Distributed Message Service for RabbitMQ

User Guide

Issue 05

Date 2023-03-09

HUAWEI CLOUD COMPUTING TECHNOLOGIES CO., LTD.

Trademarks and Permissions


and other Huawei trademarks are the property of Huawei Technologies Co., Ltd.
All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Huawei Cloud and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Contents

1 Service Overview

1.1 What Is DMS for RabbitMQ?

Based on the open-source RabbitMQ, Distributed Message Service (DMS) for RabbitMQ provides messaging services with rich messaging features, flexible routing, high availability, monitoring, and alarming functions. It is applicable to flash sales, flow control, and system decoupling scenarios.

- Immediate use

  DMS for RabbitMQ provides single-node and cluster instances with a range of specifications for you to choose from. Instances can be created with just a few clicks on the console, without requiring you to prepare servers.
- Rich features

  DMS for RabbitMQ supports Advanced Message Queuing Protocol (AMQP) and a variety of messaging features such as message broadcast, delayed delivery, and dead letter queues.
- Flexible routing

  In RabbitMQ, an exchange receives messages from producers and pushes the messages to queues. RabbitMQ provides direct, topic, headers, and fanout exchanges. You can also bind and customize exchanges.
- High availability

  In a RabbitMQ cluster, data is replicated to all nodes through mirrored queues, preventing service interruption and data loss in case of a node breakdown.
- Monitoring and alarm

  RabbitMQ cluster metrics are monitored and reported, including broker memory, CPU usage, and network flow. If an exception is detected, an alarm will be triggered.

1.2 Product Advantages

DMS for RabbitMQ provides easy-to-use message queuing based on RabbitMQ. Services can be quickly migrated to the cloud without any change, reducing maintenance and usage costs.

- Rapid deployment

  Simply set instance information on the DMS for RabbitMQ console, submit your order, and a complete RabbitMQ instance will be automatically created and deployed.

- Service migration without modifications

  DMS for RabbitMQ is compatible with open-source RabbitMQ APIs and supports all message processing functions of open-source RabbitMQ.

  If your application services are developed based on open-source RabbitMQ, you can easily migrate them to DMS for RabbitMQ after specifying a few authentication configurations.

  NOTE

  RabbitMQ instances are compatible with RabbitMQ 3.7.17 and 3.8.35.

- Exclusive experience

  RabbitMQ instances are physically isolated from each other and exclusively owned by the tenant.

- High performance

  Each queue can process up to 100,000 transactions per second (with default configurations). Performance can be increased simply by adding queues.

- Data security

  Operations on RabbitMQ instances are recorded and can be audited. Messages can be encrypted before storage.

  In addition to SSL, VPCs and security groups also provide security controls on network access.

- Simple O&M

  The cloud service platform provides a whole set of monitoring and alarm services, eliminating the need for 24/7 attendance. RabbitMQ instance metrics are monitored and reported, including the number of partitions, topics, and accumulated messages. You can configure alarm rules and receive SMS or email notifications on how your services are running in real time.

- Multi-language support

  RabbitMQ is an open-source service based on AMQP. It is used to store and forward messages in a distributed system. A RabbitMQ server is compiled in Erlang (supporting high concurrency, distribution, and robust fault tolerance), and a RabbitMQ client can be compiled in various programming languages, including Python, Ruby, .NET, Java, JMS, C, PHP, ActionScript, XMPP, STOMP, and AJAX.

1.3 Application Scenarios

RabbitMQ is popular message-oriented middleware that features highly reliable, asynchronous message delivery. It can be used for transmitting data between different systems in the enterprise application, payment, telecommunications, e-commerce, social networking, instant messaging, video, Internet of Things, and Internet of Vehicle industries.

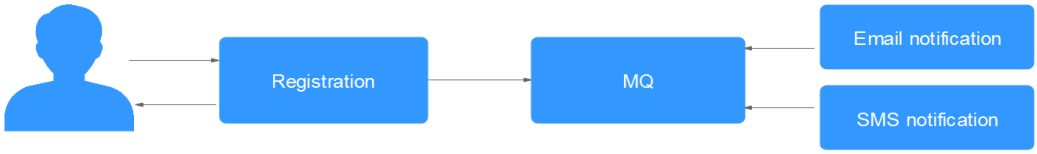
Asynchronous Communication

Non-core or less important messages are sent asynchronously to receiving systems, so that the main service process is not kept waiting for the results of other systems, allowing for faster responses.

For example, RabbitMQ can be used to send a notification email and SMS message after a user has registered with a website, providing fast responses throughout the registration process.

Figure 1-1 Serial registration and notification

Figure 1-2 Asynchronous registration and notification using message queues

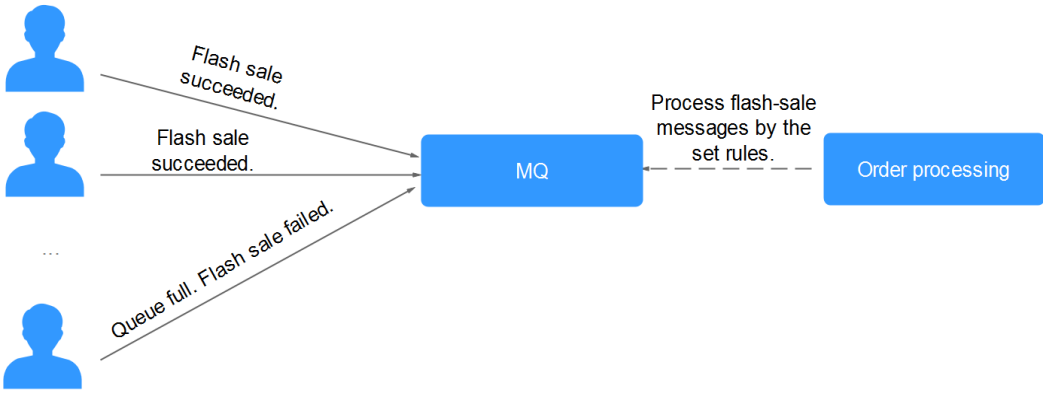


Traffic Control

In e-commerce systems or large-scale websites, there is a processing capability gap between upstream and downstream systems. Traffic bursts from upstream systems with high processing capabilities may have a large impact on downstream systems with lower processing capabilities. For example, online sales promotions involve a huge amount of traffic flooding into e-commerce systems. RabbitMQ provides a three-day buffer by default for hundreds of millions of messages, such as orders and other information. In this way, message consumption systems can process the messages during off-peak periods.

In addition, flash sale traffic bursts originating from frontend systems can be handled with RabbitMQ, keeping the backend systems from crashing.

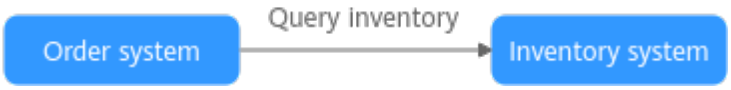
Figure 1-3 Traffic burst handling using RabbitMQ



System Decoupling

Take e-commerce flash sales as an example. Traditionally, an order processing system sends order requests to the inventory system and waits for responses. If the inventory system goes down, the order processing system will not be able to get the data it wants, and the order will fail to be submitted. This means that the order processing system and the inventory system are closely coupled.

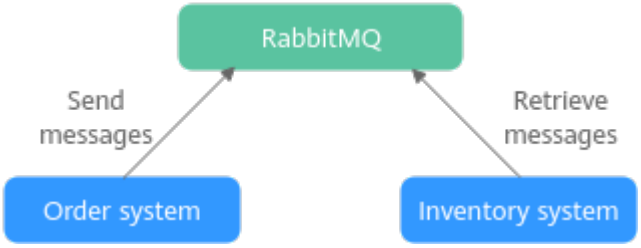
Figure 1-4 Closely coupled systems



With RabbitMQ, order submission data will be stored in queues. Then, a response will be returned indicating that the order has been submitted.

The inventory system consumes the order submission message it has subscribed to. In this way, order submission will not be interrupted even if the inventory system breaks down.

Figure 1-5 System decoupling



High Availability

Normally, there is only one broker. If the broker fails, queues on it will become unavailable.

Queue mirroring is available since RabbitMQ 2.6.0. In a RabbitMQ cluster, queues can be mirrored across brokers. In the event of a broker failure, services are still available because the mirrors will take over.

Quorum queues are available since RabbitMQ 3.8. Quorum queues can be used to replicate queue data, ensuring that queues can still run if a broker breaks down.

1.4 Specifications

RabbitMQ Instance Specifications

RabbitMQ instances are compatible with RabbitMQ 3.7.17 and 3.8.35. **Table 1-1** lists the specifications of single-node and cluster RabbitMQ instances.

NOTE

- To ensure stability, **the maximum size of a single message is 50 MB. Do not send a message larger than 50 MB**.
- In the following tables, TPS is represented by the number of messages (2 KB each) processed per second. In the tests, persistence and queue mirroring were not enabled. Messages were retrieved immediately after creation and were not accumulated in the queues. The data is for reference only and may differ from that in your production environment.
- Performance is related to the queue quantity, message accumulation, number of connections, number of channels, number of consumers, queue mirroring, priority queue, message persistence, and the exchange type. Select instance specifications based on the pressure test result of the service model.
- A maximum of 2047 channels can be opened on a connection.

Table 1-1 Specifications of RabbitMQ instances

Flavor	Brokers	Storage Space	Reference TPS	Maximum Consumers per Broker	Recommended Queues per Broker	Maximum Connections per Broker
rabbitmq.2u4g.single	1	100 GB–30,000 GB	10,000	20,000	200	3000
rabbitmq.4u8g.single	1	100 GB–30,000 GB	20,000	30,000	400	4500
rabbitmq.8u16g.single	1	100 GB–30,000 GB	35,000	50,000	800	7500
rabbitmq.16u32g.single	1	100 GB–30,000 GB	45,000	80,000	1600	12,000
rabbitmq.2u4g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	30,000–70,000	20,000	200	3000
rabbitmq.4u8g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	45,000–80,000	30,000	400	4500
rabbitmq.8u16g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	85,000–120,000	50,000	800	7500
rabbitmq.12u24g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	100,000–150,000	60,000	1200	10,000

Flavor	Brokers	Storage Space	Reference TPS	Maximum Consumers per Broker	Recommended Queues per Broker	Maximum Connections per Broker
rabbitmq.16u32g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	130,000–180,000	80,000	1600	12,000

Storage Space Selection

In cluster mode, RabbitMQ persists messages to disk. When creating a RabbitMQ instance, select a proper storage space size based on the estimated message size and the number of replicas in a mirrored queue, which can be maximally equal to the number of brokers in the cluster.

For example, if the estimated message size is 100 GB, the disk capacity must be at least: 100 GB x Number of mirrored replicas + 100 GB (reserved).

For single-node instances, select a storage space size based on the estimated message size and the reserved disk space.

You can change the number of brokers in a cluster, but cannot change the specifications of a single-node instance.

1.5 Comparing RocketMQ, Kafka, and RabbitMQ

Feature	RocketMQ	Kafka	RabbitMQ
Priority queue	Not supported	Not supported	Supported. It is recommended that the priority be set to 0–10.
Delayed queue	Supported	Not supported	Supported
Dead letter queue	Supported	Not supported	Supported
Message retry	Supported	Not supported	Not supported
Retrieval mode	Pull-based and push-based	Pull-based	Pull-based and push-based
Message broadcasting	Supported	Supported	Supported
Message tracking	Supported	Supports offset and timestamp tracking.	Not supported. Once a message retrieval has been acknowledged, RabbitMQ will be notified that the message can be deleted.

Feature	RocketMQ	Kafka	RabbitMQ
Message accumulation	Supported	Supports higher accumulation performance than RabbitMQ thanks to high throughput.	Supported
Persistence	Supported	Supported	Supported
Message tracing	Supported	Not supported	Supported by the firehose feature or the rabbitmq_tracing plugin. However, rabbitmq_tracing reduces performance and should be used only for troubleshooting.
Message filtering	Supported	Supported	Not supported, but can be encapsulated.
Multi-tenancy	Supported	Not supported	Supported
Multi-protocol	Compatible with RocketMQ.	Only supports Apache Kafka.	RabbitMQ is based on AMQP and supports MQTT and STOMP.
Multi-language	Supports clients in multiple programming languages.	Kafka is written in Scala and Java and supports clients in multiple programming languages.	RabbitMQ is written in Erlang and supports clients in multiple programming languages.
Throttling	Planned	Supports throttling on producer or consumer clients.	Supports credit-based throttling on producers, a mechanism that triggers protection from within.
Ordered message delivery	Message order is maintained within a queue.	Supports partition-level FIFO.	Not supported. Supports FIFO only for single-threaded message queuing without advanced features such as delayed queues or priority queues.
Security	Supports SSL authentication.	Supports SSL and SASL authentication and read/write permissions control.	Similar to Kafka.
Transactional messages	Supported	Supported	Supported

1.6 Related Services

- Elastic Cloud Server (ECS)

  An ECS is a basic computing unit that consists of vCPUs, memory, OS, and EVS disks. RabbitMQ instances run on ECSs. A broker corresponds to an ECS.

- Elastic Volume Service (EVS)

  EVS provides block storage services for ECSs. All RabbitMQ data, such as messages, metadata, and logs, is stored in EVS disks.

- Cloud Trace Service (CTS)

  Cloud Trace Service (CTS) generates traces to provide you with a history of operations performed on cloud service resources. The traces include operation requests sent using the cloud management console or open APIs as well as the operation results. You can view all generated traces to query, audit, and backtrack performed operations.

- VPC

  RabbitMQ instances run in VPCs and use the IP addresses and bandwidth of VPC. Security groups of VPCs enhance the security of network access to the RabbitMQ instances.

- Cloud Eye

  Cloud Eye is an open platform that provides monitoring, alarm reporting, and alarm notification for your resources in real time.

  NOTE

  The values of all RabbitMQ instance metrics are reported to Cloud Eye every minute.

- Elastic IP (EIP)

  The EIP service provides independent public IP addresses and bandwidth for Internet access. RabbitMQ instances bound with EIPs can be accessed over public networks.

- Data Encryption Workshop (DEW)

  When creating a RabbitMQ instance, you can specify whether to enable disk encryption. Enabling disk encryption improves data security. Disk encryption depends on DEW.

- Tag Management Service (TMS)

  TMS is a visualized service for fast and unified cross-region tagging and categorization of cloud services.

  Tags facilitate RabbitMQ instance identification and management.

1.7 Notes and Constraints

DMS for RabbitMQ has the following constraints, as listed in **Table 1-2**.

Table 1-2 RabbitMQ usage constraints

Item	Constraint	Description
Version	Server version: 3.7.17 and 3.8.35	AMQP 0-9-1 clients are supported.
Number of connections	The allowed number of connections differs by instance specifications and mode (single-node or cluster). For details, see **Specifications**.	-
Channels	≤ 2047	Number of channels that can be created for a single connection.
Message size	≤ 50 MB per message	Do not send a message larger than 50 MB. Otherwise, the message will fail to be created.
Memory high watermark	≤ 40%	If the memory usage exceeds 40%, the high memory watermark is triggered, blocking publishers.
Disk high watermark	≥ 5 GB	If the remaining disk space is less than 5 GB, the high disk watermark is triggered, blocking publishers.

Item	Constraint	Description
cluster_partition_handling	pause_minority	When a network partition occurs in a cluster, cluster brokers will determine whether they are in a minority, that is, fewer than or equal to the total number of brokers. Minority brokers pause when a partition starts, detect the network status periodically, and start again when the partition ends. If queue mirroring is not enabled, queue replicas in the minority will no longer be available for message creation and retrieval. This strategy sacrifices availability for data consistency.
rabbitmq_delayed_message_exchange	There may be an error of about 1%. The actual delivery time may be earlier or later than the scheduled delivery time.	Whether delayed message delivery is enabled for the instance

1.8 Basic Concepts

DMS for RabbitMQ uses RabbitMQ as the messaging engine. In RabbitMQ, messages are sent by producers, stored in queues, and received by consumers. The following explains basic concepts of RabbitMQ.

Message

A message has a message body and a label. The message body, in JSON or other formats, contains the content of the message. The label only describes the message.

Messages are sent by producers and retrieved by consumers, but a producer and a consumer are not directly linked to each other.

Producer

A producer is an application that sends messages to queues. The messages are then delivered to other systems or modules for processing as agreed.

Consumer

A consumer is an application that receives messages. Consumers subscribe to queues. During routing, only the message body will be stored in the queue, so only the message body will be consumed by consumers.

Queue

A queue stores messages that are sent from producers and await retrievals by consumers. If different consumers subscribe to the same queue, the messages in that queue will be distributed across the consumers.

Broker

Nodes that provide message middleware services.

1.9 Permissions Management

You can use Identity and Access Management (IAM) to manage DMS for RabbitMQ permissions and control access to your resources. IAM provides identity authentication, permissions management, and access control.

You can create IAM users for your employees, and assign permissions to these users on a principle of least privilege (PoLP) basis to control their access to specific resource types. For example, you can create IAM users for software developers and assign specific permissions to allow them to use DMS for RabbitMQ resources but prevent them from being able to delete resources or perform any high-risk operations.

If your account does not require individual IAM users for permissions management, skip this section.

IAM is free of charge. You pay only for the resources you use. For more information, see **IAM Service Overview**.

DMS for RabbitMQ Permissions

By default, new IAM users do not have any permissions assigned. To assign permissions to these new users, add them to one or more groups, and attach permissions policies or roles to these groups.

DMS for RabbitMQ is a project-level service deployed and accessed in specific physical regions. When assigning DMS for RabbitMQ permissions to a user group, specify region-specific projects where the permissions will take effect. If you select **All projects**, the permissions will be granted for all region-specific projects. When accessing DMS for RabbitMQ, the users need to switch to a region where they have been authorized to use this service.

You can grant permissions by using roles and policies.

- Roles: A type of coarse-grained authorization mechanism that provides only a limited number of service-level roles. When using roles to grant permissions, you also need to assign dependency roles. However, roles are not an ideal choice for fine-grained authorization and secure access control.

- Policies: A type of fine-grained authorization mechanism that defines permissions required to perform operations on specific cloud resources under certain conditions. This mechanism allows for more flexible policy-based authorization for securer access control. For example, you can grant DMS for RabbitMQ users only the permissions for managing instances. Most policies define permissions based on APIs. For the API actions supported by DMS for RabbitMQ, see **Permissions Policies and Supported Actions**.

NOTE

Permissions policies of DMS for RabbitMQ are based on DMS. Therefore, when assigning permissions, select DMS permissions policies.

Table 1-3 lists all the system-defined roles and policies supported by DMS for RabbitMQ.

Table 1-3 System-defined roles and policies supported by DMS for RabbitMQ

Role/Policy Name	Description	Type	Dependency
DMS FullAccess	Administrator permissions for DMS. Users granted these permissions can perform all operations on DMS.	System-defined policy	None
DMS UserAccess	Common user permissions for DMS, excluding permissions for creating, modifying, deleting, and scaling up instances.	System-defined policy	None
DMS ReadOnlyAccess	Read-only permissions for DMS. Users granted these permissions can only view DMS data.	System-defined policy	None
DMS Administrator	Administrator permissions for DMS.	System-defined role	This role depends on the **Tenant Guest** and **VPC Administrator** roles.

Table 2 lists the common operations supported by each DMS for RabbitMQ system policy or role. Select the policies or roles as required.

Table 1-4 Common operations supported by each system policy

Operation	DMS FullAccess	DMS UserAccess	DMS ReadOnlyAccess
Creating instances	√	×	×
Modifying instances	√	×	×
Deleting instances	√	×	×
Modifying instance specifications	√	×	×
Restarting instances	√	√	×
Querying instance information	√	√	√

Helpful Links

- **What Is IAM?**
- **Creating a User and Granting DMS for RabbitMQ Permissions**
- **Permissions Policies and Supported Actions**

1.10 Billing

DMS for RabbitMQ supports pay-per-use.

Billing Items

DMS for RabbitMQ is billed based on RabbitMQ instance specifications and storage space.

Table 1-5 Billing of DMS for RabbitMQ

Billing Item	Description
Instance	• RabbitMQ instances are billed based on the specifications described in **Table 1-6**. • RabbitMQ instances can be billed on a pay-per-use (hourly) basis.

Billing Item	Description
Storage	• RabbitMQ instances are also billed based on the storage space. For each type of instance specification, you can choose the high I/O or ultra-high I/O disk type to meet your service requirements. You can specify the number of replicas when creating a topic. For example, if the required disk size to store the message data is 100 GB and there are three replicas, the disk capacity should be at least: 100 GB x 3 = 300 GB. • Storage space can be specified with increments of 100 GB. For details about the storage space range, see **Table 1-6**. • Storage space can be billed on a pay-per-use (hourly) basis.

Table 1-6 Specifications of RabbitMQ instances

Flavor	Brokers	Storage Space	Reference TPS	Maximum Consumers per Broker	Recommended Queues per Broker	Maximum Connections per Broker
rabbitmq.2u4g.single	1	100 GB–30,000 GB	10,000	20,000	200	3000
rabbitmq.4u8g.single	1	100 GB–30,000 GB	20,000	30,000	400	4500
rabbitmq.8u16g.single	1	100 GB–30,000 GB	35,000	50,000	800	7500
rabbitmq.16u32g.single	1	100 GB–30,000 GB	45,000	80,000	1600	12,000
rabbitmq.2u4g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	30,000–70,000	20,000	200	3000

Flavor	Brokers	Storage Space	Reference TPS	Maximum Consumers per Broker	Recommended Queues per Broker	Maximum Connections per Broker
rabbitmq.4u8g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	45,000–80,000	30,000	400	4500
rabbitmq.8u16g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	85,000–120,000	50,000	800	7500
rabbitmq.12u24g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	100,000–150,000	60,000	1200	10,000
rabbitmq.16u32g.cluster	3/5/7	3/5/7 x 100 GB–30,000 GB	130,000–180,000	80,000	1600	12,000

Mapping Between Old and New Flavors

Table 1-7 compares the old and new RabbitMQ instance flavors.

Table 1-7 Mapping between old and new RabbitMQ instance flavors

Old Flavor	TPS (Old)	New Flavor	TPS (New)
2 vCPUs | 4 GB x 1	10,000	rabbitmq.2u4g.single x 1	10,000
4 vCPUs | 8 GB x 1	20,000	rabbitmq.4u8g.single x 1	20,000
8 vCPUs | 16 GB x 1	35,000	rabbitmq.8u16g.single x 1	35,000
16 vCPUs | 32 GB x 1	45,000	rabbitmq.16u32g.single x 1	45,000
4 vCPUs | 8 GB x 3	45,000	rabbitmq.4u8g.cluster x 3	45,000
4 vCPUs | 8 GB x 5	70,000	rabbitmq.4u8g.cluster x 5	70,000
4 vCPUs | 8 GB x 7	80,000	rabbitmq.4u8g.cluster x 7	80,000
8 vCPUs | 16 GB x 3	85,000	rabbitmq.8u16g.cluster x 3	85,000

Old Flavor	TPS (Old)	New Flavor	TPS (New)
8 vCPUs | 16 GB x 5	110,000	rabbitmq. 8u16g.cluster x 5	110,000
8 vCPUs | 16 GB x 7	120,000	rabbitmq. 8u16g.cluster x 7	120,000
16 vCPUs | 32 GB x 3	130,000	rabbitmq. 16u32g.cluster x 3	130,000
16 vCPUs | 32 GB x 5	160,000	rabbitmq. 16u32g.cluster x 5	160,000
16 vCPUs | 32 GB x 7	180,000	rabbitmq. 16u32g.cluster x 7	180,000

Assume that your service has 10,000 TPS and you need to reserve 30% of the traffic to accommodate traffic hikes, you can use the rabbitmq.4u8g.single x 1 flavor. If your service requires high availability, use the rabbitmq.4u8g.cluster x 3 flavor.

Billing Modes

Pay-per-use (hourly): This billing mode is flexible, enabling you to start and stop services anytime. You pay only for the actual usage duration. The minimum time unit is one hour. Less than an hour is recorded as an hour.

Configuration Changes

You can increase the number of brokers (for cluster instances only) and the disk size (for both cluster and single-node instances).

2 Getting Started

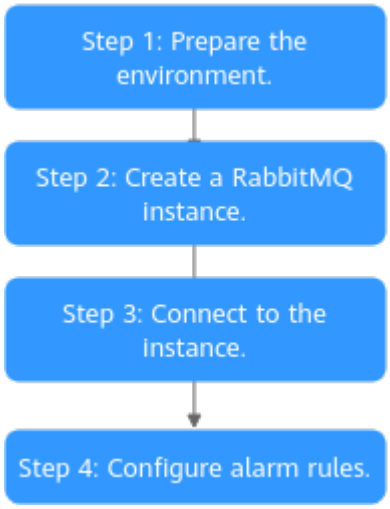
2.1 Introduction

This document provides instructions for getting started with Distributed Message Service (DMS) for RabbitMQ, including creating a RabbitMQ instance on the console and connecting to a RabbitMQ instance through an Elastic Cloud Server (ECS).

You can also **create a RabbitMQ instance by calling APIs**.

Procedure

Figure 2-1 Procedure for using DMS for RabbitMQ



1. **Prepare the environment**.

   A RabbitMQ instance runs in a Virtual Private Cloud (VPC). Before creating a RabbitMQ instance, ensure that a VPC is available.

2. **Create a RabbitMQ instance**.

   When creating an instance, you can choose whether to enable SSL. If SSL is enabled, data is encrypted for transmission, improving data security. The SSL

setting can be configured only when you create an instance. After an instance is created, the SSL setting cannot be changed.

3. Connect to the instance.

   A client can connect to an instance **with SSL** or **without SSL**.

4. **Configure alarm rules**.

   Configure alarm rules for a RabbitMQ instance to monitor the service running status.

NOTE

Learn more about the **Basic Concepts**.

2.2 Step 1: Prepare the Environment

VPC

A VPC provides an isolated virtual network for your RabbitMQ instances. You can configure and manage the network as required.

Step 1 Before creating a RabbitMQ instance, ensure that a VPC and a subnet are available.

For details, see "Creating a VPC" in *Virtual Private Cloud User Guide*. If you already have an available VPC and subnet, you do not need to create new ones.

Note the following when creating a VPC and subnet:

- The VPC and the RabbitMQ instance must be in the same region.
- Use the default settings when creating a VPC and a subnet.

Step 2 Before creating a RabbitMQ instance, ensure that a security group is available.

For details, see "Creating a Security Group" in *Virtual Private Cloud User Guide*. If you already have an available security group, you do not need to create a new one.

To use RabbitMQ instances, add the security group rules described in **Table 2-1**. Other rules can be added based on site requirements.

Table 2-1 Security group rules

Direction	Protocol	Port	Source	Description
Inbound	TCP	5672	0.0.0.0/0	Access a RabbitMQ instance (without SSL encryption).
Inbound	TCP	5671	0.0.0.0/0	Access a RabbitMQ instance (with SSL encryption).
Inbound	TCP	15672	0.0.0.0/0	Access the management UI (without SSL encryption).

Direction	Protocol	Port	Source	Description
Inbound	TCP	15671	0.0.0.0/0	Access the management UI (with SSL encryption).

NOTE

After a security group is created, its default inbound rule allows communication among ECSs within the security group and its default outbound rule allows all outbound traffic. In this case, you can access a RabbitMQ instance within a VPC, and do not need to add rules according to **Table 2-1**.

----End

(Optional) EIP

To access a RabbitMQ instance over a public network, prepare an elastic IP address (EIP) in advance.

For details, see **Assigning an EIP**.

The EIP must be created in the region the RabbitMQ instance is in.

ECS

Before connecting to a RabbitMQ instance, ensure that you have purchased an ECS, installed the JDK, and configured environment variables. The following steps describe how to complete these preparations. A Linux ECS is taken as an example. For more information on how to install JDK and configure the environment variables for a Windows ECS, please search the Internet.

Step 1 Log in to the management console, under **Computing**, click **Elastic Cloud Server**, and then create an ECS.

For details, see **Creating an ECS**. If you already have an available ECS, skip this step.

Step 2 Log in to the ECS.

Step 3 Install JDK or JRE, and add the following contents to **.bash_profile** in the home directory to configure the environment variables **JAVA_HOME** and **PATH**: In this command, **/opt/java/jdk1.8.0_151** is the JDK installation path. Change it to the path where you install JDK or JRE.

```
export JAVA_HOME=/opt/java/jdk1.8.0_151
export PATH=$JAVA_HOME/bin:$PATH
```

Run the **source .bash_profile** command for the modification to take effect.

NOTE

Use Oracle JDK instead of ECS's default JDK (for example, OpenJDK), because ECS's default JDK may not be suitable. Obtain Oracle JDK 1.8.111 or later from **Oracle's official website**.

----End

2.3 Step 2: Create a RabbitMQ Instance

RabbitMQ is an open-source service based on AMQP. It is used to store and forward messages in a distributed system. A RabbitMQ server is compiled in Erlang (supporting high concurrency, distribution, and robust fault tolerance), and a RabbitMQ client can be compiled in various programming languages, including Python, Ruby, .NET, Java, JMS, C, PHP, ActionScript, XMPP, STOMP, and AJAX.

Advanced Message Queuing Protocol (AMQP) is an advanced message queue protocol that provides an open standard of application layer protocols.

Prerequisites

Ensure that a VPC is available. For details on how to create a VPC, see "Creating a VPC" in the *Virtual Private Cloud User Guide*.

If you already have an available VPC, you do not need to create a new one.

Procedure

Step 1 Log in to the RabbitMQ console, and click **Buy RabbitMQ Instance** in the upper right corner.

Step 2 Specify **Billing Mode**, **Region**, **Project**, and **AZ**.

Step 3 Specify the instance name and the enterprise project.

Step 4 Configure the following instance parameters:

1. **Version**: RabbitMQ version. Currently, only 3.7.17 and 3.8.35 are supported.
2. **Instance Type**: Select **Single-node** or **Cluster**.
   - **Single-node**: There is only one RabbitMQ broker.
   - **Cluster**: There are multiple RabbitMQ brokers, achieving highly reliable message storage.
3. **CPU Architecture**: Currently, only x86 architecture is supported.
4. **Specifications**: Select specifications as required.

   NOTE

   To ensure service stability and reliability, DMS for RabbitMQ sets the default memory high watermark to 40%. Publishers will be blocked if the memory usage exceeds 40%. To avoid reaching the high watermark, retrieve messages stacked in the queue in time.
5. **Brokers**: Select the required number of brokers.
6. **Storage Space**: Indicates the disk type and total storage space of the RabbitMQ instance.

   For details about how to select a disk type, see **Disk Types and Performance**.
   - For a single-node instance, the value range is 100 GB to 30,000 GB.
   - For a cluster instance, the value range is 100 GB x Number of brokers to 300,000 GB x Number of brokers.
7. **Disk Encryption**: Specify whether to enable disk encryption. Enabling disk encryption improves data security. Disk encryption depends on Data

Encryption Workshop (DEW). If you enable disk encryption, select a KMS key. If no key is available, click **View KMS Keys** to go to the DEW console and create one. **This parameter cannot be modified once the instance is created.**

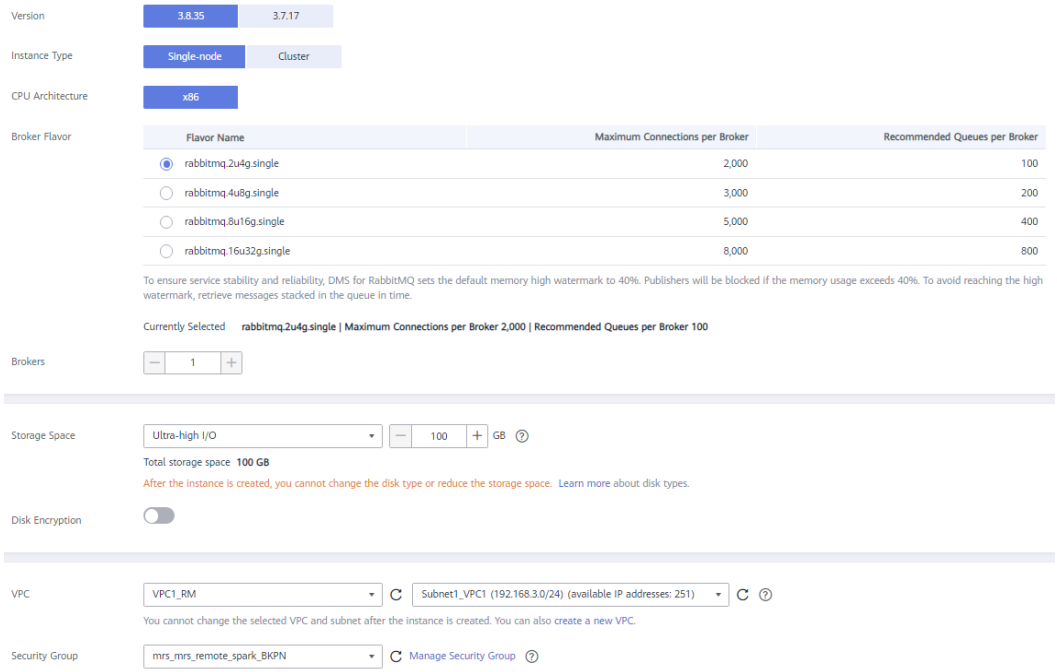
8. **VPC**: Select a VPC and a subnet.

   A VPC provides an isolated virtual network for your RabbitMQ instances. You can configure and manage the network as required.

9. **Security Group**: Select a security group.

   A security group is a set of rules for accessing a RabbitMQ instance. Click **Manage Security Group**. On the displayed console, view or create security groups.

Figure 2-2 Configuring the instance parameters



Step 5 Enter the username and password used for connecting to the RabbitMQ instance.

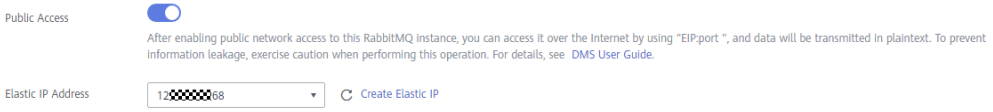
Step 6 Click **More Settings** to configure more parameters.

1. Configure **Public Access**.

   Public access can be enabled or disabled.

   A RabbitMQ instance with public access enabled can be accessed by using an EIP. After you enable public access, **Elastic IP Address** is displayed. Select an EIP or click **Create Elastic IP** to view or create EIPs.

Figure 2-3 Configuring public access for a RabbitMQ instance



NOTE

- In comparison with intra-VPC access, enabling public access might lead to packet loss and jitter. Therefore, you are advised to enable public access only during the service development and testing phases.
- If you manually unbind or delete an EIP on the VPC console, the public access function of the corresponding RabbitMQ instance is automatically disabled.

2. Configure **SSL**.

   This parameter indicates whether SSL authentication is enabled when a client is accessing an instance. If **SSL** is enabled, data will be encrypted before transmission for enhanced security.

   Once the instance is created, SSL cannot be enabled or disabled.

3. Specify tags.

   Tags are used to identify cloud resources. When you have many cloud resources of the same type, you can use tags to classify cloud resources by dimension (for example, by usage, owner, or environment).

   - If you have created predefined tags, select a predefined pair of tag key and value. You can click **View predefined tags** to go to the Tag Management Service (TMS) console and view or create tags.
   - You can also create new tags by entering **Tag key** and **Tag value**.

   Up to 20 tags can be added to each RabbitMQ instance.

4. Enter a description of the instance.

Step 7 Click **Buy**.

Step 8 Confirm the instance information and then submit the request.

Step 9 Return to the instance list and check whether the instance has been created.

It takes 3 to 15 minutes to create an instance. During this period, the instance status is **Creating**.

- If the instance is created successfully, its status changes to **Running**.
- If the instance fails to be created, view **Instance Creation Failures**. Delete the instance and create another instance. If the instance creation fails again, contact customer service.

----End

2.4 Step 3: Connect to an Instance to Create and Retrieve Messages

2.4.1 Connecting to an Instance Without SSL

The following demo shows how to access and use a RabbitMQ instance in a VPC, assuming that the RabbitMQ client is deployed in an ECS.

RabbitMQ instances are compatible with the open-source RabbitMQ protocol. To access a RabbitMQ instance in your service code, see the tutorials for different languages at **https://www.rabbitmq.com/getstarted.html**.

Prerequisites

- A RabbitMQ instance has been created following the instructions in **Step 2: Create a RabbitMQ Instance**, and the username and password used to create the instance have been obtained.
- The **Instance Address (Private Network)** or **Instance Address (Public Network)** of the instance has been recorded from the instance details.
- An ECS has been created, and its VPC, subnet, and security group configurations are the same as those of the RabbitMQ instance.
- You have installed the JDK and configured the environment variables. For details, see **Step 1: Prepare the Environment**.

Accessing the Instance Using CLI

Step 1 Run the following command to download **RabbitMQ-Tutorial.zip**:

```
$ wget https://dms-demo.obs.cn-north-1.myhuaweicloud.com/RabbitMQ-Tutorial.zip
```

Step 2 Run the following command to decompress **RabbitMQ-Tutorial.zip**:

```
$ unzip RabbitMQ-Tutorial.zip
```

Step 3 Run the following command to navigate to the **RabbitMQ-Tutorial** directory, which contains the precompiled JAR file:

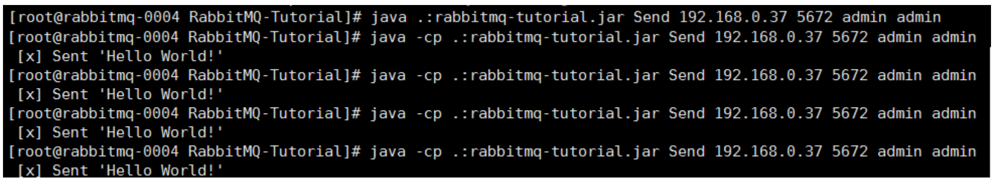
```
$ cd RabbitMQ-Tutorial
```

Step 4 Create messages using the sample project.

```
$ java -cp .:rabbitmq-tutorial.jar Send host port user password
```

host indicates the connection address for accessing the instance. *port* is the listening port of the instance, which is **5672** by default. *user* and *password* indicate the username and password used for accessing the instance.

Figure 2-4 Sample project for message creation



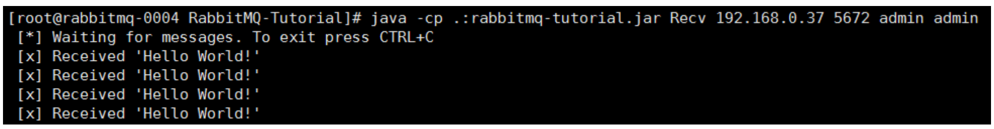
Press **Ctrl**+**C** to exit.

Step 5 Retrieve messages using the sample project.

```
$ java -cp .:rabbitmq-tutorial.jar Recv host port user password
```

host indicates the connection address for accessing the instance. *port* is the listening port of the instance, which is **5672** by default. *user* and *password* indicate the username and password used for accessing the instance.

Figure 2-5 Sample project for message retrieval



To stop retrieving messages, press **Ctrl**+**C** to exit.

----End

Java Sample Code

Accessing an instance and creating messages

```
ConnectionFactory factory = new ConnectionFactory();
 factory.setHost(host);
 factory.setPort(port);

 factory.setUsername(user);
 factory.setPassword(password);
 Connection connection = factory.newConnection();
 Channel channel = connection.createChannel();

 channel.queueDeclare(QUEUE_NAME, false, false, false, null);

 String message = "Hello World!";
 channel.basicPublish("", QUEUE_NAME, null, message.getBytes("UTF-8"));
 System.out.println(" [x] Sent '" + message + "'");

 channel.close();
 connection.close();
```

Accessing an instance and retrieving messages

```
ConnectionFactory factory = new ConnectionFactory();
 factory.setHost(host);
 factory.setPort(port);
 factory.setUsername(user);
 factory.setPassword(password);
 Connection connection = factory.newConnection();
 Channel channel = connection.createChannel();

 channel.queueDeclare(QUEUE_NAME, false, false, false, null);
 System.out.println(" [*] Waiting for messages. To exit press CTRL+C");

 Consumer consumer = new DefaultConsumer(channel)
 {
    @Override
    public void handleDelivery(String consumerTag, Envelope envelope, AMQP.BasicProperties properties,
          byte[] body)
          throws IOException
    {
       String message = new String(body, "UTF-8");
       System.out.println(" [x] Received '" + message + "'");
    }
 };
 channel.basicConsume(QUEUE_NAME, true, consumer);
```

2.4.2 Connecting to an Instance with SSL

If SSL is enabled, data will be encrypted before transmission for enhanced security.

The following demo shows how to access and use a RabbitMQ instance in a VPC, assuming that the RabbitMQ client is deployed in an ECS.

RabbitMQ instances are compatible with the open-source RabbitMQ protocol. To access a RabbitMQ instance in your service code, see the tutorials for different languages at **https://www.rabbitmq.com/getstarted.html**.

Prerequisites

- A RabbitMQ instance has been created following the instructions in **Step 2: Create a RabbitMQ Instance**, and the username and password used to create the instance have been obtained.
- The **Instance Address (Private Network)** or **Instance Address (Public Network)** of the instance has been recorded from the instance details.
- An ECS has been created, and its VPC, subnet, and security group configurations are the same as those of the RabbitMQ instance.
- You have installed the JDK and configured the environment variables. For details, see **Step 1: Prepare the Environment**.

Accessing the Instance Using CLI

Step 1 Run the following command to download **RabbitMQ-Tutorial-SSL.zip**:

```
$ wget https://dms-demo.obs.cn-north-1.myhuaweicloud.com/RabbitMQ-Tutorial.zip
```

Step 2 Run the following command to decompress **RabbitMQ-Tutorial-SSL.zip**:

```
$ unzip RabbitMQ-Tutorial-SSL.zip
```

Step 3 Run the following command to navigate to the **RabbitMQ-Tutorial-SSL** directory, which contains the precompiled JAR file:

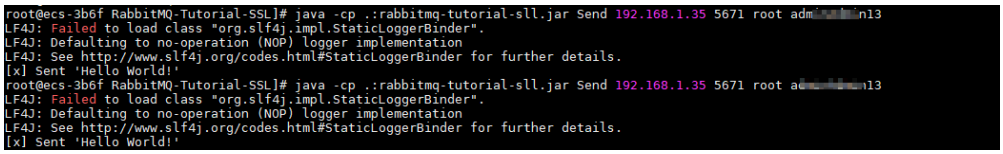
```
$ cd RabbitMQ-Tutorial-SSL
```

Step 4 Create messages using the sample project.

```
$ java -cp .:rabbitmq-tutorial-sll.jar Send host port user password
```

host indicates the connection address for accessing the instance. *port* is the listening port of the instance, which is **5671** by default. *user* and *password* indicate the username and password used for accessing the instance.

Figure 2-6 Sample project for message creation



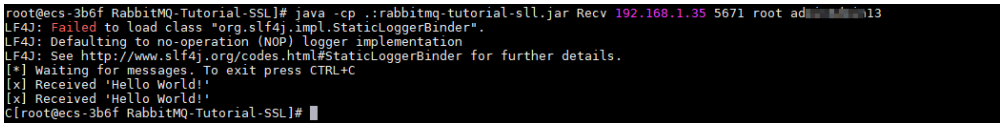
Press **Ctrl**+**C** to exit.

Step 5 Retrieve messages using the sample project.

```
$ java -cp .:rabbitmq-tutorial-sll.jar Recv host port user password
```

host indicates the connection address for accessing the instance. *port* is the listening port of the instance, which is **5671** by default. *user* and *password* indicate the username and password used for accessing the instance.

Figure 2-7 Sample project for message retrieval



To stop retrieving messages, press **Ctrl**+**C** to exit.

----End

Java Sample Code

Accessing an instance and creating messages

```
ConnectionFactory factory = new ConnectionFactory();
 factory.setHost(host);
 factory.setPort(port);

 factory.setUsername(user);
 factory.setPassword(password);
 factory.useSslProtocol();
 Connection connection = factory.newConnection();
 Channel channel = connection.createChannel();

 channel.queueDeclare(QUEUE_NAME, false, false, false, null);

 String message = "Hello World!";
 channel.basicPublish("", QUEUE_NAME, null, message.getBytes("UTF-8"));
 System.out.println(" [x] Sent '" + message + "'");

 channel.close();
 connection.close();
```

Accessing an instance and retrieving messages

```
ConnectionFactory factory = new ConnectionFactory();
 factory.setHost(host);
 factory.setPort(port);
 factory.setUsername(user);
 factory.setPassword(password);
 factory.useSslProtocol();
 Connection connection = factory.newConnection();
 Channel channel = connection.createChannel();

 channel.queueDeclare(QUEUE_NAME, false, false, false, null);
 System.out.println(" [*] Waiting for messages. To exit press CTRL+C");

 Consumer consumer = new DefaultConsumer(channel)
 {
    @Override
    public void handleDelivery(String consumerTag, Envelope envelope, AMQP.BasicProperties properties,
           byte[] body)
           throws IOException
    {
       String message = new String(body, "UTF-8");
       System.out.println(" [x] Received '" + message + "'");
    }
 };
 channel.basicConsume(QUEUE_NAME, true, consumer);
```

2.5 Step 4: Configure Alarm Rules

This section describes the alarm rules of some metrics and how to configure the rules. In actual scenarios, you are advised to configure alarm rules for metrics by referring to the following alarm policies.

Table 2-2 Alarm rules for RabbitMQ instances

Metric	Alarm Policy	Description	Solution
Available Messages	Alarm threshold: Raw data > Expected number of available messages Number of consecutive periods: 1 Alarm severity: Major	If the number of available messages is too large, messages are accumulated.	See **the solution to preventing message accumulation**.
Unacked Messages	Alarm threshold: Raw data > Expected number of unacknowledged messages Number of consecutive periods: 1 Alarm severity: Major	If the number of unacknowledged messages is too large, messages may be accumulated.	• Check whether the consumer is abnormal. • Check whether the consumer logic is time-consuming.
Connections	Alarm threshold: Raw data > Expected number of connections Number of consecutive periods: 1 Alarm severity: Major	A sharp increase in the number of connections may be a warning of a traffic increase.	The services may be abnormal. Check whether other alarms exist.
Channels	Alarm threshold: Raw data > Expected number of channels Number of consecutive periods: 1 Alarm severity: Major	A sharp increase in the number of channels may be a warning of a traffic increase.	The services may be abnormal. Check whether other alarms exist.

Metric	Alarm Policy	Description	Solution
Erlang Processes	Alarm threshold: Raw data > Expected number of processes Number of consecutive periods: 1 Alarm severity: Major	A sharp increase in the number of processes may be a warning of a traffic increase.	The services may be abnormal. Check whether other alarms exist.

NOTE

- Set the alarm threshold based on the service expectations. For example, if the expected usage is 35%, set the alarm threshold to 35%.
- The number of consecutive periods and alarm severity can be adjusted based on the service logic.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 View the instance metrics using either of the following methods:

- Click next to a RabbitMQ instance name. On the Cloud Eye console, view the metrics of the instance, nodes, and queues. Metric data is reported to Cloud Eye every minute.
- Click the desired RabbitMQ instance to view its details. In the navigation pane, choose **Monitoring** view. On the displayed page, view the metrics of the instance, nodes, and queues. Metric data is reported to Cloud Eye every minute.

Step 5 Hover the mouse pointer over a metric and click to create an alarm rule for the metric.

Step 6 Specify the alarm rule details.

For more information about creating alarm rules, see **Creating an Alarm Rule**.

1. Enter the alarm name and description.

2. Specify the alarm policy and alarm severity.

   For example, an alarm can be triggered and notifications can be sent once every day if the raw value of connections exceeds the preset value for three consecutive periods and no actions are taken to handle the exception.

3. Set **Alarm Notification** configurations. If you enable **Alarm Notification**, set the validity period, notification object, and trigger condition.
4. Click **Create**.

----End

3 Permissions Management

3.1 Creating a User and Granting DMS for RabbitMQ Permissions

Use **Identity and Access Management (IAM)** to implement fine-grained permissions control over your Distributed Message Service (DMS) for RabbitMQ resources. With IAM, you can:

- Create IAM users for employees based on your enterprise's organizational structure. Each IAM user will have their own security credentials for accessing DMS for RabbitMQ resources.
- Grant only the permissions required for users to perform a specific task.
- Entrust another account or cloud service to perform efficient O&M on your DMS for RabbitMQ resources.

If your account does not require individual IAM users, skip this chapter.

This section describes the procedure for granting user permissions. **Figure 3-1** shows the process flow.

NOTE

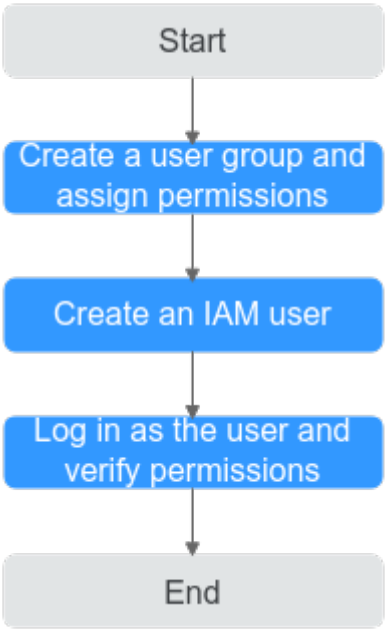
DMS for RabbitMQ permissions policies are based on DMS. Therefore, when assigning permissions, select DMS permissions policies.

Prerequisites

Learn about the permissions (see **System-defined roles and policies supported by DMS for RabbitMQ**) supported by DMS for RabbitMQ and choose policies according to your requirements. For the system policies of other services, see **System Permissions**.

Process Flow

Figure 3-1 Process of granting DMS for RabbitMQ permissions



1. **Create a user group and assign permissions**.

   Create a user group on the IAM console, and assign the **DMS ReadOnlyAccess** policy to the group.

2. **Create an IAM user**.

   Create a user on the IAM console and add the user to the group created in **1**.

3. **Log in** and verify permissions.

   In the authorized region, perform the following operations:

   - Choose **Service List** > **Distributed Message Service for RabbitMQ**. Then click **Buy Instance** on the console of DMS for RabbitMQ. If a message appears indicating that you have insufficient permissions to perform the operation, the **DMS ReadOnlyAccess** policy is in effect.
   - Choose **Service List** > **Elastic Volume Service**. If a message appears indicating that you have insufficient permissions to access the service, the **DMS ReadOnlyAccess** policy is in effect.

3.2 DMS for RabbitMQ Custom Policies

Custom policies can be created to supplement the system-defined policies of DMS for RabbitMQ. For the actions that can be added for custom policies, see **Permissions Policies and Supported Actions**.

You can create custom policies in either of the following ways:

- Visual editor: Select cloud services, actions, resources, and request conditions. This does not require knowledge of policy syntax.

- JSON: Edit JSON policies from scratch or based on an existing policy.

For details, see **Creating a Custom Policy**. The following section contains examples of common DMS for RabbitMQ custom policies.

NOTE

DMS for RabbitMQ permissions policies are based on DMS. Therefore, when assigning permissions, select DMS permissions policies.

Example Custom Policies

- Example 1: Allowing users to delete and restart instances

```
{
   "Version": "1.1",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": [
            "
                dms:instance:delete
                dms:instance:modifyStatus
             "
         ]
      }
   ]
}
```

- Example 2: Denying instance deletion

  A policy with only "Deny" permissions must be used in conjunction with other policies to take effect. If the permissions assigned to a user contain both "Allow" and "Deny", the "Deny" permissions take precedence over the "Allow" permissions.

  For example, if you want to assign all of the permissions of the **DMS FullAccess** policy to a user, except for deleting instances, you can create a custom policy to deny only instance deletion. When you apply both the **DMS FullAccess** policy and the custom policy denying instance deletion, since "Deny" always takes precedence over "Allow", the "Deny" will be applied for that one conflicting permission. The user will then be able to perform all operations on instances except deleting instances. The following is an example of a deny policy:

```
{
      "Version": "1.1",
      "Statement": [
            {
                  "Effect": "Deny",
                  "Action": [
                        "dms:instance:delete"
                  ]
            }
      ]
}
```

3.3 DMS for RabbitMQ Resources

A resource is an object that exists within a service. DMS for RabbitMQ resources are **rabbitmq**. You can select them by specifying their paths.

Table 3-1 DMS for RabbitMQ resources and their paths

Resource	Resource Name	Path
rabbitmq	Instance	Format: DMS:*:*: rabbitmq: *instance ID* Note: For instance resources, IAM automatically generates the prefix (**DMS:*:*:rabbitmq:**) of the resource path. For the path of a specific instance, add the *instance ID* to the end. You can also use an asterisk * to indicate any instance. For example: **DMS:*:*:rabbitmq:*** indicates any RabbitMQ instance.

3.4 DMS for RabbitMQ Request Conditions

Request conditions are useful for fine tuning when a custom policy takes effect. A request condition consists of a condition key and operator. Condition keys are either global or service-level and are used in the Condition element of a policy statement. **Global condition keys** (starting with **g:**) are available for operations of all services, while service-level condition keys (starting with a service name such as *dms:*) are available only for operations of a specific service. An operator is used together with a condition key to form a complete condition statement.

DMS for RabbitMQ has a group of predefined condition keys that can be used in IAM. For example, to define an "Allow" permission, you can use the condition key **dms:ssl** to check whether SSL is enabled for a RabbitMQ instance. The following table lists the predefined condition keys of DMS for RabbitMQ.

Table 3-2 Predefined condition keys of DMS for RabbitMQ

Condition Key	Operator	Description
dms:publicIP	Bool IsNullOrEmpty BoolIfExists	Whether public access is enabled
dms:ssl	Bool IsNullOrEmpty BoolIfExists	Whether SSL is enabled

4 Preparing the Environment

Before creating RabbitMQ instances, you must create a VPC and configure security groups and subnets for it. A VPC creates an isolated virtual network environment for you to configure and manage RabbitMQ instances, improving resource security and simplifying network deployment.

Once you have created a VPC, you can use it for all instances you subsequently create.

Creating a VPC

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Networking** > **Virtual Private Cloud**.

Step 4 Click **Create VPC**.

Step 5 Create a VPC as prompted, For details on how to create a VPC, see the *Virtual Private Cloud User Guide*.

After a VPC is created, a subnet is also created. If the VPC needs more subnets, go to **Step 6**. Otherwise, go to **Step 7**.

Step 6 In the navigation pane, choose **Subnets**. Click **Create Subnet**. Create a subnet as prompted,

For details on how to create a subnet, see the *Virtual Private Cloud User Guide*.

Step 7 In the navigation pane, choose **Access Control** > **Security Groups**. Create a security group as prompted,

For details on how to create a security group, see the *Virtual Private Cloud User Guide*.

To use RabbitMQ instances, add the security group rules described in **Table 4-1**. Other rules can be added based on site requirements.

NOTE

After a security group is created, its default inbound rule allows communication among ECSs within the security group and its default outbound rule allows all outbound traffic. In this case, you can access a RabbitMQ instance within a VPC, and do not need to add rules according to **Table 4-1**.

Table 4-1 Security group rules

Direction	Protocol	Port	Source	Description
Inbound	TCP	5672	0.0.0.0/0	Access a RabbitMQ instance (without SSL encryption).
Inbound	TCP	5671	0.0.0.0/0	Access a RabbitMQ instance (with SSL encryption).
Inbound	TCP	15672	0.0.0.0/0	Access the management UI (without SSL encryption).
Inbound	TCP	15671	0.0.0.0/0	Access the management UI (with SSL encryption).

----End

5 Buying an Instance

Scenario

RabbitMQ instances are physically isolated and exclusively occupied by each tenant. You can customize the computing capabilities and storage space of a RabbitMQ instance based on service requirements.

RabbitMQ is an open-source service based on the Advanced Message Queuing Protocol (AMQP). It is used to store and forward messages in a distributed system. A RabbitMQ server is compiled in Erlang (supporting high concurrency, distributed deployment, and robust fault tolerance), and a RabbitMQ client can be compiled in various programming languages, including Python, Ruby, .NET, Java, JMS, C, PHP, ActionScript, XMPP, STOMP, and AJAX.

Advanced Message Queuing Protocol (AMQP) is an advanced message queue protocol that provides an open standard of application layer protocols.

Prerequisites

A VPC configured with security groups and subnets is available.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click  and select a region.

NOTE

Select the same region as your application service.

Step 3 Click  and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Click **Buy Instance** in the upper right corner of the page.

Step 5 Specify **Billing Mode**, **Region**, **Project**, and **AZ**.

Step 6 Specify the instance name and the enterprise project.

Step 7 Configure the following instance parameters.

1. **Version**: RabbitMQ version. Currently, only 3.7.17 and 3.8.35 are supported.
2. **Instance Type**: Select **Single-node** or **Cluster**.
   - **Single-node**: There is only one RabbitMQ broker.
   - **Cluster**: There are multiple RabbitMQ brokers, achieving highly reliable message storage.
3. **CPU Architecture**: Currently, only x86 architecture is supported.
4. **Broker Flavor**: Select a flavor as required.

   NOTE

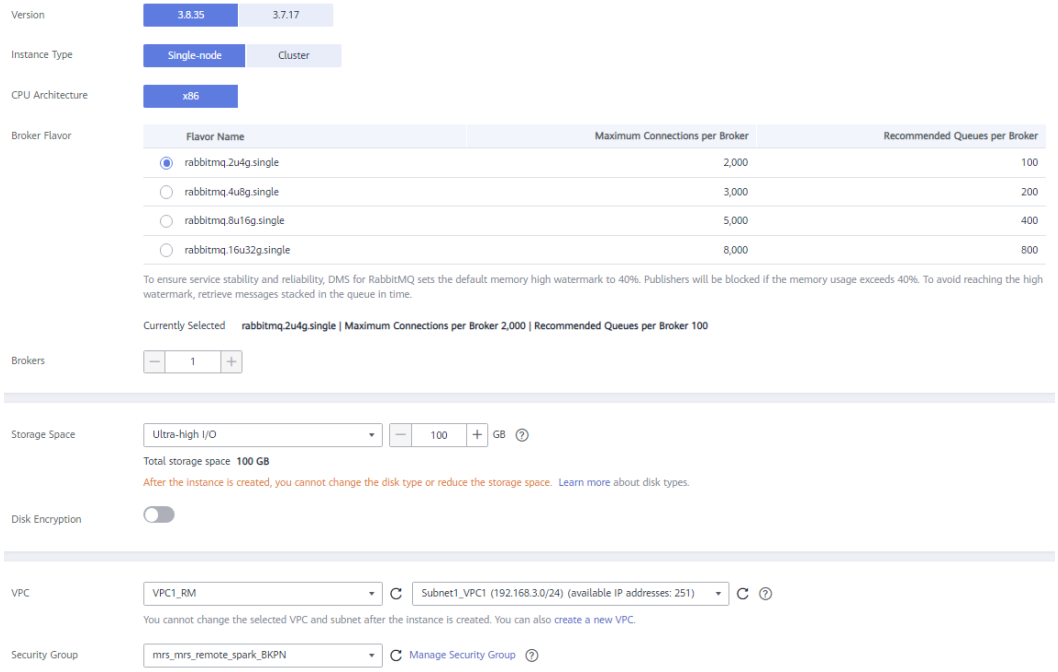
   To ensure service stability and reliability, DMS for RabbitMQ sets the default memory high watermark to 40%. Publishers will be blocked if the memory usage exceeds 40%. To avoid reaching the high watermark, retrieve messages stacked in the queue in time.
5. **Brokers**: Select the required number of brokers.
6. **Storage Space**: Indicates the disk type and total storage space of the RabbitMQ instance.

   For details on how to select a disk type, see **Disk Types and Performance**.
   - For a single-node instance, the value range is 200 GB to 90,000 GB.
   - For a cluster instance, the value range can be 100 GB x Number of brokers to 90,000 GB, 200 GB x Number of brokers to 90,000 GB, or 300 GB x Number of brokers to 90,000 GB.
7. **Disk Encryption**: Specify whether to enable disk encryption. Enabling disk encryption improves data security. Disk encryption depends on Data Encryption Workshop (DEW). If you enable disk encryption, select a KMS key. If no key is available, click **View KMS Keys** to go to the DEW console and create one. **This parameter cannot be modified once the instance is created.**
8. **VPC**: Select a VPC and a subnet.

   A VPC provides an isolated virtual network for your RabbitMQ instances. You can configure and manage the network as required.
9. **Security Group**: Select a security group.

   A security group is a set of rules for accessing a RabbitMQ instance. Click **Manage Security Group**. On the console that is displayed, view or create security groups.

Figure 5-1 Configuring the instance parameters



Step 8 Enter the username and password used for connecting to the RabbitMQ instance.

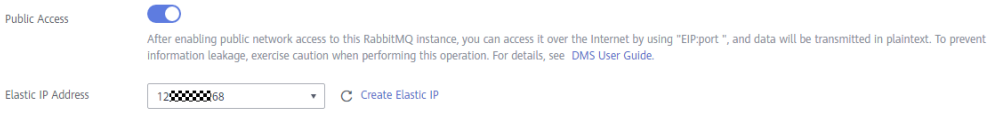
Step 9 Click **More Settings** to configure more parameters.

1. Configure **Public Access**.

   Public access can be enabled or disabled.

   A RabbitMQ instance with public access enabled can be accessed by using an EIP. After you enable public access, **Elastic IP Address** is displayed. Select an EIP or click **Create Elastic IP** to view or create EIPs.

   Figure 5-2 Configuring public access for a RabbitMQ instance

   NOTE

   - In comparison with intra-VPC access, enabling public access might lead to packet loss and jitter. Therefore, you are advised to enable public access only during the service development and testing phases.
   - If you manually unbind or delete an EIP on the VPC console, the public access function of the corresponding RabbitMQ instance is automatically disabled.

2. Configure **SSL**.

   This parameter indicates whether SSL authentication is enabled when a client is accessing an instance. If **SSL** is enabled, data will be encrypted before transmission for enhanced security.

   Once the instance is created, SSL cannot be enabled or disabled.

3. Specify tags.

Tags are used to identify cloud resources. When you have many cloud resources of the same type, you can use tags to classify cloud resources by dimension (for example, usage, owner, or environment).

- If you have created predefined tags, select a predefined pair of tag key and value. You can click **View predefined tags** to go to the Tag Management Service (TMS) console and view or create tags.
- You can also create new tags by entering **Tag key** and **Tag value**.

Up to 20 tags can be added to each RabbitMQ instance. For details about the requirements on tags, see **Managing Instance Tags**.

4. Enter a description of the instance.

Step 10 Click **Buy Now**.

Step 11 Confirm the instance information and click **Submit**.

Step 12 Return to the instance list and check whether the instance has been created.

It takes 3 to 15 minutes to create an instance. During this period, the instance status is **Creating**.

- If the instance is created successfully, its status changes to **Running**.
- If the instance fails to be created, view **Instance Creation Failures**. Delete the instance by referring to **Deleting an Instance** and create another instance. If the RabbitMQ instance creation fails a second time, contact customer service.

----End

6 Accessing a RabbitMQ Instance

6.1 Accessing a RabbitMQ Instance Without SSL Encryption

RabbitMQ instances are compatible with the open-source RabbitMQ protocol. To access and use a RabbitMQ instance in different languages, see the tutorials at **https://www.rabbitmq.com/getstarted.html**.

The following demo shows how to access and use a RabbitMQ instance in a VPC, assuming that the RabbitMQ client is deployed in an ECS.

If SSL is enabled for the instance, see **Accessing a RabbitMQ Instance with SSL Encryption** for how to access the instance.

Prerequisites

- A RabbitMQ instance has been created following the instructions in **Buying an Instance**, and the username and password used to create the instance have been obtained.
- The **Instance Address (Private Network)** or **Instance Address (Public Network)** of the instance has been recorded from the instance details.
- An ECS has been created, and its VPC, subnet, and security group configurations are the same as those of the RabbitMQ instance.

Accessing the Instance in CLI Mode

Step 1 Log in to the ECS.

Step 2 Install JDK or JRE, and add the following lines to **.bash_profile** in the home directory to configure the environment variables **JAVA_HOME** and **PATH**:

```
export JAVA_HOME=/opt/java/jdk1.8.0_151
export PATH=$JAVA_HOME/bin:$PATH
```

Run the **source .bash_profile** command for the modification to take effect.

NOTE

Use Oracle JDK instead of ECS's default JDK (for example, OpenJDK), because ECS's default JDK may not be suitable for the sample project. Obtain Oracle JDK 1.8.111 or later from **Oracle's official website**.

Step 3 Run the following command to download **RabbitMQ-Tutorial.zip**:

```
$ wget https://dms-demo.obs.cn-north-1.myhuaweicloud.com/RabbitMQ-Tutorial.zip
```

Step 4 Run the following command to decompress **RabbitMQ-Tutorial.zip**:

```
$ unzip RabbitMQ-Tutorial.zip
```

Step 5 Run the following command to navigate to the **RabbitMQ-Tutorial** directory, which contains the precompiled JAR file:

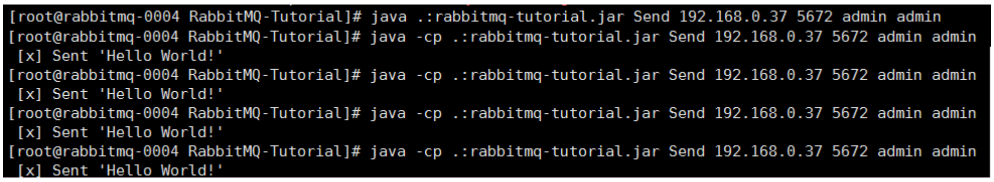
```
$ cd RabbitMQ-Tutorial
```

Step 6 Create messages using the sample project.

```
$ java -cp .:rabbitmq-tutorial.jar Send host port user password
```

host indicates the connection address for accessing the instance. *port* is the listening port of the instance, which is **5672** by default. *user* and *password* indicate the username and password used for accessing the instance.

Figure 6-1 Sample project for creating messages



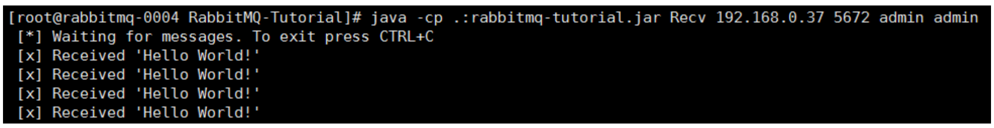
Press **Ctrl**+**C** to exit.

Step 7 Retrieve messages using the sample project.

```
$ java -cp .:rabbitmq-tutorial.jar Recv host port user password
```

host indicates the connection address for accessing the instance. *port* is the listening port of the instance, which is **5672** by default. *user* and *password* indicate the username and password used for accessing the instance.

Figure 6-2 Sample project for retrieving messages



To stop retrieving messages, press **Ctrl**+**C** to exit.

----End

Java Sample Code

Accessing a RabbitMQ instance and creating messages

```
ConnectionFactory factory = new ConnectionFactory();
 factory.setHost(host);
```



```
factory.setPort(port);

factory.setUsername(user);
factory.setPassword(password);
Connection connection = factory.newConnection();
Channel channel = connection.createChannel();

channel.queueDeclare(QUEUE_NAME, false, false, false, null);

String message = "Hello World!";
channel.basicPublish("", QUEUE_NAME, null, message.getBytes("UTF-8"));
System.out.println(" [x] Sent '" + message + "'");

channel.close();
connection.close();
```

Accessing a RabbitMQ instance and retrieving messages

```
ConnectionFactory factory = new ConnectionFactory();
factory.setHost(host);
factory.setPort(port);
factory.setUsername(user);
factory.setPassword(password);
Connection connection = factory.newConnection();
Channel channel = connection.createChannel();

channel.queueDeclare(QUEUE_NAME, false, false, false, null);
System.out.println(" [*] Waiting for messages. To exit press CTRL+C");

Consumer consumer = new DefaultConsumer(channel)
{
    @Override
    public void handleDelivery(String consumerTag, Envelope envelope, AMQP.BasicProperties properties,
            byte[] body)
            throws IOException
    {
        String message = new String(body, "UTF-8");
        System.out.println(" [x] Received '" + message + "'");
    }
};
channel.basicConsume(QUEUE_NAME, true, consumer);
```

6.2 Accessing a RabbitMQ Instance with SSL Encryption

If SSL is enabled, data will be encrypted before transmission for enhanced security.

This section describes intra-VPC access to a RabbitMQ instance with SSL enabled.

Prerequisites

- A RabbitMQ instance has been created following the instructions in **Buying an Instance**, and the username and password used to create the instance have been obtained.
- The **Instance Address (Private Network)** or **Instance Address (Public Network)** of the instance has been recorded from the instance details.
- An ECS has been created, and its VPC, subnet, and security group configurations are the same as those of the RabbitMQ instance.

Accessing the Instance in CLI Mode

Step 1 Log in to the ECS. If public network access is enabled, log in to the server for running commands.

Step 2 Install JDK or JRE, and add the following lines to **.bash_profile** in the home directory to configure the environment variables **JAVA_HOME** and **PATH**:

```
export JAVA_HOME=/opt/java/jdk1.8.0_151
export PATH=$JAVA_HOME/bin:$PATH
```

Run the **source .bash_profile** command for the modification to take effect.

NOTE

Use Oracle JDK instead of ECS's default JDK (for example, OpenJDK), because ECS's default JDK may not be suitable for the sample project. Obtain Oracle JDK 1.8.111 or later from **Oracle's official website**.

Step 3 Run the following command to download **RabbitMQ-Tutorial-SSL.zip**:

```
$ wget https://dms-demo.obs.cn-north-1.myhuaweicloud.com/RabbitMQ-Tutorial-SSL.zip
```

Step 4 Run the following command to decompress **RabbitMQ-Tutorial-SSL.zip**:

```
$ unzip RabbitMQ-Tutorial-SSL.zip
```

Step 5 Run the following command to navigate to the **RabbitMQ-Tutorial-SSL** directory, which contains the precompiled JAR file:

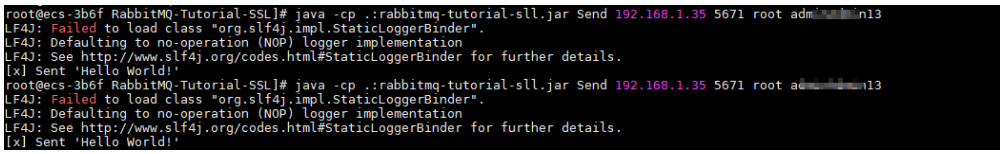
```
$ cd RabbitMQ-Tutorial-SSL
```

Step 6 Create messages using the sample project.

```
$ java -cp .:rabbitmq-tutorial-sll.jar Send host port user password
```

host indicates the connection address for accessing the instance. *port* is the listening port of the instance, which is **5671** by default. *user* and *password* indicate the username and password used for accessing the instance.

Figure 6-3 Sample project for message creation



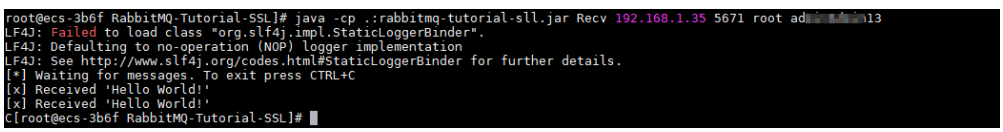
Press **Ctrl**+**C** to exit.

Step 7 Retrieve messages using the sample project.

```
$ java -cp .:rabbitmq-tutorial-sll.jar Recv host port user password
```

host indicates the connection address for accessing the instance. *port* is the listening port of the instance, which is **5671** by default. *user* and *password* indicate the username and password used for accessing the instance.

Figure 6-4 Sample project for message retrieval



To stop retrieving messages, press **Ctrl**+**C** to exit.

----End

Java Sample Code

Accessing a RabbitMQ instance and creating messages

```
ConnectionFactory factory = new ConnectionFactory();
 factory.setHost(host);
 factory.setPort(port);

 factory.setUsername(user);
 factory.setPassword(password);
 factory.useSslProtocol();
 Connection connection = factory.newConnection();
 Channel channel = connection.createChannel();

 channel.queueDeclare(QUEUE_NAME, false, false, false, null);

 String message = "Hello World!";
 channel.basicPublish("", QUEUE_NAME, null, message.getBytes("UTF-8"));
 System.out.println(" [x] Sent '" + message + "'");

 channel.close();
 connection.close();
```

Accessing a RabbitMQ instance and retrieving messages

```
ConnectionFactory factory = new ConnectionFactory();
 factory.setHost(host);
 factory.setPort(port);
 factory.setUsername(user);
 factory.setPassword(password);
 factory.useSslProtocol();
 Connection connection = factory.newConnection();
 Channel channel = connection.createChannel();

 channel.queueDeclare(QUEUE_NAME, false, false, false, null);
 System.out.println(" [*] Waiting for messages. To exit press CTRL+C");

 Consumer consumer = new DefaultConsumer(channel)
 {
    @Override
    public void handleDelivery(String consumerTag, Envelope envelope, AMQP.BasicProperties properties,
           byte[] body)
           throws IOException
    {
       String message = new String(body, "UTF-8");
       System.out.println(" [x] Received '" + message + "'");
    }
 };
 channel.basicConsume(QUEUE_NAME, true, consumer);
```

6.3 Connecting to the Management Address of a RabbitMQ Instance

Access the management address of a RabbitMQ instance by using the browser-based, open-source RabbitMQ cluster management tool.

Procedure

Step 1 Obtain the management address of an instance.

1. Log in to the management console.
2. In the upper left corner, click  and select a region.

NOTE

Select the same region as your application service.

3. Click ☰ and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.
4. Click the name of the instance whose management address you want to obtain. On the **Basic Information** tab page, view the **Mgmt. UI Address**, and **Username**.

   The management UI address is the same as **Instance Address (Private Network)** or **Instance Address (Public Network)**. The port number is 15672 (SSL disabled) or 15671 (SSL enabled).

   NOTE

   The username and password are customized when the RabbitMQ instance was created.

Step 2 Check whether the rules of the security group of the instance are correctly configured.

1. In the **Network** section on the **Basic Information** tab page, click the name of the security group.
2. Click the **Inbound Rules** tab to view the inbound rules of the security group.
   - SSL disabled
     - For intra-VPC access, inbound access through port 5672 must be allowed.
     - For public access, inbound access through port 15672 must be allowed.
   - SSL enabled
     - For intra-VPC access, inbound access through port 5671 must be allowed.
     - For public access, inbound access through port 15671 must be allowed.

Step 3 In the address box of the browser, enter the URL of the management UI.

NOTE

- If public access is enabled for the RabbitMQ instance, you can use a browser to access the web page through the public network.
- If public access is not enabled for the RabbitMQ instance, you must purchase a Windows ECS that can connect to the RabbitMQ instance. Then, log in to the ECS and access the web page.

Figure 6-5 Logging in to the management UI

Step 4 Click **Login**.

----End

6.4 Enabling Heartbeats

If messages may be retrieved more than 90 seconds after they are created, enable heartbeats on the client and set the heartbeat timeout to shorter than 90 seconds, to prevent the client from being disconnected from a cluster RabbitMQ instance.

What Is a Heartbeat?

RabbitMQ heartbeats help the application layer detect interrupted connections and unresponsive peers in a timely manner. Heartbeats also prevent some network devices from disconnecting TCP connections where there is no activity for a certain period of time. **To enable heartbeats, specify the heartbeat timeout for connections.**

The heartbeat timeout defines after how long the peer TCP connection is considered closed by the server or client. The server and client negotiate the timeout value. The client must be configured with the value to request heartbeats. The Java, .NET, and Erlang clients maintained by RabbitMQ use the following negotiation logic:

- If the heartbeat timeout set on neither the server nor the client is **0**, the smaller value is used.
- If the heartbeat timeout is set to **0** on either the server or the client, the non-zero value is used.
- If the heartbeat timeout set on both the server and the client is **0**, heartbeats are disabled.

After the heartbeat timeout is configured, the RabbitMQ server and client send AMQP heartbeat frames to each other at an interval of half the heartbeat timeout. After a client misses two heartbeats, it is considered unreachable and the TCP connection is closed. If the client detects that the server cannot be accessed due to heartbeats, the client needs to reconnect to the server.

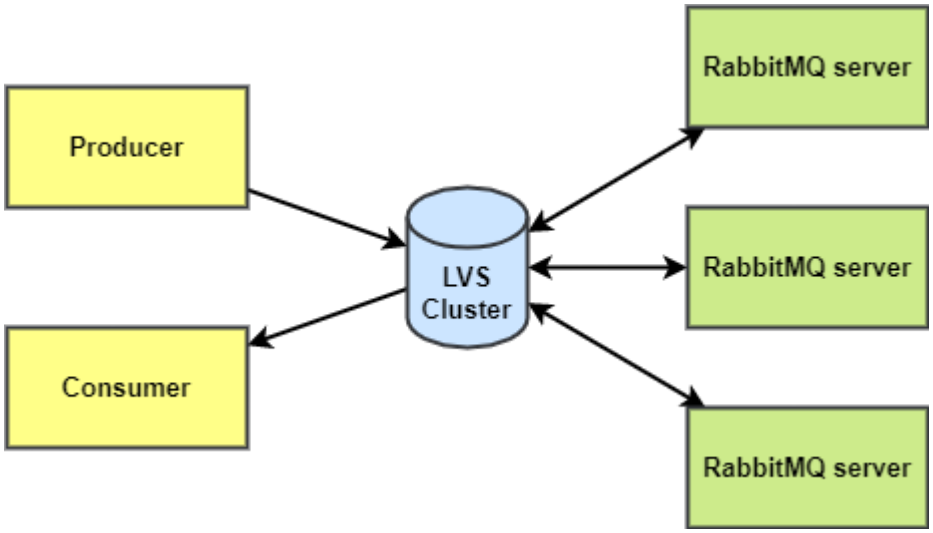
NOTICE

Some clients (such as C clients) do not have the logic for sending heartbeats. Even if the heartbeat timeout is configured and heartbeats are enabled, heartbeats still cannot be sent. In this case, an extra thread needs to be started to compile the logic for sending heartbeats.

LVS Heartbeat Timeout

Cluster RabbitMQ instances use Linux Virtual Servers (LVSs) for load balancing, as shown in **Figure 6-6**. Single-node instances do not have LVSs.

Figure 6-6 Load balancing of a cluster instance



LVS configures a heartbeat timeout of 90 seconds by default on client connections. If a client does not send a heartbeat (AMQP heartbeat frames or messages) to LVS for 90 seconds, LVS disconnects the client and the client will need to reconnect to LVS.

If messages are retrieved more than 90 seconds after they are created, enable heartbeats on the client and set the heartbeat timeout to shorter than 90 seconds.

Configuring Heartbeat Timeout on the Client

- Java client

  Before creating a connection, configure the **ConnectionFactory#setRequestedHeartbeat** parameter. Example:

  ```
  ConnectionFactory cf = new ConnectionFactory();
  // The heartbeat timeout is 60 seconds.
  cf.setRequestedHeartbeat(60);
  ```

- .NET client

  ```
  var cf = new ConnectionFactory();
  // The heartbeat timeout is 60 seconds.
  cf.RequestedHeartbeat = TimeSpan.FromSeconds(60);
  ```

- Python Pika

  ```
  // The heartbeat timeout is 60 seconds.
  params = pika.ConnectionParameters(host='host', heartbeat=60,
  ```



```
credentials=pika.PlainCredentials('username', 'passwd'))
connection = pika.BlockingConnection(params)

while True:
    channel.basic_publish(exchange='', routing_key='hello', body='Hello World!')
    print(" [x] Sent 'Hello World!'")
    # The producer needs to use connection.sleep() to trigger a heartbeat. time.sleep() cannot trigger
heartbeats.
    connection.sleep(200)
```

6.5 Viewing Client Connection Addresses

View client connection addresses on the RabbitMQ management UI.

NOTE

A client's connection addresses can be viewed only when the client is connected to a RabbitMQ instance.

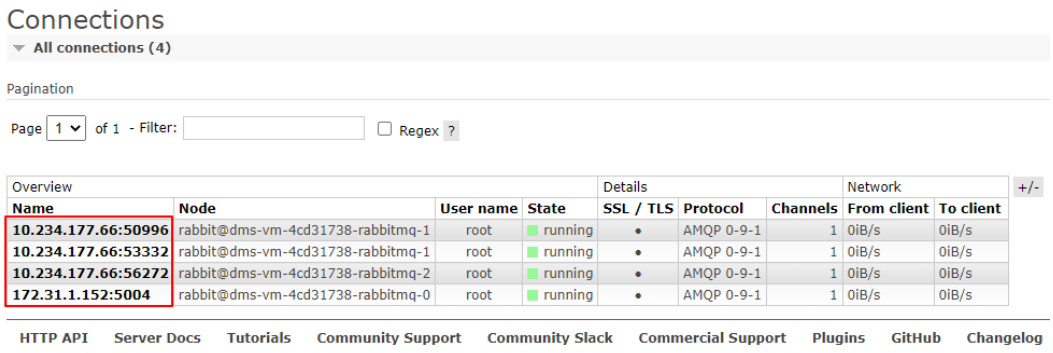
Procedure

Step 1 **Log in to the RabbitMQ management UI**.

Step 2 In the navigation pane, choose **Connections**.

Step 3 View client connection addresses, as shown in **Figure 6-7**.

Figure 6-7 Client connection addresses



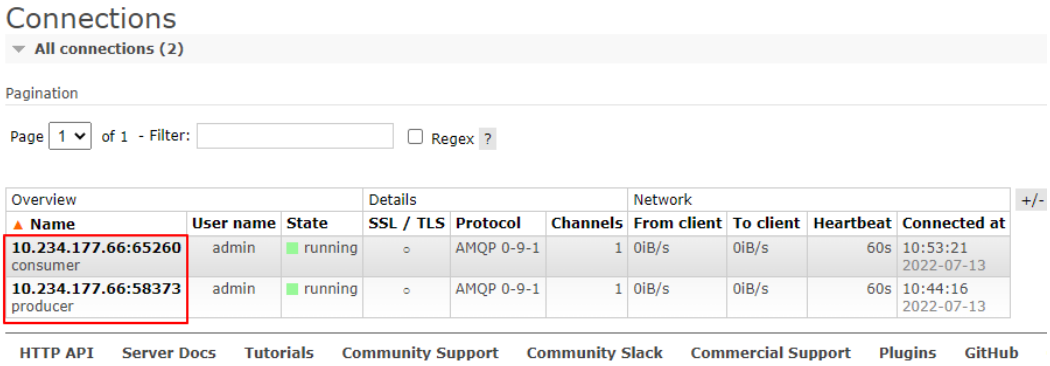
A client can function as a producer to create messages and as a consumer to retrieve messages. The producer and consumer IP addresses are the same, as shown in **Figure 6-7**, and are difficult to distinguish. To differentiate between producer and consumer IP addresses, you can set the **clientProperties** parameter on the client. The following is an example:

```
// Configure client connection parameters.
HashMap<String, Object> clientProperties = new HashMap<>();
clientProperties.put("connection_name", "producer");
connectionFactory.setClientProperties(clientProperties);

// Create a connection.
Connection connection = connectionFactory.newConnection();
```

After the **clientProperties** parameter is set, the connection addresses are displayed as shown in **Figure 6-8**.

Figure 6-8 Client connection addresses (with producer/consumer differentiated)



----End

7 Operating RabbitMQ Instances

7.1 Viewing an Instance

Scenario

View detailed information about a RabbitMQ instance on the console, for example, the connection address and port number for accessing the instance.

Prerequisites

A RabbitMQ instance has been created.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Search for a RabbitMQ instance by specifying the tag, status, name, connection address, or ID. **Table 7-1** describes the various possible statuses of a RabbitMQ instance.

Table 7-1 RabbitMQ instance status description

Status	Description
Creating	The instance is being created.

Status	Description
Running	The instance is running properly. Only instances in the **Running** state can provide services.
Faulty	The instance is not running properly.
Starting	The status between **Frozen** and **Running**.
Restarting	The instance is being restarted.
Changing	The instance specifications are being changed.
Change failed	The instance specifications failed to be changed.
Upgrading	The instance is being upgraded.
Rolling back	The instance is being rolled back.

Step 5 Click the name of the chosen RabbitMQ instance and view the instance details on the page that is displayed.

Table 7-2 describes the parameters for connecting to an instance. For details about other parameters, see the **Basic Information** tab page of the instance on the console.

Table 7-2 Connection parameters

Parameter	Description
Instance Address (Private Network)	Address for connecting to the instance when public access is disabled.
Public Access	Whether public access has been enabled.
Instance Address (Public Network)	Address for connecting to the instance when public access is enabled.

----End

7.2 Restarting a RabbitMQ Instance

Scenario

Restart one or more RabbitMQ instances at a time on the RabbitMQ console.

NOTICE

When a RabbitMQ instance is being restarted, message retrieval and creation requests of the client will be rejected.

Prerequisites

The status of the RabbitMQ instance you want to restart is in the **Running** or **Faulty** state.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Restart RabbitMQ instances using one of the following methods:

- Select one or more RabbitMQ instances and click **Restart** in the upper left corner.
- In the row containing the desired RabbitMQ instance, click **Restart**.
- Click the desired RabbitMQ instance to view its details. In the upper right corner, click **Restart**.

Step 5 Click **Yes**.

It takes 3 to 15 minutes to restart a RabbitMQ instance. After it is successfully restarted, the instance should be in the **Running** state.

NOTE

Restarting a RabbitMQ instance only restarts the instance process and does not restart the VM where the instance is located.

To restart a single RabbitMQ instance, you can also click **Restart** in the row containing the chosen RabbitMQ instance on the **RabbitMQ Premium** page.

----End

7.3 Deleting an Instance

Scenario

With a few clicks on the DMS (for RabbitMQ) console, you can delete one or more RabbitMQ instances that have been created or multiple RabbitMQ instances that failed to be created.

NOTICE

Deleting a RabbitMQ instance will delete the data in the instance without any backup. Exercise caution when performing this operation.

Prerequisites

The status of the RabbitMQ instance you want to delete is **Running** or **Faulty**.

Deleting a RabbitMQ Instance

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Delete RabbitMQ instances using one of the following methods:

- Select one or more RabbitMQ instances and click **Delete** in the upper left corner.
- In the row containing the RabbitMQ instance to be deleted, choose **More** > **Delete**.
- Click the desired RabbitMQ instance to view its details. In the upper right corner, choose **More** > **Delete**.

NOTE

RabbitMQ instances in the **Creating**, **Starting**, **Changing**, **Change failed**, or **Restarting** state cannot be deleted.

Step 5 Click **Yes**.

It takes 1 to 60 seconds to delete a RabbitMQ instance.

----End

Deleting a RabbitMQ Instance That Failed to Be Created

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 If there are RabbitMQ instances that failed to be created, **Instance Creation Failures** and quantity information will be displayed. Click the icon or quantity next to **Instance Creation Failures**.

Step 5 Delete RabbitMQ instances that failed to be created in either of the following ways:

- To batch delete all RabbitMQ instances that failed to be created, click **Clear Failed Instance**.
- To delete a single RabbitMQ instance that failed to be created, click **Delete** in the row containing the chosen RabbitMQ instance.

----End

7.4 Modifying the Instance Information

After creating a RabbitMQ instance, you can adjust some parameters of the instance based on your service requirements.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click  and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click  and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Click the desired RabbitMQ instance to view its details.

Step 5 Modify the following parameters if needed:

- Instance Name
- Description
- Enterprise Project
- Security Group
- Public Access (For details about how to change the public access configuration, see **Configuring Public Access**.)

After the parameters are modified, view the modification result in the following ways:

- If **Public Access** has been modified, you will be redirected to the **Background Tasks** page, which displays the modification progress and result.
- If **Instance Name**, **Description**, **Enterprise Project**, or **Security Group** has been modified, the modification result will be displayed on the upper right corner of the page.

----End

7.5 Resetting the Instance Password

Scenario

If you forget the password of a RabbitMQ instance, reset the password so that you can normally access the instance.

NOTE

You can reset the password of a RabbitMQ instance only if the instance in the **Running** state.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Reset the instance password using either of the following methods:

- In the row containing the desired instance, choose **More** > **Reset Password**.
- Click the desired RabbitMQ instance to view its details. In the upper right corner, choose **More** > **Reset Password**.

Step 5 Enter and confirm a new password, and click **OK**.

- If the password is successfully reset, a success message will be displayed.
- If the password fails to be reset, a failure message will be displayed. If you still fail to reset the password after multiple attempts, contact customer service.

NOTE

A success message is displayed only after the password is successfully reset on all brokers.

----End

7.6 Modifying Instance Specifications

Scenario

After creating a RabbitMQ instance in cluster mode, you can modify the number of cluster brokers and storage space, but cannot modify the flavor. For single-node RabbitMQ instances, you can increase the storage space.

You can change instances to higher specifications, but not lower ones.

Notes and Constraints

- To ensure that the instance runs properly, do not perform other operations on the instance during the modification.

Prerequisites

A RabbitMQ instance has been created and is in the **Running** state.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click  and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click  and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Modify the instance specifications using either of the following methods:

- In the row containing the desired instance, choose **More** > **Modify Specifications**.
- Click the desired RabbitMQ instance to view its details. In the upper right corner, choose **More** > **Modify Specifications**.

Step 5 Specify the required storage space or the number of brokers.

The storage space and the number of brokers can only be changed separately.

- Expand the storage space.

  For **Modify By**, select **Storage**. For **Storage Space per Broker**, specify a new storage space, and click **Next**. Confirm the configurations and click **Submit**.

  View the new storage space (Storage space per broker x Number of brokers) in the **Used/Available Storage Space (GB)** column in the instance list.

  NOTE

  Available storage space = Actual storage space – Storage space for storing logs – Disk formatting loss

  For example, if the storage space is expanded to 700 GB, the storage space for storing logs is 100 GB, and the disk formatting loss is 7 GB, then the available storage space after capacity expansion will be 593 GB.

- Add brokers.

  For **Modify By**, select **Brokers**. Then, enter the number of brokers and click **Next**. Confirm the configurations and click **Submit**.

  View the number of brokers in the **Specifications** column in the instance list.

  NOTE

  Services may temporarily stutter during the modification. Ensure that your client can auto-reconnect. Modify specifications during off-peak hours.

----End

7.7 Configuring Public Access

Scenario

Enable public access to a RabbitMQ instance so that you can access the instance over a public network. If you no longer need public access to the instance, you can disable it as required.

NOTICE

In comparison with intra-VPC access, packet loss and jitter may occur and the access delay increases during public access. Therefore, you are advised to enable public access to RabbitMQ instances only during the service development and testing phase.

Prerequisites

Public access can be enabled only for RabbitMQ instances in the **Running** state.

Enabling Public Access

Step 1 Log in to the management console.

Step 2 In the upper left corner, click  and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click  and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Click the desired instance to view its details.

Step 5 Click  next to **Public Access**.

Step 6 Select an EIP from the **Elastic IP Address** drop-down list and click  .

If no EIP exists in the **Elastic IP Address** drop-down list box, click **Create Elastic IP** to create an EIP on the page that is displayed.

It takes 10s to 30s to enable public access. After public access is enabled, the **Background Tasks** page is displayed. If the task status is **Successful**, public access is enabled successfully.

NOTE

After enabling public access, configure the following settings:

- If SSL is not enabled, add an inbound rule to the security group, allowing access to ports 5672 and 15672.

  To access the RabbitMQ management plane, visit http://*{public IP address of the RabbitMQ instance}*:15672, and enter your username and password.

  To access the instance through clients, use port 5672.

- If SSL is enabled, add an inbound rule to the security group, allowing access to ports 5671 and 15671.

  To access the RabbitMQ management plane, visit https://*{public IP address of the RabbitMQ instance}*:15671, and enter your username and password.

  To access the instance through clients, use port 5671.

----End

Disabling Public Access

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Click the desired instance to view its details.

Step 5 Click next to **Public Access**.

Step 6 Click .

It takes 10s to 30s to disable public access. After public access is disabled, the **Background Tasks** page is displayed. If the task status is **Successful**, public access is disabled successfully.

----End

7.8 Configuring Queue Mirroring

In a RabbitMQ cluster, queues can be mirrored across multiple nodes. In the event of a node failure, services are still available because the mirrors will take over services.

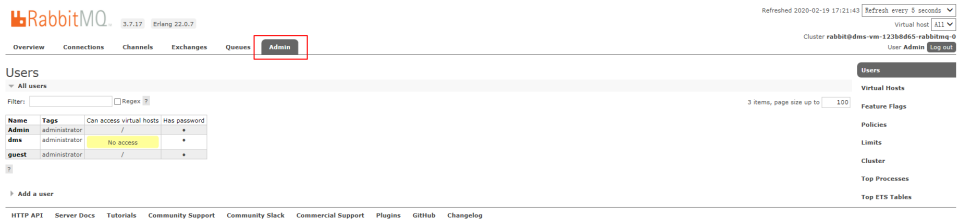
To learn more about the RabbitMQ management UI, visit the **RabbitMQ official website**. The following procedure describes how to configure queue mirroring on the RabbitMQ management UI.

Procedure

Step 1 Log in to the **management UI of a RabbitMQ instance**.

Step 2 Click the **Admin** tab.

Figure 7-1 Admin tab page



Step 3 (Optional) In the navigation tree on the right, choose **Virtual Hosts**, specify **Name**, and click **Add virtual host** to create a virtual host.

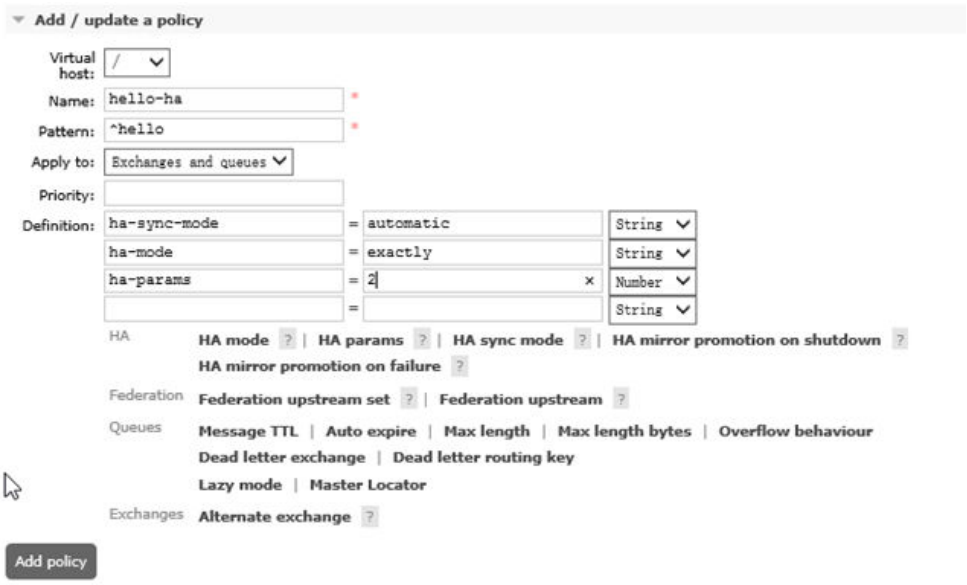
Perform this step only if you need to specify a virtual host. Otherwise, go to **Step 4**.

Figure 7-2 Creating a virtual host

Step 4 In the navigation tree on the right, choose **Policies** and set policies for the virtual host.

To set policies for a specific virtual host, select the virtual host created in **Step 3** from the **Virtual host** drop-down list box. If no virtual host has been created, the default value **/** is used.

Figure 7-3 Setting policies for a virtual host



Parameter description:

- **Name**: customized name of the policy.
- **Pattern**: regular expression that defines the pattern for matching queues.
- **Definition**: definition of the mirror, which consists of **ha-sync-mode**, **ha-mode**, and **ha-params**.
  - **ha-sync-mode**: queue synchronization mode. Options: **automatic** and **manually**.
    - **automatic**: Data is automatically synchronized from the master.
    - **manually**: Data is manually synchronized from the master.
  - **ha-mode**: queue mirroring mode. Options: **all**, **exactly**, and **nodes**.
    - **all**: Mirror the queue across all nodes in the cluster.
    - **exactly**: Mirror the queue to a specific number (determined through **ha-params**) of nodes in the cluster.
    - **nodes**: Mirror the queue to specific nodes (determined through **ha-params**).
  - **ha-params**: This parameter is used for specifying the nodes in the **ha-mode** parameter.
- (Optional) **Priority**: priority of the policy.

Step 5 Click **Add policy**.

The following figure shows a successfully added policy.

Figure 7-4 Virtual host policy

----End

7.9 Managing Instance Tags

Tags facilitate RabbitMQ instance identification and management.

You can add tags to a RabbitMQ instance when creating the instance or add tags on the details page of the created instance. Up to 20 tags can be added to an instance. Tags can be modified and deleted.

A tag consists of a tag key and a tag value. **Table 7-3** lists the tag key and value requirements.

Table 7-3 Tag key and value requirements

Name	Rules
Tag key	• Cannot be left blank. • Must be unique for the same instance. • Can contain a maximum of 36 characters. • Cannot contain the following characters: =*<>\,|/ • Cannot start or end with a space.
Tag value	• Cannot be left blank. • Can contain a maximum of 43 characters. • Cannot contain the following characters: =*<>\,|/ • Cannot start or end with a space.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Click the desired instance to view its details.

Step 5 Click the **Tags** tab. Tags of the instance are displayed.

Step 6 Perform the following operations as required:

- Adding a tag
  a. Click **Create/Delete Tag**.
  b. Enter a tag key and a tag value, and click **Add**.
     If you have created predefined tags, select a pair of tag key and value, and click **Add**.
  c. Click **OK**.
- Deleting a tag
  Delete a tag using either of the following methods:
  – In the row containing the tag to be deleted, click **Delete**. Click **Yes**.
  – Click **Create/Delete Tag**. In the dialog box that is displayed, click next to the tag to be deleted and click **OK**.

----End

7.10 Deleting Queues

Delete queues on the RabbitMQ management UI or by calling APIs.

- **Method 1: Deleting a Single Queue on the Management UI**: Delete a single queue on the **Queues** tab page of the management UI.
- **Method 2: Deleting Queues in Batches Using a Policy**: Add a policy to delete multiple queues at a time. The policy has the same prefix as the queues to be deleted, and the queue time-to-live (TTL) is 1 ms.
- **Method 3: Deleting a Single Queue Using an API**: Call an API to delete a queue from a RabbitMQ instance with SSL disabled.
- **Method 4: Deleting Queues in Batches Using an API**: Compile a shell script to repeatedly call an API to delete queues in batches from a RabbitMQ instance with SSL disabled.

NOTICE

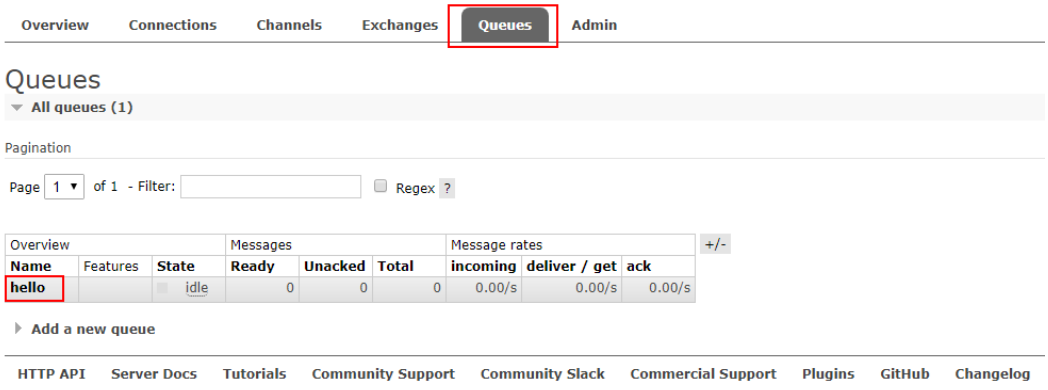
Before deleting a queue, ensure that all messages in the queue have been retrieved. Otherwise, unretrieved messages will be deleted together with the queue.

Method 1: Deleting a Single Queue on the Management UI

Step 1 **Log in to the RabbitMQ management UI**.

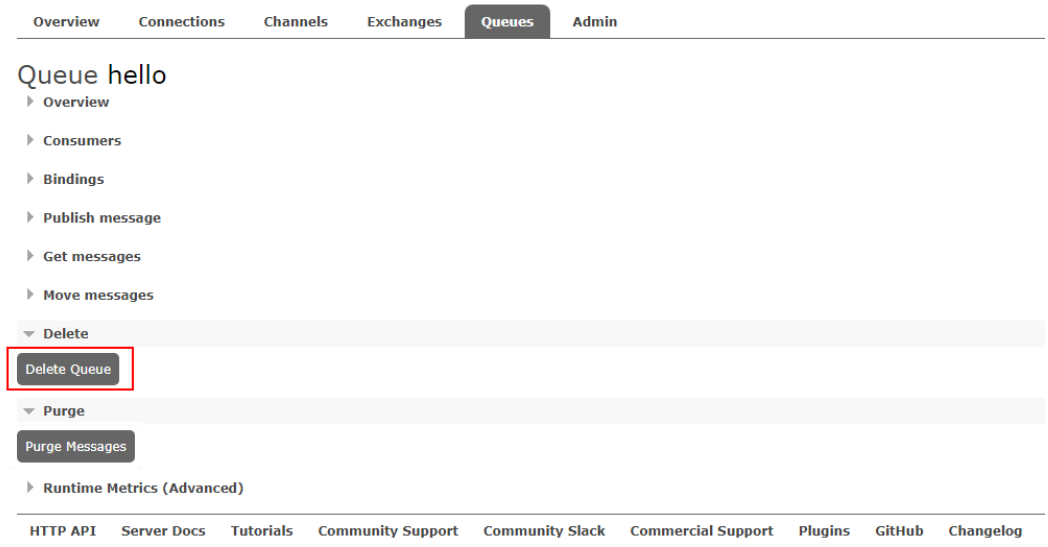
Step 2 On the **Queues** tab page, click the name of the desired queue.

Figure 7-5 Queue list



Step 3 Click **Delete Queue** to delete the queue.

Figure 7-6 Deleting a single queue



----End

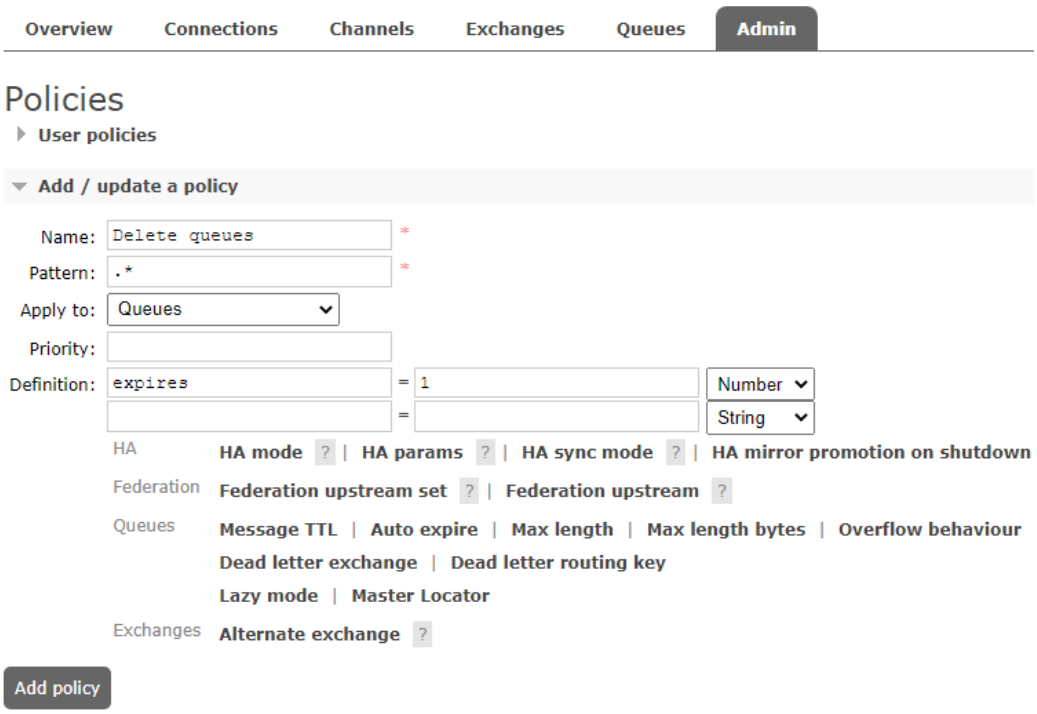
Method 2: Deleting Queues in Batches Using a Policy

Add a policy to delete multiple queues at a time. The policy has the same prefix as the queues to be deleted, and the queue TTL is 1 ms.

Step 1 **Log in to the RabbitMQ management UI**.

Step 2 On the **Admin** > **Policies** page, add a policy.

Figure 7-7 Adding a policy to delete queues in batches



- **Name**: Enter a policy name.
- **Pattern**: queue matching mode. Enter a queue name. Queues with the same prefix will be matched. If this parameter is set to **.***, all queues are matched. If this parameter is set to **.*queue-name**, all queues whose name prefix is **queue-name** are matched.
- **Apply to**: Select **Queues**.
- **Priority**: policy priority. A larger value indicates a higher priority. This parameter is optional.
- **Definition**: TTL, in milliseconds. Set **expires** to **1**, indicating that the queue expiration time is 1 ms.

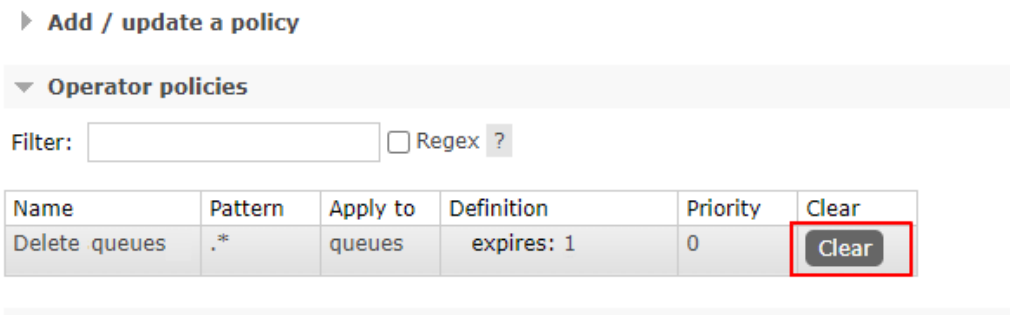
Step 3 Click **Add policy**.

On the **Queues** tab page, check whether the queues are successfully deleted.

Step 4 After the queues are deleted, choose **Admin** > **Policies**, locate the row that contains the policy added in **Step 2**, and click **Clear** to delete the policy.

If this policy is retained, it will also apply to queues created later, and queues may be deleted by mistake.

Figure 7-8 Deleting the policy



----End

Method 3: Deleting a Single Queue Using an API

If SSL is not enabled for a RabbitMQ instance, you can call an API to delete a queue.

Step 1 Connect to the instance in Linux. For details, see **Accessing a RabbitMQ Instance Without SSL Encryption**.

Step 2 Run the following command to delete a queue:

```
curl -i -XDELETE http://${USERNAME}:${PASSWORD}@${HOST}:${PORT}/api/queues/${VHOST_NAME}/${QUEUE_NAME}
```

Parameter description:

- **USERNAME**: username set when the instance was created.
- **PASSWORD**: password set when the instance was created. If you forget the password, reset it by referring to **Resetting the Instance Password**.
- **HOST**: management UI address queried on the instance details page.
- **PORT**: management UI port number queried on the instance details page.
- **VHOST_NAME**: virtual host name. The default value is **/**. Change it to **%2F** in the command.
- **QUEUE_NAME**: name of the queue to be deleted.

Example:

```
curl-i -XDELETE http://test:Zsxxxdx@192.168.0.241:15672/api/queues/%2F/hello
```

If the deletion is successful, the following information is displayed.

Figure 7-9 Queue deleted

You can also check whether the queue is successfully deleted on the **Queues** tab page of the management UI.

----End

Method 4: Deleting Queues in Batches Using an API

If SSL is not enabled for a RabbitMQ instance, you can compile a shell script to repeatedly call an API to delete queues in batches.

Step 1 Connect to the instance in Linux. For details, see **Accessing a RabbitMQ Instance Without SSL Encryption**.

Step 2 Create the **delete_queues.sh** script.

```
touch delete_queues.sh
```

Step 3 Edit the script.

```
vim delete_queues.sh
```

Copy the following content to the script. Change the values of **USERNAME**, **PASSWORD**, **HOST**, and **QUEUES_LIST** as required.

```
#!/usr/bin/env bash

USERNAME=root
PASSWORD=Zsxxxdx
HOST=192.168.0.241
PORT=15672
VHOST='%2F'


QUEUES_LIST="test1 test2 test3";
for QUEUE_NAME in $QUEUES_LIST :
do
   curl -i -XDELETE http://$USERNAME:$PASSWORD@$HOST:$PORT/api/queues/$VHOST/$QUEUE_NAME
done
```

Parameter description:

- **USERNAME**: username set when the instance was created.
- **PASSWORD**: password set when the instance was created. If you forget the password, reset it by referring to **Resetting the Instance Password**.
- **HOST**: management UI address queried on the instance details page.
- **PORT**: management UI port number queried on the instance details page.
- **VHOST**: virtual host name. The default value is **/**. Change it to **%2F** in the command.
- **QUEUES_LIST**: names of the queues to be deleted. Use spaces to separate queue names.

Step 4 Save the script.

Step 5 Configure the script permissions.

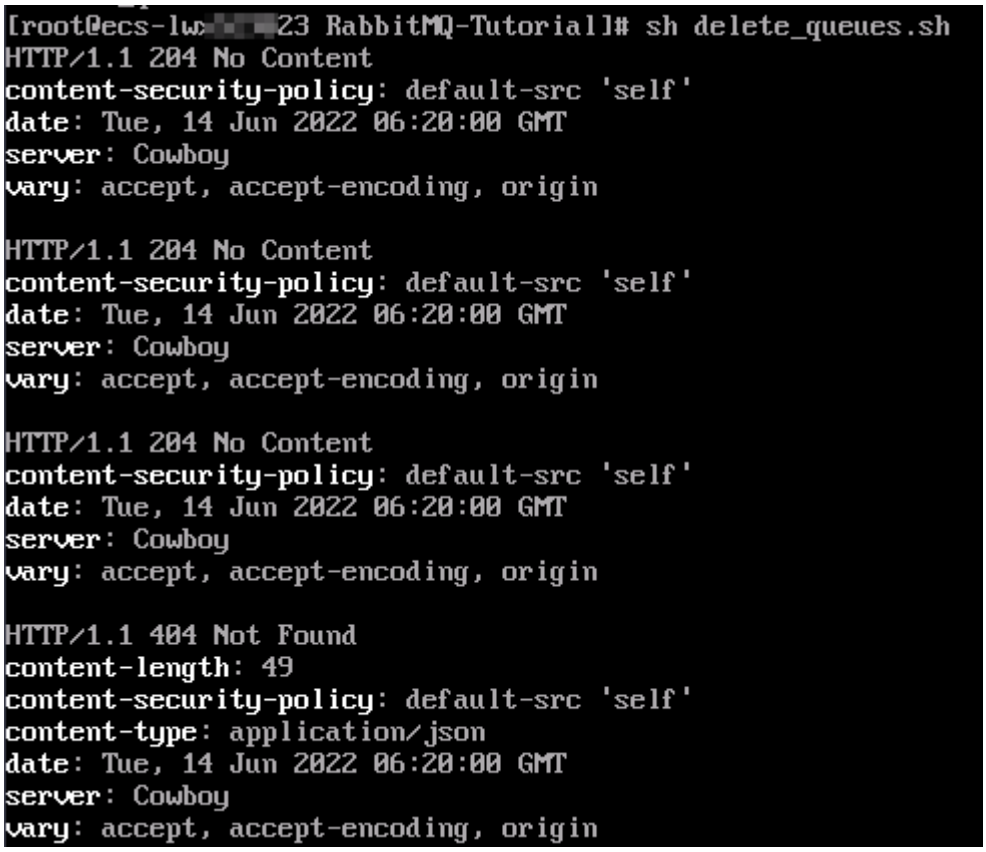
```
chmod 777 delete_queues.sh
```

Step 6 Run the script.

```
sh delete_queues.sh
```

If the deletion is successful, the following information is displayed.

Figure 7-10 Queues deleted



You can also check whether the queues are successfully deleted on the **Queues** tab page of the management UI.

----End

7.11 Upgrading the Version

Scenario

Upgrade a RabbitMQ instance on the DMS for RabbitMQ console.

Precautions

- The upgrade process causes the instance to be temporarily unavailable. Message production and consumption requests from clients will be rejected, and non-persistent resources and messages will be deleted. Perform the upgrade during off-peak hours.
- Compared with RabbitMQ 3.7.17, RabbitMQ 3.8.5 introduces two new parameters: **consumer_timeout** and **max_message_size**. Before the upgrade, check whether the two parameters affect the existing service logic.
  - **consumer_timeout**: consumer ACK timeout. If the client does not acknowledge consumption within the specified period, the connection is forcibly disconnected and messages will be resent. The default timeout period is 1,800,000 ms.

- **max_message_size**: maximum size of a single message. If this limit is exceeded, the request is rejected and a channel exception is returned. The default maximum size is 134,217,728 bytes.

Prerequisites

A RabbitMQ instance using version 3.7.17 has been created.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click  and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click  and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Upgrade a RabbitMQ instance using either of the following methods:

- In the row containing the desired instance, choose **More** > **Upgrade**.
- Click the desired instance to view its details. In the upper right corner, choose **More** > **Upgrade**.

Step 5 In the displayed dialog box, click **OK**.

When the instance status changes from **Upgrading** to **Running**, the upgrade has completed. View the current version in the **Version** column.

----End

8 Plug-in Management

8.1 Enabling Plug-ins

After creating a RabbitMQ instance, you can enable the plug-ins listed in the following table. The plug-ins are disabled by default when the instance is created.

NOTE

When plug-ins are enabled, the instance will not be restarted. However, enabling plug-ins rabbitmq_mqtt, rabbitmq_web_mqtt, rabbitmq_stomp, and rabbitmq_web_stomp will restart Keepalived and disconnect the instance. After the instance is disconnected, it may be automatically reconnected depending on the service logic.

Table 8-1 Plug-ins that can be enabled or disabled

Name	Function	Port
rabbitmq_amqp1_0	Support for AMQP 1.0	-
rabbitmq_delayed_message_exchange	Delayed messages There may be an error of about 1%. The actual delivery time may be earlier or later than the scheduled delivery time.	-
rabbitmq_federation	Federation	-
rabbitmq_sharding	Sharding	-
rabbitmq_shovel	Message moving	-
rabbitmq_tracing	Message tracing	-
rabbitmq_mqtt	Support for MQTT over TCP	1883
rabbitmq_web_mqtt	Support for MQTT over WebSocket	15675
rabbitmq_stomp	Support for STOMP over TCP	61613

Name	Function	Port
rabbitmq_web_stomp	Support for STOMP over WebSocket	15674
rabbitmq_consistent_hash_exchange	Consistent hash exchange	-

NOTE

The ports of the plug-ins cannot be changed.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Click the desired instance to view its details.

Step 5 On the **Plug-ins** tab page, click **Enable** next to the desired plug-in.

Confirm that you want to enable the plug-in and wait for it to be enabled successfully.

----End

8.2 Using the rabbitmq_tracing Plug-in

Scenario

The rabbitmq_tracing plug-in provides the message tracing function. It traces incoming and outgoing messages of RabbitMQ, captures the messages, and saves message logs to the corresponding trace file.

Prerequisites

You have purchased an instance.

Procedure

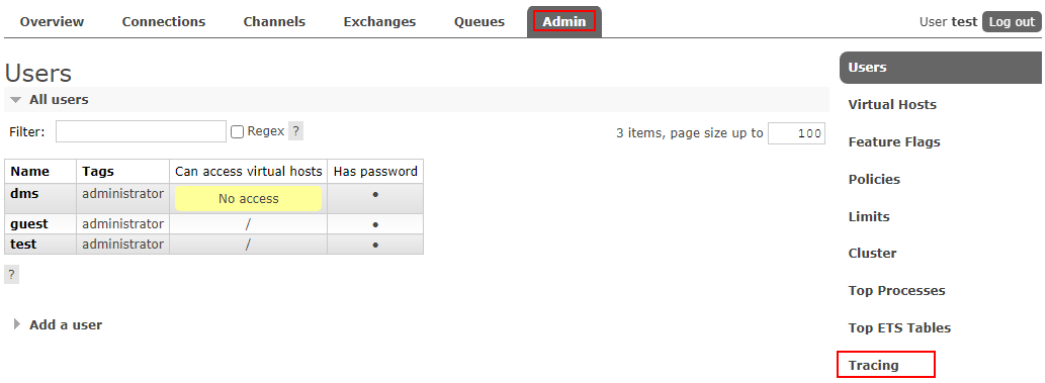
Step 1 Enable the rabbitmq_tracing plug-in by referring to **Enabling Plug-ins**.

Step 2 **Log in to the RabbitMQ management UI**.

Step 3 On the top navigation bar, choose **Admin**.

Step 4 In the navigation tree on the right, choose **Tracing**.

Figure 8-1 Admin page



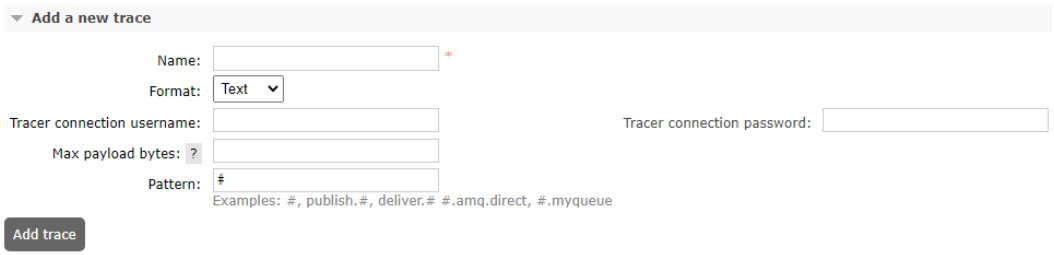
Step 5 In the **Add a new trace** area, set the following parameters and click **Add trace** to add a trace.

Table 8-2 Trace parameters

Parameter	Description
Name	Name of the trace.
Format	Format of the output message log. **Text** (easy to read) and **JSON** (easy to parse) are supported.
Tracer connection username	Name of the user that creates tracing.
Tracer connection password	Password of the user that creates a trace.
Max payload bytes	Maximum size of a message, in bytes. Assume that **Max payload bytes** is set to **10**. A message larger than 10 bytes will be truncated when it is transferred through RabbitMQ. For example, **trace test payload** will become **trace test** after truncation.

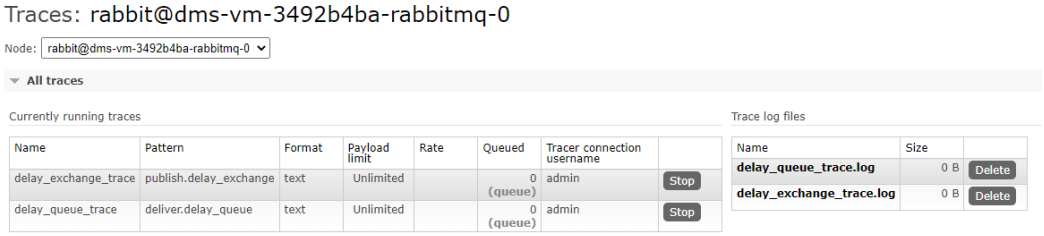
Parameter	Description
Pattern	Matching pattern. Options: • **#**: Trace all messages entering and leaving RabbitMQ. • **publish#**: Trace all messages entering RabbitMQ. • **deliver#**: Trace all messages leaving RabbitMQ. • **publish.***delay_exchange*: Trace messages entering a specified exchange. *delay_exchange* indicates an exchange name. Change it to the actual value. • **deliver.***delay_queue*: Trace messages entering a specified queue. *delay_queue* indicates a queue name. Change it to the actual value.

Figure 8-2 Adding a trace



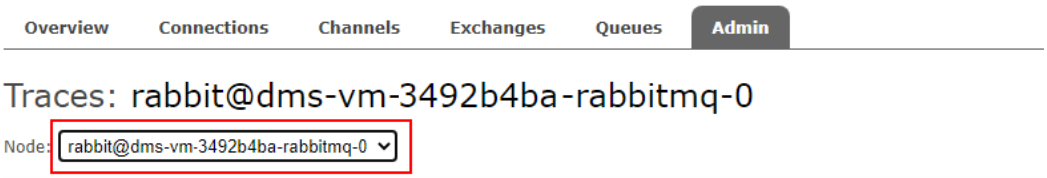
After the trace is created, it is displayed in the **All traces** area.

Figure 8-3 Trace list



Step 6 (Optional) For a cluster RabbitMQ instance, switch nodes by specifying **Node** and repeat **Step 5** to create traces for them.

Figure 8-4 Switching nodes



Step 7 After message logs are stored in the trace log file, click the trace log file name to view the log content.

Figure 8-5 Trace log files

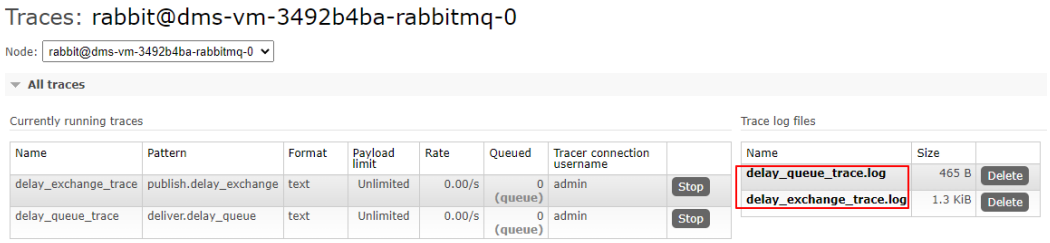


Figure 8-6 shows the content of **delay_exchange_trace.log**.

Figure 8-6 delay_exchange_trace.log

```
================================================================================
2022-07-20 3:22:32:837: Message published

Node:          rabbit@dms-vm-3492b4ba-rabbitmq-0
Connection:    <rabbit@dms-vm-3492b4ba-rabbitmq-0.1657790484.10274.7>
Virtual host:  /
User:          admin
Channel:       1
Exchange:      delay_exchange
Routing keys:  [<<>>]
Routed queues:  []
Properties:    [{<<"delivery_mode">>,signedint,2},{<<"headers">>,table,[]}]
Payload:
hello world
```

Figure 8-7 shows the content of **delay_queue_trace.log**.

Figure 8-7 delay_queue_trace.log

```
================================================================================
2022-07-20 3:23:22:468: Message received

Node:          rabbit@dms-vm-3492b4ba-rabbitmq-0
Connection:    <rabbit@dms-vm-3492b4ba-rabbitmq-0.1657790484.10565.7>
Virtual host:  /
User:          admin
Channel:       1
Exchange:
Routing keys:  [<<"delay_queue">>]
Queue:         delay_queue
Properties:    [{<<"delivery_mode">>,signedint,1},{<<"headers">>,table,[]}]
Payload:
hello world
```

----End

9 Managing Virtual Hosts

9.1 Creating a Virtual Host

Scenario

Each virtual host serves as an independent RabbitMQ server. Virtual hosts provide logical separation of exchanges, queues, and bindings. Different applications run on different virtual hosts without interfering with each other. An instance can have multiple virtual hosts, and a virtual host can have multiple exchanges and queues. To connect a producer or consumer to a RabbitMQ instance, you must specify a virtual host. For details, see **Virtual Hosts** on the official RabbitMQ website.

Methods of creating a virtual host:

- **Method 1: By using the console**
- **Method 2: By using the RabbitMQ management UI**
- **Method 3: By calling an API**

Method 1: Creating a Virtual Host on the Console

Step 1 Log in to the management console.

Step 2 In the upper left corner, click  and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click  and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Click an instance to go to the details page.

Step 5 In the navigation pane, choose **Virtual Hosts**.

Step 6 Click **Create Virtual Host**.

Step 7 Enter a virtual host name and click **OK**.

After the creation is successful, the new virtual host is displayed in the virtual host list.

Tracing indicates whether message tracing is enabled. If it is enabled, you can trace the message forwarding path.

NOTE

- The virtual host name cannot be modified once specified.
- After an instance is created, a virtual host named **/** is automatically created.

----End

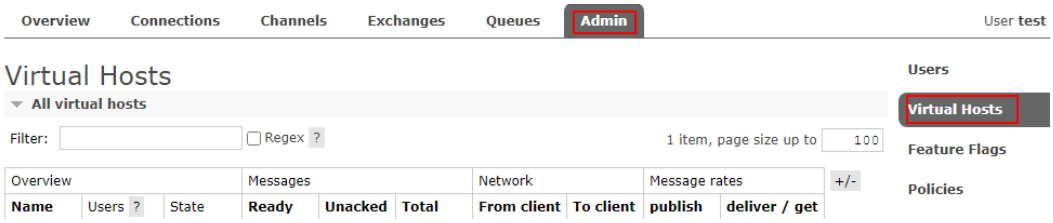
Method 2: Creating a Virtual Host on the RabbitMQ Management UI

Step 1 Log in to the **RabbitMQ management UI**.

Step 2 On the top navigation bar, choose **Admin**.

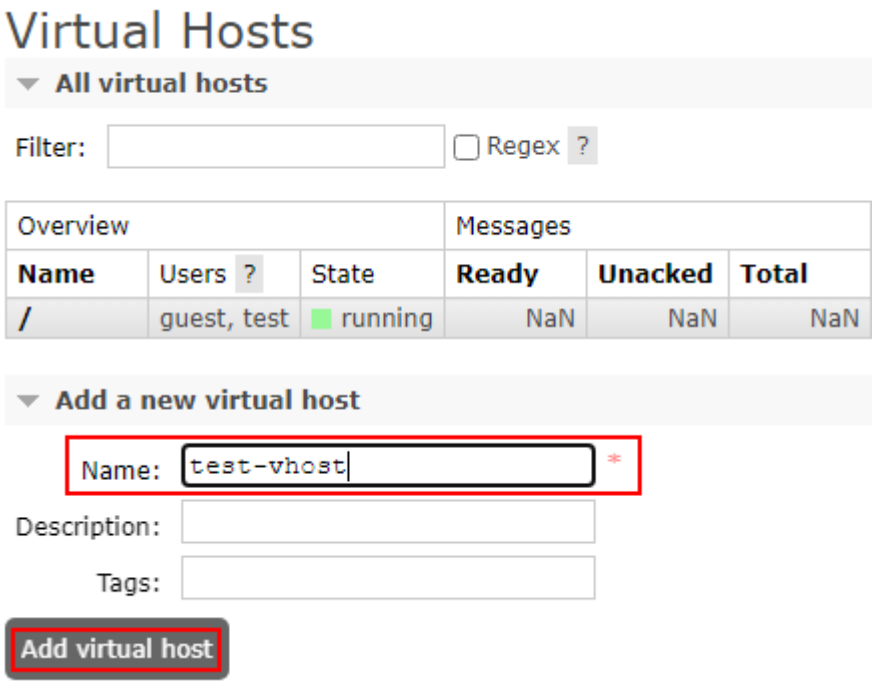
Step 3 In the navigation tree on the right, choose **Virtual Hosts**.

Figure 9-1 Virtual Hosts



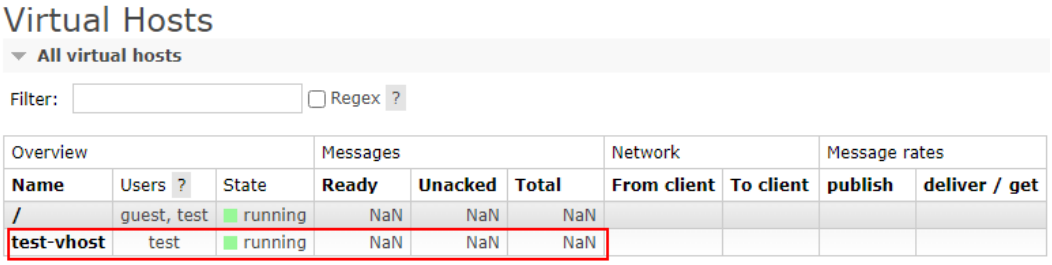
Step 4 In the **Add a new virtual host** area, enter the virtual host name and click **Add virtual host**.

Figure 9-2 Creating a virtual host (management UI)



After the creation is successful, the new virtual host is displayed in the **All virtual hosts** area.

Figure 9-3 Virtual host list (management UI)



----End

Method 3: Creating a Virtual Host by Calling an API

Step 1 In Linux, **connect to the RabbitMQ instance**.

Step 2 Run the following command to create a virtual host:

```
curl -i -X PUT http://${USERNAME}:${PASSWORD}@${HOST}:${PORT}/api/vhosts/${VHOST_NAME}
```

Parameter description:

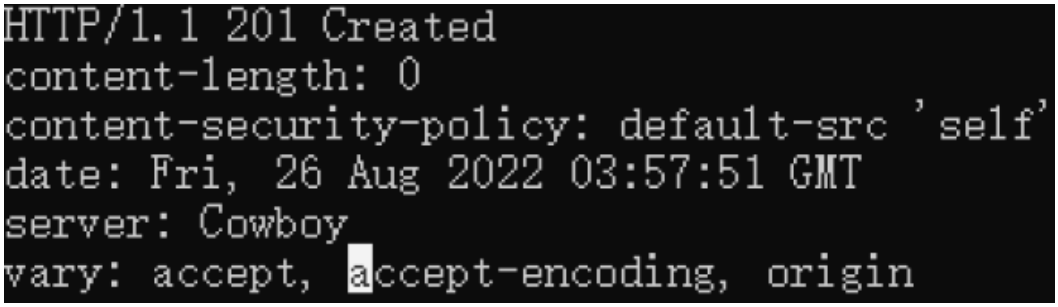
- **USERNAME**: username set when the RabbitMQ instance was created. View the username in the **Connection** area on the instance details page.
- **PASSWORD**: password set when the RabbitMQ instance was created. If you forget the password, **reset it**.
- **HOST**: IP address of the management UI. View the management UI address in the **Connection** area on the instance details page.
- **PORT**: port of the management UI. View the management UI port in the **Connection** area on the instance details page.
- **VHOST_NAME**: name of the virtual host to be created.

Example:

```
curl -i -X PUT http://root:txxxt@192.168.1.3:15672/api/vhosts/vhost-demo
```

If the creation is successful, the following information is displayed.

Figure 9-4 Virtual host created successfully



----End

9.2 Deleting a Virtual Host

Scenario

Methods of deleting a virtual host:

- **Method 1: By using the console**
- **Method 2: By using the RabbitMQ management UI**
- **Method 3: By calling an API**

Method 1: Deleting a Virtual Host on the Console

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 Click an instance to go to the details page.

Step 5 In the navigation pane, choose **Virtual Hosts**.

Step 6 Delete virtual hosts using either of the following methods:

- Select one or more virtual hosts and click **Delete Virtual Host** in the upper left corner.
- In the row containing the virtual host you want to delete, click **Delete**.

Step 7 In the confirmation dialog box that is displayed, click **Yes**.

----End

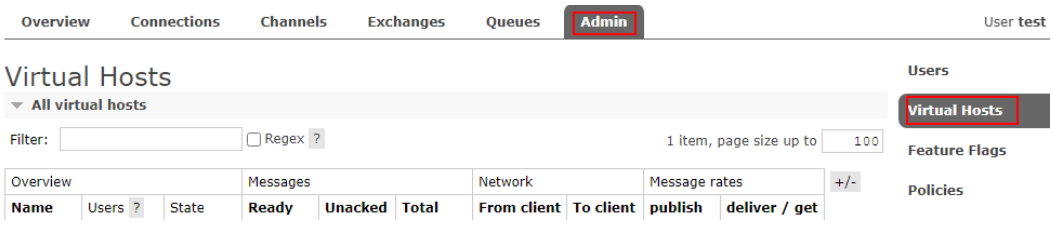
Method 2: Deleting a Virtual Host on the RabbitMQ Management UI

Step 1 Log in to the **RabbitMQ management UI**.

Step 2 On the top navigation bar, choose **Admin**.

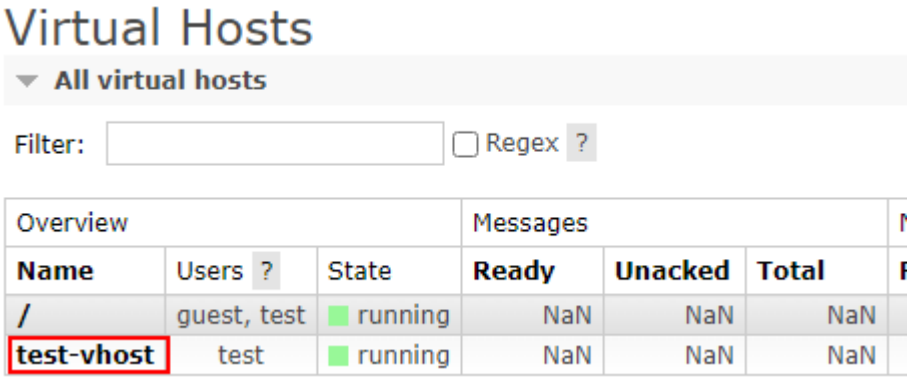
Step 3 In the navigation tree on the right, choose **Virtual Hosts**.

Figure 9-5 Virtual Hosts page



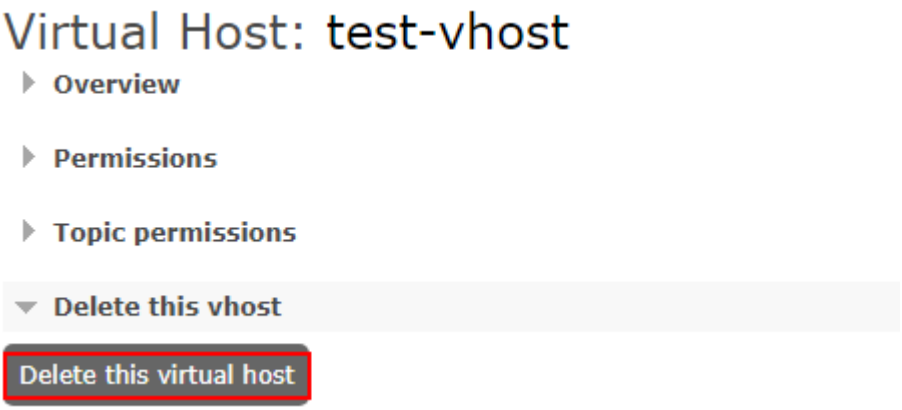
Step 4 Click the name of the virtual host to be deleted.

Figure 9-6 Virtual host to be deleted



Step 5 In the **Delete this vhost** area, click **Delete this virtual host**. A confirmation dialog box is displayed.

Figure 9-7 Deleting a virtual host



Step 6 Click **OK**.

----End

Method 3: Deleting a Virtual Host by Calling an API

Step 1 In Linux, **connect to the RabbitMQ instance**.

Step 2 Run the following command to delete a virtual host:

```
curl -i -X DELETE http://${USERNAME}:${PASSWORD}@${HOST}:${PORT}/api/vhosts/${VHOST_NAME}
```

Parameter description:

- **USERNAME**: username set when the RabbitMQ instance was created. View the username in the **Connection** area on the instance details page.
- **PASSWORD**: password set when the RabbitMQ instance was created. If you forget the password, **reset it**.
- **HOST**: IP address of the management UI. View the management UI address in the **Connection** area on the instance details page.

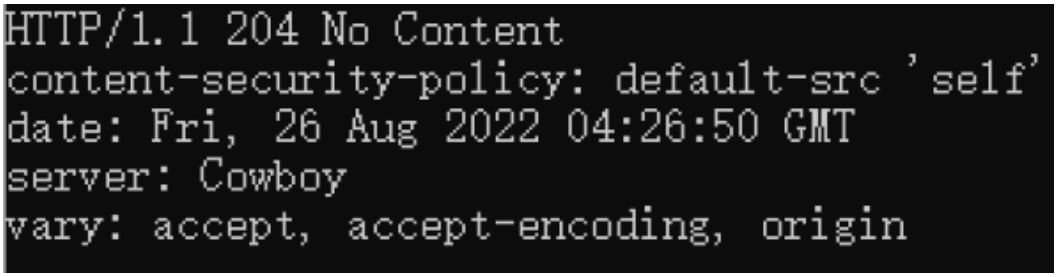
- **PORT**: port of the management UI. View the management UI port in the **Connection** area on the instance details page.
- **VHOST_NAME**: name of the virtual host to be deleted.

Example:

```
curl -i -X DELETE http://root:txxxt@192.168.1.3:15672/api/vhosts/vhost-demo
```

If the deletion is successful, the following information is displayed.

Figure 9-8 Virtual host deleted successfully



----End

10 Advanced Features

10.1 Lazy Queues

Scenario

By default, messages produced by RabbitMQ producers are stored in the memory. When the memory needs to be released, the messages will be paged out to the disk. Paging takes a long time, during which queues cannot process messages.

If production is too fast (for example during batch processing) or consumers cannot consume messages for a long time due to various reasons (for example when consumers are offline or broke down), a large number of messages will be stacked. Memory usage becomes high and paging is frequently triggered, which may affect message sending and receiving of other queues. In this case, you are advised to use lazy queues.

Lazy queues store as many messages to the disk as possible. Messages are loaded to the memory only when they are being consumed. This reduces memory consumption, but increases I/O and affects single-queue throughput. An important goal of lazy queues is to support long queues, that is, queues with many messages stored or stacked.

Lazy queues are recommended in the following scenarios:

- Messages may be stacked in queues.
- There is no high requirement on the queue performance (throughput), for example, less than 10,000 TPS.
- Stable production and consumption are desired, without being affected by memory changes.

Lazy queues are not suitable in the following scenarios:

- High RabbitMQ performance is expected.
- Queues are always short (with no messages stacked).
- The queue length limit is configured in a policy.

For more information about lazy queues, see **Lazy Queues**.

Configuring a Lazy Queue

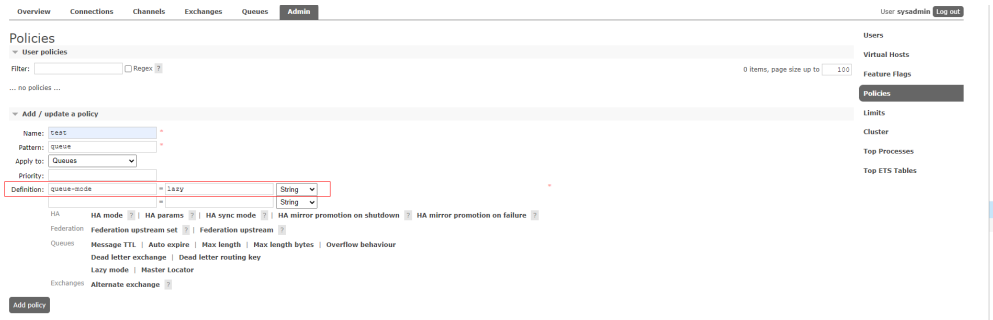
A queue has two modes: **default** and **lazy**. The default mode is **default**. To configure a queue to be **lazy**, you can use the **channel.queueDeclare** argument or a policy. If both these methods are used, the configuration set by the policy takes precedence.

- **The following example shows how to set a lazy queue by using channel.queueDeclare on a Java client.**

```
Map<String, Object> args = new HashMap<String, Object>();
args.put("x-queue-mode", "lazy");
channel.queueDeclare("myqueue", false, false, false, args);
```

- The following figure shows how to use a policy to set a lazy queue on the **RabbitMQ management UI**.

Figure 10-1 Using a policy to set a lazy queue



10.2 Message Persistence

Scenario

By default, messages produced by RabbitMQ producers are stored in the memory. When a node breaks down or restarts, how can we ensure that messages are not lost? In RabbitMQ, you can configure persistence for exchanges, queues, and messages. **Persistence means writing messages in the memory to the disk to prevent them from being lost due to exceptions. However, if message persistence is enabled, RabbitMQ performance deteriorates because read and write operations are much slower in disks than in memory.** Different from the lazy queue mechanism, a persisted message is stored in both the disk and memory. It is deleted from the memory only when the memory is insufficient.

NOTICE

- Non-persistent queues and exchanges are lost after a restart.
- Non-persistent messages are lost after a restart. (Messages that are sent to persistent queues or exchanges will not automatically become persistent.)
- A message will be lost if the server restarts before the message persistence is complete.

Configuring Exchange Persistence

When creating an exchange on the **RabbitMQ management UI**, set **durable** to **true**, as shown in **Figure 10-2**. **Figure 10-3** shows a successful configuration.

Figure 10-2 Configuring exchange persistence

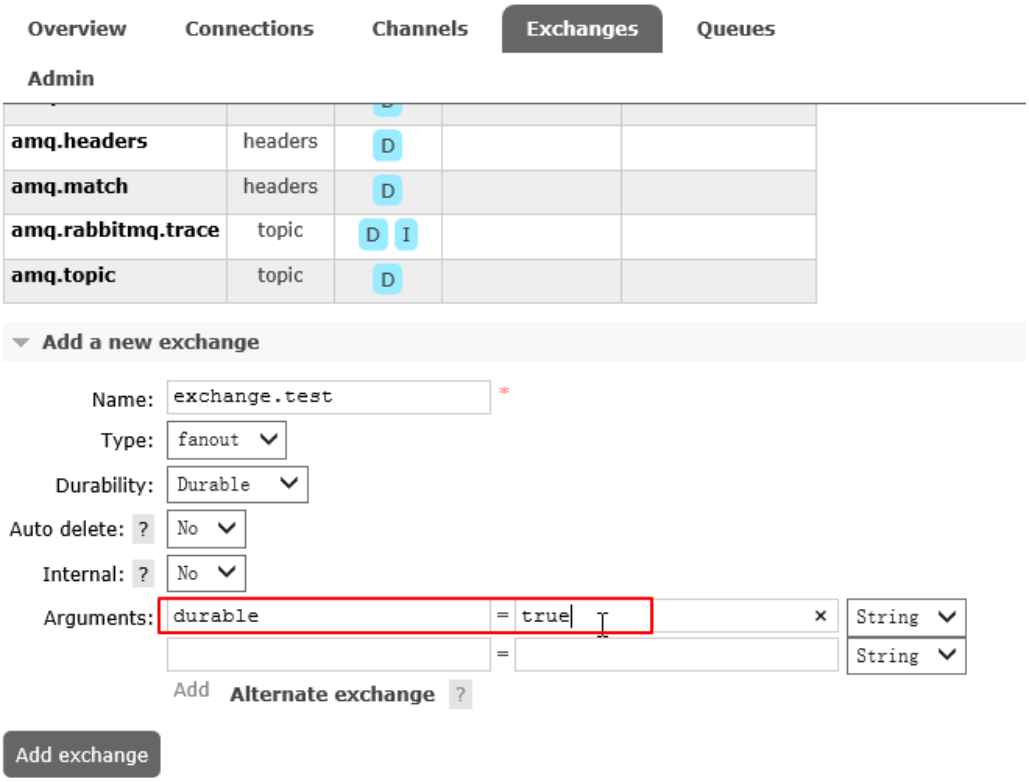
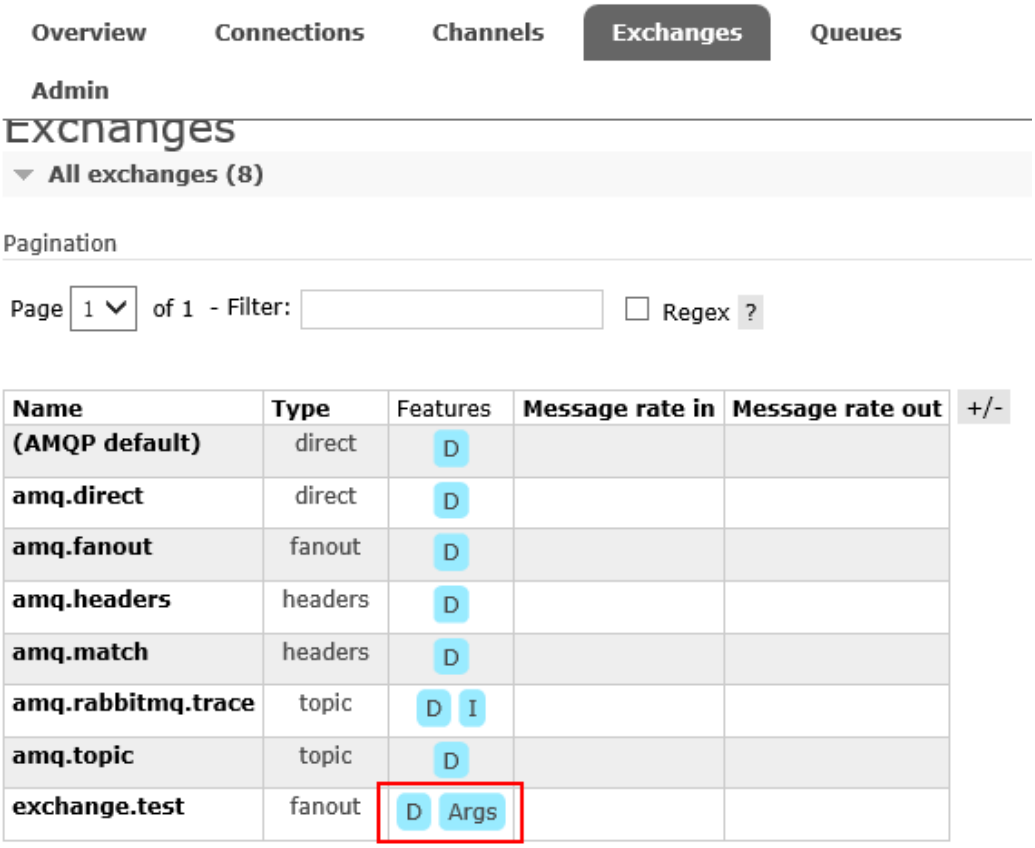


Figure 10-3 Exchange persistence configured



Configuring Queue Persistence

When creating a queue on the **RabbitMQ management UI**, set **durable** to **true**, as shown in **Figure 10-4**. **Figure 10-5** shows a successful configuration.

Figure 10-4 Configuring queue persistence

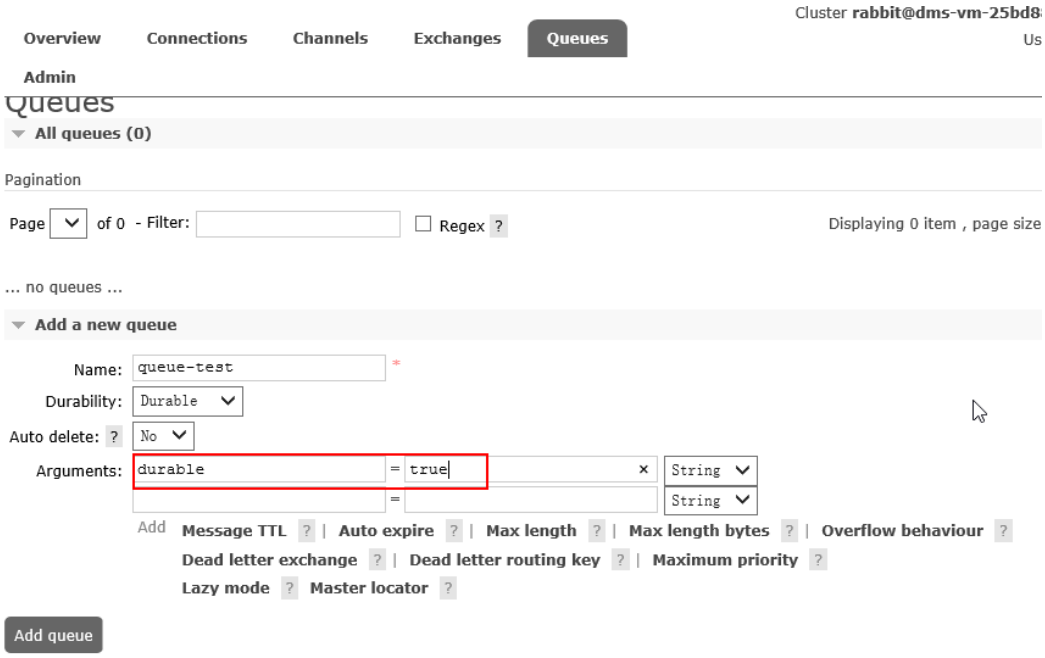
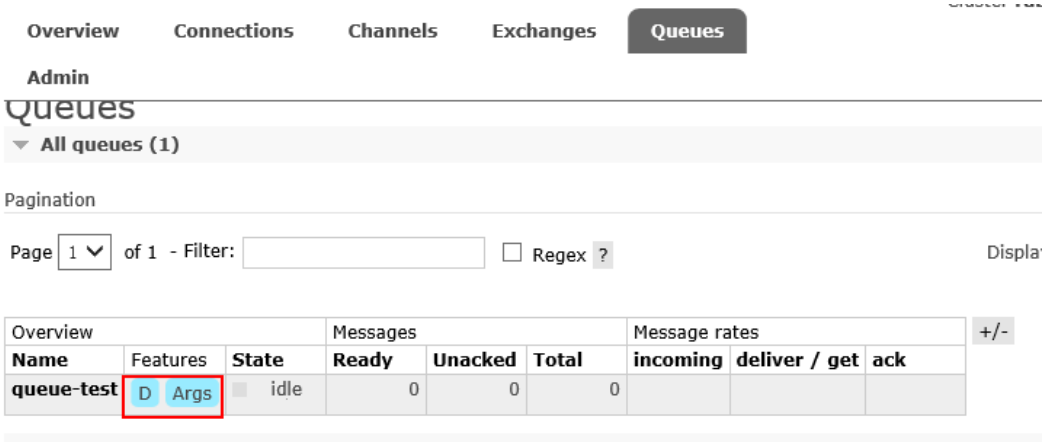


Figure 10-5 Queue persistence configured



Configuring Message Persistence

After configuring queue persistence, set **MessageProperties** to **PERSISTENT_TEXT_PLAIN** to send persistent messages to the queue.

The following example shows how to configure message persistence on a Java client.

```
import com.rabbitmq.client.MessageProperties;
channel.basicPublish("", "my_queue",MessageProperties.PERSISTENT_TEXT_PLAIN, message.getBytes());
```


10.3 Dead Lettering and TTL

Dead lettering and time to live (TTL) are two RabbitMQ features that must be used with caution because they may adversely affect system performance.

Dead Lettering

Dead lettering is a message mechanism in RabbitMQ. When a message is consumed, it becomes a dead letter message if any of the following happens:

- **requeue** is set to **false**, and the consumer uses **basic.reject** or **basic.nack** to negatively acknowledge (NACK) the message.
- The message has stayed in the queue for longer than the configured TTL.
- The number of messages in the queue exceeds the maximum queue length.

Such a message will be stored in a dead letter queue, if any, for special treatment. If there is no dead letter queue, the message will be discarded.

For more information about dead lettering, see **Dead Letter Exchanges**.

Configuring dead letter exchanges and routing information using queue parameters

To configure a dead letter exchange for a queue, specify the **x-dead-letter-exchange** and **x-dead-letter-routing-key** parameters when declaring the queue. The queue sends the dead letter message to the dead letter exchange based on **x-dead-letter-exchange** and sets the dead letter routing key for the dead letter message based on **x-dead-letter-routing-key**.

The following example shows how to configure a dead letter exchange and routing information on a Java client.

```
channel.exchangeDeclare("some.exchange.name", "direct");

Map<String, Object> args = new HashMap<String, Object>();
args.put("x-dead-letter-exchange", "some.exchange.name");
args.put("x-dead-letter-routing-key", "some-routing-key");
channel.queueDeclare("myqueue", false, false, false, args);
```

TTL

TTL indicates the expiration time. You can configure TTL for messages and queues. Message TTL can be configured using the following methods:

- Configure a TTL in queue properties: All messages in the queue have the same expiration time.
- Configure a TTL for each message: Each message has a dedicated TTL.

If both methods are used, the smaller TTL value is used.

If a message that has stayed in a queue for longer than the TTL, the message will be discarded. If a dead letter exchange has been configured for the queue, the message will be sent to the dead letter exchange, and then routed to the dead letter queue.

For more information about TTL, see **TTL**.

Configuring queue TTL

The **x-expires** parameter in the **channel.queueDeclare** argument is used to control after how long of being unused a queue is automatically deleted. "Unused" indicates that there is no consumer in the queue, the queue is not re-declared, and the **Basic.Get** command is not invoked during this period. The value of **x-expires** must be a non-zero integer, in milliseconds.

The following example shows how to configure a queue TTL on a Java client.

```
Map<String, Object> args = new HashMap<String, Object>();
args.put("x-expires", 1800000);
channel.queueDeclare("myqueue", false, false, false, args);
```

Configuring message TTL

Configure a TTL in queue properties: Add the **x-message-ttl** parameter to the **channel.queueDeclare** argument. The value of this parameter must be a non-zero integer, in milliseconds.

The following example shows how to configure a message TTL by setting queue properties on a Java client.

```
Map<String,Object> arg = new HashMap<String, Object>();
arg.put("x-message-ttl",6000);
channel.queueDeclare("normalQueue",true,false,false,arg);
```

Configure a TTL for each message: Add the **expiration** parameter to the **channel.basicPublish** argument. The value of this parameter must be a non-zero integer, in milliseconds.

The following example shows how to set a per-message TTL on a Java client.

```
byte[] messageBodyBytes = "Hello, world!".getBytes();
AMQP.BasicProperties properties = new AMQP.BasicProperties.Builder()
                                  .expiration("60000")
                                  .build();
channel.basicPublish("my-exchange", "routing-key", properties, messageBodyBytes);
```

10.4 Message Acknowledgment

Scenario

How does a producer confirm that a message has been properly published to the server? How does the server confirm that a message has been successfully consumed? The answer is RabbitMQ's acknowledgement mechanism.

Acknowledgments by publishers ("publisher confirms") and consumers are critical to ensure data reliability. If a connection fails, messages being transmitted may be lost and need to be transmitted again. The acknowledgment mechanism enables the server and client to know when to retransmit messages. A client may acknowledge a message upon receipt of the message, or after it has completely processed the message. **Producer confirms affect performance and should be disabled if high throughput is required. However, disabling producer confirms leads to lower reliability.**

For details about the message acknowledgment mechanism, see **Consumer Acknowledgment and Publisher Confirms**.

Producer Confirms

The server confirms that it has received the message sent from the producer.

The following example shows how to configure publisher confirms on a Java client.

```
try {
   channel.confirmSelect(); // Enable publisher confirms on the channel.
   // Send messages normally.
   channel . basicPublish( "exchange " , " routingKey" , null , "publisher confirm test " .getBytes());
   if (!channel.waitForConfirms()) {
      System.out.println( "send message failed " ) ;
      // do something else....
   }
} catch (InterruptedException e) {
      e.printStackTrace() ;
}
```

After the **channel .waitForConfirms** method is called, the system waits for a confirmation from the server. Such synchronous waiting affects performance, but is necessary if the publisher requires at-least-once delivery.

Consumer Acknowledgment

The server determines whether to delete a message from a queue based on whether the message is successfully received by the consumer.

Consumer acknowledgments are important to ensure data reliability. Consumer applications should take enough time to process important messages before acknowledging the messages. In this way, we do not have to worry about message losses caused by consumer process exceptions (such as program breakdown and restart) during message processing.

Consumer acknowledgment can be enabled by using the **basicConsume** method. In most cases, consumer acknowledgments are enabled on channels.

The following example shows how to configure consumer acknowledgments on a Java client (using **Channel#basicAck** and **basic.ack** for positive acknowledgment):

```
// this example assumes an existing channel instance

boolean autoAck = false;
channel.basicConsume(queueName, autoAck, "a-consumer-tag",
    new DefaultConsumer(channel) {
        @Override
        public void handleDelivery(String consumerTag,
                                   Envelope envelope,
                                   AMQP.BasicProperties properties, byte[] body)
            throws IOException
        {
            long deliveryTag = envelope.getDeliveryTag();
            // positively acknowledge a single delivery, the message will
            // be discarded
            channel.basicAck(deliveryTag, false);
        }
    });
```

Unacknowledged messages are cached in the memory. If there are too many unacknowledged messages, the memory usage becomes high. In this case, you

can limit the number of messages prefetched by the consumer. For details, see **Prefetch**.

10.5 Prefetch

Scenario

Prefetch limits the number of unacknowledged messages. Once a consumer has more unacknowledged messages than the prefetch limit, the server stops sending messages to the consumer, unless at least one message is acknowledged. Prefetch is essentially a flow control measure on consumers.

Consider the following factors when setting prefetch:

- If the limit is too low, the performance may be affected, because RabbitMQ keeps waiting for the permission to send messages.
- If the limit is too high, a large number of messages may be transmitted to a consumer, leaving other consumers idle. In addition, you also need to consider consumer configurations. When processing messages, consumers save all messages in the memory. A high prefetch limit may affect consumer performance and may even crash the consumer.

For details about prefetch, see **Consumer Prefetch**.

What Is a Proper Prefetch Limit?

- If you have only one or a few consumers processing messages, it is recommended that you prefetch multiple messages at a time to keep the client busy. If your processing time and network status are stable, you can obtain an estimated prefetch value by dividing the total round-trip time by the processing time of each message on the client.
- If you have a large number of consumers and the processing time is short, a low prefetch limit is recommended. However, if the limit is too low, consumers will be idle after they have processed a batch of messages but the next batch has not yet arrived. If the limit is too high, a single consumer may be busy while other consumers are idle.
- If you have a large number of consumers and the processing time is long, set the prefetch value to **1** so that messages can be evenly distributed among all consumers.

NOTICE

If automatic message acknowledgment has been configured on the client, the prefetch value is invalid, and acknowledged messages are deleted from queues.

Setting the Prefetch Value

The following example shows how to set the prefetch value to **10** for a single consumer on a Java client.


```
ConnectionFactory factory = new ConnectionFactory();

Connection connection = factory.newConnection();
Channel channel = connection.createChannel();

channel.basicQos(10, false);

QueueingConsumer consumer = new QueueingConsumer(channel);
channel.basicConsume("my_queue", false, consumer);
```

On a Java client, the default value of **global** is **false**. Therefore, the preceding example can be simply written as **channel.basicQos(10)**.

The values of **global** are described as follows.

Table 10-1 Description of global values

Value of global	Description
false	Applied separately to each new consumer on the channel.
true	Shared among all consumers on the channel.

10.6 Heartbeat Detection

RabbitMQ heartbeats help the application layer detect interrupted connections and unresponsive peers in a timely manner. Heartbeats also prevent some network devices from disconnecting TCP connections where there is no activity for a certain period of time.

Heartbeat Timeout

The heartbeat timeout defines after how long the peer TCP connection is considered closed by the server or client.

After a timeout is set on the RabbitMQ server and client separately, the server and client negotiate the timeout value. The value must be configured for the client so that it can request heartbeats. The Java, .NET, and Erlang clients maintained by RabbitMQ use the following negotiation logic:

- If the heartbeat timeout set on neither the server nor the client is **0**, the smaller value is used.
- If the heartbeat timeout is set to **0** on either the server or the client, the non-zero value is used.
- If the heartbeat timeout set on both the server and the client is **0**, heartbeats are disabled.

For more information about heartbeat detection, see **Detecting Dead TCP Connections with Heartbeats and TCP Keepalives**.

Heartbeat Frames

The interval for sending heartbeat frames (also called a heartbeat interval) is half of the heartbeat timeout. After a client misses two heartbeats, it is considered

unreachable. Different clients show this differently, but the TCP connection will be closed. If the client detects that the server cannot be accessed due to heartbeats, the client needs to reconnect to the server.

Any traffic, including protocol operations, message publishing, message acknowledgment, and heartbeat frames, is considered as a valid heartbeat. If there is any other traffic on the connection, the client can choose to send heartbeat frames or not. If there is no other traffic on the connection, the client must send heartbeat frames.

Configuring Heartbeat Timeout on the Client

If the heartbeat timeout is set to a small value, false alarms may be reported in the case of temporary network congestion or temporary server traffic control. In most cases, it is recommended that the timeout be set to 5 to 20 seconds.

- Java client

  Before creating a connection, configure the **ConnectionFactory#setRequestedHeartbeat** parameter. Example:

  ```
  ConnectionFactory cf = new ConnectionFactory();
  // The heartbeat timeout is 15 seconds.
  cf.setRequestedHeartbeat(15);
  ```

- .NET client

  ```
  var cf = new ConnectionFactory();
  // The heartbeat timeout is 15 seconds.
  cf.RequestedHeartbeat = TimeSpan.FromSeconds(15);
  ```

10.7 Single Active Consumer

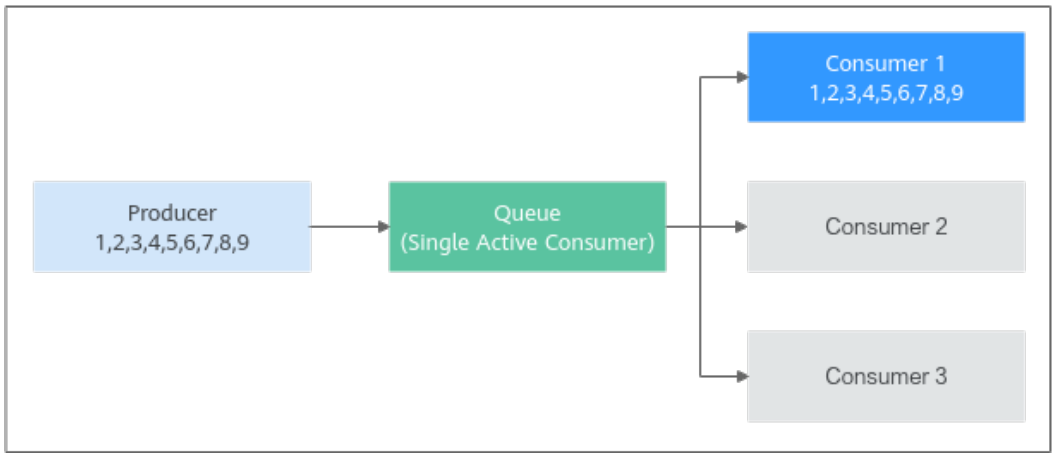
Scenario

A queue can have multiple registered consumers, but single active consumer allows only one consumer to consume messages from the queue. Another consumer can consume messages only when the active one is abnormal. Single active consumer can be used when the message consumption sequence must be ensured and high reliability is required.

NOTICE

Single active consumer is available only in RabbitMQ 3.8.35.

Figure 10-6 Single active consumer



In **Figure 10-6**, Producer produces nine messages. Due to the setting of single active consumer, only Consumer 1 can consume messages.

For more information about single active consumer, see **Single Active Consumer**.

Configuration

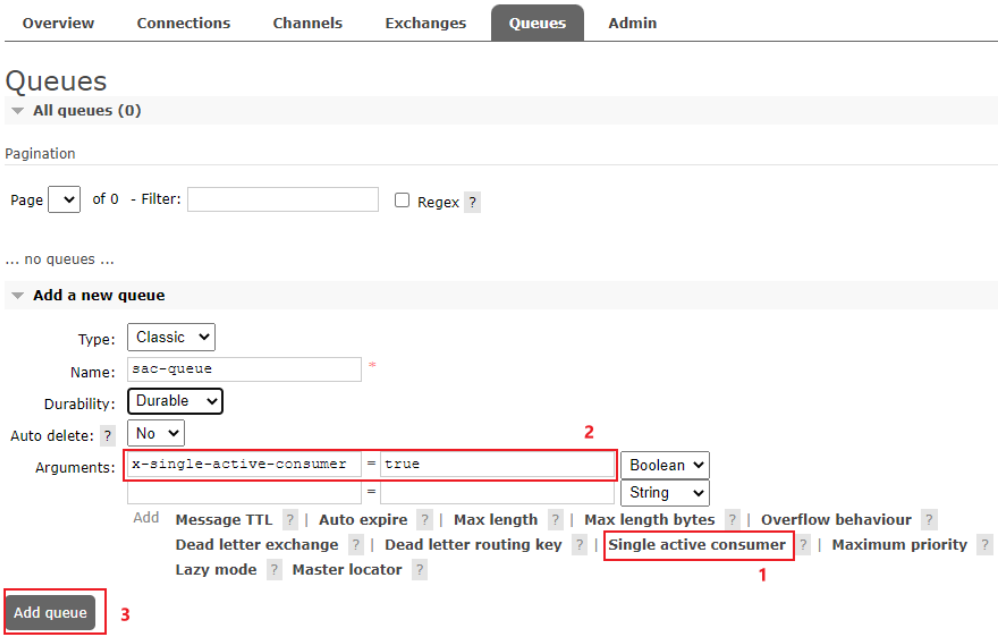
When declaring a queue, you can configure a single active consumer by setting the **x-single-active-consumer** parameter to **true**.

- **The following example shows how to configure single active consumer on a Java client.**

```
Channel ch = ...;
Map<String, Object> arguments = newHashMap<String, Object>();
arguments.put("x-single-active-consumer", true);
ch.queueDeclare("my-queue", false, false, false, arguments);
```

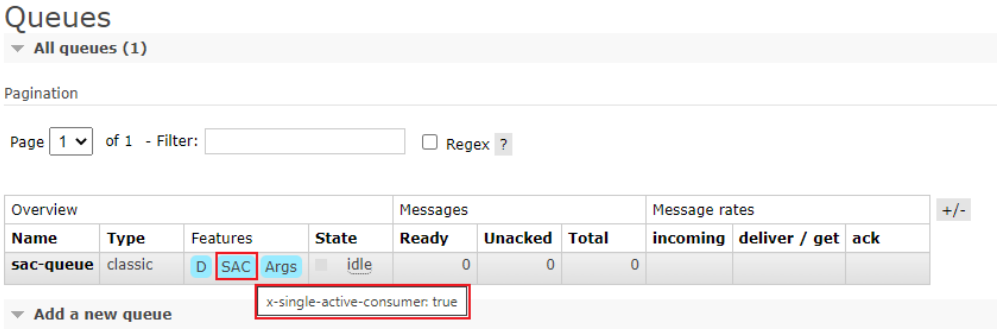
- **The following example shows how to configure single active consumer on the RabbitMQ management UI.**

Figure 10-7 Configuring single active consumer



After the setting is complete, check whether the queue features contain single active consumer on the **Queues** page. As shown in **Figure 10-8**, **SAC** indicates single active consumer.

Figure 10-8 Viewing queue features



10.8 Quorum Queues

Scenario

Quorum queues provide the queue replication capability to ensure high data availability and security. Quorum queues can be used to replicate queue data between RabbitMQ nodes, ensuring that queues can still run when a node breaks down.

Quorum queues can be used in scenarios where queues exist for a long time and there are high requirements on queue fault tolerance and data security and low requirements on latency and queue features. Quorum queues are not recommended if a large number of messages may be stacked, because write amplification significantly increases disk usage.

Messages in quorum queues are preferentially stored in the memory. You are advised to limit the queue length and memory usage of quorum queues. When the number of stacked messages exceeds the threshold, the messages are written to the disk to avoid high memory watermark.

For more information about quorum queues, see **Quorum Queues**.

NOTICE

Quorum queues are available only in RabbitMQ 3.8.35.

Comparing Quorum Queues and Mirrored Queues

Quorum queues are introduced in RabbitMQ 3.8 to address the technical limitations of mirrored queues. Quorum queues have similar functions as mirrored queues and provide high-availability queues for RabbitMQ.

Mirrored queues are slow at replicating messages.

- A mirrored queue has a queue leader and many mirrors. When a producer sends a message to the queue leader, the leader replicates the message to the mirrors, and sends back confirmation to the producer only after all mirrors have saved the message.
- If a node in a RabbitMQ cluster goes offline due to a fault, all data in the mirrors stored on the node will be lost after the fault is rectified and the node goes online again. In this case, O&M personnel need to determine whether to replica data from the queue leader to the mirrors. If they choose not to replicate data, messages may be lost. If they choose to replicate data, the queue is blocked during replication and no operation can be performed on the queue. When a large number of messages are stacked, the queue will be unavailable for several minutes, hours, or even longer.

Quorum queues can solve these problems.

- Quorum queues are based on a variant of the Raft consensus algorithm. They deliver a higher message throughput. A quorum queue has a primary replica (queue leader) and many followers. When a producer sends a message to the leader, the leader replicates the message to the followers, and sends back confirmation to the producer only after half of the followers have saved the message. This means that a small number of slow followers do not affect the performance of the entire queue. Similarly, the election of the leader requires the consent of more than half of the followers, which prevents the queue from having two leaders in the event of network partitioning. Therefore, quorum queues attach more importance to consistency than availability.
- After a node in a RabbitMQ cluster goes online after recovering from a fault, the data stored on the node will not be lost. The queue leader directly replicates messages from the position where the followers were interrupted. The replication process is non-blocking, and the entire queue is not affected by the addition of new followers.

Compared with mirrored queues, quorum queues have fewer features, as shown in **Table 10-2**. Quorum queues consume more memory and disk space.

Table 10-2 Features

Feature	Mirrored Queues	Quorum Queues
Non-durable queues	Supported	Not supported
Exclusive queues	Supported	Not supported
Message persistence	Per message	Always
Queue rebalancing	Automatic	Manual
Message TTL	Supported	Not supported
Queue TTL	Supported	Supported
Queue length limit	Supported	Supported (except **x-overflow: reject-publish-dlx**)

Feature	Mirrored Queues	Quorum Queues
Lazy queues	Supported	Supported after the queue length is limited
Message priority	Supported	Not supported
Consumption priority	Supported	Supported
Dead letter exchanges	Supported	Supported
Dynamic policy	Supported	Supported
Poison message (let consumers consume infinitely) handling	Not supported	Supported
Global QoS prefetch	Supported	Not supported

Configuration

When declaring a queue, set the **x-queue-type** queue argument to **quorum**. This argument can be set only during queue declaration and cannot be set by using a policy.

The default replication factor of a quorum queue is five.

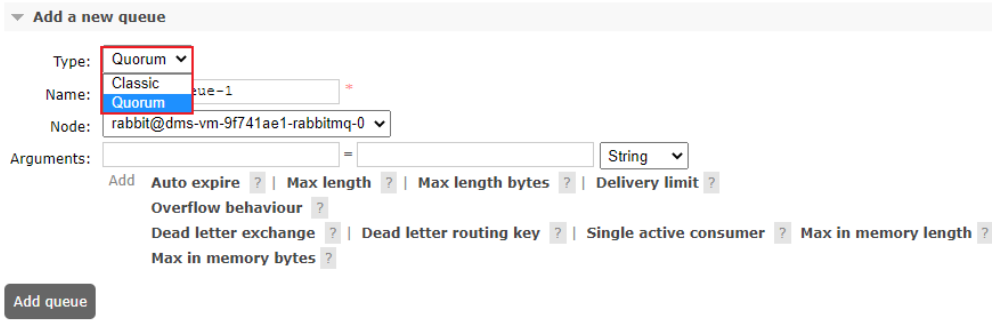
- **The following example shows how to configure a quorum queue on a Java client.**

```
ConnectionFactory factory = newConnectionFactory();
factory.setRequestedHeartbeat(30);
factory.setHost(HOST);
factory.setPort(PORT);
factory.setUsername(USERNAME);
factory.setPassword(PASSWORD);

finalConnection connection = factory.newConnection();
finalChannel channel = connection.createChannel();
// Create the queue parameter map.
Map<String, Object> arguments = newHashMap<>();
arguments.put("x-queue-type", "quorum");
// Declare the quorum queue.
channel.queueDeclare("test-quorum-queue", true, false, false, arguments);
```

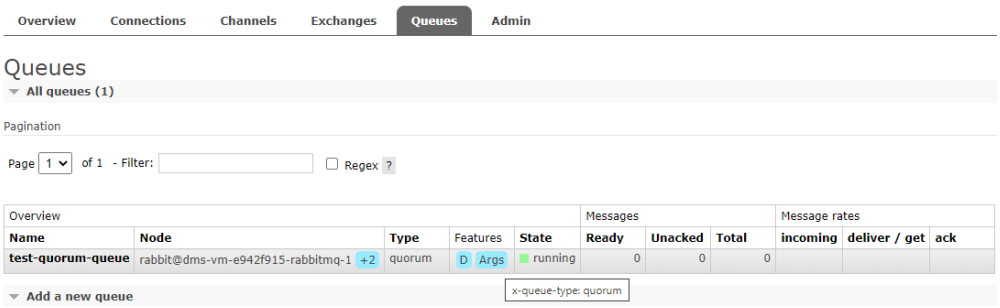
- **The following example shows how to configure a quorum queue on the RabbitMQ management UI.**

Figure 10-9 Configuring a quorum queue



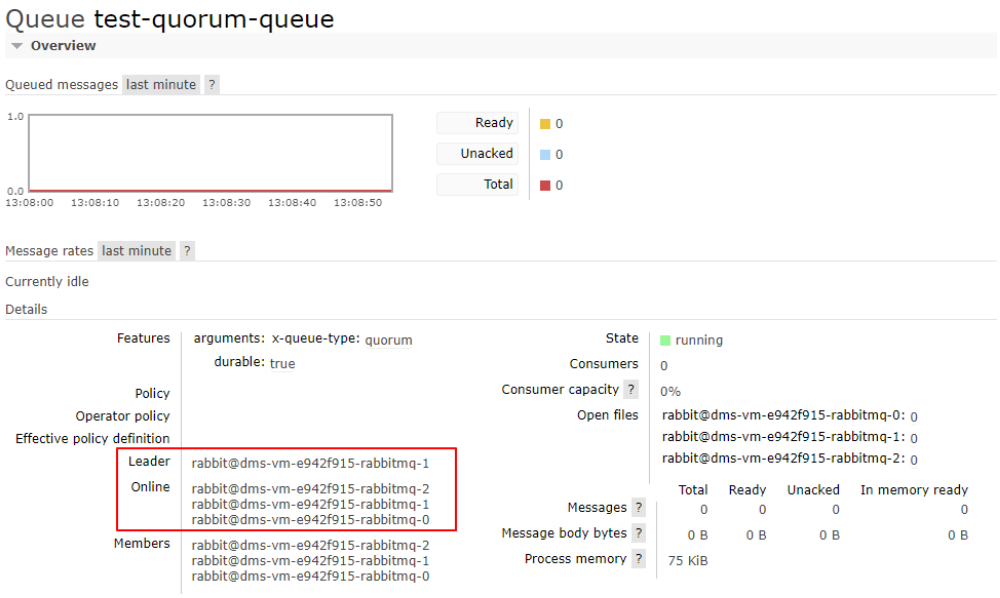
After the configuration is complete, check whether the queue type is **quorum** on the **Queues** page, as shown in **Figure 10-10**. In the **Node** column, **+2** indicates that the queue has two replicas. Blue indicates that the two replicas have been synchronized. Red indicates that some messages have not been replicated.

Figure 10-10 Checking the queue type



On the **Queues** page, click the name of the desired queue. Check the node where the leader of this quorum queue resides and the node where active followers reside.

Figure 10-11 Queue details page



Configuring the Quorum Queue Length

You can configure a policy or queue attributes to limit the length of a quorum queue and the length that can be stored in the memory.

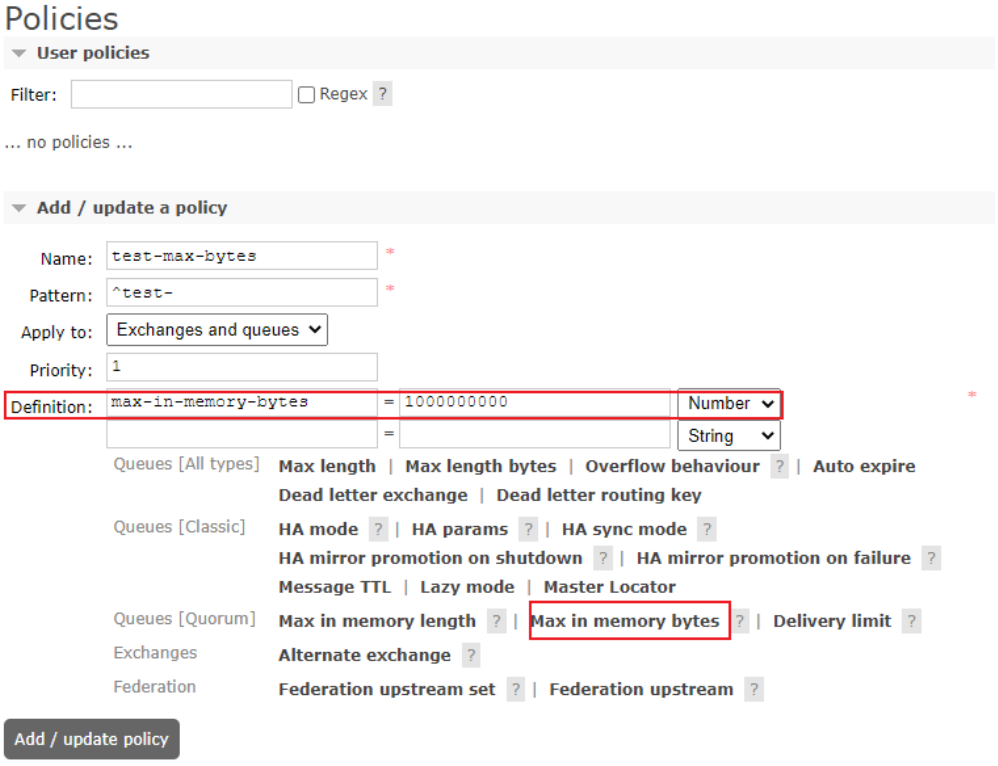
- **x-max-length**: maximum number of messages in the quorum queue. If this limit is exceeded, excess messages will be discarded or sent to the dead letter exchange.
- **x-max-length-bytes**: maximum size (in bytes) of messages in the quorum queue. If this limit is exceeded, excess messages will be discarded or sent to the dead letter exchange.

- **x-max-in-memory-length**: maximum number of messages of the quorum queue that can be stored in memory.
- **x-max-in-memory-bytes**: maximum size (in bytes) of messages of the quorum queue that can be stored in memory.

The following describes how to limit the length of a quorum queue stored in the memory by configuring a policy or the queue attribute.

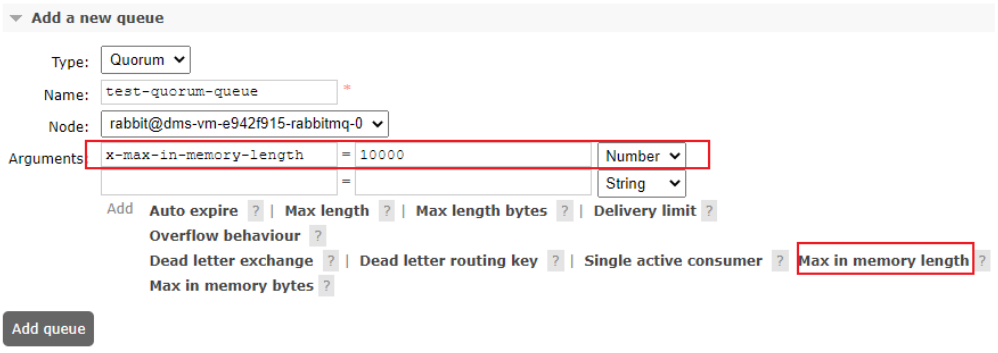
- By using a policy (recommended)

Figure 10-12 Using a policy to set x-max-in-memory-bytes



- By configuring the queue argument

Figure 10-13 Setting x-max-in-memory-length in the queue argument



11 Quotas

What Is Quota?

A quota is a limit on the quantity or capacity of a certain type of service resources that you can use, for example, the maximum number of RabbitMQ instances that you can create.

If the current resource quota cannot meet your service requirements, you can apply for a higher quota.

How Do I View My Quota?

1. Log in to the management console.
2. Click  in the upper left corner to select a region and a project.
3. Click  (the **My Quota** icon) in the upper right corner.

   The **Service Quota** page is displayed.
4. On the **Service Quota** page, view the used and total quotas of resources.

   If a quota cannot meet your needs, apply for a higher quota by performing the following operations.

How Do I Increase My Quota?

The system does not support online quota adjustment. To increase a quota, contact customer service by calling the hotline or sending an email. We will process your request as soon as possible and will inform you of the processing progress by phone or email.

Before you contact customer service, prepare the following information:

- Account name, project name, and project ID

  To obtain the preceding information, log in to the management console, click the username in the upper-right corner, and choose **My Credentials** from the drop-down list.
- Quota information, including:
  - Service name

- Quota type
- Required quota

To increase a quota, contact the administrator.

12 Monitoring

12.1 RabbitMQ Metrics

Introduction

This section describes metrics reported by DMS for RabbitMQ to Cloud Eye as well as their namespaces and dimensions. You can use the Cloud Eye console to query the RabbitMQ metrics and alarms.

Namespace

SYS.DMS

Instance Metrics

Table 12-1 Instance metrics

Metric ID	Metric Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
connections	Connections	Number of connections in the RabbitMQ instance Unit: count	≥ 0	RabbitMQ instance	1 minute
channels	Channels	Number of channels in the RabbitMQ instance Unit: count	0–2047	RabbitMQ instance	1 minute
queues	Queues	Number of queues in the RabbitMQ instance Unit: count	0–1200	RabbitMQ instance	1 minute

Metric ID	Metric Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
consumers	Consumers	Number of consumers in the RabbitMQ instance Unit: count	0–1200	RabbitMQ instance	1 minute
messages_ready	Available Messages	Number of messages that can be retrieved in the RabbitMQ instance Unit: count	0–10,000,000	RabbitMQ instance	1 minute
messages_unacknowledged	Unacked Messages	Number of messages that have been retrieved but not acknowledged in the RabbitMQ instance Unit: count	0–10,000,000	RabbitMQ instance	1 minute
publish	Publish	Rate at which messages are created in the RabbitMQ instance Unit: count/s	0–25,000	RabbitMQ instance	1 minute
deliver	Deliver (manual ack)	Rate at which messages are retrieved (and manually acknowledged) in a RabbitMQ instance Unit: count/s	0–25,000	RabbitMQ instance	1 minute
deliver_no_ack	Deliver (auto ack)	Rate at which messages are retrieved (and automatically acknowledged) in a RabbitMQ instance. Unit: count/s	0–50,000	RabbitMQ instance	1 minute

Node Metrics

Table 12-2 Node metrics

Metric ID	Metric Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
fd_used	File Handles	Number of file handles used by RabbitMQ in the node Unit: count	0–65,535	RabbitMQ instance node	1 minute
socket_used	Socket Connections	Number of socket connections used by RabbitMQ in the node Unit: count	0–50,000	RabbitMQ instance node	1 minute
proc_used	Erlang Processes	Number of Erlang processes used by RabbitMQ in the node Unit: count	0–1,048,576	RabbitMQ instance node	1 minute
mem_used	Memory Usage	Memory usage of RabbitMQ in the node Unit: byte	0–32,000,000,000	RabbitMQ instance node	1 minute
disk_free	Available Memory	Available memory of RabbitMQ in the node Unit: byte	0–500,000,000,000	RabbitMQ instance node	1 minute

Queue Metrics

Table 12-3 Queue metrics

Metric ID	Metric Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
queue_messages_unacknowledged	Unacked Messages	Number of messages that have been retrieved but not acknowledged in the RabbitMQ queue Unit: count	0–10,000,000	RabbitMQ instance queue	1 minute

Metric ID	Metric Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
queue_messages_ready	Available Messages	Number of messages that can be retrieved in the RabbitMQ queue Unit: count	0–10,000,000	RabbitMQ instance queue	1 minute

Dimensions

Key	Value
rabbitmq_instance_id	RabbitMQ instance
rabbitmq_node	RabbitMQ instance node
rabbitmq_queue	RabbitMQ instance queue

12.2 Setting RabbitMQ Alarm Rules

This section describes the alarm rules of some metrics and how to configure the rules. In actual scenarios, you are advised to configure alarm rules for metrics by referring to the following alarm policies.

Table 12-4 Alarm rules for RabbitMQ instances

Metric	Alarm Policy	Description	Solution
Available Messages	Alarm threshold: Raw data > Expected number of available messages Number of consecutive periods: 1 Alarm severity: Major	If the number of available messages is too large, messages are accumulated.	See **the solution to preventing message accumulation**.

Metric	Alarm Policy	Description	Solution
Unacked Messages	Alarm threshold: Raw data > Expected number of unacknowledged messages Number of consecutive periods: 1 Alarm severity: Major	If the number of unacknowledged messages is too large, messages may be accumulated.	• Check whether the consumer is abnormal. • Check whether the consumer logic is time-consuming.
Connections	Alarm threshold: Raw data > Expected number of connections Number of consecutive periods: 1 Alarm severity: Major	A sharp increase in the number of connections may be a warning of a traffic increase.	The services may be abnormal. Check whether other alarms exist.
Channels	Alarm threshold: Raw data > Expected number of channels Number of consecutive periods: 1 Alarm severity: Major	A sharp increase in the number of channels may be a warning of a traffic increase.	The services may be abnormal. Check whether other alarms exist.
Erlang Processes	Alarm threshold: Raw data > Expected number of processes Number of consecutive periods: 1 Alarm severity: Major	A sharp increase in the number of processes may be a warning of a traffic increase.	The services may be abnormal. Check whether other alarms exist.

NOTE

- Set the alarm threshold based on the service expectations. For example, if the expected usage is 35%, set the alarm threshold to 35%.
- The number of consecutive periods and alarm severity can be adjusted based on the service logic.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 View the instance metrics using either of the following methods:

- Click next to a RabbitMQ instance name. On the Cloud Eye console, view the metrics of the instance, nodes, and queues. Metric data is reported to Cloud Eye every minute.
- Click the desired RabbitMQ instance to view its details. In the navigation pane, choose **Monitoring** view. On the displayed page, view the metrics of the instance, nodes, and queues. Metric data is reported to Cloud Eye every minute.

Step 5 Hover the mouse pointer over a metric and click to create an alarm rule for the metric.

Step 6 Specify the alarm rule details.

For more information about creating alarm rules, see **Creating an Alarm Rule**.

1. Enter the alarm name and description.
2. Specify the alarm policy and alarm severity.

   For example, an alarm can be triggered and notifications can be sent once every day if the raw value of connections exceeds the preset value for three consecutive periods and no actions are taken to handle the exception.
3. Set **Alarm Notification** configurations. If you enable **Alarm Notification**, set the validity period, notification object, and trigger condition.
4. Click **Create**.

----End

12.3 Viewing Metrics

Scenario

Cloud Eye monitors DMS for RabbitMQ metrics in real time. You can view these metrics on the console.

Prerequisites

At least one RabbitMQ instance has been created. The instance has at least one available message.

Procedure

Step 1 Log in to the management console.

Step 2 In the upper left corner, click  and select a region.

NOTE

Select the region where your RabbitMQ instance is.

Step 3 Click  and choose **Application** > **Distributed Message Service for RabbitMQ** to open the console of DMS for RabbitMQ.

Step 4 View the instance metrics using either of the following methods:

- Click  next to a RabbitMQ instance name. On the Cloud Eye console, view the metrics of the instance, nodes, and queues. Metric data is reported to Cloud Eye every minute.
- Click the desired RabbitMQ instance to view its details. In the navigation pane, choose **Monitoring** view. On the displayed page, view the metrics of the instance, nodes, and queues. Metric data is reported to Cloud Eye every minute.

----End

13 Auditing

13.1 Operations Logged by CTS

With Cloud Trace Service (CTS), you can record operations associated with DMS for RabbitMQ for later query, audit, and backtrack operations.

Table 13-1 DMS for RabbitMQ operations that can be recorded by CTS

Operation	Resource Type	Trace Name
Successfully deleting a background task	rabbitmq	deleteDMSBackendJobSuccess
Failing to delete a background task	rabbitmq	deleteDMSBackendJobFailure
Successfully creating an order for creating an instance	rabbitmq	createDMSInstanceOrderSuccess
Failing to create an order for creating an instance	rabbitmq	createDMSInstanceOrderFailure
Successfully creating an order for modifying an instance	rabbitmq	modifyDMSInstanceOrderSuccess
Failing to create an order for modifying an instance	rabbitmq	modifyDMSInstanceOrderFailure
Successfully scaling up an instance	rabbitmq	extendDMSInstanceSuccess
Failing to scale up an instance	rabbitmq	extendDMSInstanceFailure

Operation	Resource Type	Trace Name
Successfully resetting instance password	rabbitmq	resetDMSInstancePasswordSuccess
Failing to reset instance password	rabbitmq	resetDMSInstancePasswordFailure
Successfully deleting an instance that failed to be created	rabbitmq	deleteDMSCreateFailureInstancesSuccess
Failing to delete an instance that failed to be created	rabbitmq	deleteDMSCreateFailureInstancesFailure
Successfully restarting an instance	rabbitmq	restartDMSInstanceSuccess
Failing to restart an instance	rabbitmq	restartDMSInstanceFailure
Successfully deleting multiple instances at a time	rabbitmq	batchDeleteDMSInstanceSuccess
Failing to delete multiple instances at a time	rabbitmq	batchDeleteDMSInstanceFailure
Successfully restarting multiple instances at a time	rabbitmq	batchRestartDMSInstanceSuccess
Failing to restart multiple instances at a time	rabbitmq	batchRestartDMSInstanceFailure
Successfully modifying instance information	rabbitmq	modifyDMSInstanceInfoSuccess
Failing to modify instance information	rabbitmq	modifyDMSInstanceInfoFailure
Successfully deleting multiple instance tasks at a time	rabbitmq	batchDeleteDMSInstanceTask
Successfully deleting an instance task	rabbitmq	deleteDMSInstanceTaskSuccess
Failing to delete an instance task	rabbitmq	deleteDMSInstanceTaskFailure
Successfully creating an instance task	rabbitmq	createDMSInstanceTaskSuccess

Operation	Resource Type	Trace Name
Failing to create an instance task	rabbitmq	createDMSInstanceTaskFailure
Successfully submitting a request for scaling up an instance	rabbitmq	extendDMSInstanceTaskSuccess
Failing to submit a request for scaling up an instance	rabbitmq	extendDMSInstanceTaskFailure
Successfully submitting a request for restarting an instance	rabbitmq	restartDMSInstanceTaskSuccess
Failing to submit a request for restarting an instance	rabbitmq	restartDMSInstanceTaskFailure
Successfully submitting a request for restarting multiple instances at a time	rabbitmq	batchRestartDMSInstanceTask-Success
Failing to submit a request for restarting multiple instances at a time	rabbitmq	batchRestartDMSInstanceTask-Failure
Successfully submitting a request for modifying instance information	rabbitmq	modifyDMSInstanceInfoTaskSuc-cess
Failing to submit a request for modifying instance information	rabbitmq	modifyDMSInstanceInfoTaskFai-lure

13.2 Viewing Audit Logs

See **Querying Traces on the CTS Console**.

14 FAQs

14.1 Instances

14.1.1 What RabbitMQ Version Does DMS for RabbitMQ Use?

The RabbitMQ version on the server is 3.7.17 and 3.8.35.

14.1.2 What SSL Version Does DMS for RabbitMQ Use?

TLS 1.2.

14.1.3 Why Can't I View the Subnet and Security Group Information During Instance Creation?

This may be because you do not have the permissions of the server administrator and VPC administrator. For details about how to add user permissions, see **Modifying User Group Permissions**.

14.1.4 What If One RabbitMQ VM Fails to Be Restarted When a Cluster RabbitMQ Instance Is Being Restarted?

Restarting a RabbitMQ instance will restart only the RabbitMQ processes instead of VMs on which the instance runs.

For a cluster RabbitMQ instance, if the RabbitMQ process fails to be restarted on one VM, the instance will be still in the **Running** state after the restart and a message will be displayed indicating that some nodes are faulty. A RabbitMQ daemon process runs on each VM and periodically checks whether the RabbitMQ process exists. If the RabbitMQ process does not exist, the RabbitMQ process will be automatically started.

If a RabbitMQ instance exception lasts for more than 1 minute, an alarm will be reported.

14.1.5 How Are Requests Evenly Distributed to Each VM of a Cluster RabbitMQ Instance?

A cluster uses Linux virtual servers (LVSs) inside for load balancing, which evenly distribute requests to each VM.

14.1.6 Do Queues Inside a Cluster RabbitMQ Instance Have Any Redundancy Backup?

Whether queue mirroring (that is, redundancy backup) is implemented depends on your service requirements. If you configure mirroring, queue replicas are stored on multiple brokers in a cluster. If a broker is faulty, queue data is synchronized from another normal broker.

14.1.7 Does DMS for RabbitMQ Support Data Persistence? How Do I Perform Scheduled Data Backups?

DMS for RabbitMQ supports data persistence, which can be configured by connecting to a RabbitMQ instance using a client, or by configuring persistence when creating queues using the RabbitMQ Management interface.

Unfortunately, data backup scheduling and backup operations on the console are not supported.

14.1.8 How Do I Obtain the Certificate After SSL Has Been Enabled?

DMS for RabbitMQ uses one-way authentication and does not involve any certificates.

14.1.9 Can I Change the SSL Setting of a RabbitMQ Instance?

No. Once the instance has been created, you cannot enable or disable SSL. You are advised to enable SSL when creating the instance.

14.1.10 Can RabbitMQ Instances Be Scaled Up?

Single-node RabbitMQ instances: The storage space can be increased.

Cluster RabbitMQ instances: The storage space and the broker quantity can be increased.

14.1.11 Does DMS for RabbitMQ Support MQTT?

Yes. The MQTT plug-in can be enabled. For details about the MQTT plug-in, see **https://www.rabbitmq.com/mqtt.html#enabling-plugin**.

The supported plug-ins are listed as follows.

In the following list, an empty square bracket indicates that the plug-in has not been installed. **[E*]** indicates that the plug-in has been explicitly installed. **[e*]** indicates that the plug-in has been implicitly installed, that is, the plug-in is installed as the dependency of other plug-ins.

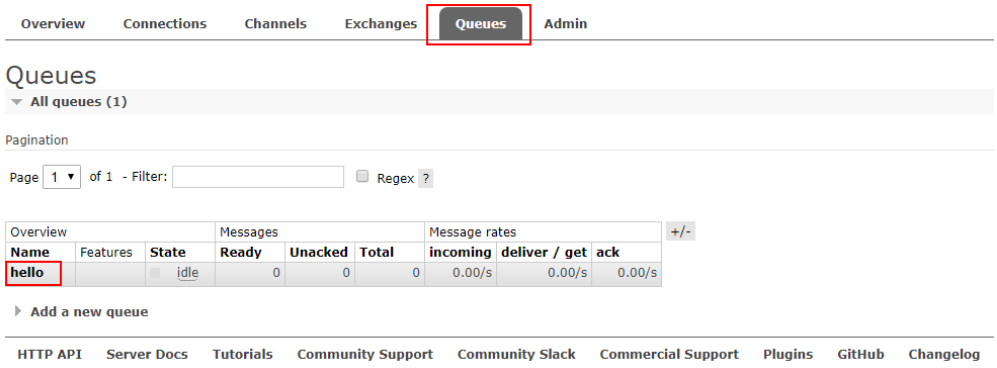

```
[ ] rabbitmq_amqp1_0                  3.8.35
[ ] rabbitmq_auth_backend_cache       3.8.35
[ ] rabbitmq_auth_backend_http        3.8.35
[ ] rabbitmq_auth_backend_ldap        3.8.35
[ ] rabbitmq_auth_mechanism_ssl       3.8.35
[ ] rabbitmq_consistent_hash_exchange 3.8.35
[ ] rabbitmq_delayed_message_exchange 3.8.9
[ ] rabbitmq_event_exchange           3.8.35
[ ] rabbitmq_federation               3.8.35
[ ] rabbitmq_federation_management    3.8.35
[ ] rabbitmq_jms_topic_exchange       3.8.35
[E*] rabbitmq_management              3.8.35
[e*] rabbitmq_management_agent        3.8.35
[ ] rabbitmq_mqtt                     3.8.35
[ ] rabbitmq_peer_discovery_aws       3.8.35
[ ] rabbitmq_peer_discovery_common    3.8.35
[ ] rabbitmq_peer_discovery_consul    3.8.35
[ ] rabbitmq_peer_discovery_etcd      3.8.35
[ ] rabbitmq_peer_discovery_k8s       3.8.35
[ ] rabbitmq_random_exchange          3.8.35
[ ] rabbitmq_recent_history_exchange  3.8.35
[ ] rabbitmq_sharding                 3.8.35
[ ] rabbitmq_shovel                   3.8.35
[ ] rabbitmq_shovel_management        3.8.35
[ ] rabbitmq_stomp                    3.8.35
[E*] rabbitmq_top                     3.8.35
[ ] rabbitmq_tracing                  3.8.35
[ ] rabbitmq_trust_store              3.8.35
[e*] rabbitmq_web_dispatch            3.8.35
[ ] rabbitmq_web_mqtt                 3.8.35
[ ] rabbitmq_web_mqtt_examples        3.8.35
[ ] rabbitmq_web_stomp                3.8.35
[ ] rabbitmq_web_stomp_examples       3.8.35
```

The plug-ins that you can enable on the RabbitMQ console are rabbitmq_amqp1_0, rabbitmq_delayed_message_exchange, rabbitmq_federation, rabbitmq_sharding, rabbitmq_shovel, rabbitmq_tracing, rabbitmq_mqtt, rabbitmq_web_mqtt, rabbitmq_stomp, rabbitmq_web_stomp, and rabbitmq_consistent_hash_exchange. When an instance is created, these plug-ins are disabled by default. To enable them, go to the **Plug-ins** page of an instance on the RabbitMQ console.

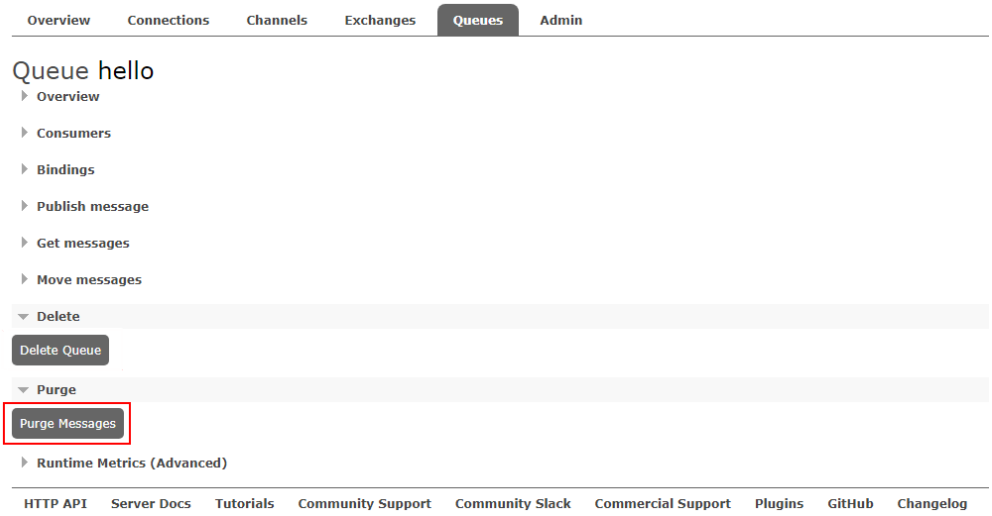
To install plug-ins that cannot be enabled on the console (such as rabbitmq_random_exchange), contact customer service. Services are not affected during the installation.

14.1.12 How Do I Clear Queue Data?

1. **Log in to the management UI**.
2. On the **Queues** tab page, click the name of a queue.



3. Click **Purge Messages** to remove messages from the queue.



14.1.13 Does RabbitMQ Support Two-Way Authentication?

No.

14.1.14 Does DMS for RabbitMQ Support CPU and Memory Upgrades?

No. DMS for RabbitMQ does not support CPU and memory upgrades.

14.1.15 How Do I Disable the RabbitMQ Management UI?

If you want to disable login to the management UI of a RabbitMQ instance, do not allow inbound access over port 15672 (if SSL is disabled for the instance) or 15671 (if SSL is enabled for the instance) in the security group rules.

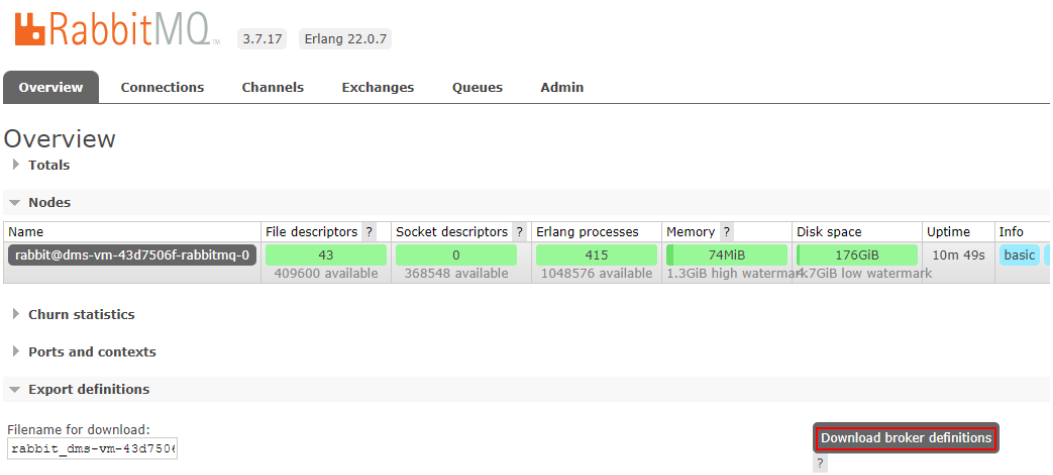
14.1.16 Can I Change the AZ for an Instance?

No. To use a different AZ, create another instance and migrate metadata to it.

To migrate instance metadata, perform the following steps:

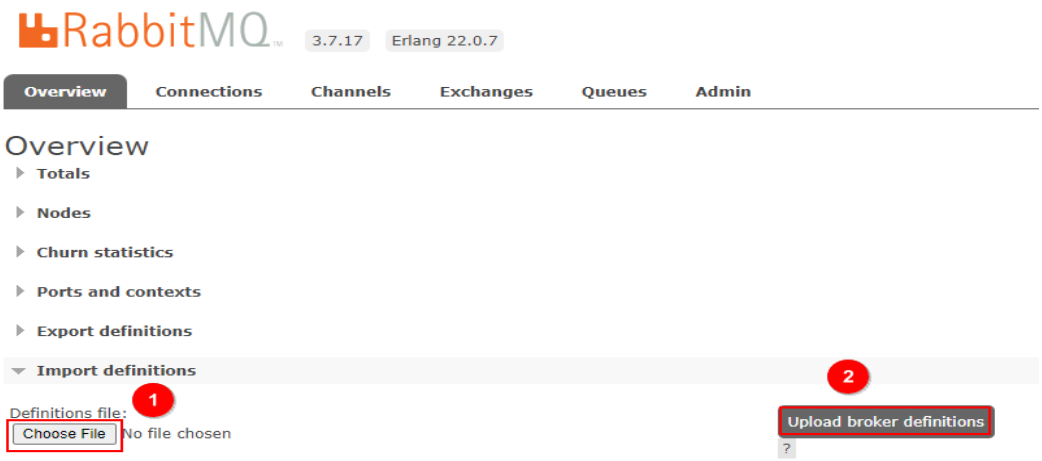
Step 1 **Log in to the management UI of the original instance**.

Step 2 On the **Overview** tab page, click **Download broker definitions** to export the metadata.

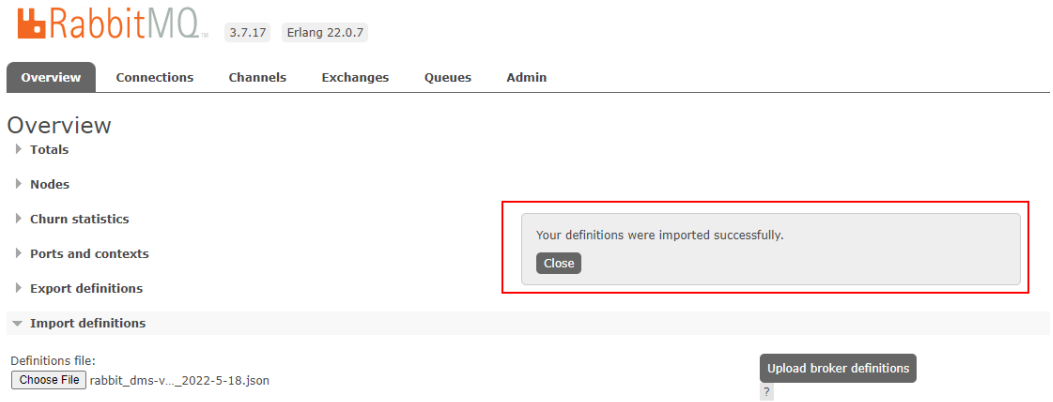


Step 3 Log in to the management UI of the new instance. On the **Overview** tab page, click **Choose File** and select the metadata exported from **Step 2**.

Step 4 Click **Upload broker definitions** to upload the metadata.



If the upload is successful, the following information is displayed:



----End

14.1.17 How Do I Obtain the Region ID?

To obtain the region ID,

Step 1 Go to the **Regions and Endpoints** page.

Step 2 Obtain region IDs from the **Region** column.

----End

14.2 Connections

14.2.1 How Do I Configure a Security Group?

To access a RabbitMQ instance within a VPC or over public networks, configure the security group rules as follows.

- Intra-VPC Access

  To access a RabbitMQ instance, you must deploy your client on an ECS in the same VPC as the instance.

  In addition, before you can access the instance through your client, you must configure correct rules for the security groups of both the ECS and RabbitMQ instance.

  a. You are advised to configure the same security group for the ECS and RabbitMQ instance. After a security group is created, network access in the group is not restricted by default.

  b. If different security groups are configured, you may need to refer to the following configurations:

  NOTE

  - Assume that security groups **sg-53d4**, **sg-RabbitMQ**, and **Default_All** are configured respectively for your ECS and RabbitMQ instance.
  - You can specify a security group or IP address as the remote end in the following rules.

  Add the following security group rule to allow the ECS to access the RabbitMQ instance.

  Figure 14-1 Configuring security group rules for the ECS

Table 14-1 Security group rule

Direction	Protocol & Port	Destination
Outbound	All	Default_All

To ensure that your client can access the RabbitMQ instance, add the following rule to the security group configured for the RabbitMQ instance.

Figure 14-2 Configuring security group for the RabbitMQ instance

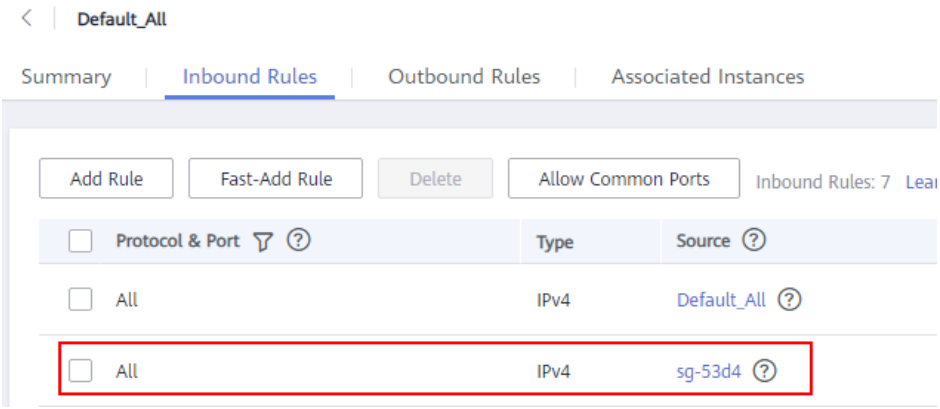


Table 14-2 Security group rule

Direction	Protocol & Port	Source
Inbound	All	sg-53d4

- Public access:

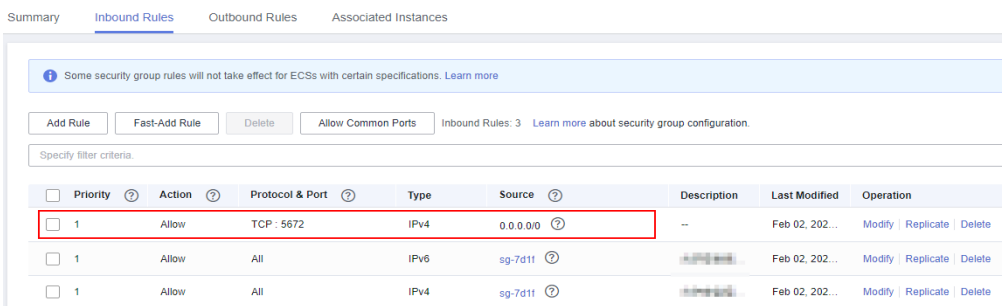
  To ensure that your client can access the RabbitMQ instance, add the following rule to the security group configured for the RabbitMQ instance.

  Table 14-3 Security group rule

Direction	Protocol & Port	Source
Inbound	TCP:5672	0.0.0.0/0

  Figure 14-3 show the rules.

  Figure 14-3 Rule 1 for the security group



14.2.2 Why Does a Client Fail to Connect to a RabbitMQ Instance?

This problem occurs when the connection address, port number, username, or password is incorrect, or when the maximum allowed number of connections is exceeded.

- **Incorrect connection address**

  Error message displayed for an incorrect connection address in intra-VPC access:

  ```
  [root@ecs-heru RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 192.168.125.110 5672 user *******
  Exception in thread "main" java.net.NoRouteToHostException: No route to host (Host unreachable)
  at java.net.PlainSocketImpl.socketConnect(Native Method)
  at java.net.AbstractPlainSocketImpl.doConnect(AbstractPlainSocketImpl.java:350)
  at java.net.AbstractPlainSocketImpl.connectToAddress(AbstractPlainSocketImpl.java:206)
  ```

  Error message displayed for an incorrect connection address in public access:

  ```
  [root@ecs-heru RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 139.xxx.178 5672 user *******
  Exception in thread "main" java.net.SocketTimeoutException: connect timed out
  at java.net.PlainSocketImpl.socketConnect(Native Method)
  at java.net.AbstractPlainSocketImpl.doConnect(AbstractPlainSocketImpl.java:350)
  ```

- **Incorrect port number**

  Error message displayed for an incorrect port number in intra-VPC access:

  ```
  [root@ecs-heru RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 192.168.125.111 5673 user *******
  Exception in thread "main" java.net.ConnectException: Connection refused (Connection refused)
  at java.net.PlainSocketImpl.socketConnect(Native Method)
  at java.net.AbstractPlainSocketImpl.doConnect(AbstractPlainSocketImpl.java:350)
  at java.net.AbstractPlainSocketImpl.connectToAddress(AbstractPlainSocketImpl.java:206)
  ```

  Error message displayed for an incorrect port number in public access:

  ```
  [root@ecs-heru RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 139.xxx.179 5673 user *******
  Exception in thread "main" java.net.SocketTimeoutException: connect timed out
  at java.net.PlainSocketImpl.socketConnect(Native Method)
  at java.net.AbstractPlainSocketImpl.doConnect(AbstractPlainSocketImpl.java:350)
  at java.net.AbstractPlainSocketImpl.connectToAddress(AbstractPlainSocketImpl.java:206)
  ```

- **Incorrect username or password**

  ```
  [root@ecs-heru RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 192.168.125.111 5672 user *******
  Exception in thread "main" com.rabbitmq.client.AuthenticationFailureException: ACCESS_REFUSED - Login was refused using authentication mechanism PLAIN. For details
   see the broker logfile.
  at com.rabbitmq.client.impl.AMQConnection.start(AMQConnection.java:351)
  at
  com.rabbitmq.client.impl.recovery.RecoveryAwareAMQConnectionFactory.newConnection(RecoveryAwareAMQConnectionFactory.java:64)
  ```

- **Maximum number of connections exceeded**

14.2.3 Does DMS for RabbitMQ Support Public Access?

Yes. You can enable public access on the instance creation page when creating the instance, or on the instance details page after the instance has been created.

14.2.4 Does DMS for RabbitMQ Support Cross-Region Deployment?

No. Currently, only cross-AZ deployment is supported. Cross-region deployment is not supported.

14.2.5 Does DMS for RabbitMQ Support Cross-VPC Access?

Yes. RabbitMQ instances support cross-VPC and cross-subnet access. By establishing a peering connection between two VPCs, ECSs in one VPC can access instances in the other VPC.

For details about VPC peering connections, see **VPC Peering Connection**.

14.2.6 Does DMS for RabbitMQ Support Cross-Subnet Access?

Yes.

If the client and the instance are in the same VPC, cross-subnet access is supported. By default, subnets in the same VPC can communicate with each other.

If the client and the instance are in different VPCs, **establish a VPC peering connection**.

You can also access an instance through the public access address bound to the instance.

14.2.7 What Should I Do If I Fail to Access a RabbitMQ Instance with SSL Encryption?

1. Check the inbound rule of the security group. You must allow access using port 5671 (with SSL encryption) or 5672 (without SSL encryption).

2. Configure one-way SSL authentication as follows:

```
ConnectionFactory factory = new ConnectionFactory();
factory.setHost(host);
factory.setPort(port);
factory.setUsername(user);
factory.setPassword(password);
factory.useSslProtocol();
Connection connection = factory.newConnection();
Channel channel = connection.createChannel();
```

14.2.8 Can I Access a RabbitMQ Instance Using DNAT?

No. You can only use a proxy, VPN, Direct Connect, FullNAT, or reverse proxy to access a RabbitMQ instance.

14.2.9 Why Can't I Open the Management Web UI?

Possible cause: The security group of the instance is incorrectly configured.

Solution: Do as follows to reconfigure the security group.

1. In the **Network** section on the **Basic Information** tab page, click the name of the security group.
2. Click the **Inbound Rules** tab to view the inbound rules of the security group.
   - SSL disabled
     - For intra-VPC access, inbound access through port 5672 must be allowed.

    - For public access, inbound access through port 15672 must be allowed.
  - SSL enabled
    - For intra-VPC access, inbound access through port 5671 must be allowed.
    - For public access, inbound access through port 15671 must be allowed.

14.2.10 Can a Client Connect to Multiple Virtual Hosts of a RabbitMQ Instance?

Yes.

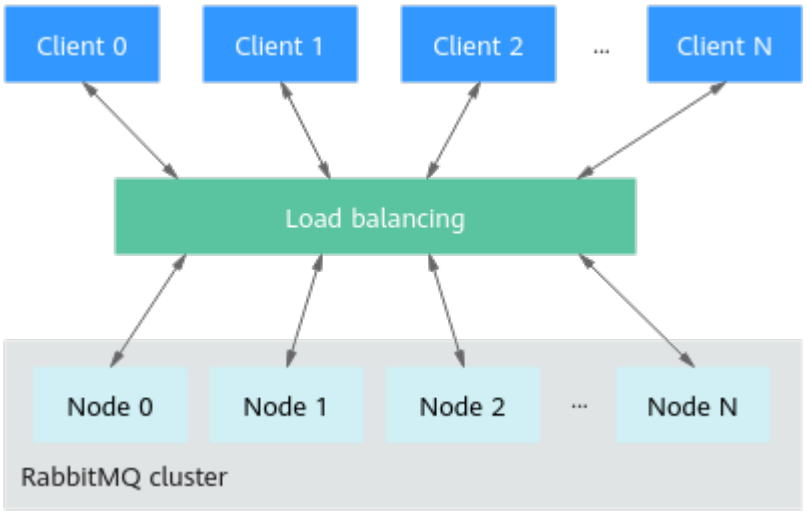
Virtual hosting is a basic feature of RabbitMQ. Each virtual host (vhost) serves as an independent RabbitMQ server. Different vhosts have different data directories but share the same process. Connecting to multiple vhosts does not differ much in performance from connecting to one vhost. The only difference is that the RabbitMQ process has more objects. You are advised to test the performance by using the service model.

For details, see **Virtual Hosts** on the official RabbitMQ website.

14.2.11 Why Does a RabbitMQ Cluster Have Only One Connection Address?

The connection address of a cluster RabbitMQ instance is actually the LVS node address (load balancing address) of the instance. When clients connect to the instance, the load balancer distributes the client request to each node of the cluster instance.

Figure 14-4 Connections



14.3 Plug-ins

14.3.1 What Plug-ins Does DMS for RabbitMQ Support?

What Plug-ins Does DMS for RabbitMQ Support?

The supported plug-ins are listed as follows. In the following list, an empty square bracket indicates that the plug-in is not installed; **[E*]** indicates that the plug-in has been explicitly installed; **[e*]** indicates that the plug-in has been implicitly installed, that is, the plug-in is installed as the dependency of other plug-ins.

```
[ ] rabbitmq_amqp1_0                  3.8.35
[ ] rabbitmq_auth_backend_cache       3.8.35
[ ] rabbitmq_auth_backend_http        3.8.35
[ ] rabbitmq_auth_backend_ldap        3.8.35
[ ] rabbitmq_auth_mechanism_ssl       3.8.35
[ ] rabbitmq_consistent_hash_exchange 3.8.35
[ ] rabbitmq_delayed_message_exchange 3.8.9
[ ] rabbitmq_event_exchange           3.8.35
[ ] rabbitmq_federation               3.8.35
[ ] rabbitmq_federation_management    3.8.35
[ ] rabbitmq_jms_topic_exchange       3.8.35
[E*] rabbitmq_management              3.8.35
[e*] rabbitmq_management_agent        3.8.35
[ ] rabbitmq_mqtt                     3.8.35
[ ] rabbitmq_peer_discovery_aws       3.8.35
[ ] rabbitmq_peer_discovery_common    3.8.35
[ ] rabbitmq_peer_discovery_consul    3.8.35
[ ] rabbitmq_peer_discovery_etcd      3.8.35
[ ] rabbitmq_peer_discovery_k8s       3.8.35
[ ] rabbitmq_random_exchange          3.8.35
[ ] rabbitmq_recent_history_exchange  3.8.35
[ ] rabbitmq_sharding                 3.8.35
[ ] rabbitmq_shovel                   3.8.35
[ ] rabbitmq_shovel_management        3.8.35
[ ] rabbitmq_stomp                    3.8.35
[E*] rabbitmq_top                     3.8.35
[ ] rabbitmq_tracing                  3.8.35
[ ] rabbitmq_trust_store              3.8.35
[e*] rabbitmq_web_dispatch            3.8.35
[ ] rabbitmq_web_mqtt                 3.8.35
[ ] rabbitmq_web_mqtt_examples        3.8.35
[ ] rabbitmq_web_stomp                3.8.35
[ ] rabbitmq_web_stomp_examples       3.8.35
```

The plug-ins that you can enable on the RabbitMQ console are rabbitmq_amqp1_0, rabbitmq_delayed_message_exchange, rabbitmq_federation, rabbitmq_sharding, rabbitmq_shovel, rabbitmq_tracing, rabbitmq_mqtt, rabbitmq_web_mqtt, rabbitmq_stomp, rabbitmq_web_stomp, and rabbitmq_consistent_hash_exchange. When an instance is created, these plug-ins are disabled by default. To enable them, go to the **Plug-ins** page of an instance on the RabbitMQ console by following the instructions in **Enabling Plug-ins**.

To install other plug-ins, contact customer service. Services are not affected during the installation.

14.4 Messages

14.4.1 Does DMS for RabbitMQ Support Delayed Message Delivery?

Yes. To delay message delivery, you can set the time-to-live (TTL) and dead letter exchanges (DLX). You can also use plug-ins to delay message delivery. Currently, the following plug-ins are supported: rabbitmq_amqp1_0, rabbitmq_delayed_message_exchange, rabbitmq_federation, rabbitmq_sharding, rabbitmq_shovel, rabbitmq_tracing, rabbitmq_mqtt, rabbitmq_web_mqtt, rabbitmq_stomp, rabbitmq_web_stomp, and rabbitmq_consistent_hash_exchange.

14.4.2 How Does Message Accumulation Affect Services? What Can I Do?

How Does Message Accumulation Affect Services?

Excessive message accumulation in a queue may cause memory or disk alarms. As a result, all connections will be blocked, other queues cannot be used, and the overall service quality deteriorates.

Causes of Message Accumulation

1. Messages are published much faster than they are retrieved. For example, consumers process messages slowly in a certain period. It may take only 3 seconds to send a message, but 1 minute to retrieve the message. If 20 messages are sent per minute, and only one message is processed by consumers, a large number of messages will be stacked in the queue.
2. Consumers are abnormal and cannot retrieve messages, while publishers keep sending messages.
3. Consumers are normal, but their subscriptions to queues are abnormal.
4. Consumers and their subscriptions to queues are normal, but the code logic of consumers is time-consuming, which reduces the consumption capability and results in a situation similar to **1**.

Solutions to Message Accumulation

1. If messages are published much faster than they are retrieved, solve the problem in the following ways:
   - Add consumers to accelerate message retrieval.
   - Use publisher confirms and monitor the publishing rate and duration on the publishing end. When the duration increases significantly, apply flow control.
2. If consumers are abnormal, check whether the consumer logic is correct and optimize the program.
3. Check whether consumers' subscriptions to queues are normal.
4. If the code logic of consumers is time-consuming, set expiration time on messages using either of the following methods:
   - When creating messages, set the message expiration time by using the **expiration** parameter.

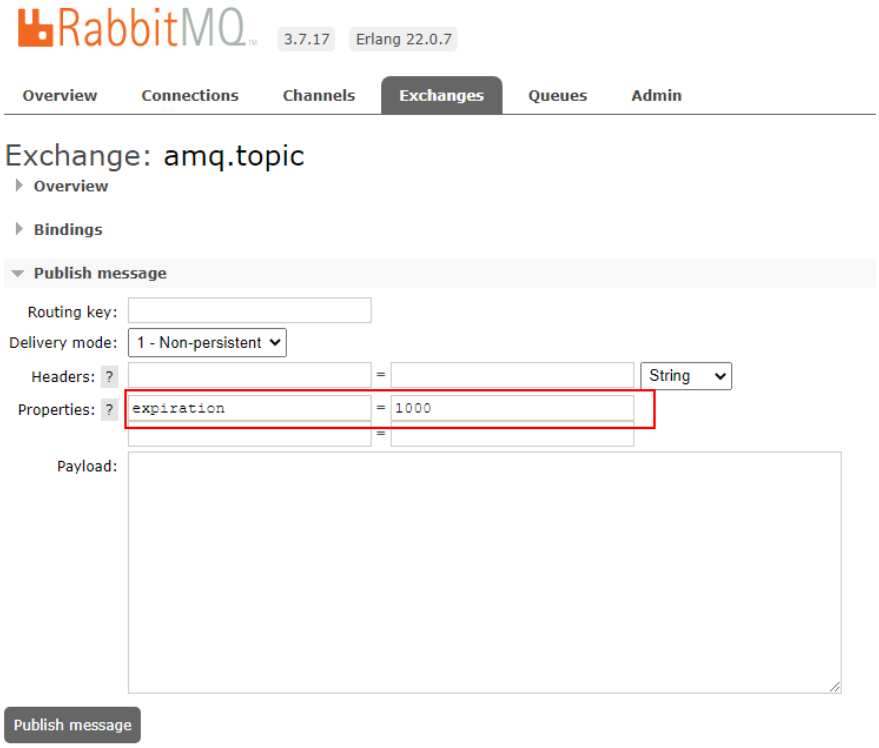
- Set the value of **expiration** in **properties**. The unit is ms.

```
AMQP.BasicProperties properties = new AMQP.BasicProperties().builder()
    .deliveryMode(2)
    .contentEncoding("UTF-8")
    .expiration("10000")
    .build();

String message = "hello rabbitmq";
channel.basicPublish(exchange, routingKey, properties,
message.getBytes(StandardCharsets.UTF_8));
```

- Set the value of **expiration** on the management UI. The unit is ms.

  Log in to the management UI. On the **Exchanges** tab page, click an exchange name to view its details. In the **Publish message** area, set **expiration**, as shown in the following figure.



– Set the queue expiration time by using the **x-message-ttl** parameter. The expiration time starts when messages enter the queue. When the expiration time elapses, the messages are automatically deleted.

- Set the value of **x-message-ttl** in the client code. The unit is ms.

```
Map<String, Object> arguments = new HashMap<String, Object>();
arguments.put("x-message-ttl", 10000);
channel.queueDeclare(queueName, true, false, false, arguments);
```

- Set the value of **x-message-ttl** when creating a queue on the management UI. The unit is ms.

  Log in to the management UI. On the **Exchanges** tab page, create a queue and set the value of **x-message-ttl**, as shown in the following figure.

14.4.3 How Long Are Messages Be Retained?

Normally, messages are retained until they are retrieved. However, if a message has a time to live (TTL), it will be retained until expiry.

14.5 Monitoring & Alarm

14.5.1 Why Can't I View the Monitoring Data of a RabbitMQ Instance?

The monitoring data cannot be displayed if the queue name starts with a special character, such as a period (.) or underscore (_). You are advised to delete the queue whose name starts with a special character.

14.5.2 What Should I Do If the Number of Channels Keeps Rising?

A maximum of 2047 channels are allowed in each connection. If this limit is exceeded, new channels cannot be created. Check if unused resources are not released.

A Change History

Released On	Description
2023-03-09	This issue incorporates the following changes: • Added the disk encryption function, as described in section **Buying an Instance**. • Added **Change History**.
2023-02-27	This issue incorporates the following change: • Added the disk encryption function, as described in section **Buying an Instance**.
2023-02-08	This issue incorporates the following changes: • Added description about new specifications in **Specifications** and **Buying an Instance**. • Added **Upgrading the Version** and **Managing Virtual Hosts**.
2021-11-26	This issue incorporates the following changes: • Added section **Billing**.
2020-11-06	This issue is the first official release.

