Distributed Message Service for RabbitMQ

Getting Started

Issue 01

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Contents

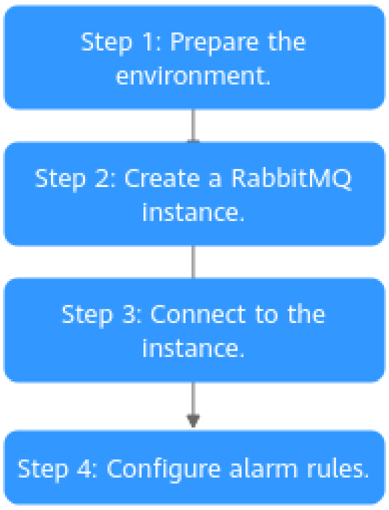
1 Introduction

This document takes the example of creating and connecting to a RabbitMQ instance with SSL disabled to get you quickly started with Distributed Message Service (DMS) for RabbitMQ.

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

Procedure

Figure 1-1 Procedure for using DMS for RabbitMQ



Step 1: Prepare the environment.
Step 2: Create a RabbitMQ instance.
Step 3: Connect to the instance.
Step 4: Configure alarm rules.

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**.

   You can select the specifications and quantity when creating a RocketMQ instance.

3. Connect to the instance.

   A client connects to the instance with SSL disabled using the demo provided by RabbitMQ.

4. **Configure alarm rules**.

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

NOTE

For details about RabbitMQ concepts, see **Basic Concepts**.

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**. 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**. 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	15672	0.0.0.0/0	Access the management UI (without 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

ECS

Before connecting to a RabbitMQ instance, ensure that you have purchased an ECS, installed the JDK, and configured environment variables. 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. In the service list, click **Elastic Cloud Server** under **Compute**, and then click **Buy ECS**.

For details, see **Purchasing 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

3 Step 2: Create a RabbitMQ Instance

This section takes the example of creating a RocketMQ v3.8.5 instance with SSL disabled to describe how to create a RabbitMQ instance on the console.

Prerequisites

- To achieve fine-grained management of your cloud resources, create IAM user groups and users and grant specified permissions to the users. For details, see **Creating a User and Granting DMS for RabbitMQ Permissions**.
- You have configured **instance dependencies**.

Procedure

Step 1 Go to the **Buy Instance page**.

Step 2 Set **Billing Mode** to **Pay-per-use**.

Step 3 Specify **Region**, **Project**, and **AZ**.

Step 4 Specify the instance name and the enterprise project.

Step 5 Set the instance information. For details, see **Table 3-1**.

Table 3-1 Configuring the instance parameters

Parameter	Description
Version	Select **3.8.35**.
Architecture	Select **Cluster**.
CPU Architecture	Select **x86**.
Flavor	Select **rabbitmq.2u4g.cluster**.
Brokers	Enter **3**.
Storage Space per Broker	Select **Ultra-high I/O** and enter **100** GB. Total storage space = Storage space per broker × Broker quantity. After the instance is created, you cannot change the disk type.

Step 6 Configure the instance network. For details, see **Table 3-2**.

Table 3-2 Configuring instance network

Parameter	Description
VPC	Select the created VPC and subnet. You cannot change the VPC and subnet after the instance is created.
Security Group	Select the created security group.
SSL	Do not enable it.

Step 7 Enter the username and password used for connecting to the RabbitMQ instance.

Step 8 Click **Advanced Settings**. For more information, see **Table 3-3**.

Table 3-3 Advanced settings

Parameter	Description
Public Access	Do not enable it.
Tags	Skip it.
Description	Skip it.

Step 9 Click **Buy Now**.

Step 10 Confirm the instance information, read and agree to the *HUAWEI CLOUD Customer Agreement*, and then submit the request.

Step 11 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 is in the **Creation failed** state, delete it, and buy a new one. If the instance purchase fails again, contact customer service.

----End

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

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)** 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:

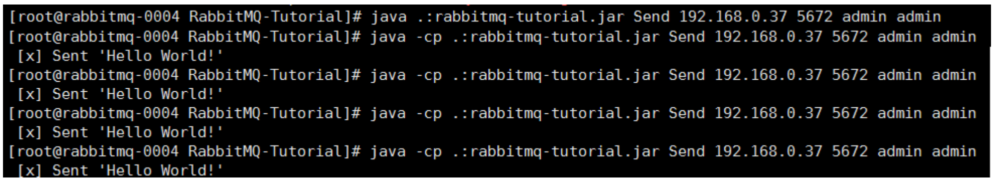
```
$ cd RabbitMQ-Tutorial
```

Step 4 Produce 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 4-1 Sample project for message production



```
[root@rabbitmq-0004 RabbitMQ-Tutorial]# java .:rabbitmq-tutorial.jar Send 192.168.0.37 5672 admin admin
[root@rabbitmq-0004 RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 192.168.0.37 5672 admin admin
 [x] Sent 'Hello World!'
[root@rabbitmq-0004 RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 192.168.0.37 5672 admin admin
 [x] Sent 'Hello World!'
[root@rabbitmq-0004 RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 192.168.0.37 5672 admin admin
 [x] Sent 'Hello World!'
[root@rabbitmq-0004 RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Send 192.168.0.37 5672 admin admin
 [x] Sent 'Hello World!'
```

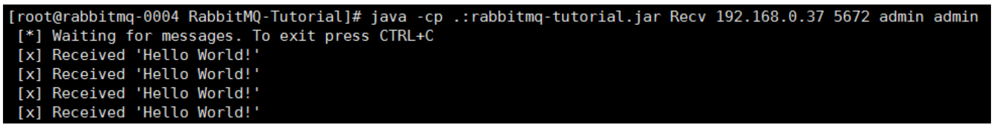
Press **Ctrl**+**C** to exit.

Step 5 Consume 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 4-2 Sample project for message consumption



```
[root@rabbitmq-0004 RabbitMQ-Tutorial]# java -cp .:rabbitmq-tutorial.jar Recv 192.168.0.37 5672 admin admin
 [*] Waiting for messages. To exit press CTRL+C
 [x] Received 'Hello World!'
 [x] Received 'Hello World!'
 [x] Received 'Hello World!'
 [x] Received 'Hello World!'
```

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

----End

Java Sample Code

Accessing an instance and producing 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 consuming 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);
```

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 5-1 Alarm rules for RabbitMQ instances

Metric	Alarm Policy	Description	Solution
Memory High Watermark	Alarm threshold: Raw data ≥ 1 Number of consecutive periods: 1 Alarm severity: Critical	A threshold of 1 indicates that the memory high watermark is reached, blocking message publishing.	● 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.
Disk High Watermark	Alarm threshold: Raw data ≥ 1 Number of consecutive periods: 1 Alarm severity: Critical	A threshold of 1 indicates that the disk high watermark is reached, blocking message publishing.	● Reduce the number of messages accumulated in lazy queues. ● Reduce the number of messages accumulated in durable queues. ● Delete queues.

Metric	Alarm Policy	Description	Solution
Memory Usage	Alarm threshold: Raw data > Expected usage (30% is recommended) Number of consecutive periods: 3–5 Alarm severity: Major	To prevent high memory watermarks from blocking publishing, configure an alarm for this metric on each node.	- 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.
CPU Usage	Alarm threshold: Raw data > Expected usage (70% is recommended) Number of consecutive periods: 3–5 Alarm severity: Major	A high CPU usage may slow down publishing rate. Configure an alarm for this metric on each node.	- Reduce the number of mirrored queues. - For a cluster instance, add nodes and rebalance queues between all nodes.
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.

Metric	Alarm Policy	Description	Solution
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 **Middleware** > **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:

- In the row containing the desired instance, click **View Metric**. 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

6 Common Practices

You can use the common practices provided by DMS for RabbitMQ to meet your service requirements.

Table 6-1 Common practices

Practice	Description
Migrating RabbitMQ services	Migrate RabbitMQ services from an off-cloud, single-node or cluster instance to a RabbitMQ instance on Huawei Cloud.
Migrating queues	Configure queue load balancing to handle uneven queue distribution across nodes in a RabbitMQ cluster due to node scale-out or queue deletion.