Red Hat AMQ 2021.Q1

Using the AMQ Ruby Client

For Use with AMQ Clients 2.9

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Abstract

This guide describes how to install and configure the client, run hands-on examples, and use your client with other AMQ components.

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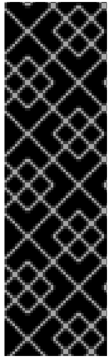
MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see our CTO Chris Wright's message .

CHAPTER 1. OVERVIEW

AMQ Ruby is a library for developing messaging applications. It enables you to write Ruby applications that send and receive AMQP messages.



IMPORTANT

The AMQ Ruby client is a Technology Preview feature only. Technology Preview features are not supported with Red Hat production service level agreements (SLAs) and might not be functionally complete. Red Hat does not recommend using them in production. These features provide early access to upcoming product features, enabling customers to test functionality and provide feedback during the development process.

For more information about the support scope of Red Hat Technology Preview features, see https://access.redhat.com/support/offerings/techpreview/.

AMQ Ruby is part of AMQ Clients, a suite of messaging libraries supporting multiple languages and platforms. For an overview of the clients, see AMQ Clients Overview. For information about this release, see AMQ Clients 2.9 Release Notes .

AMQ Ruby is based on the Proton API from Apache Qpid. For detailed API documentation, see the AMQ Ruby API reference .

1.1. KEY FEATURES

- An event-driven API that simplifies integration with existing applications
- SSL/TLS for secure communication
- Flexible SASL authentication
- Automatic reconnect and failover
- Seamless conversion between AMQP and language-native data types
- Access to all the features and capabilities of AMQP 1.0

1.2. SUPPORTED STANDARDS AND PROTOCOLS

AMQ Ruby supports the following industry-recognized standards and network protocols:

- Version 1.0 of the Advanced Message Queueing Protocol (AMQP)
- Versions 1.0, 1.1, 1.2, and 1.3 of the Transport Layer Security (TLS) protocol, the successor to SSL
- Simple Authentication and Security Layer (SASL) mechanisms supported by Cyrus SASL, including ANONYMOUS, PLAIN, SCRAM, EXTERNAL, and GSSAPI (Kerberos)
- Modern TCP with IPv6

1.3. SUPPORTED CONFIGURATIONS

AMQ Ruby supports the OS and language versions listed below. For more information, see Red Hat AMQ 7 Supported Configurations.

- Red Hat Enterprise Linux 7 with Ruby 2.0
- Red Hat Enterprise Linux 8 with Ruby 2.5

AMQ Ruby is supported in combination with the following AMQ components and versions:

- All versions of AMQ Broker
- All versions of AMQ Interconnect
- A-MQ 6 versions 6.2.1 and newer

1.4. TERMS AND CONCEPTS

This section introduces the core API entities and describes how they operate together.

Table 1.1. API terms

Entity	Description
Container	A top-level container of connections.
Connection	A channel for communication between two peers on a network. It contains sessions.
Session	A context for sending and receiving messages. It contains senders and receivers.
Sender	A channel for sending messages to a target. It has a target.
Receiver	A channel for receiving messages from a source. It has a source.
Source	A named point of origin for messages.
Target	A named destination for messages.
Message	An application-specific piece of information.
Delivery	A message transfer.

AMQ Ruby sends and receives *messages*. Messages are transferred between connected peers over *senders* and *receivers*. Senders and receivers are established over *sessions*. Sessions are established over *connections*. Connections are established between two uniquely identified *containers*. Though a connection can have multiple sessions, often this is not needed. The API allows you to ignore sessions unless you require them.

A sending peer creates a sender to send messages. The sender has a *target* that identifies a queue or topic at the remote peer. A receiving peer creates a receiver to receive messages. The receiver has a *source* that identifies a queue or topic at the remote peer.

The sending of a message is called a *delivery*. The message is the content sent, including all metadata such as headers and annotations. The delivery is the protocol exchange associated with the transfer of that content.

To indicate that a delivery is complete, either the sender or the receiver settles it. When the other side learns that it has been settled, it will no longer communicate about that delivery. The receiver can also indicate whether it accepts or rejects the message.

1.5. DOCUMENT CONVENTIONS

The sudo command

In this document, **sudo** is used for any command that requires root privileges. Exercise caution when using **sudo** because any changes can affect the entire system. For more information about **sudo**, see Using the sudo command.

File paths

In this document, all file paths are valid for Linux, UNIX, and similar operating systems (for example, **/home/andrea**). On Microsoft Windows, you must use the equivalent Windows paths (for example, **C:\Users\andrea**).

Variable text

This document contains code blocks with variables that you must replace with values specific to your environment. Variable text is enclosed in arrow braces and styled as italic monospace. For example, in the following command, replace ***<project-dir>*** with the value for your environment:

```
$ cd <project-dir>
```

CHAPTER 2. INSTALLATION

This chapter guides you through the steps to install AMQ Ruby in your environment.

2.1. PREREQUISITES

- You must have a subscription to access AMQ release files and repositories.
- To install packages on Red Hat Enterprise Linux, you must register your system.
- To use AMQ Ruby, you must install Ruby in your environment.

2.2. INSTALLING ON RED HAT ENTERPRISE LINUX

Procedure

1. Use the **subscription-manager** command to subscribe to the required package repositories. If necessary, replace ***<variant>*** with the value for your variant of Red Hat Enterprise Linux (for example, **server** or **workstation**).

   Red Hat Enterprise Linux 7

   ```
   $ sudo subscription-manager repos --enable=amq-clients-2-for-rhel-7-<variant>-rpms
   ```

   Red Hat Enterprise Linux 8

   ```
   $ sudo subscription-manager repos --enable=amq-clients-2-for-rhel-8-x86_64-rpms
   ```

2. Use the **yum** command to install the **rubygem-qpid_proton** and **rubygem-qpid_proton-doc** packages.

   ```
   $ sudo yum install rubygem-qpid_proton rubygem-qpid_proton-doc
   ```

For more information about using packages, see Appendix B, *Using Red Hat Enterprise Linux packages*.

CHAPTER 3. GETTING STARTED

This chapter guides you through the steps to set up your environment and run a simple messaging program.

3.1. PREREQUISITES

- You must complete the installation procedure for your environment.
- You must have an AMQP 1.0 message broker listening for connections on interface **localhost** and port **5672**. It must have anonymous access enabled. For more information, see Starting the broker.
- You must have a queue named **examples**. For more information, see Creating a queue.

3.2. RUNNING HELLO WORLD

The Hello World example creates a connection to the broker, sends a message containing a greeting to the **examples** queue, and receives it back. On success, it prints the received message to the console.

Change to the examples directory and run the **helloworld.rb** example.

```
$ cd /usr/share/proton/examples/ruby/
$ ruby helloworld.rb amqp://127.0.0.1 examples
Hello World!
```

CHAPTER 4. EXAMPLES

This chapter demonstrates the use of AMQ Ruby through example programs.

For more examples, see the AMQ Ruby example suite and the Qpid Proton Ruby examples.

4.1. SENDING MESSAGES

This client program connects to a server using **<connection-url>**, creates a sender for target **<address>**, sends a message containing **<message-body>**, closes the connection, and exits.

Example: Sending messages

```
require 'qpid_proton'

class SendHandler < Qpid::Proton::MessagingHandler
  def initialize(conn_url, address, message_body)
    super()

    @conn_url = conn_url
    @address = address
    @message_body = message_body
  end

  def on_container_start(container)
    conn = container.connect(@conn_url)
    conn.open_sender(@address)
  end

  def on_sender_open(sender)
    puts "SEND: Opened sender for target address '#{sender.target.address}'\n"
  end

  def on_sendable(sender)
    message = Qpid::Proton::Message.new(@message_body)
    sender.send(message)

    puts "SEND: Sent message '#{message.body}'\n"

    sender.close
    sender.connection.close
  end
end

if ARGV.size == 3
  conn_url, address, message_body = ARGV
else
  abort "Usage: send.rb <connection-url> <address> <message-body>\n"
end

handler = SendHandler.new(conn_url, address, message_body)
container = Qpid::Proton::Container.new(handler)
container.run
```

Running the example

To run the example program, copy it to a local file and invoke it using the **ruby** command. For more information, see Chapter 3, *Getting started*.

```
$ ruby send.rb amqp://localhost queue1 hello
```

4.2. RECEIVING MESSAGES

This client program connects to a server using **<connection-url>**, creates a receiver for source **<address>**, and receives messages until it is terminated or it reaches **<count>** messages.

Example: Receiving messages

```
require 'qpid_proton'

class ReceiveHandler < Qpid::Proton::MessagingHandler
  def initialize(conn_url, address, desired)
    super()

    @conn_url = conn_url
    @address = address

    @desired = desired
    @received = 0
  end

  def on_container_start(container)
    conn = container.connect(@conn_url)
    conn.open_receiver(@address)
  end

  def on_receiver_open(receiver)
    puts "RECEIVE: Opened receiver for source address '#{receiver.source.address}'\n"
  end

  def on_message(delivery, message)
    puts "RECEIVE: Received message '#{message.body}'\n"

    @received += 1

    if @received == @desired
      delivery.receiver.close
      delivery.receiver.connection.close
    end
  end
end

if ARGV.size > 1
  conn_url, address = ARGV[0..1]
else
  abort "Usage: receive.rb <connection-url> <address> [<message-count>]\n"
end

begin
  desired = Integer(ARGV[2])
rescue TypeError
```

```
  desired = 0
end

handler = ReceiveHandler.new(conn_url, address, desired)
container = Qpid::Proton::Container.new(handler)
container.run
```

Running the example

To run the example program, copy it to a local file and invoke it using the **ruby** command. For more information, see Chapter 3, *Getting started*.

```
$ ruby receive.rb amqp://localhost queue1
```

CHAPTER 5. NETWORK CONNECTIONS

5.1. CONNECTION URLS

Connection URLs encode the information used to establish new connections.

Connection URL syntax

```
scheme://host[:port]
```

- *Scheme* - The connection transport, either **amqp** for unencrypted TCP or **amqps** for TCP with SSL/TLS encryption.
- *Host* - The remote network host. The value can be a hostname or a numeric IP address. IPv6 addresses must be enclosed in square brackets.
- *Port* - The remote network port. This value is optional. The default value is 5672 for the **amqp** scheme and 5671 for the **amqps** scheme.

Connection URL examples

```
amqps://example.com
amqps://example.net:56720
amqp://127.0.0.1
amqp://[::1]:2000
```

CHAPTER 6. SENDERS AND RECEIVERS

The client uses sender and receiver links to represent channels for delivering messages. Senders and receivers are unidirectional, with a source end for the message origin, and a target end for the message destination.

Sources and targets often point to queues or topics on a message broker. Sources are also used to represent subscriptions.

6.1. CREATING QUEUES AND TOPICS ON DEMAND

Some message servers support on-demand creation of queues and topics. When a sender or receiver is attached, the server uses the sender target address or the receiver source address to create a queue or topic with a name matching the address.

The message server typically defaults to creating either a queue (for one-to-one message delivery) or a topic (for one-to-many message delivery). The client can indicate which it prefers by setting the **queue** or **topic** capability on the source or target.

For more details, see the following examples:

- queue-send.rb
- queue-receive.rb
- topic-send.rb
- topic-receive.rb

6.2. CREATING DURABLE SUBSCRIPTIONS

A durable subscription is a piece of state on the remote server representing a message receiver. Ordinarily, message receivers are discarded when a client closes. However, because durable subscriptions are persistent, clients can detach from them and then re-attach later. Any messages received while detached are available when the client re-attaches.

Durable subscriptions are uniquely identified by combining the client container ID and receiver name to form a subscription ID. These must have stable values so that the subscription can be recovered.

Example

6.3. CREATING SHARED SUBSCRIPTIONS

A shared subscription is a piece of state on the remote server representing one or more message receivers. Because it is shared, multiple clients can consume from the same stream of messages.

The client configures a shared subscription by setting the **shared** capability on the receiver source.

Shared subscriptions are uniquely identified by combining the client container ID and receiver name to form a subscription ID. These must have stable values so that multiple client processes can locate the same subscription. If the **global** capability is set in addition to **shared**, the receiver name alone is used to identify the subscription.

Example

CHAPTER 7. LOGGING

7.1. ENABLING PROTOCOL LOGGING

The client can log AMQP protocol frames to the console. This data is often critical when diagnosing problems.

To enable protocol logging, set the **PN_TRACE_FRM** environment variable to **1**:

Example: Enabling protocol logging

```
$ export PN_TRACE_FRM=1
$ <your-client-program>
```

To disable protocol logging, unset the **PN_TRACE_FRM** environment variable.

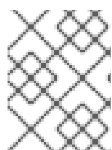
CHAPTER 8. INTEROPERABILITY

This chapter discusses how to use AMQ Ruby in combination with other AMQ components. For an overview of the compatibility of AMQ components, see the product introduction.

8.1. INTEROPERATING WITH OTHER AMQP CLIENTS

AMQP messages are composed using the AMQP type system. This common format is one of the reasons AMQP clients in different languages are able to interoperate with each other.

When sending messages, AMQ Ruby automatically converts language-native types to AMQP-encoded data. When receiving messages, the reverse conversion takes place.



NOTE

More information about AMQP types is available at the interactive type reference maintained by the Apache Qpid project.

Table 8.1. AMQP types

AMQP type	Description
null	An empty value
boolean	A true or false value
char	A single Unicode character
string	A sequence of Unicode characters
binary	A sequence of bytes
byte	A signed 8-bit integer
short	A signed 16-bit integer
int	A signed 32-bit integer
long	A signed 64-bit integer
ubyte	An unsigned 8-bit integer
ushort	An unsigned 16-bit integer
uint	An unsigned 32-bit integer
ulong	An unsigned 64-bit integer
float	A 32-bit floating point number

AMQP type	Description
double	A 64-bit floating point number
array	A sequence of values of a single type
list	A sequence of values of variable type
map	A mapping from distinct keys to values
uuid	A universally unique identifier
symbol	A 7-bit ASCII string from a constrained domain
timestamp	An absolute point in time

Table 8.2. AMQ Ruby types before encoding and after decoding

AMQP type	AMQ Ruby type before encoding	AMQ Ruby type after decoding
null	nil	nil
boolean	true, false	true, false
char	-	String
string	String	String
binary	-	String
byte	-	Integer
short	-	Integer
int	-	Integer
long	Integer	Integer
ubyte	-	Integer
ushort	-	Integer
uint	-	Integer
ulong	-	Integer

AMQP type	AMQ Ruby type before encoding	AMQ Ruby type after decoding
float	-	Float
double	Float	Float
array	-	Array
list	Array	Array
map	Hash	Hash
symbol	Symbol	Symbol
timestamp	Date, Time	Time

Table 8.3. AMQ Ruby and other AMQ client types (1 of 2)

AMQ Ruby type before encoding	AMQ C++ type	AMQ JavaScript type
nil	nullptr	null
true, false	bool	boolean
String	std::string	string
Integer	int64_t	number
Float	double	number
Array	std::vector	Array
Hash	std::map	object
Symbol	proton::symbol	string
Date, Time	proton::timestamp	number

Table 8.4. AMQ Ruby and other AMQ client types (2 of 2)

AMQ Ruby type before encoding	AMQ .NET type	AMQ Python type
nil	null	None
true, false	System.Boolean	bool

AMQ Ruby type before encoding	AMQ .NET type	AMQ Python type
String	**System.String**	**unicode**
Integer	**System.Int64**	**long**
Float	**System.Double**	**float**
Array	**Amqp.List**	**list**
Hash	**Amqp.Map**	**dict**
Symbol	**Amqp.Symbol**	**str**
Date, Time	**System.DateTime**	**long**

8.2. INTEROPERATING WITH AMQ JMS

AMQP defines a standard mapping to the JMS messaging model. This section discusses the various aspects of that mapping. For more information, see the AMQ JMS Interoperability chapter.

JMS message types

AMQ Ruby provides a single message type whose body type can vary. By contrast, the JMS API uses different message types to represent different kinds of data. The table below indicates how particular body types map to JMS message types.

For more explicit control of the resulting JMS message type, you can set the **x-opt-jms-msg-type** message annotation. See the AMQ JMS Interoperability chapter for more information.

Table 8.5. AMQ Ruby and JMS message types

AMQ Ruby body type	JMS message type
String	**TextMessage**
nil	**TextMessage**
-	**BytesMessage**
Any other type	**ObjectMessage**

8.3. CONNECTING TO AMQ BROKER

AMQ Broker is designed to interoperate with AMQP 1.0 clients. Check the following to ensure the broker is configured for AMQP messaging:

- Port 5672 in the network firewall is open.

- The AMQ Broker AMQP acceptor is enabled. See Default acceptor settings.
- The necessary addresses are configured on the broker. See Addresses, Queues, and Topics.
- The broker is configured to permit access from your client, and the client is configured to send the required credentials. See Broker Security.

8.4. CONNECTING TO AMQ INTERCONNECT

AMQ Interconnect works with any AMQP 1.0 client. Check the following to ensure the components are configured correctly:

- Port 5672 in the network firewall is open.
- The router is configured to permit access from your client, and the client is configured to send the required credentials. See Securing network connections.

APPENDIX A. USING YOUR SUBSCRIPTION

AMQ is provided through a software subscription. To manage your subscriptions, access your account at the Red Hat Customer Portal.

A.1. ACCESSING YOUR ACCOUNT

Procedure

1. Go to access.redhat.com.
2. If you do not already have an account, create one.
3. Log in to your account.

A.2. ACTIVATING A SUBSCRIPTION

Procedure

1. Go to access.redhat.com.
2. Navigate to **My Subscriptions**.
3. Navigate to **Activate a subscription** and enter your 16-digit activation number.

A.3. DOWNLOADING RELEASE FILES

To access .zip, .tar.gz, and other release files, use the customer portal to find the relevant files for download. If you are using RPM packages or the Red Hat Maven repository, this step is not required.

Procedure

1. Open a browser and log in to the Red Hat Customer Portal **Product Downloads** page at access.redhat.com/downloads.
2. Locate the **Red Hat AMQ** entries in the **INTEGRATION AND AUTOMATION** category.
3. Select the desired AMQ product. The **Software Downloads** page opens.
4. Click the **Download** link for your component.

A.4. REGISTERING YOUR SYSTEM FOR PACKAGES

To install RPM packages for this product on Red Hat Enterprise Linux, your system must be registered. If you are using downloaded release files, this step is not required.

Procedure

1. Go to access.redhat.com.
2. Navigate to **Registration Assistant**.
3. Select your OS version and continue to the next page.

4. Use the listed command in your system terminal to complete the registration.

For more information about registering your system, see one of the following resources:

- Red Hat Enterprise Linux 7 - Registering the system and managing subscriptions
- Red Hat Enterprise Linux 8 - Registering the system and managing subscriptions

APPENDIX B. USING RED HAT ENTERPRISE LINUX PACKAGES

This section describes how to use software delivered as RPM packages for Red Hat Enterprise Linux.

To ensure the RPM packages for this product are available, you must first register your system.

B.1. OVERVIEW

A component such as a library or server often has multiple packages associated with it. You do not have to install them all. You can install only the ones you need.

The primary package typically has the simplest name, without additional qualifiers. This package provides all the required interfaces for using the component at program run time.

Packages with names ending in **-devel** contain headers for C and C++ libraries. These are required at compile time to build programs that depend on this package.

Packages with names ending in **-docs** contain documentation and example programs for the component.

For more information about using RPM packages, see one of the following resources:

- Red Hat Enterprise Linux 7 - Installing and managing software
- Red Hat Enterprise Linux 8 - Managing software packages

B.2. SEARCHING FOR PACKAGES

To search for packages, use the **yum search** command. The search results include package names, which you can use as the value for ***<package>*** in the other commands listed in this section.

```
$ yum search <keyword>...
```

B.3. INSTALLING PACKAGES

To install packages, use the **yum install** command.

```
$ sudo yum install <package>...
```

B.4. QUERYING PACKAGE INFORMATION

To list the packages installed in your system, use the **rpm -qa** command.

```
$ rpm -qa
```

To get information about a particular package, use the **rpm -qi** command.

```
$ rpm -qi <package>
```

To list all the files associated with a package, use the **rpm -ql** command.

```
$ rpm -ql <package>
```

APPENDIX C. USING AMQ BROKER WITH THE EXAMPLES

The AMQ Ruby examples require a running message broker with a queue named **examples**. Use the procedures below to install and start the broker and define the queue.

C.1. INSTALLING THE BROKER

Follow the instructions in *Getting Started with AMQ Broker* to install the broker and create a broker instance. Enable anonymous access.

The following procedures refer to the location of the broker instance as ***<broker-instance-dir>***.

C.2. STARTING THE BROKER

Procedure

1. Use the **artemis run** command to start the broker.

```
$ <broker-instance-dir>/bin/artemis run
```

2. Check the console output for any critical errors logged during startup. The broker logs **Server is now live** when it is ready.

```
$ example-broker/bin/artemis run
           __  __  ____    ____            _
     /\   |  \/  |/ __ \  |  _ \          | |
    /  \  | \  / | |  | | | |_) |_ __ ___ | | _____ _ __
   / /\ \ | |\/| | |  | | |  _ <| '__/ _ \| |/ / _ \ '__|
  / ____ \| |  | | |__| | | |_) | | | (_) |   <  __/ |
 /_/    \_\_|  |_|\___\_\ |____/|_|  \___/|_|\_\___|_|

 Red Hat AMQ <version>

2020-06-03 12:12:11,807 INFO  [org.apache.activemq.artemis.integration.bootstrap]
AMQ101000: Starting ActiveMQ Artemis Server
...
2020-06-03 12:12:12,336 INFO  [org.apache.activemq.artemis.core.server] AMQ221007:
Server is now live
...
```

C.3. CREATING A QUEUE

In a new terminal, use the **artemis queue** command to create a queue named **examples**.

```
$ <broker-instance-dir>/bin/artemis queue create --name examples --address examples --auto-
create-address --anycast
```

You are prompted to answer a series of yes or no questions. Answer **N** for no to all of them.

Once the queue is created, the broker is ready for use with the example programs.

C.4. STOPPING THE BROKER

When you are done running the examples, use the **artemis stop** command to stop the broker.

```
$ <broker-instance-dir>/bin/artemis stop
```

Revised on 2021-05-07 10:16:28 UTC