DDS Blockset

Reference

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Revision History

March 2021	Online only	New for Version 1.0 (Release 2021a)

Contents

Blocks

Take DDS Sample

Receive Data Samples from DDS network
Library: DDS Blockset

Description

The DDS Blockset provides Take DDS Sample and Write DDS Sample blocks to help model DDS applications. The Take DDS Sample block receives samples from the DDS network and converts them to signals that can be used in the Simulink® environment. The Write DDS Sample block takes signals from the Simulink environment and converts them to samples to send data into the DDS network. These blocks are preconfigured to be compatible with the DDS network and provide type checking functionality.

Ports

Input

Port_1 — Input DDS sample
scalar | vector | matrix

Receives samples from the DDS network. Samples are converted to signals that can be used within the Simulink environment. The conversion preserves the value and data type of the original DDS sample.

Data Types: bus

Output

Port_S — Show whether a DDS sample was received
scalar

Shows whether a sample was received successfully from the DDS network. If a sample was received successfully the block outputs 1, otherwise it outputs 0.

Dependencies

To enable this port, select the check box labeled **Show receive status**.

Data Types: double

Port_1 — Output signal
scalar | vector | matrix

Converted signal that can be used in the Simulink environment.

Data Types: bus

Parameters

Show receive status — Show whether a DDS sample was received
off (default) | on

Select this check box to show whether a sample was received from the DDS network. If a sample was received successfully the block outputs 1, otherwise it outputs 0.

Programmatic Use
Block Parameter: ShowQueueStatus
Type: character vector
Values: 'on' | 'off'
Default: 'off'

Extended Capabilities

C/C++ Code Generation
Generate C and C++ code using Simulink® Coder™.

See Also
Write DDS Sample

Introduced in R2021a

Write DDS Sample

Send Data Samples to DDS network
Library: DDS Blockset

Description

The DDS Blockset Library provides Take DDS Sample and Write DDS Sample blocks to help model DDS applications. The Take DDS Sample block receives samples from the DDS network and converts them to signals that can be used in the Simulink environment. The Write DDS Sample block converts signals from the Simulink environment to samples to send data into the DDS network. These blocks are preconfigured to be compatible with the DDS network and provide type checking functionality.

Ports

Input

Port_Enable — External enable signal
scalar

Enables the block to send a sample into the DDS network. For input values greater than 0 send is enabled. For input values less than or equal to 0 send is disabled.

Dependencies

To display this port, select the check box labeled **Show enable port**.

Data Types: double

Port_1 — Input signal
scalar | vector | matrix

Signal in Simulink environment. Signals are converted to samples that applications use to send data into the DDS network. The conversion preserves the value and data type of the original signal.

Data Types: bus

Output

Port_1 — Output DDS sample
scalar | vector | matrix

Sends samples into the DDS network.

Data Types: bus

Parameters

Show enable port — Display the enable port
off (default) | on

Select this check box to display enable port.

Programmatic Use
Block Parameter: ShowEnablePort
Type: character vector
Values: 'on' | 'off'
Default: 'off'

Extended Capabilities

C/C++ Code Generation
Generate C and C++ code using Simulink® Coder™.

See Also

Take DDS Sample

Introduced in R2021a

Tools

DDS Dictionary

Manage DDS aspects of an application

Description

To manage the DDS aspects of your applications in the Simulink environment, you can use a section of the Simulink data dictionary that contains DDS properties called the DDS Dictionary. The DDS Dictionary is an intuitive graphical interface that enables you to quickly create and edit the DDS Domains, Topics, Data Samples, and Quality of Service (QoS).
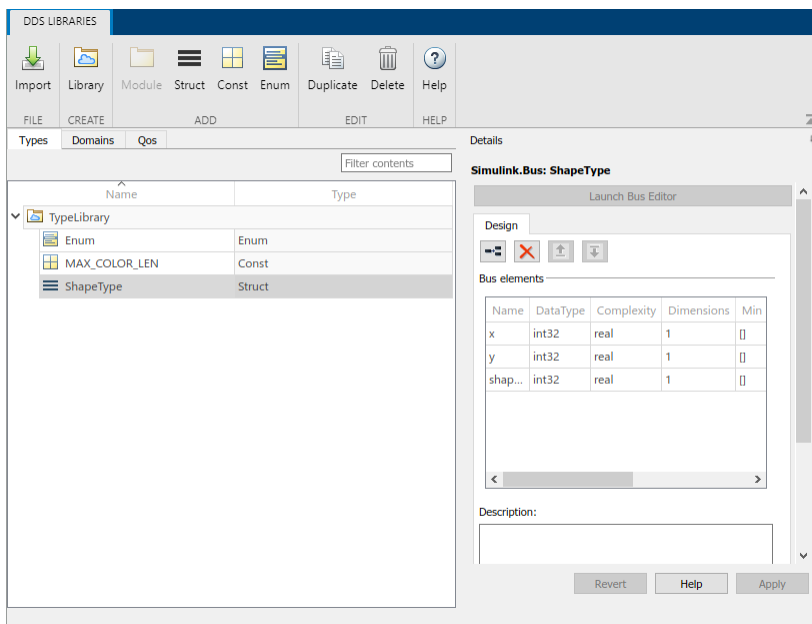
The DDS Dictionary is composed of three management tabs.

Types

The **Types** tab manages the DDS data types that are used to publish and subscribe Data Samples to the DDS network. The tab can also be used to view and edit the Simulink equivalent data types that are used to compute the application logic in the Simulink environment.
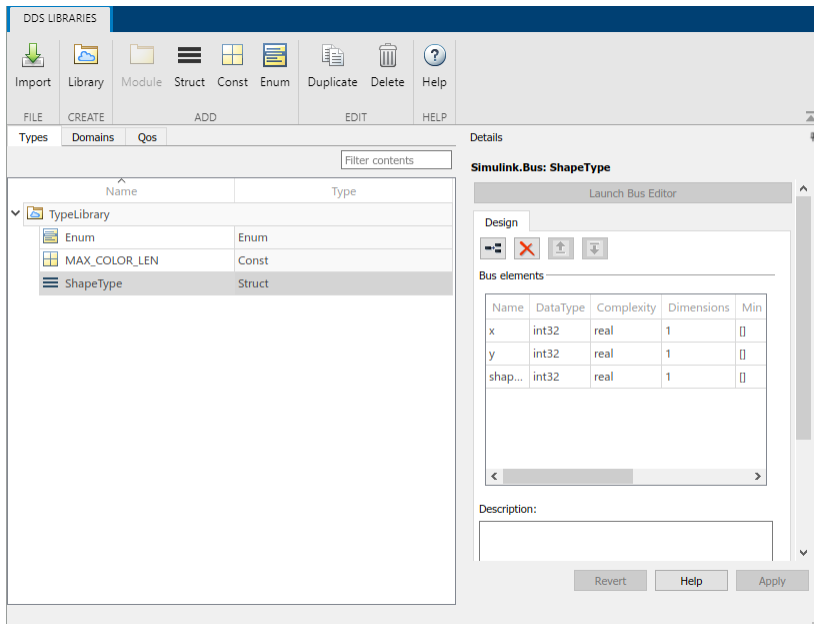
Domains

The **Domains** tab manages the Domains, Topics, and Registered Types so that applications can be configured to publish and subscribe to Topics.
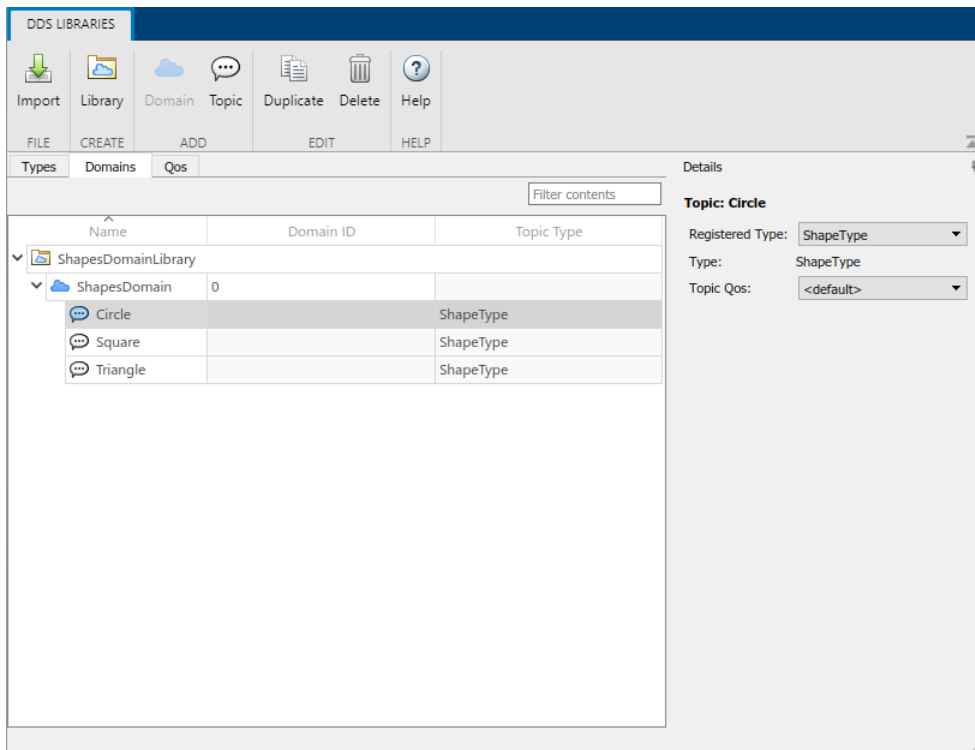
QoS

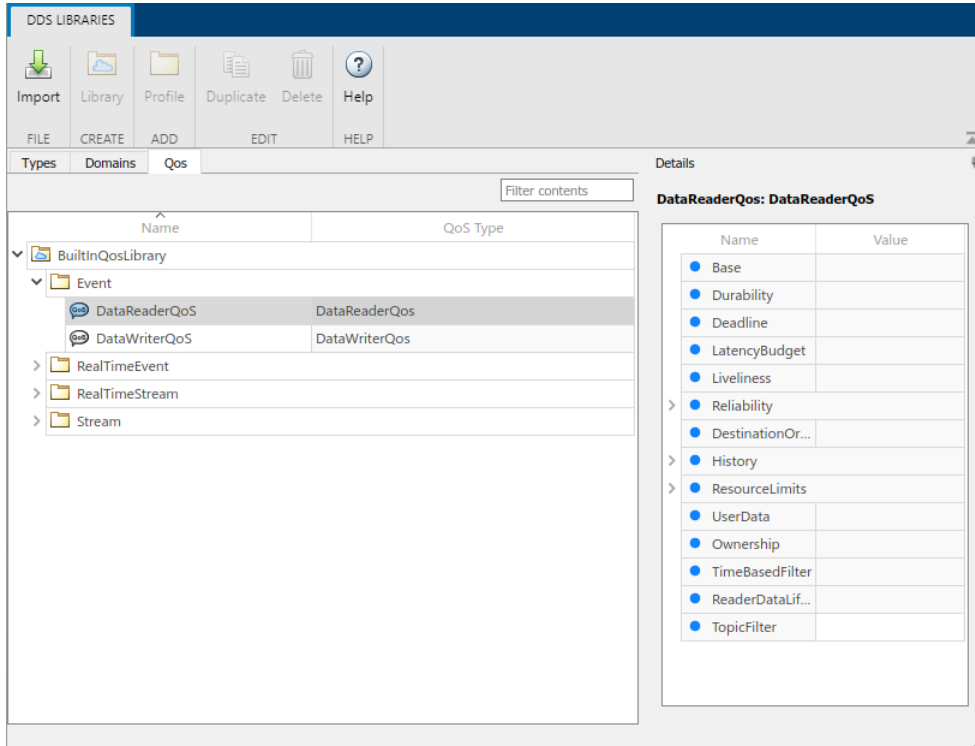The **QoS** tab manages the Quality of Service (QoS) available for a DDS application. This tab is primarily read-only, but you can import additional QoS profiles and edit the properties of certain QoS policies.

Open the DDS Dictionary

*   On the DDS Blockset app toolstrip, click **Code Interface** and select **DDS Dictionary**.
*   In a Simulink data dictionary, if DDS definitions are available, a **DDS Libraries** node appears in the dictionary. If you open the **DDS Libraries** section of the Simulink data dictionary, in the **Details** pane, you can click **Open DDS Libraries** to open the graphical interface for the DDS Dictionary.

Examples

Import XML Files

This example shows how to import additional XML files to include more DDS definitions in your DDS Dictionary.

1   Open the DDS Dictionary.
2   Click **Import**.
3   Select additional XML files and click **Open**.

Configure Types

This example shows how to create and configure new DDS data types and their equivalent Simulink data types.

1 Open the DDS Dictionary.
2 Create a new DDS data type library. On the DDS Dictionary toolstrip, click **Library**.
3 Create DDS data types. Select the new library and create the following new DDS data types:

- Create a DDS Struct data type. On the DDS Dictionary toolstrip, click **Struct**. Select the new DDS type and in the **Details** pane, view its Simulink equivalent data type, a `Simulink.Bus` object.

- Create a DDS Const data type. On the DDS Dictionary toolstrip, click **Const**. Select the new DDS type and in the **Details** pane, view its Simulink equivalent data type, a numeric MATLAB® variable.

- Create a DDS Enum data type. On the DDS Dictionary toolstrip, click **Enum**. Select the new DDS type and in the **Details** pane, view its Simulink equivalent data type, a Simulink Enumerated data type.

Configure Domains and Topics

This example shows how to create and configure a new Domain and Topic.

1 Open the DDS Dictionary. Click the **Domain** tab.
2 Create a new Domain. On the DDS Dictionary toolstrip, click **Domain**.

- Edit the Domain name. For the new Domain, in the **Name** column, edit the name directly in the spreadsheet.

- Edit the Domain ID. For the new Domain, in the **Domain ID** column, edit the Domain ID directly in the spreadsheet.

3 Create a Registered Type. To create a new Topic you must first create a Registered Type for your new Domain. Select the new Domain, in the **Details** pane, click the link icon to create a Registered Type.
4 Create a new Topic. On the DDS Dictionary toolstrip, click **Topic**.

- Set the Registered Type for a Topic. Select the new Topic. In the **Details** pane, from the **Registered Type** drop-down, select a Registered Type from the listed options.

- Set the Quality of Service (QoS) for a Topic. Select the new Topic. In the **Details** pane, from the **Topic QoS** drop-down, select a QoS profile from listed options.

Configure Quality of Service (QoS)

This example shows how to import and view the Quality of Service (QoS) for your DDS application.

1 Open the DDS Dictionary.
2 Import QoS from XML.
3 In the DDS Dictionary, click the **QoS** tab and view QoS profiles and policies. In the **Details** pane, set QoS policy values as needed.

Parameters

Types

Name — Names of DDS data type libraries and data types
character vector

The names of DDS data type libraries or DDS data types available in the DDS Dictionary.

Example: TypeLibrary, ShapeType

Type — DDS data type
character vector

The DDS data type in the DDS Dictionary. Supported DDS data types are Const, Enum, and Struct.

To view the equivalent Simulink data type for a DDS data type, select a DDS data type to open the **Details** pane and review the corresponding Simulink data type information.

DDS Data Type	Simulink Data Type
Const	numeric MATLAB variable
Enum	Enumeration
Struct	`Simulink.Bus` object

Example: Const, Enum, Struct

Domains

Name — Names of Domain libraries, modules, Domains, and Topics
character vector

The names of Domain Libraries, Domain Modules, Domains, and Topics available in the DDS Dictionary.

Example: ShapesDomainLibrary, ShapesLibrary, Circle

`Domain ID` — ID of a Domain
character vector

Domain ID you can set to specify a Domain.

Example: 1

`Topic Type` — DDS data type specified for a Topic
character vector

The DDS data type that a Topic uses for its Data Samples.

Example: ShapeType

QoS

Name — Names of QoS libraries and profiles
character vector

The names of Quality of Service (QoS) libraries and profiles.

Example: BuiltInQosLibrary, Event, DataReaderQoS

QoS Type — Specifies the type of QoS profile
character vector

The QoS Type is a read-only field that shows if a QoS profile is specified for DataReaders or DataWriters.

Example: DataReaderQoS

See Also
Code Mappings Editor

Introduced in R2021a
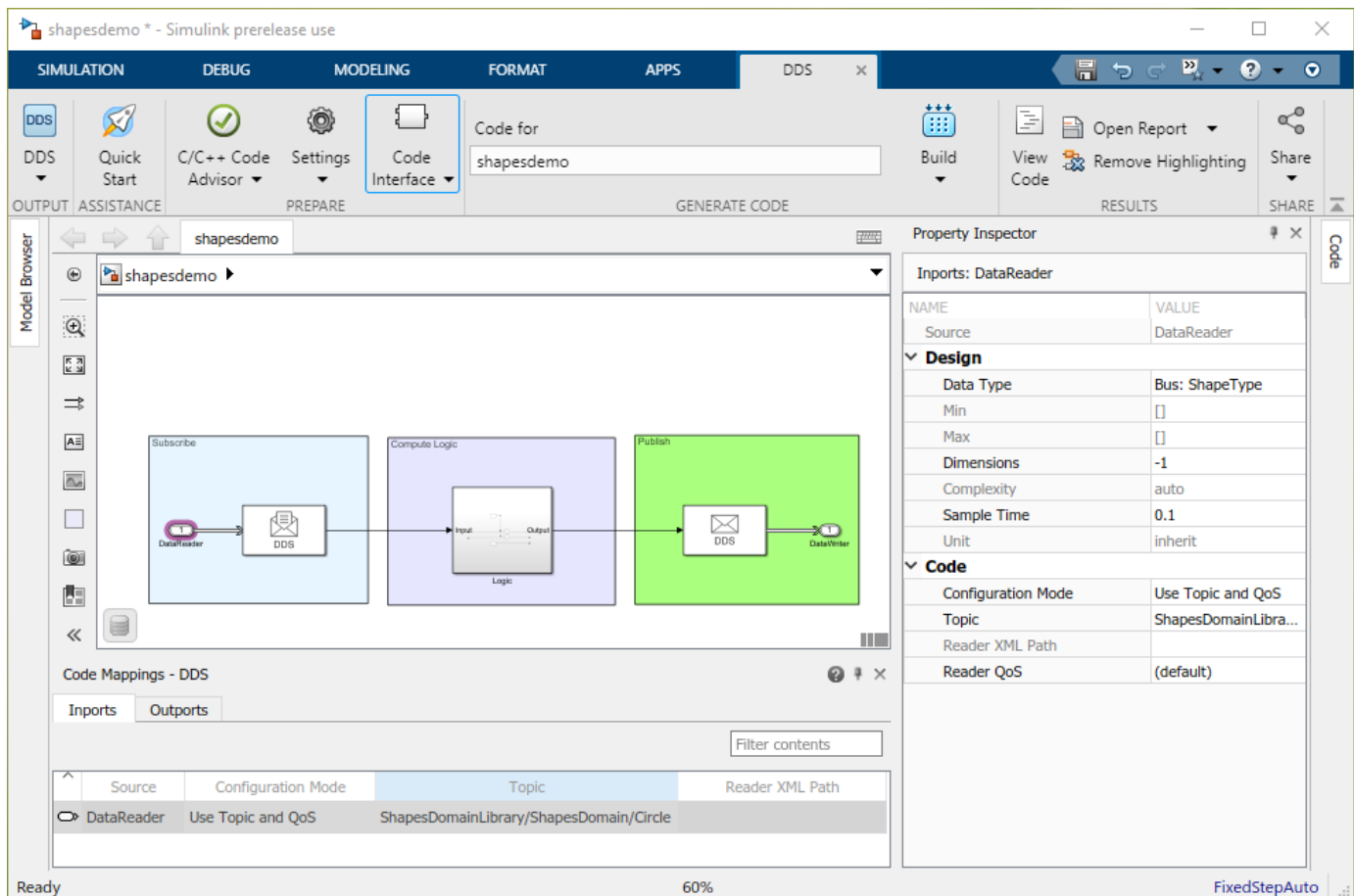
Code Mappings Editor

Configure DDS application inports and outports as DataReaders and DataWriters

Description

The Code Mappings editor is a graphical interface where you can configure inports and outports as DataReaders and DataWriters in a DDS application.

To configure the inports and outports, use the Code Mappings editor panes:

- **Inports**
- **Outports**

Open the Code Mappings Editor

- Open a model in the DDS Blockset app. On the toolstrip, click **Code Interface** and select **Individual Element Code Mappings**.
- Open a model in the DDS Blockset app. The Code Mappings editor appears as a minimized tab directly below the model canvas. Click the tab to expand the editor.

Examples

Configure DataReaders and DataWriters by using Topic and QoS

This example uses the Shapes Demo example model to show how to configure the DataReaders and DataWriters for a DDS application by using Topic and QoS.

Create a DDS application

1   Open the Shapes Demo example model, `shapesdemo`.
2   Create DDS definitions. In the DDS Application Quick Start, select **Create and use default dictionary**.

Configure the DDS Interface

1   Open the Code Mappings editor. On the toolstrip, click **Code Interface** and select **Individual Element Code Mappings**.

2   Configure the inports. The inports represent DataReaders in a DDS application.

- Select the configuration mode. On the **Inports** tab, for the **Configuration Mode**, select Use Topic and QoS.
- Select the Topic. For the **Topic**, select the Circle Topic specified in the drop-down options by its path (`ShapesDomainLibrary/ShapesDomain/Circle`). The set of drop-down options shows the Topics that are specified with the same DDS data type as the inport.

- Select the Quality of Service (QoS). To specify QoS, in the Property Inspector, expand the **Code** section, and select your QoS profile from the **Reader QoS** drop-down options. For this example, leave the QoS set to the default.

3 Configure the outports. The outports represent DataWriters in a DDS application.

- Select the configuration mode. On the **Outports** tab, for the **Configuration Mode**, select `Use Topic and QoS`.

- Select the Topic. For the **Topic**, select the Circle Topic specified in the drop-down options by its path (`ShapesDomainLibrary/ShapesDomain/Circle`). The set of drop-down options shows the Topics that are specified with the same DDS data type as the outport.

- Select the Quality of Service (QoS). To specify QoS, in the Property Inspector, expand the **Code** section, and select your QoS profile from the **Reader QoS** drop-down options. For this example, leave the QoS set to the default.

4 To generate the DataReaders and DataWriters, press **Ctrl+D**. You can now view the DataReaders and DataWriters in the editor.

Deploy the DDS application

1 Set up the build environment for your target vendor.
2 On the toolstrip, click **Build**.
3 Deploy the application executable on DDS.

**Configure DataReaders and DataWriters by using XML Path**

This example uses the Shapes Demo example model to show how to configure the DataReaders and DataWriters for a DDS application by using definitions previously specified in imported XML.

Create a DDS application

1 Open the Shapes Demo example model, `shapesdemo`.
2 Create DDS definitions. In the DDS Application Quick Start, select **Import from XML** and select the `shapesexample_qos` XML file. When you close the Quick Start, the DDS DataReader and DataWriter definitions from the `shapesexample_qos` XML file become available in the DDS Dictionary for the example application.

Configure the DDS Interface

1 Open the Code Mappings editor. On the toolstrip, click **Code Interface** and select **Individual Element Code Mappings**.
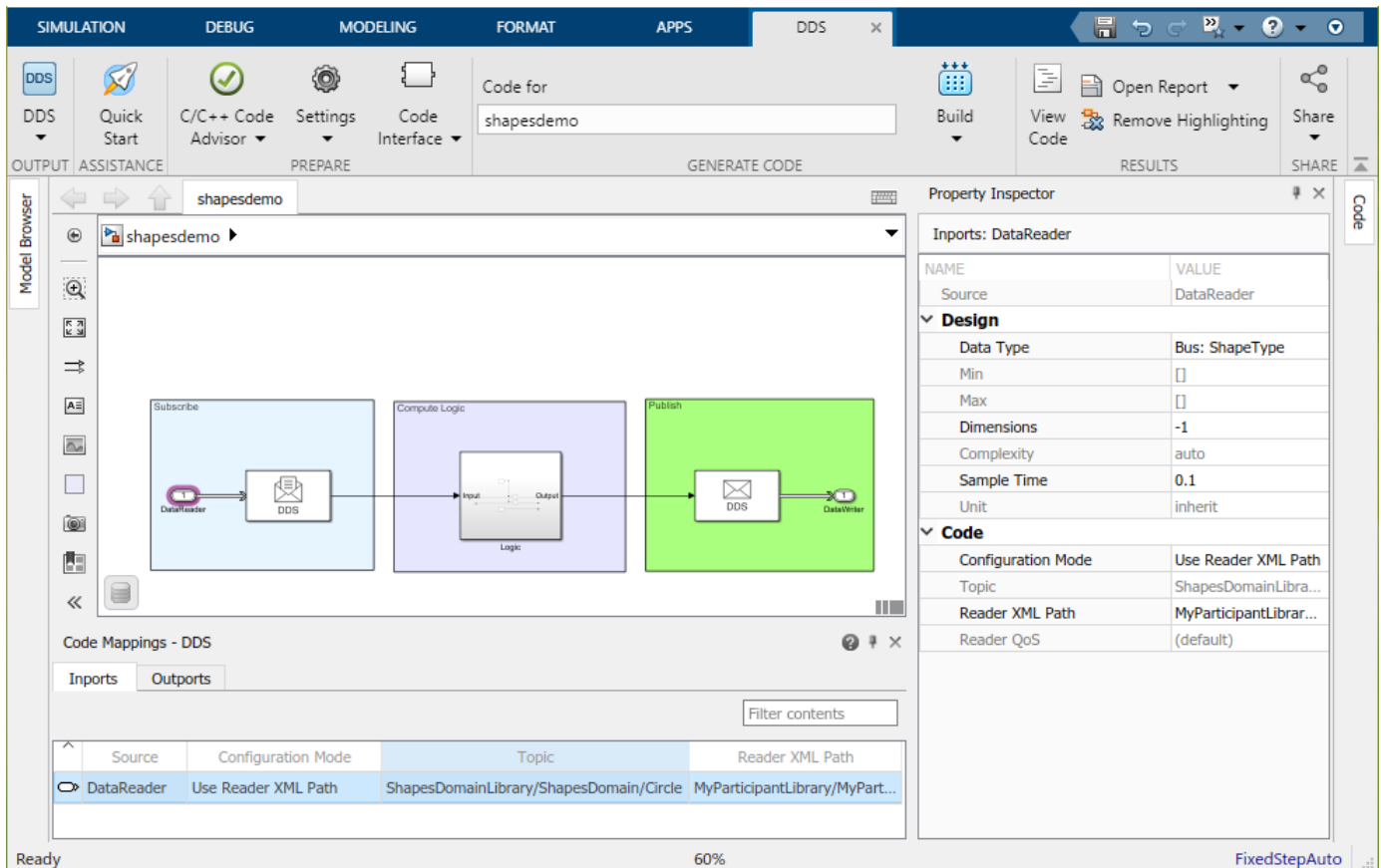
2　Configure the inports. The inports represent DataReaders in a DDS application.

- Select the configuration mode. On the **Inports** tab, for the **Configuration Mode**, select `Use Reader XML Path`.

- Select the DataReader. For the **Reader XML Path**, click and select from the drop-down options the `MySquareRdr` DataReader specified by its path (`myParticipant/MySubscriber/MySquareRdr`). The set of drop-down options shows the readers that are specified with the same DDS data type as the inport. The **Topic** and **QoS** properties load based on your reader definition from the XML file.

3　Configure the outports. The outports represent DataWriters in a DDS application.

- Select the configuration mode. On the **Outports** tab, for the **Configuration Mode**, select `Use Writer XML Path`.

- Select the DataWriter. For the **Writer XML Path**, click and select from the drop-down options the `MySquareWtr` DataWriter specified by its path (`myParticipant/MySubscriber/MySquareWtr`). The set of drop-down options shows the writers that are specified with the same DDS data type as the outport. The **Topic** and **QoS** properties load based on your writer definition from the XML file.

Deploy the DDS application

1　Set up the build environment for your target vendor.
2　On the toolstrip, click **Build**.
3　Deploy the application executable on DDS.

Parameters

Inports

`Source` — Root-level Inport block or bus element
character vector

Identifies a root-level Inport block or an element of an In Bus Element block in the model. Inports map to DataReaders in DDS applications.

`Configuration Mode` — Determines how DataReaders are specified in a DDS application
character vector

DataReaders contain Topic and QoS properties. To specify a DataReader with these properties for a DDS application, you can configure the reader by using the configuration mode `Use Reader XML Path` or `Use Topic and QoS`.

If you have previously defined DataReaders in XML, you can use the `Use Reader XML Path` configuration mode. For each inport, in the **Reader XML Path** column, you can select a previously defined DataReader from the drop-down options.

If you do not have previously defined DataReaders, you can use the `Use Topic and QoS` configuration mode. For each inport, use the **Topic** drop-down options to select a Topic, and then use the Property Inspector to specify the QoS policies.

`Topic` — Specifies the Topic that a DDS application subscribes to
character vector

Select or generate a Topic for each DataReader.

`Reader XML Path` — Specifies the DataReader
character vector

Select or generate a DataReader for each inport.

Outports

`Source` — Name of root Outport block or bus element
character vector

Identifies a root-level DDS Outport block or an element of an Out Bus Element block in the model. Outports map to DataWriters in DDS applications.

`Configuration Mode` — Determines how DataWriters are specified in a DDS application
character vector

DDS DataWriters contain Topic and QoS properties. To specify a DataWriter with these properties for a DDS application, you can configure the writer by using the configuration mode `Use Writer XML Path` or `Use Topic and QoS`.

If you have previously defined DataWriters in XML, you can use the `Use Writer XML Path` configuration mode. For each outport, in the **Writer XML Path** column, you can select a previously defined DataWriter from the drop-down options.

If you do not have previously defined DataWriters, you can use the `Use Topic and QoS` configuration mode. For each outport, use the **Topic** drop-down options to select a Topic, and then use the Property Inspector to specify the QoS policies.

`Topic` — Specifies the Topic that a DDS application publishes
character vector

Select or generate a Topic for each DataWriter.

`Writer XML Path` — Specifies the DataWriter
character vector

Select or generate a DataWriter for each outport.

See Also
DDS Dictionary

Introduced in R2021a