RTI Monitor

Getting Started Guide

Version 6.1.2

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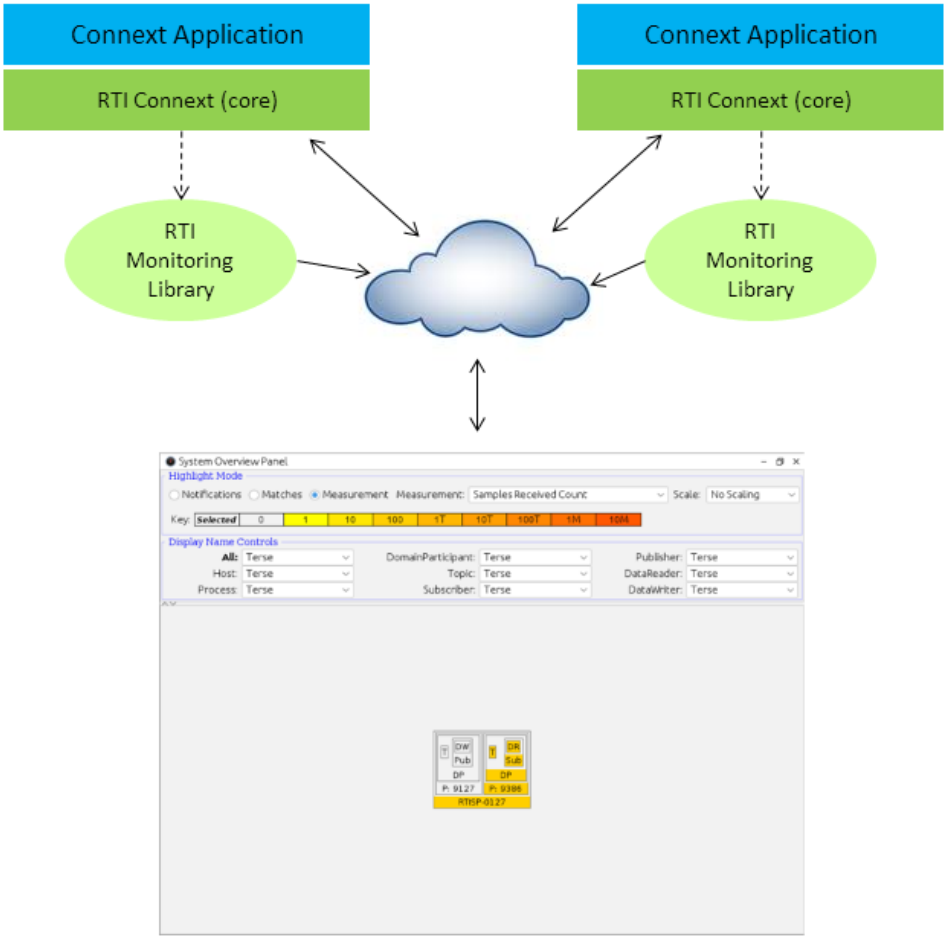
Chapter 1 Welcome

RTI® Monitor is a graphical tool that displays monitoring data from *RTI Connext® DDS* applications.



RTI Monitor

Monitor will help you:

- **Understand your system** with an easy-to-use graphical view into your entire *Connext DDS* application.
- **Verify your design** by making sure the entities in your *Connext DDS* applications are communicating as expected.
- **Tune performance** by providing deep statistics on every aspect of the middleware's operation.
- **Optimize integration** with detailed information on every entity in your system.
- **Monitor real-time operation** with a dashboard of tools to see traffic patterns, errors, lost samples, and more.

You can run *Monitor* on the same host as the *Connext DDS* application or on a different host.

To enable a *Connext DDS* application to provide monitoring data to *Monitor*, the application needs to use the *RTI Monitoring Library* plugin included with *Connext DDS*.

Monitoring is enabled in the application by setting values in the DomainParticipant's PropertyQosPolicy (programmatically or through an XML QoS profile). See the Monitoring Library section of the RTI Connext DDS Core Libraries User's Manual.

Connext DDS notifies *Monitoring Library* every time an entity is created/deleted or a QoS is changed. *Monitoring Library* also periodically queries the status of all entities. *Monitoring Library* sends all the data to *Monitor* once it gets the data from the *Connext DDS* application.

1.1 Paths Mentioned in Documentation

The documentation refers to:

- **<NDDSHOME>**

  This refers to the installation directory for *RTI® Connext® DDS*. The default installation paths are:
  - macOS® systems:
    /Applications/rti_connext_dds-6.1.2
  - Linux systems, non-*root* user:
    /home/<*your user name*>/rti_connext_dds-6.1.2
  - Linux systems, *root* user:
    /opt/rti_connext_dds-6.1.2
  - Windows® systems, user without Administrator privileges:
    <*your home directory*>\rti_connext_dds-6.1.2
  - Windows systems, user with Administrator privileges:
    C:\Program Files\rti_connext_dds-6.1.2

You may also see **$NDDSHOME** or **%NDDSHOME%**, which refers to an environment variable set to the installation path.

Wherever you see **<NDDSHOME>** used in a path, replace it with your installation path.

Note for Windows Users: When using a command prompt to enter a command that includes the path **C:\Program Files** (or any directory name that has a space), enclose the path in quotation marks. For example:

```
"C:\Program Files\rti_connext_dds-6.1.2\bin\rtiddsgen"
```

Or if you have defined the **NDDSHOME** environment variable:

```
"%NDDSHOME%\bin\rtiddsgen"
```

- ***<path to examples>***

  By default, examples are copied into your home directory the first time you run *RTI Launcher* or any script in **<NDDSHOME>/bin**. This document refers to the location of the copied examples as ***<path to examples>***.

  Wherever you see ***<path to examples>***, replace it with the appropriate path.

  Default path to the examples:

  - macOS systems: **/Users/<*your user name*>/rti_workspace/6.1.2/examples**
  - Linux systems: **/home/<*your user name*>/rti_workspace/6.1.2/examples**
  - Windows systems: ***<your Windows documents folder>*\rti_workspace\6.1.2\examples**

    Where 'your Windows documents folder' depends on your version of Windows. For example, on Windows 10, the folder is **C:\Users\<*your user name*>\Documents**.

  Note: You can specify a different location for **rti_workspace**. You can also specify that you do not want the examples copied to the workspace. For details, see *Controlling Location for RTI Workspace and Copying of Examples* in the *RTI Connext DDS Installation Guide*.

Chapter 2 Starting RTI Monitor

There are two ways to start *Monitor:*

- From *RTI Launcher's* **Tools** tab, click on the **Monitor** icon.
- From a command prompt:
  - On Linux and macOS systems:

    ```
    cd <NDDSHOME>/bin
    ./rtimonitor
    ```

  - On Windows systems:

    ```
    cd <NDDSHOME>\bin
    rtimonitor
    ```

  Monitor accepts the command-line options in Table 2.1 Command-line Options.

Table 2.1 Command-line Options

Option	Description
-aggregationPeriodSeconds <seconds>	*Monitor* periodically goes through all the monitored entities in the system (this information is saved in its own database) to calculate aggregated statistics and states. This value controls that minimum period (specified in seconds). Default: 5 seconds
-help	Displays all command-line options.
-historyDepth <value>	*Monitor* saves some statistics' history, so it can be displayed in the charts. This option controls how much historical data (number of samples) is saved per monitoring topic. Default: 12 samples
-ignoreTypeConflicts	Instructs *Monitor* to ignore any type conflicts. In *Monitor*, type conflicts are based on type-code equality rather than type compatibility. This command-line option can be useful if you have types that have different type-code but are compatible. Default: Not specified (do not ignore type conflicts)

Table 2.1 Command-line Options

Option	Description
-initialDomainIds <domain_id_list>	Specifies which domains *Monitor* will join when it starts up. <domain_id_list> is a list of domain IDs, each separated by a comma. To specify multiple domain IDs on a Windows system, enclose the comma-separated IDs in quotation marks. For example: -initialDomainIds "31, 32". Default: If not specified, you will be prompted to enter a domain ID when *Monitor* starts.
-matchRefreshPeriodSeconds <seconds>	Specifies the period at which to refresh the system overview panel's matches. Default: 5 seconds
-notificationHistoryDepth <value>	Specifies the number of notifications to keep per entity. Default: 12 notifications
-pruneDeadObjectsPeriodSeconds <seconds>	Sets the period at which *Monitor* should clean up user-interface objects (such as the Host, and Process nodes in the tree views) that are no longer current (have no more children nodes in the tree view). This value should be increased when dealing with very large systems where the time to complete discovery is longer than the default value of 3 seconds. Default: 3 seconds
-spawnReadThreads	Instructs *Monitor* to use multiple threads (according to the number of cores on the host) to retrieve data from its DataReaders (which contain monitoring data). This is typically only needed for very large systems. Default: Not specified (use a single read thread to retrieve data at a period of 1 second)
-verbosity <value>	Sets the verbosity for *Monitor* and *Connext DDS*. • 0: silent (both *Connext DDS* and *Monitor*) • 1: errors (both *Connext DDS* and *Monitor*) • 2: warnings (*Monitor* only) • 3: warnings (both *Connext DDS* and *Monitor*) • 4: information (*Monitor* only) • 5: tracing (*Monitor* only) • 6: tracing (both *Connext DDS* and *Monitor*) Default: 1

Chapter 3 A Demo using RTI Shapes Demo

Before going through the steps in this chapter, make sure that both *RTI Monitor* and *RTI Shapes Demo* are installed.

3.1 Showing System Topology, Sample Counts and Rates

1. Start two instances of *Shapes Demo.*

   There are two ways to start *Shapes Demo:*

   - From *RTI Launcher's* **Learn** tab, click on the **Shapes Demo** icon.
   - From a command prompt:

     On Linux and macOS systems:

     ```
     cd <NDDSHOME>/bin
     ./rtishapesdemo
     ```

     On Windows systems:

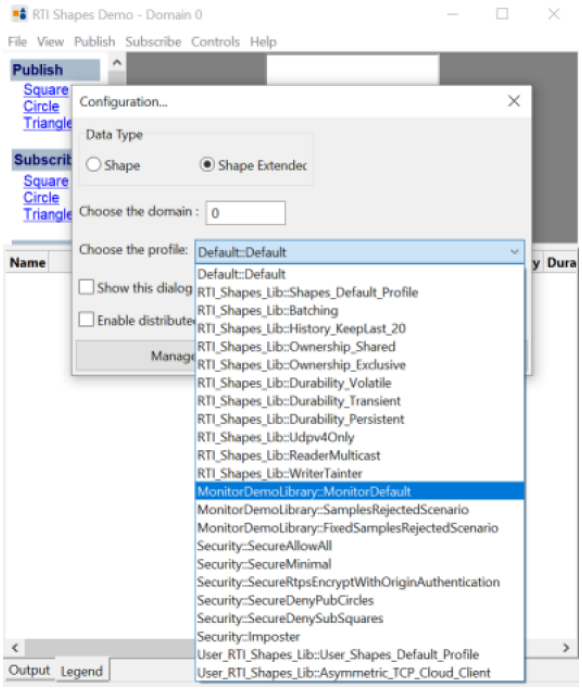
     ```
     cd <NDDSHOME>\bin
     rtishapesdemo
     ```

   a. When the *Shapes Demo* window appears, open the **Configuration** dialog (under Controls). If the **Stop** button is enabled, press it.

   b. Uncheck the **Enable distributed logger** checkbox.

   c. From the drop-down list of profiles, choose **MonitorDemoLibrary::MonitorDefault**.

      Shapes Demo will use domain ID 0 by default. If you choose to use a different domain ID, make sure to use the same value in both instances of *Shapes Demo*.



   d. Press **Start**.

   e. Repeat, so you are running two instances of *Shapes Demo*.

2. In one instance of *Shapes Demo*, create a reliable square publisher as follows:

   a. Select **Publish, Square**.

   b. Choose the profile **MonitorDemoLibrary::MonitorDefault**.

   c. Make sure the **Reliability** box is checked.

   d. Select **OK**.

3. In the other instance of *Shapes Demo*, create a reliable square subscriber as follows:

   a. Select **Subscribe, Square**.

   b. Choose the profile **MonitorDemoLibrary::MonitorDefault**.

   c. Check the **Reliability** box.

   d. Select **OK**.

4. Start *Monitor*.

   There are two ways to start *Monitor:*

   - From *RTI Launcher's* **Tools** tab, click on the **Monitor** icon.
   - From a command prompt:

On Linux and macOS systems:

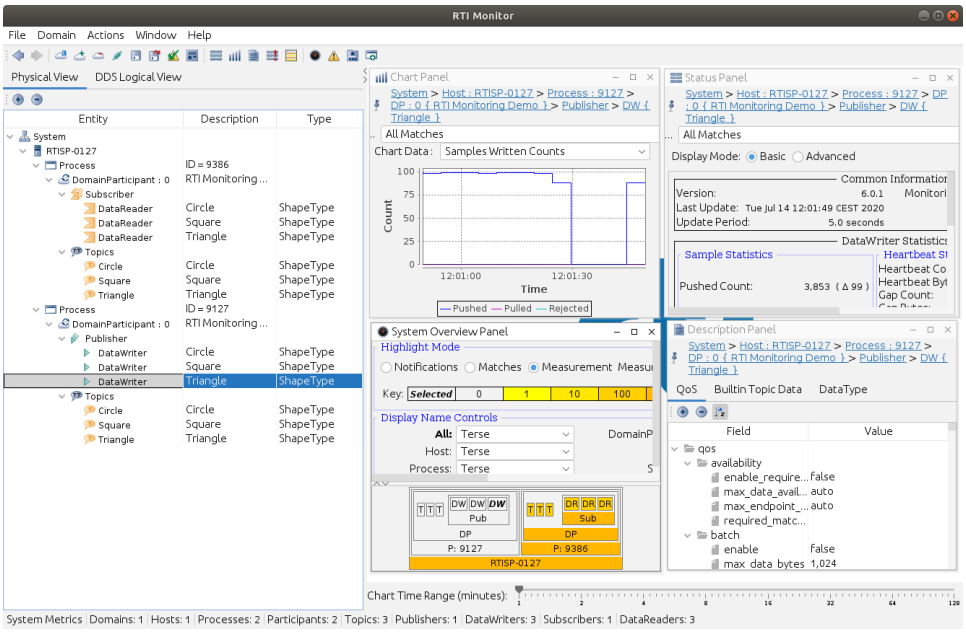
```
cd <NDDSHOME>/bin
./rtimonitor
```

On Windows systems:

```
cd <NDDSHOME>\bin
rtimonitor
```

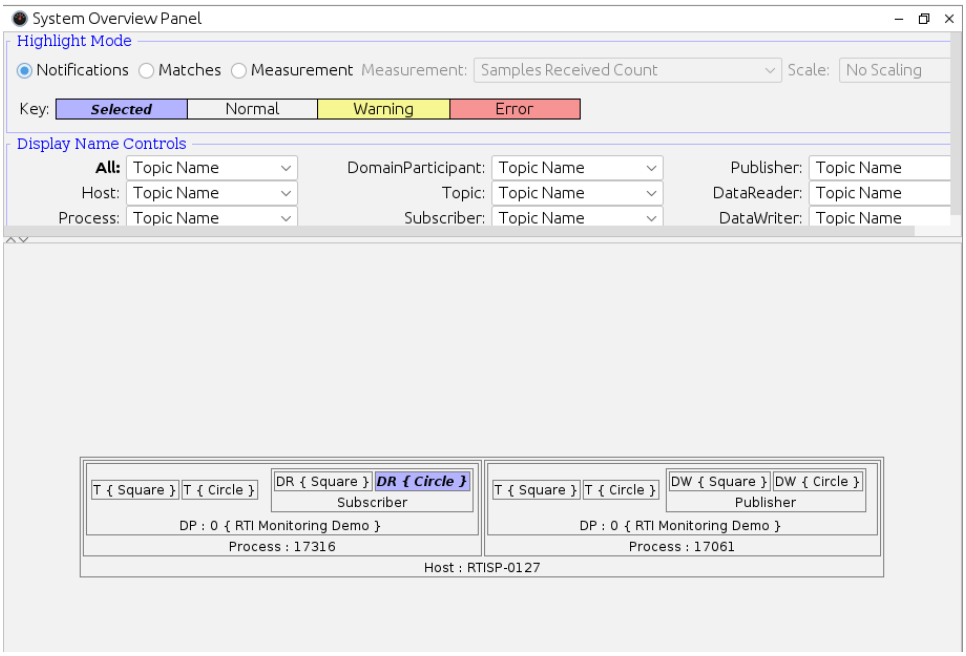
5. Review the system topology:

   a. Expand the Physical View tree by clicking the button below the **Physical View** tab.



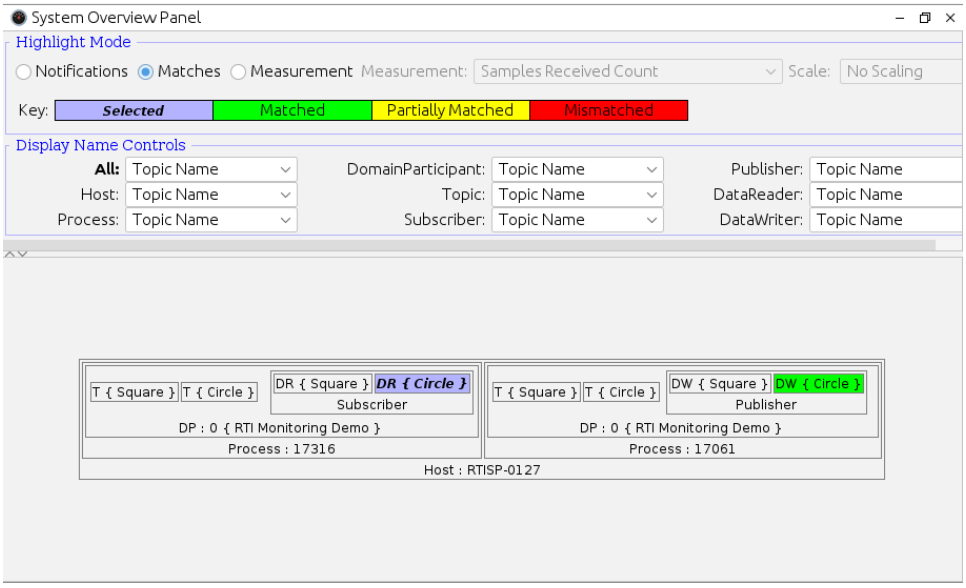
   b. Close the Status Panel on the right (select the red at the top-right corner of that panel).

   c. Select the **System Overview** button in the toolbar to see a summary of the monitored domain.



d. Select the **Matches** option in the System Overview panel. Select **DW** or **DR** in the system map to see what entities are matched in the system.

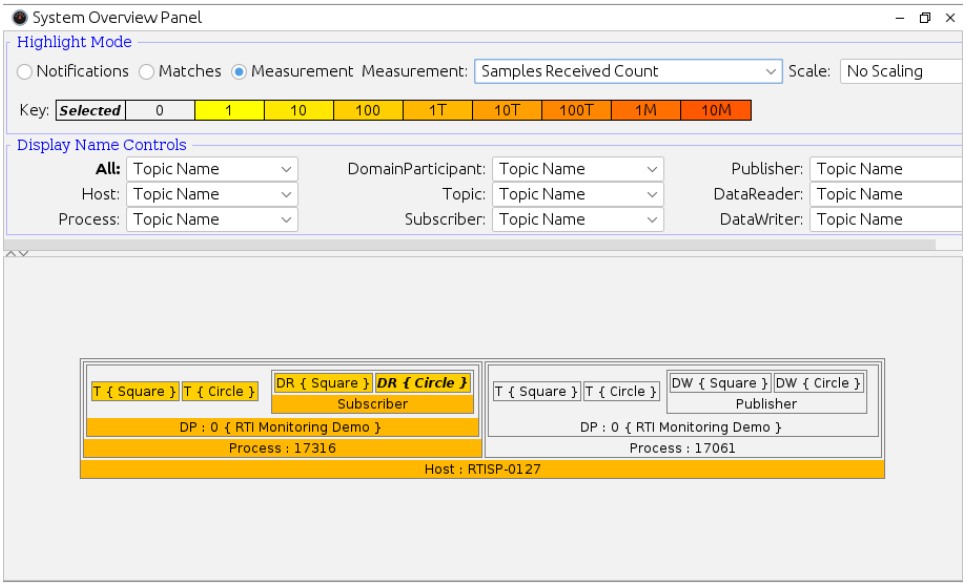
   Notice that when you select an entity in the system map, that entity also becomes selected in the Physical View tree.



e. Click the Back button on the toolbar; it will change the selection back to the previously selected entity—in the Physical View tree and the System Overview panel. Try the Forward

button too.

f. In the System Overview panel, select the **Measurement** option and **Samples Received Count** in the drop-down menu. You will see a color map that indicates the number of samples received by various entities in the system.

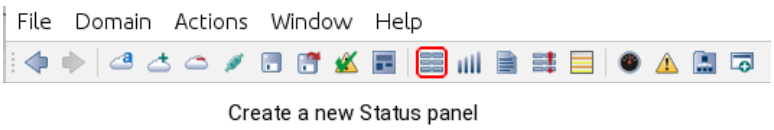


Notes:

- To change the scaling of the numbers indicated in the color map, use the **Scale** drop-down menu.
- Move the mouse over the entities in the map to see a tool tip of the actual value.
- You can select different **Display Name Controls** for each kind of entity (or all entities) to control how much detail will appear in the map in the System Overview panel.

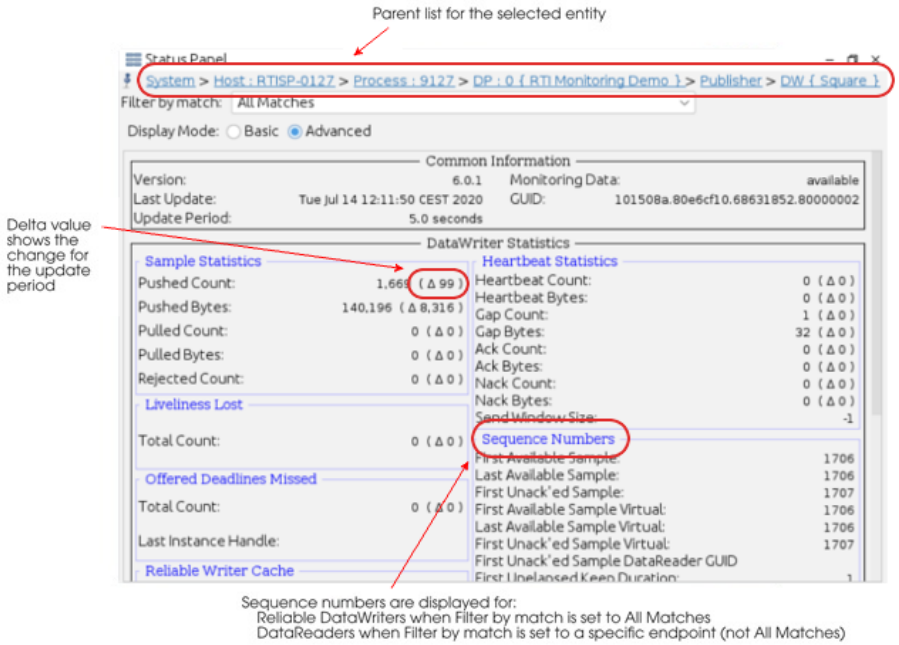
g. Close the System Overview panel.

h. In the Physical View tree, select the **DataWriter**, then select the **Status Panel** button in the toolbar.



i. Select the **Advanced** display mode.

j. Scroll down to see Discovery Statistics. Click the link next to **Last DataReader GUID**. This will select the matching DataReader in the Physical View tree and the panel will switch to show DataReader status instead.



The top of the Status panel (and some of the other entity-specific panels that you will see later in this demo) shows a list of parent entities to which the selected entity belongs. For example:

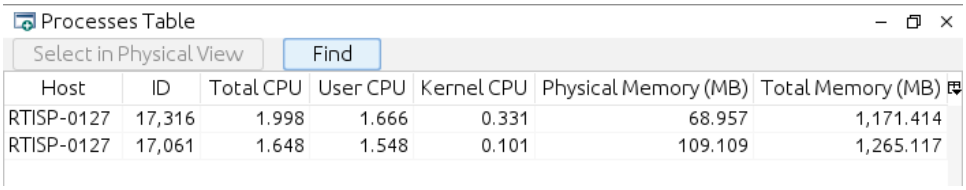
k. Click on **DP : 0 { RTI Monitoring Demo }** in the list of parent entities. This will select the DomainParticipant in the Physical View tree and the Status panel will change to show the DomainParticipant's status. Notice that the Status panel now shows an aggregation of the statuses of all the DataWriters and DataReaders that belong to the selected DomainParticipant.

l. Close the Status panel.

6. Review all the processes in the system:

a. Select the **Processes Table** button from the toolbar.

b. This will display a panel that shows the processor and memory usage of all monitored processes.



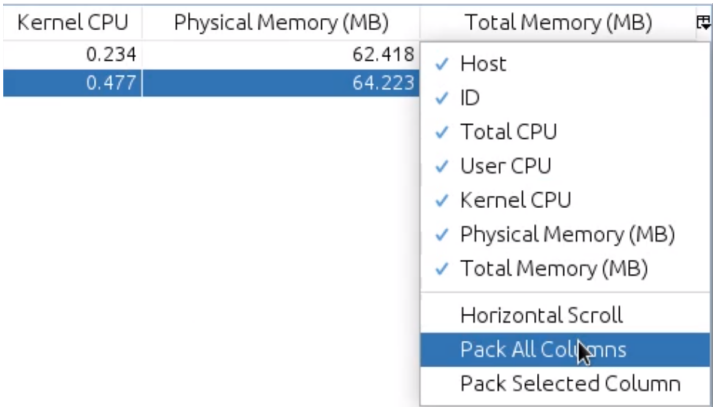
Select one of the processes in the table and click on the **Select in Physical View** button; this will select the same process in the Physical View tree.

The **Find** button is useful for searching a large table for a specific process. (This is a simple string search, so you must use the same format displayed in the table; for example, notice that the process ID includes a comma.)

c. Click on the **Total CPU** column heading. This will sort the table by the values in this column. Clicking it again will sort in the opposite order. This is useful to watch in real time to see which processes are using a lot of CPU. You can sort based on any of the columns.

d. Click the button just above the vertical scroll bar. This allows you to choose which columns appear in the table. For instance, to remove the ID column, uncheck it. (Note: to enable the 'Pack Selected Column' option, select a cell in the top row.)

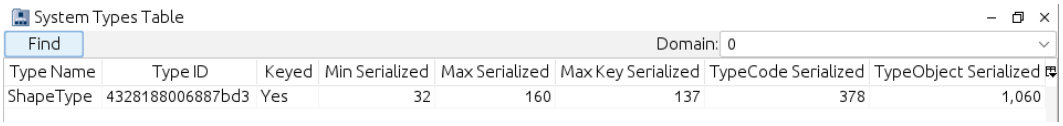
You can also change the order of the columns by simply dragging them to a new place in the table.



e. Close the Processes Table.

7. Review all the data types in the system by selecting the **System Types Table** button from the tool-bar.

This will display a panel that shows all the known data types in the selected domain. In this case, there is only one data type called **ShapeType**.



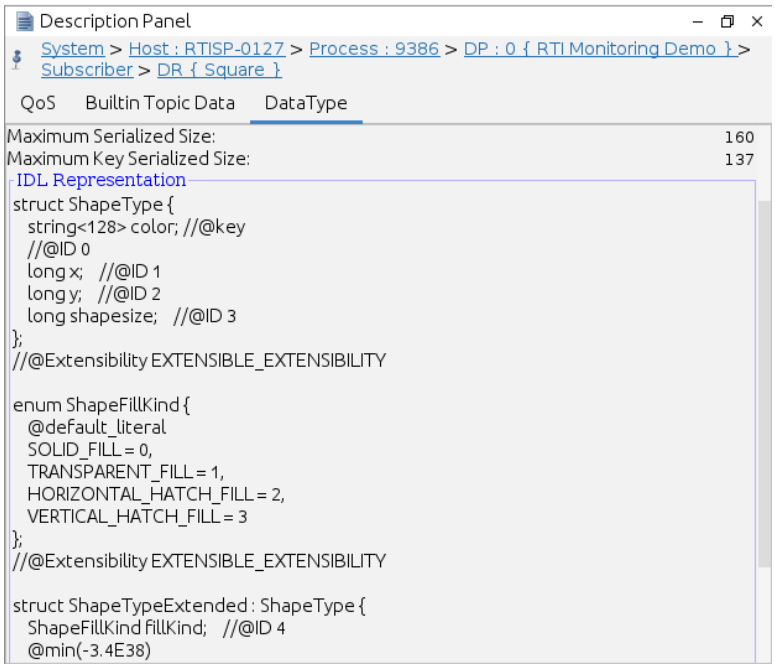
Like the Processes Table we saw earlier, this table also has a button (above the vertical scroll bar) to control the columns that appear in the table. You can also sort the table based on any of the columns by clicking on the column heading.

Close the System Types Table.

8. Show details of each data type:
    a. Select the **Physical View** tab on the left.
    b. Select **DataReader** in the tree, then select the **Description Panel** button from the toolbar.

Create a new Description panel

    c. In the Description panel, select the **DataType** tab to see the data type for the data reader in IDL. You can also see other properties related to the data type.



d. Close the Description Panel.

9. To show panels for two or more entities side-by-side for comparison, you can press the **pin** button at the top-left corner of all the entity-specific panels. The panel is then pinned to the entity and the panel will periodically receive updated data for the pinned entity—even when another entity is selected in the tree.

   a. Select the **Physical View** tab on the left.

   b. From the menu, make sure **Window**, **Auto Checkerboard Tile** is checked.

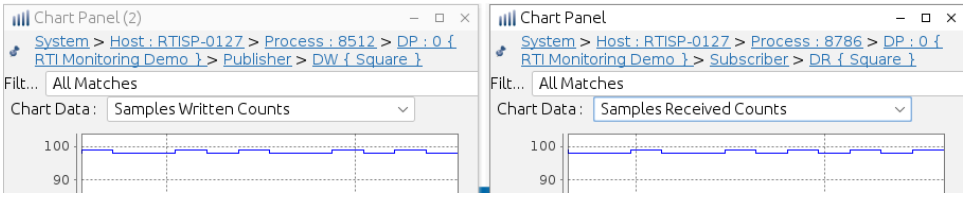
   c. In the Physical View tree, select the **DataWriter**, then press the **Chart** button in the toolbar.

Create a new Chart panel

   d. In the Chart panel, press the **pin** button on the top-left corner. Notice that the button has changed to **pinned** to indicate that the panel is pinned to a specific entity. For Chart Data, select **Samples Written Counts**.

   e. In the Physical View tree, select the **DataReader**, then press the **Chart** button in the toolbar to create the second Chart panel and press its **pin** button . For Chart Data, select **Samples Received Counts**.

f. Now you can compare the DataWriter's Samples Written Counts and the DataReader's Samples Received Counts side-by-side. Notice that the send and receive sample counts are about the same.



Notes:

- The default settings set the publish rate of the monitoring topics to 5 seconds. Therefore, you may need to wait 5 seconds for the *Monitor* data to be updated.
- The charts for Samples Written Counts and Samples Received Counts show the number of samples sent/received in the last sample period. In this case, the sample period is 5 seconds. Since *Shapes Demo* publishes 16 samples per second, you will see approximately 80 - 100 samples per sample period, depending on your platform.
- The **Chart Time Range** slider (at the bottom of *Monitor*) changes the time scale of the graphs.
- To unpin the panels, press their **pin** buttons again. Notice that now both chart panels are showing **DR** as the current entity at the top, since that entity is selected in the Physical View tree.

10. Start a third instance of *Shapes Demo* with a specific publishing interval:

    - On Windows systems:

      Open a command prompt and enter the following (replacing the installation directory to match your system):

      ```
      > cd <NDDSHOME>\bin
      > rtishapesdemo -pubInterval 250
      ```

    - On Linux and macOS systems:

      Enter the following (replacing the installation directory to match your system):

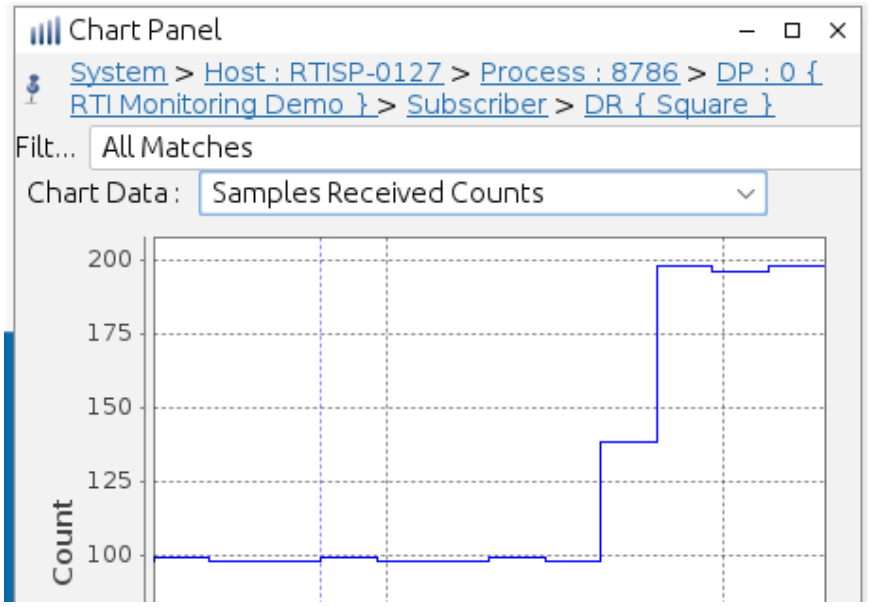
      ```
      > cd <NDDSHOME>/bin
      > ./rtishapesdemo -pubInterval 250
      ```

    Just like the other *Shapes Demo* instances, choose the profile **MonitorDemoLibrary::MonitorDefault**.

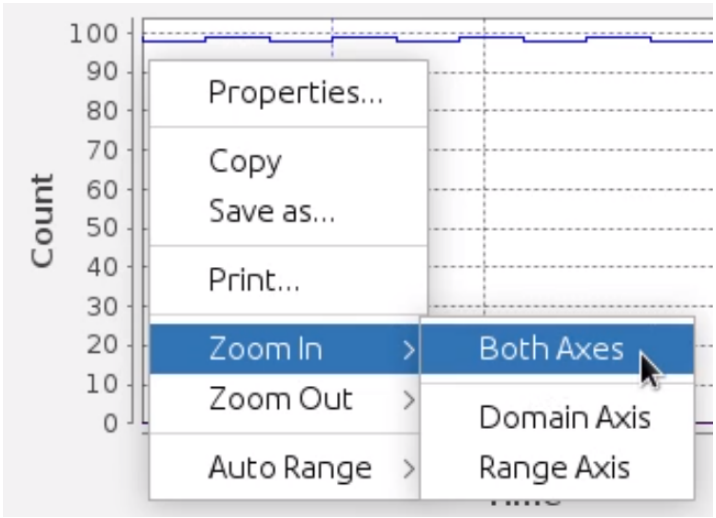
11. In the new *Shapes Demo* window, create a reliable square publisher of a different color:

a. Select **Publish, Square**.
b. Choose the profile **MonitorDemoLibrary::MonitorDefault**.
c. Select **YELLOW**.
d. Make sure the **Reliability** box is checked.
e. Select **OK**.

12. Examine the data in chart:
    a. In *Monitor*, notice the number of received samples increases in the chart.



    b. Right-click in the white space in one of the charts to see how you can change the chart:



    c. Close the two Chart panels.

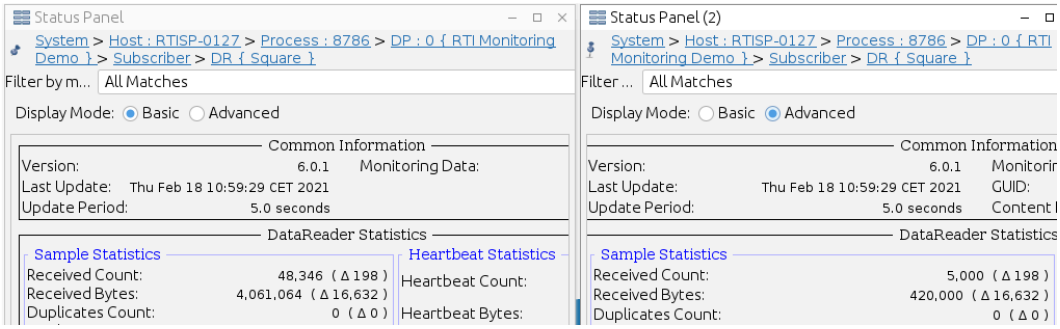
13. Let's see how to determine which DataWriter is contributing more received samples:

    a. In the Physical View tree, select the **Expand All** button.

    b. Select the **DataReader** in the tree, then select the **Status Panel** button from the toolbar. For **Filter by match**, select the first matching endpoint in the drop-down menu.

    c. Select the **Status Panel** button again to open a second status panel for the reader. For **Filter by match**, select the second matching endpoint in the drop-down menu.

    Now you have status for both of the reader's matching writers side-by-side. The Received Count values will point out which one is contributing more samples.



14. Let's see how to save the current data to be used for future analysis:

    a. Select the **Save Data** button in the toolbar.

    b. Select a location and enter a filename in the file dialog.

    c. Close the third instance of *Shapes Demo*—the one started with **-pubInterval 250** that is publishing yellow squares.

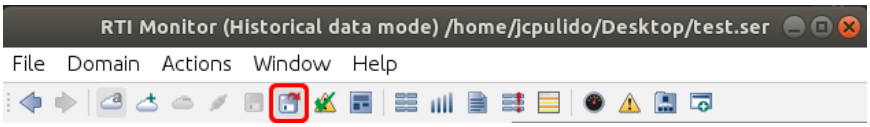
    d. In the remaining two instances of *RTI Shapes Demo*, select **Controls, Delete All.**

    No shapes publications or subscriptions should be running in the system now.

    e. Select the **Load Data** button from the toolbar.

    f. You will see a prompt asking if you want to lose the current data and leave the domain. Select **OK** to continue. In the file dialog, select the file in which you previously saved the data.

Notice that the title of the *Monitor* window has changed to **Historical data mode** and shows the name of the loaded data file. Now you are seeing a snapshot of the system.



g. Select the **Expand All** button for the Physical View tree. You can see all the previously created entities, even though no publications or subscriptions are currently running.

h. Select **Domain, Show Current Domain** from the menu. Notice that you are not joined to any domain now because *Monitor* is showing historical data instead of live data. Click **OK** to close the dialog box.

15. Prepare for the next demo:

    a. Select the **Join Domain** button from the toolbar. You will see a prompt asking if you want to lose the currently loaded data. Click **OK** to continue. Rejoin your original domain by entering the domain ID, then click **OK**.

    Notice that the title of *Monitor* is no longer showing **Historical data mode**. *Monitor* is showing live data again.

    b. Close all the panels.

3.2 Showing Content-Filtered Samples

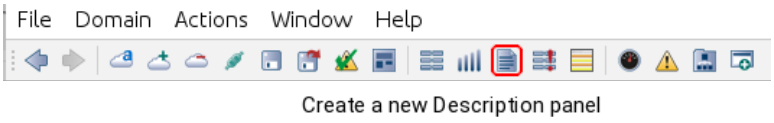
The steps in this section assume you are using the same profile used in 3.1 Showing System Topology, Sample Counts and Rates on page 6 for the two instances of *Shapes Demo*.

1. In one instance of *Shapes Demo*, create a reliable square publisher:
    a. Select **Publish**, **Square**.
    b. Make sure the **Reliability** box is checked.
    c. Select **OK**.
2. In the other instance of *Shapes Demo*, create a content-filtered, reliable square subscriber:
    a. Select **Subscribe**, **Square**.
    b. Check the **Reliability** box.
    c. Check the **Use Filter** box under Content Filter Topic.
    d. Select **OK**.

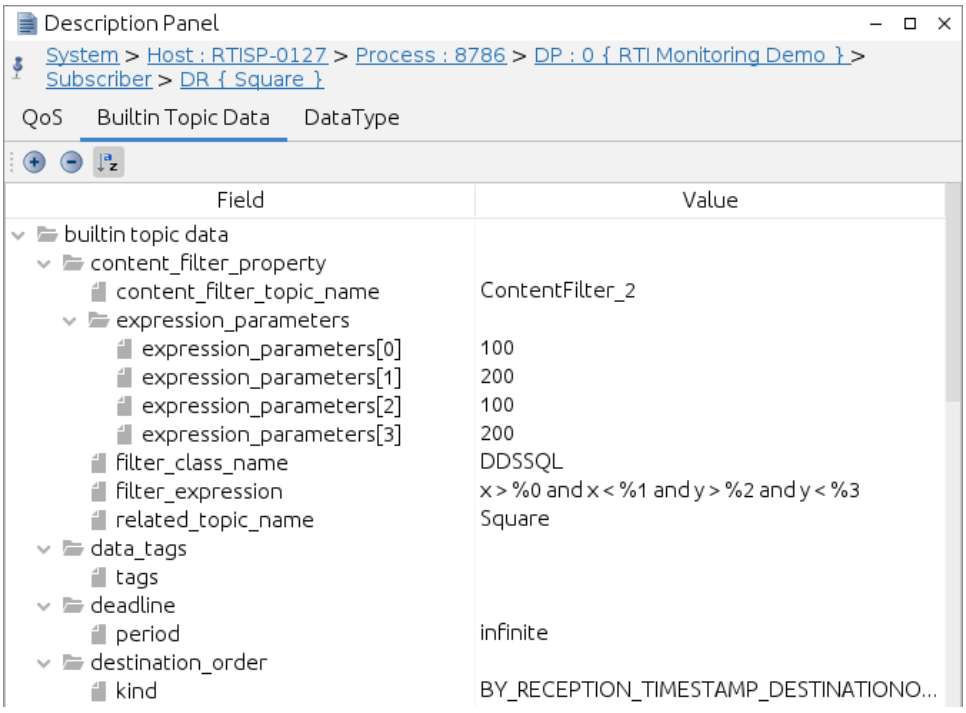
Notice that the subscriber only receives samples that are within the filtering square.

3. Observe the filtered samples in *Monitor*:
   a. Select the **Expand All** button for the Physical View tree in *Monitor*.
   b. In the Physical View tree, select the **DataReader**.

      The Status panel is showing values for the **DataReader**. Notice that the **Sample Statistics**, **Filtered Count** is zero. This shows that content filtering is only happening on the writer side in this case.
   c. Close the Status panel.
4. Show the content-filter expression:
   a. In the Physical View tree, select the **DataReader**, then select the **Description Panel** button from the toolbar.



   b. Select the **Builtin Topic Data** tab in the Description Panel.
   c. See the content filter expression under builtin topic data/content_filter_property/filter_expression and builtin topic data/content_filter_property/expression_parameters.



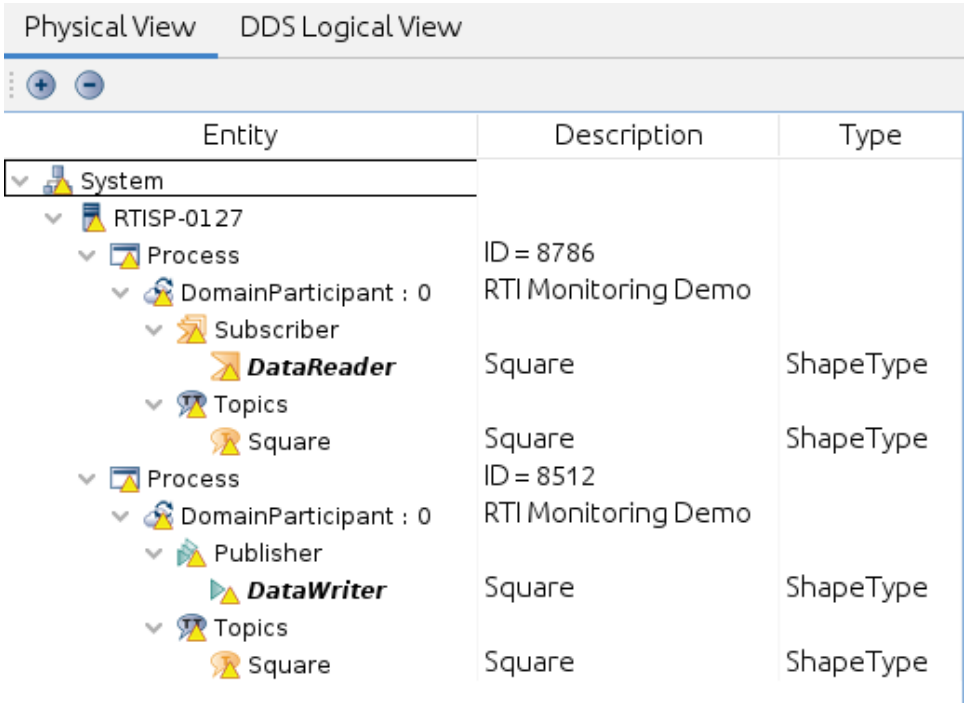
5. Prepare for the next demo:
    a. Close the Description panel.
    b. In the two instances of *Shapes Demo*, select **Controls, Delete All.**

3.3 Showing Deadlines

The steps in this section assume you are using the same profile used in 3.1 Showing System Topology, Sample Counts and Rates on page 6 for the two instances of *Shapes Demo*.

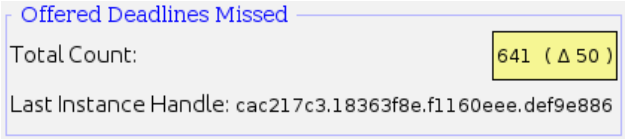
1. In one instance of *Shapes Demo*, create a reliable square publisher with a 100ms deadline:
    a. Select **Publish, Square**.
    b. Make sure the **Reliability** box is checked.
    c. Set **Deadline** to **100**.
    d. Select **OK**.
2. In the other instance of *Shapes Demo*, create a reliable square subscriber with a 250ms deadline:
    a. Select **Subscribe, Square.**
    b. Check the **Reliability** box.
    c. Set **Deadline** to **250**.
    d. Select **OK**.
3. In the publisher *Shapes Demo* instance, select **Controls, Pause Publishing**.
4. Observe the results in *Monitor*:
    a. Select the **Expand All** button for the Physical View tree in *Monitor*.

        Notice that all the entities in the Physical View tree are marked with yellow triangles to show there is a potential problem. The root cause of the problem is in bold (the **DataWriter** and **DataReader** in this case). The parent entities are also marked with yellow triangles, but not in bold.



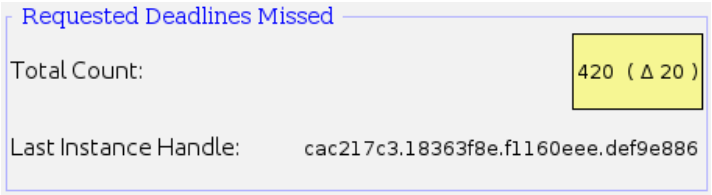
b. In the Physical View tree, select the **DataWriter**, then select the **Status Panel** button in the toolbar.

c. In the Status panel, select the **Advanced** display mode. Under **Offered Deadlines Missed**, notice the non-zero **Total Count** highlighted in yellow.



d. In the Physical View tree, select the **DataReader**. Now the Status Panel is showing values for the **DataReader**.

Under **Requested Deadlines Missed**, you will see a non-zero **Total Count** highlighted in yellow.



You may notice that the DataWriter's **Offered Deadlines Missed Total Count** is different than the DataReader's **Requested Deadlines Missed Total Count**. That's because these

entities were created with different deadline values (100ms for the writer, 250ms for the reader).

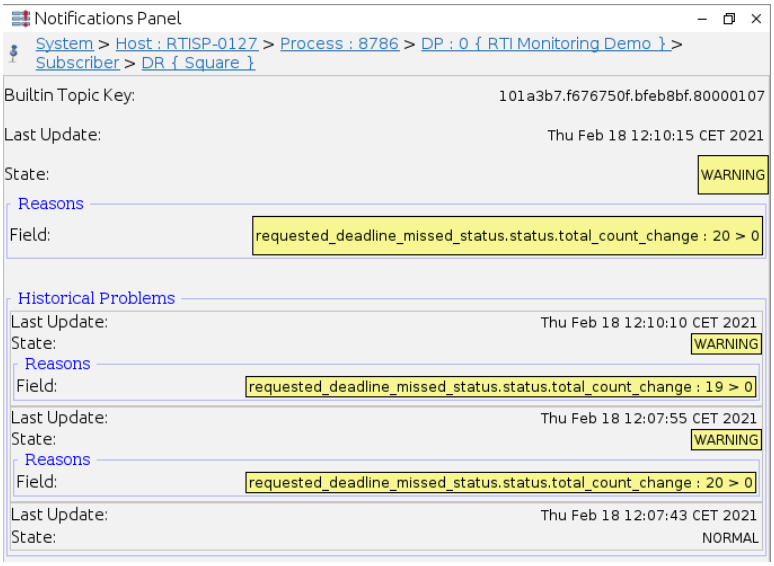
e. Close the Status panel.

5. Look at the notifications:

a. In the Physical View tree, select the **DataWriter**, then select the **Notifications Panel** button in the toolbar.

Create a new Notifications panel

The Notifications panel displays the selected entity's current status and a historical list of all alarm statuses related to the selected entity.

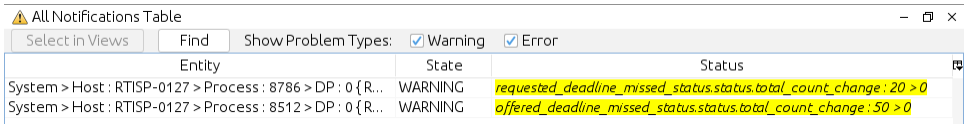


b. Close the Notifications panel.

c. Select the **All Notifications Table** button from the toolbar.

Create a new All Notifications Table

The All Notifications Table displays all the notifications *in the entire system* (not just for the selected entity). By default, it shows both warnings and errors. You can choose to see either just the warnings or just the errors by checking/unchecking the options.



If a row is selected in the All Notifications Table, clicking the **Select In Views** button will select the corresponding entity in the tree views.

d. Close the All Notifications Table panel.

e. Select the **System Overview Panel** button from the toolbar. Select the **Notifications** option. All the entities in the system that have caused a notification are highlighted in the system map.

f. Close the System Overview Panel.

6. Clear the notifications:

   a. In the publisher shapes demo instance, select **Controls, Resume Publishing**.

   b. From *Monitor’s* menu, select the **Clear All Notifications** button from the toolbar. This will clear all the yellow markers in the tree.

Clear All Notifications

7. Prepare for the next demo:

   a. In one instance of *Shapes Demo*, select **Controls, Delete All**.

   b. Close the other *Shapes Demo* instance.

3.4 Showing a ‘Samples Rejected’ Scenario

1. Configure the existing instance of *Shapes Demo* to use the profile, **MonitorDemoLibrary::SamplesRejectedScenario**.

   a. Select **Controls, Configuration, Stop**.

   b. Choose the profile **MonitorDemoLibrary::SamplesRejectedScenario**.

   c. Select **Start**.

2. Create a reliable square publisher with the **MonitorDemoLibrary::SamplesRejectedScenario** profile:

   a. Select **Publish, Square**.

   b. Choose the profile **MonitorDemoLibrary::SamplesRejectedScenario.**

   c. Make sure the **Reliability** box is checked.

   d. Select **OK**.

3. Create a new *Shapes Demo* instance with a reliable subscribing rate of 1,000 ms:

   For example, on a Windows system open a command prompt and enter the following (replacing the installation directory to match your system):

   ```
   > cd <NDDSHOME>\bin
   > rtishapesdemo.bat -subInterval 1000
   ```

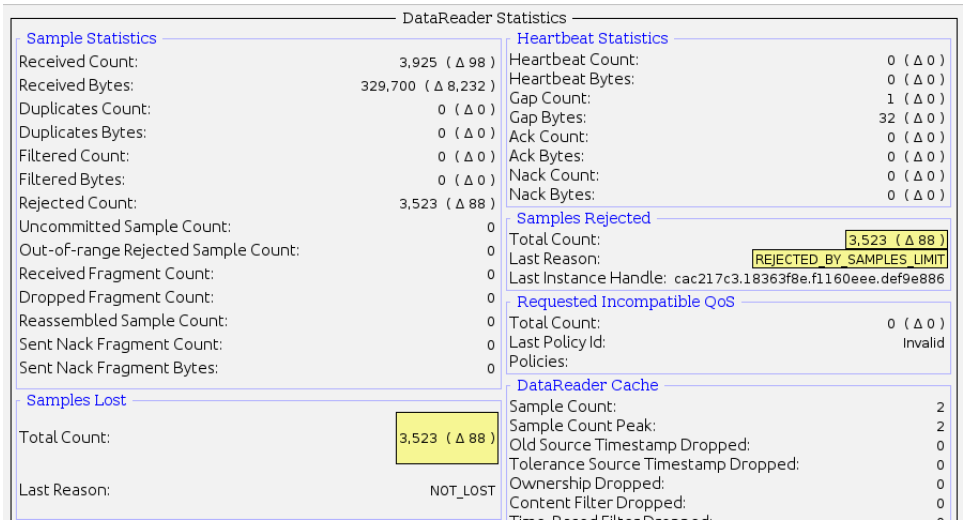
   Or, on a Linux system enter the following (replacing the installation directory to match your system):

   ```
   > cd <NDDSHOME>/bin
   > ./rtishapesdemo -subInterval 1000
   ```

4. Configure the new *Shapes Demo* instance to use the profile **MonitorDemoLibrary::SamplesRejectedScenario**:
   a. Select **Controls, Configuration, Stop**.
   b. Choose the profile **MonitorDemoLibrary::SamplesRejectedScenario**.
   c. Select **Start**.
5. In the new *Shapes Demo* instance, create a reliable square subscriber that uses **take()** and the **MonitorDemoLibrary::SamplesRejectedScenario** profile:
   a. Select **Subscribe, Square**.
   b. Choose the profile **MonitorDemoLibrary::SamplesRejectedScenario.**
   c. Check the **Reliability** box.
   d. For the Read method to use, select **Take()**.
   e. Select **OK**.
6. Notice that the subscriber is not receiving all the samples. Let's see why.
   a. Select the **Expand All** button for the Physical View tree in *Monitor*.
   b. In the Physical View tree, select the **DataReader**, then select the **Status Panel** button from the toolbar.
   c. Select the **Advanced** display mode.

      Notice that the **Total Count** values for **Samples Lost** and **Samples Rejected** are non-zero. This indicates that not all samples are being received. **Samples Lost** and **Samples Rejected** are both yellow to indicate that this may or may not be a problem, depending on your use case.

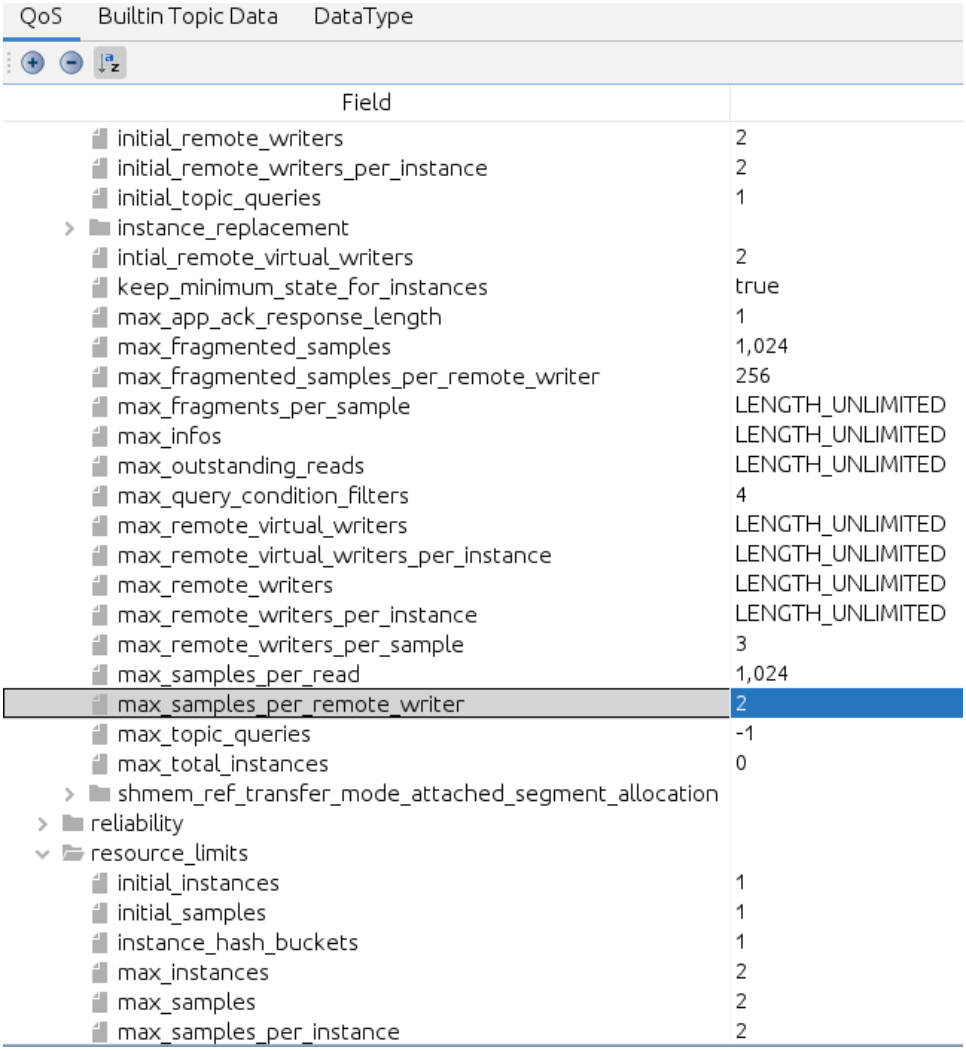
      Also notice further down under **DataReader Cache** that both **Sample Count** and **Sample Count Peak** are 2 (you will see why this is significant later).



d. In the Physical View tree, select the **DataReader**, then select the **Description Panel** button from the toolbar.

Create a new Description panel

In the QoS tab, scroll down and notice that the values for **qos/resource_limits/max_samples** and **qos/reader_resource_limits/max_samples_per_remote_writer** are both 2, which is the same as the **Sample Count** and **Sample Count Peak** values we saw in the Status panel. This shows that the reader’s queue for receiving samples is full.



7. Fix the problem by creating a DataReader with a larger queue size:
    a. In the Subscriber *Shapes Demo* instance, select **Controls, Delete All**.
    b. Create a new reliable square subscriber that uses **take()** and the **MonitorDemoLibrary::FixedSamplesRejectedScenario** profile, which will fix **the problem by increasing the queue size.**
    c. Select **Subscribe, Square**.
    d. Choose the profile **MonitorDemoLibrary::FixedSamplesRejectedScenario**. This profile uses a larger queue size.
    e. Check the **Reliability** box.
    f. For Read method to use, select **Take()**.
    g. Select **OK**.

8. Verify the new reader queue size in *Monitor*:
    a. Select the **Expand All** button under the Physical View tab.
    b. In the Physical View tree, select the **DataReader**.
    c. In the Status panel that is already open, notice that the **Total Count** values for **Samples Lost** and **Samples Rejected** are now zero.

       In the **DataReader Cache** section, notice the v**alues for Sample Count** and **Sample Count Peak**.

       In the Description panel that is already open, notice in the QoS tab that the values for **qos/resource_limits/max_samples** and **qos/reader_resource_limits/max_samples_per_remote_writer** are now 100. This is larger than the **SampleCount** and **Sample Count Peak** values seen in the Status panel. This shows that now the reader queue still has a lot of room before it becomes full and starts dropping samples.

This concludes the demo.

Chapter 4 Troubleshooting

4.1 Debugging Problems with Monitor on Windows System

If you run *Monitor* on a Windows system and it is not showing any error messages, but the *Monitor* window is not showing up, or you are not seeing any data in the *Monitor* window, you can modify **<NDDSHOME>\bin\rtimonitor.bat** to change **javaw.exe** to **java.exe**, so that error messages will be displayed in a command prompt to help you debug the issue.

4.2 Running Monitor on a System with Limited Memory

Monitor runs with Java and a default maximum Java heap size of 500m. If you are monitoring on a system with very little memory and you are only monitoring a very small system, you may be able to reduce memory usage by modifying **<NDDSHOME>\bin\rtimonitor.bat** (on Windows systems) or **<NDDSHOME>/bin/rtimonitor** (on Linux and macOS systems) to decrease the maximum Java heap size usage.

For example, in the script change "**-Xmx500m**" to "**-Xmx300m**".

Monitor will save some history of statistics to be displayed in the charts. By default, this value is 12. If you are running on a system with limited memory, you can decrease this value with the command-line option, -historyDepth <value> on page 4.

4.3 Running Monitor with a Large System

Monitor runs with Java and a default maximum Java heap size of 500m. If you are monitoring a very large system, you may need to modify **<NDDSHOME>\bin\rtimonitor.bat** (on Windows systems) or **<NDDSHOME>/bin/rtimonitor** (on Linux and macOS systems) to increase the maximum Java heap size usage. For example, in the script, change **-Xmx500m** to **-Xmx1536m**.

4.4 Error Regarding 'Incompatible Shared Memory Segment'

If you see the following error messages:

```
[D0000|ENABLE]NDDS_Transport_Shmem_attach_writer:incompatible shared memory segment found.
Found segment with max message size 9216. Needed 65530.
```

These messages likely mean either:

a. Another application is currently running on the same host, in the same domain, with different shared-memory transport settings, or

b. If you are on a Linux system, there was an old application running on that domain ID before—with different shared-memory transport settings—that was not terminated gracefully.

To correct problem (a), if you do not intend to monitor the application that has different shared-memory settings on the same host, you can use another domain ID for the monitoring topics, both in *Monitor* and in the *Connext DDS* applications that you want to monitor. If you intend to monitor all the *Connext DDS* applications in that domain on the same host, make sure that all the applications running on the same host with the same domain ID have consistent shared-memory transport settings.

The QoS profile used by *Monitor* is in **<NDDSHOME>/resource/xml/RTI_MONITOR_QOS_PROFILES.xml**. The transport settings in this profile need to be consistent with the transport settings in all the *Connext DDS* applications that are running on the same host with the same domain ID. All shared-memory transport settings are specified under the **domain_participant_qos** and have property names that begin with **dds.transport.shmem.builtin**. See the *Monitoring Library* part of the RTI Connext DDS Core Libraries User's Manual for an explanation of the transport settings.

To correct problem (b), use the **ipcrm** command to clean up the shared-memory and shared-semaphore resources. See the *RTIConnext DDSCore Libraries Platform Notes* for details. You can also run *Monitor* and the *Connext DDS* application that you want to monitor with another domain ID that doesn't have any shared-memory or shared-semaphore resources left-over from previous runs.

4.5 Unable to Create Participant in Connext DDS Application

If you see error messages similar to the following:

```
[CREATE Participant]RTIOsapiLibrary_open:error opening library
rtimonitoringnothing.dll
[CREATE Participant]DDS_DomainParticipantMonitoring_
initializeMonitoringLibrary:
ERROR: Failed to get load monitoring library
[CREATE Participant]DDS_DomainParticipantMonitoring_initializeI:
!create monitoring library instance
[CREATE Participant]DDS_DomainParticipant_createI:!create builtin monitoring support
[CREATE Participant]DDS_DomainParticipantFactory_create_participant_
disabledI:!create participant
```

These messages most likely mean that your *Connext DDS* application is configured to load the monitoring library dynamically, but you don't have the monitoring library in your path.

The environment variable that needs to include the monitoring library depends on your platform:

- Linux: **LD_LIBRARY_PATH**
- macOS: **DYLD_LIBRARY_PATH**
- Windows: **Path**

If you see error messages similar to the following:

```
[CREATE Participant]DDS_DomainParticipantFactory_set_default_-participant_qos:ERROR:
Inconsistent QoS (more information at WARN verbosity level)
[CREATE Participant]DDS_DomainParticipantFactory_load_profilesI:ERROR: loading profiles
[CREATE Participant]DDS_DomainParticipantFactory_create_participant_-disabledI:ERROR: loading
profiles
```

These messages most likely mean that you are using a lot of properties in the ParticipantQos to configure monitoring, and **participant_property_string_max_length** or **participant_property_list_max_length** in the DomainParticipant's **ResourceLimitsQosPolicy** is not large enough to accommodate all the properties. Try increasing those values in your *Connext DDS* application to fix the problem.

4.6 Not Receiving Monitoring Data due to Inconsistent QoS

If you see an error message similar to the following:

```
WARN : com.rti.dds.monitor.util.DebugDataReaderListener.on_requested_incompatible_qos(Unknown
Source) : - topic: rti/dds/monitoring/domainParticipantDescription :
RequestedIncompatibleQosStatus[total_count=1, total_count_change=1, last_policy_id=Durability,
policies=[QosPolicyCount[policy_id=Durability, count=1]]]
```

This message most likely means that the internal DataWriters created by *Monitoring Library* for publishing monitoring topics have QoS that are incompatible with the QoS of the internal DataReaders created by *Monitor* for subscribing to monitoring topics.

If you see this error message, try specifying the **rti.monitor.config.qos_library** and **rti.monitor.config.qos_profile** properties in the *Connext DDS* application that has monitoring turned on, to ensure that the internally created DataWriters are using the correct QoS values. The default QoS values used for the internally created DataReaders are listed in **RTIMonitoringQosLibrary** and **RTIMonitoringPublishingQosProfile** in the file **<NDDSHOME>/resource/xml/MONITORING_QOS_PROFILES.xml**. See the section on *Monitoring Library* in the *RTI Connext DDS Core Libraries User's Manual* for an explanation of the QoS settings that are required to specify the QoS library and profile.

4.7 Not Receiving Monitoring Data for Entities

Some of the monitoring topics (the *description* monitoring topics) can have data that is larger than what is supported by the default transport settings, especially for cases in which a lot of propagated properties are

added to the PropertyQosPolicy, or a large UserDataQosPolicy, TopicDataQosPolicy, or GroupDataQosPolicy is involved. By default, asynchronous publishing is used for the writers in *Monitoring Library* for these monitoring topics to resolve the large data issue—transport settings and the maximum type-code serialized size are left at the default values.

The maximum type-code serialized size and transport settings *must be* consistent between *Monitor* and the *Connext DDS* application in which monitoring is enabled. By keeping the maximum type-code serialized size and all the transport settings at default values in the QoS profile used by *Monitor*, all monitored *Connext DDS* applications that use default settings will work with *Monitor* out of the box.

If you are not receiving monitoring data, it is most likely because you do have inconsistent transport settings or inconsistent maximum type-code serialized size settings between *Monitor* and the *Connext DDS* application in which monitoring is enabled (maybe you are not using the default maximum type-code serialized size or transport settings in the monitored *Connext DDS* application).

If your monitored *Connext DDS* application is required to use a large maximum serialized type-code size or transport settings that support large data, you will need to change the corresponding settings in the QoS profile used by *Monitor*. The maximum type-code serialized size is configured under **resource_limits** for the **domain_participant_qos**; transport settings are configured under **property** for the **participant_qos**. The QoS profile used by *Monitor* is in **<NDDSHOME>/resource/xml/RTI_MONITOR_QOS_PROFILES.xml**. See the "Changing Transport Settings in the Configuration File" section in the *Monitor User's Manual* for more information on editing this file.

A sample large-data QoS profile is provided with *Connext DDS* for your reference; it has large-data support turned on for both the UDPv4 and shared-memory transports, and uses large maximum type-code serialized size support. If you need to use large data or large type-code in your *Connext DDS* application, you can use this provided large-data QoS profile in the monitored application and also uncomment the corresponding transport and maximum type-code serialized size settings in the *Monitor* QoS profile; this will enable consistent large maximum type-code serialized size and large-data transport settings. See the section on *Monitoring Library* in the *RTI Connext DDS Core Libraries User's Manual* for an explanation of this large-data QoS profile.

4.8 No Type Code for Some Entities in Description Panel

If the type code for your user data type is larger than the default maximum type-code serialized size, the IDL for that data type may not show up in the DataType tab in *Monitor's* Description Panel. However, it should not affect the rest of the monitoring data.

To see the IDL representation of large type-code in *Monitor*, you can increase the maximum type-code serialized size, both in the monitored *Connext DDS* application and in *Monitor*. However, if you do that, you will also need to increase the values in the transport settings to support large data in *Connext DDS* discovery traffic—both in the monitored *Connext DDS* application and in *Monitor*.

A sample large-data QoS profile is provides with *Connext DDS*; it has large-data support turned on for both the UDPv4 and shared-memory transports, and a larger maximum type-code serialized size. See the

section on *Monitoring Library* in the *RTI Connext DDS Core Libraries User's Manual* for an explanation of the large-data QoS profile. If you use the provided large-data QoS profile, you can uncomment the corresponding settings in the *Monitor* QoS profile to enable support for large type-code and large data. Both the monitored *Connext DDS* application and *Monitor* must have a consistent maximum type-code serialized size and consistent transport settings. The QoS profile used by *Monitor* is in **<NDDSHOME>/resource/xml/RTI_MONITOR_QOS_PROFILES.xml**.

4.9 Running out of Memory

If *Monitor* is running out of memory, you can use a smaller value for the **-historyDepth** command-line option or run *Monitor* on a 64-bit machine.

4.10 Running without an Active Network Interface

If you run *Monitor* on a computer that does not have an active network interface, you may see an error message stating "No interface found enabled for multicast."

Modify the QoS profile used by *Monitor* to turn off UDPv4 and only use the shared-memory transport:

```
<domain_participant_qos>
    ...
    <transport_builtin>
        <mask>SHMEM</mask>
    </transport_builtin>
</domain_participant_qos>
```

The QoS profile used by *Monitor* is in **<NDDSHOME>/resource/xml/RTI_MONITOR_QOS_PROFILES.xml**. See Section 3.8 in the *Monitor User's Manual* for more information on editing this file.