Name of AUTOSAR client port

character vector | string scalar

Name of the AUTOSAR client port to which to map the specified function-caller block.

Example: `'cPort'`

`arOperationName` — Name of AUTOSAR operation

character vector | string scalar

Name of the AUTOSAR operation to which to map the specified function-caller block.

Example: `'readData'`

See Also

`getFunctionCaller`

Topics

“Configure and Map AUTOSAR Component Programmatically”

“AUTOSAR Component Configuration”

Introduced in R2014b

mapInport

Package: `autosar.api`

Map Simulink inport to AUTOSAR port

Syntax

```
mapInport(slMap,slPortName,arPortName,arDataElementName,
arDataAccessMode)
```

Description

`mapInport(slMap,slPortName,arPortName,arDataElementName, arDataAccessMode)` maps the Simulink inport `slPortName` to the AUTOSAR data element `arDataElementName` at AUTOSAR receiver port `arPortName`. The AUTOSAR data access mode for the receiver port is set to `arDataAccessMode`.

Examples

Set AUTOSAR Mapping Information for Model Inport

Set AUTOSAR mapping information for a model inport in the example model `autosar_swc_expfcns`. The model has an inport named `RPort_DE1`. This example changes the AUTOSAR data access mode for `RPort_DE1` from `ImplicitReceive` to `ExplicitReceive`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
mapInport(slMap,'RPort_DE1','RPort','DE1','ExplicitReceive');
[arPortName,arDataElementName,arDataAccessMode]=getInport(slMap,'RPort_DE1')
```

```
arPortName =
RPort

arDataElementName =
```

```
DE1

arDataAccessMode =
ExplicitReceive
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slPortName` — Name of model inport

character vector | string scalar

Name of the model inport for which to set AUTOSAR mapping information.

Example: `'Input'`

`arPortName` — Name of AUTOSAR port

character vector | string scalar

Name of the AUTOSAR port to which to map the specified Simulink inport.

Example: `'Input'`

`arDataElementName` — Name of AUTOSAR data element

character vector | string scalar

Name of the AUTOSAR data element to which to map the specified Simulink inport.

Example: `'Input'`

`arDataAccessMode` — Value of AUTOSAR data access mode

character vector | string scalar

Value of the AUTOSAR data access mode to which to map the specified Simulink inport. The value can be `ImplicitReceive`, `ExplicitReceive`, `QueuedExplicitReceive`, `ErrorStatus`, `ModeReceive`, `IsUpdated`, `EndToEndRead`, or `ExplicitReceiveByVal`.

Example: `'ExplicitReceive'`

See Also

`getInport`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

mapOutport

Package: `autosar.api`

Map Simulink outport to AUTOSAR port

Syntax

```
mapOutport(slMap,slPortName,arPortName,arDataElementName,
arDataAccessMode)
```

Description

`mapOutport(slMap,slPortName,arPortName,arDataElementName,
arDataAccessMode)` maps the Simulink outport `slPortName` to the AUTOSAR data element `arDataElementName` at AUTOSAR provider port `arPortName`. The AUTOSAR data access mode for the provider port is set to `arDataAccessMode`.

Examples

Set AUTOSAR Mapping Information for Model Outport

Set AUTOSAR mapping information for a model outport in the example model `autosar_swc_expfcns`. The model has an outport named `PPort_DE1`. This example changes the AUTOSAR data access mode for `PPort_DE1` from `ImplicitSend` to `ExplicitSend`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
slMap=autosar.api.getSimulinkMapping(hModel);
mapOutport(slMap,'PPort_DE1','PPort','DE1','ExplicitSend');
[arPortName,arDataElementName,arDataAccessMode]=getOutport(slMap,'PPort_DE1')
```

```
arPortName =
PPort

arDataElementName =
```

```
DE1

arDataAccessMode =
ExplicitSend
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slPortName` — Name of model outport

character vector | string scalar

Name of the model outport for which to set AUTOSAR mapping information.

Example: `'Output'`

`arPortName` — Name of AUTOSAR port

character vector | string scalar

Name of the AUTOSAR port to which to map the specified Simulink outport.

Example: `'Output'`

`arDataElementName` — Name of AUTOSAR data element

character vector | string scalar

Name of the AUTOSAR data element to which to map the specified Simulink outport.

Example: `'Output'`

`arDataAccessMode` — Value of AUTOSAR data access mode

character vector | string scalar

Value of the AUTOSAR data access mode to which to map the specified Simulink outport. The value can be `ImplicitSend`, `ImplicitSendByRef`, `ExplicitSend`, `EndToEndWrite`, or `ModeSend`.

Example: `'ExplicitSend'`

See Also

`getOutport`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

mapParameter

Package: `autosar.api`

Map Simulink model workspace parameter to AUTOSAR component internal parameter

Syntax

```
mapParameter(slMap,slParameter,arParamType)
mapParameter(slMap,slParameter,arParamType,Name,Value)
```

Description

`mapParameter(slMap,slParameter,arParamType)` maps the Simulink model workspace parameter `slParameter` to an AUTOSAR parameter of type `arParamType` for AUTOSAR run-time calibration. AUTOSAR parameter types include `SharedParameter`, `PerInstanceParameter`, and `ConstantMemory`.

`mapParameter(slMap,slParameter,arParamType,Name,Value)` specifies additional properties for an AUTOSAR `SharedParameter`, `PerInstanceParameter`, or `ConstantMemory` parameter by using one or more `Name,Value` pair arguments.

Examples

Set AUTOSAR Mapping Information for Simulink Model Workspace Parameters

Set AUTOSAR mapping and property information for Simulink model workspace parameters K and INC in example model `autosar_swc_counter`.

```
hModel = 'autosar_swc_counter';
open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);

mapParameter(slMap,'K','SharedParameter')
arMappedTo = getParameter(slMap,'K')
arValue = getParameter(slMap,'K','SwCalibrationAccess')
```

```
mapParameter(slMap,'INC','ConstantMemory','SwCalibrationAccess','ReadOnly')
arMappedTo = getParameter(slMap,'INC')
arValue = getParameter(slMap,'INC','SwCalibrationAccess')

arMappedTo =
    'SharedParameter'

arValue =
    'ReadWrite'

arMappedTo =
    'ConstantMemory'

arValue =
    'ReadOnly'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slParameter` — Name of Simulink model workspace parameter

character vector | string scalar

Name of the Simulink model workspace parameter to set AUTOSAR mapping information for.

Example: `'INC'`

`arParamType` — Type of AUTOSAR parameter

character vector | string scalar

Type of AUTOSAR component internal parameter to map the specified Simulink model workspace parameter to. Valid AUTOSAR parameter types include `SharedParameter`, `PerInstanceParameter`, `ConstantMemory`, and `Auto`. To accept software mapping defaults, specify `Auto`.

Example: `'SharedParameter'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'SwCalibrationAccess','ReadOnly'` specifies read-only access to the parameter for run-time calibration.

`DisplayFormat` — Calibration display format
character vector | string scalar

Specify display format for the AUTOSAR parameter. AUTOSAR display format specifications control the width and precision display for measurement and calibration data. For more information, see “Configure DisplayFormat”.

Example: `'DisplayFormat','%2.6f'`

`IsConst` — C `const` type qualifier flag (`ConstantMemory` only)
character vector | string scalar

Specify whether to include C type qualifier `const` in generated code for the AUTOSAR parameter.

Example: `'IsConst','true'`

`IsVolatile` — C `volatile` type qualifier flag (`ConstantMemory` only)
character vector | string scalar

Specify whether to include C type qualifier `volatile` in generated code for the AUTOSAR parameter.

Example: `'IsVolatile','true'`

`Qualifier` — C `AdditionalNativeTypeQualifier` flag (`ConstantMemory` only)
character vector | string scalar

Optionally specify an AUTOSAR additional native type qualifier to include in generated code for the AUTOSAR parameter.

Example: `'Qualifier','test_qualifier'`

`SwAddrMethod` — Name of parameter `SwAddrMethod`
character vector | string scalar

Specify a `SwAddrMethod` name that is valid for the AUTOSAR parameter. Code generation uses the `SwAddrMethod` name to group AUTOSAR parameters in a memory section for access by measurement and calibration tools. For a list of valid `SwAddrMethod` values for the parameter, see the Code Mappings editor, **Parameters** tab. For more information, see “Configure SwAddrMethod”.

Example: `'SwAddrMethod','CONST'`

`SwCalibrationAccess` — Calibration access mode
character vector | string scalar

Specify how measurement and calibration tools can access the AUTOSAR parameter. Valid access values include `ReadOnly`, `ReadWrite`, and `NotAccessible`. For more information, see “Configure SwCalibrationAccess”.

Example: `'SwCalibrationAccess','ReadOnly'`

See Also

`getParameter`

Topics

“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2018b

mapSignal

Package: `autosar.api`

Map Simulink block signal to AUTOSAR variable

Syntax

```
mapSignal(slMap,slPortHandle,arVarType)
mapSignal(slMap,slPortHandle,arVarType,Name,Value)
```

Description

`mapSignal(slMap,slPortHandle,arVarType)` maps the named or test-pointed Simulink block signal associated with outport port handle `slPortHandle` to an AUTOSAR variable of type `arVarType` for AUTOSAR run-time calibration. AUTOSAR variable types include `ArTypedPerInstanceMemory` and `StaticMemory`.

`mapSignal(slMap,slPortHandle,arVarType,Name,Value)` specifies additional properties for an AUTOSAR `ArTypedPerInstanceMemory` or `StaticMemory` variable by using one or more `Name,Value` pair arguments.

Examples

Set AUTOSAR Mapping Information for Simulink Block Signals

Set AUTOSAR mapping and property information for the Simulink block signals for blocks `RelOpt` and `Sum` in example model `autosar_swc_counter`.

```
hModel = 'autosar_swc_counter';
open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);

portHandles = get_param('autosar_swc_counter/RelOpt','portHandles');
outportHandle = portHandles.Outport;
mapSignal(slMap,outportHandle,'StaticMemory')
arMappedTo = getSignal(slMap,outportHandle)
```

```
arValue = getSignal(slMap,outportHandle,'SwCalibrationAccess')

portHandles = get_param('autosar_swc_counter/Sum','portHandles');
outportHandle = portHandles.Outport;
mapSignal(slMap,outportHandle,'ArTypedPerInstanceMemory',...
    'SwCalibrationAccess','ReadWrite')
arMappedTo = getSignal(slMap,outportHandle)
arValue = getSignal(slMap,outportHandle,'SwCalibrationAccess')

arMappedTo =
    'StaticMemory'

arValue =
    'ReadOnly'

arMappedTo =
    'ArTypedPerInstanceMemory'

arValue =
    'ReadWrite'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slPortHandle` — Simulink outport port handle for a block signal

handle

Outport port handle for a named or test-pointed Simulink block signal to set AUTOSAR mapping information for. Use MATLAB commands to construct the outport port handle. For example, for a Relational Operator block named `RelOpt`:

```
portHandles = get_param('autosar_swc_counter/RelOpt','portHandles');
outportHandle = portHandles.Outport;
```

Example: `outportHandle`

`arVarType` — Type of AUTOSAR variable

character vector | string scalar

Type of AUTOSAR variable to map the specified Simulink block signal to. Valid AUTOSAR variable types include `ArTypedPerInstanceMemory`, `StaticMemory`, and `Auto`. To accept software mapping defaults, specify `Auto`.

Example: `'StaticMemory'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'SwCalibrationAccess','ReadWrite'` specifies read-write access to the variable for run-time calibration.

`DisplayFormat` — Calibration display format

character vector | string scalar

Specify display format for the AUTOSAR variable. AUTOSAR display format specifications control the width and precision display for measurement and calibration data. For more information, see “Configure DisplayFormat”.

Example: `'DisplayFormat','%2.6f'`

`IsVolatile` — C `volatile` type qualifier flag (`StaticMemory` only)

character vector | string scalar

Specify whether to include C type qualifier `volatile` in generated code for the AUTOSAR variable.

Example: `'IsVolatile','true'`

`Qualifier` — C `AdditionalNativeTypeQualifier` flag (`StaticMemory` only)

character vector | string scalar

Optionally specify an AUTOSAR additional native type qualifier to include in generated code for the AUTOSAR variable.

Example: `'Qualifier','test_qualifier'`

`ShortName` — Variable short name

character vector | string scalar

Specify a short name for the AUTOSAR variable. If unspecified, `arxml` export generates a short name, which can differ from the signal name.

Example: `'ShortName','SM_equal_to_count'`

`SwAddrMethod` — Name of variable `SwAddrMethod`
character vector | string scalar

Specify a `SwAddrMethod` name that is valid for the AUTOSAR variable. Code generation uses the `SwAddrMethod` name to group AUTOSAR variables in a memory section for access by measurement and calibration tools. For a list of valid `SwAddrMethod` values for the variable, see the Code Mappings editor, **Signals/States** tab. For more information, see “Configure SwAddrMethod”.

Example: `'SwAddrMethod','VAR'`

`SwCalibrationAccess` — Calibration access mode
character vector | string scalar

Specify how measurement and calibration tools can access the AUTOSAR variable. Valid access values include `ReadOnly`, `ReadWrite`, and `NotAccessible`. For more information, see “Configure SwCalibrationAccess”.

Example: `'SwCalibrationAccess','ReadWrite'`

See Also
`getSignal`

Topics
“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2018b

mapState

Package: `autosar.api`

Map Simulink block state to AUTOSAR variable

Syntax

```
mapState(slMap,slStateOwnerBlock,'',arVarType)
mapState(slMap,slStateOwnerBlock,slState,arVarType)
mapState(slMap,slStateOwnerBlock,slState,arVarType,Name,Value)
```

Description

`mapState(slMap,slStateOwnerBlock,'',arVarType)` maps the Simulink block state associated with state owner block `slStateOwnerBlock` to an AUTOSAR variable of type `arVarType` for AUTOSAR run-time calibration. AUTOSAR variable types include `ArTypedPerInstanceMemory` and `StaticMemory`.

`mapState(slMap,slStateOwnerBlock,slState,arVarType)` maps Simulink block state `slState` associated with state owner block `slStateOwnerBlock` to an AUTOSAR variable of type `arVarType`. Specify a nonempty `slState` argument only for blocks with multiple states.

`mapState(slMap,slStateOwnerBlock,slState,arVarType,Name,Value)` specifies additional properties for an AUTOSAR `ArTypedPerInstanceMemory` or `StaticMemory` variable by using one or more `Name,Value` pair arguments.

Examples

Set AUTOSAR Mapping Information for Simulink Block State

Set AUTOSAR mapping and property information for the Simulink block state for Unit Delay block X in example model `autosar_swc_counter`. The state owner block has one state.

```
hModel = 'autosar_swc_counter';
open_system(hModel);
slMap = autosar.api.getSimulinkMapping(hModel);

mapState(slMap,'autosar_swc_counter/X','','ArTypedPerInstanceMemory',...
    'SwCalibrationAccess','ReadWrite')
arMappedTo = getState(slMap,'autosar_swc_counter/X')
arValue = getState(slMap,'autosar_swc_counter/X','','SwCalibrationAccess')

arMappedTo =
    'ArTypedPerInstanceMemory'

arValue =
    'ReadWrite'
```

Input Arguments

`slMap` — Simulink to AUTOSAR mapping information for a model

handle

Simulink to AUTOSAR mapping information for a model, previously returned by *`slMap`* = `autosar.api.getSimulinkMapping(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `slMap`

`slStateOwnerBlock` — Simulink state owner block handle or path

handle | character vector | string scalar

Handle or path to Simulink state owner block to set AUTOSAR mapping information for.

Example: `'autosar_swc_counter/X'`

`slState` — Simulink state

character vector | string scalar

Name of Simulink state associated with state owner block `slStateOwnerBlock`. Specify a nonempty state name only for blocks with multiple states. If `slState` is empty, the function sets mapping information for the first state in the block.

Example: `''`

`arVarType` — Type of AUTOSAR variable

character vector | string scalar

Type of AUTOSAR variable to map the specified Simulink block state to. Valid AUTOSAR variable types include `ArTypedPerInstanceMemory`, `StaticMemory`, and `Auto`. To accept software mapping defaults, specify `Auto`.

Example: `'ArTypedPerInstanceMemory'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'SwCalibrationAccess','ReadWrite'` specifies read-write access to the variable for run-time calibration.

`DisplayFormat` — Calibration display format

character vector | string scalar

Specify display format for the AUTOSAR variable. AUTOSAR display format specifications control the width and precision display for measurement and calibration data. For more information, see “Configure DisplayFormat”.

Example: `'DisplayFormat','%2.6f'`

`IsVolatile` — C `volatile` type qualifier flag (`StaticMemory` only)

character vector | string scalar

Specify whether to include C type qualifier `volatile` in generated code for the AUTOSAR variable.

Example: `'IsVolatile','true'`

`Qualifier` — C `AdditionalNativeTypeQualifier` flag (`StaticMemory` only)

character vector | string scalar

Optionally specify an AUTOSAR additional native type qualifier to include in generated code for the AUTOSAR variable.

Example: `'Qualifier','test_qualifier'`

`ShortName` — Variable short name

character vector | string scalar

Specify a short name for the AUTOSAR variable. If unspecified, `arxml` export generates a short name, which is based on the state name if one exists. If the state is unnamed, the generated short name can differ from the block name.

Example: `'ShortName','PIM_X'`

`SwAddrMethod` — Name of variable `SwAddrMethod`
character vector | string scalar

Specify a `SwAddrMethod` name that is valid for the AUTOSAR variable. Code generation uses the `SwAddrMethod` name to group AUTOSAR variables in a memory section for access by measurement and calibration tools. For a list of valid `SwAddrMethod` values for the variable, see the Code Mappings editor, **Signals/States** tab. For more information, see “Configure SwAddrMethod”.

Example: `'SwAddrMethod','VAR'`

`SwCalibrationAccess` — Calibration access mode
character vector | string scalar

Specify how measurement and calibration tools can access the AUTOSAR variable. Valid access values include `ReadOnly`, `ReadWrite`, and `NotAccessible`. For more information, see “Configure SwCalibrationAccess”.

Example: `'SwCalibrationAccess','ReadWrite'`

See Also
`getState`

Topics
“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2018b

overflowed

Determine when Stateflow message queue overflows

Syntax

```
overflowed(message_name)
```

Description

`overflowed(message_name)` checks whether a message is lost because it was sent to a queue that was already full. In each time step, the value of this operator is set when a chart adds a message to, or removes a message from, a queue. It is invalid to use the `overflowed` operator before sending or retrieving a message in the same time step.

- To check the overflow status of an input message queue, first remove a message from the queue.
- To check the overflow status of an output message queue, first add a message to the queue.
- To check the overflow status of a local message queue, first add a message to the queue or remove a message from the queue.

Examples

Check for Overflow in Transition

Check the input or local queue for message `M`. If a message is present and the queue has overflowed, transition occurs.

```
M[overflowed(M)]
```

Check for Overflow in State Action

Check the input or local queue for message `M`. If a message is present and the queue has overflowed, increment the value of `x`.

```
on M:
if overflowed(M) == true
    x = x+1;
end
```

Check for Overflow After Sending Message

Send message and check for overflow. If the queue overflows, increment the value of `x`.

```
entry:
M.data = 3;
send(M);
if overflowed(M) == true
    x = x+1;
end
```

Tips

- By default, when a message queue overflows, simulation stops with an error. To prevent a run-time error and allow the `overflowed` operator to dynamically react to dropped messages, set the value of the **Queue Overflow Diagnostic** property to `Warning` or `None`. For more information, see “Queue Overflow Diagnostic” (Stateflow).

See Also

length | receive | send

Topics

“Determine When a Queue Overflows”
“Control Message Activity in Stateflow Charts” (Stateflow)
“Set Properties for a Message” (Stateflow)

Introduced in R2018b

set

Package: `autosar.api`

Set property of AUTOSAR element

Syntax

```
set(arProps,elementPath,property,value)
```

Description

`set(arProps,elementPath,property,value)` sets the specified `property` of the AUTOSAR element at `elementPath` to `value`. For properties that reference other elements, `value` is s path. To set XML packaging options, specify `elementPath` as `XmlOptions`.

Examples

Set IsService Property for Sender-Receiver Interface

For an AUTOSAR model, set the `IsService` property for sender-receiver interface `Interface1` to `true` (1), indicating that the port interface is used for AUTOSAR services.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
arProps = autosar.api.getAUTOSARProperties(hModel);
set(arProps,'Interface1','IsService',true);
isService = get(arProps,'Interface1','IsService')
```

```
isService =
  logical
   1
```

Set Runnable Symbol Name

For an AUTOSAR model, set the `symbol` property for runnable `Runnable1` to `test_symbol`.

```
hModel = 'autosar_swc_expfcns';
open_system(hModel);
arProps = autosar.api.getAUTOSARProperties(hModel);
compQName = get(arProps,'XmlOptions','ComponentQualifiedName');
runnables = find(arProps,compQName,'Runnable','PathType','FullyQualified');
runnables(2)

ans =
    {'/pkg/swc/ASWC/IB/Runnable1'}

get(arProps,runnables{2},'symbol')

ans =
Runnable1

set(arProps,runnables{2},'symbol','test_symbol')
get(arProps,runnables{2},'symbol')

ans =
test_symbol
```

Input Arguments

`arProps` — AUTOSAR properties information for a model

handle

AUTOSAR properties information for a model, previously returned by *`arProps`* `= autosar.api.getAUTOSARProperties(`*`model`*`)`. *`model`* is a handle, character vector, or string scalar representing the model name.

Example: `arProps`

`elementPath` — Path to an AUTOSAR element

character vector | string scalar

Path to an AUTOSAR element for which to set a property. To set XML packaging options, specify `XmlOptions`,

Example: `'Input'`

`property` — Type of property

character vector | string scalar

Type of property for which to specify a value, among valid properties for the AUTOSAR element.

Example: `'IsService'`

`value` — Value of property
value of property | path to composite property or property that references other properties

Value to set for the specified property. For properties that reference other elements, specify a path.

Example: `true`

See Also
`get`

Topics
“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2013b

updateAUTOSARProperties

Package: `arxml`

Update model with `arxml` definitions of AUTOSAR elements

Syntax

```
updateAUTOSARProperties(ar,modelname)
updateAUTOSARProperties(ar,modelname,Name,Value)
```

Description

`updateAUTOSARProperties(ar,modelname)` updates the specified open model with AUTOSAR elements in the XML files associated with `arxml.importer` object `ar`. The update generates a report that details the AUTOSAR elements added to the model. For `updateAUTOSARProperties`, the associated XML definition files are not required to contain the AUTOSAR software component mapped by the model. (Compare with `updateModel`, which requires the component.)

For each imported AUTOSAR element, the function also imports the element dependencies. For example, importing CompuMethod elements also imports Unit and PhysicalDimension elements.

By default, the function imports AUTOSAR elements as read-only definitions, which prevents changes. To allow imported elements to be modified, set the `ReadOnly` property to `false`.

`updateAUTOSARProperties(ar,modelname,Name,Value)` updates the specified open model with AUTOSAR elements by using a `Name,Value` argument pair to specify a specific element category, package, or path.

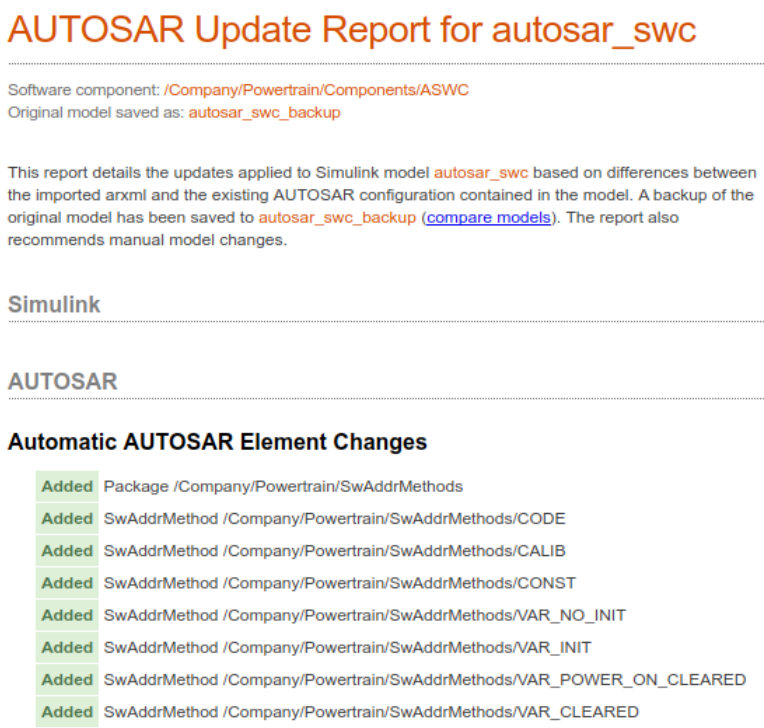
Examples

Reuse AUTOSAR SwAddrMethod Elements in Component Model

Suppose that you are developing an AUTOSAR software component model into which you want to import predefined SwAddrMethod elements that are shared by multiple product lines and teams. This example shows how to import definitions from shared descriptions file `SwAddrMethods.arxml` into example model `autosar_swc` and generate an update report.

```
addpath(fullfile(matlabroot,'/examples/autosarblockset'));
modelName = 'autosar_swc';
open_system(modelName);
ar = arxml.importer('SwAddrMethods.arxml');
updateAUTOSARProperties(ar,modelName);
```

```
### Updating model autosar_swc
### Saving original model as autosar_swc_backup.slx
### Creating HTML report autosar_swc_update_report.html
```



AUTOSAR Update Report for autosar_swc

Software component: /Company/Powertrain/Components/ASWC
Original model saved as: autosar_swc_backup

This report details the updates applied to Simulink model autosar_swc based on differences between the imported arxml and the existing AUTOSAR configuration contained in the model. A backup of the original model has been saved to autosar_swc_backup (compare models). The report also recommends manual model changes.

Simulink

AUTOSAR

Automatic AUTOSAR Element Changes

Added	Package /Company/Powertrain/SwAddrMethods
Added	SwAddrMethod /Company/Powertrain/SwAddrMethods/CODE
Added	SwAddrMethod /Company/Powertrain/SwAddrMethods/CALIB
Added	SwAddrMethod /Company/Powertrain/SwAddrMethods/CONST
Added	SwAddrMethod /Company/Powertrain/SwAddrMethods/VAR_NO_INIT
Added	SwAddrMethod /Company/Powertrain/SwAddrMethods/VAR_INIT
Added	SwAddrMethod /Company/Powertrain/SwAddrMethods/VAR_POWER_ON_CLEARED
Added	SwAddrMethod /Company/Powertrain/SwAddrMethods/VAR_CLEARED

Update Model with Specific AUTOSAR Elements

Update model `mySWC` with two AUTOSAR elements, specified by root paths `/ExternalElements/CompuMethods/RpmCm` and `/AUTOSAR_PlatformTypes/ImplementationDataTypes/uint16`.

```
open_system('mySWC')
ar = arxml.importer('ExternalElements.arxml');
updateAUTOSARProperties(ar,'mySWC','RootPath',{'/ExternalElements/CompuMethods/RpmCm',...
                        '/AUTOSAR_PlatformTypes/ImplementationDataTypes/uint16'});
```

Allow Modification of Imported AUTOSAR Elements

Import XML definitions of AUTOSAR software address methods as read/write elements. By default, the function imports AUTOSAR elements as read-only definitions, which prevents changes.

```
open_system('mySWC')
ar = arxml.importer('SwAddressMethods.arxml');
updateAUTOSARProperties(ar,'mySWC','ReadOnly',false);
```

Update Model with AUTOSAR Elements From a Specific Package

Update model `mySWC` with AUTOSAR elements from package `/AUTOSAR_PlatformTypes/CompuMethods`.

```
open_system('mySWC')
ar = arxml.importer('ExternalElements.arxml');
updateAUTOSARProperties(ar,'mySWC','Package',{'/AUTOSAR_PlatformTypes/CompuMethods'});
```

Update Model with AUTOSAR Elements From a Specific Category

Update model `mySWC` with AUTOSAR elements of category `ImplementationDataType`. Importing `ImplementationDataType` elements also imports dependent elements, such as `SwBaseType` elements.

```
open_system('mySWC')
ar = arxml.importer('ExternalElements.arxml');
updateAUTOSARProperties(ar,'mySWC','Category',{'ImplementationDataType'});
```

Input Arguments

`ar` — `arxml.importer` object

object

AUTOSAR information previously imported from XML files, specified as an `arxml.importer` object.

`modelname` — Model name

character vector | string scalar

Name of the open model to be updated with definitions of AUTOSAR elements in the XML files associated with an `arxml.importer` object.

Example: `'mySWC'`

Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name,Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

Example: `'Category',{'ImplementationDataType'}` directs the importer to update a model with AUTOSAR elements of category `ImplementationDataType`.

`Category` — AUTOSAR element categories
cell array of character vectors | string array

One or more AUTOSAR element categories from which to import elements.

Example: `'Category',{'ImplementationDataType'}`

`Package` — AUTOSAR element packages
cell array of character vectors | string array

Paths to one or more AUTOSAR element packages from which to import elements.

Example: `'Package',{'/AUTOSAR_PlatformTypes/CompuMethods'}`

To refine a category or package import, you can specify both a category and a package from which to import elements. For example:

```
'Category',{'ImplementationDataType'}, ...
'Package',{'/AUTOSAR_PlatformTypes/ImplementationDataTypes'}
```

`ReadOnly` — Designate elements as read-only or read/write
`true` (default) | `false`

Specify whether to treat imported elements as read-only (the default), preventing definition changes, or read/write.

Example: `'ReadOnly',false`

`RootPath` — AUTOSAR elements
cell array of character vectors | string array

Root paths to one or more specific AUTOSAR elements to import.

Example: `'RootPath',{'/ExternalElements/CMs/RpmCm','/AUTOSAR_PlatformTypes/IDTs/uint16'}`

`DataTypeMappingSet` — AUTOSAR data type mapping sets
cell array of character vectors | string array

Paths to one or more AUTOSAR data type mapping sets associated with application data type elements.

Example: `{'/AUTOSAR_PlatformTypes/DataTypeMappingSets/MapSet1'}`

See Also

`arxml.importer` | `updateModel`

Topics

“Reuse AUTOSAR Element Descriptions”
“Reuse AUTOSAR Elements in Component Model”
“Reuse AUTOSAR Adaptive Elements in Component Model”
“Import AUTOSAR Software Component”
“AUTOSAR arxml Importer”

Introduced in R2019a

updateModel

Package: `arxml`

Update AUTOSAR model with `arxml` changes

Syntax

```
updateModel(ar,modelname)
```

Description

`updateModel(ar,modelname)` updates the specified open model with changes detected in the XML files associated with `arxml.importer` object `ar`. The update generates and opens a report that details the updates applied to the model, and required changes that were not made automatically. The XML files must contain the AUTOSAR software component mapped by the model.

Example

Update Model with AUTOSAR `arxml` Changes

Update model `mySWC` with the AUTOSAR `arxml` changes described in `updatedSWC.arxml` and open an update report.

```
open_system('mySWC')
ar = arxml.importer('updatedSWC.arxml');
updateModel(ar,'mySWC');
```

```
### Updating model mySWC
### Saving original model as mySWC_backup.slx
### Creating HTML report mySWC_update_report.html
```

Input Arguments

`ar` — `arxml.importer` object
object

AUTOSAR information previously imported from XML files, specified as an `arxml.importer` object.

`modelname` — Model name
character vector | string scalar

Name of an open model to be updated with changes in the XML files associated with an `arxml.importer` object.

Example: `'mySWC'`

See Also

`arxml.importer`

Topics

“Import AUTOSAR Component to Simulink”
“Import AUTOSAR Composition to Simulink”
“Import AUTOSAR Software Component”
“AUTOSAR arxml Importer”
“Import AUTOSAR Software Component Updates”

Introduced in R2014a

Blocks — Alphabetical List

Component

Model software component in AUTOSAR architecture model

Library

AUTOSAR Blockset

Description

In an AUTOSAR architecture model, you use the composition editor and the Simulink Toolstrip **Modeling** tab to add and connect compositions and components. Use the Component block to add a software component to an AUTOSAR software design.

To add and connect AUTOSAR components:

- For each component required by the design, from the **Modeling** tab or the palette, add a Component block. You can use the Property Inspector to set the component **Kind** — `Application`, `ComplexDeviceDriver`, `EcuAbstraction`, `SensorAccuator`, or `ServiceProxy`. (`Application` and `SensorAccuator` are common.)
- Add component require and provide ports. To add each component port, click an edge of a Component block. When port controls appear, select **Input** for a require port or **Output** for a provide port.
- To connect the Component blocks to other blocks, connect the block ports with signal lines.
- To connect the 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.

- Configure additional AUTOSAR properties using the Property Inspector.

After you add and connect AUTOSAR components, the next step is to add Simulink behavior to the AUTOSAR components by creating, importing, or linking models.

If you have Simulink Requirements™ software, you can link components in an AUTOSAR architecture model to Simulink requirements.

See Also

Composition | Diagnostic Service Component | NVRAM Service Component

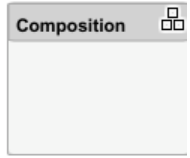
Topics

“Add and Connect AUTOSAR Compositions and Components”
“Author AUTOSAR Compositions and Components in Architecture Model”
“Define AUTOSAR Component Behavior by Creating or Linking Models”
“Link AUTOSAR Components to Simulink Requirements”

Introduced in R2019b

Composition

Model software composition in AUTOSAR architecture model



Library

AUTOSAR Blockset

Description

In an AUTOSAR architecture model, you use the composition editor and the Simulink Toolstrip **Modeling** tab to add and connect compositions and components. Use the Composition block to add a nested software composition to an AUTOSAR software design.

To add and connect a nested AUTOSAR composition:

- From the **Modeling** tab or the palette, add a Composition block.
- Add composition require and provide ports. To add each composition port, click an edge of the Composition block. When port controls appear, select **Input** for a require port or **Output** for a provide port.

  Alternatively, open the Composition block. To add each composition port, click the boundary of the composition diagram. When port controls appear, select **Input** for a require port or **Output** for a provide port.
- To connect the Composition block to other blocks, connect the block ports with signal lines.
- To connect the Composition block to architecture or composition model root ports, drag from the composition ports to the containing model boundary. When you release the connection, a root port is created at the boundary.

- Configure additional AUTOSAR properties using the Property Inspector.

Typically, an AUTOSAR composition contains a set of AUTOSAR components and compositions with a shared purpose. To populate a composition, open the Composition block and begin adding more Component and Composition blocks.

See Also

Component | Diagnostic Service Component | NVRAM Service Component

Topics

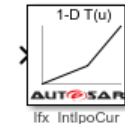
“Add and Connect AUTOSAR Compositions and Components”
“Author AUTOSAR Compositions and Components in Architecture Model”

Introduced in R2019b

Curve

Approximate one-dimensional function

Library: AUTOSAR Blockset / Classic Platform / Library Routines / Interpolation



Description

The Curve block performs one-dimensional interpolated table lookup, including index searches. The table is a sampled representation of a function. Breakpoint sets relate the input values to positions in the table. You can also use the Prelookup and Prelookup Using Curve blocks together to perform the same operations as this block.

If you select the AUTOSAR 4.0 code replacement library (CRL) for your AUTOSAR model, code generated from this block is replaced with the AUTOSAR library routine that you configure in the block parameters dialog box.

Ports

Input

u1 — First-dimension inputs

scalar | vector | matrix

Real-valued inputs to the **u1** port, mapped to an output value by looking up or interpolating the table of values that you define.

Example: 0:10

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

Output

`Port_1` — Output computed by looking up or estimating table values

scalar | vector | matrix

Output generated by looking up or estimating table values based on the input values. If the inputs match the index values of breakpoint sets the curve block provides a table value as output. If the block inputs do not match index values in breakpoint sets, but are within range, the block performs the interpolation method you selected and provides an estimated value from the table values as output.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

Parameters

`Targeted Routine Library` — Indicates the AUTOSAR routine library used for block code replacement

IFX(fixed-point) (default) | IFL(floating-point)

If you select the AUTOSAR 4.0 code replacement library (CRL) for your model, code generated from this block is replaced from the selected AUTOSAR routine library. This parameter enables you to choose either fixed-point (IFX) or floating-point (IFL) code replacement and validation checks.

`Targeted Routine` — AUTOSAR library routine used for code replacement

Ifx_IntIpoMap (default)

This parameter reflects the name of the AUTOSAR code replacement library (CRL) routine used to replace the code generated by this block. The naming convention includes the targeted routine library, interpolation method, and block type. This parameter is reference-only and must not be edited.

Table Specification

`Data specification` — Method of table and breakpoint specification

`Table and breakpoints` (default) | `Lookup table object`

From the list, select:

- `Table and breakpoints` — Specify the table data and breakpoints. Selecting this option enables these parameters:
  - **Table data**
  - **Breakpoints specification**
  - **Breakpoints**
  - **Edit table and breakpoints**
- `Lookup table object` — Use an existing lookup table (`Simulink.LookupTable`) object. Selecting this option enables the **Name** field and the **Edit table and breakpoints** button.

Programmatic Use

Block Parameter: `DataSpecification`
Type: character vector
Values: `'Table and breakpoints' | 'Lookup table object'`
Default: `'Table and breakpoints'`

`Name` — Name of the lookup table object

`[]` (default) | `Simulink.LookupTable` object

Enter the name of the lookup table (`Simulink.LookupTable`) object.

Dependencies

To enable this parameter, set **Data specification** to `Lookup table object`.

Programmatic Use

Block Parameter: `LookupTableObject`
Type: character vector
Values: name of a `Simulink.LookupTable` object
Default: `''`

`Table data` — Define the table of output values

`[1 2 4]` (default) | character vector

Enter the table of output values.

During simulation, the matrix must be one-dimensional. However, during block diagram editing, you can enter an empty matrix (specified as `[]`) or an undefined workspace variable. This technique lets you postpone specifying a correctly dimensioned matrix for the table data and continue editing the block diagram.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints`.

Programmatic Use

Block Parameter: `Table`
Type: character vector
Values: matrix of table values
Default: `'[1 2 4]'`

`Breakpoints specification` — Method of breakpoint specification

`Explicit values` (default) | `Even spacing`

Specify whether to enter data as explicit breakpoints or as parameters that generate evenly spaced breakpoints.

- To explicitly specify breakpoint data, set this parameter to `Explicit values` and enter breakpoint data in the text box next to the **Breakpoints** parameters.
- To specify parameters that generate evenly spaced breakpoints, set this parameter to `Even spacing` and enter values for the **First point** and **Spacing** parameters for each dimension of breakpoint data. The block calculates the number of points to generate from the table data.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints`.

Programmatic Use

Block Parameter: `BreakpointsSpecification`
Type: character vector
Values: `'Explicit values' | 'Even spacing'`
Default: `'Explicit values'`

`Breakpoints` — Explicit breakpoint values, or first point and spacing of breakpoints

`[10,22,31]` (default) | 1-by-n or n-by-1 vector of monotonically increasing values

Specify the breakpoint data explicitly or as evenly-spaced breakpoints, based on the value of the **Breakpoints specification** parameter.

- If you set **Breakpoints specification** to `Explicit values`, enter the breakpoint set that corresponds to each dimension of table data in each **Breakpoints** row. For each

dimension, specify breakpoints as a 1-by-n or n-by-1 vector whose values are strictly monotonically increasing.

- If you set **Breakpoints specification** to `Even spacing`, enter the parameters **First point** and **Spacing** in each **Breakpoints** row to generate evenly-spaced breakpoints in the respective dimension. Your table data determines the number of evenly spaced points.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints`.

Programmatic Use

Block Parameter: `BreakpointsForDimension1`
Type: character vector
Values: 1-by-n or n-by-1 vector of monotonically increasing values
Default: `'[10, 22, 31]'`

`First point` — First point in evenly spaced breakpoint data

1 (default) | scalar

Specify the first point in your evenly spaced breakpoint data as a real-valued, finite, or scalar. This parameter is available when you set the **Breakpoints specification** to `Even spacing`.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints` and **Breakpoints specification** to `Even spacing`.

Programmatic Use

Block Parameter: `BreakpointsForDimension1FirstPoint`
Type: character vector
Values: real-valued, finite, scalar
Default: `'1'`

`Spacing` — Spacing between evenly spaced breakpoints

1 (default) | scalar

Specify the spacing between points in your evenly-spaced breakpoint data.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints` and **Breakpoints specification** to `Even spacing`.

Programmatic Use
Block Parameter: `BreakpointsForDimension1Spacing`
Type: character vector
Values: positive, real-valued, finite, scalar
Default: `'1'`

`Edit table and breakpoints` — Launch Lookup Table Editor dialog box button

Click this button to open the Lookup Table Editor. You can then edit the object and save the new values for the object. For more information, see “Edit Lookup Tables” (Simulink) in the Simulink documentation.

Algorithm

`Index search method` — Method of calculating table indices
`Linear search` (default) | `Evenly spaced points` | `Binary search`

Select `Evenly spaced points`, `Linear search`, or `Binary search`. Each search method has speed advantages in different circumstances:

- For evenly spaced breakpoint sets (for example, 10, 20, 30, and so on), you achieve optimal speed by selecting `Evenly spaced points` to calculate table indices. This algorithm uses only the first two breakpoints of a set to determine the offset and spacing of the remaining points.

  Note When using the `Simulink.LookupTable` object to specify table data and the **Breakpoints Specification** parameter of the referenced `Simulink.LookupTable` object is set to `Even spacing`, set the **Index search method** to `Evenly spaced points`.

- For unevenly spaced breakpoint sets, follow these guidelines:
  - If input signals do not vary significantly between time steps, selecting `Linear search` with **Begin index search using previous index result** produces the best performance.
  - If input signals jump more than one or two table intervals per time step, selecting `Binary search` produces the best performance.

A suboptimal choice of an index search method can lead to slow performance of models that rely heavily on lookup tables.

The generated code stores only the first breakpoint, the spacing, and the number of breakpoints when:

- The breakpoint data is not tunable.
- The index search method is `Evenly spaced points`.

Programmatic Use

Block Parameter: `IndexSearchMethod`
Type: character vector
Values: `'Binary search' | 'Evenly spaced points' | 'Linear search'`
Default: `'Linear search'`

`Begin index search using previous index result` — Start using the index from the previous time step

`off` (default) | `on`

Select this check box when you want the block to start its search using the index found at the previous time step. For inputs that change slowly with respect to the interval size, enabling this option can improve performance. Otherwise, the linear search and binary search methods can take longer, especially for large breakpoint sets.

Dependencies

To enable this parameter, set **Index search method** to `Linear search` or `Binary search`.

Programmatic Use

Block Parameter: `BeginIndexSearchUsing PreviousIndexResult`
Type: character vector
Values: `'off' | 'on'`
Default: `'off'`

`Interpolation method` — Method of interpolation between breakpoint values

`Linear point-slope` (default) | `Flat`

When an input falls between breakpoint values, the block interpolates the output value by using neighboring breakpoints. For more information, see “Interpolation Methods” (Simulink).

Programmatic Use

Block Parameter: `InterpMethod`
Type: character vector

Values: `'Linear point-slope' | 'Flat'`
Default: `'Linear point-slope'`

`Integer rounding mode` — Rounding mode for fixed-point operations
`Round` (default) | `Zero`

Specify the rounding mode for fixed-point or floating-point lookup table calculations that occur during simulation or execution of code generated from the model.

This option does not affect rounding of block parameter values. Simulink rounds such values to the nearest representable integer value. To control the rounding of a block parameter, enter an expression using a MATLAB rounding function into the edit field on the block dialog box.

Programmatic Use
Block Parameter: `RndMeth`
Type: character vector
Values: `'Round' | 'Zero'`
Default: `'Round'`

Data Types

`Table data` — Data type of table data
`Inherit: Same as output` (default) | `double` | `single` | `int8` | `uint8` | `int16` | `uint16` | `int32` | `uint32` | `fixdt(1,16)` | `fixdt(1,16,0)` | `fixdt(1,16,2^0,0)` | `<data type expression>`

Specify the table data type. The block validates that the selected types are compatible with the specification of the targeted routine. You can set the table data type to:

- A rule that inherits a data type, for example, `Inherit: Same as output`
- The name of a built-in data type, for example, `single`
- The name of a data type object, for example, a `Simulink.NumericType` object
- An expression that evaluates to a data type, for example, `fixdt(1,16,0)`

Click the **Show data type assistant** button  to display the **Data Type Assistant**, which helps you set the data type attributes. For more information, see “Specify Data Types Using Data Type Assistant” (Simulink).

Tip Specify a table data type different from the output data type in these cases:

- Lower memory requirement for storing table data that uses a smaller type than the output signal.
- Sharing of prescaled table data between two Map blocks that have different output data types.
- Sharing of custom storage table data in the generated code for blocks that have different output data types.

Programmatic Use

Block Parameter: `TableDataTypeStr`
Type: character vector
Values: `'Inherit: Inherit from 'Table data'' | 'Inherit: Same as output' | 'double' | 'single' | 'int8' | 'uint8' | 'int16' | 'uint16' | 'int32' | 'uint32' | 'fixdt(1,16)' | 'fixdt(1,16,0)' | 'fixdt(1,16,2^0,0)'|'<data type expression>'`
Default: `'Inherit: Same as output'`

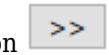
`Breakpoints` — Breakpoint data type

`Inherit: Same as corresponding input` (default) | `double` | `single` | `int8` | `uint8` | `int16` | `uint16` | `int32` | `uint32` | `fixdt(1,16)` | `fixdt(1,16,0)` | `fixdt(1,16,2^0,0)` | `Enum: <class name>` | `<data type expression>`

Specify the data type for a set of breakpoint data. You can set the breakpoint data type to:

- A rule that inherits a data type, for example, `Inherit: Same as corresponding input`
- The name of a built-in data type, for example, `single`
- The name of a data type class, for example, an enumerated data type class
- The name of a data type object, for example, a `Simulink.NumericType` object
- An expression that evaluates to a data type, for example, `fixdt(1,16,0)`

A limitation for using enumerated data with this block is that it does not support out-of-range input for enumerated date. When specifying enumerated data, include the entire enumeration set in the breakpoint data set.

Click the **Show data type assistant** button  to display the **Data Type Assistant**, which helps you set the data type attributes. For more information, see “Specify Data Types Using Data Type Assistant” (Simulink).

Programmatic Use

Block Parameter: `BreakpointsForDimension1DataTypeStr | BreakpointsForDimension2DataTypeStr`
Type: character vector
Values: `'Inherit: Same as corresponding input' | 'Inherit: Inherit from 'Breakpoint data'' | 'double' | 'single' | 'int8' | 'uint8' | 'int16' | 'uint16' | 'int32' | 'uint32' | 'fixdt(1,16)' | 'fixdt(1,16,0)' | 'fixdt(1,16,2^0,0)'|'<data type expression>'`
Default: `'Inherit: Same as corresponding input'`

Extended Capabilities

C/C++ Code Generation

Generate C and C++ code using Simulink® Coder™.

See Also

Curve Using Prelookup | Map | Map Using Prelookup | Prelookup

Topics

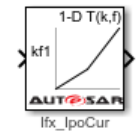
“Configure Lookup Tables for AUTOSAR Measurement and Calibration”
“Code Generation with AUTOSAR Code Replacement Library”

Introduced in R2019a

Curve Using Prelookup

Use previously calculated index and fraction values to accelerate approximation of one-dimensional function

Library: AUTOSAR Blockset / Classic Platform / Library Routines / Interpolation



Description

The Curve Using Prelookup block is intended for use with a Prelookup block. This block enables a prelookup result to drive multiple interpolation results. The Prelookup block computes the index and interval fraction that specify how its input value u relates to the breakpoint data set and feeds the resulting index and fraction values into the Curve Using Prelookup block to interpolate a one-dimensional table. The Prelookup and Curve Using Prelookup blocks have distributed algorithms that when used together perform the same algorithm operation as the Curve block but offer greater flexibility and more efficient simulation and code generation.

If you select the AUTOSAR 4.0 code replacement library (CRL) for your AUTOSAR model, code generated from this block is replaced with the AUTOSAR library routine that you configure in the block parameters dialog box.

Ports

Input

`kf1` — Input containing index `k` and fraction `f`

bus object

Inputs to the **kf1** port contain index `k` and fraction `f` specified as a bus object.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point` | `bus`

T — Table data

scalar | vector | matrix | 1-d array

Table data values provided as input to port **T**. These table values correspond to the breakpoint data sets specified in Prelookup blocks. The Interpolation Using Prelookup block generates output by looking up or estimating table values based on index (`k`) and interval fraction (`f`) values fed from Prelookup blocks.

Dependencies

To enable this port, set **Source** to `Input port`.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

Output

`Port 1` — Approximation of one-dimensional function

scalar | vector | matrix

Approximation of the one-dimensional function computed by interpolating table data that uses values from the input index, `k`, and the fraction, `f`.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

Parameters

`Targeted Routine Library` — Indicates the AUTOSAR routine library used for block code replacement

IFX(fixed-point) (default) | IFL(floating-point)

If you select the AUTOSAR 4.0 code replacement library (CRL) for your model, code generated from this block is replaced from the selected AUTOSAR routine library. This parameter enables you to choose either fixed-point (IFX) or floating-point (IFL) code replacement and validation checks.

`Targeted Routine` — AUTOSAR library routine used for code replacement

Ifx_IpoCur (default)

This parameter reflects the name of the AUTOSAR code replacement library (CRL) routine used to replace the code generated by this block. The naming convention includes

the targeted routine library, interpolation method, and block type. This parameter is reference-only and must not be edited.

Table Specification

`Data Specification` — Choose how to enter table data

`Explicit values` (default) | `Lookup table object`

Specify whether to enter table data directly or use a lookup table object. If you set this parameter to:

- `Explicit values`, the **Table Data** parameter is visible in the dialog box.
- `Lookup table object`, the **Name** parameter is visible in the dialog box.

Programmatic Use

Block Parameter: `TableSpecification`
Type: character vector
Values: `'Explicit values' | 'Lookup table object'`
Default: `'Explicit values'`

`Name` — Name of a `Simulink.LookupTable` object

`Simulink.LookupTable object`

Specify the name of a `Simulink.LookupTable` object. A lookup table object references Simulink breakpoint objects. If a `Simulink.LookupTable` object does not exist, click the action button and select **Create**. The corresponding parameters of the new lookup table object are populated with the block information.

Dependencies

To enable this parameter, set **Data Specification** to `Lookup table object`.

Programmatic Use

Block Parameter: `LookupTableObject`
Type: character vector
Value: `Simulink.LookupTable object`
Default: `''`

`Table data` — Define the table of output values

`[1 2 4]` (default) | character vector

Enter the table of output values.

During simulation, the matrix size must be one-dimensional. However, during block diagram editing, you can enter an empty matrix (specified as `[]`) or an undefined workspace variable. This technique lets you postpone specifying a correctly dimensioned matrix for the table data and continue editing the block diagram.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints`.

Programmatic Use

Block Parameter: `Table`
Type: character vector
Values: matrix of table values
Default: `'[1 2 4]'`

`Edit table and breakpoints` — Launch Lookup Table Editor dialog box

button

Click this button to open the Lookup Table Editor. For more information, see “Edit Lookup Tables” (Simulink) in the Simulink documentation.

Clicking this button for a lookup table object lets you edit the object and save the new values for the object.

Algorithm

`Interpolation method` — Select `Linear point-slope` or `Flat` interpolation methods

`Linear point-slope` (default) | `Flat`

Specify the method that the block uses to interpolate table data. You can select `Linear point-slope` or `Flat`. For more information, see “Interpolation Methods” (Simulink).

Programmatic Use

Block Parameter: `InterpMethod`
Type: character vector
Values: `'Flat' | 'Linear point-slope'`
Default: `'Linear point-slope'`

`Integer rounding mode` — Rounding mode for fixed-point operations

`Round` (default) | `Zero`

Specify the rounding mode for fixed-point or floating-point lookup table calculations that occur during simulation or execution of code generated from the model.

This option does not affect rounding of values of block parameters. Simulink rounds such values to the nearest representable integer value. To control the rounding of a block parameter, enter an expression using a MATLAB rounding function into the edit field on the block dialog box.

Programmatic Use
Block Parameter: `RndMeth`
Type: character vector
Values: `'Round' | 'Zero'`
Default: `'Round'`

Data Types

`Table data` — Data type of table data

`Inherit: Same as output` (default) | `double` | `single` | `int8` | `uint8` | `int16` | `uint16` | `int32` | `uint32` | `fixdt(1,16)` | `fixdt(1,16,0)` | `fixdt(1,16,2^0,0)` | `<data type expression>`

Specify the table data type. The block validates that the selected types are compatible with the specification of the targeted routine. You can set it to:

- A rule that inherits a data type, for example, `Inherit: Same as output`
- The name of a built-in data type, for example, `single`
- The name of a data type object, for example, a `Simulink.NumericType` object
- An expression that evaluates to a data type, for example, `fixdt(1,16,0)`

Click the **Show data type assistant** button  to display the **Data Type Assistant**, which helps you set the data type attributes. For more information, see “Specify Data Types Using Data Type Assistant” (Simulink).

Tip Specify a table data type different from the output data type for these cases:

- Lower memory requirement for storing table data that uses a smaller type than the output signal
- Sharing of prescaled table data between two Curve blocks with different output data types

- Sharing of custom storage table data in the generated code for blocks with different output data types

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Programmatic Use
Block Parameter: `TableDataTypeStr`
Type: character vector
Values: `'Inherit: Inherit from 'Table data'' | 'Inherit: Same as output' | 'double' | 'single' | 'int8' | 'uint8' | 'int16' | 'uint16' | 'int32' | 'uint32' | 'fixdt(1,16)' | 'fixdt(1,16,0)' | 'fixdt(1,16,2^0,0)'|'<data type expression>'`
Default: `'Inherit: Same as output'`

Extended Capabilities

C/C++ Code Generation

Generate C and C++ code using Simulink® Coder™.

See Also

Curve | Map | Map Using Prelookup | Prelookup

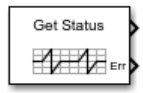
Topics

“Configure Lookup Tables for AUTOSAR Measurement and Calibration”
“Code Generation with AUTOSAR Code Replacement Library”

Introduced in R2019a

DiagnosticInfoCaller

Call AUTOSAR Diagnostic Event Manager (Dem) service interface `DiagnosticInfo`



Library

AUTOSAR Blockset / Classic Platform / Basic Software / Diagnostic Event Manager (Dem)

Description

Call AUTOSAR Dem service interface `DiagnosticInfo` using a specified operation.

Parameters

Client port name

Name of the client port used by the AUTOSAR software component for the function call, set to `DiagnosticInfo` by default.

Operation

Name of an operation defined by the AUTOSAR standard for the Dem service interface `DiagnosticInfo`:

- `GetEventStatus` (default)
- `GetEventFailed`
- `GetEventTested`
- `GetDTCOfEvent`
- `GetFaultDetectionCounter`
- `GetEventExtendedDataRecord`
- `GetEventFreezeFrameData`

Data type for DTCFormat (`GetDTCOfEvent` only)

Name of a data type that defines Dem format type values for the function input `DTCFormat`. By default, the data type is set to `Enum: Dem_DTCFormatType`. For more information about format type values, see the AUTOSAR standard *Specification of Diagnostic Event Manager*.

Sample time

Block sample time, set to -1 (inherited) by default.

See Also

Diagnostic Service Component | DiagnosticMonitorCaller

Topics

“Configure Calls to AUTOSAR Diagnostic Event Manager Service”
“Configure AUTOSAR Basic Software Service Implementations for Simulation”
“Simulate AUTOSAR Basic Software Services and Run-Time Environment”

Introduced in R2016b

DiagnosticMonitorCaller

Call AUTOSAR Diagnostic Event Manager (Dem) service interface `DiagnosticMonitor`

Library

AUTOSAR Blockset / Classic Platform / Basic Software / Diagnostic Event Manager (Dem)

Description

Call AUTOSAR Dem service interface `DiagnosticMonitor` using a specified operation.

Parameters

Client port name

Name of the client port used by the AUTOSAR software component for the function call, set to `DiagnosticMonitor` by default.

Operation

Name of an operation defined by the AUTOSAR standard for the Dem service interface `DiagnosticMonitor`:

- `SetEventStatus` (default)
- `ResetEventStatus`
- `PrestoreFreezeFrame`
- `ClearPrestoredFreezeFrame`
- `SetEventDisabled`

Data type for EventStatus (`SetEventStatus` only)

Name of a data type that defines Dem event status values for the function input `EventStatus`. By default, the data type is set to `Enum: Dem_EventStatusType`.

For more information about event status values, see the AUTOSAR standard *Specification of Diagnostic Event Manager*.

Sample time

Block sample time, set to -1 (inherited) by default.

See Also

Diagnostic Service Component | DiagnosticInfoCaller

Topics

“Configure Calls to AUTOSAR Diagnostic Event Manager Service”
“Configure AUTOSAR Basic Software Service Implementations for Simulation”
“Simulate AUTOSAR Basic Software Services and Run-Time Environment”

Introduced in R2016b

Diagnostic Service Component

Configure AUTOSAR Diagnostic Services and Runtime Environment (RTE) for emulation

Library

AUTOSAR Blockset / Classic Platform / Basic Software / Diagnostic Event Manager (Dem)

Description

The Diagnostic Service Component block provides reference implementations of Diagnostic Event Manager (Dem) services supported by AUTOSAR Basic Software (BSW) caller blocks. When coupled with Dem caller blocks, the reference implementations allow you to configure and run system- or composition-level simulations of AUTOSAR Dem service calls.

The block has prepopulated parameters, including **Counter-Based Debouncing** parameters and RTE parameters. Examine the parameter settings and consider if modifications are required, based on how you are using the Dem service operations.

The **Counter-Based Debouncing** parameters control the counter-based debounce algorithm provided by the Dem service reference implementations. During multiple simulation runs, you can tune event step size and threshold parameters and observe the effects.

Debouncing provides a means to determine when a monitored event is regarded as passed or failed. The software maintains a counter for each event ID. When PREFAIL events arrive, the software increments the event ID counter by a fixed step value. When PREPASS events arrive, the software decrements the event ID counter by a fixed step value. When a counter reaches a lower or upper threshold, the event is considered passed or failed.

In the Dem reference implementations, the step size and threshold parameters apply globally to event IDs, not to individual IDs.

Parameters

Increment step size

Specify a fixed-step value, 1 to 32767, by which to increment a Dem event ID counter when PREFAIL events arrive.

Decrement step size

Specify a fixed-step value, 1 to 32767, by which to decrement a Dem event ID counter when PREPASS events arrive.

Failed threshold

Specify a Dem event ID counter threshold value, 1 to 32767, to represent failed status.

Passed threshold

Specify a Dem event ID counter threshold value, -32768 to -1, to represent passed status.

Event ID

The RTE tab table lists component client ports and their mapping to Dem service event IDs. Each row in the table represents a call into Dem services from a Basic Software caller block. Calls that act on the same event should use the same event ID. Check the event ID mappings. For an example of mapping Dem client ports to shared event IDs, see “Simulate AUTOSAR Basic Software Services and Run-Time Environment”.

See Also

DiagnosticInfoCaller | DiagnosticMonitorCaller

Topics

“Configure Calls to AUTOSAR Diagnostic Event Manager Service”
“Configure AUTOSAR Basic Software Service Implementations for Simulation”
“Simulate AUTOSAR Basic Software Services and Run-Time Environment”

Introduced in R2017b

Event Receive

Convert input event to signal

Library: AUTOSAR Blockset / Adaptive Platform / Signal Routing

Description

At the top level of an AUTOSAR adaptive model, use the Event Receive and Event Send blocks to set up event-based communication.

- After each root inport, add an Event Receive block which converts an input event to a signal, while preserving the signal values and data type.
- Before each root outport, add an Event Send block which converts an input signal to an event, while preserving the signal values and data type.

Ports

Input

`Port_1` — Input event

scalar | vector | matrix

The input port for the Event Receive block to accept an event.

Example:

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `int64` | `uint8` | `uint16` | `uint32` | `uint64` | `Boolean` | `enumerated` | `bus`

Output

`Port_1` — Output signal

scalar | vector | matrix

The output port for the Event Receive block to output a signal.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `int64` | `uint8` | `uint16` | `uint32` | `uint64` | `Boolean` | `enumerated` | `bus`

Extended Capabilities

C/C++ Code Generation

Generate C and C++ code using Simulink® Coder™.

See Also

Event Send

Topics

“Configure AUTOSAR Adaptive Software Components”

Introduced in R2019a

Event Send

Convert input signal to event

Library: AUTOSAR Blockset / Adaptive Platform / Signal Routing

Description

At the top level of an AUTOSAR adaptive model, use the Event Receive and Event Send blocks to set up event-based communication.

- After each root inport, add an Event Receive block which converts an input event to a signal, while preserving the signal values and data type.
- Before each root outport, add an Event Send block which converts an input signal to an event, while preserving the signal values and data type.

Ports

Input

`Port_1` — Input signal

scalar | vector | matrix

The input port for the Event Send block to receive inputs of any type that AUTOSAR Blockset supports.

Example:

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `int64` | `uint8` | `uint16` | `uint32` | `uint64` | `Boolean` | `enumerated` | `bus`

Output

`Port_1` — Output event

scalar | vector | matrix

The output port for the Event Send block to output an event.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `int64` | `uint8` | `uint16` | `uint32` | `uint64` | `Boolean` | `enumerated` | `bus`

Extended Capabilities

C/C++ Code Generation

Generate C and C++ code using Simulink® Coder™.

See Also

Event Receive

Topics

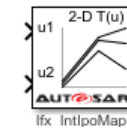
“Configure AUTOSAR Adaptive Software Components”

Introduced in R2019a

Map

Approximate two-dimensional function

Library: AUTOSAR Blockset / Classic Platform / Library Routines / Interpolation



Description

The Map block performs two-dimensional, interpolated table lookup, including index searches. The table is a sampled representation of a function in two variables. Breakpoint sets relate the input values to positions in the table. You can also use the Prelookup and Prelookup Using Map blocks together to perform the same operations as this block.

When you set the **Math and Data Types > Use algorithms optimized for row-major array layout** configuration parameter, the block behavior changes from column-major to row-major. For these blocks, the column-major and row-major algorithms might differ in the order of the output calculations, possibly resulting in slightly different numeric values. This capability requires Simulink Coder or Embedded Coder software. For more information on row-major support, see “Code Generation of Matrices and Arrays” (Simulink Coder).

If you select the AUTOSAR 4.0 code replacement library (CRL) for your AUTOSAR model, code generated from this block is replaced with the AUTOSAR library routine that you configure in the block parameters dialog box.

Ports

Input

u1 — First dimension input values

scalar | vector | matrix

Real-valued inputs to the first port, mapped to an output value by looking up or interpolating the table of values that you define.

Example: 0:10

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

u2 — Second dimension input values

scalar | vector | matrix

Real-valued inputs to the second port, mapped to an output value by looking up or interpolating the table of values that you define.

Example: 0:10

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

Output

y — Output computed by looking up or estimating table values

scalar | vector | matrix

Output generated by looking up or estimating table values based on input values. If the inputs match the index values of breakpoint sets, the map block provides a table value as output. If the block inputs do not match index values in breakpoint sets, but are within range, the block performs the configured interpolation method and provides an estimated value from the table as output.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

Parameters

`Targeted Routine Library` — Indicates the AUTOSAR routine library used for block code replacement

IFX(fixed-point) (default) | IFL(floating-point)

If you select the AUTOSAR 4.0 code replacement library (CRL) for your model, code generated from this block is replaced from the selected AUTOSAR routine library. This parameter enables you to choose either fixed-point (IFX) or floating-point (IFL) code replacement and validation checks.

`Targeted Routine` — AUTOSAR library routine used for code replacement

Ifx_IntIpoMap (default)

This parameter reflects the name of the AUTOSAR code replacement library (CRL) routine used to replace the code generated by this block. The naming convention includes the targeted routine library, interpolation method, and block type. This parameter is reference-only and must not be edited.

Table Specification

`Data specification` — Method of table and breakpoint specification

`Table and breakpoints` (default) | `Lookup table object`

From the list, select:

- `Table and breakpoints` — Specify the table data and breakpoints. Selecting this option enables these parameters:
  - **Table data**
  - **Breakpoints specification**
  - **Breakpoints 1**
  - **Breakpoints 2**
  - **Edit table and breakpoints**
- `Lookup table object` — Use an existing lookup table (`Simulink.LookupTable`) object. Selecting this option enables the **Name** field and the **Edit table and breakpoints** button.

Programmatic Use

Block Parameter: `DataSpecification`
Type: character vector
Values: `'Table and breakpoints' | 'Lookup table object'`
Default: `'Table and breakpoints'`

`Name` — Name of the lookup table object

`[]` (default) | `Simulink.LookupTable` object

Enter the name of the lookup table (`Simulink.LookupTable`) object.

Dependencies

To enable this parameter, set **Data specification** to `Lookup table object`.

Programmatic Use

Block Parameter: `LookupTableObject`
Type: character vector
Values: name of a `Simulink.LookupTable` object
Default: `''`

`Table data` — Define the table of output values

`[4 5 6;16 19 20;10 18 23]` (default) | character vector

Enter the table of output values.

During simulation, the matrix size must be two dimensional. However, during block diagram editing, you can enter an empty matrix (specified as `[]`) or an undefined workspace variable. This technique lets you postpone specifying a correctly dimensioned matrix for the table data and continue editing the block diagram.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints`.

Programmatic Use

Block Parameter: `Table`
Type: character vector
Values: matrix of table values
Default: `'[4 5 6;16 19 20;10 18 23]'`

`Breakpoints specification` — Method of breakpoint specification

`Explicit values` (default) | `Even spacing`

Specify whether to enter data as explicit breakpoints or as parameters that generate evenly spaced breakpoints.

- To explicitly specify breakpoint data, set this parameter to `Explicit values` and enter breakpoint data in the text box next to the **Breakpoints** parameters.
- To specify parameters that generate evenly spaced breakpoints, set this parameter to `Even spacing` and enter values for the **First point** and **Spacing** parameters for each dimension of breakpoint data. The block calculates the number of points to generate from the table data.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints`.

Programmatic Use

Block Parameter: `BreakpointsSpecification`
Type: character vector
Values: `'Explicit values' | 'Even spacing'`
Default: `'Explicit values'`

`Breakpoints` — Explicit breakpoint values, or first point and spacing of breakpoints

`[10,22,31]` (default) | 1-by-n or n-by-1 vector of monotonically increasing values

Specify the breakpoint data explicitly or as evenly-spaced breakpoints, based on the value of the **Breakpoints specification** parameter.

- If you set **Breakpoints specification** to `Explicit values`, enter the breakpoint set that corresponds to each dimension of table data in each **Breakpoints** row. For each dimension, specify breakpoints as a 1-by-n or n-by-1 vector whose values are strictly monotonically increasing.
- If you set **Breakpoints specification** to `Even spacing`, enter the parameters **First point** and **Spacing** in each **Breakpoints** row to generate evenly-spaced breakpoints in the respective dimension. Your table data determines the number of evenly spaced points.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints`.

Programmatic Use

Block Parameter: `BreakpointsForDimension1 | BreakpointsForDimension2`
Type: character vector
Values: 1-by-n or n-by-1 vector of monotonically increasing values
Default: `'[10, 22, 31]'`

`First point` — First point in evenly spaced breakpoint data

1 (default) | scalar

Specify the first point in your evenly spaced breakpoint data as a real-valued, finite, or scalar. This parameter is available when you set the **Breakpoints specification** to `Even spacing`.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints` and **Breakpoints specification** to `Even spacing`.

Programmatic Use

Block Parameter: `BreakpointsForDimension1FirstPoint | BreakpointsForDimensionSecondPoint`
Type: character vector
Values: real-valued, finite, scalar
Default: `'1'`

`Spacing` — Spacing between evenly spaced breakpoints

1 (default) | scalar

Specify the spacing between points in your evenly-spaced breakpoint data.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints` and **Breakpoints specification** to `Even spacing`.

Programmatic Use

Block Parameter: `BreakpointsForDimension1Spacing | BreakpointsForDimension2Spacing`
Type: character vector
Values: positive, real-valued, finite, scalar
Default: `'1'`

`Edit table and breakpoints` — Launch Lookup Table Editor dialog box

button

Click this button to open the Lookup Table Editor. You can then edit the object and save the new values for the object. For more information, see “Edit Lookup Tables” (Simulink) in the Simulink documentation.

Algorithm

`Index search method` — Method of calculating table indices

`Linear search` (default) | `Evenly spaced points` | `Binary search`

Select `Evenly spaced points`, `Linear search`, or `Binary search`. Each search method has speed advantages in different circumstances:

- For evenly spaced breakpoint sets (for example, 10, 20, 30, and so on), you achieve optimal speed by selecting `Evenly spaced points` to calculate table indices. This algorithm uses only the first two breakpoints of a set to determine the offset and spacing of the remaining points.

Note When using the `Simulink.LookupTable` object to specify table data and the **Breakpoints Specification** parameter of the referenced `Simulink.LookupTable` object is set to `Even spacing`, set the **Index search method** to `Evenly spaced points`.

- For unevenly spaced breakpoint sets, follow these guidelines:
  - If input signals do not vary significantly between time steps, selecting `Linear search` with **Begin index search using previous index result** produces the best performance.
  - If input signals jump more than one or two table intervals per time step, selecting `Binary search` produces the best performance.

A suboptimal choice of an index search method can lead to slow performance of models that rely heavily on lookup tables.

The generated code stores only the first breakpoint, the spacing, and the number of breakpoints when:

- The breakpoint data is not tunable.
- The index search method is `Evenly spaced points`.

Programmatic Use

Block Parameter: `IndexSearchMethod`
Type: character vector
Values: `'Binary search' | 'Evenly spaced points' | 'Linear search'`
Default: `'Linear search'`

`Begin index search using previous index result` — Start using the index from the previous time step

`off` (default) | `on`

Select this check box when you want the block to start its search using the index found at the previous time step. For inputs that change slowly with respect to the interval size, enabling this option can improve performance. Otherwise, the linear search and binary search methods can take longer, especially for large breakpoint sets.

Dependencies

To enable this parameter, set **Index search method** to `Linear search` or `Binary search`.

Programmatic Use
Block Parameter: `BeginIndexSearchUsing PreviousIndexResult`
Type: character vector
Values: `'off' | 'on'`
Default: `'off'`

`Interpolation method` — Method of interpolation between breakpoint values

`Linear point-slope` (default) | `Flat`

When an input falls between breakpoint values, the block interpolates the output value by using neighboring breakpoints. For more information, see “Interpolation Methods” (Simulink).

Programmatic Use
Block Parameter: `InterpMethod`
Type: character vector
Values: `'Linear point-slope' | 'Flat'`
Default: `'Linear point-slope'`

`Integer rounding mode` — Rounding mode for fixed-point operations

`Round` (default) | `Zero`

Specify the rounding mode for fixed-point or floating-point lookup table calculations that occur during simulation or execution of code generated from the model.

This option does not affect rounding of block parameter values. Simulink rounds such values to the nearest representable integer value. To control the rounding of a block parameter, enter an expression using a MATLAB rounding function into the edit field on the block dialog box.

Programmatic Use
Block Parameter: `RndMeth`
Type: character vector
Values: `'Round' | 'Zero'`
Default: `'Round'`

Data Types

`Table data` — Data type of table data

`Inherit: Same as output` (default) | `double` | `single` | `int8` | `uint8` | `int16` | `uint16` | `int32` | `uint32` | `fixdt(1,16)` | `fixdt(1,16,0)` | `fixdt(1,16,2^0,0)` | `<data type expression>`

Specify the table data type. The block validates that the selected types are compatible with the specification of the targeted routine. You can set the table data type to:

- A rule that inherits a data type, for example, `Inherit: Same as output`
- The name of a built-in data type, for example, `single`
- The name of a data type object, for example, a `Simulink.NumericType` object
- An expression that evaluates to a data type, for example, `fixdt(1,16,0)`

Click the **Show data type assistant** button  to display the **Data Type Assistant**, which helps you set the data type attributes. For more information, see "Specify Data Types Using Data Type Assistant" (Simulink).

Tip Specify a table data type different from the output data type in these cases:

- Lower memory requirement for storing table data that uses a smaller type than the output signal.
- Sharing of prescaled table data between two Map blocks that have different output data types.
- Sharing of custom storage table data in the generated code for blocks that have different output data types.

Programmatic Use

Block Parameter: `TableDataTypeStr`
Type: character vector
Values: `'Inherit: Inherit from 'Table data'' | 'Inherit: Same as output' | 'double' | 'single' | 'int8' | 'uint8' | 'int16' | 'uint16' | 'int32' | 'uint32' | 'fixdt(1,16)' | 'fixdt(1,16,0)' | 'fixdt(1,16,2^0,0)'|'<data type expression>'`
Default: `'Inherit: Same as output'`

`Breakpoints` — Breakpoint data type

`Inherit: Same as corresponding input` (default) | `double` | `single` | `int8` | `uint8` | `int16` | `uint16` | `int32` | `uint32` | `fixdt(1,16)` | `fixdt(1,16,0)` | `fixdt(1,16,2^0,0)` | `Enum: <class name>` | `<data type expression>`

Specify the data type for a set of breakpoint data. You can set the breakpoint data type to:

- A rule that inherits a data type, for example, `Inherit: Same as corresponding input`
- The name of a built-in data type, for example, `single`
- The name of a data type class, for example, an enumerated data type class
- The name of a data type object, for example, a `Simulink.NumericType` object
- An expression that evaluates to a data type, for example, `fixdt(1,16,0)`

A limitation for using enumerated data with this block is that it does not support out-of-range input for enumerated date. When specifying enumerated data, include the entire enumeration set in the breakpoint data set.

Click the **Show data type assistant** button 

to display the **Data Type Assistant**, which helps you set the data type attributes. For more information, see "Specify Data Types Using Data Type Assistant" (Simulink).

Programmatic Use
Block Parameter: `BreakpointsForDimension1DataTypeStr | BreakpointsForDimension2DataTypeStr`
Type: character vector
Values: `'Inherit: Same as corresponding input' | 'Inherit: Inherit from 'Breakpoint data'' | 'double' | 'single' | 'int8' | 'uint8' | 'int16' | 'uint16' | 'int32' | 'uint32' | 'fixdt(1,16)' | 'fixdt(1,16,0)' | 'fixdt(1,16,2^0,0)'|'<data type expression>'`
Default: `'Inherit: Same as corresponding input'`

Extended Capabilities

C/C++ Code Generation

Generate C and C++ code using Simulink® Coder™.

See Also

Curve | Curve Using Prelookup | Map Using Prelookup | Prelookup

Topics

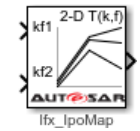
“Configure Lookup Tables for AUTOSAR Measurement and Calibration”
“Code Generation with AUTOSAR Code Replacement Library”

Introduced in R2019a

Map Using Prelookup

Use previously calculated index and fraction values to accelerate approximation of two-dimensional function

Library: AUTOSAR Blockset / Classic Platform / Library Routines / Interpolation



Description

The Map Using Prelookup block is intended for use with a Prelookup block. This block enables a prelookup result to drive multiple interpolation results. The Prelookup block calculates the index and interval fraction that specify how its input value `u` relates to the breakpoint data set and feeds the resulting index and fraction values into a Map Using Prelookup block to interpolate a two-dimensional table. The Prelookup and Map Using Prelookup blocks have distributed algorithms that when used together perform the same algorithm operation as the Map block but offer greater flexibility and more efficient simulation and code generation.

If you select the AUTOSAR 4.0 code replacement library (CRL) for your AUTOSAR model, code generated from this block is replaced with the AUTOSAR library routine that you configure in the block parameters dialog box.

Ports

Input

`kf1` — Input containing index `k` and fraction `f`

bus object

Inputs to the **kf1** port contain index `k` and fraction `f` specified as a bus object.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point` | `bus`

T — Table data

scalar | vector | matrix | 2-d array

Table data values provided as input to port **T**. These table values correspond to the breakpoint data sets specified in Prelookup blocks. The Interpolation Using Prelookup block generates output by looking up or estimating table values based on index (`k`) and interval fraction (`f`) values fed from a Prelookup block.

Dependencies

To enable this port, set **Source** to `Input port`.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

Output

`Port 1` — Approximation of two-dimensional function

scalar | vector | matrix

Approximation of the two-dimensional function computed by interpolating table data that uses values from the input index, `k`, and the fraction, `f`.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point`

Parameters

`Targeted Routine Library` — Indicates the AUTOSAR routine library used for block code replacement

IFX(fixed-point) (default) | IFL(floating-point)

If you select the AUTOSAR 4.0 code replacement library (CRL) for your model, code generated from this block is replaced from the selected AUTOSAR routine library. This parameter enables you to choose either fixed-point (IFX) or floating-point (IFL) code replacement and validation checks.

`Targeted Routine` — AUTOSAR library routine used for code replacement

Ifx_IpoMap (default)

This parameter reflects the name of the AUTOSAR code replacement library (CRL) routine used to replace the code generated by this block. The naming convention includes

the targeted routine library, interpolation method, and block type. This parameter is reference-only and must not be edited.

Table Specification

`Data Specification` — Choose how to enter table data

`Explicit values` (default) | `Lookup table object`

Specify whether to enter table data directly or use a lookup table object. If you set this parameter to:

- `Explicit values`, the **Table Data** parameter is visible in the dialog box.
- `Lookup table object`, the **Name** parameter is visible in the dialog box.

Programmatic Use

Block Parameter: `TableSpecification`
Type: character vector
Values: `'Explicit values' | 'Lookup table object'`
Default: `'Explicit values'`

`Name` — Name of a `Simulink.LookupTable` object

`Simulink.LookupTable object`

Specify the name of a `Simulink.LookupTable` object. A lookup table object references Simulink breakpoint objects. If a `Simulink.LookupTable` object does not exist, click the action button  and select **Create**. The corresponding parameters of the new lookup table object are populated with the block information.

Dependencies

To enable this parameter, set **Data Specification** to `Lookup table object`.

Programmatic Use

Block Parameter: `LookupTableObject`
Type: character vector
Value: `Simulink.LookupTable object`
Default: `''`

`Table data` — Define the table of output values

`[4 5 6;16 19 20;10 18 23]` (default) | character vector

Enter the table of output values.

During simulation, the matrix size must be two-dimensional. However, during block diagram editing, you can enter an empty matrix (specified as `[]`) or an undefined workspace variable. This technique lets you postpone specifying a correctly dimensioned matrix for the table data and continue editing the block diagram.

Dependencies

To enable this parameter, set **Data specification** to `Table and breakpoints`.

Programmatic Use

Block Parameter: `Table`
Type: character vector
Values: matrix of table values
Default: `[4 5 6;16 19 20;10 18 23]'`

`Edit table and breakpoints` — Launch Lookup Table Editor dialog box

button

Click this button to open the Lookup Table Editor. For more information, see "Edit Lookup Tables" (Simulink) in the Simulink documentation.

Clicking this button for a lookup table object lets you edit the object and save the new values for the object.

Algorithm

`Interpolation method` — Select `Linear point-slope` or `Flat` interpolation methods

`Linear point-slope` (default) | `Flat`

Specify the method that the block uses to interpolate table data. You can select `Linear point-slope` or `Flat`. For more information, see "Interpolation Methods" (Simulink).

Programmatic Use

Block Parameter: `InterpMethod`
Type: character vector
Values: `'Flat' | 'Linear point-slope'`
Default: `'Linear point-slope'`

`Integer rounding mode` — Rounding mode for fixed-point operations

`Round` (default) | `Zero`

Specify the rounding mode for fixed-point or floating-point lookup table calculations that occur during simulation or execution of code generated from the model.

This option does not affect rounding of values of block parameters. Simulink rounds such values to the nearest representable integer value. To control the rounding of a block parameter, enter an expression using a MATLAB rounding function into the edit field on the block dialog box.

Programmatic Use
Block Parameter: `RndMeth`
Type: character vector
Values: `'Round' | 'Zero'`
Default: `'Round'`

Data Types

`Table data` — Data type of table data

`Inherit: Same as output` (default) | `double` | `single` | `int8` | `uint8` | `int16` | `uint16` | `int32` | `uint32` | `fixdt(1,16)` | `fixdt(1,16,0)` | `fixdt(1,16,2^0,0)` | `<data type expression>`

Specify the table data type. The block will validate that the selected types are compatible with the specification of the targeted routine. You can set it to:

- A rule that inherits a data type, for example, `Inherit: Same as output`
- The name of a built-in data type, for example, `single`
- The name of a data type object, for example, a `Simulink.NumericType` object
- An expression that evaluates to a data type, for example, `fixdt(1,16,0)`

Click the **Show data type assistant** button 

to display the **Data Type Assistant**, which helps you set the data type attributes. For more information, see “Specify Data Types Using Data Type Assistant” (Simulink).

Tip Specify a table data type different from the output data type for these cases:

- Lower memory requirement for storing table data that uses a smaller type than the output signal
- Sharing of prescaled table data between two Curve blocks with different output data types

- Sharing of custom storage table data in the generated code for blocks with different output data types

---

Programmatic Use
Block Parameter: `TableDataTypeStr`
Type: character vector
Values: `'Inherit: Inherit from 'Table data'' | 'Inherit: Same as output' | 'double' | 'single' | 'int8' | 'uint8' | 'int16' | 'uint16' | 'int32' | 'uint32' | 'fixdt(1,16)' | 'fixdt(1,16,0)' | 'fixdt(1,16,2^0,0)'|'<data type expression>'`
Default: `'Inherit: Same as output'`

Extended Capabilities

C/C++ Code Generation

Generate C and C++ code using Simulink® Coder™.

See Also

Curve | Curve Using Prelookup | Map | Prelookup

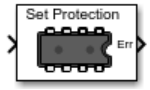
Topics

“Configure Lookup Tables for AUTOSAR Measurement and Calibration”
“Code Generation with AUTOSAR Code Replacement Library”

Introduced in R2019a

NvMAdminCaller

Call AUTOSAR NVRAM Manager (NvM) service interface `NvMAdmin`



Library

AUTOSAR Blockset / Classic Platform / Basic Software / NVRAM Manager (NvM)

Description

Call AUTOSAR NvM service interface `NvMAdmin` using a specified operation.

Parameters

Client port name

Name of the client port used by the AUTOSAR software component for the function call, set to `NvMAdmin` by default.

Operation

Name of an operation defined by the AUTOSAR standard for the NvM service interface `NvMAdmin`. One operation is supported: `SetBlockProtection`.

Sample time

Block sample time, set to -1 (inherited) by default.

See Also

NVRAM Service Component | NvMServiceCaller

Topics

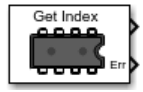
“Configure Calls to AUTOSAR NVRAM Manager Service”

“Configure AUTOSAR Basic Software Service Implementations for Simulation”
“Simulate AUTOSAR Basic Software Services and Run-Time Environment”

Introduced in R2016b

NvMServiceCaller

Call AUTOSAR NVRAM Manager (NvM) service interface `NvMService`



Library

AUTOSAR Blockset / Classic Platform / Basic Software / NVRAM Manager (NvM)

Description

Call AUTOSAR NvM service interface `NvMService` using a specified operation.

Parameters

Client port name

Name of the client port used by the AUTOSAR software component for the function call, set to `NvMService` by default.

Operation

Name of an operation defined by the AUTOSAR standard for the NvM service interface `NvMService`:

- `GetDataIndex` (default)
- `GetErrorStatus`
- `EraseNvBlock`
- `InvalidateNvBlock`
- `ReadBlock`
- `RestoreBlockDefaults`
- `SetDataIndex`

- `SetRamBlockStatus`
- `WriteBlock`

Argument specification (`ReadBlock`, `RestoreBlockDefaults`, and `WriteBlock` only)

MATLAB expression that specifies data type and dimensions for data to be read or written by the operation. The default expression is `uint8(1)`. For examples, see "Argument Specification for Simulink Function Blocks" (Simulink).

Sample time

Block sample time, set to -1 (inherited) by default.

See Also

NVRAM Service Component | NvMAdminCaller

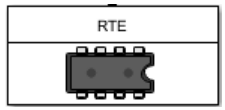
Topics

"Configure Calls to AUTOSAR NVRAM Manager Service"
"Configure AUTOSAR Basic Software Service Implementations for Simulation"
"Simulate AUTOSAR Basic Software Services and Run-Time Environment"

Introduced in R2016b

NVRAM Service Component

Configure AUTOSAR NVRAM Services and Runtime Environment (RTE) for emulation



Library

AUTOSAR Blockset / Classic Platform / Basic Software / NVRAM Manager (NvM)

Description

The NVRAM Service Component block provides reference implementations of NVRAM Manager (NvM) services supported by AUTOSAR Basic Software (BSW) caller blocks. When coupled with NvM caller blocks, the reference implementations allow you to configure and run system- or composition-level simulations of AUTOSAR NvM service calls.

The block has prepopulated parameters, including **NVRAM Properties** parameters and RTE parameters. Examine the parameter settings and consider if modifications are required, based on how you are using the NvM service operations.

Parameters

Maximum number of memory blocks

Specify the maximum number of memory blocks to use in NvM service operations.

Block ID

The RTE tab table lists component client ports and their mapping to NvM service block IDs. Each row in the table represents a call into NvM services from a Basic Software caller block. Calls that act on the same NvM block should use the same block ID. Check the block ID mappings.

See Also

NvMAdminCaller | NvMServiceCaller

Topics

“Configure Calls to AUTOSAR NVRAM Manager Service”
“Configure AUTOSAR Basic Software Service Implementations for Simulation”
“Simulate AUTOSAR Basic Software Services and Run-Time Environment”

Introduced in R2017b

Prelookup

Compute index and fraction for a Curve Using Prelookup or Map Using Prelookup block

Library: AUTOSAR Blockset / Classic Platform / Library Routines / Interpolation

Description

The Prelookup block computes the index and fraction that specify how its input value u relates to the breakpoint dataset. The Prelookup block feeds the resulting output index and fraction values as a bus into a Curve Using Prelookup block to interpolate a one-dimensional table or a Map Using Prelookup block to interpolate a two-dimensional table. When a Prelookup block is used with either a Curve Using Prelookup or Map Using Prelookup block, they perform the same algorithm operation as the Curve or Map blocks. The use of the two blocks together offers greater flexibility and more efficient simulation and code generation.

If you select the AUTOSAR 4.0 code replacement library (CRL) for your AUTOSAR model, code generated from this block is replaced with the AUTOSAR library routine that you configure in the block parameters dialog box.

Ports

Input

`Port_1` — Input signal, u

scalar | vector | matrix

The Prelookup block accepts real-valued signals of any numeric data type that Simulink supports, except Boolean. The Prelookup block supports fixed-point data types for signals and breakpoint data.

Data Types: `single` | `double` | `int8` | `int16` | `int32` | `uint8` | `uint16` | `uint32` | `fixed point` | `bus`

Output

`Port_2` — Bus containing output index and fraction
bus

Outputs the index and fraction as a bus, which specifies the interval containing the input and the normalized position of the input on the interval. The `bus` type is defined automatically based on if the **Targeted Routine Library** is set to fixed-point (IFX) or floating-point (IFL) code replacement.

Data Types: `bus`

Parameters

`Targeted Routine Library` — Indicates the AUTOSAR routine library used for block code replacement
IFX(fixed-point) (default) | IFL(floating-point)

If you select the AUTOSAR 4.0 code replacement library (CRL) for your model, code generated from this block is replaced from the selected AUTOSAR routine library. This parameter enables you to choose either fixed-point (IFX) or floating-point (IFL) code replacement and validation checks.

`Targeted Routine` — AUTOSAR library routine used for code replacement
Ifx_DPSearch (default)

This parameter reflects the name of the AUTOSAR code replacement library (CRL) routine used to replace the code generated by this block. The naming convention includes the targeted routine library, interpolation method, and block type. This parameter is reference-only and must not be edited.

Table Specification

`Breakpoints Specification` — Choose how to enter breakpoint data
`Explicit values` (default) | `Breakpoint object`

If you set this parameter to:

- `Explicit values`, the **Breakpoints** and parameter becomes visible in the dialog box.

- `Breakpoint object`, the **Name** parameter is visible in the dialog box.

Programmatic Use
Block Parameter: `BreakpointsSpecification`
Type: character vector
Values: `'Explicit values' | 'Breakpoint object'`
Default: `'Explicit values'`

`Breakpoints` — Breakpoint data values

`[1 2 3]` (default)

Explicitly specify the breakpoint data. Each breakpoint data set must be a strictly monotonically increasing vector that contains two or more elements.

Dependencies

To enable this parameter, set **Breakpoints Specification** to `Explicit values`.

Programmatic Use
Block Parameter: `BreakpointsData`
Type: character vector
Values: `'[1 2 3]'`
Default: `'[1 2 3]'`

`Name` — Name of a `Simulink.Breakpoint` object

`no default` | `Simulink.Breakpoint`

Specify the name of a `Simulink.Breakpoint` object. If a `Simulink.Breakpoint` object does not exist, click the action button  and select **Create**. The corresponding parameters of the new breakpoint object are populated with the block information.

Dependencies

To enable this parameter, set **Breakpoints Specification** to `Breakpoint object`.

Programmatic Use
Block Parameter: `BreakpointObject`
Type: character vector
Values: `Simulink.Breakpoint` object
Default: `''`

Algorithms

`Index search method` — Method for searching breakpoint data
`Linear search` (default) | `Binary search`

Each search method has speed advantages in different situations:

- If input values for `u` do not vary significantly between time steps, selecting `Linear search` with **Begin index search using previous index result** produces the best performance.
- If input values for `u` jump more than one or two table intervals per time step, selecting `Binary search` produces the best performance.

A suboptimal choice of index search method can lead to slow performance of models that rely heavily on lookup tables.

`Begin index search using previous index result` — Start search using the index found at the previous time step
`off` (default) | `on`

For input values of `u` that change slowly with respect to the interval size, enabling this option can improve performance. Otherwise, the linear search and binary search methods can take longer, especially for large breakpoint sets.

Programmatic Use
Block Parameter: `IndexSearchMethod`
Values: `'Binary search' | 'Linear search'`
Type: character vector
Default: `'Binary search'`

`Integer rounding mode` — Rounding mode for fixed-point operations
`Round` (default) | `Zero`

Specify the rounding mode for fixed-point or floating-point lookup table calculations that occur during simulation or execution of code generated from the model.

This option does not affect rounding of block parameter values. Simulink rounds such values to the nearest representable integer value. To control the rounding of a block parameter, enter an expression using a MATLAB rounding function into the edit field on the block dialog box.

Programmatic Use
Block Parameter: `RndMeth`
Type: character vector
Values: `'Round' | 'Zero'`
Default: `'Round'`

Extended Capabilities

C/C++ Code Generation

Generate C and C++ code using Simulink® Coder™.

See Also

Curve | Curve Using Prelookup | Map | Map Using Prelookup

Topics

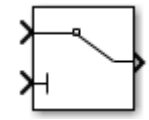
“Configure Lookup Tables for AUTOSAR Measurement and Calibration”
“Code Generation with AUTOSAR Code Replacement Library”

Introduced in R2019a

Signal Invalidation

Control AUTOSAR root outport data element invalidation

Library: AUTOSAR Blockset / Classic Platform / Signal Routing



Description

Relay the first input, a data value, to the output, based on the value of the second input, an invalidation control flag.

If the input data value is valid (invalidation control flag is `false`), the software relays the input data value to the output.

If the input data value is invalid (invalidation control flag is `true`), the resulting action is determined by the value of the block parameter **Signal invalidation policy**:

- `Keep` - Replace the input data value with the last valid signal value.
- `Replace` - Replace the input data value with the value of the block parameter **Initial value**.
- `DontInvalidate` - Do not replace the input data value.

This block must be connected directly to a root outport block. It cannot be used within a reusable subsystem.

Ports

Input

`Port_1` — Input data value
numeric value

Input data value to be relayed if valid.

Example: 4

Data Types: `single` | `double` | `base integer` | `Boolean` | `fixed point` | `enumerated` | `bus`

`Port_2` — Invalidation control flag

`true` | `false`

The invalidation control flag determines whether the input data value is valid and can be relayed (`false`), or is invalid and must be handled based on an invalidation policy (`true`).

Example: `false`

Data Types: `Boolean`

Output

`Port_1` — Output data value

numeric value

Output data value produced by the combination of the input data value and the invalidation control flag.

Data Types: `single` | `double` | `base integer` | `Boolean` | `fixed point` | `enumerated` | `bus`

Parameters

`Signal invalidation policy` — Invalidation policy

`Keep` (default) | `Replace` | `DontInvalidate`

Specify an AUTOSAR data element invalidation policy, which determines how an invalid data element is handled.

`Initial value` — Data element initial value

0 (default) | numeric value

Specify a data element initial value. If the input data value is flagged as invalid, and if the **Signal invalidation policy** is `Replace`, the software replaces the input data value with the specified initial value.

Extended Capabilities

C/C++ Code Generation

Generate C and C++ code using Simulink® Coder™.

See Also

Topics

“Configure AUTOSAR Sender-Receiver Data Invalidation”

Introduced in R2015b

Tools — Alphabetical List

Code Mappings Editor

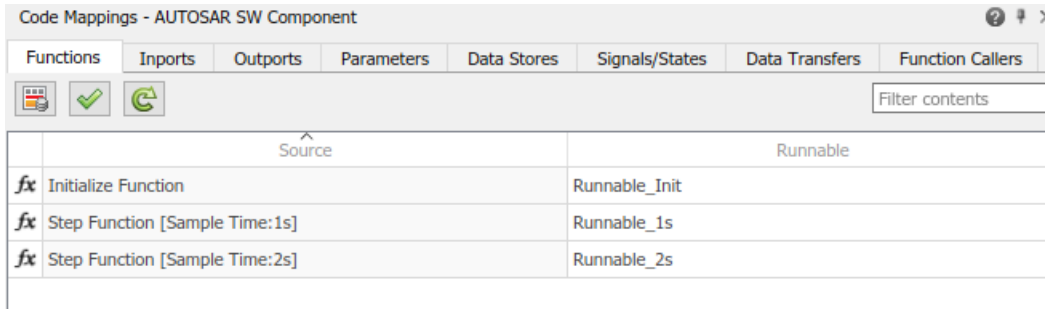
Map AUTOSAR elements for code generation

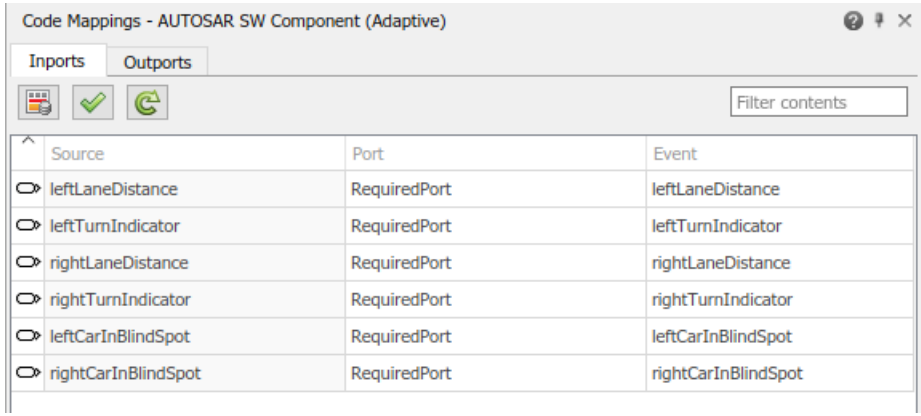
Description

The Code Mappings editor is a graphical interface for mapping AUTOSAR elements for code generation. Map Simulink model elements such as inports, outports, and entry-point functions to AUTOSAR component elements such as receiver ports, sender ports, and runnables.

Using a tabbed table format, the Code Mappings editor displays model inports, outports, and other model elements relevant to your AUTOSAR platform. Use this view to map model elements to AUTOSAR component elements from a Simulink model perspective. The mappings that you configure are reflected in generated AUTOSAR-compliant C or C++ code and exported `arxml` descriptions.

For more information, see “Map AUTOSAR Elements for Code Generation” or “Map AUTOSAR Adaptive Elements for Code Generation”.





The Code Mappings editor provides in-canvas access to AUTOSAR mapping information, with batch editing, element filtering, easy navigation to model elements and AUTOSAR properties, and model element traceability. As you progressively configure the model representation of the AUTOSAR component, you can apply these Code Mappings editor controls:

- **Filter contents** field – Selectively display some elements, while omitting others, in the current view.
- **AUTOSAR Dictionary** button – Switch from the Code Mappings editor view of a Simulink element to the AUTOSAR Dictionary view of the corresponding AUTOSAR element.
- **Validate** button – Validate the AUTOSAR component configuration.
- **Update** button – Update the Simulink to AUTOSAR mapping of the model to reflect model changes, such as adding, changing, or removing Simulink data transfers, entry-point functions, and function callers.

Open the Code Mappings Editor

- If your model already has a mapped AUTOSAR software component, in the model window, do one of the following:
  - From the **Apps** tab, open the AUTOSAR Component Designer app.

- Click the perspective control in the lower-right corner and select **Code**.

The model opens in the AUTOSAR code perspective, which includes the Code Mappings editor.

- If your model does not have a mapped AUTOSAR component, in the model window, do one of the following:
  - Use the AUTOSAR Component Quick Start.
    1. On the **Modeling** tab, select **Model Settings**. In the Configuration Parameters dialog box, **Code Generation** pane, set the system target file to either `autosar.tlc` or `autosar_adaptive.tlc`. Click **OK**.
    2. On the **Apps** tab, click **AUTOSAR Component Designer**. The AUTOSAR Component Quick Start opens.
    3. Work through the component quick-start procedure and click **Finish**.
  - For an Embedded Coder model, you can use the Embedded Coder Quick Start.
    1. With the Embedded Coder app open, on the **C Code** tab, select **Quick Start**. The Embedded Coder Quick Start opens.
    2. As you work through the quick-start procedure, in the Output window, select output option **C code compliant with AUTOSAR** or **C++ code compliant with AUTOSAR Adaptive Platform**.
    3. Click **Finish**.

  The model opens in the AUTOSAR code perspective, which includes the Code Mappings editor.

Examples

Map Model Elements to AUTOSAR Component Elements

If you are modeling for the AUTOSAR Classic Platform, navigate Code Mappings editor tabs to perform these actions:

- “Map Entry-Point Functions to AUTOSAR Runnables”
- “Map Inports and Outports to AUTOSAR Sender-Receiver Ports”

- “Map Model Workspace Parameters to AUTOSAR Component Internal Parameters”
- “Map Data Stores to AUTOSAR Variables”
- “Map Block Signals and States to AUTOSAR Variables”
- “Map Data Transfers to AUTOSAR Inter-Runnable Variables”
- “Map Function Callers to AUTOSAR Client-Server Ports and Operations”
- “Map Submodel Parameters to AUTOSAR Component Internal Parameters”
- “Map Submodel Data Stores to AUTOSAR Variables”
- “Map Submodel Signals and States to AUTOSAR Variables”

If you are modeling for the AUTOSAR Adaptive Platform, navigate Code Mappings editor tabs to:
“Map Inports and Outports to AUTOSAR Required and Provided Service Ports”

See Also

Topics

“Map AUTOSAR Elements for Code Generation”
“Map Calibration Data for Submodels Referenced from AUTOSAR Component Models”
“Configure AUTOSAR Elements and Properties”
“Map AUTOSAR Adaptive Elements for Code Generation”
“Configure AUTOSAR Adaptive Elements and Properties”
“Configure and Map AUTOSAR Component Programmatically”
“AUTOSAR Component Configuration”

Introduced in R2018a

Model Advisor Checks

MathWorks AUTOSAR Blockset Checks

In this section...

MathWorks Automotive Advisory Board Checks

MathWorks® AUTOSAR Blockset and its checks facilitate designing and troubleshooting models from which code is generated for automotive applications.

To check that your model or subsystem complies with AUTOSAR Blockset standards, open the Model Advisor and run the checks in **By Product > AUTOSAR Blockset**.

The Model Advisor performs a checkout of the Simulink Check™ license when you run the AUTOSAR Blockset checks.

Check model configuration parameters for AUTOSAR compliance

Check ID: `mathworks.autosar.autosar_configset`

Description

Check configuration settings in the model configuration that apply to AUTOSAR compatibility.

Available with AUTOSAR Blockset.

Results and Recommended Actions

Condition	Recommended Action
One or more of the model configuration parameters are not compatible with AUTOSAR.	Set the listed configuration parameters to the recommended values. alternatively, you can automatically fix the parameters to the recommended actions by using Auto-Fix option.

Following are the model parameters the check will look into provided that the the **AUTOSAR Compliance** is set to **on** by using a proper license (TLC file).

Parameter	Recommended Values	Auto Fix	Condition Dependencies
AutoInsertRateTranBlk	off	off	STC = STIndependent && SolverMode = SingleTasking
AutosarCompliant	On	On	
AutosarMaxShortNameLength	range(32,128)	128	~isAdaptiveAutosar
CombineOutputUpdateFcns	on	on	
ERTFilePackagingFormat	Modular	Modular	CodeInterfacePackaging = reusable function
InlineParams	On	On	CodeInterfacePackaging = reusable function
RateTransitionBlockCode	inline	inline	
SFInvalidInputDataAccessInChartInitDiag	warning error	warning	

Parameter	Recommended Values	Auto Fix	Condition Dependencies
SimulationMode	normal external SIL PIL	normal	
SupportComplex	off	off	~isAdaptiveAutosar
SupportContinuousTime	off	off	
SupportNonFinite	off	off	
SupportNonInlinedSFcns	off	off	

Capabilities and Limitations

- Runs on library models.
- Allows exclusions of blocks and charts.

Check compatibility of AUTOSAR Interpolation Routines

Check ID: `mathworks.autosar.lut_replacement_check`

Description

Identifies the Simulink Lookup Table blocks that are incompatible with AUTOSAR Interpolation Routines.

Available with AUTOSAR Blockset.

Results and Recommended Actions

Condition	Recommended Action
The Model Parameter Code Replacement Library is set to **None**.	The Model Parameter Code Replacement Library should not be set to **None**.

BlockType	Condition	Recommended Action
Prelookup	Parameter**ExtrapMethod** is set to **Clip**.	Consider using AUTOSAR Prelookup block for better compatibility.
n-D Lookup Table	Parameter **Dimensions**is set to **1** and the parameter**ExtrapMethod** is set to **Clip**	Consider using AUTOSAR Curve block for better compatibility.
	Parameter **Dimensions**is set to **2** and the parameter**ExtrapMethod** is set to **Clip**	Consider using AUTOSAR Map block for better compatibility.
Interpolation Using Prelookup	Parameter **Dimensions**is set to **1** and the parameter**ExtrapMethod** is set to **Clip**	Consider using AUTOSAR Curve Using Prelookup block
	Parameter **Dimensions**is set to **2** and the parameter**ExtrapMethod** is set to **Clip**	Consider using AUTOSAR Map Using Prelookup block

Capabilities and Limitations

- Runs on library models.
- Analyzes content of library-linked blocks. By default, the input parameter **Follow links** is set to `on`.
- Analyzes content in masked subsystems. By default, the input parameter **Look under masks** is set to `graphical`.
- Allows exclusions of blocks and charts.