Distributed Message Service for RocketMQ

Service Overview

Issue	01
Date	2022-11-24

HUAWEI TECHNOLOGIES CO., LTD.

Trademarks and Permissions

HUAWEI and other Huawei trademarks are trademarks 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 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 What Is DMS for RocketMQ?

Distributed Message Service (DMS) for RocketMQ is message-oriented middleware that delivers low latency, high flexibility, high throughput, dynamic expansion, easy management, and abundant messaging functions.

DMS for RocketMQ has the following features:

- Compatibility with open-source RocketMQ clients.
- Abundant messaging functions, including ordered message delivery, delayed messages, scheduled messages, message retry, dead letter messages, and transactional messages, which meet diverse needs in e-commerce and finance scenarios.
- Monitoring and analysis functions, including message tracing, message tracking, trace analysis, dead letter message export, monitoring and alarms, which allow you to monitor your services and keep them up and running.

Message Types

DMS for RocketMQ supports four messages types.

- Normal messages: Messages that do no have any features of delayed messages, ordered messages, or transactional messages.
- Delayed/Scheduled messages: Messages that are delivered to consumers after a specific period after being sent from producers to DMS for RocketMQ.
- Ordered messages: Messages that are retrieved in the exact order that they are created.
- Transactional message: Messages that achieve eventual consistency, delivering distributed transaction processing similar to X/Open XA.

Advanced Features

DMS for RocketMQ provides four advanced features.

- Message filtering: Consumers can tag messages in the subscribed topics to retrieve only the required messages.
- Message retry: DMS for RocketMQ retries sending messages that fail to be retrieved. If the message retrieval still fails after the maximum number of retries is reached, the messages are sent to the dead letter queue.

Table 1-1 describes the retry mechanism in DMS for RocketMQ.

Table 1-1 Message retry mechanism

Retrieval Type	Retry Interval	Maximum Retries
Ordered retrieval	The interval is set by the **suspendTimeMillis** parameter. The default interval is 1000 ms, that is, 1s.	The maximum number of retries is set by the **setMaxReconsumeTimes** method on the consumer. If this parameter is not set, there will be unlimited retries.
Normal retrieval	The interval varies by the retry number, as shown in Table 1-2.	Set during consumer group creation. Value range: 1–16 times

Table 1-2 Intervals between retries in normal retrievals

Retry No.	Interval	Retry No.	Interval
1	10s	9	7 min
2	30s	10	8 min
3	1 min	11	9 min
4	2 min	12	10 min
5	3 min	13	20 min
6	4 min	14	30 min
7	5 min	15	1 h
8	6 min	16	2 h

- Delayed messages: After being sent from producers to DMS for RocketMQ, messages are delivered to consumers only after a **fixed period**. A producer can specify one of the 18 delay levels listed in Table 1-3.

Table 1-3 Delay levels

Delay Level	Delay	Delay Level	Delay
1	1s	10	6 min
2	5s	11	7 min

Delay Level	Delay	Delay Level	Delay
3	10s	12	8 min
4	30s	13	9 min
5	1 min	14	10 min
6	2 min	15	20 min
7	3 min	16	30 min
8	4 min	17	1 h
9	5 min	18	2 h

- Scheduled messages: After being sent from producers to DMS for RocketMQ, messages are delivered to consumers only after a specified time point. In DMS for RocketMQ, you can schedule messages to be delivered at **any time** within one year. You can also cancel scheduled messages.

2 Product Advantages

DMS for RocketMQ has the following advantages:

- Instant availability: You can build your own message service in the cloud in just a few steps. After you create a RocketMQ instance, you can quickly access it at its connection addresses. DMS for RocketMQ is fully compatible with open-source RocketMQ, allowing you to migrate your applications to the cloud with no change to the application code.
- Fully hosted services: DMS for RocketMQ provides automatic deployment, after-sales services, and comprehensive O&M solutions including monitoring and alarms. You can focus on your service development without having to worry about deployment and O&M.
- Low latency: For the deployment on Huawei Cloud, intranet access latency is reduced to microseconds.
- Elasticity and high reliability: Raft-based clustering facilitates fault detection and failover, ensuring service continuity and reliability.
- Dynamic scaling: Clusters can be scaled out dynamically as service demand changes.
- Easy management: Monitoring and alarms, link diagnosis, and message tracing facilitate fault locating and routine maintenance.
- Abundant messaging functions: Ordered message delivery, intentional delivery delay, message retry, dead letter messages, message filtering, and transaction messages meet needs in diverse scenarios.

3 Application Scenarios

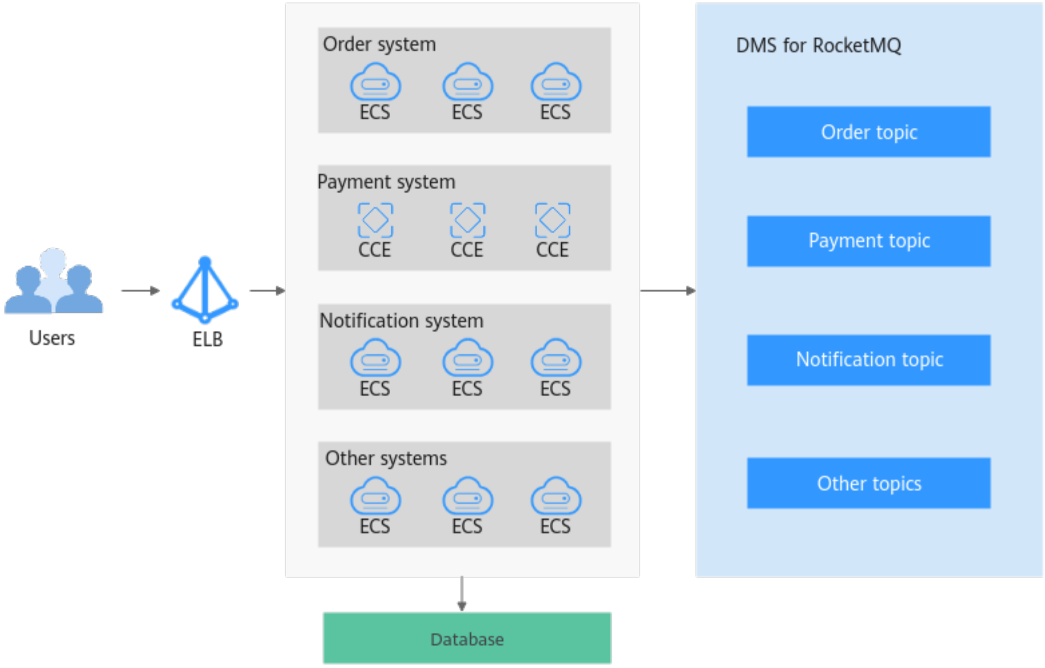
E-Commerce

E-commerce applications face the following challenges:

- E-commerce applications usually involve order placement, payment, and notification processing. Multiple service systems work together to complete a task, and upper-layer service systems depend on lower-layer service systems. If there are a large number of layers, the performance of user-facing services will deteriorate, affecting user experience.
- During e-commerce shopping events, service systems that provide subscription-based notifications are required.

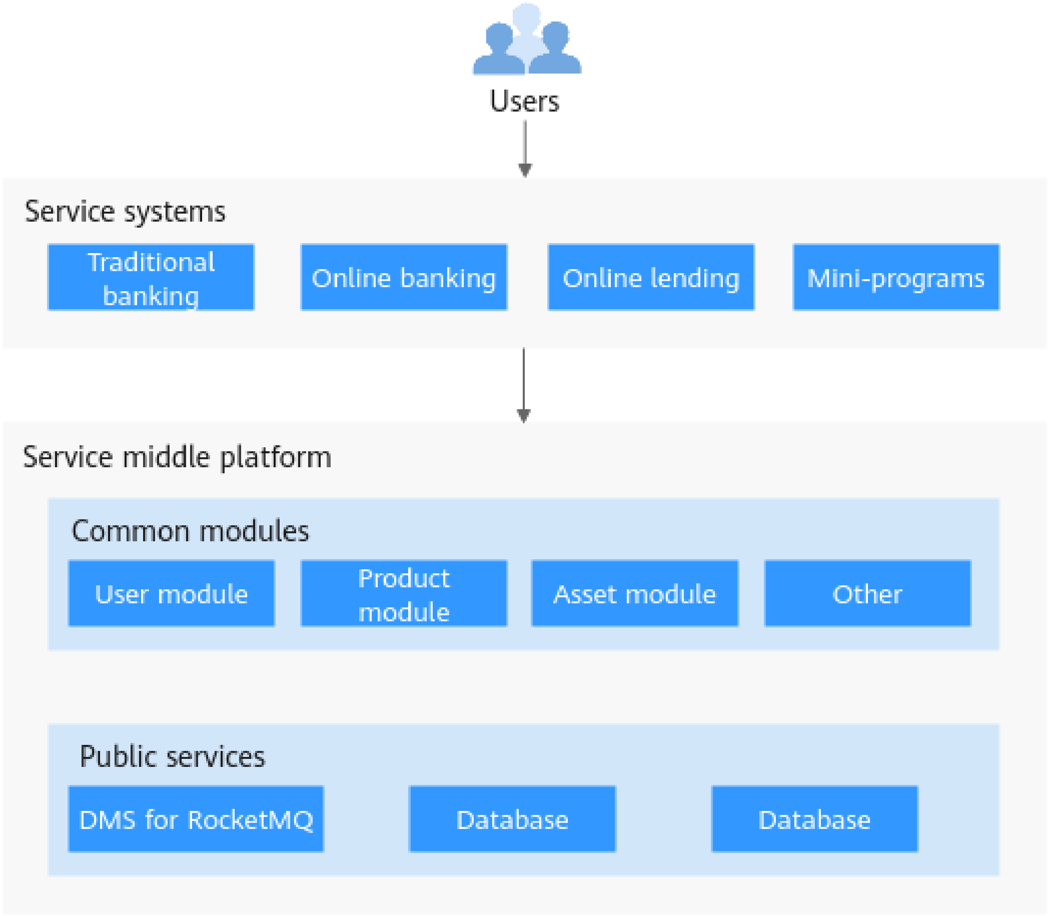
DMS for RocketMQ can help you cope with e-commerce challenges.

- DMS for RocketMQ decouples service systems to improve their processing capabilities and response speeds.
- DMS (for RocketMQ) allows for scheduled and delayed message delivery to meet the requirements for subscription-based notifications.



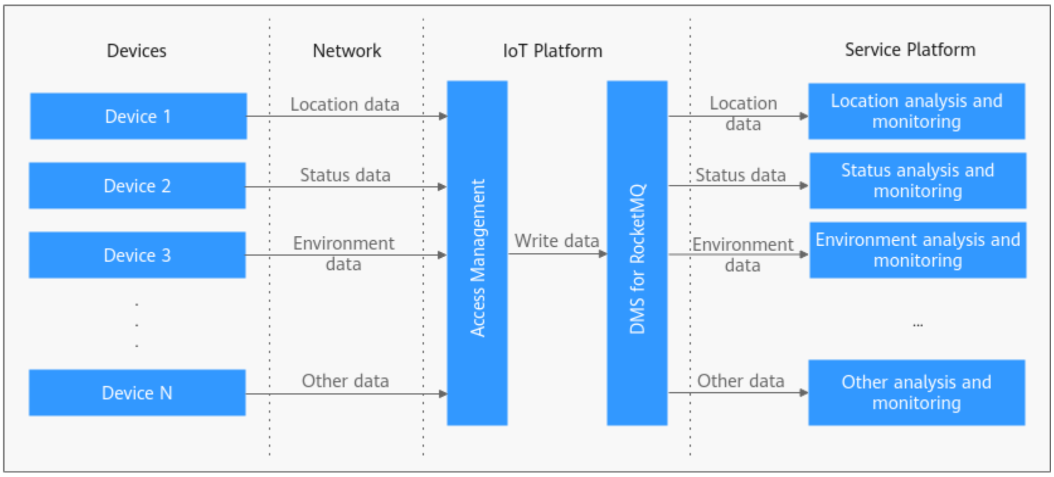
Finance

Unlike traditional finance, Internet finance requires fast responses to the rapidly changing Internet landscape. Common functions in traditional finance are extracted and then packaged into microservice modules to form a middle platform which provides basic capabilities for upper-layer service systems. With its decoupling and linking advantages, DMS for RocketMQ improves the processing capability and response speed of each microservice module, playing an indispensable role in the service middle platform.



IoT

Massive device access is typical in IoT scenarios. A massive number of devices bring in massive amounts of data. However, each service component only desires specific data. Therefore, it is important to quickly identify data that services desire from a large amount of data. To address this challenge, DMS for RocketMQ provides message filtering. When sent from devices, messages are tagged to specify the message type. Services can specify only the desired types of messages to retrieve.


Devices
Network
IoT Platform
Service Platform
Device 1
Device 2
Device 3
Device N
Location data
Status data
Environment data
Other data
Access Management
Write data
DMS for RocketMQ
Location data
Status data
Environment data
Other data
Location analysis and monitoring
Status analysis and monitoring
Environment analysis and monitoring
...
Other analysis and monitoring

4 Specifications

The specifications of a RocketMQ instance are defined on five dimensions:

- ECS flavor: Flavor of the ECS used by the instance
- Number of brokers: Scale of the instance
- Storage space: Size of the storage space that the instance can use
- TPS per broker: TPS performance of the instance
- Max. topics per broker: Number of topics allowed for the instance.
- Max. consumer groups per broker: Number of consumer groups allowed for the instance.

Table 4-1 lists supported specifications.

Table 4-1 Instance specifications

Flavor	Brokers	Storage Space (GB per Broker)	TPS per Broker	Max. Topics per Broker	Max. Consumer Groups per Broker
rocketmq.4u8g.cluster.small	1–2	300–60,000	15,000	2000	2000
rocketmq.4u8g.cluster	1–10	300–600,000	20,000	4000	4000
rocketmq.8u16g.cluster	1–10	300–900,000	25,000	8000	8000
rocketmq.12u24g.cluster	1–10	300–900,000	28,000	12,000	12,000
rocketmq.16u32g.cluster	1–10	300–900,000	30,000	16,000	16,000

5 Comparing RocketMQ and Kafka

Feature	RocketMQ	Kafka
Priority queue	Not supported	Not supported
Delayed queue	Supported	Not supported
Dead letter queue	Supported	Not supported
Message retry	Supported	Not supported
Retrieval mode	Pull-based and push-based	Pull-based
Message broadcasting	Supported	Supported
Message tracking	Supported	Supports offset and timestamp tracking.
Message accumulation	Supported	Supports higher accumulation performance than RabbitMQ thanks to high throughput.
Persistence	Supported	Supported
Message tracing	Supported	Not supported
Message filtering	Supported	Supported
Multi-tenancy	Supported	Not supported
Multi-protocol	Compatible with RocketMQ.	Only supports Apache Kafka.
Multi-language	Supports clients in multiple programming languages.	Kafka is written in Scala and Java and supports clients in multiple programming languages.
Throttling	Planned	Supports throttling on producer or consumer clients.
Ordered message delivery	Message order is maintained within a queue.	Supports partition-level FIFO.

Feature	RocketMQ	Kafka
Security	Supports SSL authentication.	Supports SSL and SASL authentication and read/write permissions control.
Transactional messages	Supported	Supported

6 Comparing DMS for RocketMQ and Open-Source RocketMQ

DMS for RocketMQ maintains open-source compatibility while supporting or enhancing features in the open-source versions.

Table 6-1 Differences between DMS for RocketMQ and open-source RocketMQ

Feature	DMS for RocketMQ	Open-Source RocketMQ
Delayed/Scheduled messages	● Delayed message: There are 18 delay levels. The longest delay is two hours. ● Scheduled messages: The message delivery delay can be customized. The longest delay is one year.	Only 18 delay levels are supported. The longest delay is two hours.
Ordered messages	Supported	Supported
Message retry	Supported	Supported
Dead letter messages	Supported	Supported
Cluster consumption	Supported	Supported
Message broadcasting	Supported	Supported
Dead letter queues	Supported	Supported
Resetting message retrieval start position	Supported	Supported
Message query	Supported	Supported
Encrypted transmission	Supported	Supported
Message tracing	Supported	Supported

Feature	DMS for RocketMQ	Open-Source RocketMQ
Transactional messages	Supported. The performance is ten times higher than that of open-source RocketMQ when a large number of transactional messages are stacked.	Supported. However, if a large number of transactional messages are stacked, the performance is poor.
Exporting dead letter messages	Supported	Not supported
Data dumping	Planned	Not supported
Instance diagnosis	One-click diagnosis of retrieval issues	Not supported
Instance monitoring	Historical monitoring data can be displayed in graphs. More than 18 metrics can be monitored.	Only current monitoring data can be viewed. Metrics such as CPU and memory cannot be monitored.
ACL	Flexible configuration with a few clicks	Complex configuration
O&M and capacity expansion	Fast expansion with a few clicks	Manual expansion, which is complex

7 Restrictions

This section describes the restrictions on using DMS for RocketMQ.

Table 7-1 DMS for RocketMQ restrictions

Item	Default Limit	Description
Maximum number of topics	Depends on the **instance specifications**. This limit cannot be changed.	When this limit is reached, no more topics can be created.
Maximum number of consumer groups	Depends on the **instance specifications**. This limit cannot be changed.	When this limit is reached, no more consumer groups can be created.
Message size	The maximum size of a message is 4 MB. The maximum size of a message attribute is 16 KB. The message size cannot be changed.	When this limit is reached, the message fails to be sent.
Message retention duration	Two days. This limit cannot be changed.	Messages can be retained for a maximum of two days and will be automatically deleted after two days.
Consumer offset reset	Two days. This limit cannot be changed.	You can reset the retrieval start position to any time within two days.
Delay of scheduled messages	The maximum delay is one year. This limit cannot be changed.	You can schedule messages to be delivered at any time within one year.

8 Related Services

- Virtual Private Cloud (VPC)

  RocketMQ 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 instances.

- Cloud Eye

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

- 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 Huawei Cloudmanagement console or open APIs, as well as the operation results. You can view all generated traces to query, audit, and backtrack performed operations.

9 RocketMQ Concepts

Topic

A topic is a category of messages. It is the basic unit for creating and retrieving messages.

Queue

A topic consists of multiple queues. A larger number of queues indicates higher retrieval concurrency.

Producer

A producer sends messages to the server.

Consumer

A consumer obtains messages from the server.

Consumer Group

A consumer group contains consumers that have similar retrieval behavior.

Broker

Brokers are a cluster of ECSs that process services. A broker consists of one master and two slaves.

10 Permissions Management

You can use Identity and Access Management (IAM) to manage DMS for RocketMQ permissions and control access to your resources. IAM provides identity authentication, permissions management, and access control, helping you secure access to your Huawei Cloud resources.

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 RocketMQ resources but prevent them from being able to delete resources or perform any high-risk operations.

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

IAM is free of charge. You pay only for the resources in your account. For more information about IAM, see the **IAM Service Overview**.

NOTE

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

DMS for RocketMQ 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 RocketMQ is a project-level service deployed and accessed in specific physical regions. When assigning DMS for RocketMQ 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 RocketMQ, the users need to switch to a region where they have been authorized to use this service.

You can grant users 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 RocketMQ users only the permissions for managing instances.

Table 10-1 lists all the system-defined roles and policies supported by DMS for RocketMQ.

Table 10-1 System-defined roles and policies supported by DMS for RocketMQ

Role/Policy Name	Description	Type	Dependencies
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 RocketMQ system policy or role. Select the policies or roles as required.

Table 10-2 Common operations supported by each system-defined policy or role of DMS for RocketMQ

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

11 Billing

DMS for RocketMQ supports pay-per-use and yearly/monthly billing.

Billing Items

DMS for RocketMQ is billed based on the instance flavor and storage space.

Table 11-1 Billing items of DMS for RocketMQ

Item	Billing
Instance	• Instances are billed based on the flavors described in **Table 11-2**. • RocketMQ instances can be billed on a yearly/monthly or pay-per-use (hourly) basis.
Storage space	• Instances are 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. • Storage space can be specified with increments of 100 GB. For details about the storage space range, see **Table 11-2**. • Storage space can be billed on a yearly/monthly or pay-per-use (hourly) basis.

Table 11-2 Instance flavors

Flavor	Brokers	Storage Space (GB per Broker)	TPS per Broker	Queues per Broker
rocketmq.4u8g.cluster.small	1–2	300–60,000	15,000	2000

Flavor	Brokers	Storage Space (GB per Broker)	TPS per Broker	Queues per Broker
rocketmq.4u8g.cluster	1–10	300–600,000	20,000	4000
rocketmq.8u16g.cluster	1–10	300–900,000	25,000	8000
rocketmq.12u24g.cluster	1–10	300–900,000	28,000	12,000
rocketmq.16u32g.cluster	1–10	300–900,000	30,000	16,000

Billing Modes

Two billing modes are available, allowing you to pay less by using more.

- Yearly/Monthly: Provides a larger discount than pay-per-use billing and is recommended for long-term use of resources.
- Pay-per-use (hourly): a flexible billing mode, which allows you to pay for only the resources you actually use. The minimum time unit is one hour. Less than an hour is recorded as an hour.

Renewal

You can renew an instance before it expires, or you can set auto-renewal rules for an instance.