RTI Queuing Service

Getting Started Guide

Version 6.1.0
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Chapter 1 Welcome to RTI Queuing Service

RTI® Queuing Service is a broker that provides a queuing communication model in which a sample is stored in a queue until it is consumed by one QueueConsumer. If there are no QueueConsumers available when the sample is sent, the sample is kept in the queue until a QueueConsumer is available to process it. If a QueueConsumer receives a sample and does not acknowledge it before a specified amount of time or acknowledges it negatively, the sample will be redelivered to a different QueueConsumer.

Queuing Service provides an “at-most-once” and “at-least once” delivery semantic.

By default, Queuing Service keeps the samples in memory. To provide fault tolerance, Queuing Service can be configured to keep the samples on disk.

For high availability, Queuing Service provides mechanisms to replicate its state so that samples can survive the loss of any particular service and/or computer.

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-6.1.0`
  
  - Linux systems, non-root user:
    `/home/<your user name>/rti_connext_dds-6.1.0`
  
  - Linux systems, root user:
    `/opt/rti_connext_dds-6.1.0`
- Windows® systems, user without Administrator privileges:
  \(<your\ home\ directory>\rti\_connext\_dds\-6.1.0\)

- Windows systems, user with Administrator privileges:
  \(C:\Program\ Files\rti\_connext\_dds\-6.1.0\)

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

Wherever you see \<$NDSSHOME>$ 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-6.1.0\bin\rtiddsgen"
```

Or if you have defined the \texttt{NDDSHOME} environment variable:

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

- \(<\text{path to examples}>\)

By default, examples are copied into your home directory the first time you run RTI Launcher or any script in \<$NDSSHOME>/bin. This document refers to the location of the copied examples as \(<\text{path to examples}>\).

Wherever you see \(<\text{path to examples}>\), replace it with the appropriate path.

Default path to the examples:

- macOS systems: \(/Users/<your\ user\ name>/rti\_workspace/6.1.0/examples\)
- Linux systems: \(/home/<your\ user\ name>/rti\_workspace/6.1.0/examples\)
- Windows systems: \(<your\ Windows\ documents\ folder>/rti\_workspace/6.1.0/examples\)

  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 \textit{Controlling Location for RTI Workspace and Copying of Examples} in the RTI Connext DDS Installation Guide.
Chapter 2 Installing Queuing Service

This chapter describes:

- 2.1 Installing on a Linux or macOS System below
- 2.2 Installing on a Windows System on the next page

2.1 Installing on a Linux or macOS System

Install Queuing Service on top of Connext DDS. There are two ways to install it, from RTI Launcher or from the command line.

From RTI Launcher:

1. Start RTI Launcher from the command line:

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

   `<NDDSHOME>` is described in 1.1 Paths Mentioned in Documentation on page 1.

2. From the Configuration tab, select Install RTI Packages.

3. In the resulting dialog, use the + sign to add the `.rtipkg` file that you want to install.

4. Click Install.

From the command line:

```
cd <NDDSHOME>/bin
./rtipkginstall <path to .rtipkg file>
```

If you want to install Queuing Service without user interaction (unattended mode), use the `-u` flag when installing from the command line:

```
cd <NDDSHOME>/bin
./rtipkginstall -u <path to .rtipkg file>
```
2.2 Installing on a Windows System

Queuing Service will be installed in the <NDDSHOME> directory (see 1.1 Paths Mentioned in Documentation on page 1).

2.2 Installing on a Windows System

Install Queuing Service on top of Connext DDS. There are two ways to install it, from RTI Launcher or from the command line.

**From RTI Launcher:**

1. Start *RTI Launcher* from the Start menu or the command line:
   
   ```
   cd <NDDSHOME>/bin
   rtilauncher
   ```
   
   `<NDDSHOME>` is described in 1.1 Paths Mentioned in Documentation on page 1.

2. From the Configuration tab, select Install RTI Packages.
3. In the resulting dialog, use the + sign to add the .rtipkg file that you want to install.
4. Click Install.

**From the command line:**

```
cd <NDDSHOME>/bin
rtipkginstall <path to .rtipkg file>
```

If you want to install Queuing Service without user interaction (unattended mode), use the `-u` flag when installing from the command line:

```
cd <NDDSHOME>/bin
./rtipkginstall -u <path to .rtipkg file>
```

Queuing Service will be installed in the `<NDDSHOME>` directory (see 1.1 Paths Mentioned in Documentation on page 1).
Chapter 3 Using the Examples

*Queuing Service* includes two examples to show its most relevant functionality:

- **hello_world**: A Hello World application, in which is shown how to send/receive samples from/to *Queuing Service*. The example also shows how to use other relevant features such as persistence and replication.
- **remote_config**: A Remote Configuration example, in which is shown how to remotely create/delete resources, query their status, get a message, or flushing SharedReaderQueues. This example uses the Request/Reply API.

The examples are in `<path to examples>/queuing_service/<language>`, where `<path to examples>` is described in 1.1 Paths Mentioned in Documentation on page 1 and `<language>` is c++ for C++ or cs for .NET. There are some differences between the versions:

- The .NET **hello_world** example uses the *Queuing Service* wrapper API, while the C++ example uses `DataWriters` and `DataReaders` directly to interact with *Queuing Service*, since the wrapper API is not available for C++.
- The .NET **hello_world** example uses two SharedReaderQueues: a request and a reply SharedReaderQueue. The C++ example only uses a request SharedReaderQueue.
- The .NET **hello_world** example is also a performance test, measuring requests and replies per second, The C++ version sends one message per second.

By default, the .NET **hello_world** example’s SharedReaderQueues use different types than the C++ example.

Because of these differences, you will need to make some modifications in the examples in order for a **hello_world** C++ Producer to interoperate with a **hello_world** .NET Replier, and vice-versa.

To run the examples, please follow the instructions in the README.txt file included in the example’s directory.
Chapter 4 Running Queuing Service

Queuing Service runs as a separate application. The script to run the executable is in `<NDDSHOME>/bin`. There are three ways to start Queuing Service:

- **4.1 Starting from Launcher below**
- **4.2 Starting Manually from the Command Line below**
- **4.3 Using Queuing Service as a Windows Service on page 9**

If you are starting Queuing Service as a Windows Service, also read 4.3 Using Queuing Service as a Windows Service on page 9.

**4.1 Starting from Launcher**

1. Start RTI Launcher from the Start menu (on Windows systems) or on the command line, type:
   
   `<NDDSHOME>/bin/rtilauncher`

2. From the Services tab, select Queuing Service.

**4.2 Starting Manually from the Command Line**

To start Queuing Service, enter:

```
cd <NDDSHOME>
bin/rtiqueuingservice [options]
```

**Example:**

```
cd <NDDSHOME>
bin/rtiqueuingservice -cfgFile example.xml -cfgName QueuingService_1
```
To run this service executable on a target system (not your host development platform), you must first select the target architecture. To do so, either:
Set the environment variable CONNEXTDDS_ARCH to the name of the target architecture. (Do this for each command shell you will be using.)
Or set the variable connexdds_architecture in the file rticommom_config.[sh/bat]\(^a\) to the name of the target architecture. If the CONNEXTDDS_ARCH environment variable is set, the architecture in this file will be ignored.

Table 4.1 RTI Queuing Service Command-Line Options describes the command-line options.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-appName &lt;name&gt;</td>
<td>Assigns a name to the execution of Queuing Service. Remote commands will refer to the queuing service using this name. In addition, the name of DomainParticipants created by Queuing Service will be based on this name. Default: The name given with -cfgName, if present, otherwise it is RTI_Queuing_Service.</td>
</tr>
<tr>
<td>-cfgFile &lt;name&gt;</td>
<td>Specifies a configuration file to be loaded. This parameter is required. See Section 3.1 How to Load the XML Configuration from a File in the Queuing Service User's Manual.</td>
</tr>
<tr>
<td>-cfgName &lt;name&gt;</td>
<td>Specifies a configuration name. Queuing Service will look for a matching &lt;queuing_service&gt; tag in the configuration file. This parameter is required unless -cfgRemote is used.</td>
</tr>
<tr>
<td>-cfgRemote</td>
<td>Specifies that the initial configuration of the service must be obtained remotely from other running instances. Using this option also requires the use of -remoteAdministrationDomainId to enable remote administration, because the initial configuration will be received in the remote administration domain ID. If you use this option and -cfgName, the service will wait until a configuration with that name is received. Otherwise, the service will use the first configuration that it receives. If the service does not receive the initial configuration after a configurable timeout (see -cfgRemoteTimeout), it will load the configuration from the input configuration file(s).</td>
</tr>
<tr>
<td>-cfgRemoteTimeout &lt;n&gt;</td>
<td>Specifies the maximum amount of time, in seconds, that Queuing Service will wait for an initial configuration when using -cfgRemote. Default: 20 seconds</td>
</tr>
<tr>
<td>-daemon</td>
<td>Runs Queuing Service as a daemon/Windows service. When this flag is present, Queuing Service will start in the background. Note that some systems may require special privileges to do this.</td>
</tr>
</tbody>
</table>

\(^a\)This file is resource/scripts/rticommom_config.sh on Linux or macOS systems, resource/scripts/rticommom_config.bat on Windows systems.
Table 4.1 RTI Queuing Service Command-Line Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-domainIdBase &lt;ID&gt;</td>
<td>Sets the base domain ID. This value is added to the domain IDs in the configuration file. For example, if you set -domainIdBase to 50 and use domain IDs 0 and 1 in the configuration file, then Queuing Service will use domains 50 and 51. Default: 0</td>
</tr>
<tr>
<td>-heapSnapshotPeriod</td>
<td>Enables heap monitoring. Queuing Service will generate a heap snapshot every &lt;sec&gt;. Default: heap monitoring is disabled.</td>
</tr>
<tr>
<td>-heapSnapshotDir</td>
<td>When heap monitoring is enabled, this parameter configures the directory where the snapshots will be stored. The snapshot filename format is RTI_&lt;configurationName&gt;&lt;processId&gt;&lt;index&gt;.log. Default: current working directory</td>
</tr>
<tr>
<td>-help</td>
<td>Displays help information.</td>
</tr>
<tr>
<td>-remoteAdministrationDomainId &lt;ID&gt;</td>
<td>Enables remote administration and sets the domain ID for remote communication. When remote administration is enabled, Queuing Service will create a DomainParticipant, Publisher, Subscriber, DataWriter, and DataReader in the designated domain. See Chapter 5, Administering Queuing Service from a Remote Location, in the Queuing Service User's Manual. This option overrides the value of the tag &lt;domain_id&gt; within a &lt;administration&gt; tag. This parameter is required when using -cfgRemote. Default: Remote administration is not enabled unless it is enabled from the XML file.</td>
</tr>
<tr>
<td>-persistentFilePrefix</td>
<td>Specifies a name prefix to use with all files created by Queuing Service. This option overrides the value of the tag &lt;file_prefix&gt; within &lt;persistence_settings&gt;/&lt;filesystem&gt;. Default: Value in &lt;persistence_settings&gt;/&lt;filesystem&gt;/&lt;file_prefix&gt;.</td>
</tr>
<tr>
<td>-persistentStoragePath</td>
<td>Configures the directory for persistent storage. This option overrides the value of the tag &lt;directory&gt; within &lt;persistence_settings&gt;/&lt;filesystem&gt;. Default: Value in &lt;persistence_settings&gt;/&lt;filesystem&gt;/&lt;directory&gt;.</td>
</tr>
<tr>
<td>-var &lt;name&gt;=&lt;value&gt;</td>
<td>Sets the value of the variable &lt;name&gt;. This variable can be referenced within the XML configuration files using the $(&lt;name&gt;) notation. See Section 3.4, Using Variables in XML, in the Queuing Service User's Manual for more information on configuration variables. You may have more than one -var flag on the command line. On Windows platforms, you will need to put quotation marks around the variable name and value, like this: -var&quot;MY_VAR=myvalue&quot;</td>
</tr>
</tbody>
</table>
4.3 Using Queuing Service as a Windows Service

Windows Services automatically run in the background when the system reboots. If you want to run Queuing Service as a Windows Service, use a Windows service wrapper such as nssm or winsw. For instance, you can download nssm from https://nssm.cc/download. Follow the product's documentation to set up Queuing Service as a Windows service. For example, for nssm, see https://nssm.cc/usage.

Here are some things to consider when running Queuing Service as a Windows Service:

- Some versions of Windows do not allow Windows Services to communicate with other services/applications using shared memory. For this reason, if you plan to run Queuing Service as a Windows Service, you should disable the shared-memory transport in all the DomainParticipants created by Queuing Service and in the applications communicating with Queuing Service. For more information on setting builtin transports, see Built-in Transport Plugins, in the RTI Connext DDS Core Libraries User's Manual.

- In some scenarios, you may need to add a multicast address (e.g., builtin.udpv4://239.255.0.1) to your discovery peers. For details on setting the discovery peers, see information about setting discovery peers in the "Troubleshooting" section of Introduction to Publish/Subscribe, in the RTI Connext DDS Getting Started Guide.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-verbosity &lt;n&gt;</td>
<td>Controls what type of messages are logged:</td>
</tr>
<tr>
<td></td>
<td>0 - Silent</td>
</tr>
<tr>
<td></td>
<td>1 - Exceptions (Connext DDS and Queuing Service) (default)</td>
</tr>
<tr>
<td></td>
<td>2 - Warnings (Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>3 - Information (Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>4 - Warnings (Connext DDS and Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>5 - Tracing (Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>6 - Tracing (Connext DDS and Queuing Service)</td>
</tr>
<tr>
<td></td>
<td>Each verbosity level, n, includes all the verbosity levels smaller than n.</td>
</tr>
</tbody>
</table>

| -version     | Prints the Queuing Service version number.                                    |