

Data Replication Service

Best Practices

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1 Best Practices Summary

This document describes how to use Data Replication Service (DRS) to quickly migrate or synchronize databases in typical application scenarios.

Table 1-1 DRS best practices

Function	Source DB Type	Destination DB	Cases
Real-Time Migration	MySQL databases on other clouds	Huawei Cloud RDS for MySQL instances	Migrating MySQL Databases from Other Clouds to RDS for MySQL
		Huawei Cloud TaurusDB instances	From Other Cloud MySQL to TaurusDB
	MongoDB databases on other clouds	Huawei Cloud DDS instances	From Other Cloud MongoDB to DDS
	On-premises MySQL databases	Huawei Cloud RDS for MySQL instances	From ECS-hosted MySQL to RDS for MySQL
	MySQL databases on ECSs	Huawei Cloud TaurusDB instances	From ECS-hosted MySQL to TaurusDB
	MongoDB databases on ECSs	Huawei Cloud DDS instances	From ECS-hosted MongoDB to DDS
	On-premises MySQL databases	Huawei Cloud RDS for MySQL instances	From On-Premises MySQL to RDS for MySQL
	On-premises MongoDB databases	Huawei Cloud DDS instances	From On-Premises MongoDB to DDS

Function	Source DB Type	Destination DB	Cases
	RDS for MySQL instances	Distributed Database Middleware (DDM) instances	From RDS for MySQL to DDM
	MySQL schema and logic table	Distributed Database Middleware (DDM) instances	From MySQL Schema and Logic Table to DDM
Backup Migration	On-premises Microsoft SQL Server databases	Huawei Cloud RDS for SQL Server instances	Migrating Microsoft SQL Server Backup Data to RDS SQL Server DB Instance
Real-Time Synchronization	PostgreSQL databases on other clouds	Huawei Cloud RDS for PostgreSQL instances	From Other Cloud PostgreSQL to RDS for PostgreSQL
	PostgreSQL databases on ECSs		From ECS-hosted PostgreSQL to RDS for PostgreSQL
	On-premises PostgreSQL databases		From On-Premises PostgreSQL to RDS for PostgreSQL
	On-premises MySQL databases	Huawei Cloud distributed GaussDB instances	From On-premises MySQL to GaussDB Distributed
	On-premises Oracle databases	Huawei Cloud distributed GaussDB instances	From On-premises Oracle to GaussDB Distributed
		Huawei Cloud centralized GaussDB instances	From On-premises Oracle to GaussDB Centralized
		Distributed Database Middleware (DDM) instances	From On-Premises Oracle to DDM
	Huawei Cloud RDS for MySQL instances	DMS for Kafka	From RDS for MySQL to Kafka

Function	Source DB Type	Destination DB	Cases
	GaussDB Distributed	DMS for Kafka	From GaussDB Distributed to Kafka
	Huawei Cloud centralized GaussDB instances	DMS for Kafka	From GaussDB Centralized to Kafka
Real-Time Disaster Recovery	Huawei Cloud RDS for MySQL instances	Huawei Cloud RDS for MySQL instances	Configuring Remote Single-Active DR for an RDS for MySQL Instance Using DRS

2 Real-Time Migration

2.1 Migrating MySQL Databases from Other Clouds to RDS for MySQL

2.1.1 Overview

Scenarios

This best practice includes the following tasks:

- Create an RDS for MySQL instance.
- Migrate data from a MySQL database on other clouds to RDS for MySQL.

Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is at least \$0 USD.

Service List

- Virtual Private Cloud (VPC)
- RDS
- Data Replication Service (DRS)

Before You Start

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- All settings in this best practice are for reference only. For more information about MySQL migration, see [From MySQL to MySQL](#).

2.1.2 Resource Planning

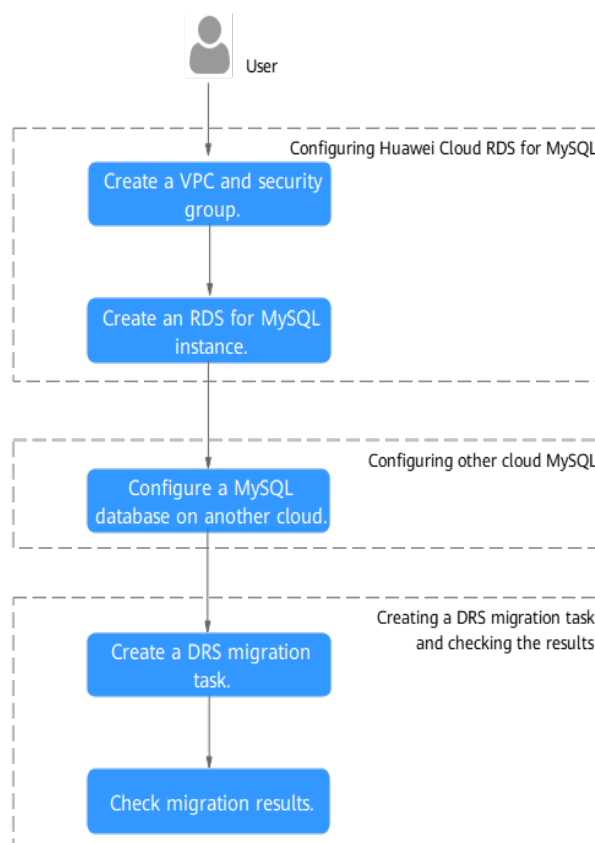
Table 2-1 Resource planning

Category	Subcategory	Planned Value	Description
VPC	VPC name	vpc-src-172	Specify a name that is easy to identify.
	Region	Test region	To achieve lower network latency, select the region nearest to you.
	AZ	AZ3	-
	Subnet	172.16.0.0/16	Select a subnet with sufficient network resources.
	Subnet name	subnet-src-172	Specify a name that is easy to identify.
MySQL on another cloud	Database version	MySQL 5.7	-
	IP address	10.154.217.42	Enter an IP address.
	Port	3306	-
RDS for MySQL instance	Instance name	rds-mysql	Specify a name that is easy to identify.
	DB engine version	MySQL 5.7	-
	Instance type	Single	A single instance is used in this example. To improve service reliability, select a primary/standby instance.
	Storage type	Cloud SSD	-
	AZ	AZ1	AZ1 is selected in this example. To improve service reliability, select the primary/standby instance type and deploy the primary and standby instances in different AZs.
	Instance class	General-purpose 2 vCPUs 8 GB	-
DRS migration task	Task name	DRS-mysql	Specify a name that is easy to identify.

Category	Subcategory	Planned Value	Description
	Source DB engine	MySQL	-
	Destination DB engine	MySQL	-
	Network type	Public network	Public network is used in this example.

2.1.3 Operation Process

Figure 2-1 Flowchart



2.1.4 Creating a VPC and Security Group

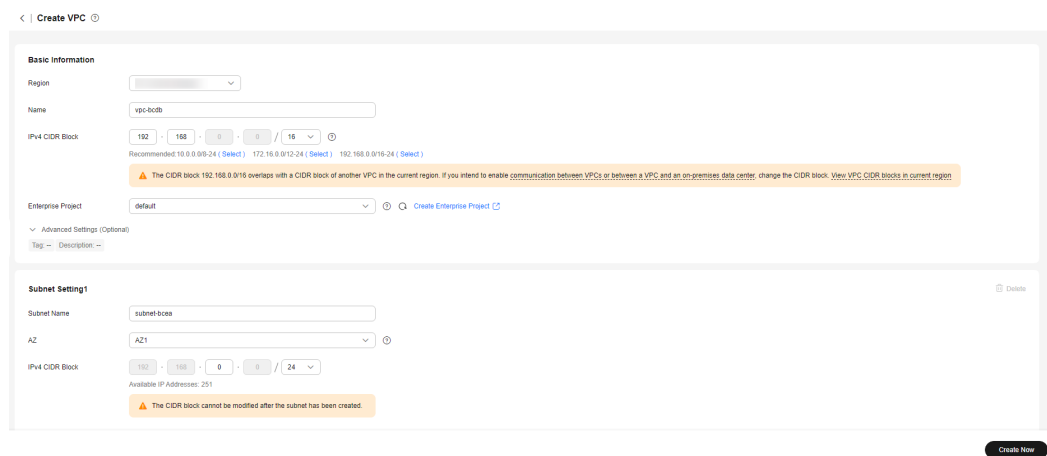
Create a VPC and security group for an RDS for MySQL instance

Creating a VPC

Step 1 Go to the [Create VPC](#) page.

Step 2 Configure the basic information, subnet, and IP address.

Figure 2-2 Creating a VPC



Step 3 Click **Create Now**.


Step 4 Return to the VPC list and check whether the VPC is created.

If the VPC status becomes available, the VPC has been created.

----End

Creating a Security Group

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner of the management console and select **CN-Hong Kong**.

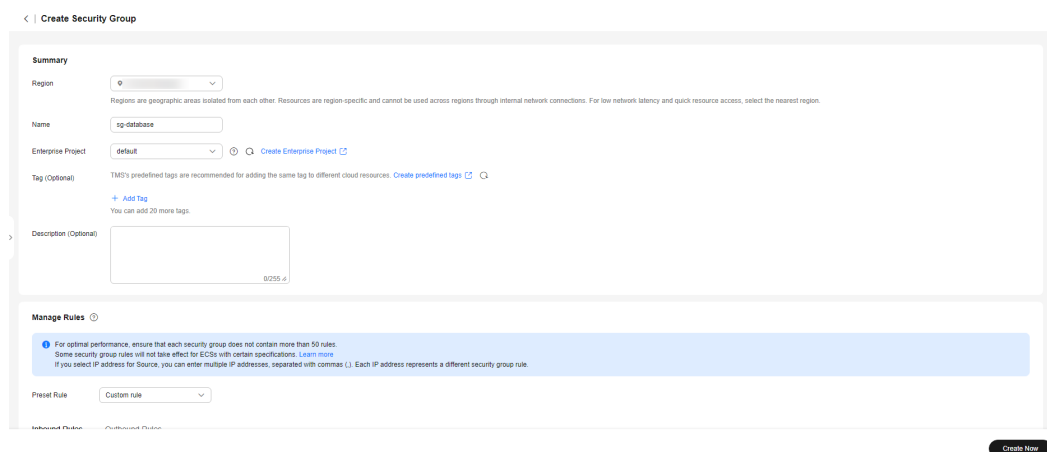
Step 3 Under the service list, choose **Networking > Virtual Private Cloud**.

Step 4 In the navigation pane, choose **Access Control > Security Groups**.

Step 5 Click **Create Security Group**.

Step 6 Configure parameters as needed.

Figure 2-3 Creating a security group



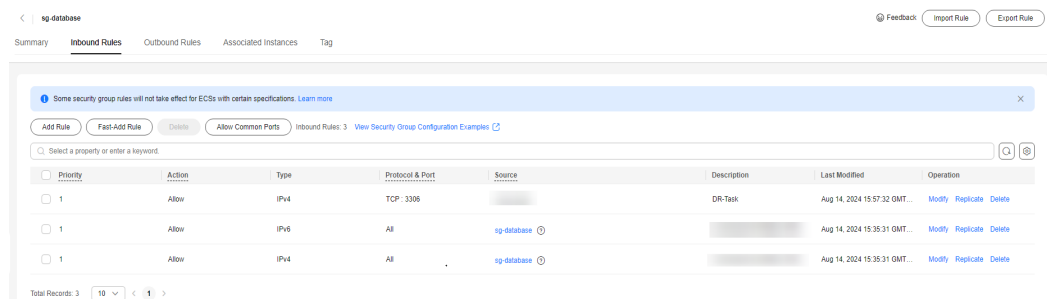
Step 7 Click **Create Now**.

Step 8 Return to the security group list and click the security group name.

Step 9 Click the **Inbound Rules** tab, and then click **Add Rule**.

Step 10 Configure an inbound rule to allow access from database port **3306**.

Figure 2-4 Inbound rules



----End

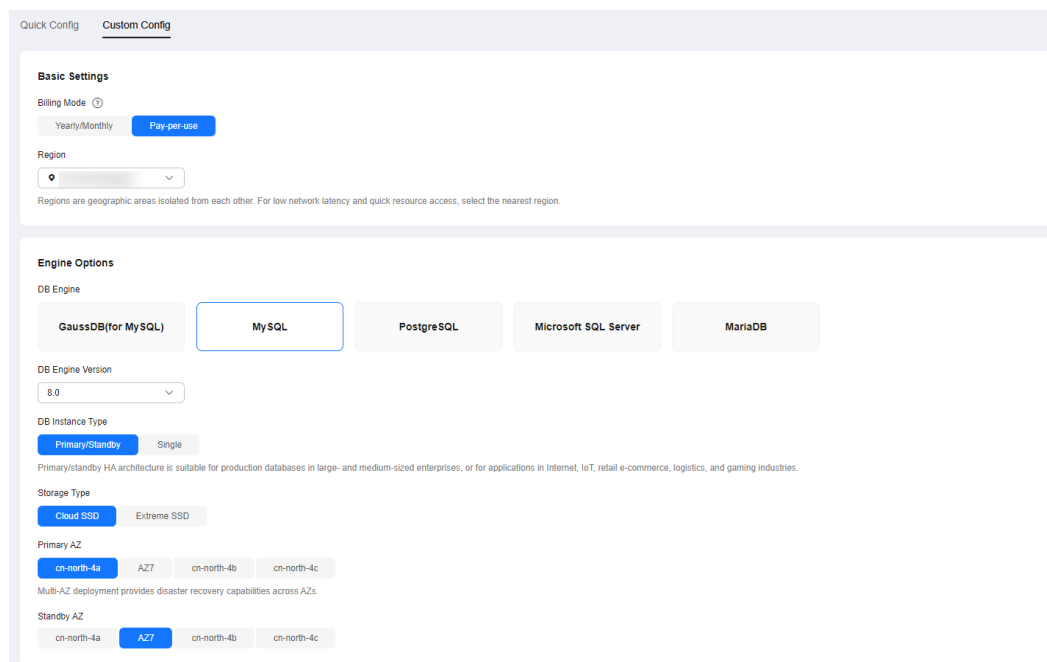
2.1.5 Creating an RDS for MySQL Instance

Create an RDS for MySQL instance, and select the VPC and security group you configured for the instance.

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

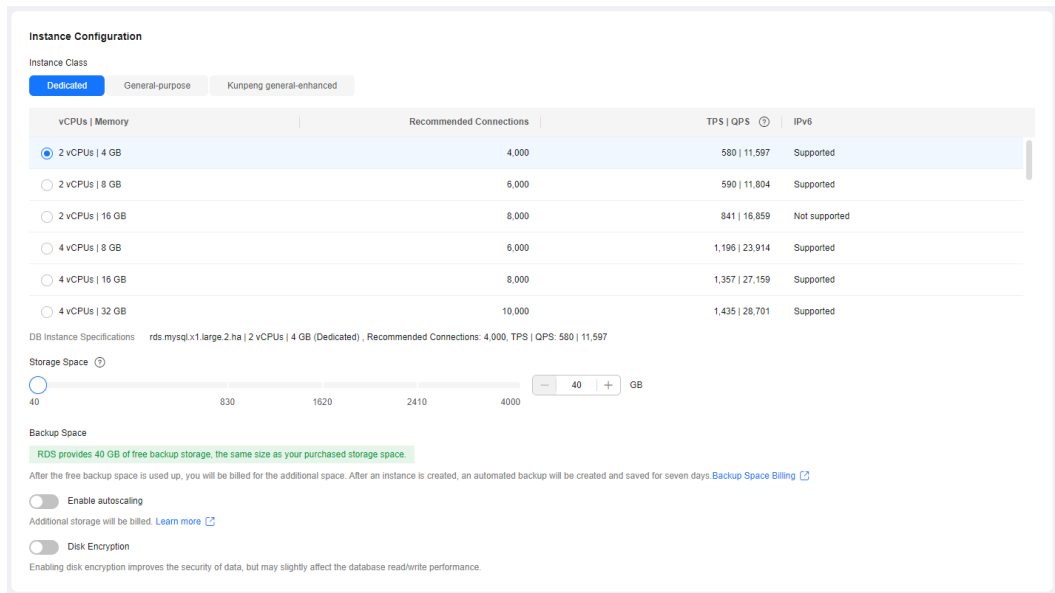
Step 2 Configure basic information for the instance. Select **CN-Hong Kong** for **Region**.

Figure 2-5 Basic information



Step 3 Select an instance class.

Figure 2-6 Instance class



Step 4 Select a VPC and security group for the instance and configure the database port. The VPC and security group have been created in [Creating a VPC and Security Group](#).

Figure 2-7 Network configurations

The screenshot displays the network configuration interface for a DB instance, divided into two main sections: Basic Settings and Connectivity.

Basic Settings

- DB Instance Name:** A text input field containing "rds-9812". A help icon is visible to the right.
- Help Text:** "If you buy multiple DB instances at a time, they will be named with four digits appended in the format "DB instance name-SN". For example, if the DB instance name is "instance", the first instance will be named "instance-0001", the second "instance-0002", and so on."
- Password:** A section with a "Skip" button (highlighted in blue) and a "Configure" button.
- Footer Note:** "To log in, you will have to reset the password later on the Basic Information page for this instance."

Connectivity

- VPC:** A dropdown menu showing "vpc-a33b". A search icon and a "Create VPC" link are to the right.
- Help Text:** "The VPC an RDS instance is deployed in cannot be changed later. ECSs in different VPCs cannot communicate with each other by default."
- Subnet:** A dropdown menu showing "subnet-a389(192.168.0.0/24)". A search icon is to the right.
- Help Text:** "IPv6 CIDR block: 2407:c080:1200:217e::/64. An EIP is required if you want to access DB instances through a public network. View EIP link."
- IPv4 Address:** A text input field with three dots, indicating an unassigned address.
- Addresses available:** "251 View In-use IP Addresses link."
- Database Port:** A text input field with "Default port: 3306".
- Security Group:** A dropdown menu showing "sg-database". A search icon and a "View Security Group" link are to the right.
- Help Text:** "Ensure that port 3306 of the security group allows traffic from your server IP address to the DB instance. Create Security Group link."
- Footer:** "Security Group Rules ^" link.

Step 5 Complete advanced settings.

Figure 2-8 Additional options

Additional Options

Enterprise Project ⓘ

default Q [Create Enterprise Project](#)

Parameter Template

Default-HighPerformance-Edition-MySQL-8.0 Q [View Parameter Template](#)

⚠ Using a high-performance template tends to result in lost data and replication exceptions after an instance recovers from a crash. There may also be out of memory (OOM) errors with small instance classes in high concurrency scenarios. For details, see the user guide. [View Details](#)

Time Zone

(UTC+08:00) Beijing, Chongqing, Hong Kong, Urumqi

Table Name ⓘ

Case sensitive **Case insensitive**

Tag

TMS's predefined tags are recommended for adding the same tag to different cloud resources. [Create predefined tags](#) Q

[+ Add Tag](#)

You can add 20 more tags.

Read Replica

Skip Create

Required Duration and Quantity

Quantity

1

You can create 50 more instances (read replicas included). [Increase Quota](#)

Step 6 Click **Next**.

Step 7 Confirm the settings.

- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.

Step 8 Return to the instance list. If the instance status becomes available, the instance has been created.

----End

2.1.6 Configuring a MySQL Instance on Another Cloud

Prerequisites

- You have purchased a MySQL instance from another cloud vendor platform.
- Your account has the migration permissions listed in [Permission Requirements](#).

Permission Requirements

Table 2-2 lists the permissions required for migrating data from a MySQL instance on another cloud to RDS for MySQL using DRS. For details about the permissions, see [Which MySQL Permissions Are Required for DRS?](#)

Table 2-2 Migration permissions

Database	Full Migration Permission	Full+Incremental Migration Permission
Source database (MySQL)	SELECT, SHOW VIEW, and EVENT	SELECT, SHOW VIEW, EVENT, LOCK TABLES, REPLICATION SLAVE, and REPLICATION CLIENT

Network Configuration

You need to enable public accessibility for the source database.

Whitelist Settings

The EIP of the DRS replication instance must be on the whitelist of the source database for the connectivity between the DRS replication instance and the source database. To obtain the EIP of the DRS replication instance, see [Step 3 in Creating a DRS Migration Task](#). This method of configuring a whitelist varies depending on the cloud database vendors. For details, see their official documents.

2.1.7 Cloud Migration

2.1.7.1 Creating a DRS Migration Task

Creating a Migration Task

Step 1 Go to the [Create Migration Task](#) page.

Step 2 Configure parameters as needed.

1. Enter the migration task name. Select the region hosting the destination DB instance for **Region**.

Figure 2-9 Migration task

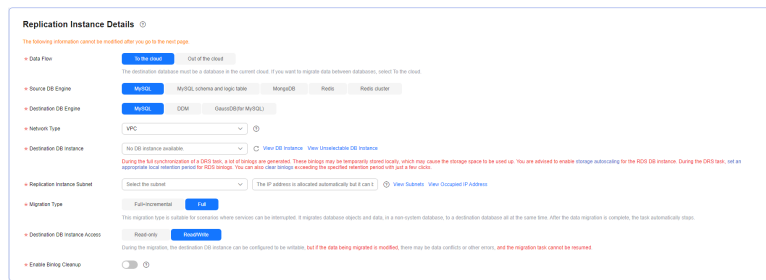
The screenshot shows a configuration form for a migration task. It includes the following fields and elements:

- Region:** A dropdown menu with a small globe icon on the left. Below it is a note: "Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region."
- Project:** A dropdown menu.
- Task Name:** A text input field containing the value "DRS-445".
- Description:** A text area for entering a description.

2. Configure the replication instance information.

Select the RDS instance created in [Creating an RDS for MySQL Instance](#) as the destination database.

Figure 2-10 Replication instance details



Step 3 Click **Create Now**.

It takes about 5 to 10 minutes to create a replication instance. After the replication instance is created, you can obtain its EIP.

✔ The replication instance is created. Its EIP is 122.9.214.142. Add this EIP to the source database whitelist so that it can access the source database.

Step 4 Configure the source and destination database information.

Figure 2-11 Configuring the source and destination databases

Source Database

DRS migrates only some key parameters to the destination database. For the other parameters that cannot be migrated, you need to use [parameter templates](#) to configure them on the destination database.

IP Address or Domain Name:

Port:

Database Username:

Database Password:

SSL Connection:

✔ Test successful

Destination Database

DB Instance Name: rds-bf16 (192.168.0.17)

Database Username:

Database Password:

Migrate Definer to User: Yes No

✔ Test successful

Step 5 Click **Next**.

Step 6 On the **Set Task** page, configure parameters as required.

- Set **Flow Control** to **No**.
- Set **Migration Object** to **All**.

Step 7 Click **Next**. On the **Check Task** page, check the migration task.

- If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.
- If all check items are successful, click **Next**.

Step 8 Compare source and destination database parameters.

- If you do not want to compare the parameters, click **Next** to skip this step.
- If there are inconsistent common parameter values, click **Save Change** to change the destination database values to match those of the source database.

Step 9 Click **Submit** to submit the task.

Return to the **Online Migration Management** page and check the migration task status.

It takes several minutes to complete.

If the status changes to **Completed**, the migration task is complete.

----End

2.1.7.2 Checking Migration Results

You can use either of the following methods to check the migration results:

1. Use DRS to compare migration objects, users, and data of source and destination databases and obtain the migration results. For details, see [Checking the Migration Results on the DRS Console](#).
2. Log in to the destination instance to check whether the databases, tables, and data are migrated. For details, see [Checking the Migration Results on the RDS Console](#).

Checking the Migration Results on the DRS Console

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner and select your region.

Step 3 Under the service list, choose **Databases > Data Replication Service**.

Step 4 Click the DRS instance name.


Step 5 Click **Migration Comparison** in the navigation pane. Under the **Object-Level Comparison** tab, click **Compare** to check whether all objects have been migrated to the destination instance.

Step 6 Click the **Data-Level Comparison** tab. On the displayed page, click **Create Comparison Task** to check whether the databases and tables of the source and destination instances are the same.

Step 7 Click **Account-Level Comparison** and check whether the accounts and permissions of the source and destination instances are the same.

----End

Checking the Migration Results on the RDS Console

- Step 1** Log in to the [management console](#).
 - Step 2** Click  in the upper left corner and select your region.
 - Step 3** Click the service list icon on the left and choose **Databases > Relational Database Service**.
 - Step 4** Locate the destination instance and click **Log In** in the **Operation** column.
 - Step 5** In the displayed dialog box, enter the password and click **Test Connection**.
 - Step 6** After the connection test is successful, click **Log In**.
 - Step 7** Check whether the databases and tables of the source instance have been migrated.
- End

Performing a Performance Test

After the migration is complete, you can perform a performance test as required.

2.2 From Other Cloud MySQL to TaurusDB

2.2.1 Overview

Description

This section includes the following content:

- Create a TaurusDB instance.
- Migrate data from MySQL on other clouds to TaurusDB.

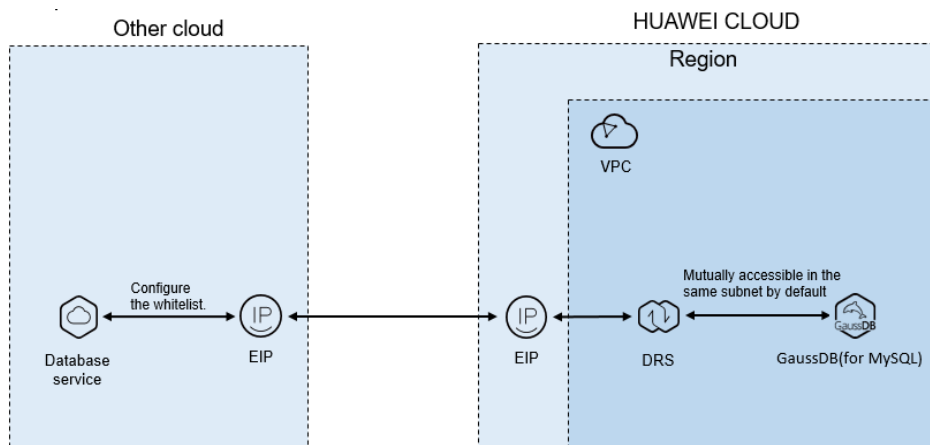
Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is greater than or equal to \$0 USD.

Deployment Architecture

In this example, the source is a MySQL database on other cloud platforms and the destination is a Huawei Cloud TaurusDB instance. Data is migrated from the source to the destination over a public network. For details about the deployment architecture, see [Figure 2-12](#).

Figure 2-12 Deployment architecture



Service List

- Virtual Private Cloud (VPC)
- TaurusDB
- Data Replication Service (DRS)

Before You Start

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- All settings in this best practice are for reference only. For more information about MySQL migration, see [From MySQL to GaussDB\(for MySQL\) Primary/Standby](#).

2.2.2 Resource Planning

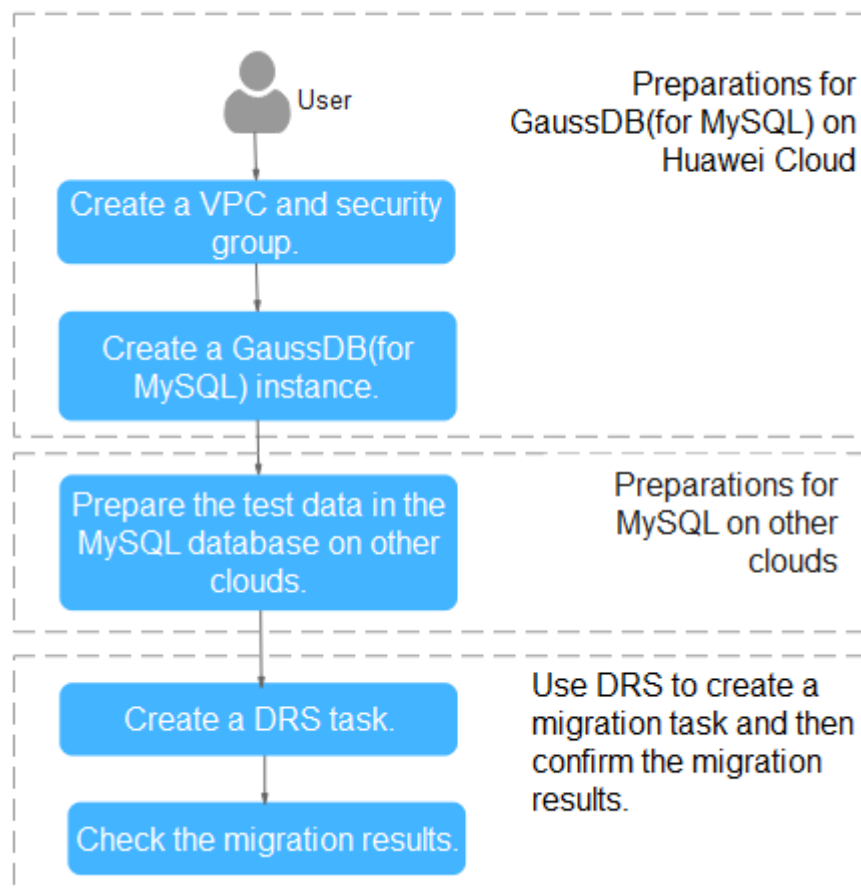
Table 2-3 Resource planning

Category	Subcategory	Plan	Description
VPC	VPC name	vpc-DRStest	Specify a name that is easy to identify.
	Region	AP-Singapore	To achieve lower network latency, select the region nearest to you.
	AZ	AZ 1	-
	Subnet	10.0.0.0/24	Select a subnet with sufficient network resources.
	Subnet name	subnet-drs01	Specify a name that is easy to identify.

Category	Subcategory	Plan	Description
Other cloud MySQL	DB engine version	MySQL 5.7	-
	IP address	10.154.217.42	Enter an IP address.
	Port	3306	-
TaurusDB instance	Instance name	gauss-drstar	Specify a name that is easy to identify.
	DB engine version	MySQL 8.0	-
	AZ type	Single AZ	In this example, a single AZ is used. To improve service reliability, select multiple AZs.
	AZ	AZ1	AZ1 is selected in this example. To improve service reliability, deploy the instance across multiple AZs.
	Instance class	Dedicated 4 vCPUs 16 GB	-
DRS migration task	Task name	DRS-test-migrate	Specify a name that is easy to identify.
	Source DB engine	MySQL	-
	Destination DB engine	TaurusDB	-
	Network type	Public network	Public network is used in this example.

2.2.3 Operation Process


Figure 2-13 Flowchart




2.2.4 Creating a VPC and Security Group

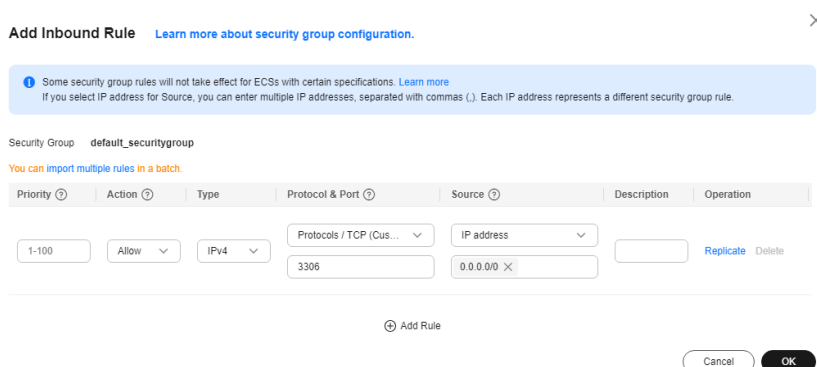
Create a VPC and security group for a TaurusDB instance.

Creating a VPC

- Step 1** Log in to the [management console](#).
 - Step 2** Click  in the upper left corner of the management console and select region AP-Singapore.
 - Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.
 - Step 4** Click **Create VPC**.
 - Step 5** Configure parameters as needed and click **Create Now**.
 - Step 6** Return to the VPC list and check whether the VPC is created.
If the VPC status becomes available, the VPC has been created.
- End

Creating a Security Group

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select region AP-Singapore.
- Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.
- Step 4** In the navigation pane, choose **Access Control > Security Groups**.
- Step 5** Click **Create Security Group**.
- Step 6** Configure parameters as needed.
- Step 7** Click **OK**.
- Step 8** Return to the security group list and click the security group name (**sg-DRS01** in this example).
- Step 9** Click the **Inbound Rules** tab, and then click **Add Rule**.
- Step 10** Configure an inbound rule to allow access from database port **3306**.



Add Inbound Rule [Learn more about security group configuration.](#) ×

! Some security group rules will not take effect for ECSs with certain specifications. [Learn more](#)
If you select IP address for Source, you can enter multiple IP addresses, separated with commas (.). Each IP address represents a different security group rule.

Security Group default_securitygroup
[You can import multiple rules in a batch.](#)

Priority	Action	Type	Protocol & Port	Source	Description	Operation
1-100	Allow	IPv4	Protocols / TCP (Cus...	IP address		Replicate Delete
			3306	0.0.0.0		


[+](#) Add Rule

[Cancel](#) [OK](#)

----End

2.2.5 Creating a TaurusDB Instance

This section describes how to create a Huawei Cloud TaurusDB instance.

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select region AP-Singapore.
- Step 3** Under the service list, choose **Databases > TaurusDB**.
- Step 4** On the **Instances** page, click **Buy DB Instance**.
- Step 5** Configure the instance name and basic information.

Basic Configuration

Billing Mode ⓘ

Yearly/Monthly **Pay-per-use** Serverless

Region ⓘ

☐ ▼

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Resource selection

DB Engine Version

TaurusDB V2.0

Kernel Version

2.0.63.250300 ▼ ⓘ

Creation Method

Create new Migrate from RDS

Edition Type ⓘ

Enterprise Standard

DB Instance Type ⓘ

Primary/Standby Single

AZ Type ⓘ

Single-AZ Multi-AZ

AZ

az2 az3 az4 az5

Storage Type ⓘ

DL6 DL5 DL4

Step 6 Configure instance specifications.

Instance Specifications **Dedicated**

Dedicated instances offer premium performance by providing dedicated CPU and memory resources for your services.

CPU Architecture **Kunpeng** ⓘ

vCPUs Memory	Maximum Connections
<input checked="" type="radio"/> 2 vCPUs 8 GB	1,000
<input type="radio"/> 4 vCPUs 16 GB	3,000
<input type="radio"/> 8 vCPUs 32 GB	6,000
<input type="radio"/> 16 vCPUs 64 GB	18,000
<input type="radio"/> 32 vCPUs 128 GB	30,000
<input type="radio"/> 48 vCPUs 192 GB	60,000

Currently selected: Dedicated Kunpeng 2 vCPUs 8 GB

Nodes ⓘ

Storage Storage will be scaled up dynamically based on how much data needs to be stored. It is billed hourly on a pay-per-use basis. ⓘ

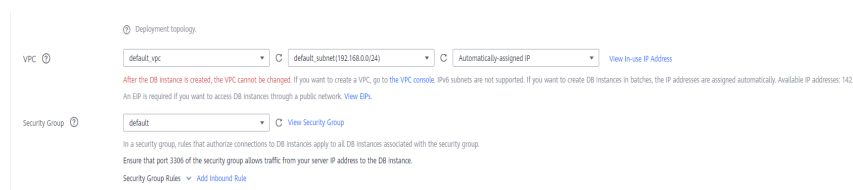
TDE **Disabled** **Enabled**

TDE can be enabled only during DB Instance creation and cannot be disabled later. Cross-region backup is unavailable for DB instances with TDE enabled.

Backup Space GaussDB(for MySQL) provides free backup storage equal to the amount of your used storage space. After the free backup space is used up, you will be billed for the additional space on a pay-per-use basis.

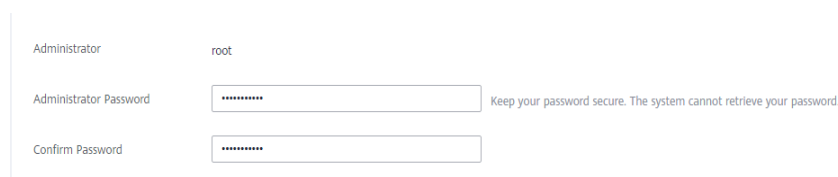
Step 7 Select a VPC and security group for the instance and configure the database port.

The VPC and security group have been created in [Creating a VPC and Security Group](#).



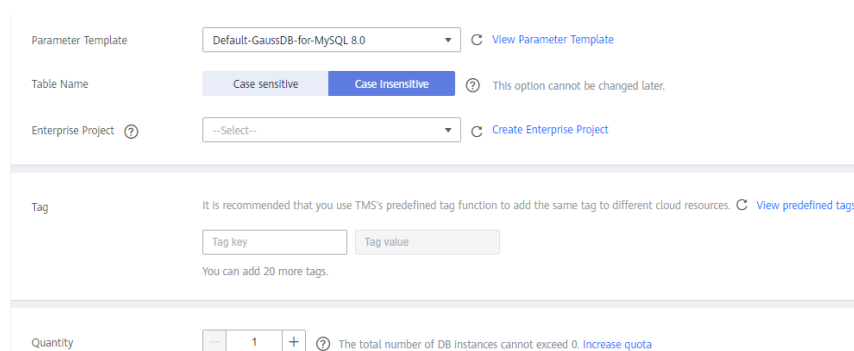
The screenshot shows a configuration page for a database instance. It includes a 'VPC' dropdown menu set to 'default_vpc', a 'Subnet' dropdown menu set to 'default_subnet(192.168.0.0/24)', and an 'IP Address' dropdown menu set to 'Automatically-assigned IP'. Below these, there is a 'Security Group' dropdown menu set to 'default'. A note states: 'After the DB instance is created, the VPC cannot be changed. If you want to create a VPC, go to the VPC console. IPv6 subnets are not supported. If you want to create DB instances in batches, the IP addresses are assigned automatically. Available IP addresses: 142. An EIP is required if you want to access DB instances through a public network. View EIPs.' There is also a 'View Security Group' link and a note about security group rules.

Step 8 Configure the instance password.



The screenshot shows a form for configuring the instance password. It includes an 'Administrator' field with the value 'root', an 'Administrator Password' field with a masked password, and a 'Confirm Password' field with a masked password. A note states: 'Keep your password secure. The system cannot retrieve your password.'

Step 9 Configure an enterprise project.



The screenshot shows a configuration page for an enterprise project. It includes a 'Parameter Template' dropdown menu set to 'Default-GaussDB-for-MySQL 8.0', a 'Table Name' dropdown menu with options 'Case sensitive' and 'Case Insensitive', and an 'Enterprise Project' dropdown menu set to '--Select--'. Below these, there is a 'Tag' section with a 'Tag key' and 'Tag value' input field, and a 'Quantity' section with a numeric input field set to '1'. A note states: 'The total number of DB instances cannot exceed 0. Increase quota'.

Step 10 Click **Next**. If you do not need to modify your settings, click **Submit**.

Step 11 Return to the instance list. If the instance becomes **Available**, the instance has been created.

----End

2.2.6 Configuring a MySQL Instance on Other Clouds

Prerequisites

- You have purchased a MySQL instance on other platforms.
- The MySQL account has the migration permissions listed in [Permission Requirements](#).

Permission Requirements

To migrate data from a MySQL database on other clouds to a TaurusDB instance, the following permissions are required.

Table 2-4 Required permissions

Database	Full Migration Permission	Full+Incremental Migration Permission
Source DB (MySQL)	SELECT, SHOW VIEW, and EVENT	SELECT, SHOW VIEW, EVENT, LOCK TABLES, REPLICATION SLAVE, and REPLICATION CLIENT

For details about MySQL authorization operations, see [operation guide](#).

Network Configuration

Enable public accessibility for the source database. The method for enabling public accessibility depends on the cloud database vendor. For details, see the official documents of the corresponding cloud database vendor.

2.2.7 Creating a DRS Migration Task


This section describes how to create a DRS instance and migrate data from a MySQL database on other clouds to a TaurusDB instance.

Pre-migration Check

Before creating a migration task, check the migration environment.

This section describes how to migrate data from a MySQL database to TaurusDB. For details, see [Before You Start](#).

Creating a Migration Task

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select region AP-Singapore.
- Step 3** Under the service list, choose **Databases > Data Replication Service**.
- Step 4** In the upper right corner, click **Create Migration Task**.
- Step 5** Configure parameters as needed.
 1. Specify a migration task name.

2. Configure replication instance details as needed.

Select the TaurusDB instance created in [Creating a TaurusDB Instance](#) as the destination database.

Figure 2-14 Replication instance information

The screenshot shows the 'Replication Instance Details' configuration page. It includes the following sections and options:

- Data Flow:** 'To the cloud' (selected) and 'Out of the cloud'.
- Source DB Engine:** 'MySQL' (selected), 'MySQL schema and logic table', 'MongoDB', 'Single-Node or Master/Standby Redis', and 'Redis cluster'.
- Destination DB Engine:** 'MySQL', 'DDM', and 'TaurusDB' (selected).
- Network Type:** 'Public network' (selected).
- Destination DB Instance:** 'No DB instance available' (selected), with links for 'View DB Instance' and 'View Unselectable DB Instance'.
- Replication Instance Subnet:** 'Select the subnet' (selected), with links for 'View Subnets' and 'View Occupied IP Address'.
- Migration Type:** 'Full+incremental' (selected) and 'Full'. A note states: 'This migration type allows you to migrate data with minimal downtime. After a full migration initializes the destination database, an incremental migration parses logs to ensure data consistency between the source and destination databases.'
- Destination DB Instance Access:** 'Read-only' (selected) and 'Read/Write'. A note states: 'During the migration, the destination DB instance becomes read-only to ensure the integrity and success of data migration. When the task is complete, the DB instance becomes readable and writable. This process takes a few minutes. This option is recommended.'
- Specify EIP:** A dropdown menu and a 'Create an EIP' link.

Step 6 Click **Create Now**.

It takes about 5 to 10 minutes to create a replication instance.

Step 7 Configure a whitelist for the source database to manage network access.

Add the EIP of the DRS replication instance to the whitelist of the source MySQL database to ensure that the source database can communicate with the DRS instance.

The method for configuring the whitelist depends on the cloud database vendor. For details, see the official documents of the corresponding cloud database vendor.

Step 8 Configure source and destination database information.

1. Configure the source database information and click **Test Connection**. If a successful test message is returned, login to the destination is successful.
2. Configure destination database information and click **Test Connection**. If a successful test message is returned, login to the destination is successful.

Step 9 Click **Next**.

Step 10 On the **Set Task** page, select migration accounts and objects.

- Select **No** for **Migrate Account**.
- Select **All** for **Migrate Object**.

Step 11 Click **Next**. On the **Check Task** page, check the migration task.

- If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.
- If all check items are successful, click **Next**.

Step 12 Click **Submit**.

Return to the **Online Migration Management** page and check the migration task status.

It takes several minutes to complete.

If the status changes to **Completed**, the migration task has been created.

 **NOTE**

- Currently, MySQL to TaurusDB migration supports two modes: full migration and full+incremental migration.
- If you create a full migration task, the task automatically stops after the full data is migrated to the destination.
- If you create a full+incremental migration task, a full migration is executed first. After the full migration is complete, an incremental migration starts.
- During the incremental migration, data is continuously migrated so the task will not automatically stop.

----End


2.2.8 Checking Migration Results

You can use either of the following methods to check the migration results:

1. DRS compares migration objects, users, and data and provide comparison results. For details, see [Checking the Migration Results on the DRS Console](#).
2. Log in to the destination side to check whether the databases, tables, and data are migrated. Confirm the data migration status. For details, see [Checking the Migration Results on the TaurusDB Console](#).

Checking the Migration Results on the DRS Console

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner of the management console and select region AP-Singapore.

Step 3 Under the service list, choose **Databases > Data Replication Service**.

Step 4 Click the DRS instance name.

Step 5 Choose **Migration Comparison** and select **Object-Level Comparison** to check whether database objects are missing.


Step 6 Click **Data-Level Comparison** and check whether the number of rows of migrated objects is consistent.

Step 7 Click **Account-Level Comparison** and check whether the accounts and permissions of the source and destination instances are the same.

----End

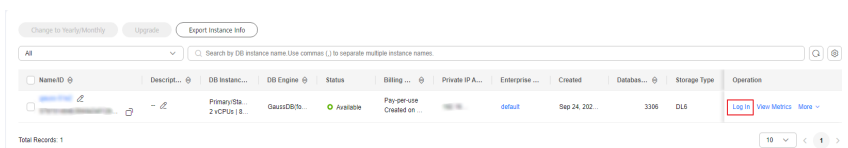
Checking the Migration Results on the TaurusDB Console

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner of the management console and select region AP-Singapore.

Step 3 Under the service list, choose **Databases > TaurusDB**.

Step 4 On the **Instances** page, locate the destination instance, and click **Log In** in the **Operation** column.



Step 5 In the dialog box that is displayed, enter the password and click **Test Connection**.

Step 6 After the connection is successful, click **Log In**.

Step 7 Check whether the destination databases and tables are the same as the source instance. Check whether migration is complete.

----End

2.3 From Other Cloud MongoDB to DDS

DRS helps you migrate MongoDB databases from other cloud platforms to DDS on the current cloud. With DRS, you can migrate databases online with zero downtime and your services and databases can remain operational during migration.

This section describes how to use DRS to migrate MongoDB databases from another cloud to DDS on the current cloud. Migration scenarios include:

- Migrating MongoDB databases from another cloud to DDS on the current cloud.
- Migrating self-built MongoDB databases from servers on another cloud to DDS on the current cloud.

Resource Planning

Table 2-5 Resource planning

Category	Subcategory	Planned Value	Description
VPC	VPC name	vpc-dds	Specify a name that is easy to identify.
	Region	AP-Singapore	To achieve lower network latency, select the region nearest to you.
	AZ	AZ1	-
	Subnet	10.0.0.0/24	Select a subnet with sufficient network resources.
	Subnet name	subnet-default	Specify a name that is easy to identify.

Category	Subcategory	Planned Value	Description
MongoDB database on other clouds	Database version	MongoDB 4.4	-
	IP address	192.168.0.1	This is only an example.
	Port	8635	This is only an example.
DDS instance	Instance name	dds-test	Specify a name that is easy to identify.
	Database version	DDS 4.4	-
	AZ type	Single-AZ	This is only an example.
	AZ	AZ1	AZ1 is selected in this example.
	Instance specifications	Enhanced II 4 vCPUs 16 GB	The specifications in the left column are selected in this example. You need to select specifications meeting your workload requirements.
DRS migration task	Task name	DRS-test-migrate	Specify a name that is easy to identify.
	Source DB engine	MongoDB	-
	Destination DB engine	DDS	-
	Network type	Public network	Public network is used in this example.

Diagram

Figure 2-15 Migrating MongoDB databases from other clouds

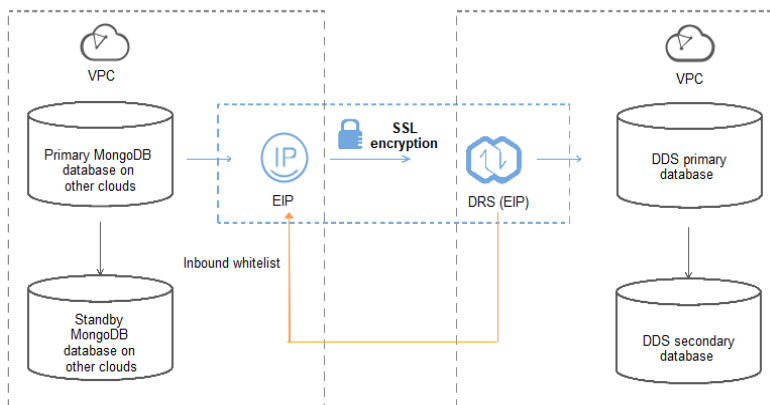
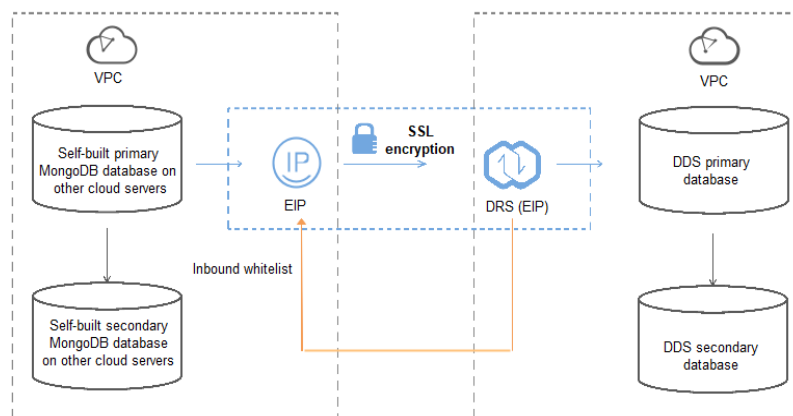
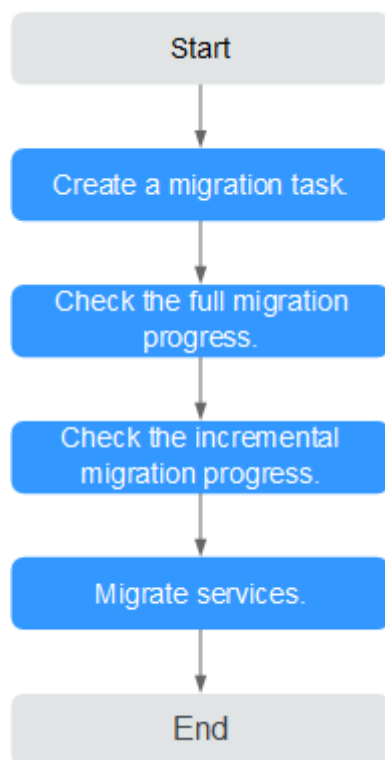


Figure 2-16 Migrating MongoDB databases from other cloud servers



Migration Process

Figure 2-17 Flowchart



Migration Suggestions (Important)

- Database migration is closely impacted by a wide range of environmental and operational factors. To ensure the migration goes smoothly, perform a test run before the actual migration to help you detect and resolve any potential issues in advance. Recommendations on how to minimize any potential impacts on your data base are provided in this section.
- It is strongly recommended that you start your migration task during off-peak hours. A less active database is easier to migrate successfully. If the data is fairly static, there is less likely to be any severe performance impacts during the migration.

Notes on Migration (Important)

NOTICE

Before creating a migration task, read the migration notes carefully.

For details, see [precautions](#) on using specific migration tasks in *Data Replication Service Real-Time Migration*.

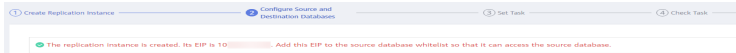
Preparations

1. Permissions

[Table 2-6](#) lists the permissions required for the source and destination databases when migrating a MongoDB database from another cloud to DDS on the current cloud.

Table 2-6 Required permissions

Database	Full Migration Permission	Full+Incremental Migration Permission
Source	<ul style="list-style-type: none"> ● Replica set: The source database user must have the read permission for the database to be migrated. ● Single node: The source database user must have the read permission for the database to be migrated. ● Cluster: The source database user must have the read permission for the databases to be migrated and the config database. ● To migrate accounts and roles of the source database, the source database user must have the read permission for the system.users and system.roles system tables of the admin database. 	<ul style="list-style-type: none"> ● Replica set: The source database user must have the read permission for the databases to be migrated and the local database. ● Single node: The source database user must have the read permission for the databases to be migrated and the local database. ● Cluster: The source mongos node user must have the readAnyDatabase permission for the databases to be migrated and the config database. The source shard node user must have the readAnyDatabase permission for the admin database and the read permission for the local database. ● To migrate accounts and roles of the source database, the source database user must have the read permission for the system.users and system.roles system tables of the admin database.
Destination	<p>The destination database user must have the dbAdminAnyDatabase permission for the admin database and the readWrite permission for the destination database. If the destination database is a cluster instance, the migration account must have the read permission for the config database.</p>	

- Source database permissions:
The source MongoDB database user must have all the required permissions listed in [Table 2-6](#). If the permissions are insufficient, create a user that has all of the permissions on the source database.
 - Destination database permissions:
If the destination database is a DDS database, the initial account can be used.
2. Network settings
- Enable public accessibility for the source database.
- Source database network settings:
Any source database MongoDB instances will need to be accessible from the Internet.
 - Destination database network settings: No settings are required.
3. Security rules
- Source database security group settings:
The replication instance needs to be able to access the source MongoDB instance. That means that the EIP of the replication instance must be on the whitelist of the source MongoDB instance.
Before configuring the network whitelist, you need to obtain the EIP of the replication instance.
 - After creating a replication instance on the DRS console, you can find the EIP on the **Configure Source and Destination Databases** page as shown in [Figure 2-18](#).
- Figure 2-18** EIP of the replication instance
- 
- The screenshot shows a progress bar with four steps: 'Create Replication Instance', 'Configure Source and Destination Databases', 'Set Task', and 'Check Task'. The second step is active. Below the progress bar, a message states: 'The replication instance is created. Its EIP is 10.0.0.0/0. Add this EIP to the source database whitelist so that it can access the source database.'
- You can also add 0.0.0.0/0 to the source database whitelist to allow any IP address to access the source database but this action may result in security risks.
- If you do take this step, then once the migration is complete, you should delete this item from the whitelist or your system will be insecure.
- Destination database security group settings:
By default, the destination database and the DRS replication instance are in the same VPC and can communicate with each other. No further configuration is required.
4. Other
- You need to export the user information of the MongoDB database first and manually add it to the destination DDS DB instance because the user information will not be migrated.

Migration Procedure

Step 1 Create a migration task.

1. Log in to the management console and choose **Databases > Data Replication Service** to go to the DRS console.
2. On the **Online Migration Management** page, click **Create Migration Task**.
3. On the **Replication Instance Information** page, configure the task details, description, and replication instance details and click **Next**.

Figure 2-19 Replication instance information

Replication Instance Details ⓘ

The following information cannot be modified after you go to the next page.

- Data Flow:** To the cloud (selected) / Out of the cloud
- Source DB Engine:** MySQL / MySQL schema and logic table / MongoDB
- Destination DB Engine:** GaussDB(for Mongo) / EBS
- Network Type:** Public network ⓘ
- I understand that an EIP will be automatically bound to the replication instance and released after the replication task is complete.
- Destination DB Instance:** ddb ⓘ View DB Instance View Unselectable DB Instance
- Replication Instance Subnet:** vpc ⓘ View Subnets
- Migration Type:** Full-Incremental (selected) / Full
- Source DB Instance Type:** Non-cluster / Cluster
- Obtain Incremental Data:** log (selected) / changeStream
- Source Shard Quantity:** - 2 +
- Destination DB Instance Access:** Read-only (selected) / Read/Write

Configuring the destination DB instance as read-only helps ensure the migration is successful. Once the migration is complete, the DB instance automatically changes to Read/Write.

Table 2-7 Task settings

Parameter	Description
Region	The region where the replication instance is deployed. You can change the region. To reduce latency and improve access speed, select the region closest to your workloads.
Project	The project corresponds to the current region and can be changed.
Task Name	The task name consists of 4 to 50 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).
Description	The description consists of a maximum of 256 characters and cannot contain the following special characters: =<>&'\"

Table 2-8 Replication instance settings

Parameter	Description
Data Flow	To the cloud

Parameter	Description
Source DB Engine	Select MongoDB .
Destination DB Engine	Select DDS .
Network Type	Select Public network .
Destination DB Instance	The DDS DB instance you purchased.
Replication Instance Subnet	<p>The subnet where the replication instance resides. You can also click View Subnet to go to the network console to view the subnet where the instance resides.</p> <p>By default, the DRS instance and the destination DB instance are in the same subnet. You need to select the subnet where the DRS instance resides, and there are available IP addresses for the subnet. To ensure that the replication instance is successfully created, only subnets with DHCP enabled are displayed.</p>
Migration Type	<ul style="list-style-type: none">- Full This migration type is suitable for scenarios where service interruption is acceptable. All objects in non-system databases are migrated to the destination database at one time. The objects include collections and indexes.- Full+Incremental The full+incremental migration type allows you to migrate data without interrupting services. After a full migration initializes the destination database, an incremental migration parses logs to ensure data consistency between the source and destination databases.
Source DB Instance Type	<p>If you select Full+Incremental for Migration Type, set this parameter based on the source database.</p> <ul style="list-style-type: none">- If the source database is a cluster instance, set this parameter to Cluster.- If the source database is a replica set or a single node instance, set this parameter to Non-cluster.

Parameter	Description
Obtain Incremental Data	<p>This parameter is available for configuration if Source DB Instance Type is set to Cluster. You can determine how to capture data changes during the incremental synchronization.</p> <ul style="list-style-type: none"> - oplog: For MongoDB 3.2 or later, DRS directly connects to each shard of the source DB instance to extract data. If you select this mode, you must disable the balancer of the source instance. When testing the connection, you need to enter the connection information of each shard node of the source instance. - changeStream: This method is recommended. For MongoDB 4.0 and later, DRS connects to mongos nodes of the source instance to extract data. If you select this method, you must enable the WiredTiger storage engine of the source instance. <p>NOTE Only whitelisted users can use changeStream. To use this function, submit a service ticket. In the upper right corner of the management console, choose Service Tickets > Create Service Ticket to submit a service ticket.</p>
Source Shard Quantity	<p>If Source DB Instance Type is set to Cluster and Obtain Incremental Data is set to oplog, enter the number of source shard nodes.</p> <p>The default minimum number of source DB instances is 2 and the maximum number is 32. You can set this parameter based on the number of source database shards.</p>

4. On the **Configure Source and Destination Databases** page, wait until the replication instance is created. Then, specify source and destination database information and click **Test Connection** for both the source and destination databases to check whether they have been connected to the replication instance. After the connection tests are successful, select the check box before the agreement and click **Next**.

Figure 2-20 Source database information

The screenshot shows the 'Source Database' configuration interface. It contains the following elements:

- mongos Address**: A text input field with a help icon and a red warning message: "Ensure that the entered addresses belong to the same DB instance."
- Authentication Database**: A text input field.
- mongos Username**: A text input field.
- mongos Password**: A password input field with masked characters.
- SSL Connection**: A toggle switch currently turned off.
- Sharded Database**: A table with four columns: "IP Address or Domain Name", "Authentication Database", "Username", and "Password". It contains two rows of input fields.
- Test Connection**: A button with a green checkmark and the text "test successful".

Table 2-9 Source database settings

Parameter	Description
mongos Address	<p>IP address or domain name of the source database in the IP address/Domain name:Port format. The port of the source database. Range: 1 - 65534</p> <p>You can enter a maximum of three groups of IP addresses or domain names of the source database. Separate multiple values with commas (.). For example: 192.168.0.1:8080,192.168.0.2:8080. Ensure that the entered IP addresses or domain names belong to the same sharded cluster.</p> <p>NOTE If multiple IP addresses or domain names are entered, the test connection is successful as long as one IP address or domain name is accessible. Therefore, you must ensure that the IP address or domain name is correct.</p>
Authentication Database	The name of the authentication database. For example: The default authentication database of Huawei Cloud DDS instance is admin .
mongos Username	A username for the source database.
mongos Password	The password for the source database username.
SSL Connection	SSL encrypts the connections between the source and destination databases. If SSL is enabled, upload the SSL CA root certificate.
Sharded Database	Enter the information about the sharded databases in the source database.

- Destination database configuration

Figure 2-21 Destination database information

Destination Database

DB Instance Name ddi-shard-ops-ls

Database Username

Database Password

Table 2-10 Destination database settings

Parameter	Description
DB Instance Name	The DB instance you selected when creating the migration task and cannot be changed.
Database Username	The username for accessing the destination database.
Database Password	The password for the database username.

5. On the **Set Task** page, select migration objects and click **Next**.

Figure 2-22 Migration object

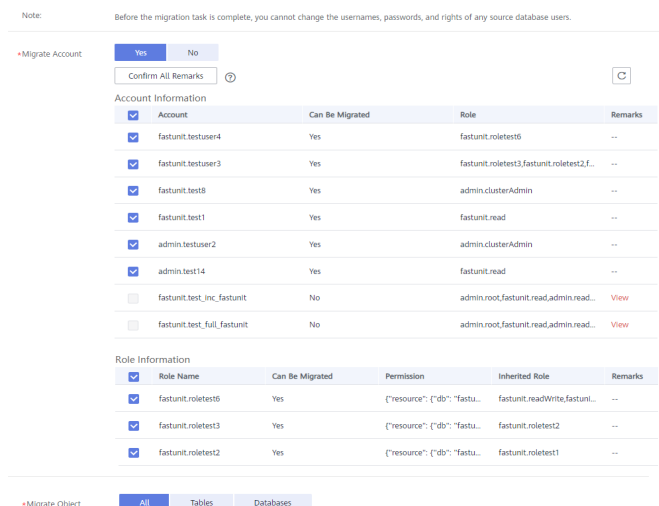



Table 2-11 Migration object

Parameter	Description
Migrate Account	<p>There are accounts that can be migrated completely and accounts that cannot be migrated. You can choose whether to migrate the accounts. Accounts that cannot be migrated or accounts that are not selected will not exist in the destination database. Ensure that your services will not be affected by these accounts.</p> <ul style="list-style-type: none"> - Yes If you choose to migrate accounts, see Migrating Accounts in <i>Data Replication Service User Guide</i> to migrate database users and roles. - No During the migration, accounts and roles are not migrated.

Parameter	Description
Migrate Object	<p>You can choose to migrate all objects, tables, or databases based on your service requirements.</p> <ul style="list-style-type: none">- All: All objects in the source database are migrated to the destination database. After the migration, the object names will remain the same as those in the source database and cannot be modified.- Tables: The selected table-level objects will be migrated.- Databases: The selected database-level objects will be migrated. <p>If the source database is changed, click  in the upper right corner before selecting migration objects to ensure that the objects to be selected are from the changed source database.</p> <p>NOTE</p> <ul style="list-style-type: none">- If you choose not to migrate all of the databases, the migration may fail because the objects, such as stored procedures and views, in the database to be migrated may have dependencies on other objects that are not migrated. To ensure a successful migration, you are advised to migrate all of the databases.- When you select an object, the spaces before and after the object name are not displayed. If there are two or more consecutive spaces in the middle of the object name, only one space is displayed.- The search function can help you quickly select the required database objects.

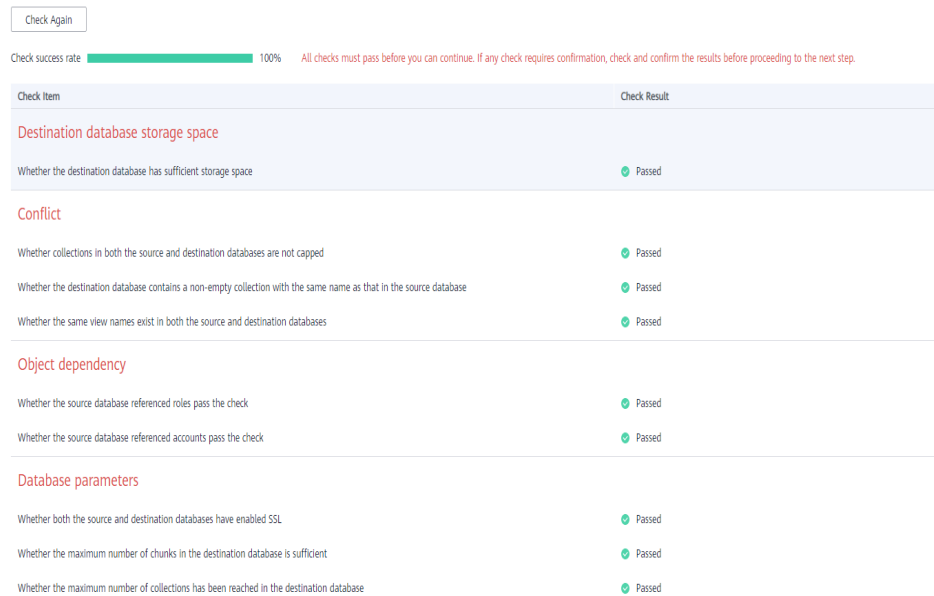
6. On the **Check Task** page, check the migration task.

- If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.

For details about how to handle check failures, see [Checking Whether the Source Database Is Connected](#) in *Data Replication Service User Guide*.

- If all check items are successful, click **Next**.

Figure 2-23 Task Check



NOTE

You can proceed to the next step only when all check items are successful. If any alarms are generated, view and confirm the alarm details first before proceeding to the next step.

- On the displayed page, specify **Start Time**, **Send Notification**, **SMN Topic**, **Synchronization Delay Threshold**, and **Stop Abnormal Tasks After** and confirm that the configured information is correct and click **Submit** to submit the task.

Figure 2-24 Task startup settings

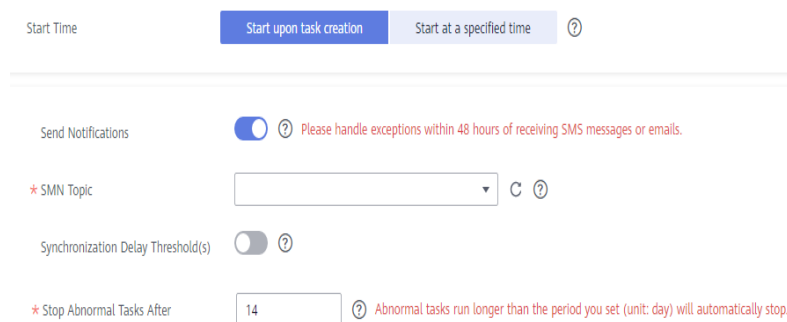


Table 2-12 Task startup settings

Parameter	Description
Start Time	<p>Set Start Time to Start upon task creation or Start at a specified time based on site requirements. The Start at a specified time option is recommended.</p> <p>NOTE The migration task may affect the performance of the source and destination databases. You are advised to start the task in off-peak hours and reserve two to three days for data verification.</p>
Send Notifications	SMN topic. This parameter is optional. If an exception occurs during migration, the system will send a notification to the specified recipients.
SMN Topic	<p>This parameter is available only after you enable Send Notification and create a topic on the SMN console and add a subscriber.</p> <p>For details, see Simple Message Notification User Guide.</p>
Synchronization Delay Threshold	<p>During an incremental migration, a synchronization delay indicates a time difference (in seconds) of synchronization between the source and destination database.</p> <p>If the synchronization delay exceeds the threshold you specify, DRS will send alarms to the specified recipients. The value ranges from 0 to 3,600. To avoid repeated alarms caused by the fluctuation of delay, an alarm is sent only after the delay has exceeded the threshold for six minutes.</p> <p>NOTE</p> <ul style="list-style-type: none">- In the early stages of an incremental migration, there is more delay because more data is waiting to be synchronized. In this situation, no notifications will be sent.- Before setting the delay threshold, enable Send Notification.- If the delay threshold is set to 0, no notifications will be sent to the recipient.
Stop Abnormal Tasks After	<p>Number of days after which an abnormal task is automatically stopped. The value must range from 14 to 100. The default value is 14.</p> <p>NOTE Tasks in the abnormal state are still charged. If tasks remain in the abnormal state for a long time, they cannot be resumed. Abnormal tasks run longer than the period you set (unit: day) will automatically stop to avoid unnecessary fees.</p>

8. After the task is submitted, go back to the **Online Migration Management** page to view the task status.

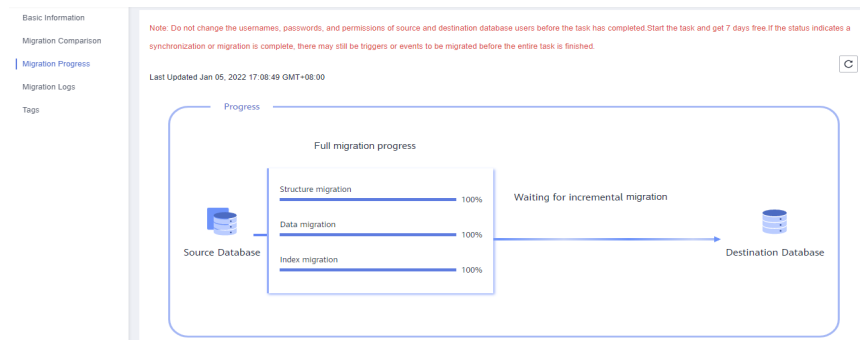
Step 2 Manage the migration task.

The migration task contains two phases: full migration and incremental migration. You can manage them in different phases.

- Full migration

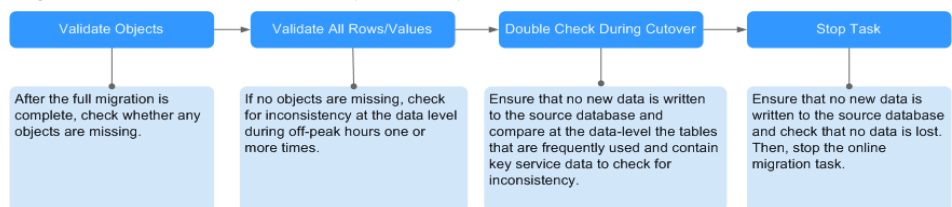
- Viewing the migration progress: Click the target full migration task, and on the **Migration Progress** tab, you can see the migration progress of the structure, data, indexes, and migration objects. When the progress reaches 100%, the migration is complete.
- Viewing migration details: In the migration details, you can view the migration progress of a specific object. If the number of objects is the same as that of migrated objects, the migration is complete. You can view the migration progress of each object in detail. Currently, this function is available only to whitelisted users. You can submit a service ticket to apply for this function.
- Incremental Migration Permission
 - Viewing the synchronization delay: After the full migration is complete, an incremental migration starts. On the **Online Migration Management** page, click the target migration task. On the displayed page, click **Migration Progress** to view the synchronization delay of the incremental migration. If the synchronization delay is 0s, the destination database is being synchronized with the source database in real time. You can also view the data consistency on the **Migration Comparison** tab.

Figure 2-25 Viewing the synchronization delay



- Viewing the migration results: On the **Online Migration Management** page, click the target migration task. On the displayed page, click **Migration Comparison** and perform a migration comparison in accordance with the comparison process, which should help you determine an appropriate time for migration to minimize service downtime.

Figure 2-26 Database comparison process



For details, see [Comparing Migration Items](#) in *Data Replication Service User Guide*.

Step 3 Cut over services.

You are advised to start the cutover process during off-peak hours. At least one complete data comparison is performed during off-peak hours. To obtain accurate

comparison results, start data comparison at a specified time point during off-peak hours. If it is needed, select **Start at a specified time** for **Comparison Time**. Due to slight time difference and continuous operations on data, inconsistent comparison results may be generated, reducing the reliability and validity of the results.

1. Interrupt services first. If the workload is not heavy, you may not need to interrupt the services.
2. Run the following statement on the source database and check whether any new sessions execute SQL statements within the next 1 to 5 minutes. If there are no new statements executed, the service has been stopped.

```
db.currentOp()
```

NOTE

The process list queried by the preceding statement includes the connection of the DRS replication instance. If no additional session executes SQL statements, the service has been stopped.

3. On the **Migration Progress** page, view the synchronization delay. When the delay is displayed as 0s and remains stable for a period, then you can perform a data-level comparison between the source and destination databases. For details about the time required, refer to the results of the previous comparison.
 - If there is enough time, compare all objects.
 - If there is not enough time, use the data-level comparison to compare the tables that are frequently used and that contain key business data or inconsistent data.
4. Determine an appropriate time to cut the services over to the destination database. After services are restored and available, the migration is complete.

Step 4 Stop or delete the migration task.

1. Stopping the migration task. After databases and services are migrated to the destination database, to prevent operations on the source database from being synchronized to the destination database to overwrite data, you can stop the migration task. This operation only deletes the replication instance, and the migration task is still displayed in the task list. You can view or delete the task. DRS will not charge for this task after you stop it.
2. Delete the migration task. After the migration task is complete, you can delete it. After the migration task is deleted, it will no longer be displayed in the task list.

----End

2.4 From ECS-hosted MySQL to RDS for MySQL

2.4.1 Overview

Scenarios

This chapter includes the following content:

- How to migrate data from self-managed MySQL databases to RDS for MySQL instances

RDS for MySQL Advantages

- **More Services at Lower Costs**
You pay for only RDS instances. There is no hardware or management investment needed.
- **Ultimate User Experience**
 - Fully compatible with MySQL
 - Excellent performance for high concurrency
 - Support for a great number of connections and quicker response
- **High Security**
 - End-to-end database security, including network isolation, access control, transmission encryption, storage encryption, and anti-DDoS
 - Highest-level certification by the NIST-CSF, with 108 key security capabilities
- **High Reliability**
Multiple deployment and DR solutions, including data backup, data restoration, dual-host hot standby, remote DR, and intra-city DR

Service List

- Virtual Private Cloud (VPC)
- Elastic Cloud Server (ECS)
- RDS
- Data Replication Service (DRS)

Notes on Usage

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- All settings in this best practice are for reference only. For more information about MySQL migration, see [From MySQL to MySQL](#).

Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is greater than or equal to \$0 USD.

2.4.2 Resource Planning

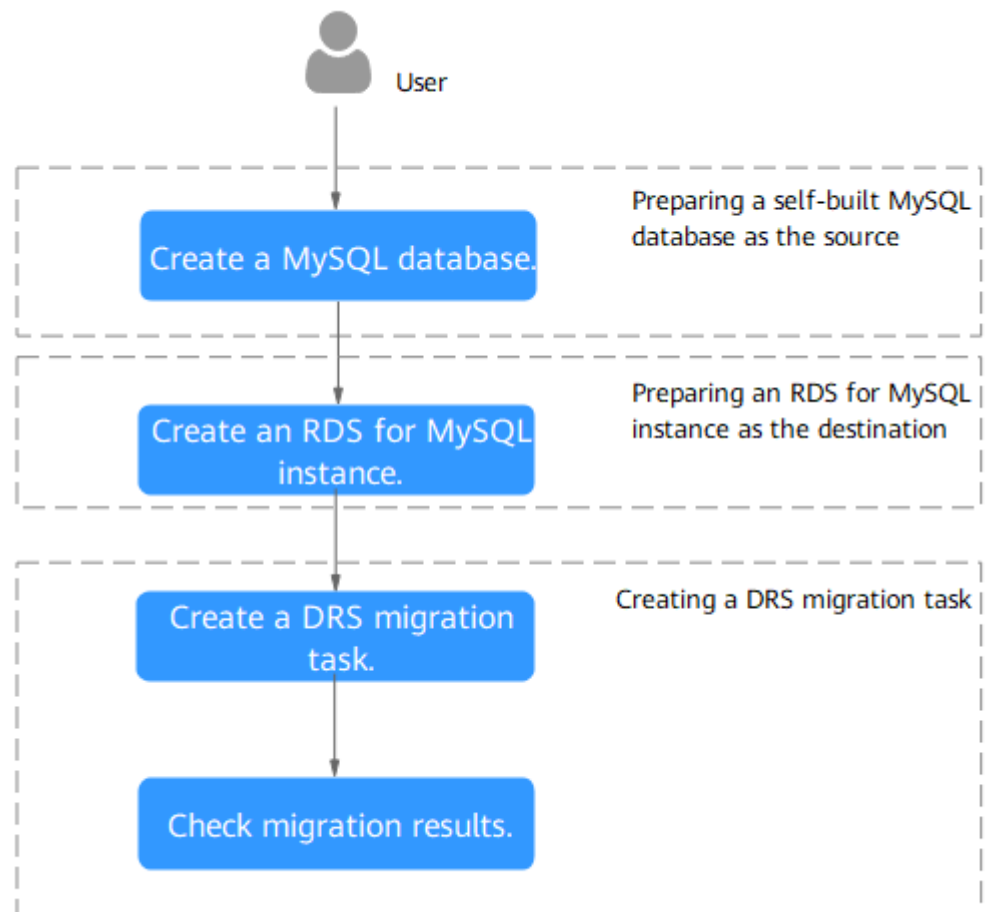
Table 2-13 Resource planning description

Category	Subcategory	Planned Value	Remarks
RDS	RDS instance name	rds-mysql	Customize a name for easy identification.
	DB engine version	MySQL 5.7	-
	Instance type	Single	In this practice, select a single instance. To improve service reliability, selecting a primary/standby instance is recommended.
	Storage type	Cloud SSD	-
	AZ	AZ3	In this practice, select a single instance. To improve service reliability, create a primary/standby instance and then deploy them in two different AZs.
	Specifications	General-purpose 4 vCPUs 8 GB	-
DRS migration task	Task name	DRS-mysql	Custom
	Source DB engine	MySQL	In this practice, the source is a MySQL database built on an ECS.
	Destination DB engine	MySQL	In this practice, the destination is an RDS for MySQL instance.
	Network type	VPC	In this practice, select the VPC network.

2.4.3 Operation Process

The following figure shows the process of creating a MySQL database on an ECS, buying an RDS for MySQL instance, and migrating data from the MySQL database to the RDS instance.

Figure 2-27 Flowchart



2.4.4 Cloud Migration

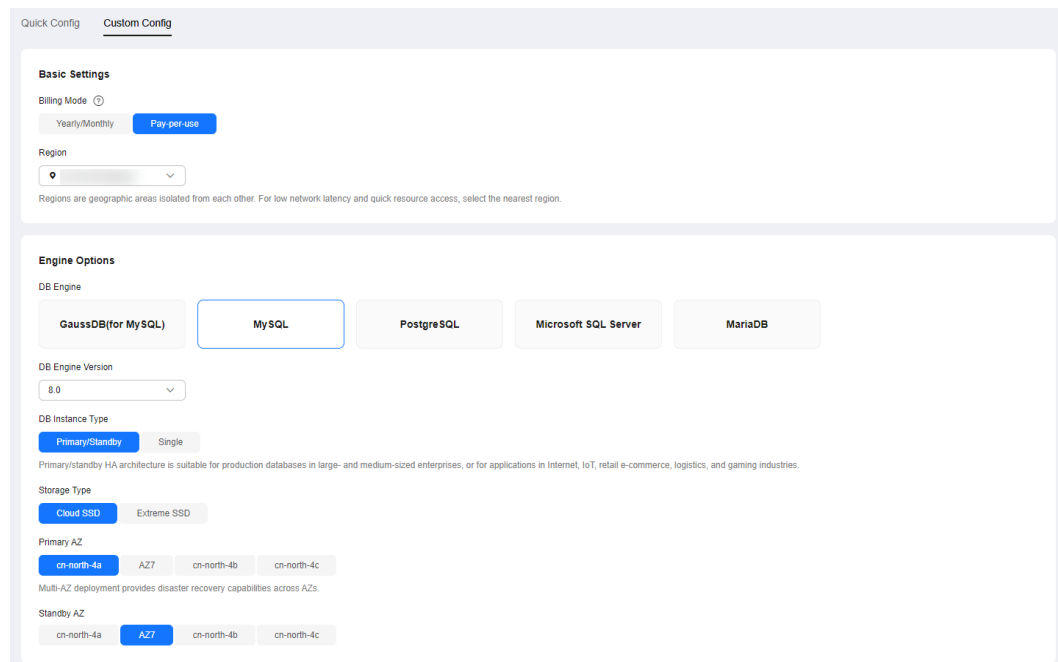
2.4.4.1 Creating an RDS for MySQL Instance

Create an RDS for MySQL instance that is in the same VPC and security group as the self-managed MySQL database.

Step 1 Go to the [Buy DB Instance](#) page.

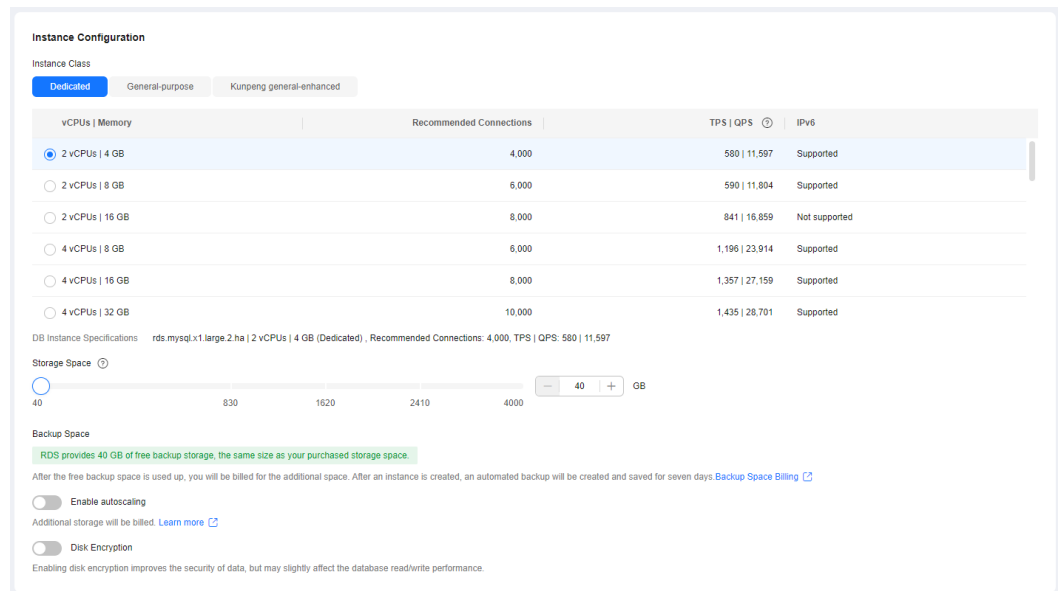
Step 2 Configure basic information for the instance. Select **CN-Hong Kong** for **Region**.

Figure 2-28 Basic information



Step 3 Select an instance class and retain the default values for other parameters.

Figure 2-29 Instance class



Step 4 Click **Next**.

Step 5 Confirm the settings.

- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.

Step 6 Return to the instance list.

If the instance status becomes available, the instance has been created.

----End

2.4.4.2 Creating a Migration Task

This topic describes how to create a DRS migration task to migrate the **loadtest** database from the self-managed MySQL server to an RDS for MySQL instance.

Pre-migration Check

Before creating a migration task, check the migration environment to ensure smooth migration.

This example describes how to migrate data from a self-managed MySQL database to an RDS for MySQL instance. For more information, see [From MySQL to MySQL](#).

Procedure

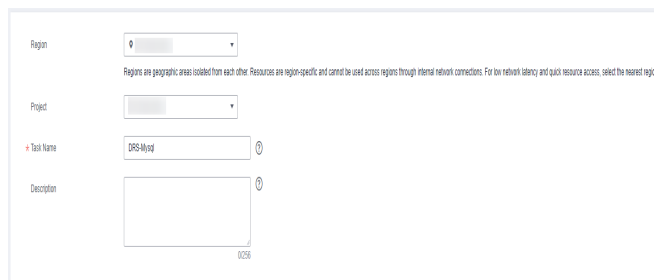
Migrate the **loadtest** database from a self-managed MySQL server to an RDS for MySQL instance.

Step 1 Go to the [Create Migration Task](#) page.

Step 2 Configure parameters as needed.

1. Specify a migration task name. Select **CN-Hong Kong** for **Region**.

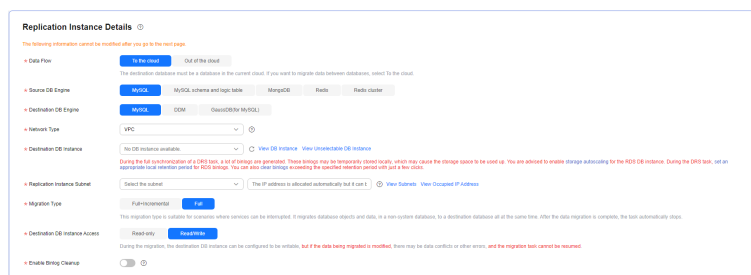
Figure 2-30 Migration task



2. Configure replication instance information.

Select the instance created in [Creating an RDS for MySQL Instance](#) as the destination instance.

Figure 2-31 Replication instance details



3. Select **default** for **Enterprise Project**.

Step 3 Click **Create Now**.

It takes about 5 to 10 minutes to create a replication task.

Step 4 Configure task information and click **Next**.

1. Configure source database information.
2. Click **Test Connection**.

If a successful test message is returned, login to the source is successful.

Figure 2-32 Source database settings

Source Database

Select Connection

DRS migrates only some key parameters to the destination database. For the other parameters that cannot be migrated, you need to use parameter templates to configure them on the destination database.

Database Type self-built database ROS DB instance

DB Instance Name [View DB Instance](#) [View Unselectable DB Instance](#)

Database Username

Database Password

SSL Connection

Test successful

3. Specify a username and password for the destination database.
 4. Click **Test Connection**.
- If a successful test message is returned, login to the destination is successful.

Figure 2-33 Destination database settings

Destination Database

DB Instance Name

Database Username

Database Password

Migrate Definer to User Yes No

SSL Connection

Test successful

Step 5 On the **Set Task** page, select the accounts and objects to be migrated, and click **Next**.

Select **All** for **Migration Object**.

Step 6 On the **Check Task** page, check the migration task.

If the check is complete and the check success rate is 100%, click **Next**.

- Step 7** On the **Compare Parameters** page, click **Next** in the lower right corner to skip the comparison.
- Step 8** On the **Confirm Task** page, specify **Start Time**, **Send Notifications**, **SMN Topic**, **Delay Threshold (s)**, and **Stop Abnormal Tasks After**, confirm that the configured information is correct, and click **Submit** to submit the task.
- Step 9** After the task is submitted, view and manage it on the **Online Migration Management** page.

----End

2.4.4.3 Confirming Migration Results

You can check migration results with either of the following methods:

Automatic: [Viewing Migration Results on the DRS Console](#). DRS automatically compares migration objects, users, and data of source and destination databases and provides migration results.

Manual: [Viewing Migration Results on the RDS Console](#). You can log in to the destination instance to check whether the databases, tables, and data are migrated.

Viewing Migration Results on the DRS Console


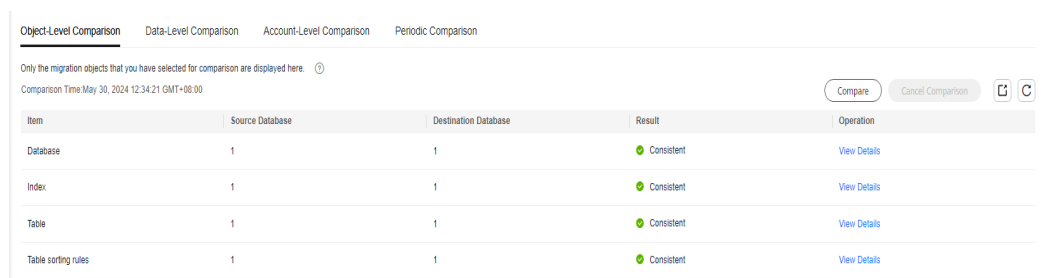
- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner and select **CN-Hong Kong**.
- Step 3** Click the service list icon on the left and choose **Databases > Data Replication Service**.
- Step 4** Locate the required DRS instance and click its name.
- Step 5** Click **Migration Comparison**.

Figure 2-34 Migration comparison




Item	Source Database	Destination Database	Result	Operation
Database	1	1	Consistent	View Details
Index	1	1	Consistent	View Details
Table	1	1	Consistent	View Details
Table sorting rules	1	1	Consistent	View Details

- Step 6** Select **Compare Data - Validate All Rows/Values** and **Compare Data -Double Check During Cutover** to check whether the objects of the source database have been migrated to the destination database.

If any check fails, rectify the fault by referring to [Solutions to Failed Check Items](#).

----End

Viewing Migration Results on the RDS Console

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner and select **CN-Hong Kong**.
- Step 3** Click the service list icon on the left and choose **Databases > Relational Database Service**.
- Step 4** Locate the required RDS instance and click **Log In** in the **Operation** column.
- Step 5** In the displayed dialog box, enter the password and click **Test Connection**.
- Step 6** After the connection test is successful, click **Log In**.
- Step 7** Check and confirm the destination database name and table name. Check whether the data migration is complete.

----End

2.5 From ECS-hosted MySQL to TaurusDB

2.5.1 Overview

This practice describes how to install a MySQL database (community edition) on a Huawei Cloud ECS and create a TaurusDB instance, and use DRS to migrate data from MySQL to TaurusDB. With DRS, you can perform real-time migration tasks with minimal downtime.

Scenarios

- With the rapid increase of enterprise workloads, traditional databases have poor scalability and require distributed reconstruction.
- Building traditional databases requires purchasing and installing servers, systems, databases, and other software. Its O&M is expensive and difficult.
- Traditional databases are poor in complex queries.
- It is hard for traditional databases to smoothly migrate data with no downtime.

Prerequisites

- You have created Huawei ID and completed real-name authentication.
- Your account balance is at least \$0 USD.

Solution Architecture

In this practice, the source database is a ECS-hosted MySQL instance and the destination database is a TaurusDB instance. [Figure 2-35](#) shows the deployment architecture when the ECS-hosted MySQL and TaurusDB instances are in the same VPC.

If the ECS-hosted MySQL and TaurusDB instances are not in the same VPC, you need to configure a **VPC peering connection** between the two VPCs. For details about the deployment architecture, see **Figure 2-36**.

Figure 2-35 Deployment architecture in the same VPC

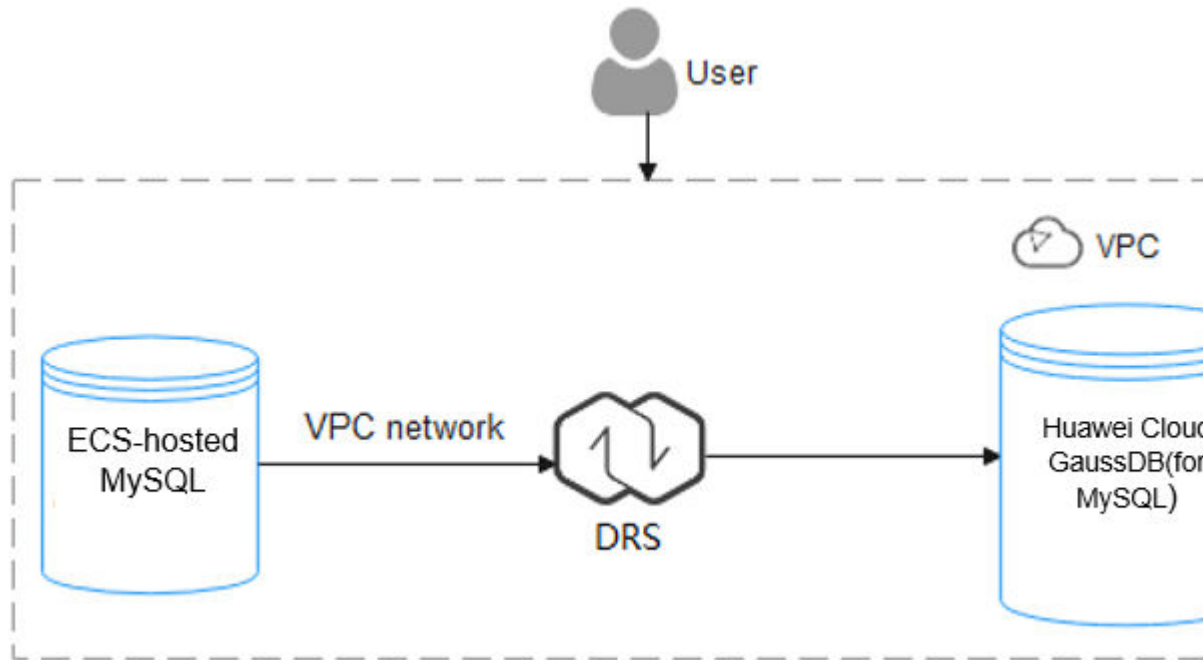
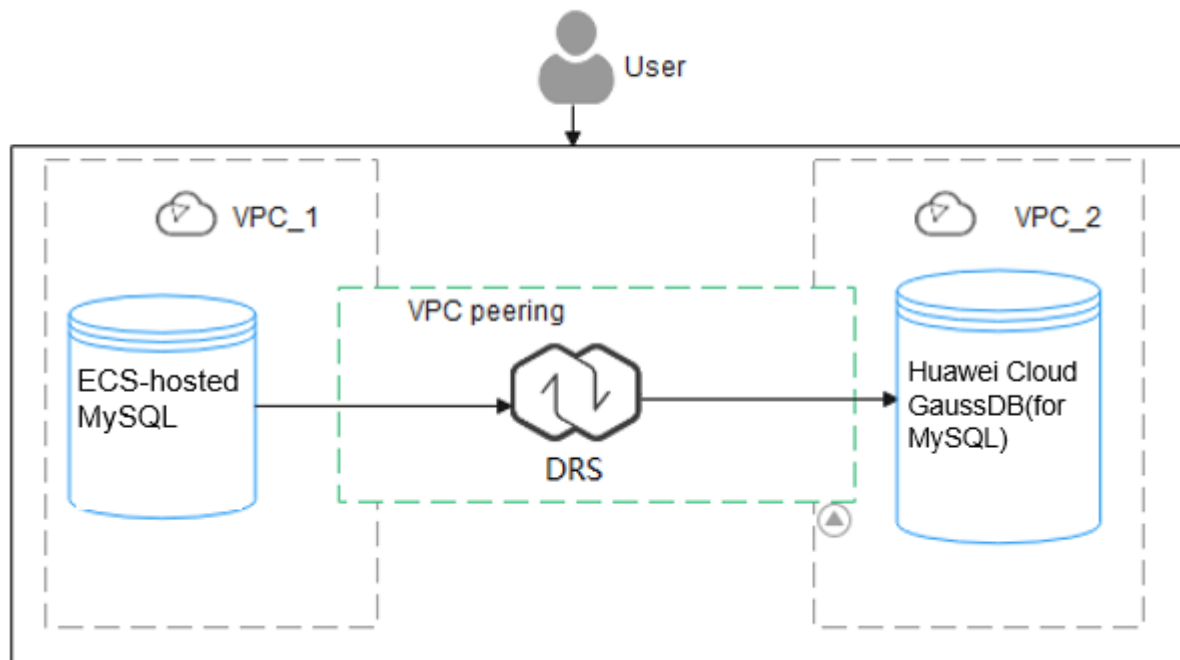


Figure 2-36 Deployment architecture in different VPCs



TaurusDB Advantages

- Robust performance: GaussDB(for MySQL) decouples storage and compute and uses a "log as database" architecture and remote direct memory access (RDMA). It can deliver seven times the performance of open-source MySQL for certain service loads.
- Elastic scaling: In addition to a primary node, you can add up to 15 read replicas for a DB instance within minutes. You can also scale up or down CPU and memory specifications for a DB instance as needed.
- High reliability: DB instances can be deployed across AZs and there are three data copies under the shared distributed storage layer. A DB instance failover can be complete within seconds with a zero RPO.
- High security: With shared distributed storage, GaussDB(for MySQL) ensures zero data loss and service recovery within seconds. VPCs, security groups, SSL connections, and data encryption are used to strictly control secure access.
- High compatibility: GaussDB(for MySQL) is fully compatible with MySQL. You can easily migrate your MySQL databases to GaussDB(for MySQL) without reconstructing existing applications.
- Mass storage: Based on Huawei-developed data functions virtualization (DFV) distributed storage, GaussDB(for MySQL) supports up to 128 TB of storage.

Service List

- Virtual Private Cloud (VPC)
- Elastic Cloud Server (ECS)
- TaurusDB
- Data Replication Service (DRS)

Notes on Usage

The resources and test data in this practice are for demonstration only. Adjust them as needed.

For more information about TaurusDB data migration, see [From MySQL to TaurusDB](#).

2.5.2 Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is greater than or equal to \$0 USD.

2.5.3 Resource Planning

Table 2-14 Resource planning

Category	Subcategory	Planned Value	Remarks
VPC	VPC name	vpc-mysql	Customize a name for easy identification.

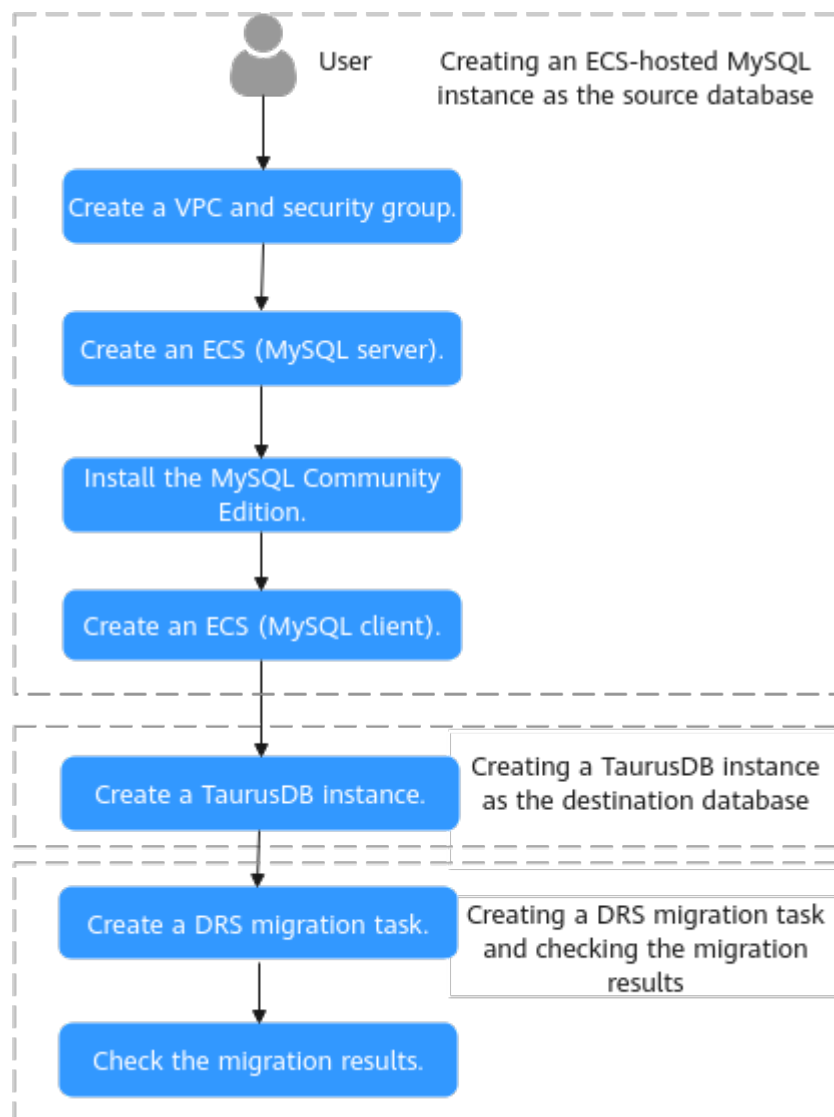
Category	Subcategory	Planned Value	Remarks
	Region	AP-Singapore	For low network latency and quick resource access, select the region nearest to you.
	AZ	AZ3	-
	Subnet	10.0.0.0/24	Select a subnet with sufficient network resources.
	Subnet name	subnet-mysql	Customize a name for easy identification.
ECS (MySQL server)	ECS name	ecs-mysql	Customize a name for easy identification.
	Specifications	s6.xlarge.2 4 vCPUs 8 GiB	Select specification based on service requirements. For details, see x86 ECS Specifications and Types
	OS	CentOS 7.6 64	-
	System disk	General purpose SSD 40 GiB	-
	Data disk	Ultra-high I/O, 100 GiB	-
	EIP	Auto assign	Buy an EIP because the public network is selected for the migration task.
ECS (MySQL client)	ECS name	ecs-client	Customize a name for easy identification.
	Specifications	s6.xlarge.2 4 vCPUs 8 GiB	Select specification based on service requirements. For details, see x86 ECS Specifications and Types .
	OS	CentOS 7.6 64	-
	System disk	General purpose SSD 40 GiB	-
	Data disk	Not required	-
	EIP	Auto assign	Buy an EIP as needed. If you do not need to access the client through a public network, you do not buy an EIP.
TaurusDB	Instance name	gauss-mysql	Customize a name for easy identification.
	DB engine	TaurusDB	-
	DB engine version	MySQL 8.0	-
	AZ type	Single-AZ	-

Category	Subcategory	Planned Value	Remarks
	AZ	AZ6	-
	Instance specifications	Dedicated Edition	-
	CPU architecture	x86 8 vCPUs 32 GB	-
DRS migration task	Task name	DRS-TaurusDB	Customize a name for easy identification.
	Source DB engine	MySQL	In this example, take a MySQL instance (community edition) installed on an ECS as the source database.
	Destination DB engine	TaurusDB	In this example, take a TaurusDB instance as the destination database.
	Network type	Public	In this example, select the public network.

2.5.4 Operation Guide

Figure 2-37 shows the process of creating a MySQL server, buying a TaurusDB instance, and migrating data from the MySQL server to the TaurusDB instance.

Figure 2-37 Flowchart



2.5.5 Procedure


2.5.5.1 ECS-hosted MySQL Server


2.5.5.1.1 Creating a VPC and Security Group

This section describes how to create a VPC and security group for your MySQL server and TaurusDB instance.

Creating a VPC

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner of the management console and select **AP-Singapore**.

Step 3 Click  in the upper left corner of the page and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

Step 4 On the displayed page, click **Create VPC** in the upper right corner.

Step 5 Configure required parameters.

Basic Information

Region:

Name:

IPv4 CIDR Block: /

Recommended: [10.0.0.0/8-24](#) | [172.16.0.0/12-24](#) | [192.168.0.0/16-24](#)

To enable communications between VPCs or between a VPC and an on-premises data center, ensure their CIDR blocks do not overlap. [Learn more about network planning](#)

Enterprise Project: [Create Enterprise Project](#)

Advanced Settings (Optional)

Tag: Description:

Subnet Setting1

Subnet Name:

AZ:

IPv4 CIDR Block: / Available IP Addresses: 251

The CIDR block cannot be modified after the subnet is created. Before creating a subnet, [plan subnet CIDR blocks](#) as required.

IPv6 CIDR Block (Optional) Enable

Associated Route Table:

Advanced Settings (Optional)

Domain Name: NTP Server Address: ...

Step 6 Click **Create Now**.


Step 7 Return to the VPC list and check whether the VPC is created.


If the VPC status becomes available, the VPC has been created.

----End

Creating a Security Group

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner of the management console and select **AP-Singapore**.

Step 3 Click  in the upper left corner of the page and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

Step 4 In the navigation pane on the left, choose **Access Control > Security Groups**.

Step 5 Click **Create Security Group** in the upper right corner of the page.

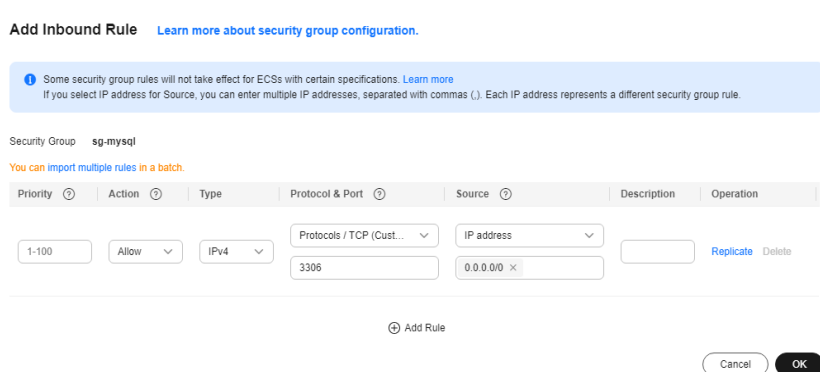
Step 6 In the displayed dialog box, configure parameters as needed.

Step 7 Click **OK**.

Step 8 Return to the security group list, locate the security group **sg-mysql**, and click its name.

Step 9 Click the **Inbound Rules** tab, and then click **Add Rule**.

Step 10 Configure an inbound rule to allow access from database port **3306**.



Add Inbound Rule [Learn more about security group configuration.](#)

! Some security group rules will not take effect for ECSs with certain specifications. [Learn more](#)
If you select IP address for Source, you can enter multiple IP addresses, separated with commas (,). Each IP address represents a different security group rule.

Security Group **sg-mysql**
You can import multiple rules in a batch.

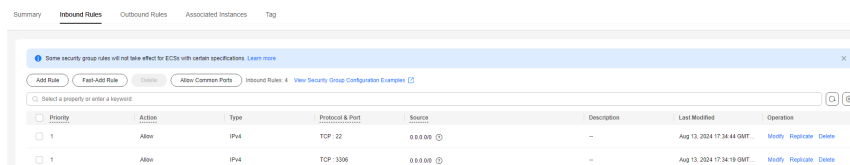
Priority	Action	Type	Protocol & Port	Source	Description	Operation
1-100	Allow	IPv4	Protocols / TCP (Cust... 3306	IP address 0.0.0.0/0		Replicate Delete

[+](#) Add Rule

Cancel **OK**

Step 11 Perform [Step 9](#) to [Step 10](#) to allow access from database port **22**.

After the rules were configured, the figure similar to the following is displayed.




Priority	Action	Type	Protocol & Port	Source	Description	Last Modified	Operation
1	Allow	IPv4	TCP / 22	0.0.0.0/0		Aug 13, 2024 17:36:44 GMT...	Modify Replicate Delete
1	Allow	IPv4	TCP / 3306	0.0.0.0/0		Aug 13, 2024 17:34:19 GMT...	Modify Replicate Delete


----End

2.5.5.1.2 Creating an ECS (MySQL Server)

This section describes how to buy an ECS for installing a MySQL database (community edition).

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner of the management console and select **AP-Singapore**.

Step 3 Click  in the upper left corner of the page and choose **Compute > Elastic Cloud Server**.

Step 4 Click **Buy ECS**.

Step 5 Configure ECS parameters.

1. Set **Specifications** to **General computing** and select **s6.xlarge.2** with 4 vCPUs and 8 GiB.

ECS Type	Flavor Name	vCPUs	Memory	CPU	Asksred / Maximum Bandwidth	Packets Per Second	IPv6
General computing s6	s6.large.1	2 vCPUs	4 GiB	Intel Cascade Lake 2.6...	0.2 / 1.5 Gbit/s	150,000 PPS	Yes
General computing s6	s6.large.2	2 vCPUs	4 GiB	Intel Cascade Lake 2.6...	0.2 / 1.5 Gbit/s	150,000 PPS	Yes
General computing s6	s6.large.4	2 vCPUs	8 GiB	Intel Cascade Lake 2.6...	0.2 / 1.5 Gbit/s	150,000 PPS	Yes
General computing s6	s6.xlarge.2	4 vCPUs	8 GiB	Intel Cascade Lake 2.6...	0.35 / 2 Gbit/s	250,000 PPS	Yes
General computing s6	s6.xlarge.4	4 vCPUs	16 GiB	Intel Cascade Lake 2.6...	0.35 / 2 Gbit/s	250,000 PPS	Yes
General computing s6	s6.2xlarge.2	8 vCPUs	16 GiB	Intel Cascade Lake 2.6...	0.75 / 3 Gbit/s	500,000 PPS	Yes
General computing s6	s6.2xlarge.4	8 vCPUs	32 GiB	Intel Cascade Lake 2.6...	0.75 / 3 Gbit/s	500,000 PPS	Yes

2. Select the image and disk specifications.

OS

Image: Public image, Private image, Shared image, KooGallery image

Operating Systems: Huawei Cloud EulerOS, CentOS, SUSE, Ubuntu, EulerOS, Debian, OpenSUSE, Fedora, AlmaLinux, Rocky Linux, CentOS Stream, CoreOS, openEuler, SUSE SAP, Windows, Other

CentOS 7.6 64bit (19 GiB)

CentOS 7 reached End of Life on June 30, 2024. Select an alternative solution.

Host protection (HPS)

HPS provides you with a range of security functions, such as risk prevention, intrusion detection, advanced protection, security operations, and web page tampering.

Basic Edition	Basic	Professional	Enterprise	Premium	Web Tamper Protection (WTP)
Basic protection, such as weak password and vulnerability detection	Basic protection, such as weak password and vulnerability detection	Virus and Trojan scan as well as one-click vulnerability remediation	Vulnerability patches, virus scan and removal	Enterprise edition functions + Patchless protection	Premium edition functions + Website tamper protection
One-month free trial	Savings for a yearly package	Savings for a yearly package	Savings for a yearly package	Savings for a yearly package	Savings for a yearly package

Storage & Backup

System Disk

Disk Type: General Purpose SSD, System Disk (GiB): 40

IOPS limit: 2,280, IOPS burst limit: 8,000 [Advanced Options](#)

Data Disk

Disk Type: Ultra-high I/O, Data Disk (GiB): 100, Quantity: 1

IOPS limit: 6,800, IOPS burst limit: 16,000 [Advanced Options](#)

Warning: Yearly/monthly data disks cannot be renewed separately. Data disks must be initialized before they can be used. [Learn how to initialize disks](#)

Add Data Disk

You can attach 22 more disks.


Enable backup

CBR backups can help you restore data in case anything happens to your ECSs. To ensure data security, you are advised to use CBR.

Step 6 Click **Next: Configure Network**.

1. Select the VPC and security group created in [Creating a VPC and Security Group](#).

Network

VPC 


[Create VPC](#)

Primary NIC


[Available private IP addresses: 220](#)

[Add Extension NIC](#)

NICs you can still add: 1


Source/Destination Check 

Security Group

Security Group 


[Create Security Group](#)

Ensure that the selected security group allows access to port 22 (SSH-based Linux login), 3389 (Windows login), and ICMP (ping operation). [Configure Security Group Rules](#)


Security Group Rules 

2. Set **EIP** to **Auto assign**, **Billed by** to **Traffic**, and **Bandwidth Size** to **20**. The bandwidth size can be changed as required.

Public Network Access


EIP 

Auto assign Use existing Not required

EIP Type 

Dynamic BGP Static BGP

Greater than or equal to 99.95% service availability rate

Billed By 

Bandwidth
 For heavy/stable traffic


Traffic
 For light/sharply fluctuating traffic

Shared bandwidth
 For staggered peak hours

Billed based on total traffic irrespective of usage duration; configurable maximum bandwidth size.

Bandwidth Size

5 10 **20** 50 100 Enter an integer from 1 to 300.

Anti-DDoS protection  **Free**

Release Option

Release with ECS

If you select this option, the EIP will be released when the ECS is deleted.

Step 7 Click **Next: Configure Advanced Settings**.
Specify **ECS Name** and **Password**.

Instance Management

ECS Name
 Allow duplicate name

When you purchase multiple ECSs, they are named based on [automatic](#) or [custom](#) naming rules. ?

Login Mode ?

Password Key pair

Keep the password secure. If you forget the password, you can log in to the ECS console and change it.

Username Password Confirm Password

Enterprise Project ?

Tag ?

TMS's predefined tags are recommended for adding the same tag to different cloud resources. [Create predefined tags](#)

[+ Add Tag](#)

You can add 10 more tags.

Step 8 Click **Next: Confirm**.

Step 9 Select an enterprise project, select the **Agreement** option, and click **Submit**.

Step 10 Return to the ECS list page and view the creation progress.

When the ECS status changes to **Running**, the ECS has been created.


----End


2.5.5.1.3 Installing a MySQL Database (Community Edition)

This section describes how to initialize disks and install a MySQL database (community edition).

Log In to the ECS

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner of the management console and select **AP-Singapore**.

Step 3 Click  in the upper left corner of the page and choose **Compute > Elastic Cloud Server**.

Step 4 Locate the ECS **ecs-mysql** and click **Remote Login** in the **Operation** column.

Step 5 Select **CloudShell-based Login**.

Step 6 Enter the password of user **root**.

NOTE

The password is the one you specified during the ECS creation.

----End

Initializing Disks

Step 1 Create the **mysql** folder.

```
mkdir /mysql
```

Step 2 View data disk information.

```
fdisk -l
```

The command output is as follows.

```
[root@ecs-mysql ~]# fdisk -l

Disk /dev/vda: 42.9 GB, 42949672960 bytes, 83886080 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x000e3a31

   Device Boot      Start         End      Blocks   Id  System
 /dev/vda1    *          2048     83886079     41942016   83   Linux

Disk /dev/vdb: 107.4 GB, 107374182400 bytes, 209715200 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

Step 3 Initialize the data disk.

```
mkfs.ext4 /dev/vdb
```

Step 4 Attach the disk.

```
mount /dev/vdb /mysql
```

Step 5 Check whether the disk has been attached.

```
df -h
```

If the following output is returned, the disk has been attached.

```
[root@ecs-mysql ~]# df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        3.9G   0  3.9G   0% /dev
tmpfs           3.9G   0  3.9G   0% /dev/shm
tmpfs           3.9G  8.6M  3.9G   1% /run
tmpfs           3.9G   0  3.9G   0% /sys/fs/cgroup
/dev/vda1       40G  2.2G  36G   6% /
tmpfs           783M   0  783M   0% /run/user/0
/dev/vdb        99G  61M  94G   1% /mysql
```

Step 6 Create a folder and switch to the **install** folder.

```
mkdir -p /mysql/install/data
mkdir -p /mysql/install/tmp
mkdir -p /mysql/install/file
mkdir -p /mysql/install/log
cd /mysql/install
```

Step 7 Download and install [the MySQL client](#).

Step 8 Initialize the MySQL client.

```
/mysql/install/mysql-8.0.22/bin/mysqld --defaults-file= /etc/my.cnf --
initialize-insecure
```

Step 9 Start the MySQL client.

```
nohup /mysql/install/mysql-8.0.22/bin/mysqld --defaults-file= /etc/my.cnf &
```

Step 10 Connect to the MySQL client.

```
/mysql/install/mysql-8.0.22/bin/mysql
```

Step 11 Create user **root** and assign the required permissions to it.

```
grant all privileges on *.* to 'root'@'%' identified by 'xxx' with grant
option;FLUSH PRIVILEGES;

----End
```

2.5.5.1.4 Creating an ECS and Installing a MySQL Client on It

Step 1 Create an ECS for installing a MySQL client by referring to [Creating an ECS \(MySQL Server\)](#).

 NOTE


- This ECS must be in the same region, AZ, VPC, and security group as the ECS where the MySQL server is deployed.
- Data disks are not required.
- This ECS name is **ecs-client**.
- Other parameters are the same as those of the ECS where the MySQL server is deployed.


Step 2 Download and install the MySQL client. For details, see [How Can I Install the MySQL Client?](#)

----End

2.5.5.1.5 Testing the ECS-hosted MySQL Performance

Step 1 Log in to the [management console](#).

Step 2 Click  in the upper left corner of the management console and select **AP-Singapore**.

- Step 3** Click  in the upper left corner of the page and choose **Compute > Elastic Cloud Server**.
- Step 4** In the ECS list, locate the ECS **ecs-client** and click **Remote Login** in the **Operation** column.
- Step 5** On the displayed page, click **CloudShell**.
- Step 6** Enter the password you specify during the ECS **ecs-client** creation.
- Step 7** Download sysbench.
- ```
wget -c https://github.com/akopytov/sysbench/archive/1.0.18.zip
```
- Step 8** Install sysbench.
- ```
unzip 1.0.18.zip
cd sysbench-1.0.18
./autogen.sh
./configure
make
make install
```
- Step 9** Log in to the MySQL database and create test database **sbtest**.
- ```
mysql -u root -P 3306 -h <host> -p -e "create database sbtest"
```
- Step 10** Import test background data to the **sbtest** database.
- ```
sysbench --db-driver=mysql --mysql-host=<host> --mysql-port=<port> --mysql-user=<user> --mysql-password=<password> --mysql-db=sbtest --table_size=250000 --tables=25 --events=0 --time=600 oltp_read_write prepare
```
- Step 11** Perform a pressure test.
- ```
sysbench --db-driver=mysql --mysql-host=<host> --mysql-port=<port> --mysql-user=<user> --mysql-password=<password> --mysql-db=sbtest --table_size=250000 --tables=25 --events=0 --time=600 --threads=<thread_num> --percentile=95 --report-interval=1 oltp_read_write run
```

---

**NOTICE**

Delete databases and tables to release storage space only after they are migrated using DRS.

```
sysbench --db-driver=mysql --mysql-host=<host> --mysql-port=<port> --mysql-user=<user> --mysql-password=<password> --mysql-db=sbtest --table_size=250000 --tables=25 --events=0 --time=600 oltp_read_write cleanup
```

---

----End


## 2.5.5.2 Cloud Migration


This chapter describes how to create a TaurusDB instance, create a DRS migration task, and migrate data from the ECS-hosted MySQL server to the TaurusDB instance.

### 2.5.5.2.1 Creating a TaurusDB Instance

This section describes how to create a TaurusDB instance that is in the same VPC and security group as the ECS-hosted MySQL server.

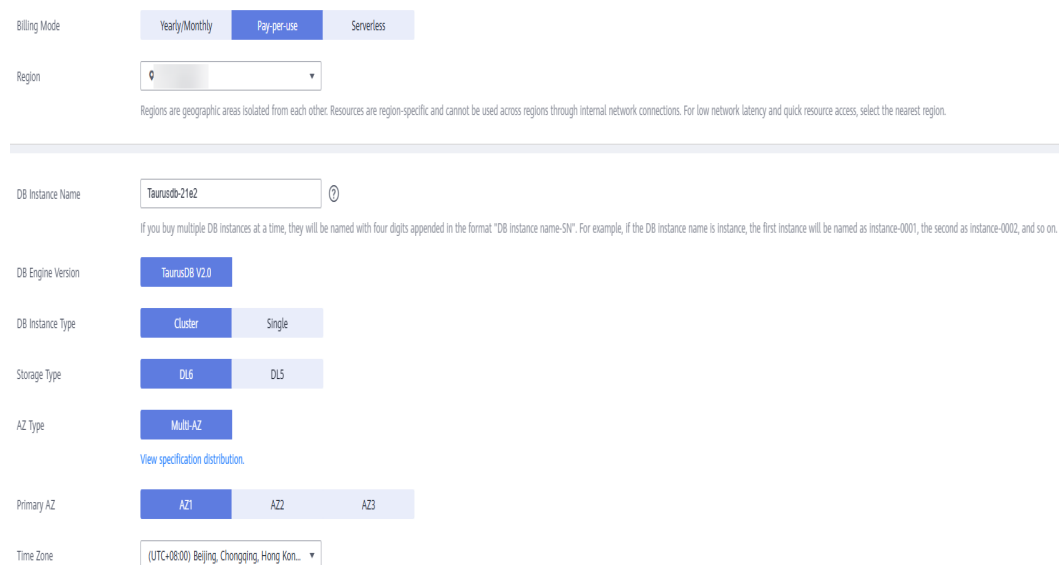
**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select **AP-Singapore**.

**Step 3** Click  in the upper left corner of the page and choose **Databases > TaurusDB**.

**Step 4** In the upper right corner, click **Buy DB Instance**.

**Step 5** Configure the instance name and basic information.



Billing Mode:  Yearly/Monthly  Pay-per-use  Serverless

Region:

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

---

DB Instance Name:

If you buy multiple DB instances at a time, they will be named with four digits appended in the format "DB instance name-SN". For example, if the DB instance name is instance, the first instance will be named as instance-0001, the second as instance-0002, and so on.

DB Engine Version:

DB Instance Type:  Cluster  Single

Storage Type:  DL6  DL5

AZ Type:  Multi-AZ

[View specification distribution.](#)

Primary AZ:  AZ1  AZ2  AZ3

Time Zone:

**Step 6** Configure instance specifications.



Instance Specifications:  Dedicated

Dedicated: The instance offers premium performance by providing dedicated CPU and memory resources for your services.

CPU Architecture:  x86  Kunpeng

| vCPUs   Memory                                   | Maximum Connections |
|--------------------------------------------------|---------------------|
| <input type="radio"/> 2 vCPUs   8 GB             | 2,500               |
| <input type="radio"/> 2 vCPUs   16 GB            | 5,000               |
| <input type="radio"/> 4 vCPUs   16 GB            | 5,000               |
| <input type="radio"/> 4 vCPUs   32 GB            | 10,000              |
| <input checked="" type="radio"/> 8 vCPUs   32 GB | 10,000              |
| <input type="radio"/> 8 vCPUs   64 GB            | 10,000              |

Currently selected: Dedicated x86 8 vCPUs 32 GB

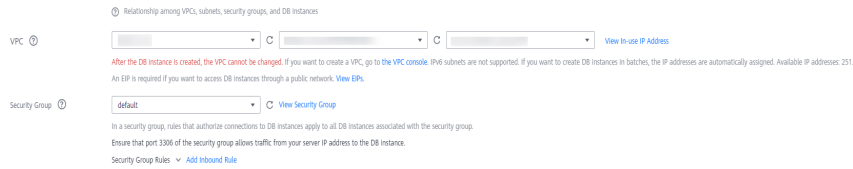
Nodes:

Storage: Storage will be scaled up dynamically based on the amount of data that needs to be stored, and is billed hourly on a pay-per-use basis.

Backup Space: GaussDB(for MySQL) provides free backup storage equal to the amount of your used storage space. After the free backup space is used up, you will be billed for the additional space on a pay-per-use basis.

**Step 7** Select the VPC and security group.

The VPC and security group have been created in [Creating a VPC and Security Group](#).



**Step 8** Configure the instance password.

Administrator

Administrator Password  Keep your password secure. The system cannot retrieve your password.

Confirm Password

**Step 9** Configure an enterprise project.

Parameter Template  [View Parameter Template](#)

Table Name   This option cannot be changed later.

Enterprise Project  [Create Enterprise Project](#)

---

Tag It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. [View predefined tags](#)

You can add 20 more tags.

---

Quantity  The total number of DB instances cannot exceed 4999. [Increase quota](#)

**Step 10** Click **Next**.

**Step 11** After confirming the settings, click **Submit**.

**Step 12** Return to the instance list.


If the instance status becomes **Available**, the instance has been created.


----End

### 2.5.5.2.2 Creating a DRS Migration Task

This section describes how to create a DRS migration task to migrate the **sbtest** database from the ECS-hosted MySQL server to the TaurusDB instance.

**Step 1** Log in to the [management console](#).

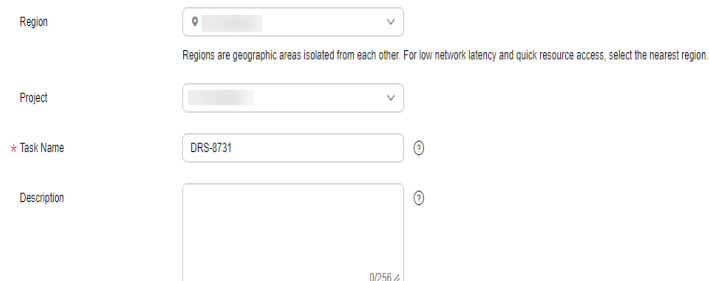
**Step 2** Click  in the upper left corner of the management console and select **AP-Singapore**.

**Step 3** Click  in the upper left corner of the page and choose **Databases > Data Replication Service**.

**Step 4** In the upper right corner, click **Create Migration Task**.

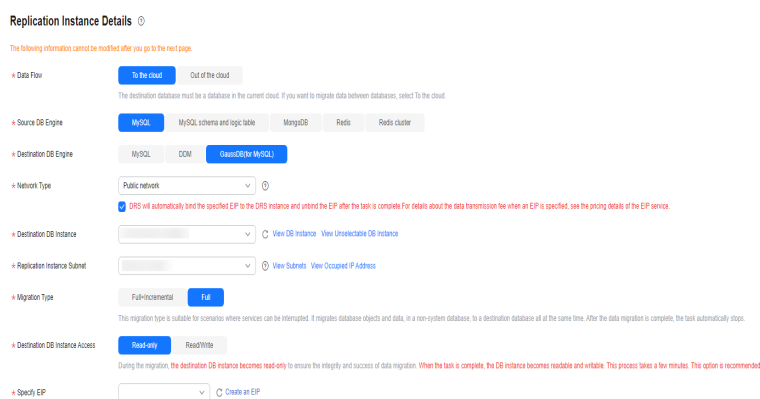
**Step 5** Configure parameters as needed.

1. Specify a task name.

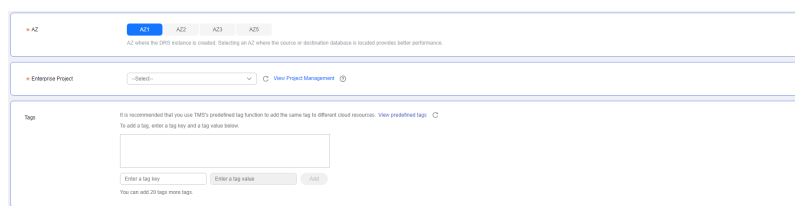


2. Configure replication instance details as needed.

Set **Destination DB Instance** to the TaurusDB instance created in [Creating a TaurusDB Instance](#).



3. Set **Enterprise Project** to default.



**Step 6** Click **Create Now**.

It takes about 5 to 10 minutes to create a replication instance.

**Step 7** Configure source and destination database information.

1. Configure source database information.
2. Click **Test Connection**.

If a successful connection message is returned, you have logged in to the source database.

3. Configure the username and password for the destination database.

4. Click **Test Connection**.

If a successful connection message is returned, you have logged in to the destination database.

**Step 8** Click **Next**.

**Step 9** Confirm the users, snapshots, and migration objects to be migrated.

Set **Migrate Object** to **All**.

**Step 10** Click **Next**.

**Step 11** View pre-check results.

**Step 12** If the check is complete and the check success rate is 100%, click **Next**.

**Step 13** Click **Submit**.

Return to the **Online Migration Management** page and check the migration task status.

It takes several minutes to complete.

If the status changes to **Completed**, the migration task has been created.

----End

### 2.5.5.2.3 Checking the Migration Results


You can check the migration results with either of the following methods:


Method 1: (Automatically) [Check the migration results on the DRS console](#). DRS can compare migration objects, users, and data of source and destination databases and obtain the migration results.

Method 2: (Manually) [Check the migration results on the TaurusDB console](#). Log in to the destination database to check whether the databases, tables, and data are migrated. Manually confirm the data migration status.

## Checking the Migration Results on the DRS Console

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select **AP-Singapore**.

**Step 3** Click  in the upper left corner of the page and choose **Databases > Data Replication Service**.

**Step 4** Click the DRS instance name.



**Step 5** Click **Migration Comparison**.

**Step 6** Under the **Compare Data - Validate ALL Rows/Values** and **Compare Data - Double Check During Cutover** tabs, check whether the objects of the source database have been migrated to destination database.

----End



## Checking the Migration Results on the TaurusDB Console

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select **AP-Singapore**.
- Step 3** Click  in the upper left corner of the page and choose **Databases > TaurusDB**.
- Step 4** Locate the required TaurusDB instance and choose **More > Log In** in the **Operation** column.
- Step 5** In the displayed dialog box, enter the password and click **Test Connection**.
- Step 6** After the connection test is successful, click **Log In**.
- Step 7** Check and confirm the destination database name and table name. Check whether the data migration is complete.

----End

## Testing TaurusDB Performance

After the migration is complete, test TaurusDB performance by referring to [Performance White Paper](#).

## 2.6 From ECS-hosted MongoDB to DDS

DRS helps you migrate data from MongoDB databases on ECSs to DDS instances on the current cloud. With DRS, you can migrate databases online with zero downtime and your services and databases can remain operational during migration.

This section describes how to use DRS to migrate data from an ECS database to a DDS instance on the current cloud. The following network scenarios are supported:

- Source and destination databases are in the same VPC.
- Source and destination databases are in different VPCs.

## Resource Planning

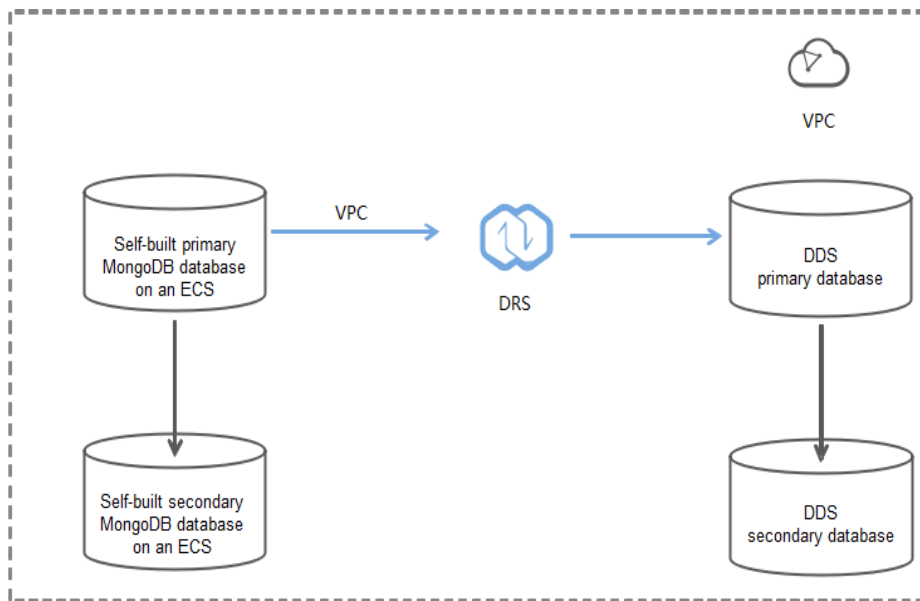
**Table 2-15** Resource planning

| Category | Subcategory | Planned Value | Description                                                         |
|----------|-------------|---------------|---------------------------------------------------------------------|
| VPC      | VPC name    | vpc-dds       | Specify a name that is easy to identify.                            |
|          | Region      | AP-Singapore  | To achieve lower network latency, select the region nearest to you. |
|          | AZ          | AZ1           | -                                                                   |

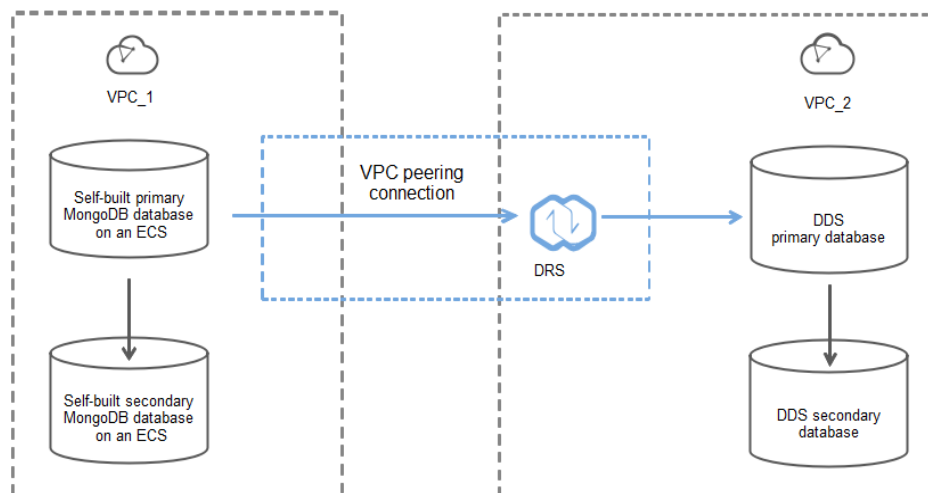
| Category           | Subcategory             | Planned Value              | Description                                                                                                                                                                                             |
|--------------------|-------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | Subnet                  | 10.0.0.0/24                | Select a subnet with sufficient network resources.                                                                                                                                                      |
|                    | Subnet name             | subnet-default             | Specify a name that is easy to identify.                                                                                                                                                                |
| ECS                | ECS name                | ecs-mongodb                | Specify a name that is easy to identify.                                                                                                                                                                |
|                    | Specifications          | s6.xlarge.2 4vCPUs 8GiB    | The specifications in the left column are selected in this example.<br>In your project, select specifications meeting your workload requirements. For details, see <a href="#">ECS Specifications</a> . |
|                    | OS                      | CentOS 7.6 64              | -                                                                                                                                                                                                       |
|                    | System disk             | General purpose SSD 40 GiB | -                                                                                                                                                                                                       |
|                    | Data disk               | Ultra-high I/O, 100 GiB    | -                                                                                                                                                                                                       |
|                    | EIP                     | Buy now                    | Buy an EIP because the public network is selected for the migration task.                                                                                                                               |
| DDS                | DDS instance name       | dds-test                   | Specify a name that is easy to identify.                                                                                                                                                                |
|                    | DB engine               | DDS                        | -                                                                                                                                                                                                       |
|                    | DB engine version       | 4.4                        | -                                                                                                                                                                                                       |
|                    | AZ type                 | Single-AZ                  | -                                                                                                                                                                                                       |
|                    | AZ                      | AZ1                        | -                                                                                                                                                                                                       |
|                    | Instance specifications | Enhanced II                | -                                                                                                                                                                                                       |
|                    | CPU architecture        | x86 8 vCPUs   32 GB        | -                                                                                                                                                                                                       |
| DRS migration task | Task name               | DRS-dds                    | Specify a name that is easy to identify.                                                                                                                                                                |
|                    | Source DB engine        | MongoDB                    | In this example, the source is a MongoDB database built on an ECS.                                                                                                                                      |
|                    | Destination DB engine   | DDS                        | In this example, a DDS instance serves as the destination database.                                                                                                                                     |
|                    | Network type            | Public network             | Public network is used in this example.                                                                                                                                                                 |

### Diagram

**Figure 2-38** Source and destination databases in the same VPC

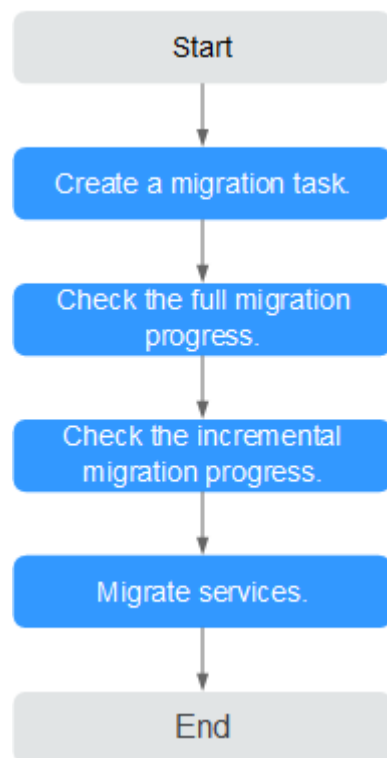


**Figure 2-39** Source and destination databases in the same region and different VPCs



## Migration Process

Figure 2-40 Flowchart



### Migration Suggestions (Important)

- Database migration is closely impacted by a wide range of environmental and operational factors. To ensure the migration goes smoothly, perform a test run before the actual migration to help you detect and resolve any potential issues in advance. Recommendations on how to minimize any potential impacts on your data base are provided in this section.
- It is strongly recommended that you start your migration task during off-peak hours. A less active database is easier to migrate successfully. If the data is fairly static, there is less likely to be any severe performance impacts during the migration.

### Notes on Migration (Important)

---

**NOTICE**

Before creating a migration task, read the migration notes carefully.

---

For details, see [precautions](#) on using specific migration tasks in *Data Replication Service Real-Time Migration*.

## Preparations

1. Permissions:

**Table 2-16** lists the permissions required for the source and destination databases when migrating data from a MongoDB database on an ECS to DDS on the current cloud.

**Table 2-16** Required permissions

| Database | Full Migration Permission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Full+Incremental Migration Permission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source   | <ul style="list-style-type: none"> <li>● Replica set: The source database user must have the read permission for the database to be migrated.</li> <li>● Single node: The source database user must have the read permission for the database to be migrated.</li> <li>● Cluster: The source database user must have the read permission for the databases to be migrated and the config database.</li> <li>● To migrate accounts and roles of the source database, the source database user must have the read permission for the <b>system.users</b> and <b>system.roles</b> system tables of the admin database.</li> </ul> | <ul style="list-style-type: none"> <li>● Replica set: The source database user must have the read permission for the databases to be migrated and the local database.</li> <li>● Single node: The source database user must have the read permission for the databases to be migrated and the local database.</li> <li>● Cluster: The source mongos node user must have the readAnyDatabase permission for the databases to be migrated and the config database. The source shard node user must have the readAnyDatabase permission for the admin database and the read permission for the local database.</li> <li>● To migrate accounts and roles of the source database, the source database user must have the read permission for the <b>system.users</b> and <b>system.roles</b> system tables of the admin database.</li> </ul> |

| Database    | Full Migration Permission                                                                                                                                                                                                                                                                   | Full+Incremental Migration Permission |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Destination | The destination database user must have the dbAdminAnyDatabase permission for the admin database and the readWrite permission for the destination database. If the destination database is a cluster instance, the migration account must have the read permission for the config database. |                                       |

- Source database permissions:  
The source MongoDB database user must have all the required permissions listed in [Table 2-16](#). If the permissions are insufficient, create a user that has all of the permissions on the source database.
  - Destination database permissions:  
The initial account of the DDS instance has the required permissions.
2. Network settings
    - The source database and destination DDS DB instance must be in the same region.
    - The source database and destination DDS DB instance can be either in the same VPC or different VPCs.
      - If the source and destination databases are in different VPCs, the subnets of the source and destination databases are required to be in different CIDR blocks. You need to create a VPC peering connection between the two VPCs.  
For details, see [VPC Peering Connection Overview](#) in the *Virtual Private Cloud User Guide*.
      - If the source and destination databases are in the same VPC, the networks are interconnected by default.
  3. Security rules
    - In the same VPC, the network is connected by default. You do not need to set a security group.
    - In different VPCs, establish a VPC peering connection between the two VPCs. You do not need to set a security group.
  4. Other

You need to export the user information of the MongoDB database first and manually add it to the destination DDS DB instance because the user information will not be migrated.

## Migration Procedure

### Step 1 Create a migration task.

1. Log in to the management console and choose **Databases > Data Replication Service** to go to the DRS console.

2. On the **Online Migration Management** page, click **Create Migration Task**.
3. On the **Create Replication Instance** page, configure the task details, recipient, and replication instance and click **Next**.

**Figure 2-41** Replication instance information

**Replication Instance Details** ⓘ

The following information cannot be modified after you go to the next page.

- \* Data Flow:  To the cloud  Out of the cloud  
The destination database must be a database in the current cloud. If you want to migrate data between databases, select To the cloud.
- \* Source DB Engine:  MySQL  MySQL schema and logic table  MongoDB
- \* Destination DB Engine:  GaussDB(for Mongo)  DDS
- \* Network Type:  ⓘ
- \* Destination DB Instance:  [View DB Instance](#) [View Unselectable DB Instance](#)
- Replication Instance Subnet:  ⓘ [View Subnets](#) [View occupied IP address](#)
- \* Migration Type:  Full-Incremental  Full  
This migration type allows you to migrate data with minimal downtime. After a full migration initializes the destination database, an incremental migration parses logs to ensure data consistency between the source and destination databases.
- \* Source DB Instance Type:  Non-cluster  Cluster

**Table 2-17** Task settings

| Parameter   | Description                                                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Region      | The region where the replication instance is deployed. You can change the region. To reduce latency and improve access speed, select the region closest to your workloads. |
| Project     | The project corresponds to the current region and can be changed.                                                                                                          |
| Task Name   | The task name consists of 4 to 50 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).             |
| Description | The description consists of a maximum of 256 characters and cannot contain the following special characters: =<>&'\\"                                                      |

**Table 2-18** Replication instance information

| Parameter             | Description             |
|-----------------------|-------------------------|
| Data Flow             | <b>To the cloud</b>     |
| Source DB Engine      | Select <b>MongoDB</b> . |
| Destination DB Engine | Select <b>DDS</b> .     |
| Network Type          | Select <b>VPC</b> .     |

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Destination DB Instance | The DDS DB instance you purchased.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Migration Type          | <p>Select <b>Full+Incremental</b> as an example:</p> <ul style="list-style-type: none"> <li>- <b>Full</b>: This migration type is suitable for scenarios where a service interruption is acceptable. All objects and data in non-system databases are migrated to the destination database at one time. The objects include tables, views, and stored procedures.</li> </ul> <p><b>NOTE</b><br/>If you perform a full migration, you are advised to stop operations on the source database. Otherwise, data generated in the source database during the migration will not be synchronized to the destination database.</p> <ul style="list-style-type: none"> <li>- <b>Full+Incremental</b>: This migration type allows you to migrate data without interrupting services. After a full migration initializes the destination database, an incremental migration initiates and parses logs to ensure data consistency between the source and destination databases.</li> </ul> <p><b>NOTE</b><br/>If you select the <b>Full+Incremental</b> migration type, data generated during the full migration will be synchronized to the destination database with zero downtime, ensuring that both the source and destination databases remain accessible.</p> |
| Source DB Instance Type | <p>If you select <b>Full+Incremental</b> for <b>Migration Type</b>, set this parameter based on the source database. <b>Non-cluster</b> is selected as an example.</p> <ul style="list-style-type: none"> <li>- If the source database is a cluster instance, set this parameter to <b>Cluster</b>.</li> <li>- If the source database is a replica set or a single node instance, set this parameter to <b>Non-cluster</b>.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Obtain Incremental Data | <p>This parameter is available for configuration if <b>Source DB Instance Type</b> is set to <b>Cluster</b>. You can determine how to capture data changes during the incremental synchronization.</p> <ul style="list-style-type: none"><li>– <b>oplog</b>: For MongoDB 3.2 or later, DRS directly connects to each shard of the source DB instance to extract data. If you select this mode, you must disable the balancer of the source instance. When testing the connection, you need to enter the connection information of each shard node of the source instance.</li><li>– <b>changeStream</b>: This method is recommended. For MongoDB 4.0 and later, DRS connects to mongos nodes of the source instance to extract data. If you select this method, you must enable the WiredTiger storage engine of the source instance.</li></ul> <p><b>NOTE</b><br/>Only whitelisted users can use <b>changeStream</b>. To use this function, submit a service ticket. In the upper right corner of the management console, choose <b>Service Tickets &gt; Create Service Ticket</b> to submit a service ticket.</p> |
| Source Shard Quantity   | <p>If <b>Source DB Instance Type</b> is set to <b>Cluster</b> and <b>Obtain Incremental Data</b> is set to <b>oplog</b>, enter the number of source shard nodes.</p> <p>The default minimum number of source DB instances is 2 and the maximum number is 32. You can set this parameter based on the number of source database shards.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

4. On the **Configure Source and Destination Databases** page, wait until the replication instance is created. Then, specify source and destination database information and click **Test Connection** for both the source and destination databases to check whether they have been connected to the replication instance. After the connection tests are successful, select the check box before the agreement and click **Next**.

**Figure 2-42** Source and destination database details

### Source Database

Source Database Type:  Non-DDS DB Instance  DDS DB Instance

VPC:  [View VPC](#)

Subnet:  [?](#)

IP Address or Domain Name:  [?](#)

*Ensure that the entered addresses belong to the same DB instance.*

Authentication Database:

Database Username:

Database Password:

SSL Connection:

---

### Destination Database

DB Instance Name:

Database Username:

Database Password:

**Table 2-19** Source database information

| Parameter            | Description                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source Database Type | Select <b>Self-built on ECS</b> .                                                                                                                                                                                                                                                                                                                                                                  |
| VPC                  | A dedicated virtual network in which the source database is located. It isolates networks for different services. You can select an existing VPC or create a VPC. For details on how to create a VPC, see <a href="#">Creating a VPC</a> .                                                                                                                                                         |
| Subnet               | A subnet provides dedicated network resources that are logically isolated from other networks, improving network security. The subnet must be in the AZ where the source database resides. You need to enable DHCP for creating the source database subnet.<br>For details on how to create a VPC, see the <a href="#">Creating a VPC</a> section in the <i>Virtual Private Cloud User Guide</i> . |

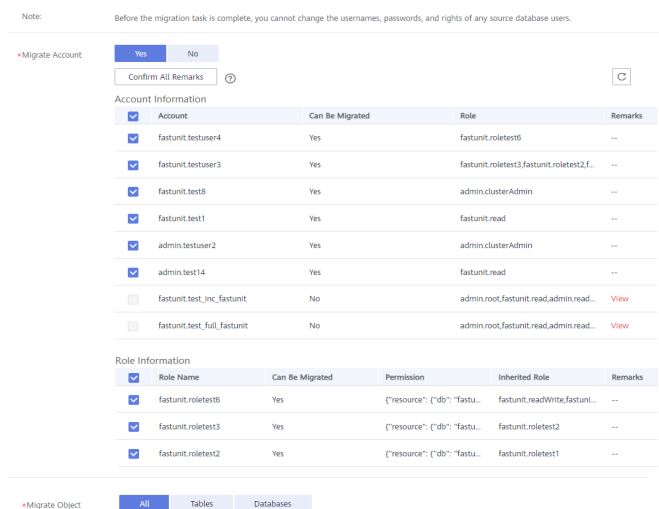
| Parameter                 | Description                                                                                                                          |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| IP Address or Domain Name | The IP address or domain name of the source database.                                                                                |
| Port                      | The port of the source database.<br>Range: 1 - 65535                                                                                 |
| Database Username         | A username for the source database.                                                                                                  |
| Database Password         | The password for the database username.                                                                                              |
| SSL Connection            | To improve data security during the migration, you are advised to enable SSL to encrypt migration links and upload a CA certificate. |

**Table 2-20** Destination database information


| Parameter         | Description                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------|
| DB Instance Name  | The DDS DB instance you have selected during the migration task creation is displayed by default and cannot be changed. |
| Database Username | The username for accessing the destination DDS DB instance.                                                             |
| Database Password | The password for the database username.                                                                                 |

5. On the **Set Task** page, select migration objects and click **Next**.

**Figure 2-43** Migration object

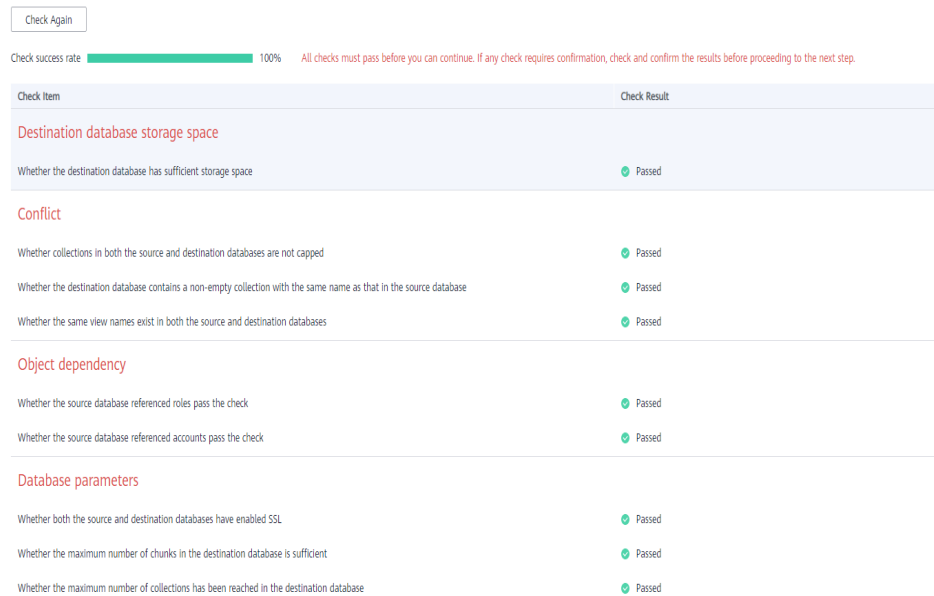


**Table 2-21** Migration object

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Migrate Account | <p>There are accounts that can be migrated completely and accounts that cannot be migrated. You can choose whether to migrate the accounts. Accounts that cannot be migrated or accounts that are not selected will not exist in the destination database. Ensure that your services will not be affected by these accounts.</p> <ul style="list-style-type: none"><li>- <b>Yes</b><br/>If you choose to migrate accounts, see <a href="#">Migrating Accounts</a> in <i>Data Replication Service User Guide</i> to migrate database users and roles.</li><li>- <b>No</b><br/>During the migration, accounts and roles are not migrated.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Migrate Object  | <p>You can choose to migrate all objects, tables, or databases based on your service requirements.</p> <ul style="list-style-type: none"><li>- <b>All:</b> All objects in the source database are migrated to the destination database. After the migration, the object names will remain the same as those in the source database and cannot be modified.</li><li>- <b>Tables:</b> The selected table-level objects will be migrated.</li><li>- <b>Databases:</b> The selected database-level objects will be migrated.</li></ul> <p>If the source database is changed, click  in the upper right corner before selecting migration objects to ensure that the objects to be selected are from the changed source database.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"><li>- If you choose not to migrate all of the databases, the migration may fail because the objects, such as stored procedures and views, in the database to be migrated may have dependencies on other objects that are not migrated. To ensure a successful migration, you are advised to migrate all of the databases.</li><li>- When you select an object, the spaces before and after the object name are not displayed. If there are two or more consecutive spaces in the middle of the object name, only one space is displayed.</li><li>- The search function can help you quickly select the required database objects.</li></ul> |

6. On the **Check Task** page, check the migration task.
  - If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.  
For details about how to handle check failures, see [Checking Whether the Source Database Is Connected](#) in *Data Replication Service User Guide*.
  - If all check items are successful, click **Next**.

**Figure 2-44** Task Check

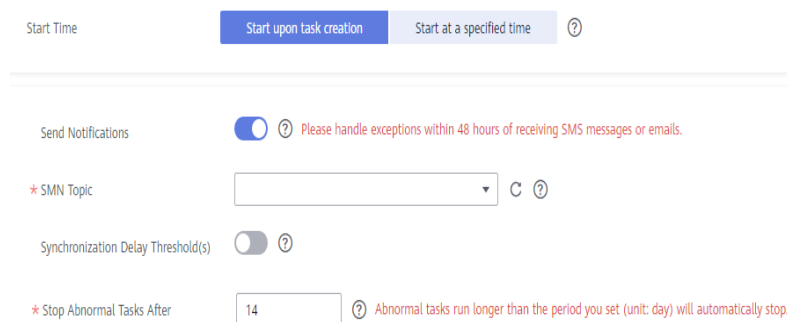


**NOTE**

You can proceed to the next step only when all check items are successful. If any alarms are generated, view and confirm the alarm details first before proceeding to the next step.

- On the displayed page, specify **Start Time**, **Send Notification**, **SMN Topic**, **Synchronization Delay Threshold**, and **Stop Abnormal Tasks After** and confirm that the configured information is correct and click **Submit** to submit the task.

**Figure 2-45** Task startup settings



**Table 2-22** Task startup settings

| Parameter                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Start Time                      | <p>Set <b>Start Time</b> to <b>Start upon task creation</b> or <b>Start at a specified time</b> based on site requirements. The <b>Start at a specified time</b> option is recommended.</p> <p><b>NOTE</b><br/>The migration task may affect the performance of the source and destination databases. You are advised to start the task in off-peak hours and reserve two to three days for data verification.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Send Notifications              | SMN topic. This parameter is optional. If an exception occurs during migration, the system will send a notification to the specified recipients.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| SMN Topic                       | <p>This parameter is available only after you enable <b>Send Notification</b> and create a topic on the SMN console and add a subscriber.</p> <p>For details, see <a href="#">Simple Message Notification User Guide</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Synchronization Delay Threshold | <p>During an incremental migration, a synchronization delay indicates a time difference (in seconds) of synchronization between the source and destination database.</p> <p>If the synchronization delay exceeds the threshold you specify, DRS will send alarms to the specified recipients. The value ranges from 0 to 3,600. To avoid repeated alarms caused by the fluctuation of delay, an alarm is sent only after the delay has exceeded the threshold for six minutes.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"><li>- In the early stages of an incremental migration, there is more delay because more data is waiting to be synchronized. In this situation, no notifications will be sent.</li><li>- Before setting the delay threshold, enable <b>Send Notification</b>.</li><li>- If the delay threshold is set to 0, no notifications will be sent to the recipient.</li></ul> |
| Stop Abnormal Tasks After       | <p>Number of days after which an abnormal task is automatically stopped. The value must range from 14 to 100. The default value is <b>14</b>.</p> <p><b>NOTE</b><br/>Tasks in the abnormal state are still charged. If tasks remain in the abnormal state for a long time, they cannot be resumed. Abnormal tasks run longer than the period you set (unit: day) will automatically stop to avoid unnecessary fees.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

8. After the task is submitted, go back to the **Online Migration Management** page to view the task status.

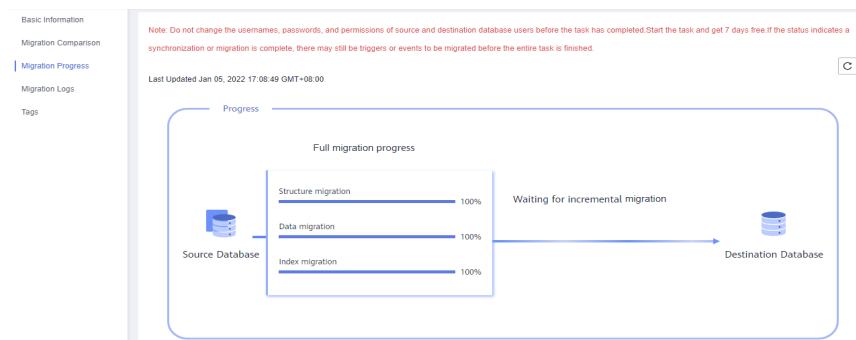
## Step 2 Manage the migration task.

The migration task contains two phases: full migration and incremental migration. You can manage them in different phases.

- Full migration

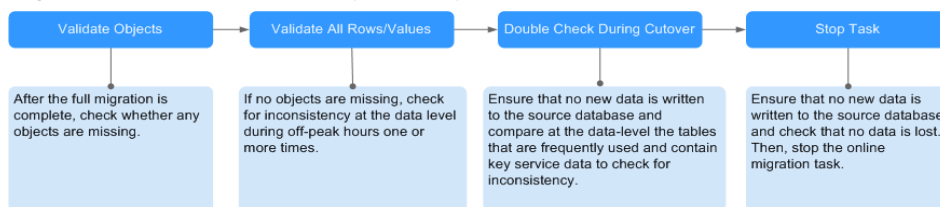
- Viewing the migration progress: Click the target full migration task, and on the **Migration Progress** tab, you can see the migration progress of the structure, data, indexes, and migration objects. When the progress reaches 100%, the migration is complete.
- Viewing migration details: In the migration details, you can view the migration progress of a specific object. If the number of objects is the same as that of migrated objects, the migration is complete. You can view the migration progress of each object in detail. Currently, this function is available only to whitelisted users. You can submit a service ticket to apply for this function.
- Incremental Migration Permission
  - Viewing the synchronization delay: After the full migration is complete, an incremental migration starts. On the **Online Migration Management** page, click the target migration task. On the displayed page, click **Migration Progress** to view the synchronization delay of the incremental migration. If the synchronization delay is 0s, the destination database is being synchronized with the source database in real time. You can also view the data consistency on the **Migration Comparison** tab.

**Figure 2-46** Viewing the synchronization delay



- Viewing the migration results: On the **Online Migration Management** page, click the target migration task. On the displayed page, click **Migration Comparison** and perform a migration comparison in accordance with the comparison process, which should help you determine an appropriate time for migration to minimize service downtime.

**Figure 2-47** Database comparison process



For details, see [Comparing Migration Items](#) in *Data Replication Service User Guide*.

**Step 3** Cut over services.

You are advised to start the cutover process during off-peak hours. At least one complete data comparison is performed during off-peak hours. To obtain accurate

comparison results, start data comparison at a specified time point during off-peak hours. If it is needed, select **Start at a specified time** for **Comparison Time**. Due to slight time difference and continuous operations on data, inconsistent comparison results may be generated, reducing the reliability and validity of the results.

1. Interrupt services first. If the workload is not heavy, you may not need to interrupt the services.
2. Run the following statement on the source database and check whether any new sessions execute SQL statements within the next 1 to 5 minutes. If there are no new statements executed, the service has been stopped.

```
db.currentOp()
```

#### NOTE

The process list queried by the preceding statement includes the connection of the DRS replication instance. If no additional session executes SQL statements, the service has been stopped.

3. On the **Migration Progress** page, view the synchronization delay. When the delay is displayed as 0s and remains stable for a period, then you can perform a data-level comparison between the source and destination databases. For details about the time required, refer to the results of the previous comparison.
  - If there is enough time, compare all objects.
  - If there is not enough time, use the data-level comparison to compare the tables that are frequently used and that contain key business data or inconsistent data.
4. Determine an appropriate time to cut the services over to the destination database. After services are restored and available, the migration is complete.

#### **Step 4** Stop or delete the migration task.

1. Stopping the migration task. After databases and services are migrated to the destination database, to prevent operations on the source database from being synchronized to the destination database to overwrite data, you can stop the migration task. This operation only deletes the replication instance, and the migration task is still displayed in the task list. You can view or delete the task. DRS will not charge for this task after you stop it.
2. Delete the migration task. After the migration task is complete, you can delete it. After the migration task is deleted, it will no longer be displayed in the task list.

----End

## 2.7 From On-Premises MySQL to RDS for MySQL

DRS supports data migration from on-premises MySQL databases to RDS for MySQL instances. With DRS, you can migrate databases online with zero downtime and your services and databases can remain operational during migration.

This section describes how to use DRS to migrate data from an on-premises MySQL database to an RDS for MySQL instance on the current cloud. The following network types are supported:



- Virtual Private Network (VPN)
- Public network

### Diagram

Figure 2-48 VPN

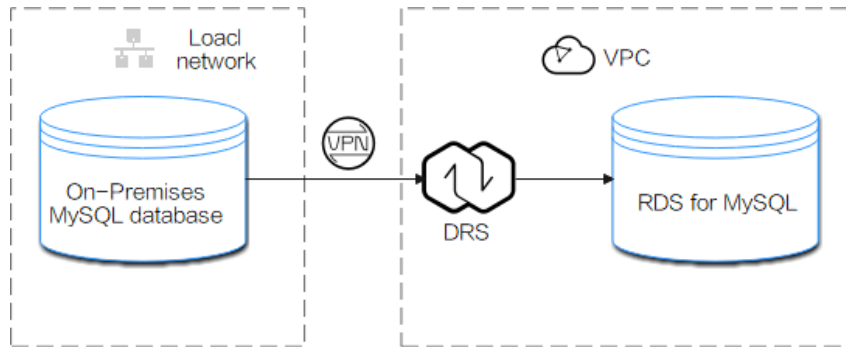
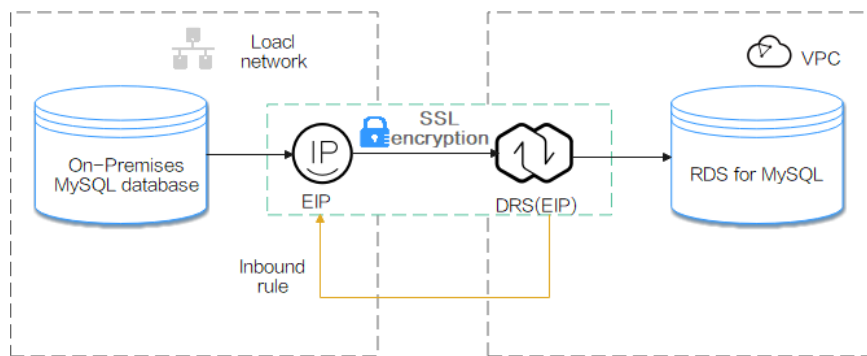
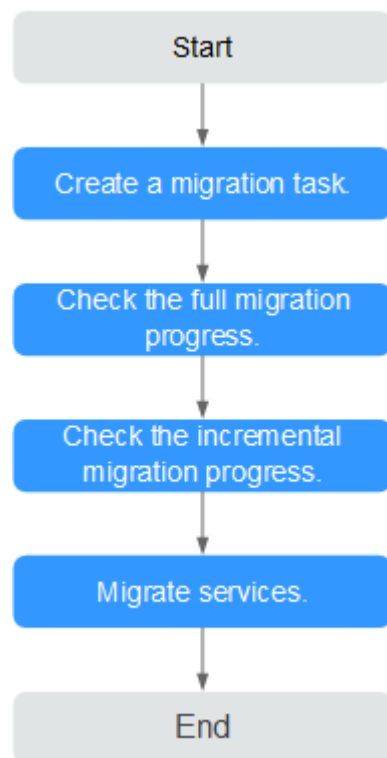


Figure 2-49 Public network+SSL connection



## Migration Process

Figure 2-50 Flowchart



### Migration Suggestions (Important)

- Database migration is closely impacted by a wide range of environmental and operational factors. To ensure the migration goes smoothly, perform a test run before the actual migration to help you detect and resolve any potential issues in advance. Recommendations on how to minimize any potential impacts on your data base are provided in this section.
- It is strongly recommended that you start your migration task during off-peak hours. A less active database is easier to migrate successfully. If the data is fairly static, there is less likely to be any severe performance impacts during the migration.

### Notes on Migration (Important)

---

**NOTICE**

Before creating a migration task, read the migration notes carefully.

---

For details, see [precautions](#) on using specific migration tasks in *Data Replication Service Real-Time Migration*.

## Preparations

### 1. Permissions

**Table 2-23** lists the permissions required for the source and destination databases when migrating data from on-premises MySQL databases to the RDS for MySQL instances on the current cloud.

**Table 2-23** Required permissions

| Database    | Full Migration                                                                                                                                                                                                                                                                                                                                                                                 | Full+Incremental Migration                                                       |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Source      | SELECT, SHOW VIEW, and EVENT                                                                                                                                                                                                                                                                                                                                                                   | SELECT, SHOW VIEW, EVENT, LOCK TABLES, REPLICATION SLAVE, and REPLICATION CLIENT |
| Destination | SELECT, CREATE, ALTER, DROP, DELETE, INSERT, UPDATE, INDEX, EVENT, CREATE VIEW, CREATE ROUTINE, TRIGGER, REFERENCES, and WITH GRANT OPTION.<br><br>If the destination database version is in the range 8.0.14 to 8.0.18, the SESSION_VARIABLES_ADMIN permission is required.<br><br>To migrate users, you must have the SELECT, INSERT, UPDATE, and DELETE permissions for the MySQL database. |                                                                                  |

- Source database permissions:  
The source database user must have all the required permissions listed in **Table 2-23**. If the permissions are insufficient, create a user that has all of the permissions on the source database.
- Destination database permissions:  
If the destination database is an RDS for MySQL database on the current cloud, the initial account can be used.

### 2. Network settings

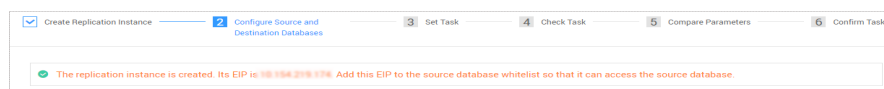
- Source database network settings:  
You can migrate data from on-premises MySQL databases to an RDS for MySQL instance on the current cloud through a VPN or public network. Enable public accessibility or establish a VPN for the on-premises MySQL databases based on your service requirements. You are advised to migrate data through a public network, which is more convenient and cost-effective.
- Destination database network settings:
  - If the source database attempts to access the destination database through a VPN, you need to enable the VPN service first so that the source database can communicate with the destination RDS for MySQL.

- If the source database attempts to access the destination database through a public network, you do not need to configure the destination database.
3. Security rules
    - a. Source database security group settings:

- The replication instance needs to be able to access the source DB. That means that the EIP of the replication instance must be on the whitelist of the source MySQL DB instance. Before configuring the network whitelist, you need to obtain the EIP of the replication instance.

After creating a replication instance on the DRS console, you can find the EIP on the **Configure Source and Destination Databases** page.

**Figure 2-51** EIP of the replication instance



- If the migration is performed over a VPN network, add the private IP address of the DRS replication instance to the network whitelist of the source MySQL database to enable the source MySQL database to communicate with the current cloud. The IP address on the **Configure Source and Destination Databases** page is the private IP address of the replication instance.
- If you do take this step, then once the migration is complete, you should delete this item from the whitelist or your system will be insecure.
- b. Destination database security group settings:

By default, the destination database and the DRS replication instance are in the same VPC and can communicate with each other. No further configuration is required.
4. Other

DRS supports migration of some parameters that are closely related to services and performance. For details about these parameters, see [Parameters for Comparison](#). If you need to migrate other parameters, configure them manually based on service requirements.

## Migration Procedure

The following describes how to use DRS to migrate data from an on-premises MySQL database to an RDS for MySQL instance on the current cloud over a public network.

### Step 1 Create a migration task.

1. Log in to the management console and choose **Databases > Data Replication Service** to go to the DRS console.
2. On the **Online Migration Management** page, click **Create Migration Task**.
3. On the **Create Replication Instance** page, configure the task details and the replication instance, and click **Next**.

Figure 2-52 Replication instance information

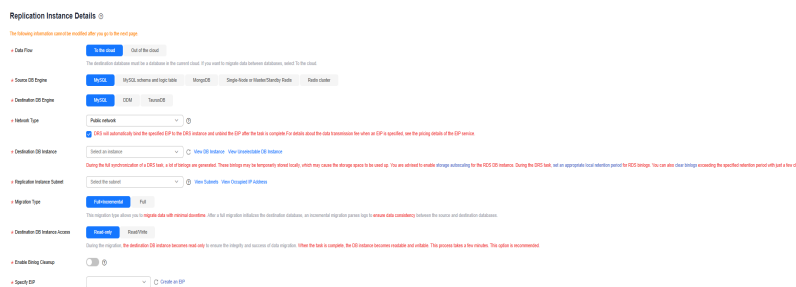


Table 2-24 Task settings

| Parameter   | Description                                                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Region      | The region where the replication instance is deployed. You can change the region. To reduce latency and improve access speed, select the region closest to your workloads. |
| Project     | The project corresponds to the current region and can be changed.                                                                                                          |
| Task Name   | The task name consists of 4 to 50 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).             |
| Description | The description consists of a maximum of 256 characters and cannot contain the following special characters: =<>&'\\"                                                      |

Table 2-25 Replication instance settings

| Parameter               | Description                                                                                                                            |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Data Flow               | Select <b>To the cloud</b> .                                                                                                           |
| Source DB Engine        | Select <b>MySQL</b> .                                                                                                                  |
| Destination DB Engine   | Select <b>MySQL</b> .                                                                                                                  |
| Network Type            | Select <b>Public network</b> . Enabling SSL is recommended. It may slow down the migration by 20% to 30% but it ensures data security. |
| Destination DB Instance | The RDS for MySQL instance you created.                                                                                                |

| Parameter                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Destination Database Access | <p>You can select <b>Read-only</b> or <b>Read/Write</b>.</p> <ul style="list-style-type: none"> <li>- <b>Read-only</b><br/>During migration, the destination database is read-only. After the migration is complete, it restores to the read/write status. This option ensures the integrity and success rate of data migration.</li> <li>- <b>Read/Write</b><br/>During migration, the destination database can be queried or modified. Data may be modified when operations are performed or applications are connected. It should be noted that background processes can often generate or modify data, which may result in data conflicts, task faults, and upload failures. Do not select this option if you do not fully understand the risks.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Migration Type              | <p>Select <b>Full+Incremental</b> as an example.</p> <ul style="list-style-type: none"> <li>- <b>Full</b>: This migration type is suitable for scenarios where service interruption is acceptable. All objects and data in non-system databases are migrated to the destination database at one time. The objects include tables, views, and stored procedures.</li> </ul> <p><b>NOTE</b><br/>If you are performing a full migration, do not perform operations on the source database. Otherwise, data generated in the source database during the migration will not be synchronized to the destination database.</p> <ul style="list-style-type: none"> <li>- <b>Full+Incremental</b>: This migration type allows you to migrate data without interrupting services. After a full migration initializes the destination database, an incremental migration initiates and parses logs to ensure data consistency between the source and destination databases.</li> </ul> <p><b>NOTE</b><br/>If you select the <b>Full+Incremental</b> migration type, data generated during the full migration will be synchronized to the destination database with zero downtime, ensuring that the source database remain accessible.</p> |

4. On the **Configure Source and Destination Databases** page, wait until the replication instance is created. Then, specify source and destination database information and click **Test Connection** for both the source and destination databases to check whether they have been connected to the replication instance. After the connection tests are successful, select the check box before the agreement and click **Next**.

**Figure 2-53** Source and destination database details

**Source Database**

IP Address or Domain Name: [192.168.1.10]

Port: [3306]

Database Username: [root]

Database Password: [\*\*\*\*\*]

SSL Connection:

Encryption Certificate: [01.png]  Test successful

---

**Destination Database**

DB Instance Name: [rds-ujm-test2]

Database Username: [root]

Database Password: [\*\*\*\*\*]

Migrate Definer to User:  Yes  No

Test successful

**Table 2-26** Source database settings

| Parameter                 | Description                                                                                                                                            |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| IP Address or Domain Name | The IP address or domain name of the source database.                                                                                                  |
| Port                      | Enter an integer ranging from 1 to 65535, which indicates the port number of the source database.                                                      |
| Database Username         | A username for the source database.                                                                                                                    |
| Database Password         | The password for the database username.                                                                                                                |
| SSL Connection            | To improve data security during a migration on a public network, you are advised to enable SSL to encrypt migration links and upload a CA certificate. |

**Table 2-27** Destination database settings

| Parameter        | Description                                                                                                                          |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| DB Instance Name | The RDS for MySQL instance you have selected during the replication instance creation is displayed by default and cannot be changed. |

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Database Username       | The username for accessing the destination RDS for MySQL instance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Database Password       | The password for the database username.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Migrate Definer to User | <ul style="list-style-type: none"> <li>- <b>Yes</b><br/>The Definers of all source database objects will be migrated to the user. Other users do not have permissions for database objects unless these users are authorized. For details on authorization, see <a href="#">How Do I Maintain the Original Service User Permission System After Definer Is Forcibly Converted During MySQL Migration?</a> in <i>Data Replication Service FAQs</i>.</li> <li>- <b>No</b><br/>The Definers of all source database objects will not be changed. You need to migrate all accounts and permissions of the source database in the next step.</li> </ul> |

- On the **Set Task** page, set the flow control mode and select migration accounts and objects.

**Figure 2-54** Migration object

Note: Before the migration task is complete, you cannot change the usernames, passwords, and rights of any source database users.

\*Flow Control  Yes  No ?

---

\*Filter DROP DATABASE  Yes  No

\*Migrate Account  Yes  No

During a database migration, you need to separately migrate accounts and permissions. *Certain accounts cannot be migrated to the destination database. Ensure that services are not affected.*

Confirm All Remarks ?

| <input checked="" type="checkbox"/> | Account          | Can Be Migrated | Permission                   | Password | Remarks |
|-------------------------------------|------------------|-----------------|------------------------------|----------|---------|
| <input checked="" type="checkbox"/> | ...@... ..       | Yes             | GRANT ALL PRIVILEGES ON *.*  |          | View    |
| <input checked="" type="checkbox"/> | '...'@'...' %    | Yes             | GRANT ALL PRIVILEGES ON *.*  |          | View    |
| <input checked="" type="checkbox"/> | ...@'...' ..     | Yes             | GRANT ALL PRIVILEGES ON *.*  |          | View    |
| <input type="checkbox"/>            | .../...'@'...' % | No              | GRANT SELECT, INSERT, UPD... | --       | View    |
| <input type="checkbox"/>            | ...@'...' %      | No              | GRANT USAGE ON *.* GRAN...   | --       | View    |
| <input type="checkbox"/>            | ...'@'...' %     | No              | GRANT ALL PRIVILEGES ON *.*  | --       | View    |
| <input type="checkbox"/>            | ...'@'localhost  | No              | GRANT USAGE ON *.* GRAN...   | --       | View    |

Reset Password

Set Unified Password

---

\*Migrate Object  All  Tables  Databases ?



**Table 2-28** Migration types and objects-public network

| Parameter            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flow Control         | <p>You can choose whether to control the flow.</p> <ul style="list-style-type: none"><li>- You can customize the maximum migration speed. In addition, you can set the time range based on your service requirements. The traffic rate setting usually includes setting of a rate limiting time period and a traffic rate value. Flow can be controlled all day or during specific time ranges. The default value is <b>All day</b>. A maximum of three time ranges can be set, and they cannot overlap.</li></ul> <p>The flow rate must be set based on the service scenario and cannot exceed 9,999 MB/s.</p> <ul style="list-style-type: none"><li>- If the migration speed is not limited, the outbound bandwidth of the source database is maximally used, which will increase the read burden on the source database. For example, if the outbound bandwidth of the source database is 100 MB/s and 80% bandwidth is used, the I/O consumption on the source database is 80 MB/s.</li></ul> <p><b>NOTE</b></p> <ul style="list-style-type: none"><li>▪ Flow control mode takes effect only during a full migration.</li><li>▪ You can also change the flow control mode after creating a task. In the task list on the <b>Online Migration Management</b> page, locate the target task and choose <b>More &gt; Speed</b> or <b>Speed</b> in the <b>Operation</b> column.</li></ul> |
| Filter DROP DATABASE | <p>During migration, executing DDL operations on the source database may affect the data migration performance to some extent. To reduce data migration risks, DRS allows you to filter out DDL operations.</p> <p>The database deletion operation can be filtered out by default.</p> <ul style="list-style-type: none"><li>- If you select <b>Yes</b>, the database deletion operation performed on the source database is not synchronized during data synchronization.</li><li>- If you select <b>No</b>, related operations are synchronized to the destination database during data synchronization.</li></ul> <p><b>NOTE</b><br/>Only the database deletion operation can be filtered.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Migrate Account | <p>During a database migration, accounts need to be migrated separately.</p> <p>There are accounts that can be migrated completely, accounts whose permissions need to be reduced, and accounts that cannot be migrated. You can choose whether to migrate the accounts based on your service requirements. If you select <b>Yes</b>, you can select the accounts to be migrated as required.</p> <ul style="list-style-type: none"><li>- <b>Yes</b><br/>If you choose to migrate accounts, see <a href="#">Migrating Accounts</a> in <i>Data Replication Service User Guide</i> to migrate database users, permissions, and passwords.</li><li>- <b>No</b><br/>During the migration, accounts and permissions are not migrated.</li></ul>                                                                                                                                                |
| Migrate Object  | <p>All database objects can be migrated. After the objects are migrated to the destination DB instance, the object names remain the same as those in the source database and cannot be modified.</p> <p>You can migrate all objects or specified objects based on your service requirements.</p> <ul style="list-style-type: none"><li>- <b>All</b>: All objects in the source database are migrated to the destination database.</li><li>- <b>Self-defined</b>: Only self-defined objects are migrated to the destination database.</li></ul> <p><b>NOTE</b><br/>If you choose not to migrate all of the databases, the migration may fail because the objects, such as stored procedures and views, in the database to be migrated may have dependencies on other objects that are not migrated. To ensure a successful migration, you are advised to migrate all of the databases.</p> |

6. Click **Next**. On the **Check Task** page, check the migration task.
  - If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.
  - If all check items are successful, click **Next**.
7. Compare the source and target parameters.

By comparing common and performance parameters for the source databases against those of the destination databases, you can help ensure that services will not change after a migration is completed. You can determine whether to use this function based on service requirements. It mainly ensures that services are not affected after a migration is completed.

  - As this process is optional, you can click **Next** if you wish to skip this step.
  - Compare common parameters:

If the parameter values in the list shown are inconsistent, you can click **Save Change** to change the destination database values to match those of the source database.

**Figure 2-55** Modifying common parameters

| Parameter Name                  | Source Database Value | Destination Database Value | Result       |
|---------------------------------|-----------------------|----------------------------|--------------|
| character_set_server            | utf8                  | utf8                       | Consistent   |
| collation_server                | utf8_general_ci       | utf8_general_ci            | Consistent   |
| connect_timeout                 | 10                    | 10                         | Consistent   |
| explicit_defaults_for_timestamp | OFF                   | ON                         | Inconsistent |
| innodb_flush_log_attrx_commit   | 1                     | 1                          | Consistent   |
| innodb_flush_log_attrx_timeout  | 30                    | 30                         | Consistent   |
| max_connections                 | 800                   | 800                        | Consistent   |
| net_read_timeout                | 30                    | 30                         | Consistent   |
| net_write_timeout               | 60                    | 60                         | Consistent   |
| tx_isolation                    | REPEATABLE-READ       | REPEATABLE-READ            | Consistent   |

Performance parameter values in both the source and destination can be the same or different.

- There is a value that is consistent, but you still want to change it in the destination, locate the parameter, enter the value in the **Change To** column, and click **Save Change** in the upper left corner.
- If you want to change a destination database value to match the source same:
  - Click **Use Source Database Value**.

The system automatically updates the destination database value to match the source.

**Figure 2-56** One-click modification

| Parameter Name          | Source Database Value | Destination Database Value | Change To | Allowed Destination Database Va... | Result                     |              |
|-------------------------|-----------------------|----------------------------|-----------|------------------------------------|----------------------------|--------------|
| binlog_cache_size       | 32768                 | 32768                      | 5         | +4096 = 32768                      | 4096-10777216              | Consistent   |
| binlog_stmt_cache_size  | 32768                 | 32768                      | 5         | +4096 = 32768                      | 4096-10777216              | Consistent   |
| bulk_insert_buffer_size | 8388608               | 8388608                    |           | 0-16440744213706551615             |                            | Consistent   |
| innodb_buffer_pool_size | 536870912             | 805306368                  | 4         | +134217728 = 536870912             | 536870912-1717086958       | Inconsistent |
| long_query_time         | 1.000000              | 1.000000                   |           |                                    | 0.03-3000                  | Consistent   |
| read_buffer_size        | 262144                | 262144                     | 54        | +4096 = 262144                     | 8192-2147429552            | Consistent   |
| read_rnd_buffer_size    | 524288                | 524288                     | 128       | +4096 = 524288                     | 1-2147483647               | Consistent   |
| sort_buffer_size        | 262144                | 262144                     |           |                                    | 32768-16440744213706551615 | Consistent   |
| sync_binlog             | 1                     | 1                          |           |                                    | 0-4254697205               | Consistent   |

**NOTE**

You can also manually enter parameter values.

- Click **Save Change** to save your changes. The system changes the parameter values based on your settings for the destination database values. After the modification, the comparison results are automatically updated.

Figure 2-57 Performance parameters

| Parameter Name                                                                                                                                            | Source Database Value | Destination Database Value | Change To | Allowed Destination Database Va... | Result                     |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------|-----------|------------------------------------|----------------------------|--------------|
| <input type="checkbox"/> binlog_cache_size                                                                                                                | 32768                 | 32768                      | 8         | +4096 = 32768                      | 4096-1677216               | Consistent   |
| <input type="checkbox"/> binlog_stmt_cache_size                                                                                                           | 32768                 | 32768                      | 8         | +4096 = 32768                      | 4096-1677216               | Consistent   |
| <input type="checkbox"/> bulk_insert_buffer_size                                                                                                          | 8388608               | 8388608                    |           |                                    | 0-18440744073709551615     | Consistent   |
| <input checked="" type="checkbox"/> innodb_buffer_pool_size<br><small>Enter a value smaller than or equal to 70% of memory size of the destina...</small> | 536870912             | 805206388                  | 4         | +13421728 = 536870912              | 536870912-1717366918       | Inconsistent |
| <input type="checkbox"/> long_query_time                                                                                                                  | 1.000000              | 1.000000                   |           |                                    | 0.01-3000                  | Consistent   |
| <input type="checkbox"/> read_buffer_size                                                                                                                 | 262144                | 262144                     | 64        | +4096 = 262144                     | 8192-214749352             | Consistent   |
| <input type="checkbox"/> read_rnd_buffer_size                                                                                                             | 524288                | 524288                     | 128       | +4096 = 524288                     | 1-2147493547               | Consistent   |
| <input type="checkbox"/> sort_buffer_size                                                                                                                 | 262144                | 262144                     |           |                                    | 32768-18446744073709551615 | Consistent   |
| <input type="checkbox"/> sync_binlog                                                                                                                      | 1                     | 1                          |           |                                    | 0-4254697295               | Consistent   |

Some parameters in the destination database require a restart before the changes can take effect. The system will display these as being inconsistent. You will need to restart the destination database after either before the migration starts or after it has completed. To minimize the impact of this restart on your services, it is recommended that you schedule a specific time to restart the destination database after the migration is complete.

For details about parameter comparison, see [Parameters for Comparison](#) in *Data Replication Service User Guide*.

- 3) Click **Next**.
8. On the displayed page, specify **Start Time**, **Send Notification**, **SMN Topic**, **Synchronization Delay Threshold**, and **Stop Abnormal Tasks After** and confirm that the configured information is correct and click **Submit** to submit the task.

Figure 2-58 Task startup settings

Table 2-29 Task startup settings

| Parameter  | Description                                                                                                                                                                                                                                                                                                                                                                                            |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Start Time | Set <b>Start Time</b> to <b>Start upon task creation</b> or <b>Start at a specified time</b> based on site requirements. The <b>Start at a specified time</b> option is recommended.<br><b>NOTE</b><br>The migration task may affect the performance of the source and destination databases. You are advised to start the task in off-peak hours and reserve two to three days for data verification. |

| Parameter                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Send Notifications              | SMN topic. This parameter is optional. If an exception occurs during migration, the system will send a notification to the specified recipients.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| SMN Topic                       | This parameter is available only after you enable <b>Send Notification</b> and create a topic on the SMN console and add a subscriber.<br>For details, see <a href="#">Simple Message Notification User Guide</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Synchronization Delay Threshold | During an incremental migration, a synchronization delay indicates a time difference (in seconds) of synchronization between the source and destination database.<br>If the synchronization delay exceeds the threshold you specify, DRS will send alarms to the specified recipients. The value ranges from 0 to 3,600. To avoid repeated alarms caused by the fluctuation of delay, an alarm is sent only after the delay has exceeded the threshold for six minutes.<br><b>NOTE</b> <ul style="list-style-type: none"><li>- In the early stages of an incremental migration, there is more delay because more data is waiting to be synchronized. In this situation, no notifications will be sent.</li><li>- Before setting the delay threshold, enable <b>Send Notification</b>.</li><li>- If the delay threshold is set to 0, no notifications will be sent to the recipient.</li></ul> |
| Stop Abnormal Tasks After       | Number of days after which an abnormal task is automatically stopped. The value must range from 14 to 100. The default value is <b>14</b> .<br><b>NOTE</b><br>Tasks in the abnormal state are still charged. If tasks remain in the abnormal state for a long time, they cannot be resumed. Abnormal tasks run longer than the period you set (unit: day) will automatically stop to avoid unnecessary fees.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

9. After the task is submitted, go back to the **Online Migration Management** page to view the task status.

## Step 2 Manage the migration task.

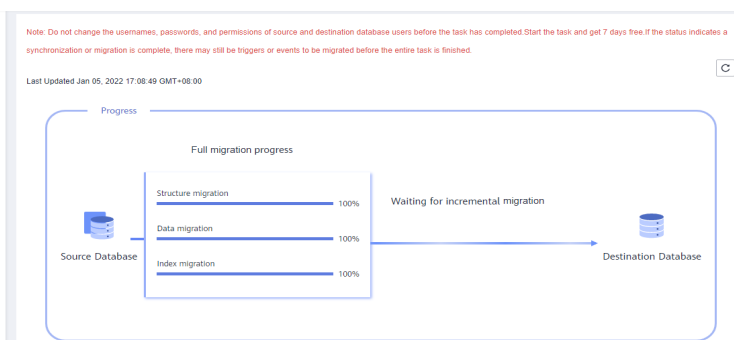
The migration task contains two phases: full migration and incremental migration. You can manage them in different phases.

- Full migration
  - Viewing the migration progress: Click the target full migration task, and on the **Migration Progress** tab, you can see the migration progress of the structure, data, indexes, and migration objects. When the progress reaches 100%, the migration is complete.
  - Viewing migration details: In the migration details, you can view the migration progress of a specific object. If the number of objects is the same as that of migrated objects, the migration is complete. You can view the migration progress of each object in detail. Currently, this

function is available only to whitelisted users. You can submit a service ticket to apply for this function.

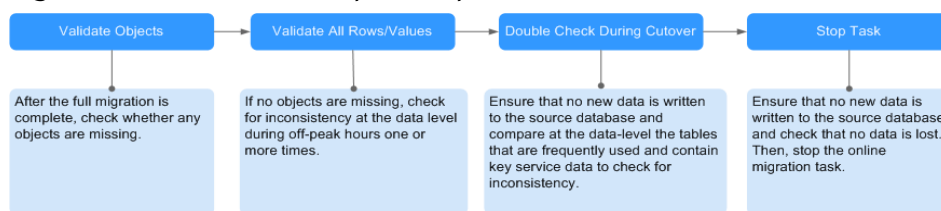
- Incremental Migration Permission
  - Viewing the synchronization delay: After the full migration is complete, an incremental migration starts. On the **Online Migration Management** page, click the target migration task. On the displayed page, click **Migration Progress** to view the synchronization delay of the incremental migration. If the synchronization delay is 0s, the destination database is being synchronized with the source database in real time. You can also view the data consistency on the **Migration Comparison** tab.

**Figure 2-59** Viewing the synchronization delay



- Viewing the migration results: On the **Online Migration Management** page, click the target migration task. On the displayed page, click **Migration Comparison** and perform a migration comparison in accordance with the comparison process, which should help you determine an appropriate time for migration to minimize service downtime.

**Figure 2-60** Database comparison process



For details, see [Comparing Migration Items](#) in *Data Replication Service User Guide*.

### Step 3 Cut over services.

You are advised to start the cutover process during off-peak hours. At least one complete data comparison is performed during off-peak hours. To obtain accurate comparison results, start data comparison at a specified time point during off-peak hours. If it is needed, select **Start at a specified time** for **Comparison Time**. Due to slight time difference and continuous operations on data, inconsistent comparison results may be generated, reducing the reliability and validity of the results.

1. Interrupt services first. If the workload is not heavy, you may not need to interrupt the services.

2. Run the following statement on the source database and check whether any new sessions execute SQL statements within the next 1 to 5 minutes. If there are no new statements executed, the service has been stopped.

```
show processlist
```

#### NOTE

The process list queried by the preceding statement includes the connection of the DRS replication instance. If no additional session executes SQL statements, the service has been stopped.

3. On the **Migration Progress** page, view the synchronization delay. When the delay is displayed as 0s and remains stable for a period, then you can perform a data-level comparison between the source and destination databases. For details about the time required, refer to the results of the previous comparison.
  - If there is enough time, compare all objects.
  - If there is not enough time, use the data-level comparison to compare the tables that are frequently used and that contain key business data or inconsistent data.
4. Determine an appropriate time to cut the services over to the destination database. After services are restored and available, the migration is complete.

#### **Step 4** Stop or delete the migration task.

1. Stopping the migration task. After databases and services are migrated to the destination database, to prevent operations on the source database from being synchronized to the destination database to overwrite data, you can stop the migration task. This operation only deletes the replication instance, and the migration task is still displayed in the task list. You can view or delete the task. DRS will not charge for this task after you stop it.
2. Delete the migration task. After the migration task is complete, you can delete it. After the migration task is deleted, it will no longer be displayed in the task list.

----End

## 2.8 From On-Premises MongoDB to DDS

DRS helps you migrate data from on-premises MongoDB databases to DDS on the current cloud. With DRS, you can migrate databases online with zero downtime and your services and databases can remain operational during migration.

This section describes how to use DRS to migrate an on-premises MongoDB database to DDS on the current cloud. The following network types are supported:

- VPN
- Public network

## Resource Planning

**Table 2-30** Resource planning

| Category                     | Subcategory             | Planned Value       | Description                                                         |
|------------------------------|-------------------------|---------------------|---------------------------------------------------------------------|
| VPC                          | VPC name                | vpc-dds             | Specify a name that is easy to identify.                            |
|                              | Region                  | AP-Singapore        | To achieve lower network latency, select the region nearest to you. |
|                              | AZ                      | AZ1                 | -                                                                   |
|                              | Subnet                  | 10.0.0.0/24         | Select a subnet with sufficient network resources.                  |
|                              | Subnet name             | subnet-default      | Specify a name that is easy to identify.                            |
| On-premises MongoDB database | Database version        | MongoDB 4.4         | Specify a name that is easy to identify.                            |
| DDS                          | DDS instance name       | dds-test            | Specify a name that is easy to identify.                            |
|                              | DB engine               | DDS                 | -                                                                   |
|                              | DB engine version       | 4.4                 | -                                                                   |
|                              | AZ type                 | Single-AZ           | -                                                                   |
|                              | AZ                      | AZ1                 | -                                                                   |
|                              | Instance specifications | Enhanced II         | -                                                                   |
|                              | CPU architecture        | x86 8 vCPUs   32 GB | -                                                                   |
| DRS migration task           | Task name               | DRS-dds             | Specify a name that is easy to identify.                            |
|                              | Source DB engine        | MongoDB             | In this example, the source is an on-premises MongoDB database.     |
|                              | Destination DB engine   | DDS                 | In this example, a DDS instance serves as the destination database. |
|                              | Network type            | Public network      | Public network is used in this example.                             |



## Diagram

Figure 2-61 VPN

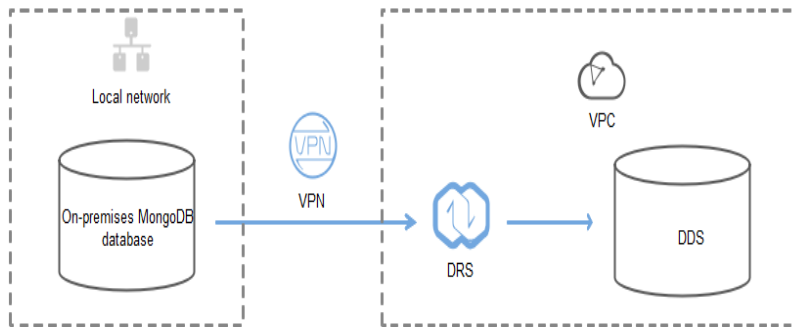
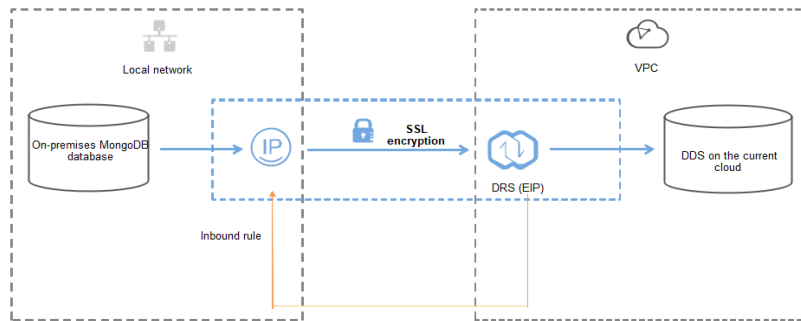
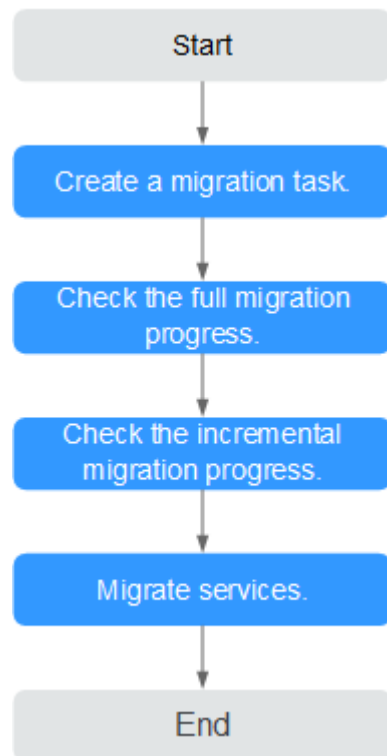


Figure 2-62 Public network+SSL connection



## Migration Process

Figure 2-63 Flowchart



### Migration Suggestions (Important)

- Database migration is closely impacted by a wide range of environmental and operational factors. To ensure the migration goes smoothly, perform a test run before the actual migration to help you detect and resolve any potential issues in advance. Recommendations on how to minimize any potential impacts on your data base are provided in this section.
- It is strongly recommended that you start your migration task during off-peak hours. A less active database is easier to migrate successfully. If the data is fairly static, there is less likely to be any severe performance impacts during the migration.

### Notes on Migration (Important)

---

**NOTICE**

Before creating a migration task, read the migration notes carefully.

---

For details, see [precautions](#) on using specific migration tasks in *Data Replication Service Real-Time Migration*.

## Preparations

### 1. Permissions

**Table 2-31** lists the permissions required for the source and destination databases when migrating data from on-premises MongoDB databases to DDS DB instances.

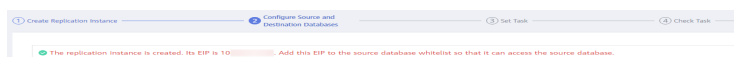
**Table 2-31** Required permissions

| Database | Full Migration Permission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Full+Incremental Migration Permission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source   | <ul style="list-style-type: none"> <li>● Replica set: The source database user must have the read permission for the database to be migrated.</li> <li>● Single node: The source database user must have the read permission for the database to be migrated.</li> <li>● Cluster: The source database user must have the read permission for the databases to be migrated and the config database.</li> <li>● To migrate accounts and roles of the source database, the source database user must have the read permission for the <b>system.users</b> and <b>system.roles</b> system tables of the admin database.</li> </ul> | <ul style="list-style-type: none"> <li>● Replica set: The source database user must have the read permission for the databases to be migrated and the local database.</li> <li>● Single node: The source database user must have the read permission for the databases to be migrated and the local database.</li> <li>● Cluster: The source mongos node user must have the readAnyDatabase permission for the databases to be migrated and the config database. The source shard node user must have the readAnyDatabase permission for the admin database and the read permission for the local database.</li> <li>● To migrate accounts and roles of the source database, the source database user must have the read permission for the <b>system.users</b> and <b>system.roles</b> system tables of the admin database.</li> </ul> |

| Database    | Full Migration Permission                                                                                                                                                                                                                                                                   | Full+Incremental Migration Permission |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Destination | The destination database user must have the dbAdminAnyDatabase permission for the admin database and the readWrite permission for the destination database. If the destination database is a cluster instance, the migration account must have the read permission for the config database. |                                       |

- Source database permissions:  
The source database user must have all the required permissions listed in [Table 2-31](#). If the permissions are insufficient, create a user that has all of the permissions on the source database.
  - Destination database permissions:  
If the destination database is a DDS database, the initial account can be used.
2. Network settings
- Source database network settings:  
You can migrate on-premises MongoDB databases to DDS through a VPN or public network. Enable public accessibility or establish a VPN for local MongoDB databases based on the site requirements. You are advised to migrate data through a public network, which is more convenient and cost-effective.
  - Destination database network settings:
    - If the source database accesses the destination database through a VPN, enable the VPN service first so that the source database can communicate with the destination DDS network.
    - If you access the DDS DB instance through a public network, no network settings are required.
3. Security rules
- a. Source database network settings:
- The replication instance needs to be able to access the source DB. That means that the EIP of the replication instance must be on the whitelist of the source MongoDB instance. Before configuring the network whitelist for the source database, you need to obtain the EIP of the DRS replication instance.  
After creating a replication instance on the DRS console, you can find the EIP on the **Configure Source and Destination Databases** page as shown in [Figure 2-64](#).

**Figure 2-64** EIP of the replication instance



You can also add 0.0.0.0/0 to the source database whitelist to allow any IP address to access the source database but this action may result in security risks.

- If the migration is performed over a VPN network, add the private IP address of the DRS replication instance to the whitelist of the source database to enable the source database to communicate with the destination database.

If you do take this step, then once the migration is complete, you should delete this item from the whitelist or your system will be insecure.

b. Destination database security group settings:

By default, the destination database and the DRS replication instance are in the same VPC and can communicate with each other. No further configuration is required.

4. Other

You need to export the user information of the MongoDB database first and manually add it to the destination DDS DB instance because the user information will not be migrated.

## Migration Procedure

The following describes how to use DRS to migrate an on-premises MongoDB database to a DDS DB instance.

### Step 1 Create a migration task.

1. Log in to the management console and choose **Databases > Data Replication Service** to go to the DRS console.
2. On the **Online Migration Management** page, click **Create Migration Task**.
3. On the **Create Replication Instance** page, configure the task details, recipient, and replication instance and click **Next**.

Figure 2-65 Replication instance information

Replication Instance Details ⓘ

The following information cannot be modified after you go to the next page.

• Data Flow: **To the cloud** (selected) / Out of the cloud

The destination database must be a database in the current cloud. If you want to migrate data between databases, select To the cloud.

• Source DB Engine: MySQL / MySQL schema and logic table / **MongoDB**

• Destination DB Engine: GaussDB(for Mongo) / **DDS**

• Network Type: Public network ⓘ

I understand that an EIP will be automatically bound to the replication instance and released after the replication task is complete.

• Destination DB Instance: dds-... ⓘ View DB Instance View Unselectable DB Instance

Replication Instance Subnet: vpc-... ⓘ View Subnets

• Migration Type: **Full-Incremental** / Full

This migration type allows you to migrate data with minimal downtime. After a full migration initializes the destination database, an incremental migration parses logs to ensure data consistency between the source and destination databases.

• Source DB Instance Type: Non-cluster / **Cluster**

• Obtain Incremental Data: **changeStream** / sqllog

MongoDB 3.2 or later versions are supported. Incremental data is extracted from the source instance shard nodes. If you select this option, disable the balancer for the source instance, and specify the IP address of each shard node.

• Source Shard Quantity: - 2 +

• Destination DB Instance Access: **Read/Write** / Read-only

Configuring the destination DB instance as read-only helps ensure the migration is successful. Once the migration is complete, the DB instance automatically changes to Read/Write.

**Table 2-32** Task settings

| Parameter   | Description                                                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Region      | The region where the replication instance is deployed. You can change the region. To reduce latency and improve access speed, select the region closest to your workloads. |
| Project     | The project corresponds to the current region and can be changed.                                                                                                          |
| Task Name   | The task name consists of 4 to 50 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).             |
| Description | The description consists of a maximum of 256 characters and cannot contain the following special characters: =<>&'\"                                                       |

**Table 2-33** Replication instance settings

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Flow               | Select <b>To the cloud</b> .                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Source DB Engine        | Select <b>MongoDB</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Destination DB Engine   | Select <b>DDS</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Network Type            | Select <b>Public network</b> .<br>Enabling SSL is recommended. It may slow down the migration by 20% to 30% but it ensures data security.                                                                                                                                                                                                                                                                                                                |
| Destination DB Instance | The DDS DB instance you purchased.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Migration Type          | <ul style="list-style-type: none"><li>- <b>Full</b><br/>It migrates all data at one time. If you perform a full migration, you are advised to stop operations on the source database. Otherwise, data generated in the source database during the migration will not be synchronized to the destination database.</li><li>- <b>Full+Incremental</b><br/>An incremental migration can keep data consistency after a full migration is complete.</li></ul> |
| Source DB Instance Type | If you select <b>Full+Incremental</b> for <b>Migration Type</b> , set this parameter based on the source database. <ul style="list-style-type: none"><li>- If the source database is a cluster instance, set this parameter to <b>Cluster</b>.</li><li>- If the source database is a replica set or a single node instance, set this parameter to <b>Non-cluster</b>.</li></ul>                                                                          |

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Obtain Incremental Data | <p>This parameter is available for configuration if <b>Source DB Instance Type</b> is set to <b>Cluster</b>. You can determine how to capture data changes during the incremental synchronization.</p> <ul style="list-style-type: none"> <li>– oplog: For MongoDB 3.2 or later, DRS directly connects to each shard of the source DB instance to extract data. If you select this mode, you must disable the balancer of the source instance. When testing the connection, you need to enter the connection information of each shard node of the source instance.</li> <li>– changeStream: This method is recommended. For MongoDB 4.0 and later, DRS connects to mongos nodes of the source instance to extract data. If you select this method, you must enable the WiredTiger storage engine of the source instance.</li> </ul> <p><b>NOTE</b><br/>Only whitelisted users can use <b>changeStream</b>. To use this function, submit a service ticket. In the upper right corner of the management console, choose <b>Service Tickets &gt; Create Service Ticket</b> to submit a service ticket.</p> |
| Source Shard Quantity   | <p>If <b>Source DB Instance Type</b> is set to <b>Cluster</b> and <b>Obtain Incremental Data</b> is set to <b>oplog</b>, enter the number of source shard nodes.</p> <p>The default minimum number of source DB instances is 2 and the maximum number is 32. You can set this parameter based on the number of source database shards.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

4. On the **Configure Source and Destination Databases** page, wait until the replication instance is created. Then, specify source and destination database information and click **Test Connection** for both the source and destination databases to check whether they have been connected to the replication instance. After the connection tests are successful, select the check box before the agreement and click **Next**.

**Figure 2-66** Source database information

The screenshot shows the 'Source Database' configuration interface. It contains the following elements:

- mongos Address:** A text input field with a help icon and a red warning message: "Ensure that the entered addresses belong to the same DB instance."
- Authentication Database:** A text input field.
- mongos Username:** A text input field.
- mongos Password:** A password input field with masked characters.
- SSL Connection:** A toggle switch.
- Sharded Database:** A table with four columns: "IP Address or Domain Name", "Authentication Database", "Username", and "Password". It contains two rows of input fields.
- Test Connection:** A button with a green checkmark and the text "test successful".

**Table 2-34** Source database settings

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mongos Address          | <p>IP address or domain name of the source database in the <b>IP address/Domain name:Port</b> format. The port of the source database. Range: 1 - 65534</p> <p>You can enter a maximum of three groups of IP addresses or domain names of the source database. Separate multiple values with commas (.). For example: 192.168.0.1:8080,192.168.0.2:8080. Ensure that the entered IP addresses or domain names belong to the same sharded cluster.</p> <p><b>NOTE</b><br/>If multiple IP addresses or domain names are entered, the test connection is successful as long as one IP address or domain name is accessible. Therefore, you must ensure that the IP address or domain name is correct.</p> |
| Authentication Database | The name of the authentication database. For example: The default authentication database of Huawei Cloud DDS instance is <b>admin</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| mongos Username         | A username for the source database.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| mongos Password         | The password for the source database username.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| SSL Connection          | SSL encrypts the connections between the source and destination databases. If SSL is enabled, upload the SSL CA root certificate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Sharded Database        | Enter the information about the sharded databases in the source database.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

- Destination database configuration

**Figure 2-67** Destination database information

**Destination Database**

DB Instance Name ddi-shard-ops-ls

Database Username

Database Password

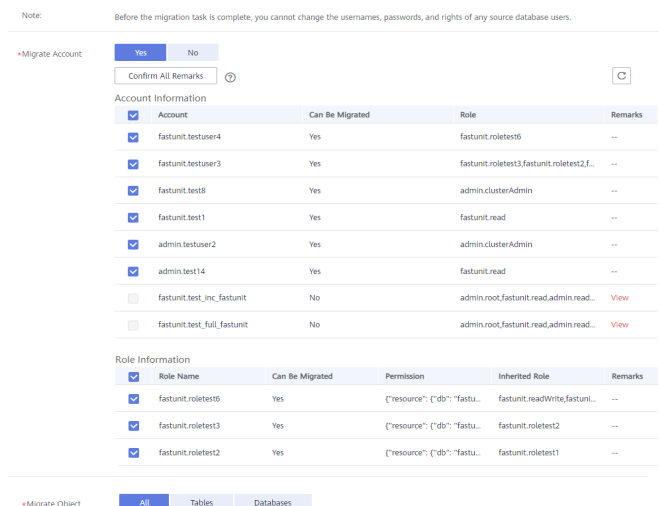


**Table 2-35** Destination database settings

| Parameter         | Description                                                                          |
|-------------------|--------------------------------------------------------------------------------------|
| DB Instance Name  | The DB instance you selected when creating the migration task and cannot be changed. |
| Database Username | The username for accessing the destination database.                                 |
| Database Password | The password for the database username.                                              |


5. On the **Set Task** page, select migration objects and click **Next**.

**Figure 2-68** Migration object



**Table 2-36** Migration object

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Migrate Account | <p>There are accounts that can be migrated completely and accounts that cannot be migrated. You can choose whether to migrate the accounts. Accounts that cannot be migrated or accounts that are not selected will not exist in the destination database. Ensure that your services will not be affected by these accounts.</p> <ul style="list-style-type: none"> <li>- <b>Yes</b><br/>If you choose to migrate accounts, see <a href="#">Migrating Accounts</a> in <i>Data Replication Service User Guide</i> to migrate database users and roles.</li> <li>- <b>No</b><br/>During the migration, accounts and roles are not migrated.</li> </ul> |

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Migrate Object | <p>You can choose to migrate all objects, tables, or databases based on your service requirements.</p> <ul style="list-style-type: none"><li>- <b>All:</b> All objects in the source database are migrated to the destination database. After the migration, the object names will remain the same as those in the source database and cannot be modified.</li><li>- <b>Tables:</b> The selected table-level objects will be migrated.</li><li>- <b>Databases:</b> The selected database-level objects will be migrated.</li></ul> <p>If the source database is changed, click  in the upper right corner before selecting migration objects to ensure that the objects to be selected are from the changed source database.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"><li>- If you choose not to migrate all of the databases, the migration may fail because the objects, such as stored procedures and views, in the database to be migrated may have dependencies on other objects that are not migrated. To ensure a successful migration, you are advised to migrate all of the databases.</li><li>- When you select an object, the spaces before and after the object name are not displayed. If there are two or more consecutive spaces in the middle of the object name, only one space is displayed.</li><li>- The search function can help you quickly select the required database objects.</li></ul> |

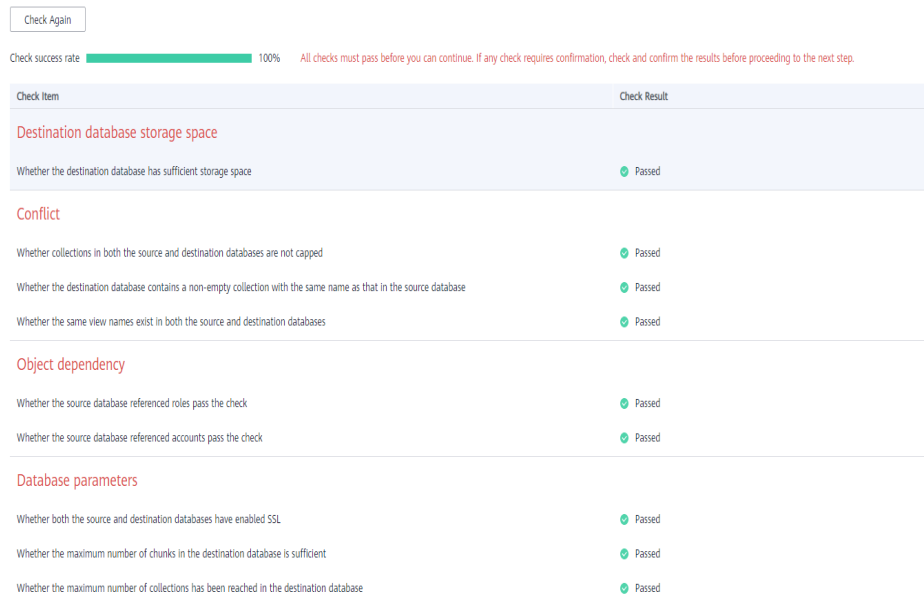
6. On the **Check Task** page, check the migration task.

- If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.

For details about how to handle check failures, see [Checking Whether the Source Database Is Connected](#) in *Data Replication Service User Guide*.

- If all check items are successful, click **Next**.

**Figure 2-69 Task Check**

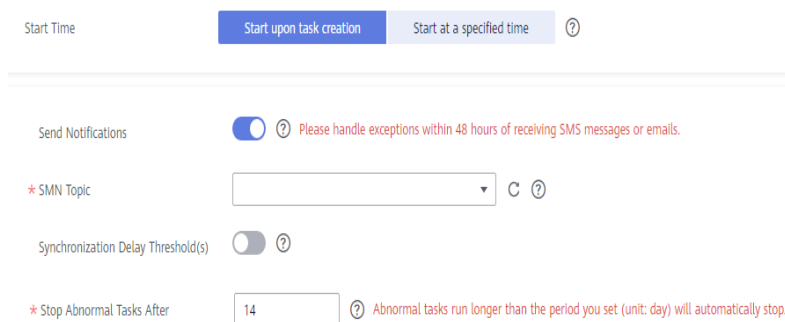


**NOTE**

You can proceed to the next step only when all check items are successful. If any alarms are generated, view and confirm the alarm details first before proceeding to the next step.

- On the displayed page, specify **Start Time**, **Send Notification**, **SMN Topic**, **Synchronization Delay Threshold**, and **Stop Abnormal Tasks After** and confirm that the configured information is correct and click **Submit** to submit the task.

**Figure 2-70 Task startup settings**



**Table 2-37** Task startup settings

| Parameter                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Start Time                      | <p>Set <b>Start Time</b> to <b>Start upon task creation</b> or <b>Start at a specified time</b> based on site requirements. The <b>Start at a specified time</b> option is recommended.</p> <p><b>NOTE</b><br/>The migration task may affect the performance of the source and destination databases. You are advised to start the task in off-peak hours and reserve two to three days for data verification.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Send Notifications              | SMN topic. This parameter is optional. If an exception occurs during migration, the system will send a notification to the specified recipients.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| SMN Topic                       | <p>This parameter is available only after you enable <b>Send Notification</b> and create a topic on the SMN console and add a subscriber.</p> <p>For details, see <a href="#">Simple Message Notification User Guide</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Synchronization Delay Threshold | <p>During an incremental migration, a synchronization delay indicates a time difference (in seconds) of synchronization between the source and destination database.</p> <p>If the synchronization delay exceeds the threshold you specify, DRS will send alarms to the specified recipients. The value ranges from 0 to 3,600. To avoid repeated alarms caused by the fluctuation of delay, an alarm is sent only after the delay has exceeded the threshold for six minutes.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"><li>- In the early stages of an incremental migration, there is more delay because more data is waiting to be synchronized. In this situation, no notifications will be sent.</li><li>- Before setting the delay threshold, enable <b>Send Notification</b>.</li><li>- If the delay threshold is set to 0, no notifications will be sent to the recipient.</li></ul> |
| Stop Abnormal Tasks After       | <p>Number of days after which an abnormal task is automatically stopped. The value must range from 14 to 100. The default value is <b>14</b>.</p> <p><b>NOTE</b><br/>Tasks in the abnormal state are still charged. If tasks remain in the abnormal state for a long time, they cannot be resumed. Abnormal tasks run longer than the period you set (unit: day) will automatically stop to avoid unnecessary fees.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

8. After the task is submitted, go back to the **Online Migration Management** page to view the task status.

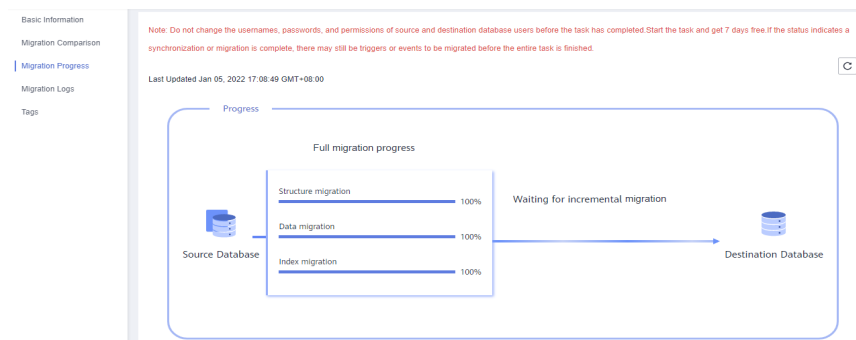
## Step 2 Manage the migration task.

The migration task contains two phases: full migration and incremental migration. You can manage them in different phases.

- Full migration

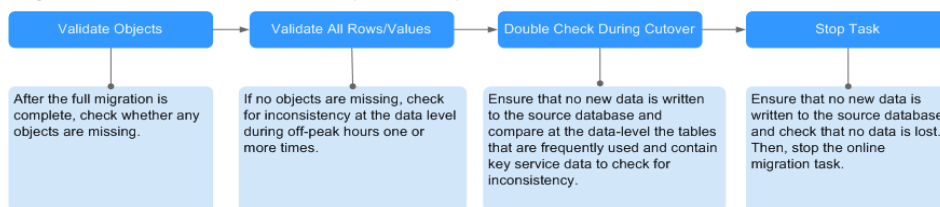
- Viewing the migration progress: Click the target full migration task, and on the **Migration Progress** tab, you can see the migration progress of the structure, data, indexes, and migration objects. When the progress reaches 100%, the migration is complete.
- Viewing migration details: In the migration details, you can view the migration progress of a specific object. If the number of objects is the same as that of migrated objects, the migration is complete. You can view the migration progress of each object in detail. Currently, this function is available only to whitelisted users. You can submit a service ticket to apply for this function.
- Incremental Migration Permission
  - Viewing the synchronization delay: After the full migration is complete, an incremental migration starts. On the **Online Migration Management** page, click the target migration task. On the displayed page, click **Migration Progress** to view the synchronization delay of the incremental migration. If the synchronization delay is 0s, the destination database is being synchronized with the source database in real time. You can also view the data consistency on the **Migration Comparison** tab.

**Figure 2-71** Viewing the synchronization delay



- Viewing the migration results: On the **Online Migration Management** page, click the target migration task. On the displayed page, click **Migration Comparison** and perform a migration comparison in accordance with the comparison process, which should help you determine an appropriate time for migration to minimize service downtime.

**Figure 2-72** Database comparison process



For details, see [Comparing Migration Items](#) in *Data Replication Service User Guide*.

**Step 3** Cut over services.

You are advised to start the cutover process during off-peak hours. At least one complete data comparison is performed during off-peak hours. To obtain accurate

comparison results, start data comparison at a specified time point during off-peak hours. If it is needed, select **Start at a specified time** for **Comparison Time**. Due to slight time difference and continuous operations on data, inconsistent comparison results may be generated, reducing the reliability and validity of the results.

1. Interrupt services first. If the workload is not heavy, you may not need to interrupt the services.
2. Run the following statement on the source database and check whether any new sessions execute SQL statements within the next 1 to 5 minutes. If there are no new statements executed, the service has been stopped.

```
db.currentOp()
```

#### NOTE

The process list queried by the preceding statement includes the connection of the DRS replication instance. If no additional session executes SQL statements, the service has been stopped.

3. On the **Migration Progress** page, view the synchronization delay. When the delay is displayed as 0s and remains stable for a period, then you can perform a data-level comparison between the source and destination databases. For details about the time required, refer to the results of the previous comparison.
  - If there is enough time, compare all objects.
  - If there is not enough time, use the data-level comparison to compare the tables that are frequently used and that contain key business data or inconsistent data.
4. Determine an appropriate time to cut the services over to the destination database. After services are restored and available, the migration is complete.

#### **Step 4** Stop or delete the migration task.

1. Stopping the migration task. After databases and services are migrated to the destination database, to prevent operations on the source database from being synchronized to the destination database to overwrite data, you can stop the migration task. This operation only deletes the replication instance, and the migration task is still displayed in the task list. You can view or delete the task. DRS will not charge for this task after you stop it.
2. Delete the migration task. After the migration task is complete, you can delete it. After the migration task is deleted, it will no longer be displayed in the task list.

----End

## 2.9 From RDS for MySQL to DDM

### 2.9.1 Overview

#### Description

This section describes:

- How to create an RDS for MySQL instance on Huawei Cloud.
- How to create a DDM instance on Huawei Cloud.
- How to migrate data from RDS for MySQL instances in different regions to DDM through a VPN.

## Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is greater than or equal to \$0 USD.

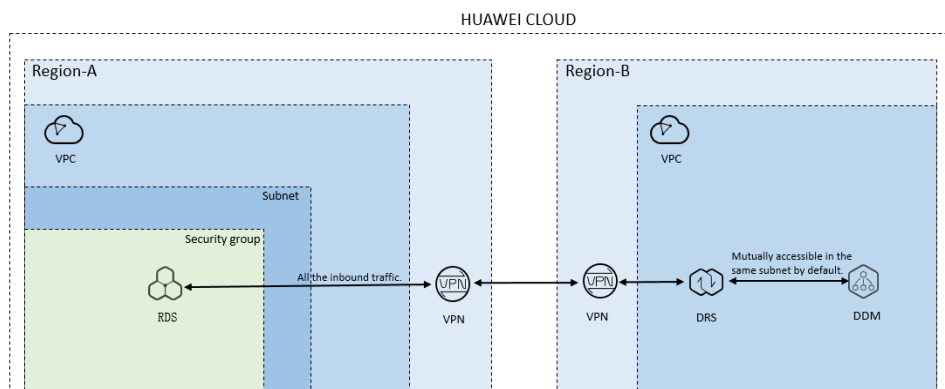
## Service List

- Virtual Private Cloud (VPC)
- Virtual Private Network (VPN)
- Relational Database Service (RDS)
- Distributed Database Middleware (DDM)
- Data Replication Service (DRS)
- Data Admin Service (DAS)

## Deployment Architecture

In this example, the source is a Huawei Cloud RDS for MySQL instance and the destination is a DDM instance in different regions of Huawei Cloud. Data is migrated from the source database to the destination database through a VPN. For details about the deployment architecture, see [Figure 2-73](#).

**Figure 2-73** VPN scenario



## Before You Start

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- The test data is for reference only. For more information about DRS, click [here](#).

## 2.9.2 Resource Planning

**Table 2-38** Resource planning

| Category              | Subcategory       | Plan                           | Description                                                                                                                                                    |
|-----------------------|-------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source VPC            | VPC name          | vpc-DRSsrc                     | Specify a name that is easy to identify.                                                                                                                       |
|                       | Region            | AP-Singapore                   | To achieve lower network latency, select the region nearest to you.                                                                                            |
|                       | AZ                | AZ2                            | -                                                                                                                                                              |
|                       | Subnet            | 10.0.0.0/24                    | Select a subnet with sufficient network resources.                                                                                                             |
|                       | Subnet name       | subnet-drs01                   | Specify a name that is easy to identify.                                                                                                                       |
| RDS (source database) | RDS instance name | rds-mysql-src                  | Specify a name that is easy to identify.                                                                                                                       |
|                       | Region            | AP-Singapore                   | To achieve lower network latency, select the region nearest to you.                                                                                            |
|                       | DB engine version | MySQL 5.7                      | -                                                                                                                                                              |
|                       | Instance type     | Single                         | A single instance is used in this example.<br>To improve service reliability, select a primary/standby instance.                                               |
|                       | Storage type      | SSD                            | -                                                                                                                                                              |
|                       | AZ                | AZ2                            | A single instance is used in this example.<br>To improve service reliability, create a primary and standby instance and then locate them in two different AZs. |
|                       | Specifications    | General-purpose 4 vCPUs   8 GB | -                                                                                                                                                              |
| Source VPN            | Gateway name      | vpngw-src                      | Specify a name that is easy to identify.                                                                                                                       |



| Category                   | Subcategory                 | Plan           | Description                                                                                                                                                                 |
|----------------------------|-----------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | Region                      | AP-Singapore   | To achieve lower network latency, select the region nearest to you.                                                                                                         |
|                            | Virtual Private Cloud (VPC) | vpc-DRSrc      | The value must be the same as the VPC of the source RDS DB instance.                                                                                                        |
|                            | VPN connection name         | vpn-src01      | Specify a name that is easy to identify.                                                                                                                                    |
|                            | Local Subnet                | subnet-drs01   | The value must be the same as the VPC subnet of the source RDS instance.                                                                                                    |
|                            | Remote gateway              | 123.60.251.207 | Specifies the peer VPN gateway. This parameter is set to the gateway address of the target VPN. After the target VPN is created, obtain the gateway information.            |
|                            | Remote subnet               | 172.16.0.0/24  | Specifies the peer VPN gateway. The value is the subnet of the destination VPN, which must be the same as the subnet of the VPC where the destination DDM instance resides. |
| Destination VPC            | VPC name                    | vpc-DRStar     | Specify a name that is easy to identify.                                                                                                                                    |
|                            | Region                      | CN-Hong Kong   | To achieve lower network latency, select the region nearest to you.                                                                                                         |
|                            | AZ                          | AZ1            | -                                                                                                                                                                           |
|                            | Subnet                      | 172.16.0.0/24  | Select a subnet with sufficient network resources.                                                                                                                          |
|                            | Subnet name                 | subnet-drs02   | Specify a name that is easy to identify.                                                                                                                                    |
| DDM (destination database) | DDM instance name           | ddm-drs-tar    | Specify a name that is easy to identify.                                                                                                                                    |
|                            | AZ                          | AZ1            | You can select one or more AZs. You are advised to create the instance across different AZs to improve service reliability.                                                 |

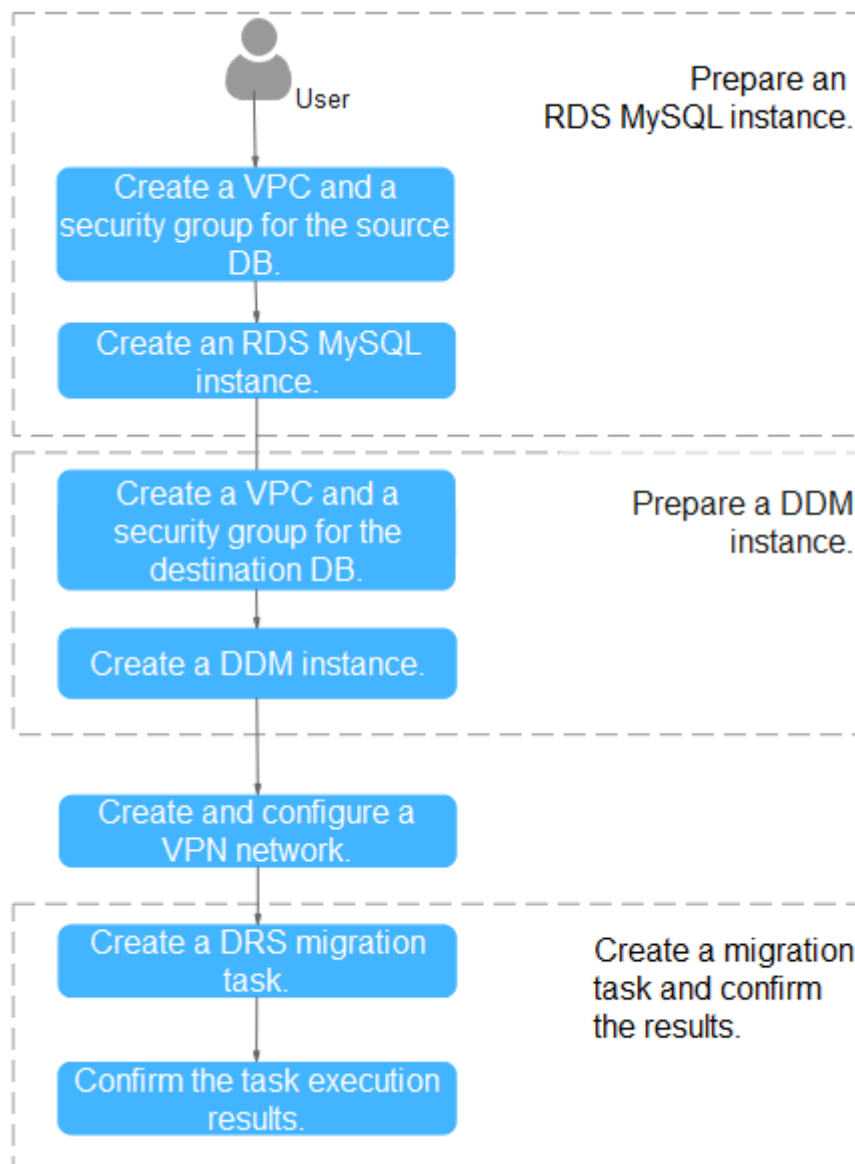
| Category                                      | Subcategory                 | Plan                             | Description                                                                                                                                                    |
|-----------------------------------------------|-----------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                               | Node specifications         | General-enhanced 8 vCPUs   16 GB | -                                                                                                                                                              |
|                                               | Nodes                       | 1                                | A single node has high availability risks. In practice, you are advised to create at least two nodes.                                                          |
| RDS instance associated with the DDM instance | RDS instance name           | rds-ddm01                        | Specify a name that is easy to identify.                                                                                                                       |
|                                               | Region                      | CN-Hong Kong                     | To achieve lower network latency, select the region nearest to you.                                                                                            |
|                                               | DB engine version           | MySQL 5.7                        | -                                                                                                                                                              |
|                                               | Instance type               | Single                           | A single instance is used in this example.<br>To improve service reliability, select a primary/standby instance.                                               |
|                                               | Storage type                | SSD                              | -                                                                                                                                                              |
|                                               | AZ                          | AZ1                              | A single instance is used in this example.<br>To improve service reliability, create a primary and standby instance and then locate them in two different AZs. |
|                                               | Specifications              | General-purpose 4 vCPUs   8 GB   | -                                                                                                                                                              |
| Destination VPN                               | Gateway name                | vpngw-tar                        | Specify a name that is easy to identify.                                                                                                                       |
|                                               | Region                      | CN-Hong Kong                     | To achieve lower network latency, select the region nearest to you.                                                                                            |
|                                               | Virtual Private Cloud (VPC) | vpc-DRStar                       | The value must be the same as the VPC of the destination DDM instance.                                                                                         |

| Category           | Subcategory           | Plan           | Description                                                                                                                                                                        |
|--------------------|-----------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | VPN connection name   | vpn-tar01      | Specify a name that is easy to identify.                                                                                                                                           |
|                    | Local subnet          | subnet-drs02   | The value must be the same as the VPC subnet of the destination DDM instance.                                                                                                      |
|                    | Remote gateway        | 123.60.236.84  | Specifies the peer VPN gateway. In this example, this parameter is set to the gateway address of the source VPN. After the source VPN is created, the gateway address is obtained. |
|                    | Remote subnet         | 10.0.0.0/24    | Specifies the peer VPN gateway. The value is the subnet of the source VPN, which must be the same as the subnet of the VPC where the source RDS for MySQL instance is located.     |
| DRS migration task | Task name             | DRS-MySQLToDDM | Specify a name that is easy to identify.                                                                                                                                           |
|                    | Source DB engine      | MySQL          | In this example, the source is an RDS for MySQL instance on Huawei Cloud.                                                                                                          |
|                    | Destination DB engine | DDM            | In this example, the destination database is DDM.                                                                                                                                  |
|                    | Network type          | VPN            | In this example, VPN is used.                                                                                                                                                      |

### 2.9.3 Operation Process

[Figure 2-74](#) shows the process of creating an RDS for MySQL instance and synchronizing data from an RDS for MySQL instance to DDM.

Figure 2-74 Flowchart




## 2.9.4 Preparing for the Source RDS for MySQL Instance

### 2.9.4.1 Creating a VPC and Security Group

Create a VPC and security group for an RDS for MySQL instance.

#### Creating a VPC

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select AP-Singapore.
- Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4 Click Create VPC.**

**Basic Information**

Region

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Name

IPv4 CIDR Block

Recommended: 10.0.0.0/8-24 (Select) 172.16.0.0/12-24 (Select) 192.168.0.0/16-24 (Select)

**⚠** The CIDR block 10.0.0.0/24 overlaps with a CIDR block of another VPC in the current region. If you intend to enable communication between VPCs or between a VPC and an on-premises data center, change the CIDR block. [View VPC CIDR blocks in current region](#)

---

Advanced Settings ▾ Tag | Description

---

**Default Subnet**

AZ  ?

Name

IPv4 CIDR Block  ? Available IP Addresses: 251

The CIDR block cannot be modified after the subnet has been created.

IPv6 CIDR Block  Enable ?

Associated Route Table  ?

---

Advanced Settings ▾ Gateway | DNS Server Address | NTP Server Address | DHCP Lease Time | Tag | Description

**Step 5 Configure parameters as needed and click Create Now.**


**Step 6 Return to the VPC list and check whether the VPC is created.**

If the VPC status becomes available, the VPC has been created.

----End

## Creating a Security Group

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select AP-Singapore.

**Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** In the navigation pane, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Configure parameters as needed.

**Create Security Group** ×

\* Name

\* Template

Description 

The security group is for general-purpose web servers and includes default rules that allow all inbound ICMP traffic and inbound traffic on ports 22, 80, 443, and 3389. The security group is used for remote login, ping, and hosting a website on ECSs.

 0/255

[Show Default Rule](#) ▼

OK Cancel

**Step 7** Click **OK**.

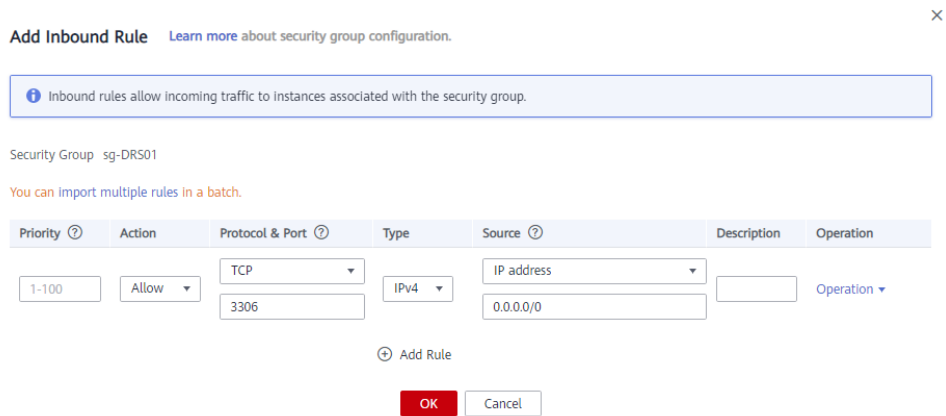
**Step 8** Return to the security group list and click the security group name (**sg-DRS01** in this example).

**Step 9** Click the **Inbound Rules** tab, and then click **Add Rule**.

Summary Inbound Rules | Outbound Rules | Associated Instances

Add Rule Fast-Add Rule Delete Allow Common Ports Inbound Rules: 9 [Learn more about security group configuration.](#)

**Step 10** Configure an inbound rule to allow access from database port **3306**.




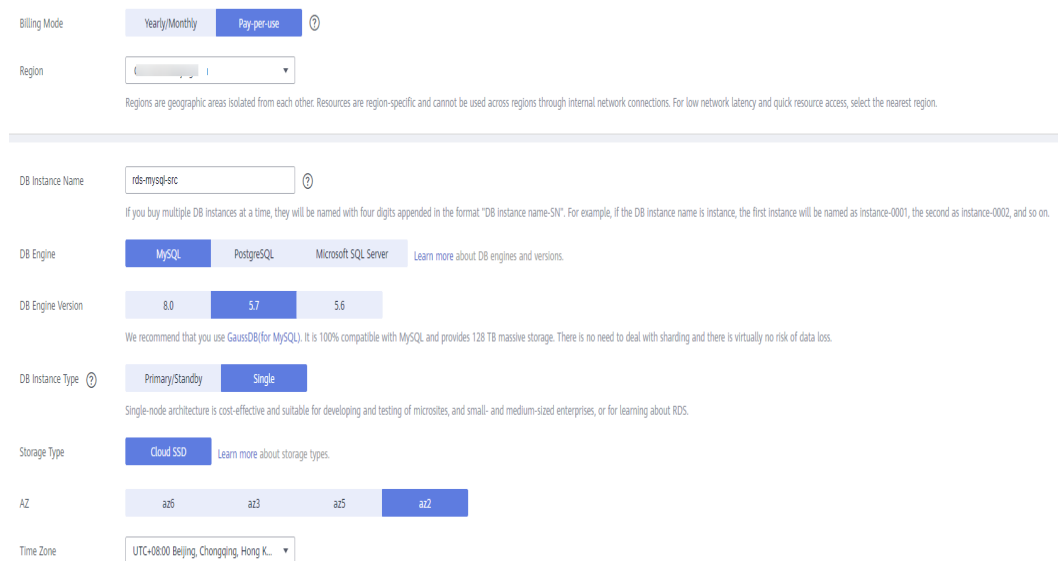
----End

### 2.9.4.2 Creating an RDS for MySQL Instance

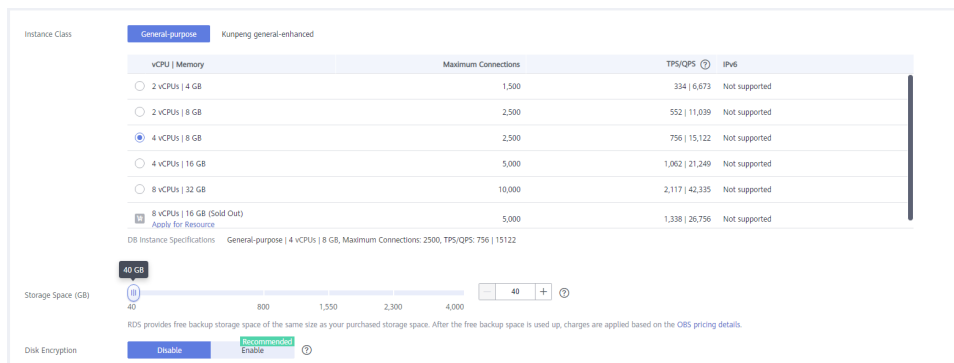
Create an RDS for MySQL instance and construct test data.

#### Creating an Instance

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select AP-Singapore.
- Step 3** Under the service list, choose **Databases > Relational Database Service**.
- Step 4** Click **Buy DB Instance**.
- Step 5** Configure the instance name and basic information.

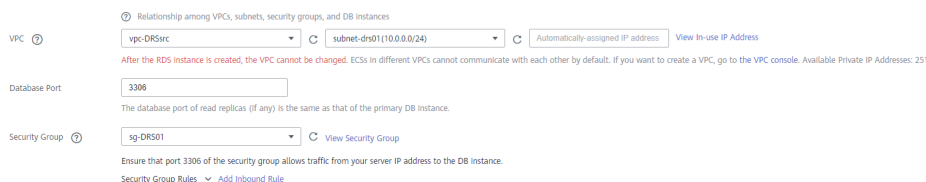


- Step 6** Configure instance specifications.

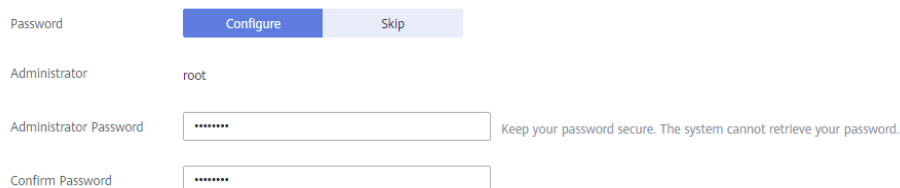


**Step 7** Select a VPC and security group for the instance and configure the database port.

The VPC and security group have been created in [Creating a VPC and Security Group](#).



**Step 8** Configure the instance password.



**Step 9** Click **Next**.

**Step 10** Confirm your settings.

- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.


**Step 11** Return to the instance list.

If the instance status becomes available, the instance has been created.

----End

## Generating Test Data

**Step 1** Log in to the [management console](#).

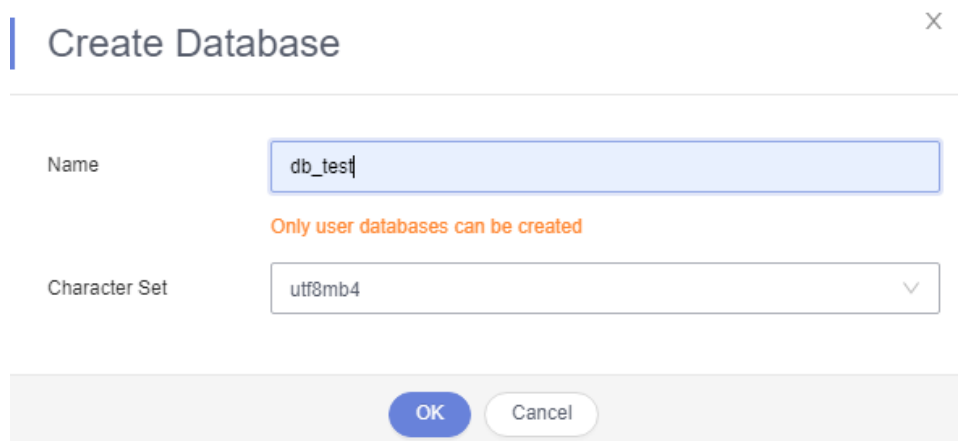
**Step 2** Click  in the upper left corner of the management console and select AP-Singapore.

**Step 3** Under the service list, choose **Databases > Relational Database Service**.

**Step 4** Select an RDS instance and choose **More > Log In**.



- Step 5** In the dialog box that is displayed, enter the username and password of the instance and click **Test Connection**.
- Step 6** After the connection is successful, click **Log In** to log in to the RDS instance.
- Step 7** Click **Create Database** to create the **db\_test** database.



**Create Database** X

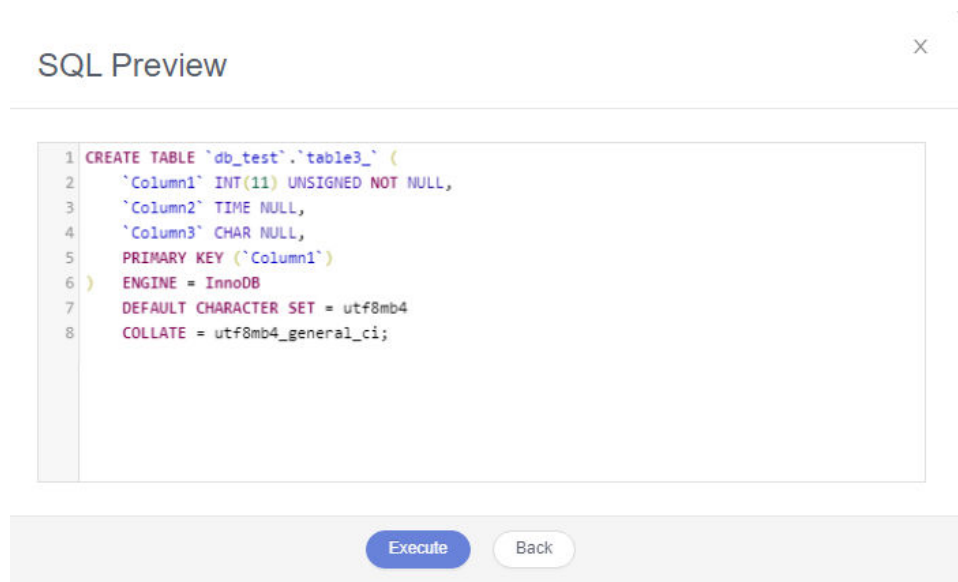
Name

Only user databases can be created

Character Set

- Step 8** Run the following statements in **db\_test** to create table **table3**:

```
CREATE TABLE `db_test`.`table3` (
 `Column1` INT(11) UNSIGNED NOT NULL,
 `Column2` TIME NULL,
 `Column3` CHAR NULL,
 PRIMARY KEY (`Column1`)
) ENGINE = InnoDB
 DEFAULT CHARACTER SET = utf8mb4
 COLLATE = utf8mb4_general_ci;
```



**SQL Preview** X

```
1 CREATE TABLE `db_test`.`table3` (
2 `Column1` INT(11) UNSIGNED NOT NULL,
3 `Column2` TIME NULL,
4 `Column3` CHAR NULL,
5 PRIMARY KEY (`Column1`)
6) ENGINE = InnoDB
7 DEFAULT CHARACTER SET = utf8mb4
8 COLLATE = utf8mb4_general_ci;
```

- Step 9** Run the following statements in table **table3** to insert three lines of data:

```
INSERT INTO `db_test`.`table3` (`Column1`,`Column2`,`Column3`) VALUES(1,'00:00:11','a');
INSERT INTO `db_test`.`table3` (`Column1`,`Column2`,`Column3`) VALUES(2,'00:00:22','b');
INSERT INTO `db_test`.`table3` (`Column1`,`Column2`,`Column3`) VALUES(5,'00:00:55','e');
```




----End

## 2.9.5 Preparing for the Destination DDM Instance

### 2.9.5.1 Creating a VPC and Security Group

Create a VPC and security group to prepare network resources and security groups for the destination DDM instance.

#### Creating a VPC

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.
- Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.  
The VPC console is displayed.
- Step 4** Click **Create VPC**.

**Basic Information**

Region

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Name

IPv4 CIDR Block

Recommended: 10.0.0.0/8-24 (Select) 172.16.0.0/12-24 (Select) 192.168.0.0/16-24 (Select)

---

Advanced Settings ▾ Tag | Description

---

**Default Subnet**

AZ  ⓘ

Name

IPv4 CIDR Block  ⓘ Available IP Addresses: 251

The CIDR block cannot be modified after the subnet has been created.

IPv6 CIDR Block  Enable ⓘ

Associated Route Table  ⓘ

---

Advanced Settings ▾ Gateway | DNS Server Address | NTP Server Address | DHCP Lease Time | Tag | Description

**Step 5** Configure parameters as needed and click **Create Now**.


**Step 6** Return to the VPC list and check whether the VPC is created.

If the VPC status becomes available, the VPC has been created.

----End

## Creating a Security Group

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.

**Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** In the navigation pane, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Specify the security group name and other information, and click **OK**.

**Create Security Group** ×

\* Name

\* Template

Description 

The security group is for general-purpose web servers and includes default rules that allow all inbound ICMP traffic and inbound traffic on ports 22, 80, 443, and 3389. The security group is used for remote login, ping, and hosting a website on ECSs.


 0/255

[Show Default Rule](#) ▾

----End

### 2.9.5.2 Creating a DDM Instance

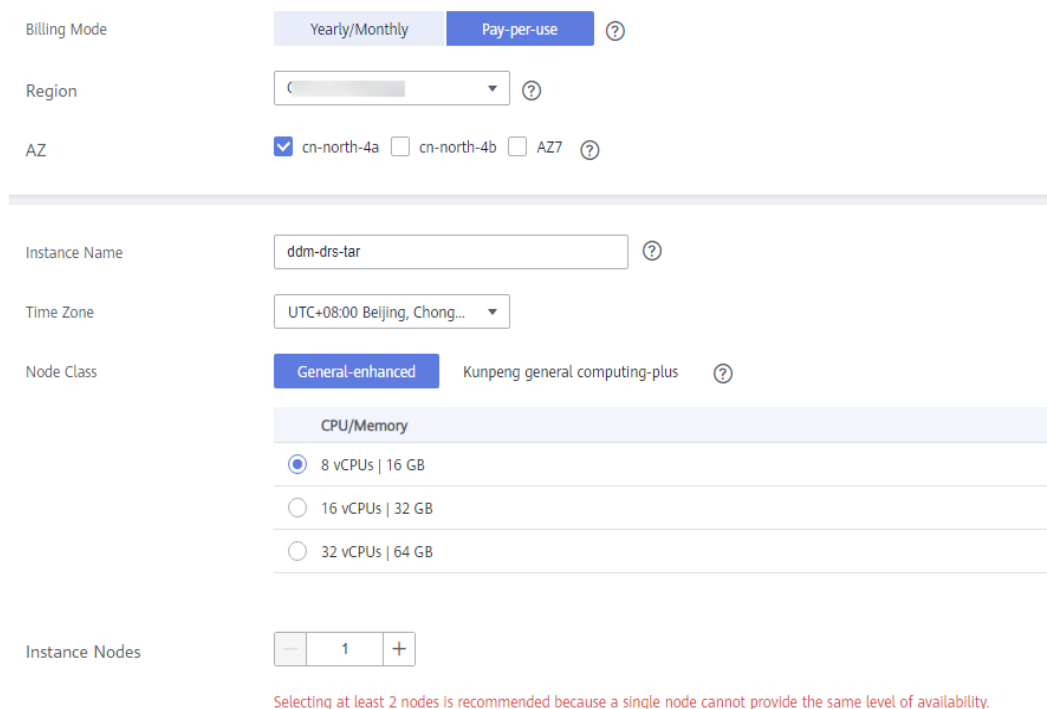
**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.

**Step 3** Click **Service List** on the left and choose **Databases > Distributed Database Middleware**.

**Step 4** On the displayed page, in the upper right corner, click **Buy DDM Instance**.

**Step 5** Specify the instance information and specifications as required.



Billing Mode: Yearly/Monthly | **Pay-per-use** ?

Region: [Dropdown] ?

AZ:  cn-north-4a  cn-north-4b  AZ7 ?

---

Instance Name: [Input: ddm-drs-tar] ?

Time Zone: [Dropdown: UTC+08:00 Beijing, Chong...] ?

Node Class: **General-enhanced** | Kunpeng general computing-plus ?

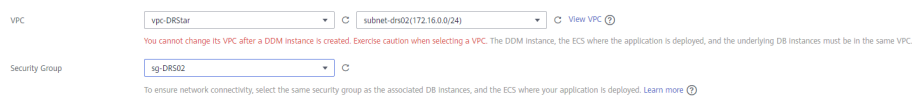
CPU/Memory:

- 8 vCPUs | 16 GB
- 16 vCPUs | 32 GB
- 32 vCPUs | 64 GB

Instance Nodes: [ - ] [ 1 ] [ + ]

Selecting at least 2 nodes is recommended because a single node cannot provide the same level of availability.

**Step 6** Select a VPC and security group for the instance and configure the database port. The VPC and security group have been created in [Creating a VPC and Security Group](#).



VPC: [Dropdown: vpc-dRStar] [Dropdown: subnet-dn02(172.16.0.0/24)] [View VPC ?]

Security Group: [Dropdown: sg-dR502] [View ?]

You cannot change its VPC after a DDM Instance is created. Exercise caution when selecting a VPC. The DDM Instance, the ECS where the application is deployed, and the underlying DB Instances must be in the same VPC.

To ensure network connectivity, select the same security group as the associated DB Instances, and the ECS where your application is deployed. Learn more ?

**Step 7** After the configuration is complete, click **Next** at the bottom of the page.

**Step 8** Confirm your settings.

- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.

**Step 9** To view and manage the instance, go to the **Instances** page.

The default database port is **5066** and can be changed after a DDM instance is created. If the status of the instance is **Running**, the instance has been created.


----End

### 2.9.5.3 Creating an RDS for MySQL Instance

Create an RDS for MySQL instance associated with the DDM instance.

#### Procedure

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.

**Step 3** Under the service list, choose **Databases > Relational Database Service**.

**Step 4** Click **Buy DB Instance**.

**Step 5** Configure the instance name and basic information.

Billing Mode:  Yearly/Monthly  Pay-per-use ⓘ

Region:

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

---

DB Instance Name:  ⓘ

If you buy multiple DB instances at a time, they will be named with four digits appended in the format "DB Instance name-SN". For example, if the DB Instance name is instance, the first instance will be named as instance-0001, the second as instance-0002, and so on.

DB Engine:  MySQL  PostgreSQL  Microsoft SQL Server Learn more about DB engines and versions. There is a limited-time offer for GaussDB(for Redis). Using GaussDB(for Redis) with RDS helps you reduce costs by storing hot and cold data separately.

DB Engine Version:  8.0  5.7  5.6

We recommend that you use GaussDB(for MySQL). It is 100% compatible with MySQL and provides 128 TB massive storage. There is no need to deal with sharding and there is virtually no risk of data loss.

DB Instance Type ⓘ:  Primary/Standby  Single

Single-node architecture is cost-effective and suitable for developing and testing of microsites, and small- and medium-sized enterprises, or for learning about RDS.

Storage Type:  Cloud SSD Learn more about storage types.

AZ:  cn-north-4a  AZ7  cn-north-4b  cn-north-4c

Time Zone:

**Step 6** Configure instance specifications.

Instance Class:  General-purpose Kunpeng general-enhanced

| vCPU   Memory                                    | Maximum Connections | TPS/QPS ⓘ      | IPv6          |
|--------------------------------------------------|---------------------|----------------|---------------|
| <input type="radio"/> 2 vCPUs   4 GB             | 1,500               | 334   6,673    | Not supported |
| <input type="radio"/> 2 vCPUs   8 GB             | 2,500               | 552   11,039   | Not supported |
| <input checked="" type="radio"/> 4 vCPUs   8 GB  | 2,500               | 756   15,122   | Not supported |
| <input type="radio"/> 4 vCPUs   16 GB            | 5,000               | 1,062   21,249 | Not supported |
| <input type="radio"/> 8 vCPUs   32 GB            | 10,000              | 2,117   42,335 | Not supported |
| <input type="radio"/> 8 vCPUs   16 GB (Sold Out) | 5,000               | 1,338   26,756 | Not supported |

DB Instance Specifications: General-purpose | 4 vCPUs | 8 GB, Maximum Connections: 2500, TPS/QPS: 756 | 15122

Storage Space (GB):  ⓘ

RDS provides free backup storage space of the same size as your purchased storage space. After the free backup space is used up, charges are applied based on the OBS pricing details.

Disk Encryption:  Enable  Disable ⓘ

**Step 7** Select a VPC and security group for the instance and configure the database port.

The VPC and security group have been created in [Creating a VPC and Security Group](#).



The RDS for MySQL instance must be in the same VPC and subnet as your DDM instance.

Relationship among VPCs, subnets, security groups, and DB instances

VPC ⓘ:  ⓘ  ⓘ  [View In-use IP Address](#)

After the RDS instance is created, the VPC cannot be changed. ECSs in different VPCs cannot communicate with each other by default. If you want to create a VPC, go to the VPC console. Available Private IP Addresses: 245

Database Port:

Security Group ⓘ:  ⓘ [View Security Group](#)

Ensure that port 3306 of the security group allows traffic from your server IP address to the DB instance.

Security Group Rules

**Step 8** Configure the instance password.

|                        |                                          |                                                                      |
|------------------------|------------------------------------------|----------------------------------------------------------------------|
| Password               | <input type="button" value="Configure"/> | <input type="button" value="Skip"/>                                  |
| Administrator          | root                                     |                                                                      |
| Administrator Password | <input type="password" value="*****"/>   | Keep your password secure. The system cannot retrieve your password. |
| Confirm Password       | <input type="password" value="*****"/>   |                                                                      |

**Step 9** Click **Next**.

**Step 10** Confirm your settings.

- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.


**Step 11** Return to the instance list.

If the instance status becomes available, the instance has been created.

----End

### 2.9.5.4 Creating a Schema and Associating It with the RDS for MySQL Instance

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.

**Step 3** Click **Service List** on the left and choose **Databases > Distributed Database Middleware**.

**Step 4** On the **Instances** page, locate the required DDM instance and click **Create Schema** in the **Operation** column.

**Step 5** On the displayed page, specify a sharding mode, enter a schema name, set the number of shards, select the required DDM accounts, and click **Next**.

In this example, the schema is unsharded, and the schema name is **db\_test**.

---

 **CAUTION**

Currently, only data can be migrated from the source RDS for MySQL database to the destination DDM instance. Source table structures and other objects cannot be migrated, so you need to create schemas in the destination database based on the table structure of the source database.

---

\* Sharding Sharded Unsharded  
 One schema corresponds to only one data node, and only one shard is created on the data node.

\* Schema Name  ?

Account  C  
 No accounts available. [Create Account](#)

---

Data Nodes ?


[RDS for MySQL 5.7](#) | [RDS for MySQL 8.0](#) | [GaussDB\(for MySQL\)](#)

Select only the data nodes that are in the same VPC as your DDM instance and not in use by other DDM instances. DDM will create databases on the selected data nodes without affecting their existing databases and tables.

| <input checked="" type="checkbox"/> | Name      | Status                                       | Connection Address | DB Engine |
|-------------------------------------|-----------|----------------------------------------------|--------------------|-----------|
| <input checked="" type="checkbox"/> | rds-ddm01 | <span style="color: green;">➔</span> Running | 172.16.0.188:3306  | MySQL 5.7 |

----End

### 2.9.5.5 Creating a DDM Account

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.
- Step 3** Click **Service List** on the left and choose **Databases > Distributed Database Middleware**.
- Step 4** On the **Instances** page, click the target instance name.
- Step 5** In the navigation pane, choose **Accounts**.
- Step 6** On the displayed page, click **Create Account** and configure the required parameters.

For details about the permissions required by the DDM account, see [Precautions](#)



×

### Create Account

\* Username  ?

\* Password

\* Confirm Password

Schema

\* Permissions

All

CREATE  DROP  ALTER  INDEX  INSERT  DELETE

UPDATE  SELECT

Description

0/256


**Step 7** Click **OK**.

----End

## 2.9.5.6 Creating Table Structures in the Destination Database

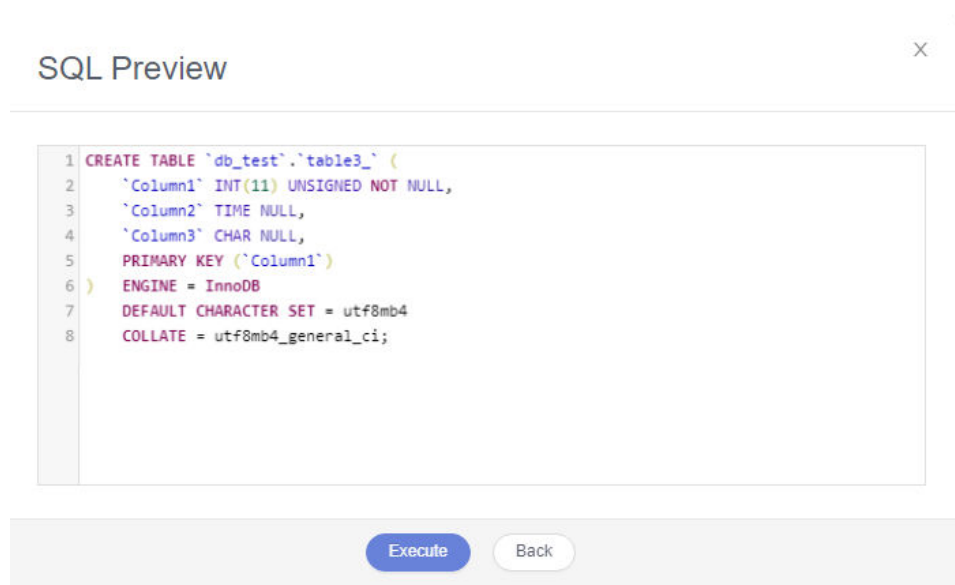
Currently, only data can be migrated from the source RDS for MySQL database to the destination DDM instance. Source table structures and other objects cannot be migrated, so you need to create table structures and indexes in the destination database based on the table structures of the source schema. Objects that are not created in the destination database are not to be migrated. For more constraints, see [Before You Start](#).

### Procedure

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.
- Step 3** Click **Service List** on the left and choose **Databases > Distributed Database Middleware**.
- Step 4** On the **Instances** page, locate the required instance and click **Log In** in the **Operation** column.
- Step 5** On the displayed page, enter the username and password created in [Creating a DDM Account](#), and then click **Test Connection**.
- Step 6** After the connection is successful, click **Log In** to log in to the DDM instance.

- Step 7** Click the **db\_test** schema created in [Creating a Schema and Associating It with the RDS for MySQL Instance](#).
- Step 8** Run the following statements in database **db\_test** to create table **table3\_** with the same structure as the source table:


```
CREATE TABLE `db_test`.`table3_` (
 `Column1` INT(11) UNSIGNED NOT NULL,
 `Column2` TIME NULL,
 `Column3` CHAR NULL,
 PRIMARY KEY (`Column1`)
) ENGINE = InnoDB
 DEFAULT CHARACTER SET = utf8mb4
 COLLATE = utf8mb4_general_ci;
```



----End

## 2.9.6 Creating and Configuring a VPN

### 2.9.6.1 Creating a VPN for the Source Database

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select AP-Singapore.
- Step 3** Click **Service List** in the upper left corner. Under **Networking**, select **Virtual Private Network**.
- Step 4** In the navigation pane on the left, choose **Virtual Private Network > VPN Gateway**.
- Step 5** On the **VPN Gateways** page, click **Buy VPN Gateway**.
- Step 6** Configure the required parameters.

\* Billing Mode:  Yearly/Monthly  Pay-per-use ?

A VPN connection must be purchased together with the VPN gateway. The VPN connection and the gateway will be billed on a pay-per-use basis.

\* Region:

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

---

\* Name:

\* VPC:  Create VPC

\* Type:  IPsec

\* Billed By:  Bandwidth  Traffic

\* Bandwidth (Mbit/s):  5  10  20  50  100  200  300 ?

**CAUTION**

The VPC connected to the VPN gateway must be the same as the VPC of the source RDS for MySQL instance, that is, the VPC created in [Creating a VPC and Security Group](#).

**Step 7** Specify the VPN connection information as prompted and click **Buy Now**.

VPN Connection

\* Name:

VPN Gateway: vpngw-src

\* Local Subnet:  Select subnet Specify CIDR block

\* Remote Gateway:

\* Remote Subnet:

Using 100.64.0.0/10 as the customer subnet may cause services such as OBS, DNS, API Gateway to become unavailable.

\* PSK:

\* Confirm PSK:

\* Advanced Settings:  Default  Custom ?

Default policy settings now include stronger encryption for enhanced security. The default IKE policy, encryption and DH algorithms (IKEv1, Group 5, and SHA1) are now IKEv2, Group 14, and SHA2-256.

| IKE Policy               |          | IPsec Policy             |             |
|--------------------------|----------|--------------------------|-------------|
| Authentication Algorithm | SHA2-256 | Authentication Algorithm | SHA2-256    |
| Encryption Algorithm     | AES-128  | Encryption Algorithm     | AES-128     |
| DH Algorithm             | Group 14 | PSK                      | DH Group 14 |
| Version                  | v2       | Transfer Protocol        | ESP         |

**CAUTION**

- The local subnet must be the same as the subnet of the VPC where the source RDS for MySQL DB instance is located, that is, the subnet created in [Creating a VPC and Security Group](#).
- The remote gateway and remote subnet are the gateway and subnet of the target VPN. The target VPN has not been created. You can enter any value and change it after the target VPN is created.


**Step 8** After the VPN gateway is created, view its information in the VPN gateway list. The status of the VPN gateway is **Not connected**. When a VPN connection uses this VPN gateway, the VPN gateway enters the **Normal** state.

| Name      | Status        | VPN Gateway | Local Gateway | Local Subnet | Remote Gateway | Remote Subnet | Billing Mode                                                | Operation |
|-----------|---------------|-------------|---------------|--------------|----------------|---------------|-------------------------------------------------------------|-----------|
| vpn-src01 | Not connected | vpngw-src   | 123.60.236.64 | 10.0.0/24    | 172.0.0.0      | 172.16.0.0/24 | Pay-per-use<br>Assigned: Apr 13, 2022<br>09:17:25 GMT+08:00 | Operation |

----End

### 2.9.6.2 Creating a VPN for the Destination Database

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.

**Step 3** Click **Service List** in the upper left corner. Under **Networking**, select **Virtual Private Network**.

**Step 4** In the navigation pane on the left, choose **Virtual Private Network > VPN Gateway**.

**Step 5** On the **VPN Gateways** page, click **Buy VPN Gateway**.

**Step 6** Configure the required parameters.

\* Billing Mode:  Yearly/Monthly  Pay-per-use ?

A VPN connection must be purchased together with the VPN gateway. The VPN connection and the gateway will be billed on a pay-per-use basis.

\* Region:  ?

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

---

\* Name:

\* VPC:  Create VPC

\* Type:  IPsec

\* Billed By:  Bandwidth  Traffic

\* Bandwidth (Mbit/s):  5  10  20  50  100  200  300 ?

**CAUTION**

The VPC connected to the VPN gateway must be the same as the VPC of the destination DDM instance, that is, the VPC created in [Creating a VPC and Security Group](#).

**Step 7** Specify the VPN connection information as prompted.

VPN Connection

\* Name

VPN Gateway

\* Local Subnet

\* Remote Gateway

\* Remote Subnet

Using 100.64.0.0/10 as the customer subnet may cause services such as OBS, DNS, API Gateway to become unavailable.

\* PSK

\* Confirm PSK

\* Advanced Settings  Default  Custom

Default policy settings now include stronger encryption for enhanced security. The default: IKE policy, encryption and DH algorithms (IKEv1, Group 5, and SHA1) are now IKEv2, Group 14, and SHA2-256.

| IKE Policy               |          | IPsec Policy             |             |
|--------------------------|----------|--------------------------|-------------|
| Authentication Algorithm | SHA2-256 | Authentication Algorithm | SHA2-256    |
| Encryption Algorithm     | AES-128  | Encryption Algorithm     | AES-128     |
| DH Algorithm             | Group 14 | PFPS                     | DH Group 14 |
| Version                  | v2       | Transfer Protocol        | ESP         |


**CAUTION**

- The local subnet must be the same as the subnet of the VPC where the destination DDM instance is located, that is, the subnet created in [Creating a VPC and Security Group](#).
- The remote gateway and remote subnet are the gateway and subnet of the source VPN. Configure the parameters based on the information about the VPN created in [Creating a VPN for the Source Database](#).

-----End

### 2.9.6.3 Modifying the VPN Configuration for the Source Database

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select AP-Singapore.

**Step 3** Click **Service List** in the upper left corner. Under **Networking**, select **Virtual Private Network**.

**Step 4** In the navigation pane on the left, choose **Virtual Private Network > VPN Connections**.

**Step 5** On the **VPN Connections** page, locate the row that contains the VPN connection created in [Creating a VPN for the Source Database](#) and click **Modify** in the **Operation** column.

**Step 6** On the **Modify VPN Connection** page, change the values of **Remote Gateway** and **Remote Subnet**.

**CAUTION**

The remote gateway and remote subnet are the gateway and subnet of the destination VPN. Configure the parameters based on the information about the VPN created in [Creating a VPN for the Destination Database](#).

**Step 7** After the configuration is complete, view the VPN gateway information in the list. The VPN gateway status is **Normal**.

| Name      | Status | VPN Gateway | Local Gateway | Local Subnet | Remote Gateway | Remote Subnet | Billing Mode                                                | Operation |
|-----------|--------|-------------|---------------|--------------|----------------|---------------|-------------------------------------------------------------|-----------|
| vpn-src01 | Normal | vpn-src     | 123.60.236.84 | 10.0.0.0/24  | 123.60.251.207 | 172.16.0.0/24 | Pay-per-use<br>Assigned: Apr 13, 2022<br>09:17:25 GMT+08:00 | Operation |

----End

## 2.9.7 Creating a DRS Migration Task

Create a DRS migration task to migrate data from RDS for MySQL databases in different regions to DDM.


### Pre-Migration Check

Before creating a migration task, check the migration environment.

This section describes how to migrate data from a MySQL database to DDM. For details, see [Before You Start](#).

### Creating a Migration Task

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.

**Step 3** Under the service list, choose **Databases > Data Replication Service**.

**Step 4** In the upper right corner, click **Create Migration Task**.

**Step 5** Configure the required parameters.

1. Specify a migration task name.

Region: [Dropdown menu]

Project: [Dropdown menu]

\* Task Name: DRS-7447

Description: [Text area]

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

2. Configure replication instance details as needed.

Select the DDM instance created in [Creating a DDM Instance](#) as the destination database.

**Figure 2-75** Replication instance information

**Replication Instance Details**

The following information cannot be modified after you go to the next page.

- Data Flow:** To the cloud (selected), Out of the cloud
- Source DB Engine:** MySQL (selected), MySQL schema and logic table, MongoDB, Single-Node or Master/Standby Redis, Redis cluster
- Destination DB Engine:** MySQL, **DDM** (selected), TaurusDB
- Network Type:** Public network (selected)
- Destination DB Instance:** Select an instance (dropdown), View DB Instance, View Unselectable DB Instance
- Replication Instance Subnet:** Select the subnet (dropdown), View Subnets, View Occupied IP Address
- Migration Type:** **Full-Incremental** (selected), Full
- Specify EIP:** (dropdown), Create an EIP

DRS will automatically bind the specified EIP to the DRS instance and unbind the EIP after the task is complete. For details about the data transmission fee when an EIP is specified, see the pricing details of the EIP service.

This migration type allows you to migrate data with minimal downtime. After a full migration initializes the destination database, an incremental migration parses logs to ensure data consistency between the source and destination databases.

**Step 6** Click **Create Now**.

It takes about 5 to 10 minutes to create a replication instance.

**Step 7** Configure source and destination database information.

1. Configure the source database information and click **Test Connection**. If a successful test message is returned, the database is connected.

**Source Database**

System databases, users, parameters, and jobs will not be migrated. You need to manually import users and jobs to the destination database and configure parameters in parameter templates of the destination database.

IP Address or Domain Name: [Text field]

Port: 3306

Database Username: root

Database Password: [Text field with eye icon]

SSL Connection: [Toggle switch]

Test Connection: [Button] Test successful

2. Configure destination database information and click **Test Connection**. If a successful test message is returned, the database is connected.

## Destination Database

|                                                                                                     |                                        |
|-----------------------------------------------------------------------------------------------------|----------------------------------------|
| DB Instance Name                                                                                    | ddm-drs-tar ( )                        |
| Database Username                                                                                   | <input type="text" value="ddm_user"/>  |
| Database Password                                                                                   | <input type="password" value="*****"/> |
| <input type="button" value="Test Connection"/> <span style="color: green;">✔ Test successful</span> |                                        |

**Step 8** Click **Next**.

**Step 9** On the **Set Task** page, configure migration objects.

- **Migrate Object:** Select **Tables**.

**Step 10** Click **Next**. On the **Check Task** page, check the migration task.

- If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.
- If all check items are successful, click **Next**.

**Step 11** Click **Submit**.

Return to the **Online Migration Management** page and check the migration task status.

It takes several minutes to complete.

| Task Name/ID                                     | Status   | Delay | Charging | Data Flow    | DB Engine | Migration Type   | Created                      | Network... | Descript... | Operation |
|--------------------------------------------------|----------|-------|----------|--------------|-----------|------------------|------------------------------|------------|-------------|-----------|
| DRS-MySQLToDDM<br>76a88a9c-b412-4ab7-9ea3-6f2... | Starting | -     | No       | To the cloud | MySQL-DDM | Full+Incremental | Apr 12, 2022 16:17:51 GMT... | VPN or ... |             | Stop      |

If the status changes to **Full migration**, the migration task has been started.

### NOTE

- For migration from MySQL to DDM, full migration and full+incremental migration modes are supported.
- If you create a full migration task, the task automatically stops after the full data is migrated to the destination.
- If you create a full+incremental migration task, a full migration is executed first. After the full migration is complete, an incremental migration starts.
- During the incremental migration, data is continuously migrated so the task will not automatically stop.

----End

## 2.9.8 Confirming Migration Results

You can use either of the following methods to check the migration results:


1. DRS compares migration objects and data and provides comparison results. For details, see [Viewing Migration Results on the DRS Console](#).



2. Log in to the destination side to check whether the databases, tables, and data are migrated. Confirm the data migration status. For details, see [Viewing Migration Results on the DDM Console](#).

## Viewing Migration Results on the DRS Console

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.

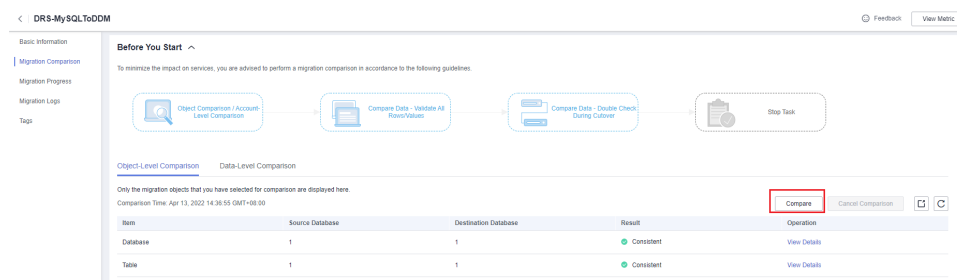
**Step 3** Under the service list, choose **Databases > Data Replication Service**.

**Step 4** Click the DRS instance name.

**Step 5** In the navigation pane on the left, choose **Migration Comparison**.

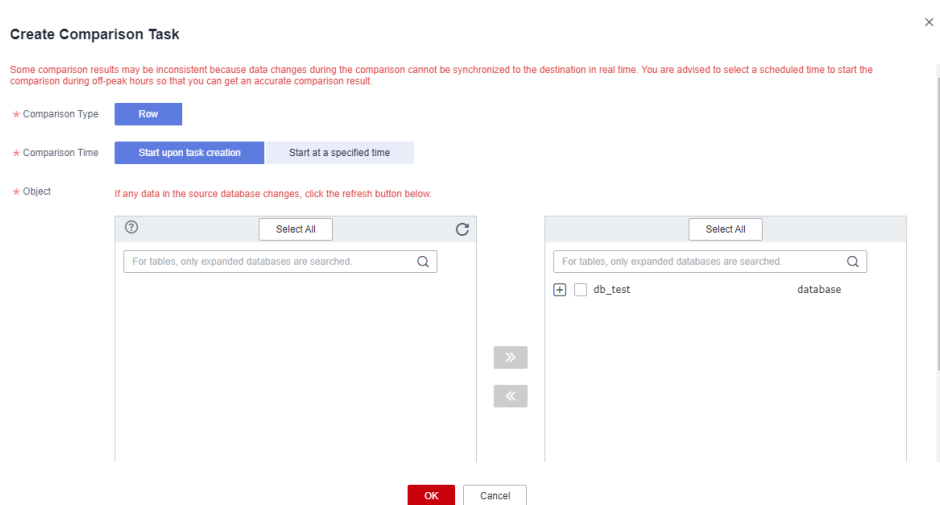
**Step 6** Click the **Object-Level Comparison** tab and check whether some objects are missing.

Click **Compare**. After the comparison is complete, view the comparison results.

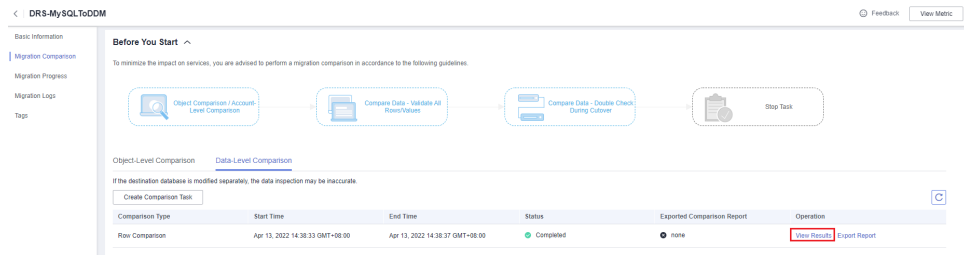


**Step 7** Choose **Data-Level Comparison** and check whether the number of rows of migrated objects is consistent.

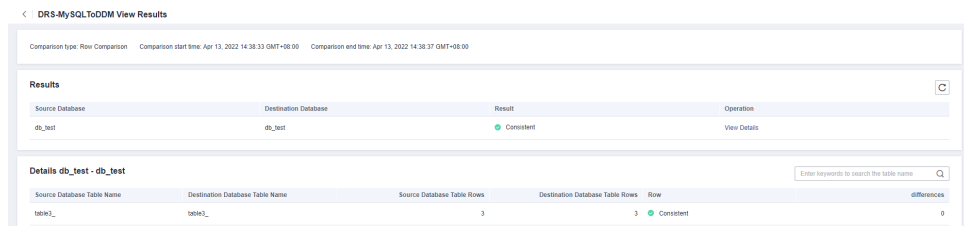
1. Click **Create Comparison Task**.
2. In the displayed dialog box, select the comparison type, time, and object.



3. After the comparison task is complete, view the data comparison results.




- To view the comparison details, click **View Results** next to the comparison task.



----End

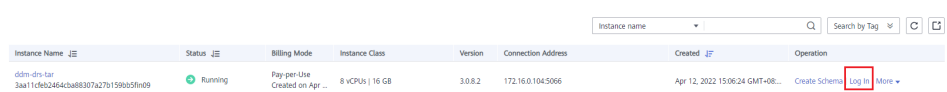
## Viewing Migration Results on the DDM Console

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select CN-Hong Kong.

**Step 3** Click **Service List** on the left and choose **Databases > Distributed Database Middleware**.

**Step 4** Locate the DDM instance and click **Log In** in the **Operation** column.



**Step 5** In the dialog box that is displayed, enter the password and click **Test Connection**.

**Step 6** After the connection is successful, click **Log In**.

**Step 7** Check whether the databases and tables of the source instance have been migrated.

----End

## 2.10 From MySQL Schema and Logic Table to DDM

### 2.10.1 Overview

#### Scenarios

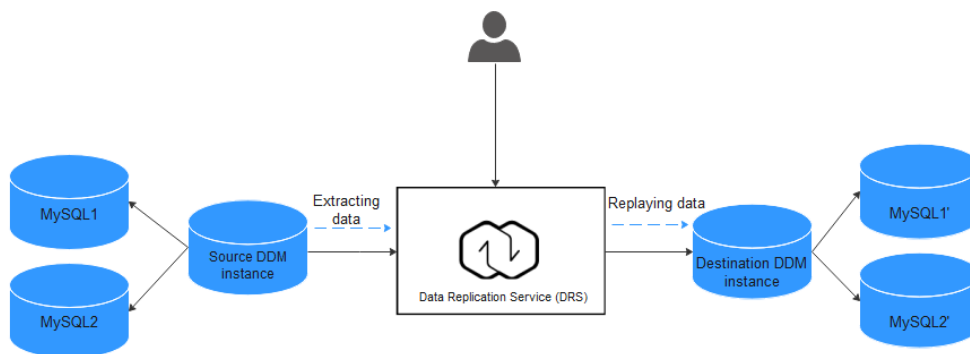
Traditional databases are expensive and difficult to maintain. These deficiencies are some of the driving forces behind cloud migration. This section describes how

to use DRS to migrate MySQL shards and tables to a DDM instance on Huawei Cloud.

## Solution Architecture

In this example, DDS shards and tables are associated with two MySQL instances at the source side, and a DDM instance is associated with two RDS MySQL instances at the destination side. Source data is migrated to the destination through a DRS instance, and source data is continuously synchronized before the incremental synchronization task is manually stopped. [Figure 2-76](#) shows the overall deployment architecture.

**Figure 2-76** Solution architecture



## Advantages

- The full+incremental migration mode is used to ensure that services are not interrupted and data is not lost during data migration.
- DRS saves traditional database administrator (DBA) costs and hardware costs, and supports on-demand pricing.
- A migration task can be set up within minutes.

## 2.10.2 Resource Planning

**Table 2-39** Resource planning

| Resource                    | Name                 | Description                                                                                                                                                                | Quantity |
|-----------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Virtual Private Cloud (VPC) | vpc-src-172          | CIDR: 172.16.0.0/16                                                                                                                                                        | 1        |
| Source DDM instance         | Autotest-DDM-SRC-001 | <ul style="list-style-type: none"> <li>• Specifications: 4 vCPUs   8 GB</li> <li>• Nodes: 2</li> <li>• Schema: db_test_info</li> <li>• Database user: test_info</li> </ul> | 1        |

| Resource                                                     | Name                    | Description                                                                                                                                                                                               | Quantity |
|--------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| RDS DB instance associated with the source DDM instance      | Auto-ddm-Single-SRC-001 | <ul style="list-style-type: none"><li>DB instance type: single</li><li>Database version: MySQL 5.7</li><li>Specifications: General-enhanced 2 vCPUs   4 GB</li><li>Storage type: ultra-high I/O</li></ul> | 1        |
|                                                              | Auto-ddm-Single-SRC-002 | <ul style="list-style-type: none"><li>DB instance type: single</li><li>Database version: MySQL 5.7</li><li>Specifications: General-enhanced 1 vCPU   2 GB</li><li>Storage type: ultra-high I/O</li></ul>  | 1        |
| Destination DDM instance                                     | Autotest-DDM-SRC-001    | <ul style="list-style-type: none"><li>Specifications: 2 vCPUs   8 GB</li><li>Nodes: 2</li><li>Schema: db_test_info</li><li>Database user: test_info_tar</li></ul>                                         | 1        |
| RDS DB instance associated with the destination DDM instance | Auto-tar-ddm-0001       | <ul style="list-style-type: none"><li>DB instance type: single</li><li>Database version: MySQL 5.7</li><li>Specifications: General-enhanced 1 vCPU   2 GB</li><li>Storage type: ultra-high I/O</li></ul>  | 1        |
|                                                              | Auto-tar-ddm-0002       | <ul style="list-style-type: none"><li>DB instance type: single</li><li>Database version: MySQL 5.7</li><li>Specifications: General-enhanced 1 vCPU   2 GB</li><li>Storage type: ultra-high I/O</li></ul>  | 1        |
| DRS replication instance                                     | DRS-test-info           | <ul style="list-style-type: none"><li>Source DB engine: MySQL shards and tables</li><li>Destination DB engine: DDM</li><li>Network type: public network</li></ul>                                         | 1        |

## 2.10.3 Process

[Figure 2-77](#) shows the main operation flowchart.

Figure 2-77 Flowchart

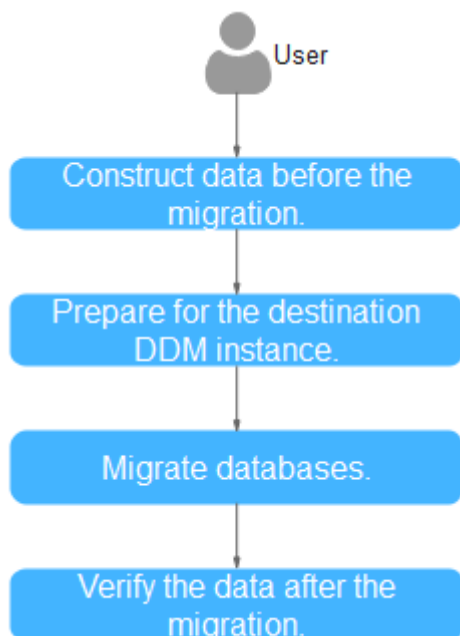


Table 2-40 Migration process

| No. | Procedure                                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | <b>Constructing Data Before the Migration</b>     | Before the migration, construct data in the source database so that you can check whether the migration is successful after the migration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2   | <b>Preparing for the Destination DDM Instance</b> | <ol style="list-style-type: none"> <li><b>Creating a VPC and Security Group:</b> Prepare network resources for creating an instance.</li> <li><b>Creating a DDM Instance:</b> Create a destination DDM instance.</li> <li><b>Creating an RDS for MySQL Instance:</b> Create an RDS MySQL instance associated with the DDM instance.</li> <li><b>Creating a DDM Account:</b> Create an account for connecting to the DDM schema.</li> <li><b>Creating a Schema and Associating It with the RDS for MySQL Instance:</b> Associate DDM with an RDS MySQL instance.</li> <li><b>Creating Table Structures in the Destination Database:</b> Create a table structure in the destination database for data migration.</li> </ol> |

| No. | Procedure                             | Description                                                                    |
|-----|---------------------------------------|--------------------------------------------------------------------------------|
| 3   | <b>Migrating Databases</b>            | Describe how to create a DRS migration task and the overall migration process. |
| 4   | <b>Verifying Data After Migration</b> | Verify the data migration results by comparing data.                           |

## 2.10.4 Procedure

### 2.10.4.1 Constructing Data Before the Migration

Before the migration, you need to construct some data types in the source database for data verification after the migration.

#### Prerequisites

You have obtained the IP address, port, username, and password of the source instance.

#### Procedure

**Step 1** Use the database connection tool to connect to the IP address of the source database.

**Step 2** Construct data in the source database based on the supported data types.

1. Log in to the source database.

2. Open a schema to be migrated.

The schema used in this practice is **db\_test\_info**.

3. Clear the previous table information in the **db\_test\_info** schema to ensure that data can be created successfully.

```
drop table if exists db_test_info_001;
```

**db\_test\_info\_001** is the name of the table created in this practice. Replace it as required.

4. Create a data table.

```
create table db_test_info_001(
column19 TIMESTAMP ,
column18 VARCHAR(256) ,
column11 DATETIME ,
column10 ENUM('a','b','c') ,
```

```
column13 FLOAT(2,1) ,
column12 YEAR ,
column15 VARCHAR(64) not null,
column14 DOUBLE(2,1) ,
column17 INT ,
column16 LONGTEXT ,
column20 TIME ,
column21 BIT(8) ,
column22 LONGBLOB ,
column23 MEDIUMINT ,
column24 VARCHAR(20) ,
column9 DECIMAL(2,1) ,
column8 VARCHAR(1024) ,
column5 SMALLINT ,
column4 DATE ,
column7 VARCHAR(32) ,
column6 SET('hehe','xixi','haha') ,
column1 char(1) ,
column0 MEDIUMINT ,
column3 BIGINT ,
column2 TINYINT ,
primary key(column19,column11,column17)
);
```

5. Insert records into the table.

```
insert into
db_test_info_001(column19,column11,column10,column1,column24,colu
mn15,column23,column0,column8) values('2019-07-24
14:08:58',now(),'A',(RAND()*10000000),
(RAND()*10000000),'db_test_info_001',(RAND()*10000000),
(RAND()*1000000),'a');
```

```
insert into
db_test_info_001(column19,column11,column17,column10,column1,colu
mn24,column15,column23,column0,column8) values(now(),now(),
(RAND()*10000000),'A',(RAND()*10000000),
(RAND()*10000000),'db_test_info_001',(RAND()*10000000),
(RAND()*1000000),'a');
```

```
insert into
db_test_info_001(column19,column11,column17,column10,column1,colu
mn24,column15,column23,column0,column8) values(now(),now(),
(RAND()*10000000),'A',(RAND()*10000000),
(RAND()*10000000),'db_test_info_001',(RAND()*10000000),
(RAND()*1000000),'a');
```

```
insert into
db_test_info_001(column19,column11,column17,column10,column1,colu
mn24,column15,column23,column0,column8) values(now(),now(),
```

```
(RAND()*10000000),'A',(RAND()*10000000),
(RAND()*10000000),'db_test_info_001',(RAND()*10000000),
(RAND()*10000000),'a');
```

6. Query the results.

```
select * FROM db_test_info_001;
```

----End

## 2.10.4.2 Preparing for the Destination DDM Instance

### 2.10.4.2.1 Creating a VPC and Security Group


This section describes how to create a VPC and security group for the instance you will create.

#### Prerequisites

- You have registered with Huawei Cloud and completed account authentication.
- Your account balance is greater than or equal to \$0 USD.

#### Creating a VPC

**Step 1** Log in to the [Huawei Cloud console](#).

**Step 2** Click  in the upper left corner and select a region and a project.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** Click **Create VPC**.

##### Basic Information


Region

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Name

CIDR Block  ·  ·  ·  /

Recommended: [10.0.0.0/8-24 \(Select\)](#) [172.16.0.0/12-24 \(Select\)](#) [192.168.0.0/16-24 \(Select\)](#)

 The CIDR block 192.168.0.0/16 overlaps with a CIDR block of another VPC in the current region. If you intend to enable communication between VPCs or between a VPC and an on-premises data center, change the CIDR block. [View VPC CIDR blocks in current region](#)

Enterprise Project  [Create Enterprise Project](#) 

Advanced Settings  Tag | Description



**Default Subnet**

AZ  ?

Name

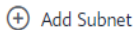
CIDR Block  ·  ·  ·  /  ? Available IP Addresses: 251  
The CIDR block cannot be modified after the subnet has been created.

Associated Route Table  ?

---

Advanced Settings ▾ Gateway | DNS Server Address | DHCP Lease Time | Tag | Description

---

 Add Subnet

**Step 5** Configure parameters as needed and click **Create Now**.

**Step 6** Return to the VPC list and check whether the VPC is created.

If the VPC status becomes available, the VPC has been created.

----End

## Creating a Security Group

**Step 1** Log in to the [Huawei Cloud console](#).

**Step 2** Click  in the upper left corner and select a region and a project.

**Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** Choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Configure parameters as needed.

✕

### Create Security Group

★ Name

★ Enterprise Project  [Create Enterprise Project](#) ?

★ Template

Description

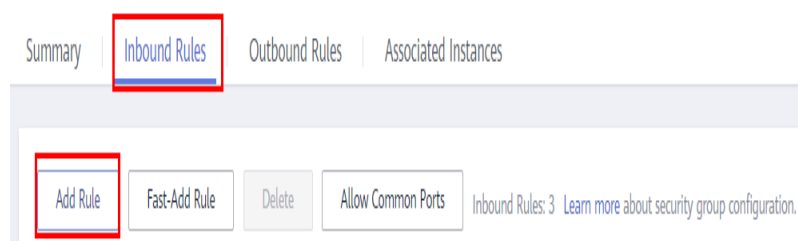
0/255

[Show Default Rule](#) ▼

**Step 7** Click **OK**.

**Step 8** Return to the security group list and click security group name **sg-01**.

**Step 9** Click the **Inbound Rules** tab, and then click **Add Rule**.



**Step 10** Configure an inbound rule and add the IP address of the source database.

✕

**Add Inbound Rule** [Learn more](#) about security group configuration.

**i** Inbound rules allow incoming traffic to instances associated with the security group.

Security Group: cse-engine-7f93

You can import multiple rules in a batch.

| Protocol & Port <span style="font-size: small;">?</span>                                                                                  | Source <span style="font-size: small;">?</span>                                                                                                         | Description                                                            | Operation                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------|
| <div style="border: 1px solid #ccc; padding: 2px;">TCP</div> <div style="font-size: x-small; margin-top: 2px;">Example: 22 or 22-30</div> | <div style="border: 1px solid #ccc; padding: 2px;">IP address</div> <div style="border: 1px solid #ccc; padding: 2px; margin-top: 2px;">0.0.0.0/0</div> | <div style="border: 1px solid #ccc; height: 20px; width: 100%;"></div> | Operation <span style="font-size: small;">▼</span> |

⊕ Add Rule

OK
Cancel

----End

### 2.10.4.2.2 Creating a DDM Instance

This section describes how to create a DDM instance as the destination database for the migration task.

- Step 1** Log in to the [Huawei Cloud console](#).
- Step 2** Click in the upper left corner and select a region and a project.
- Step 3** Click the service list icon on the left and choose **Databases > Distributed Database Middleware**.
- Step 4** On the displayed page, in the upper right corner, click **Buy DDM Instance**.
- Step 5** Specify a node class and other information.

Billing Mode: Yearly/Monthly Pay-per-use ?

Region: ?

AZ:  az1  az2  az3  az4 ?

---

Instance Name: 

Autotest-DDM-TAR-001

?

Time Zone: 

UTC+08:00 Beijing, Chong...

▼

Node Class: General-enhanced Kunpeng general computing-plus ?

**Step 6** Select a VPC and security group for the DB instance and configure the database port.

The VPC and security group have been created in [Creating a VPC and Security Group](#).

**Step 7** After the configuration is complete, click **Next** at the bottom of the page.

**Step 8** Confirm your settings.

- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.

**Step 9** Go to the **Instances** page to view and manage the instance.


The default database port is **5066** and can be changed after the instance is created. If the status of the instance is **Running**, the instance is created.

----End

### 2.10.4.2.3 Creating an RDS for MySQL Instance

Create an RDS for MySQL instance and associate it with the DDM instance.

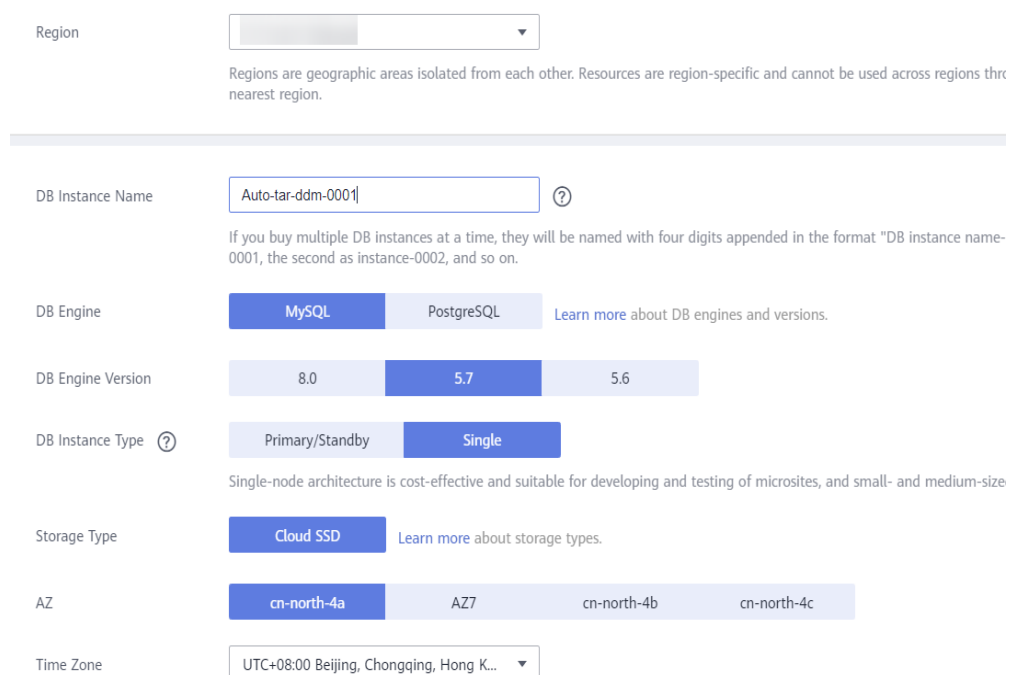
#### Procedure

**Step 1** Click  in the upper left corner and select a region.

**Step 2** Under the service list, choose **Databases > Relational Database Service**.

**Step 3** Click **Buy DB Instance**.


**Step 4** Configure the instance name and basic information.



Region

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions thrc nearest region.


---

DB Instance Name  

If you buy multiple DB instances at a time, they will be named with four digits appended in the format "DB instance name-0001, the second as instance-0002, and so on.

DB Engine  MySQL  PostgreSQL [Learn more about DB engines and versions.](#)

DB Engine Version  8.0  5.7  5.6

DB Instance Type   Primary/Standby  Single

Single-node architecture is cost-effective and suitable for developing and testing of microsites, and small- and medium-size

Storage Type  Cloud SSD [Learn more about storage types.](#)

AZ  cn-north-4a  AZ7  cn-north-4b  cn-north-4c

Time Zone

**Step 5** Configure instance specifications.

The screenshot shows the 'Instance Class' configuration page. It features a table of instance classes and a storage space slider.

| vCPU   Memory                                   | Maximum Connections | TPS/QPS        | IPv6          |
|-------------------------------------------------|---------------------|----------------|---------------|
| <input type="radio"/> 2 vCPUs   4 GB            | 1,500               | 334   6,673    | Not supported |
| <input checked="" type="radio"/> 2 vCPUs   8 GB | 2,500               | 552   11,039   | Not supported |
| <input type="radio"/> 4 vCPUs   8 GB            | 2,500               | 756   15,122   | Not supported |
| <input type="radio"/> 4 vCPUs   16 GB           | 5,000               | 1,062   21,249 | Not supported |
| <input type="radio"/> 8 vCPUs   16 GB           | 5,000               | 1,338   26,756 | Not supported |
| <input type="radio"/> 8 vCPUs   32 GB           | 10,000              | 2,117   42,335 | Not supported |

Below the table, a storage space slider is set to 40 GB. The slider ranges from 40 to 4,000 GB. A note below the slider states: 'RDS provides free backup storage space of the same size as your purchased storage space. After the free backup space is used up, charges are applied based on the OBS pricing details.'

**Step 6** Select a VPC and security group for the DB instance and configure the database port.

The VPC and security group have been created in [Creating a VPC and Security Group](#).

**CAUTION**

The RDS for MySQL instance must be in the same VPC and subnet as the DDM instance.

**Step 7** Configure the instance password.

The screenshot shows the password configuration form with the following fields and options:

- Password:** Buttons for 'Configure' and 'Skip'.
- Administrator:** Text field containing 'root'.
- Administrator Password:** Password input field with a strength indicator and a note: 'Keep your password secure. The system cannot retrieve your password.'
- Confirm Password:** Password input field for confirmation.

**Step 8** Click **Next**.

**Step 9** Confirm your settings.

- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.


**Step 10** Return to the instance list.

If the instance status becomes **Available**, the instance is created.

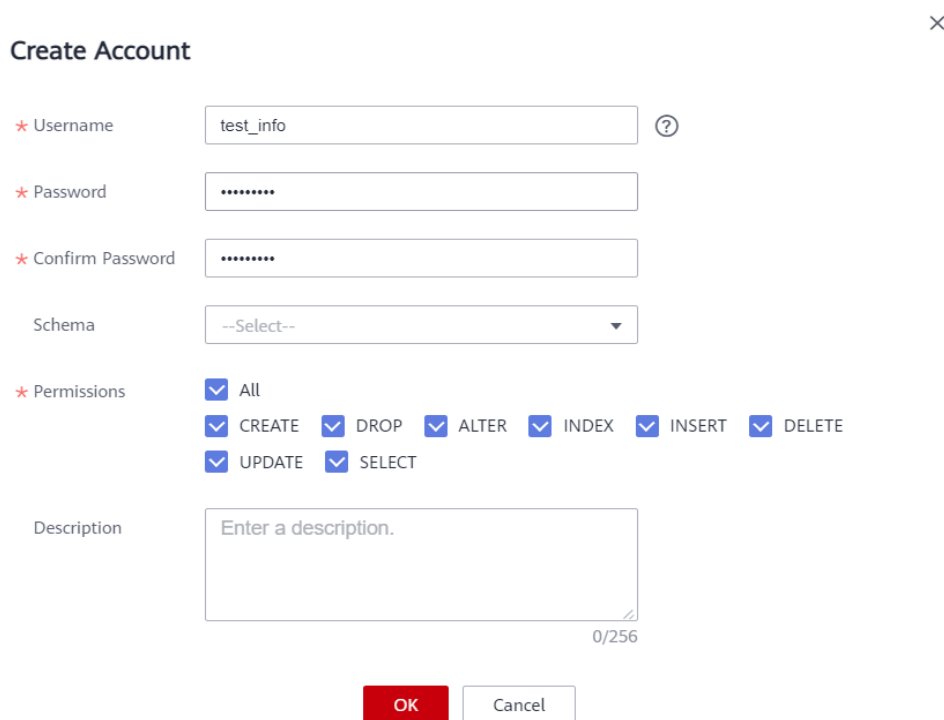
Create another RDS DB instance based on the destination RDS DB instance information in [Resource Planning](#).

----End

### 2.10.4.2.4 Creating a DDM Account

- Step 1** Click  in the upper left corner and select a region.
- Step 2** Click **Service List** on the left and choose **Databases > Distributed Database Middleware**.
- Step 3** On the **Instances** page, locate the required DDM instance and click its name.
- Step 4** In the navigation pane, choose **Accounts**.
- Step 5** On the displayed page, click **Create Account** and configure parameters as needed.

For details about the permissions required by the DDM account, see [Precautions](#). In this practice, select all permissions.



Create Account ×

\* Username  ?

\* Password

\* Confirm Password

Schema


\* Permissions  All  
 CREATE  DROP  ALTER  INDEX  INSERT  DELETE  
 UPDATE  SELECT

Description   
0/256

- Step 6** Click **OK**.

----End

### 2.10.4.2.5 Creating a Schema and Associating It with the RDS for MySQL Instance

- Step 1** Click  in the upper left corner and select a region.
- Step 2** Click **Service List** on the left and choose **Databases > Distributed Database Middleware**.
- Step 3** On the **Instances** page, locate the required DDM instance and click **Create Schema** in the **Operation** column.
- Step 4** On the displayed page, specify a sharding method, enter a schema name, set the number of shards, select the required DDM accounts, and click **Next**.

In this example, the schema is unsharded, and the schema name is **db\_test\_info**.

### CAUTION

Currently, only data can be migrated from the RDS for MySQL to DDM. To migrate table structures and other objects, you need to create schemas in the destination DDM instance based on table structures of the source RDS for MySQL instance.

\* Sharding Sharded Unsharded  
Each schema corresponds to multiple data nodes.

\* Shards

\* Schema Name

Account

No accounts available. [Create Account](#)

---

Data Nodes [?](#)

[RDS for MySQL 5.7](#) | [RDS for MySQL 8.0](#) | [GaussDB\(for MySQL\)](#)

Select only the data nodes that are in the same VPC as your DDM instance and not in use by other DDM instances. DDM will create databases on the selected data nodes without affecting their existing databases and tables.


| <input type="checkbox"/>            | Name                                | Status  | Connection Address   | DB Engine |
|-------------------------------------|-------------------------------------|---------|----------------------|-----------|
| <input type="checkbox"/>            | Auto-Single-src-57-migration-group1 | Running | 192.168.152.224:3306 | MySQL 5.7 |
| <input type="checkbox"/>            | Auto-Single-src-57-migration-low-0  | Running | 192.168.11.91:3306   | MySQL 5.7 |
| <input type="checkbox"/>            | Auto-Ha-tar-57-readonly-migration   | Running | 192.168.8.223:3306   | MySQL 5.7 |
| <input type="checkbox"/>            | Auto-Single-tar-57-dr-multiwrite    | Running | 192.168.181.115:3306 | MySQL 5.7 |
| <input checked="" type="checkbox"/> | Auto-tar-ddm-0001                   | Running | 192.168.7.133:3306   | MySQL 5.7 |
| <input checked="" type="checkbox"/> | Auto-tar-ddm-0002                   | Running | 192.168.83.80:3306   | MySQL 5.7 |

----End

## 2.10.4.2.6 Creating Table Structures in the Destination Database

Currently, DRS can only migrate data from the source instance to the destination DDM instance. It cannot migrate table structures or other objects in the source database. To migrate table structures and other objects, you need to create table structures and indexes in the destination database based on table structures of the source schema. Any source objects that have no corresponding objects created in the destination cannot be migrated. For more constraints, see [Before You Start](#).

### Procedure

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner and select a region.
- Step 3** Click **Service List** on the left and choose **Databases > Distributed Database Middleware**.
- Step 4** On the **Instances** page, locate the required instance and click **Log In** in the **Operation** column.
- Step 5** On the displayed page, enter the username and password created in [Creating a DDM Account](#), and click **Test Connection**.

- Step 6** After the connection is successful, click **Log In** to log in to the DDM instance.
- Step 7** Click the **db\_test\_info** schema created in [Creating a Schema and Associating It with the RDS for MySQL Instance](#).
- Step 8** Run the following SQL statements in database **db\_test\_info** to create table **db\_test\_info\_001** with the same structure as the source:

```
create table db_test_info_001(
column19 TIMESTAMP ,
column18 VARCHAR(256) ,
column11 DATETIME ,
column10 ENUM('a','b','c') ,
column13 FLOAT(2,1) ,
column12 YEAR ,
column15 VARCHAR(64) not null,
column14 DOUBLE(2,1) ,
column17 INT ,
column16 LONGTEXT ,
column20 TIME ,
column21 BIT(8) ,
column22 LONGBLOB ,
column23 MEDIUMINT ,
column24 VARCHAR(20) ,
column9 DECIMAL(2,1) ,
column8 VARCHAR(1024) ,
column5 SMALLINT ,
column4 DATE ,
column7 VARCHAR(32) ,
column6 SET('hehe','xixi','haha') ,
column1 char(1) ,
column0 MEDIUMINT ,
column3 BIGINT ,
column2 TINYINT ,
primary key(column19,column11,column17)
);
----End
```



### 2.10.4.3 Migrating Databases


Create a DRS instance and migrate table data from the source RDS for MySQL database to the **db\_test\_info** schema of the DDM instance.

#### Pre-migration Check

Before creating a migration task, you need to manually check the migration conditions for smooth migration.

Before the migration, see [Before You Start](#).

#### Creating a Migration Task

- Step 1** Log in to the [Huawei Cloud console](#).
- Step 2** Click  in the upper left corner and select a region.  
Select the region where the destination instance is deployed.
- Step 3** Click the service list icon on the left and choose **Databases > Data Replication Service**.
- Step 4** In the navigation pane on the left, choose **Online Migration Management** and click **Create Migration Task**.
- Step 5** Configure the replication instance information.
  1. Select a region and project, and enter a task name.

Region: CN-North-Ulanqab203  
Project: CN-North-Ulanqab203  
Task Name: DRS-7886  
Description: [Empty text area]

**Replication Instance Details**

The following information cannot be modified after you go to the next page.

- Data Flow: **To the cloud** (selected) / Out of the cloud
- Source DB Engine: MySQL, Oracle, **MySQL schema and logic table** (selected), MongoDB, Redis, Redis cluster
- Destination DB Engine: **DDM** (selected)

2. Configure the migration task type and select the destination instance and subnet.

- Source DB Engine: MySQL, Oracle, **MySQL schema and logic table** (selected), MongoDB, Redis, Redis cluster
- Destination DB Engine: **DDM** (selected)
- Network Type: **Public network** (selected)
- Destination DB Instance: No DB instance available (selected) / View DB Instance / View Unselectable DB Instance
- Replication Instance Subnet: Select the subnet (selected) / View Subnets
- Migration Type: **Full** (selected) / Full-incremental
- Source DB Instance Quantity: 2 (selected)
- Specify EP: [Empty text area] / Create an EP
- AZ: cn3 (selected) / cn1, cn2

Tags: [Empty text area]

3. Click **Create Now**.

**Step 6** Configure the source and destination instance information.

1. Enter the IP address, port number, username, and password of the source database.

Click **Test Connection**.

✔ Replication instance created successfully. [View IP](#). To ensure network connectivity, add the IP to the whitelist of the source database middleware and each sharded database.

**Source Database**

Middleware IP Address or Domain Name: 192.168.170.164

Port: 5066

Middleware Username: test\_info

Database Password: .....

SSL Connection:

| DB Instance | IP Address or Domain Name | Port | Username | Password | SSL Connection           |
|-------------|---------------------------|------|----------|----------|--------------------------|
|             | 192.168.23.97             | 3306 | root     | .....    | <input type="checkbox"/> |
|             | 192.168.81.18             | 3306 | root     | .....    | <input type="checkbox"/> |

Test Connection ✔ Test successful

2. Enter the username and password of the destination database.

Click **Test Connection**.

**Destination Database**

DB Instance Name: Autotest-DDM-TAR-001 (192.168.240.55)

Database Username: test\_info\_tar

Database Password: .....

Test Connection ✔ Test successful

3. Click **Next**. In the displayed box, read the message carefully and click **Agree**.

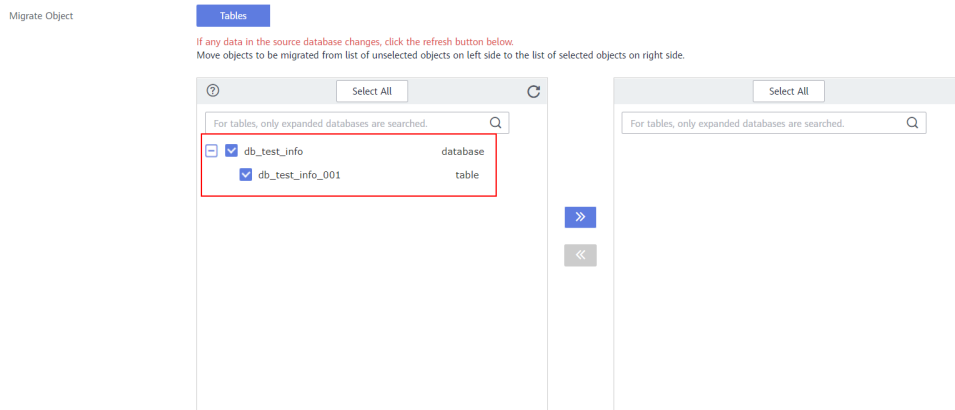
 **Notice**

I acknowledge that the IP addresses, domain names, ports, usernames, and passwords of involved databases will be temporarily collected and used in this task. These items will be deleted after the task is deleted.

**Agree**

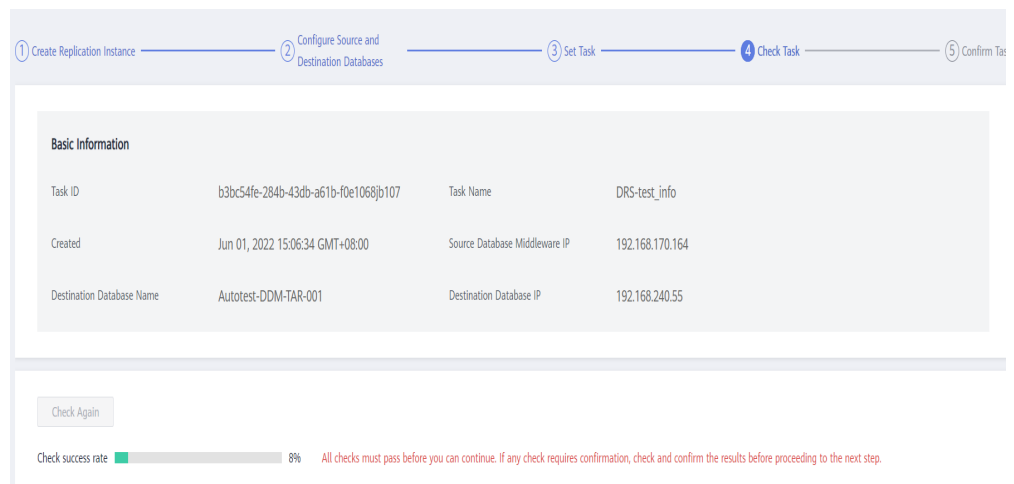
**Step 7** Configure the synchronization task.

Select the databases and tables of the source database to be migrated. In this practice, select the **db\_test\_info\_001** table in database **db\_test\_info**.



**Step 8** Perform a pre-check.

1. After all settings are complete, perform a pre-check to ensure that the migration is successful.



2. If any check fails, review the cause and rectify the fault. Then, click **Check Again**.

Check success rate  100% All checks must pass before you can continue. If any check requires confirmation, check and confirm the results before proceeding to the next step.

| Check Item                                                                                                                    | Check Result                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| <b>Destination database storage space</b>                                                                                     |                                                                               |
| Whether the destination database has sufficient storage space                                                                 | <span style="color: orange;">●</span> Confirm <a href="#">Confirm Details</a> |
| <b>Database parameters</b>                                                                                                    |                                                                               |
| Whether the AUTO_INCREMENT values of the destination database tables are too small                                            | <span style="color: green;">●</span> Passed                                   |
| Whether primary keys and shard keys are consistent                                                                            | <span style="color: green;">●</span> Passed                                   |
| Whether the schema in the source database middleware can be connected                                                         | <span style="color: green;">●</span> Passed                                   |
| Whether the source database middleware contains tables without primary keys                                                   | <span style="color: green;">●</span> Passed                                   |
| Whether the table structures (including columns and indexes) in the source and destination database middleware are consistent | <span style="color: green;">●</span> Passed                                   |
| Whether the source end contains empty databases                                                                               | <span style="color: green;">●</span> Passed                                   |
| Whether the number of source DB instances is the same as that of destination DB instances                                     | <span style="color: green;">●</span> Passed                                   |
| Whether the destination database middleware account has sufficient permissions                                                | <span style="color: green;">●</span> Passed                                   |
| Whether the source and destination database character sets are consistent                                                     | <span style="color: green;">●</span> Passed                                   |
| Whether the SSL connection is correctly configured                                                                            | <span style="color: green;">●</span> Passed                                   |
| Whether the source database binlog is row-based                                                                               | <span style="color: green;">●</span> Passed                                   |
| Whether the binlog row image value of the source database is FULL                                                             | <span style="color: green;">●</span> Passed                                   |

3. If all check items pass the pre-check, click **Next**.

### Step 9 Confirm the task.

1. Check whether all configured information is correct.

**Start Time**

Start upon task creation
Start at a specified time
?

Jun 02, 2022 03:00:00

📅

GMT+08:00

It is strongly recommended that you set the task start time to service off-peak hours and reserve 2 to 3 days to verify the data.

---

**Send Notifications**

?
If disabled, DRS alarms, such as task failure, high latency, and frozen, cannot be received.

**\* Stop Abnormal Tasks After**

14

?
Abnormal tasks run longer than the period you set (unit: day) will automatically stop.

#### Details

| Product Name | Configuration                                                                                                                                                                                                                                                                |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | <p><b>Task Information</b></p> <p>Name: DRS-test_info</p> <p>Description: Source Database IP Address or Domain Name: 192.168.170.164 Destination DB Instance Name: Autotest-DDM-TAR-001</p> <p>Migration Type: Full+Incremental migration</p> <p>Data Flow: To the cloud</p> |
|              | <p><b>Replication Instance Details</b></p> <p>Specifications: Large</p> <p>Source DB Engine: MySQL schema and logic table</p>                                                                                                                                                |

2. Specify **Start Time** and select the check box before the agreement.
3. Click **Submit**.

## Notice ×



When DRS migration tasks are in progress, certain operations may cause issues. To ensure migration success, we strongly recommend that you read [the migration precautions](#) carefully before starting migration tasks and follow the instructions to ensure migration stability.



Any task that is active will be billed, even if its status becomes abnormal. If a task is no longer needed, stop the task to avoid unnecessary fees.

If the task status is abnormal for more than 14 days, the task automatically stops. Pay attention to the alarms you received and handle the task in time to resume the download and avoid task retry failure.

I have read the precautions.

[Start at a specified time](#)

**Step 10** After the task is submitted, view and manage it.

After the task is created, return to the task list to view the status of the created task.

| <input type="checkbox"/>            | Task Name/ID <small>⌵</small>         | Status         | Delay <small>?</small> | Charging | Data FL...  | DB Eng... <small>⌵</small> | Migration T... | Created <small>⌵</small> | Netw...   | Operation |
|-------------------------------------|---------------------------------------|----------------|------------------------|----------|-------------|----------------------------|----------------|--------------------------|-----------|-----------|
| <input checked="" type="checkbox"/> | DRS-test_info<br>b3bc54fe-284b-43d... | Full migration | --                     | No       | To the c... | MySQL sch...               | Full+Incre...  | Jun 01, 2022 15:06...    | Public... | Stop      |

----End

### 2.10.4.4 Verifying Data After Migration

When the task status changes to **Incremental migration**, the full migration is complete. Then, you can log in to the DDM instance to view the migration results.

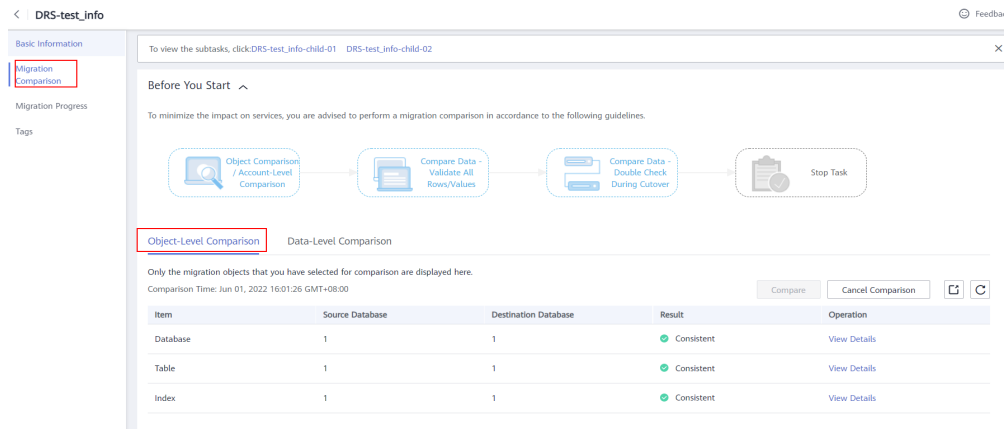
**Step 1** Wait until the synchronization task status becomes **Incremental**.

| <input type="checkbox"/>            | Task Name/ID <small>⌵</small>  | Status                | Delay <small>?</small> | Charging | Data FL...  | DB Eng... <small>⌵</small> | Migration T... | Created <small>⌵</small> | Netw...   | Operation              |
|-------------------------------------|--------------------------------|-----------------------|------------------------|----------|-------------|----------------------------|----------------|--------------------------|-----------|------------------------|
| <input checked="" type="checkbox"/> | DRS-test_info<br>b3bc54fe-2... | Incremental migration | 0s                     | No       | To the c... | MySQL sch...               | Full+Incre...  | Jun 01, 2022 15:06...    | Public... | Stop View Compare Data |

**Step 2** Click the task name to go to the **Basic Information** page.

**Step 3** Verify data consistency.

1. Choose **Migration Comparison** > **Object-Level Comparison** to view the database and table migration results.



2. Choose **Migration Comparison > Data-Level Comparison**, click **Create Comparison Task**, and view the migration results of the rows in the table.

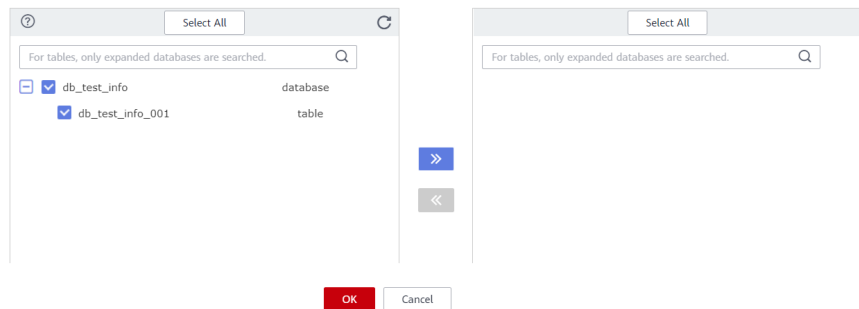
#### Create Comparison Task

Some comparison results may be inconsistent because data changes during the comparison cannot be synchronized to the destination in real time. You are advised to select a scheduled time to start the comparison during off-peak hours so that you can get an accurate comparison result.

\* Comparison Type **Row**

\* Comparison Time **Start upon task creation** Start at a specified time

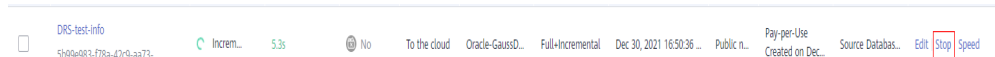
\* Object **If any data in the source database changes, click the refresh button below.**



#### Step 4 Stop the migration task.

After data is completely migrated to the destination database, stop the migration task.


1. Locate the task and click **Stop** in the **Operation** column.





2. In the display box, click **Yes**.

×

## Stop Task

 **Are you sure you want to stop this task?**

| Name          | Status                                                                                        |
|---------------|-----------------------------------------------------------------------------------------------|
| DRS-test-info |  Incremental |

 If you forcibly stop a task, the migration task will be stopped first.×

Force stop task

Description:

- Once this task is stopped, it cannot be recovered.

YesNo

**Step 5** After the migration is complete, test the performance.

For details about how to test the DDM performance, see [DDM Performance White Paper](#).

----End

# 3 Backup Migration

## 3.1 Migrating Microsoft SQL Server Backup Data to RDS SQL Server DB Instance

### 3.1.1 Overview

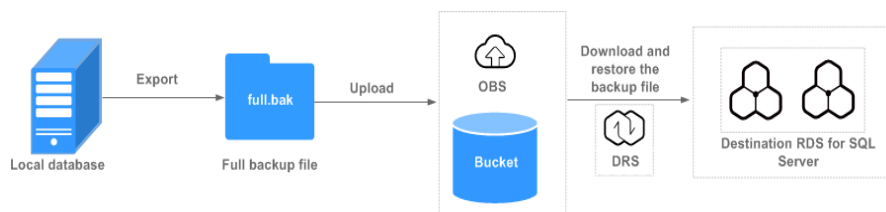
It often becomes necessary to hide a real IP address of your database for the sake of security. Migrating data through direct connections is an option, but costly. DRS supports backup migration, which allows you to export data from your source database for backup and upload the backup files to OBS. Then, you can restore the backup files to the destination database to complete the migration. Using this method, data migration can be realized without exposing your source databases.

DRS supports full migration and full+incremental migration.

#### Scenario 1: Full Backup Migration

In this scenario, you need to stop services, upload the exported full backup file of the Microsoft SQL Server database to OBS, and then restore the backup data to the destination database.

Figure 3-1 Full migration



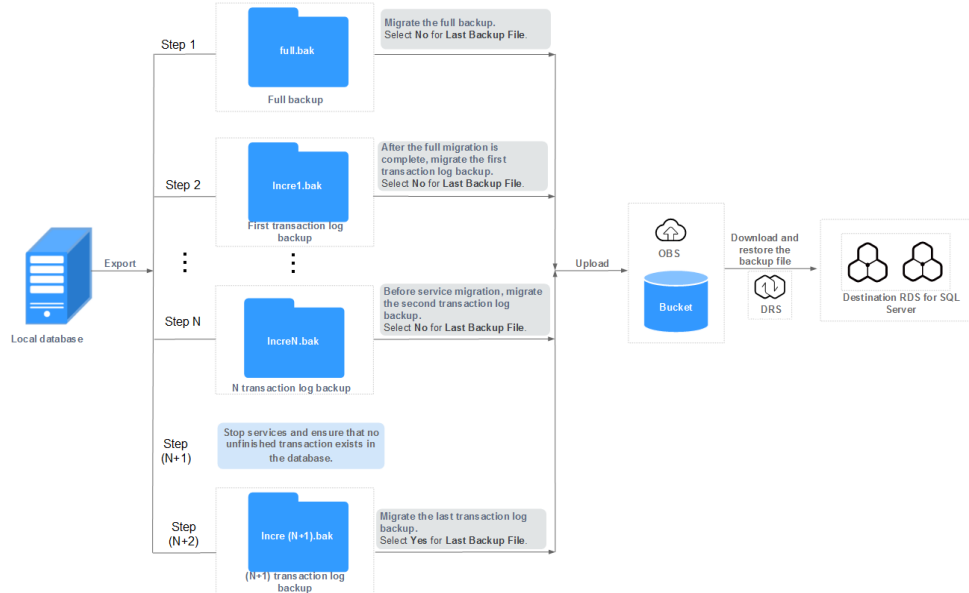
#### Scenario 2: Full+Incremental Backup Migration

In this scenario, data is migrated continuously. After a full backup and restoration is complete, you can perform incremental migrations for several times to minimize service interruption. A complete restoration process involves restoring several



incremental backup files. The destination DB instance will not be available until the last backup file is restored. You can determine whether the selected backup file is the last one.

Figure 3-2 Full+incremental migration



### 3.1.2 Migration Preparations

This section describes how to prepare for backup and migration. Before using DRS, ensure that you have completed the required preparations.

#### Preparing for Backup Files

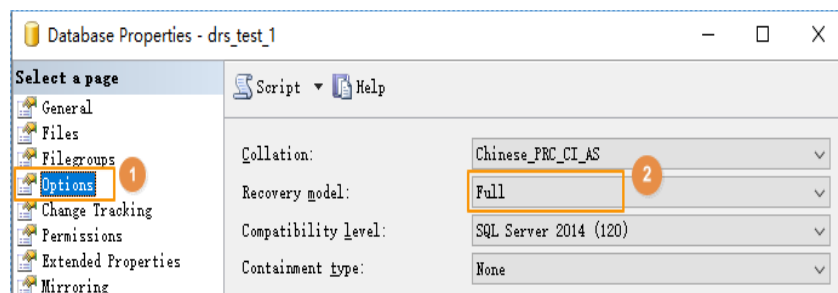
For details, see [Migration Overview](#) in *Backup Migration*.

#### Configuring Database Restoration Mode

- No configuration is required during a full backup restoration.
- During full and incremental backup migration, the recovery mode must be set to **Full**. The procedure is as follows:

Method 1: Log in to the local database center using Microsoft SQL Server Management Studio. Right-click the database to be migrated and choose **Properties** from the shortcut menu. In the dialog box that is displayed, click **Options**, and select **Full** for **Recovery mode**.

Figure 3-3 Recovery mode



Method 2: Run the following SQL commands to set the restoration mode:

```
USE master;
ALTER DATABASE database_name SET RECOVERY FULL;
```

## Destination Database Storage Space

The available storage space of the destination database should be at least 1.5 times larger than the total storage space of the database to be restored.

## Migration Duration Reference

A complete backup and migration process consists of the following phases:

Figure 3-4 Migration diagram



Table 3-1 Backup migration

| Phase          | Name                                                                                                                                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | Export the backup files.                                                                                                                                                                                                                                          | The time required for generating database backup files depends on the configuration of the source database. You need to estimate the time based on the configuration of the source database.                                                                                                                            |
| 2              | Upload the backup file to an OBS bucket.                                                                                                                                                                                                                          | OBS does not limit the upload and download speed. If you access OBS through a public network, the upload and download speed is restricted by the public network bandwidth. For example, if the bandwidth of the public network is 10 MB/s and the network is not affected by other factors, the upload rate is 10 MB/s. |
| 3              | Download the backup file to the destination RDS for SQL Server through DRS.                                                                                                                                                                                       | Generally, the download speed is 100 MB/s or 300 GB/h.                                                                                                                                                                                                                                                                  |
| 4              | Restore the backup files to the destination database.                                                                                                                                                                                                             | Generally, the recovery speed is about 5 GB/min or 300 GB/h.                                                                                                                                                                                                                                                            |
| Total Duration | Total time consumption = phase 1 time consumption + phase 2 time consumption + phase 3 time consumption + phase 4 time consumption<br>Service downtime = Service suspension -> Last incremental backup -> Uploading to OBS -> Creating a DRS task for restoration |                                                                                                                                                                                                                                                                                                                         |

The following uses an example to describe the time required for backing up and migrating data. You can estimate the migration time in advance. The actual time required depends on the network and database configurations on the client. The time listed in the following table is for reference only.

### Example

**Table 3-2** Backup migration example

| Phase          | Name                                                  | Backup File Size (GB) | Time Required (h) |
|----------------|-------------------------------------------------------|-----------------------|-------------------|
| 1              | Export the backup files.                              | 283                   | 5.5               |
| 2              | Upload the backup file to an OBS bucket.              | 283                   | 8.95              |
| 3              | Download the backup file by through DRS.              | 283                   | 0.61              |
| 4              | Restore the backup files to the destination database. | 283                   | 2.24              |
| Total Duration |                                                       |                       | 17.3              |

## 3.1.3 Exporting Backup Files

This section describes how to export the full backup files and incremental backup files of a database.

**Step 1** Check the parameter settings of the local database.

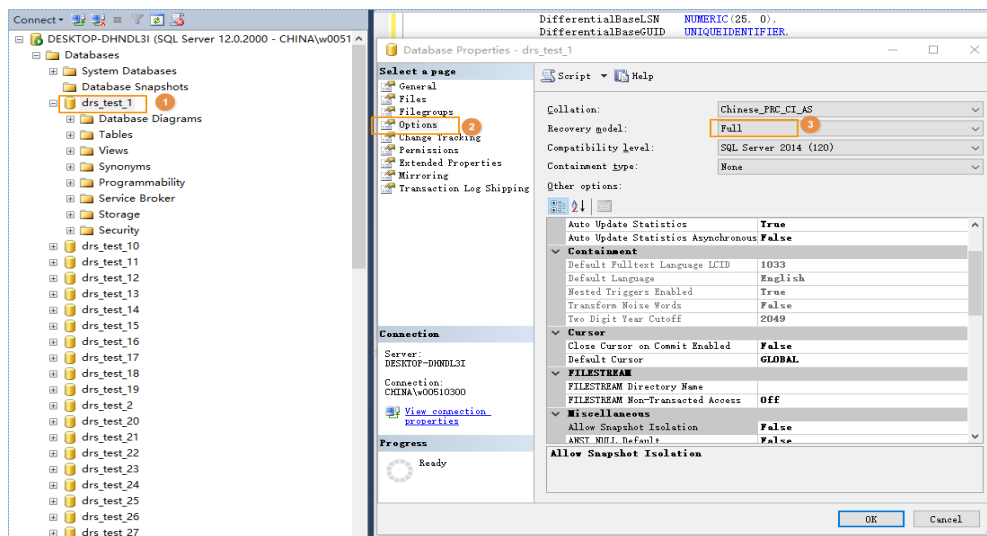
#### NOTE

This operation is mandatory for full and incremental migration. If you only perform the full migration, skip this step.

The database has log truncation and shrinking configurations. Therefore, before exporting full backup files, you must set the database recovery model to **Full** until the entire database and services are migrated to the DB instance on the current cloud.

1. Log in to the local database center through Microsoft SQL Server Management Studio.
2. Right-click the database to be migrated and choose **Properties** from the shortcut menu. In the displayed dialog box, select **Options** from the left list.
3. Select **Full** for **Recovery model**. Then, click **OK**.

Figure 3-5 Configuring the recovery model

**Step 2** (Optional) Set backup file compression parameter.

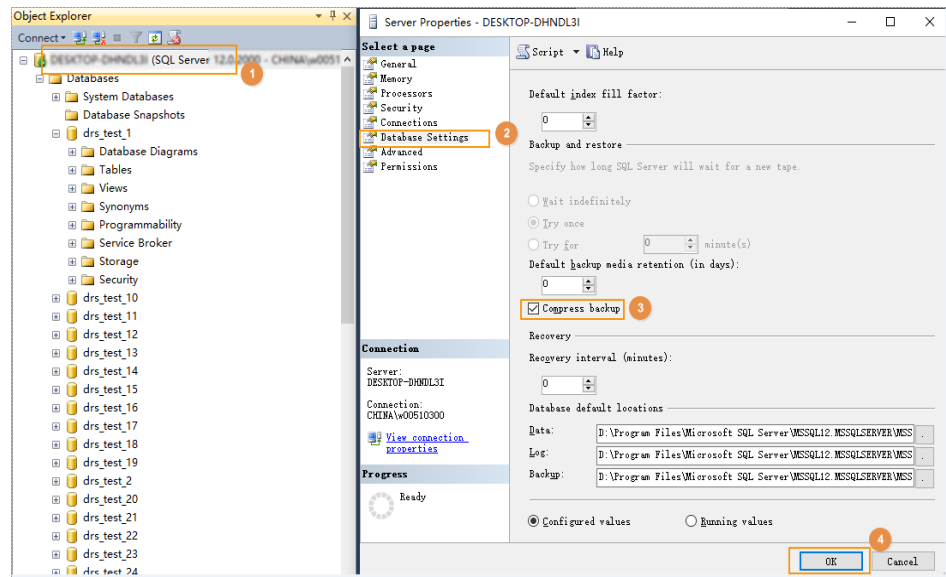
If the bandwidth of your local data center is low and uploading data to OBS Browser takes a long time, you are advised to configure the backup file compression parameters.

1. Log in to the database center through Microsoft SQL Server Management Studio as the database administrator.
2. In Object Explorer, right-click the server and choose **Properties**.
3. Click **Database Settings**.
4. In the **Backup and restore** area, select **Compress backup**.

This setting determines the server-level default setting for compression backup, as detailed below:

- If **Compress backup** is not selected, the new backup will not be compressed by default.
- If **Compress backup** is selected, the new backup file is compressed by default.

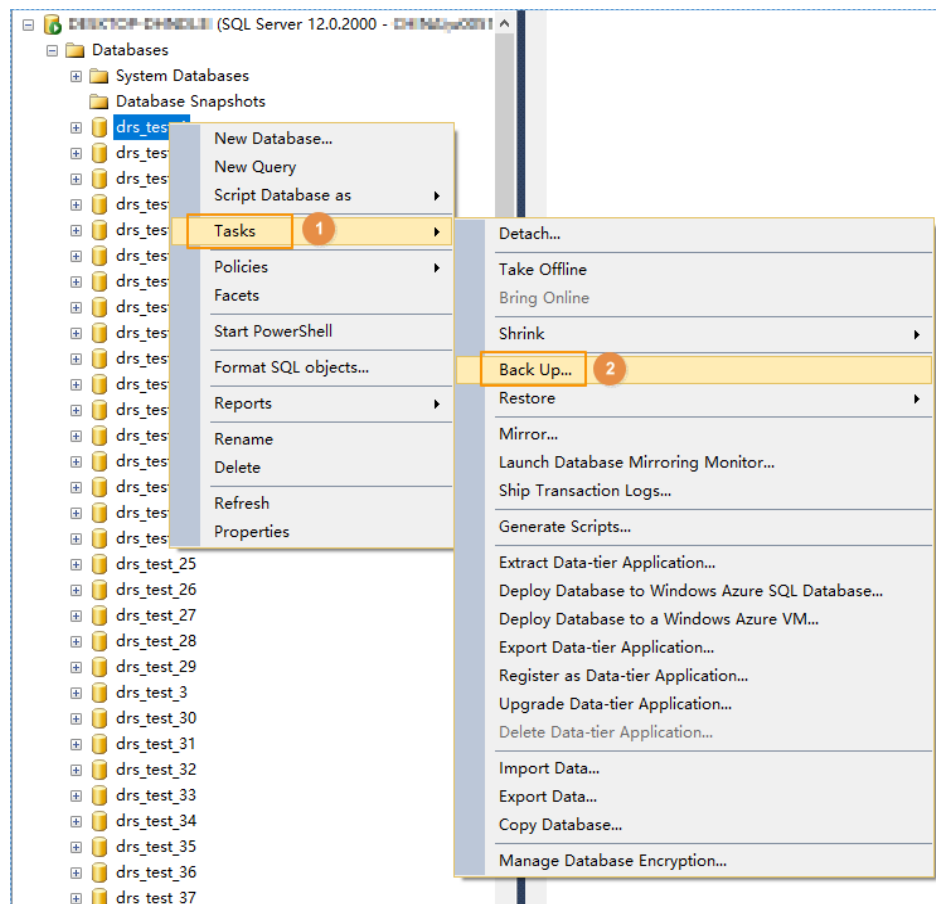
Figure 3-6 Configuring compression parameter



**Step 3** Export the full backup file.

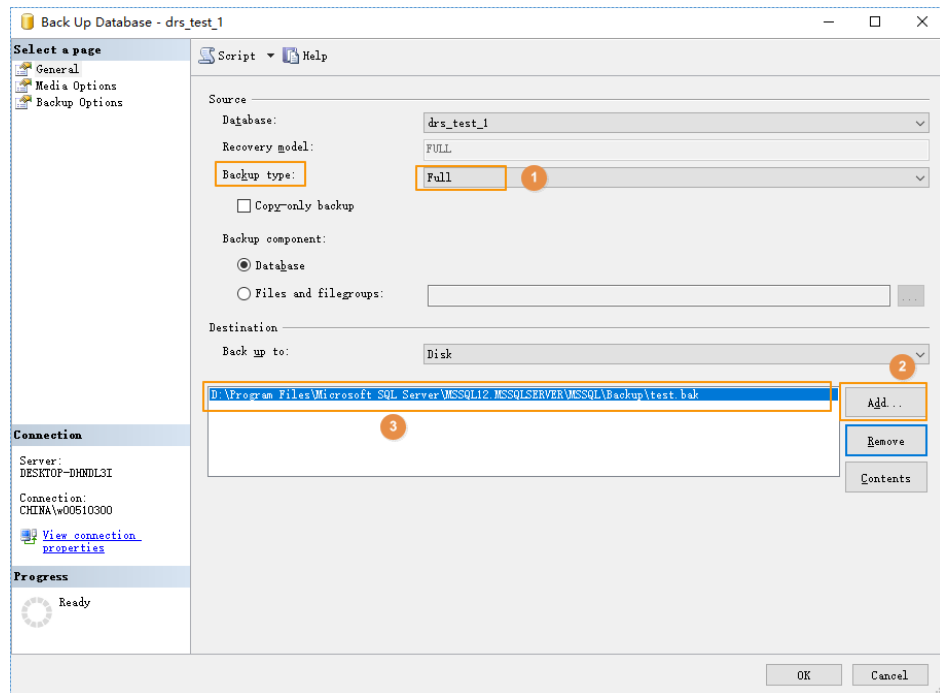
1. Log in to the local database center through Microsoft SQL Server Management Studio.
2. Right-click the database whose data needs to be exported and choose **Tasks > Back Up**.

Figure 3-7 Back Up



3. Set **Backup type** to **Full**, click **Add**, and enter the path to which the backup file is exported. The file name extension must be **.bak**.

Figure 3-8 Setting the full backup file



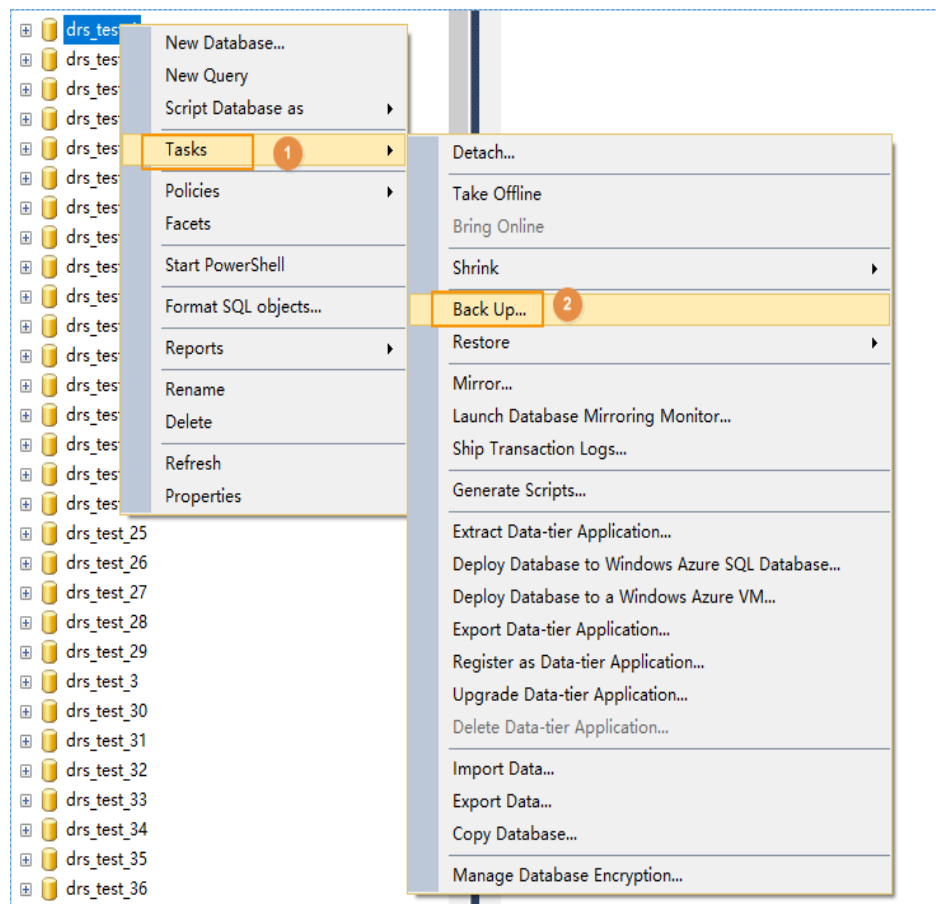
 NOTE

- It is recommended that the backup file name be the same as the database name (case sensitive), and the suffix **.bak** be added to the backup file name.
- You are advised to back up all the databases in a **.bak** file or a few **.bak** files. This reduces the frequency of uploading and restoring the database.

**Step 4** Export the incremental backup file.

1. Log in to the local database center through Microsoft SQL Server Management Studio.
2. Right-click the database whose data needs to be exported and choose **Tasks > Back Up**.

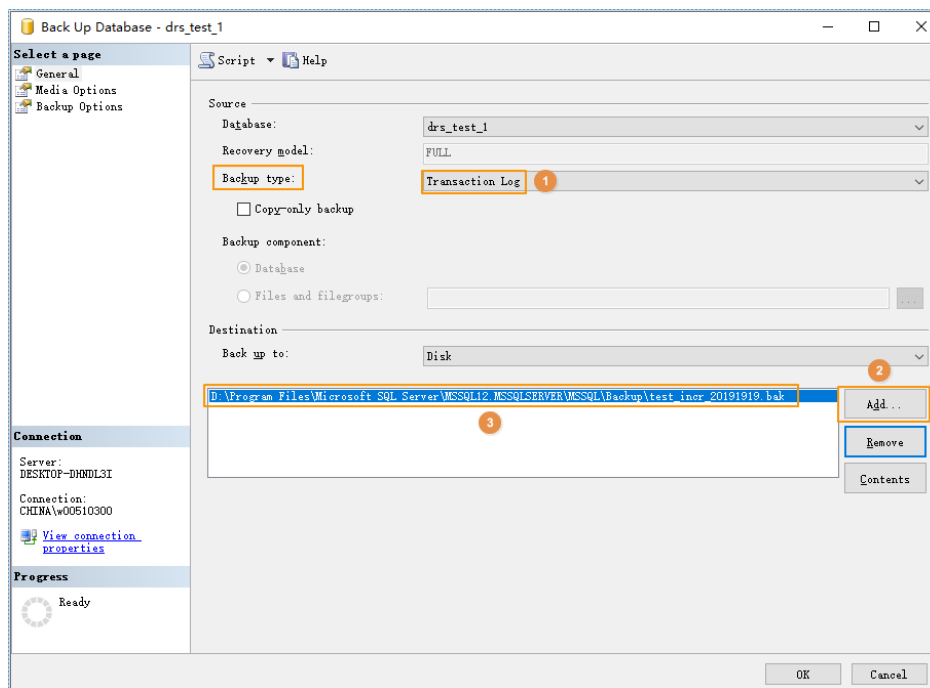
Figure 3-9 Back Up



3. Select **Transaction Log** for **Backup type**, click **Add**, and enter the path to which the backup file is exported. The suffix is **.bak**.



Figure 3-10 Setting the incremental backup file

**NOTE**

- It is recommended that the backup file name be the same as the database name (case sensitive), with the time stamp and .bak suffix. For example: [*Database name*] \_Incr\_ [*Timestamp*] .bak.
- You are advised to back up all the databases in a .bak file or a few .bak files. This reduces the frequency of uploading and restoring the database. For example, you can back up the A, B, and C databases to a .bak file, and then compress, upload, and restore the three databases in a batch. This helps to improve the success rate of data restoration.

----End

### 3.1.4 Uploading Backup Files

This section describes how to upload backup files.

**Step 1** Create an OBS bucket and upload the backup file to the OBS bucket.

**NOTE**

- If the size of the file uploaded at a time does not exceed 5 GB, select **Standard** for **Storage Class** and **Public Read** for **Bucket Policy** on the OBS console.
- If you want to upload multiple files in batches (up to 100 files can be uploaded at a time and the total size of the files cannot exceed 5 GB) or upload files greater than 5 GB at a time, download and install the **OBS Browser+** client. For details, see **Object Storage Service Client Guide**.

You are advised to store backup files in independent OBS buckets in the same region to distinguish the backup files from other public files.

Before uploading the backup file, create access keys (AK and SK) in the OBS console.

When uploading backup files, select **Standard** for **Storage Class**.

- Microsoft SQL Server supports only .bak files and does not support restoration from a newer version to an older version.
- You are advised to store backup files in independent OBS buckets in the same region to distinguish the backup files from other public files.

1. Log in to OBS Console. For details, see **Logging In to OBS Console**.
2. For details about how to add an OBS bucket, see **Creating a Bucket**.
3. For details about how to upload files to an OBS bucket, see **Uploading a File**.

----End

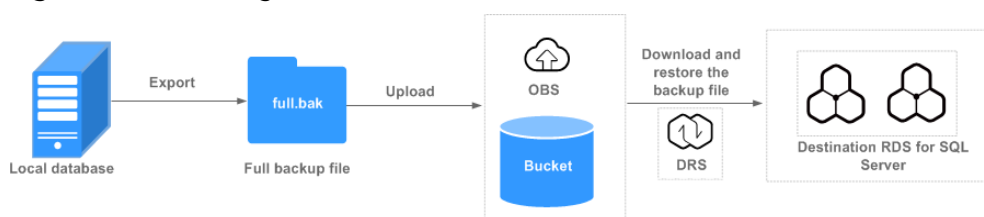
### 3.1.5 Scenario 1: Full Backup Migration

In this scenario, you need to stop services, upload the exported full backup file of the Microsoft SQL Server database to OBS, and then restore the backup data to the destination database.

This section describes how to migrate a full backup.

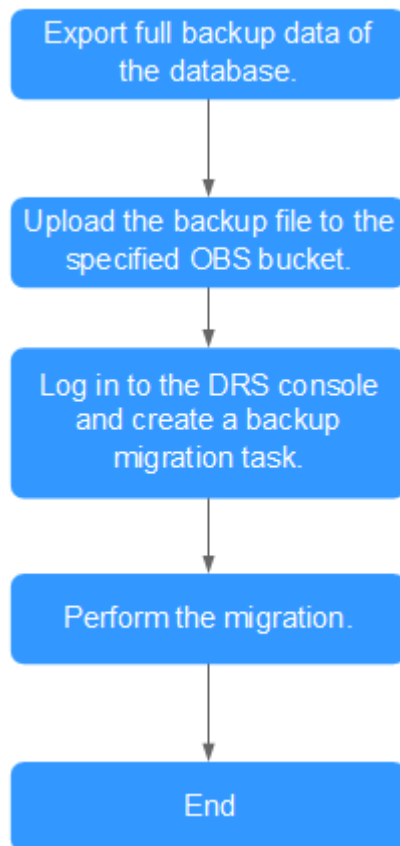
#### Migration Diagram

Figure 3-11 Full migration




## Migration Process

Figure 3-12 Migration process



### Procedure

- Step 1** Export the full backup file of the database. For details, see [Exporting Backup Files](#).
- Step 2** Upload files to an OBS bucket. For details, see [Uploading Backup Files](#).
- Step 3** Log in to the DRS console.
- Step 4** Click  in the upper left corner and select a region and a project.
- Step 5** Choose **Service List > Databases > Data Replication Service**.
- Step 6** In the navigation pane on the left, choose **Backup Migration Management**. Then, click **Create Migration Task**.
- Step 7** Enter the information about the migration task and backup file, and click **Next**.

**Figure 3-13** Migration task information

**Backup File Information**

\* Database Type: **Microsoft SQL Server**

\* Backup File Source: **OBS Bucket** | RDS full backup ⓘ

\* Bucket Name:

Tags:    
You can add 10 more tags.

Enter a backup name:

| Backup Name                                    | Size      | Last Modified Time              |
|------------------------------------------------|-----------|---------------------------------|
| <input type="checkbox"/> ehh@perry20190630 bak | 139.20 MB | Jul 02, 2019 11:56:51 GMT+08:00 |

**Table 3-3** Migration task information

| Parameter          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Task Name          | The task name consists of 4 to 64 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Description        | The description consists of a maximum of 256 characters and cannot contain the following special characters: !=<>'&"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Database Type      | Select <b>Microsoft SQL Server</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Backup File Source | Select <b>OBS bucket</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Bucket Name        | Select the bucket where the backup file is stored and the full backup file.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>The backup file of the Microsoft SQL Server must be in the .bak format. Multiple backup files can be selected at the same time.</li> <li>A database cannot be split into different files for upload.</li> <li>The bucket name, backup file name, or path cannot contain Chinese characters.</li> <li>If the number of data records in a bucket exceeds 500, data overflow may occur. As a result, some data cannot be displayed. You can use an independent standard bucket with the public-read permission.</li> </ul> |

**Step 8** On the **Select Destination** page, specify database information and click **Next**.

**Figure 3-14** Full migration database information

Database Information

Destination RDS DB Instance Name:

Backup File Format:  Full  Incremental  
Full: Indicates full backup files.

Last Backup:  Yes  No   
The destination databases involved remain available, but incremental backups can no longer be restored.

Overwrite Data:  Yes  No   
You can determine whether to overwrite data in the destination database during the restoration if the destination DB instance contains a database with the same name as the backup database.  
 Overwriting data will clear the existing data of the destination database. Exercise caution when performing this operation.

Perform Pre-verification:  Yes  No

Restore Database:  All  Custom

Reset Database Name:

**Table 3-4** Microsoft SQL Server database information

| Parameter                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Destination RDS DB Instance Name | Select a destination RDS DB instance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Backup File Format               | Select <b>Full</b> .<br><b>Full</b> : indicates full backup files.<br><b>NOTE</b><br>To migrate databases at a time, you need to stop services first and upload full backups for restoration.                                                                                                                                                                                                                                                                                                                                                                               |
| Last Backup                      | Select <b>Yes</b> if you perform a one-time full migration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Overwrite Data                   | You can determine whether to overwrite data in the destination database during the restoration if the destination DB instance contains a database with the same name as the backup database.<br><b>NOTE</b><br>If you select this option, the destination databases with the same names as the backup databases will be overwritten. Exercise caution when performing this operation.                                                                                                                                                                                       |
| Perform Pre-verification         | Specifies whether to perform pre-verification on the backup migration task. The default value is <b>Yes</b> . <ul style="list-style-type: none"> <li><b>Yes</b>: To ensure successful migration and identify potential problems in advance, verify the validity, integrity, continuity, and version compatibility of backup files before restoration.</li> <li><b>No</b>: If pre-verification is not performed, the migration speed is faster, but you need to check the validity, integrity, continuity, and version compatibility of backup files on your own.</li> </ul> |

| Parameter            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Restore Database     | <p>You can restore all or some of databases.</p> <ul style="list-style-type: none"><li>• <b>All:</b> Restores all databases in the backup file. You do not need to enter the names of the databases to be restored. By default, all databases in the backup file are restored.</li><li>• <b>Custom:</b> Restore specified databases from the backup file. You need to enter the names of the databases to be restored. The databases to be restored must be consistent with those for which the full or incremental backups are created.</li></ul>                                                                                                                    |
| Reset Database Name  | <p>If <b>Restore Database</b> is set to <b>All</b>, you can reset database names. If you enable <b>Reset Database Name</b>, the original database names in the backup file will be reset to new database names.</p> <p>Prerequisites:</p> <ul style="list-style-type: none"><li>• The backup file contains only one database.</li><li>• The backup file is a full backup file and is the last backup file. Select <b>Full</b> for <b>Backup File</b> and <b>Yes</b> for <b>Last Backup Type</b>.</li></ul> <p><b>NOTE</b><br/>The database name can be reset only when <b>Backup Type</b> is set to <b>Full</b> and <b>Restore Database</b> is set to <b>All</b>.</p> |
| Backup Database Name | <p>If <b>Restore Database</b> is set to <b>Custom</b>, specify <b>Backup Database Name</b>.</p> <p>The backup database name is case sensitive and must be the same as that in the backup file. The backup database name can contain a maximum of 256 bytes, and the new database name can contain a maximum of 128 bytes. Only letters, digits, hyphens (-), and underscores (_) are allowed.</p> <p>DRS also allows you to set an alias for the database to be restored.</p>                                                                                                                                                                                         |

**Step 9** On the **Confirm Task** page, check the configuration details, read and agree to the agreement, and click **Next**.

**Step 10** In the task list on the **Backup Migration Management** page, check whether the task is in the **Restoring** status. If the migration is successful, the task status becomes **Successful**.

----End

### 3.1.6 Scenario 2: Full+Incremental Backup Migration

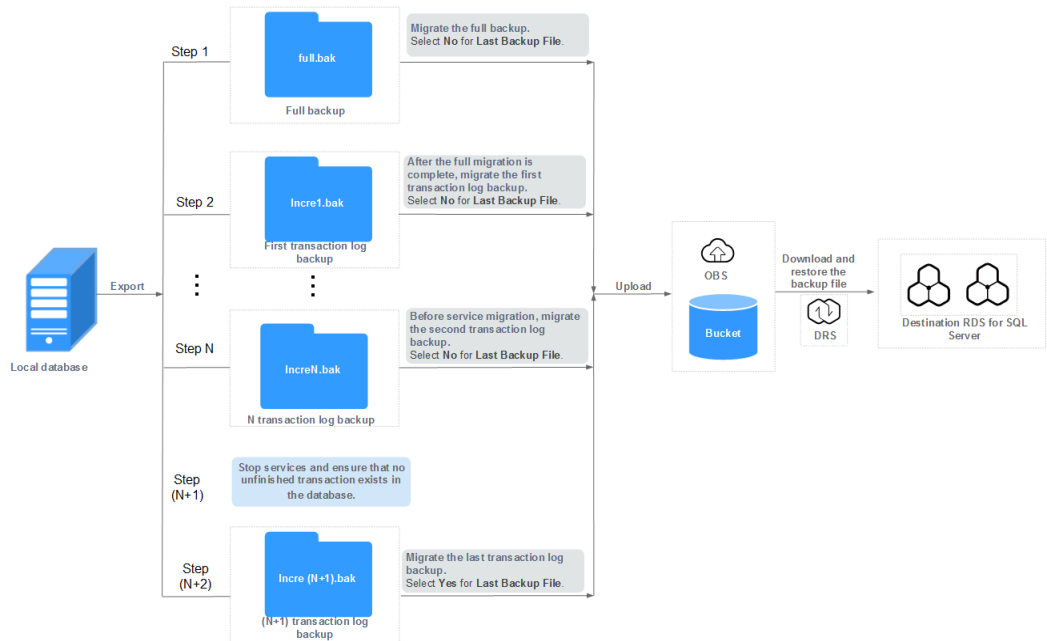
In this scenario, data is migrated continuously. After a full backup and restoration is complete, you can perform incremental migrations for several times to minimize service interruption. A complete restoration process involves restoring several incremental backup files. The destination DB instance will not be available until

the last backup file is restored. You can determine whether the selected backup file is the last one.

This section uses a full+incremental migration as an example to describe how to perform a migration while minimizing service interruption.

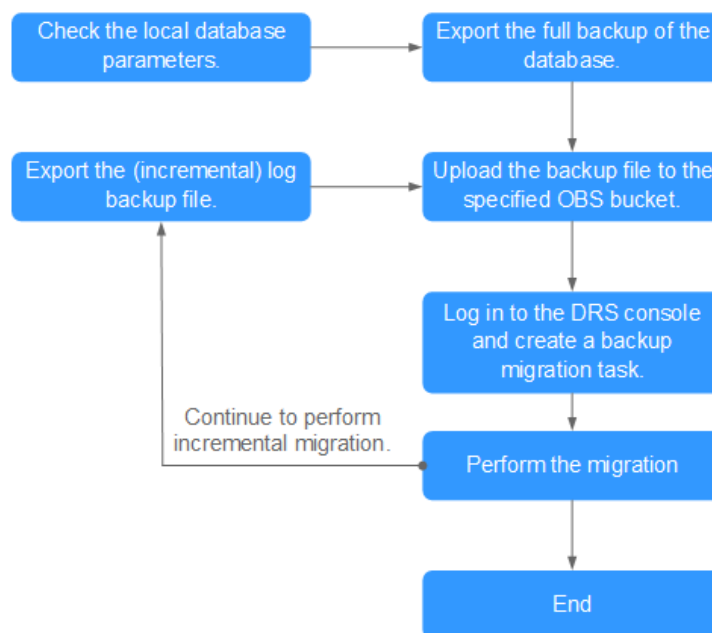
### Migration Diagram

Figure 3-15 Full+incremental migration




### Migration Process

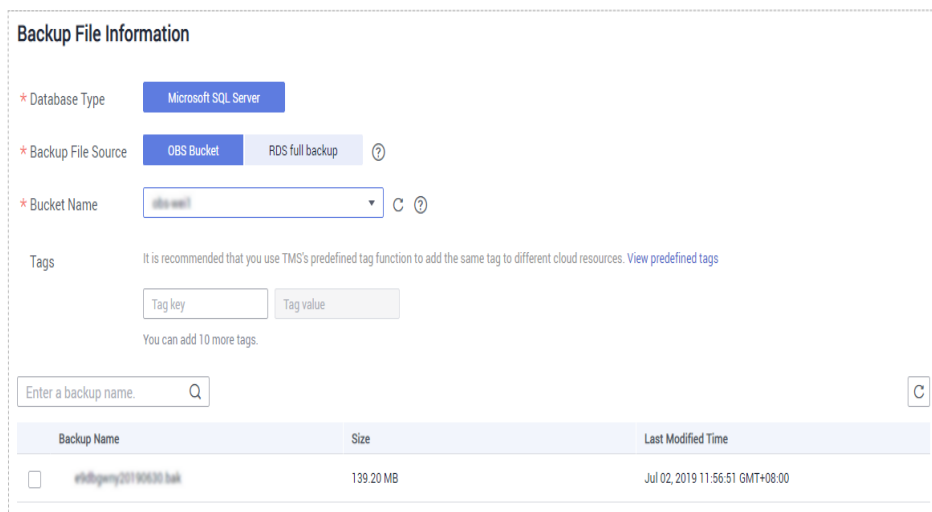
Figure 3-16 Flowchart



## First Full Migration

- Step 1** Export the full backup file of the database. For details, see [Exporting Backup Files](#).
- Step 2** Upload files to an OBS bucket. For details, see [Uploading Backup Files](#).
- Step 3** Log in to the DRS console.
- Step 4** Click  in the upper left corner and select a region and a project.
- Step 5** Choose **Service List > Databases > Data Replication Service**.
- Step 6** In the navigation pane on the left, choose **Backup Migration Management**. Then, click **Create Migration Task**.
- Step 7** Enter the information about the migration task and backup file, and click **Next**.

**Figure 3-17** Migration task information



**Backup File Information**

\* Database Type: **Microsoft SQL Server**

\* Backup File Source: **OBS Bucket** | RDS full backup ?

\* Bucket Name:  C ?

Tags: It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. [View predefined tags](#)

You can add 10 more tags.

Q C

| Backup Name                                   | Size      | Last Modified Time              |
|-----------------------------------------------|-----------|---------------------------------|
| <input type="checkbox"/> et@lpgwy20190330 bak | 139.20 MB | Jul 02, 2019 11:56:51 GMT+08:00 |

**Table 3-5** Migration task information

| Parameter          | Description                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Task Name          | The task name consists of 4 to 64 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_). |
| Description        | The description consists of a maximum of 256 characters and cannot contain the following special characters: !=<>'&"                                           |
| Database Type      | Select <b>Microsoft SQL Server</b> .                                                                                                                           |
| Backup File Source | Select <b>OBS bucket</b> .                                                                                                                                     |



| Parameter   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bucket Name | <p>Select the bucket where the backup file is stored and the full backup file.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>The backup file of the Microsoft SQL Server must be in the .bak format. Multiple backup files can be selected at the same time.</li> <li>A database cannot be split into different files for upload.</li> <li>The bucket name, backup file name, or path cannot contain Chinese characters.</li> <li>If the number of data records in a bucket exceeds 500, data overflow may occur. As a result, some data cannot be displayed. You can use an independent standard bucket with the public-read permission.</li> </ul> |

**Step 8** On the **Select Destination** page, specify database information and click **Next**.

**Figure 3-18** Full migration database information

Database Information

Destination RDS DB Instance Name  Select Destination RDS DB Instance

Backup File Format Full Incremental

Full: Indicates full backup files.

Last Backup Yes No ⓘ

The destination databases involved will be unavailable, and incremental backups can still be restored.

Overwrite Data Yes No You can determine whether to overwrite data in the destination database during the restoration if the destination DB instance contains a database with the same name as the backup database.

Overwriting data will clear the existing data of the destination database. Exercise caution when performing this operation.

Perform Pre-verification Yes No

Restore Database All Custom ⓘ

Reset Database Name  ⓘ

**Table 3-6** Microsoft SQL Server database information

| Parameter                        | Description                                                        |
|----------------------------------|--------------------------------------------------------------------|
| Destination RDS DB Instance Name | Select a destination RDS DB instance.                              |
| Backup Type                      | Select <b>Full</b> .<br><b>Full</b> : indicates full backup files. |

| Parameter                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last Backup File         | <p>A complete restoration process involves restoring several incremental backup files. The destination DB instance will not be available until the last backup file is restored. You can determine whether the selected backup file is the last one. Select <b>Yes</b> in either of the following scenarios:</p> <ul style="list-style-type: none"><li>• Perform a one-time full migration.</li><li>• The selected backup file is the last one to be restored.</li></ul> <p>Select <b>No</b> in the scenario where you continue to restore databases using incremental backup files after a full backup restoration is performed. In this case, the destination database is in the restoring state and cannot be read or written.</p> |
| Overwrite Data           | <p>You can determine whether to overwrite data in the destination database during the restoration if the destination DB instance contains a database with the same name as the backup database.</p> <p><b>NOTE</b><br/>If you select this option, the destination databases with the same names as the backup databases will be overwritten. Exercise caution when performing this operation.</p>                                                                                                                                                                                                                                                                                                                                     |
| Perform Pre-verification | <p>Specifies whether to perform pre-verification on the backup migration task. The default value is <b>Yes</b>.</p> <ul style="list-style-type: none"><li>• <b>Yes:</b> To ensure successful migration and identify potential problems in advance, verify the validity, integrity, continuity, and version compatibility of backup files before restoration.</li><li>• <b>No:</b> If pre-verification is not performed, the migration speed is faster, but you need to check the validity, integrity, continuity, and version compatibility of backup files on your own.</li></ul>                                                                                                                                                    |
| Restore Database         | <p>You can restore all or some of databases.</p> <ul style="list-style-type: none"><li>• <b>All:</b> Restores all databases in the backup file. You do not need to enter the names of the databases to be restored. By default, all databases in the backup file are restored.</li><li>• <b>Custom:</b> Restore specified databases from the backup file. You need to enter the names of the databases to be restored.<br/>The databases to be restored must be consistent with those for which the full or incremental backups are created.</li></ul>                                                                                                                                                                                |

| Parameter            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reset Database Name  | <p>If <b>Restore Database</b> is set to <b>All</b>, you can reset database names. If you enable <b>Reset Database Name</b>, the original database names in the backup file will be reset to new database names.</p> <p>Prerequisites:</p> <ul style="list-style-type: none"><li>• The backup file contains only one database.</li><li>• The backup file is a full backup file and is the last backup file. Select <b>Full</b> for <b>Backup File</b> and <b>Yes</b> for <b>Last Backup Type</b>.</li></ul> <p><b>NOTE</b><br/>The database name can be reset only when <b>Backup Type</b> is set to <b>Full</b> and <b>Restore Database</b> is set to <b>All</b>.</p> |
| Backup Database Name | <p>If <b>Restore Database</b> is set to <b>Custom</b>, specify <b>Backup Database Name</b>.</p> <p>The backup database name is case sensitive and must be the same as that in the backup file. The backup database name can contain a maximum of 256 bytes, and the new database name can contain a maximum of 128 bytes. Only letters, digits, hyphens (-), and underscores (_) are allowed.</p> <p>DRS also allows you to set an alias for the database to be restored.</p>                                                                                                                                                                                         |

**Step 9** On the **Confirm Task** page, check the configuration details, read and agree to the agreement, and click **Next**.

**Step 10** In the task list on the **Backup Migration Management** page, check whether the task is in the **Restoring** status. If the migration is successful, the task status becomes **Successful**.

----End

## First Incremental Migration

**Step 1** Export the first incremental backup file of the database. For details, see [Exporting Backup Files](#).

**Step 2** Upload files to an OBS bucket. For details, see [Uploading Backup Files](#).

**Step 3** Log in to the DRS console.

**Step 4** In the navigation pane on the left, choose **Backup Migration Management**. Then, click **Create Migration Task**.

**Step 5** Enter the information about the migration task and backup file, and click **Next**.

**Figure 3-19** Incremental backup

**Backup File Information**

\* Database Type: Microsoft SQL Server

\* Backup File Source: OBS Bucket (RDS full backup ?)

\* Bucket Name: drs-xxxxxx (C ?)

Tags: It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. View predefined tags. Tag key: Tag value. You can add 10 more tags.

Enter a backup name: [input] (C)

| Backup Name                                                       | Size      | Last Modified Time              |
|-------------------------------------------------------------------|-----------|---------------------------------|
| <input checked="" type="checkbox"/> drs-xxxxxx-transfer_test1.bak | 2.77 MB   | Jul 25, 2019 11:15:21 GMT+08:00 |
| <input type="checkbox"/> drs-xxxxxx-transfer_test2.bak            | 2.77 MB   | Jul 25, 2019 11:15:21 GMT+08:00 |
| <input type="checkbox"/> drs-xxxxxx-transfer_test3.bak            | 2.77 MB   | Jul 25, 2019 11:15:22 GMT+08:00 |
| <input type="checkbox"/> drs-xxxxxx-transfer_test1.bak            | 149.50 KB | Jul 25, 2019 11:17:00 GMT+08:00 |

**Table 3-7** Migration task information

| Parameter          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Task Name          | The task name consists of 4 to 64 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).                                                                                                                                                                                                                                                                                        |
| Description        | The description consists of a maximum of 256 characters and cannot contain the following special characters: !=<>'&"                                                                                                                                                                                                                                                                                                                                  |
| Database Type      | Select <b>Microsoft SQL Server</b> .                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Backup File Source | Select <b>OBS bucket</b> .                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Bucket Name        | Select the bucket where the backup file is stored and the first incremental backup file.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>The backup file of the Microsoft SQL Server must be in the .bak format. Multiple backup files can be selected at the same time.</li> <li>A database cannot be split into different files for upload.</li> <li>The bucket name, backup file name, or path cannot contain Chinese characters.</li> </ul> |

**Step 6** On the **Select Destination** page, specify database information and click **Next**.

**Figure 3-20** Incremental migration database information

**Database Information**

\* Destination RDS DB Instance Name  Select Destination RDS DB Instance

\* Backup Type Full Incremental

Incremental: indicates transaction log backup files.

\* Last Backup File ? Yes No

If you select No, the destination databases involved in this migration will be unavailable and incremental backups can still be restored.

\* Perform Pre-verification Yes No

\* Restore Database All Custom ?

**Table 3-8** Microsoft SQL Server database information

| Parameter                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Destination RDS DB Instance Name | Select a destination RDS DB instance.<br>The destination RDS DB instance must be the same as the DB instance selected during full backup and restoration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Backup Type                      | Select <b>Incremental</b> .<br><b>Incremental</b> : indicates log backup files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Last Backup File                 | A complete restoration process involves restoring several incremental backup files. The destination DB instance will not be available until the last backup file is restored. You can determine whether the selected backup file is the last one. Select <b>Yes</b> in either of the following scenarios: <ul style="list-style-type: none"> <li>Perform a one-time full migration.</li> <li>The selected backup file is the last one to be restored.</li> </ul> Select <b>No</b> if the incremental backup is performed for the first time. In this case, the destination database is in the restoring state and cannot be read or written. |
| Perform Pre-verification         | Specifies whether to perform pre-verification on the backup migration task. The default value is <b>Yes</b> . <ul style="list-style-type: none"> <li><b>Yes</b>: To ensure successful migration and identify potential problems in advance, verify the validity, integrity, continuity, and version compatibility of backup files before restoration.</li> <li><b>No</b>: If pre-verification is not performed, the migration speed is faster, but you need to check the validity, integrity, continuity, and version compatibility of backup files on your own.</li> </ul>                                                                  |

| Parameter        | Description                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Restore Database | <p>You can restore all or some of databases.</p> <ul style="list-style-type: none"> <li>• <b>All:</b> Restores all databases in the backup file. You do not need to enter the names of the databases to be restored. By default, all databases in the backup file are restored.</li> <li>• <b>Custom:</b> Restore specified databases from the backup file. You need to enter the names of the databases to be restored.</li> </ul> |

**Step 7** On the **Confirm Task** page, check the configuration details, read and agree to the agreement, and click **Next**.

**Step 8** In the task list on the **Backup Migration Management** page, check whether the task is in the **Restoring** status. If the migration is successful, the task status becomes **Successful**.

----End

## Second Incremental Migration

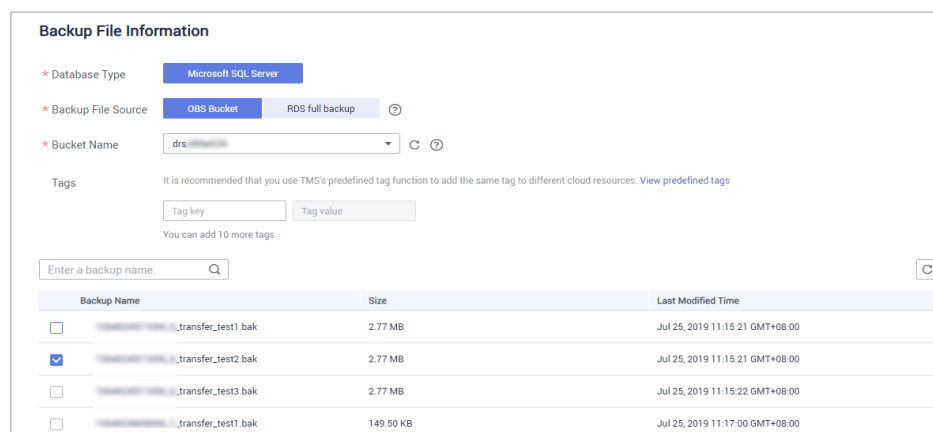
To minimize the service interruption caused by migration, you need to back up, upload, and restore transaction logs before service migration. These operations will restore historical data to the destination database, which greatly reduces the time for uploading and restoring the last transaction log backup during the migration.

**Step 1** Before service migration, export new incremental backup files. For details, see [Exporting Backup Files](#).

**Step 2** Perform [Step 2](#) to [Step 4](#).

**Step 3** Enter the information about the migration task and backup file, and click **Next**.

**Figure 3-21** Incremental backup



**Table 3-9** Migration task information

| Parameter          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Task Name          | The task name consists of 4 to 64 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).                                                                                                                                                                                                                                                                                      |
| Description        | The description consists of a maximum of 256 characters and cannot contain the following special characters: !<>&\'\"                                                                                                                                                                                                                                                                                                                               |
| Database Type      | Select <b>Microsoft SQL Server</b> .                                                                                                                                                                                                                                                                                                                                                                                                                |
| Backup File Source | Select <b>OBS bucket</b> .                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Bucket Name        | Select the bucket where the backup file is stored and the new incremental backup file.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>The backup file of the Microsoft SQL Server must be in the .bak format. Multiple backup files can be selected at the same time.</li> <li>A database cannot be split into different files for upload.</li> <li>The bucket name, backup file name, or path cannot contain Chinese characters.</li> </ul> |

**Step 4** On the **Select Destination** page, specify database information and click **Next**.

**Figure 3-22** Incremental migration database information

The screenshot shows a 'Database Information' form with the following fields and options:

- Destination RDS DB Instance Name:** A text input field with a 'Select Destination RDS DB Instance' button.
- Backup Type:** Radio buttons for 'Full' and 'Incremental'. A note below states: 'Incremental: indicates transaction log backup files.'
- Last Backup File:** Radio buttons for 'Yes' and 'No'. A note below states: 'If you select No, the destination databases involved in this migration will be unavailable and incremental backups can still be restored.'
- Perform Pre-verification:** Radio buttons for 'Yes' and 'No'.
- Restore Database:** Radio buttons for 'All' and 'Custom', with a help icon (?) next to 'Custom'.

**Table 3-10** Microsoft SQL Server database information

| Parameter                        | Description                                                                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Destination RDS DB Instance Name | Select a destination RDS DB instance. The destination RDS DB instance must be the same as the DB instance selected during full backup and restoration. |

| Parameter                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Backup Type              | Select <b>Incremental</b> .<br><b>Incremental</b> : indicates log backup files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Last Backup File         | A complete restoration process involves restoring several incremental backup files. The destination DB instance will not be available until the last backup file is restored. You can determine whether the selected backup file is the last one. Select <b>Yes</b> in either of the following scenarios: <ul style="list-style-type: none"><li>• Perform a one-time full migration.</li><li>• The selected backup file is the last one to be restored.</li></ul> Select <b>No</b> if the incremental backup is performed before migration. In this case, the destination database is in the restoring state and cannot be read or written. |
| Perform Pre-verification | Specifies whether to perform pre-verification on the backup migration task. The default value is <b>Yes</b> . <ul style="list-style-type: none"><li>• <b>Yes</b>: To ensure successful migration and identify potential problems in advance, verify the validity, integrity, continuity, and version compatibility of backup files before restoration.</li><li>• <b>No</b>: If pre-verification is not performed, the migration speed is faster, but you need to check the validity, integrity, continuity, and version compatibility of backup files on your own.</li></ul>                                                                |
| Restore Database         | You can restore all or some of databases. <ul style="list-style-type: none"><li>• <b>All</b>: Restores all databases in the backup file. You do not need to enter the names of the databases to be restored. By default, all databases in the backup file are restored.</li><li>• <b>Custom</b>: Restore specified databases from the backup file. You need to enter the names of the databases to be restored.</li></ul>                                                                                                                                                                                                                   |

**Step 5** On the **Confirm Task** page, check the configuration details, read and agree to the agreement, and click **Next**.

**Step 6** In the task list on the **Backup Migration Management** page, check whether the task is in the **Restoring** status. If the migration is successful, the task status becomes **Successful**.

----End

## Checking Database Transactions

Before service migration, stop services and ensure that no unfinished transaction exists in the database. Otherwise, data may be lost during migration.

**Step 1** Run the following statement to check whether the IP addresses of the service system are disconnected:



```
select * from sys.dm_exec_connections;
```

- If yes, all service system IP addresses are disconnected and the last incremental backup can be migrated.
- If no, go to [Step 2](#).

**Step 2** If an IP address is not disconnected, run the following statement to query the sessions that are not closed:

```
select * from sys.dm_exec_sessions;
```

Run the following statement to view the transactions that are being executed:

```
select * from sys.dm_tran_session_transactions;
```

If the query result contains unclosed sessions and transactions that are being executed, go to [Step 3](#).

**Step 3** The last incremental backup can be migrated only after the transaction is complete, the session is closed, and the service system is disconnected.

----End

## Last Incremental Migration

After several incremental migrations, the two databases are almost consistent. During the transaction checks, services are stopped and no data will be generated. Then, you need to perform the last incremental migration to ensure the data consistency.

**Step 1** Export the new incremental backup file of the database. For details, see [Exporting Backup Files](#).

**Step 2** Perform [Step 2](#) to [Step 4](#).

**Step 3** Enter the information about the migration task and backup file, and click **Next**.

**Figure 3-23** Incremental backup

**Backup File Information**

\* Database Type: Microsoft SQL Server

\* Backup File Source: OBS Bucket RDS full backup

\* Bucket Name: drs-obs-1234567890

Tags: It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. [View predefined tags](#)

You can add 10 more tags.

Enter a backup name.

| Backup Name                                            | Size      | Last Modified Time              |
|--------------------------------------------------------|-----------|---------------------------------|
| <input type="checkbox"/> transfer_test1.bak            | 2.77 MB   | Jul 25, 2019 11:15:21 GMT+08:00 |
| <input type="checkbox"/> transfer_test2.bak            | 2.77 MB   | Jul 25, 2019 11:15:21 GMT+08:00 |
| <input checked="" type="checkbox"/> transfer_test3.bak | 2.77 MB   | Jul 25, 2019 11:15:22 GMT+08:00 |
| <input type="checkbox"/> transfer_test1.bak            | 149.50 KB | Jul 25, 2019 11:17:00 GMT+08:00 |

**Table 3-11** Migration task information

| Parameter          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Task Name          | The task name consists of 4 to 64 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).                                                                                                                                                                                                                                                                                      |
| Description        | The description consists of a maximum of 256 characters and cannot contain the following special characters: !=<>'&"                                                                                                                                                                                                                                                                                                                                |
| Database Type      | Select <b>Microsoft SQL Server</b> .                                                                                                                                                                                                                                                                                                                                                                                                                |
| Backup File Source | Select <b>OBS bucket</b> .                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Bucket Name        | Select the bucket where the backup file is stored and the new incremental backup file.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>The backup file of the Microsoft SQL Server must be in the .bak format. Multiple backup files can be selected at the same time.</li> <li>A database cannot be split into different files for upload.</li> <li>The bucket name, backup file name, or path cannot contain Chinese characters.</li> </ul> |

**Step 4** On the **Select Destination** page, specify database information and click **Next**.

**Figure 3-24** Incremental migration database information

The screenshot shows the 'Database Information' section of a configuration page. It contains the following elements:

- Destination RDS DB Instance Name:** A text input field with a placeholder and a 'Select Destination RDS DB Instance' button.
- Backup Type:** Two radio buttons, 'Full' and 'Incremental'. 'Incremental' is selected. A note below states: 'Incremental: indicates transaction log backup files.'
- Last Backup File:** Two radio buttons, 'Yes' and 'No'. 'Yes' is selected. A note below states: 'If you select Yes, the destination databases involved in this migration remain available and incremental backups can no longer be restored.'
- Perform Pre-verification:** Two radio buttons, 'Yes' and 'No'. 'Yes' is selected.
- Restore Database:** Two radio buttons, 'All' and 'Custom'. 'All' is selected.

**Table 3-12** Microsoft SQL Server database information

| Parameter                        | Description                                                                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Destination RDS DB Instance Name | Select a destination RDS DB instance. The destination RDS DB instance must be the same as the DB instance selected during full backup and restoration. |

| Parameter                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Backup Type              | Select <b>Incremental</b> .<br><b>Incremental</b> : indicates log backup files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Last Backup File         | Select <b>Yes</b> because it is the last incremental migration after services are stopped.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Perform Pre-verification | Specifies whether to perform pre-verification on the backup migration task. The default value is <b>Yes</b> . <ul style="list-style-type: none"><li>• <b>Yes</b>: To ensure successful migration and identify potential problems in advance, verify the validity, integrity, continuity, and version compatibility of backup files before restoration.</li><li>• <b>No</b>: If pre-verification is not performed, the migration speed is faster, but you need to check the validity, integrity, continuity, and version compatibility of backup files on your own.</li></ul> |
| Restore Database         | You can restore all or some of databases. <ul style="list-style-type: none"><li>• <b>All</b>: Restores all databases in the backup file. You do not need to enter the names of the databases to be restored. By default, all databases in the backup file are restored.</li><li>• <b>Custom</b>: Restore specified databases from the backup file. You need to enter the names of the databases to be restored.</li></ul>                                                                                                                                                    |

**Step 5** On the **Confirm Task** page, check the configuration details, read and agree to the agreement, and click **Next**.

**Step 6** In the task list on the **Backup Migration Management** page, check whether the task is in the **Restoring** status. If the migration is successful, the task status becomes **Successful**.

----End

## 3.1.7 Manual Configuration

### Scenarios

After data is migrated from the local host or VMs to the RDS for SQL Server DB instance on the current cloud through DRS, the Login accounts, database links, Agent Jobs, and key configurations of the source database also need to be synchronized to the destination database.

### Login Account

Login account is an instance-level account of Microsoft SQL Server and is used to manage user server and database permissions. Generally, a user has multiple such accounts. After the user is migrated to the RDS for SQL Server DB instance, you need to manually create corresponding Login accounts on the DB instance. The following describes how to create a Login account with the same name and

password as those of your local Login account on the RDS for SQL Server DB instance and grant permissions to the account.

- Step 1** Execute the following script to obtain the script for creating a Local account on your local instance. The obtained script can be directly executed on the destination DB instance to create a Login account with the same name and password.

```
SELECT 'IF (SUSER_ID('+QUOTENAME(SP.name,'"')+') IS NULL) BEGIN CREATE LOGIN '+
+QUOTENAME(SP.name)+
CASE
WHEN SP.type_desc = 'SQL_LOGIN' THEN ' WITH PASSWORD = '
+CONVERT(NVARCHAR(MAX),SL.password_hash,1)+ ' HASHED,SID='
+CONVERT(NVARCHAR(MAX),SP.SID,1)+' ,CHECK_EXPIRATION = '
+ CASE WHEN SL.is_expiration_checked = 1 THEN 'ON' ELSE 'OFF' END +', CHECK_POLICY = '
+CASE WHEN SL.is_policy_checked = 1 THEN 'ON,' ELSE 'OFF,' END
ELSE ' FROM WINDOWS WITH'
END
+' DEFAULT_DATABASE=[' +SP.default_database_name+ '], DEFAULT_LANGUAGE=['
+SP.default_language_name+ '] END;' as CreateLogin
FROM sys.server_principals AS SP LEFT JOIN sys.sql_logins AS SL
ON SP.principal_id = SL.principal_id
WHERE SP.type = 'S'
AND SP.name NOT LIKE '###'
AND SP.name NOT LIKE 'NT AUTHORITY%'
AND SP.name NOT LIKE 'NT SERVICE%'
AND SP.name NOT IN ('rdsadmin','rdsbackup','rdsuser','rdsmirror','public')
```

- Step 2** Execute the script in [Step 1](#):

**Figure 3-25** Obtaining the script

```
CreateLogin
1 IF (SUSER_ID('sa') IS NULL) BEGIN CREATE LOGIN [sa] WITH PASSWORD = 0x0100396F2EFAD6A3D84E2A8B941E8ED32E5189A4BE757...
2 IF (SUSER_ID('rdsuser2') IS NULL) BEGIN CREATE LOGIN [rdsuser2] WITH PASSWORD = 0x0100E8EBCBC25FC67008D4E75AD660D1...
3 IF (SUSER_ID('csidbo') IS NULL) BEGIN CREATE LOGIN [csidbo] WITH PASSWORD = 0x0100A508789C15CE688664E162A5EDF4F4D2E...
4 IF (SUSER_ID('TestLogin7') IS NULL) BEGIN CREATE LOGIN [TestLogin7] WITH PASSWORD = 0x010073DA9A79E6677E8AF7077EF67...
5 IF (SUSER_ID('rdsuser3') IS NULL) BEGIN CREATE LOGIN [rdsuser3] WITH PASSWORD = 0x01009448FEDBC8D5B5E2529384029CA0...
6 IF (SUSER_ID('Test2') IS NULL) BEGIN CREATE LOGIN [Test2] WITH PASSWORD = 0x0100130953CEAEC997D08B6EAF65F84EBCAA44...
7 IF (SUSER_ID('Test3') IS NULL) BEGIN CREATE LOGIN [Test3] WITH PASSWORD = 0x0100EE98873948E02595BDCD953E426637281B7...
8 IF (SUSER_ID('Test4') IS NULL) BEGIN CREATE LOGIN [Test4] WITH PASSWORD = 0x01000EE91B9EF087741F16A44E70AA813D0BA8B...
9 IF (SUSER_ID('Test5') IS NULL) BEGIN CREATE LOGIN [Test5] WITH PASSWORD = 0x010056EEF845DF098D2DF9395AF7B7618A20735...
```

- Step 3** Copy and execute the script obtain in [Step 2](#) on the destination instance. The created Login account is the same as the original one.

- Step 4** Map the newly created Login account to the database user permissions that have been migrated to the RDS for SQL Server DB instance to ensure permission consistency.

```
declare @DBName nvarchar(200)
declare @Login_name nvarchar(200)
declare @SQL nvarchar(MAX)
set @Login_name = 'TestLogin7' //Enter the login name one by one.
declare DBName_Cursor cursor for
select quotename(name)from sys.databases where database_id > 4 and state = 0
and name not like '%$%'
and name <> 'rdsadmin'
open DBName_Cursor
fetch next from DBName_Cursor into @DBName
WHILE @@FETCH_STATUS= 0
begin
SET @SQL=' USE '+ (@DBName)+ '
if exists(select top 1 1 from sys.sysusers where name = "'+ @Login_name +'"')
begin
```

```
ALTER USER '+@Login_name+' with login = '+@Login_name+';
end
'
print @SQL
EXEC (@SQL)
fetch next from DBName_Cursor into @DBName
end
close DBName_Cursor
deallocate DBName_Cursor
```

#### NOTE

After the preceding script is executed, you can view the Login account with the same name on the new instance, and the password and permission are the same as those on your local host.

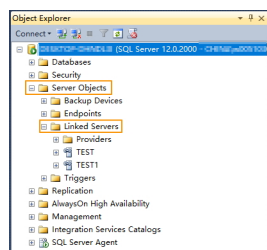
----End

## Database Link

SQL Server allows you to create database links to interact with databases on external DB instances. Therefore you can query, synchronize, and compare databases of different types or on different DB instances. However, these links cannot be automatically synchronized to the DB instance on cloud so you need to synchronize them manually.

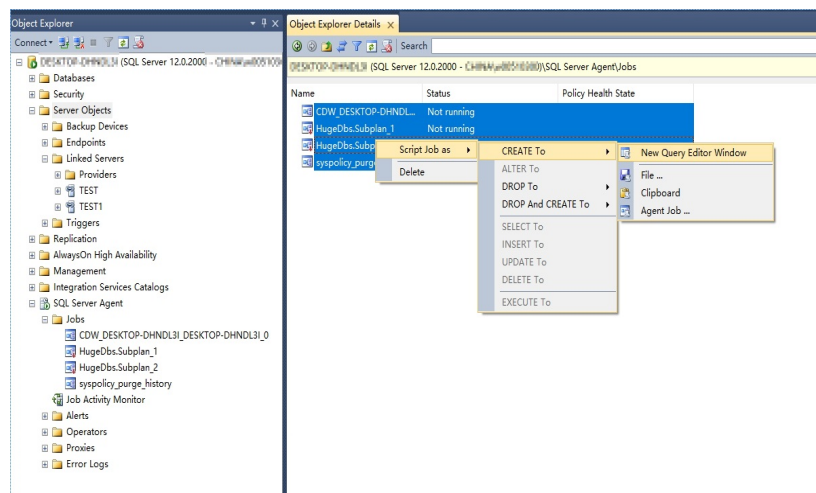
- Step 1** Connect the local DB instance and cloud DB instance through Microsoft SQL Server Management Studio. Choose **Server Objects > Linked Servers** and locate the DBLink of the current DB instance.

**Figure 3-26** Viewing database links



- Step 2** Select the linked server and press **F7**. The **Object Explore** page is displayed. On this page, you can quickly create a script.

Figure 3-27 Creating the script



**Step 3** In the displayed window, view all the scripts for creating DBLinks of the current DB instance. You only need to copy the scripts to the destination DB instance and change the password on @rmtpassword.

```
USE [master]
GO
```

```

/***** Object: LinkedServer [DRS_TEST_REMOTE] Script Date: 2019/5/25 17:51:50 *****/
EXEC master.dbo.sp_addlinkedserver @server = N'DRS_TEST_REMOTE', @srvproduct=N'',
@provider=N'SQLNCLI', @datasrc=N'DESKTOP-B18JH5T\SQLSERVER2016EE'
/* For security reasons the linked server remote logins password is changed with ##### */
EXEC master.dbo.sp_addlinkedsrvlogin
@rmtsrsvname=N'DRS_TEST_REMOTE',@useself=N'False',@locallogin=NULL,@rmtuser=N'sa',@r
mtpassword='#####'
GO

```

#### NOTE

The preceding script is an example. The created script may contain a large number of default system configuration items. You need to retain only the following two key scripts for each DBLink. In addition, you need to enter the account and password again.

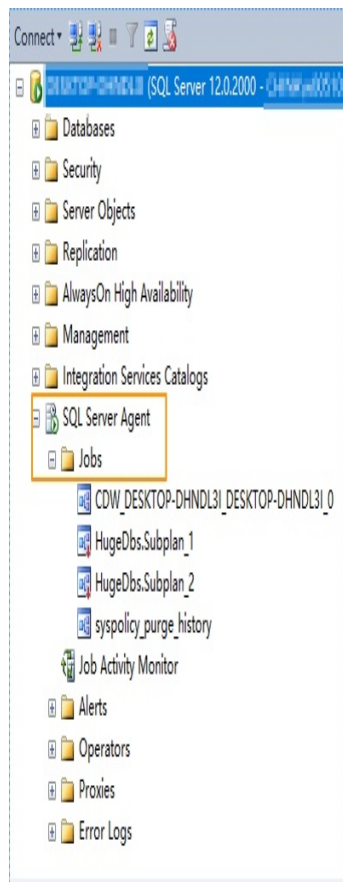
----End

## Agent JOB

Agent Job is the agent service of Microsoft SQL Server. It helps you quickly create scheduled tasks on DB instances, perform routine O&M, and process data. You need to manually migrate local Job scripts.

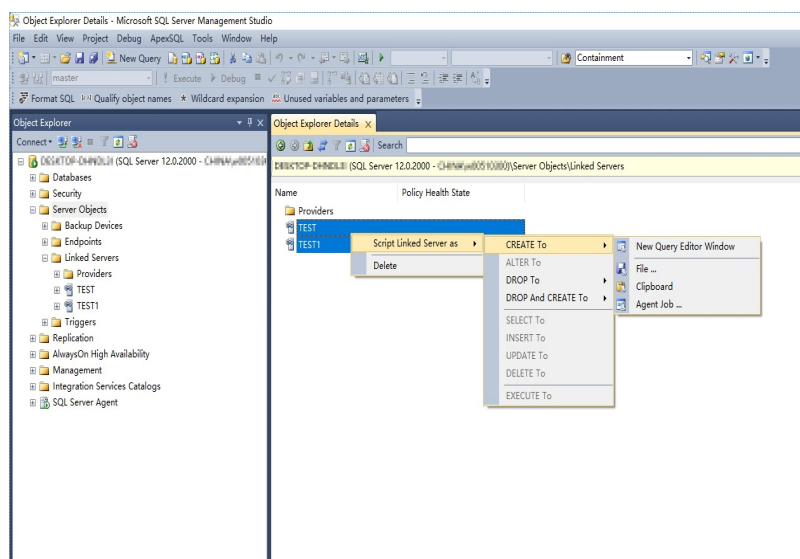
**Step 1** Connect the local DB instance and cloud DB instance through Microsoft SQL Server Management Studio. Choose **SQL Server Agent** > **Jobs** and locate all the jobs of the current DB instance.

Figure 3-28 Viewing Jobs



**Step 2** Select a job and press **F7**. All jobs are displayed on the **Object Explore** page. Select all jobs and create a script in the new window.

Figure 3-29 Creating a script



**Step 3** Copy the T-SQL script in the new window to the new DB instance, and then modify the following key items to ensure that the creation is successful.

- Modify the owner account of each job.  
Example:  
@owner\_login\_name=N'rdsuser'
- Modify the DB instance name of each job.  
Example:  
@server=N' DB instance IP address'  
@server\_name = N'DB instance IP address'

** NOTE**

The owner account of the new job is very important. On the RDS for SQL Server DB instance, only the owner of the job can view the job of the DB instance. Therefore, it is recommended that all job owners use the same account to facilitate job management.

----End

## Key Configuration

After the database is restored to the RDS for SQL Server DB instance, some local important configuration items need to be synchronized to keep service running properly.

1. tempdb: The file configuration of the temporary database needs to be synchronized.

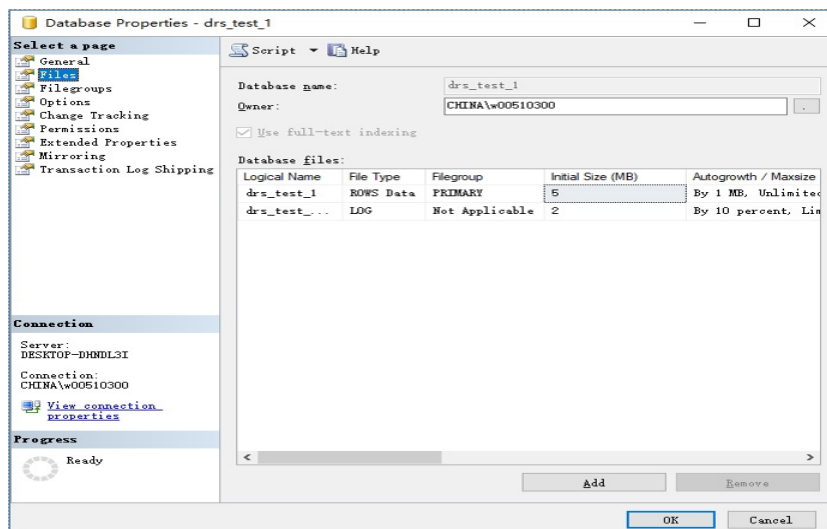
It is recommended that you set 8 temporary files and ensure that the files are stored in **D:\RDSDBDATA\Temp\**.

Run the following script on the destination database to add the temporary database file configuration:

```
USE [master]
GO
ALTER DATABASE [tempdb] ADD FILE (NAME = N'tempdb1', FILENAME =
N'D:\RDSDBDATA\Temp\tempdb1.ndf' , SIZE = 65536KB , FILEGROWTH = 65536KB)
GO
ALTER DATABASE [tempdb] ADD FILE (NAME = N'tempdb2', FILENAME =
N'D:\RDSDBDATA\Temp\tempdb2.ndf' , SIZE = 65536KB , FILEGROWTH = 65536KB)
GO
ALTER DATABASE [tempdb] ADD FILE (NAME = N'tempdb3', FILENAME =
N'D:\RDSDBDATA\Temp\tempdb3.ndf' , SIZE = 65536KB , FILEGROWTH = 65536KB)
GO
ALTER DATABASE [tempdb] ADD FILE (NAME = N'tempdb4', FILENAME =
N'D:\RDSDBDATA\Temp\tempdb4.ndf' , SIZE = 65536KB , FILEGROWTH = 65536KB)
GO
ALTER DATABASE [tempdb] ADD FILE (NAME = N'tempdb5', FILENAME =
N'D:\RDSDBDATA\Temp\tempdb5.ndf' , SIZE = 65536KB , FILEGROWTH = 65536KB)
GO
ALTER DATABASE [tempdb] ADD FILE (NAME = N'tempdb6', FILENAME =
N'D:\RDSDBDATA\Temp\tempdb6.ndf' , SIZE = 65536KB , FILEGROWTH = 65536KB)
GO
ALTER DATABASE [tempdb] ADD FILE (NAME = N'tempdb7', FILENAME =
N'D:\RDSDBDATA\Temp\tempdb7.ndf' , SIZE = 65536KB , FILEGROWTH = 65536KB)
GO
```



Figure 3-30 Checking temporary files



2. Database isolation level: Check whether the database isolation level is enabled on the source DB instance and synchronize the isolation level to the RDS for SQL Server DB instance. There are two snapshot isolation parameters:
  - Is Read Committed Snapshot On
  - Allow Snapshot Isolation

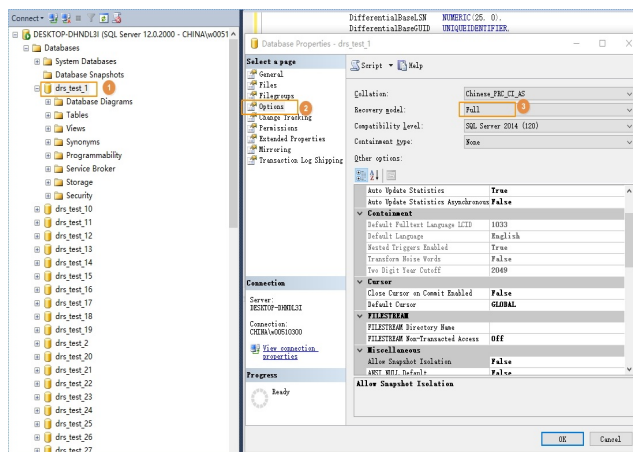
If the database isolation level of the source DB instance is enabled, you can run the following script on the destination database to enable the database isolation level:

```
USE [DBName]
GO
ALTER DATABASE [DBName] SET READ_COMMITTED_SNAPSHOT ON WITH NO_WAIT
GO
ALTER DATABASE [DBName] SET ALLOW_SNAPSHOT_ISOLATION ON
GO
```

3. Max Degree of Parallelism: The maximum degree of parallelism is set to **0** by default on the RDS for SQL Server instance. You can also set the value based on the local settings to avoid exceptions in different service scenarios.

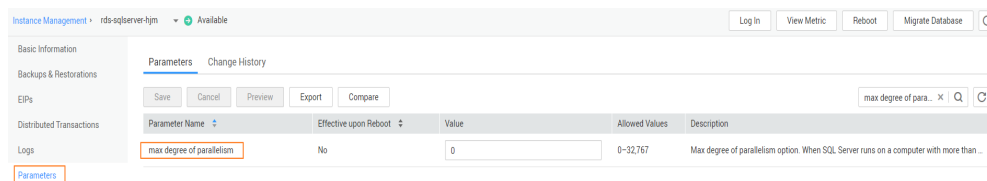
In **Object Explorer**, right-click a local server and select **Properties**. Click the **Advanced** node. In the **Max Degree of Parallelism** box, view the value of the local instance and change the **max degree of parallelism** value in the parameter group of the destination RDS for SQL Server instance to the same.

Figure 3-31 Max Degree of Parallelism



Log in to the RDS console. On the **Instance Management** page, click the target DB instance name. Choose **Parameters**, search for the **max degree of parallelism** parameter, and change its value.

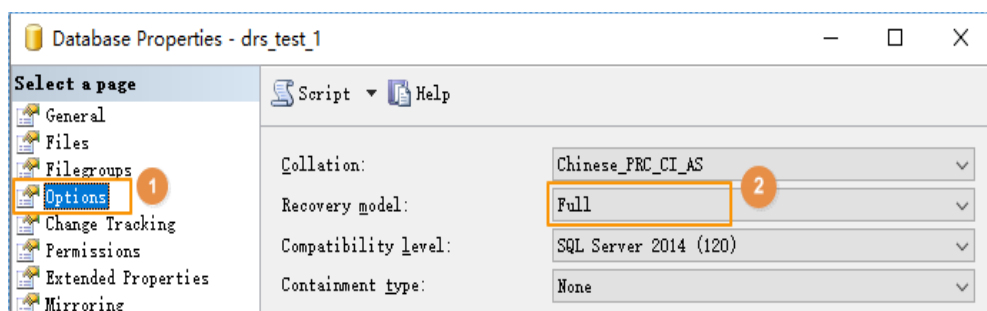
Figure 3-32 max degree of parallelism



4. Check whether the database recovery model on the cloud is set to **Full**. If not, change the mode.

Right-click the database and choose **Properties** from the shortcut menu. In the displayed page, select **Options**. Then, verify that **Recovery Model** is set to **Full**. Ensure that the database is highly available and the backup policy is executable.

Figure 3-33 Checking the database recovery model



# 4 Real-Time Synchronization

## 4.1 From Other Cloud PostgreSQL to RDS for PostgreSQL

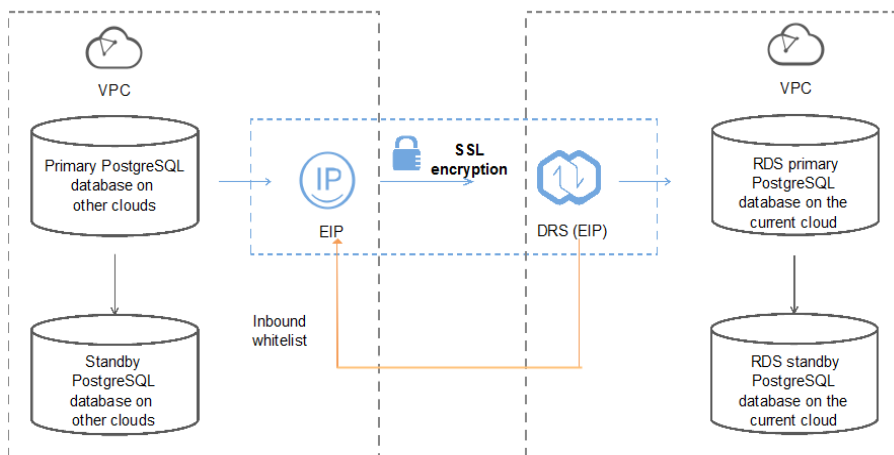
DRS helps you synchronize PostgreSQL instances from other cloud platforms to the current cloud. DRS supports real-time synchronization to ensure real-time flow of key service data.

This section describes how to use DRS to synchronize data from a PostgreSQL instance on another cloud to the current cloud. Synchronization scenarios include:

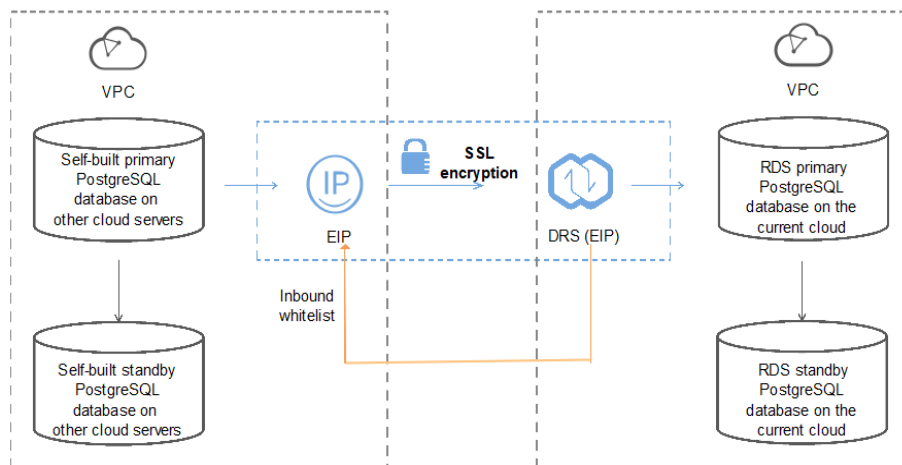
- Synchronizing PostgreSQL databases from another cloud to the current cloud.
- Synchronizing PostgreSQL databases from other cloud servers to the current cloud in real time.

### Diagram

**Figure 4-1** Real-time synchronization of other cloud PostgreSQL databases

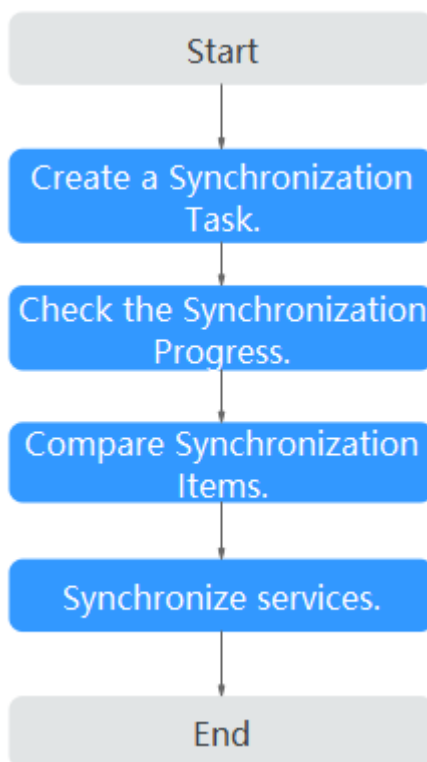


**Figure 4-2** PostgreSQL databases on other cloud servers



## Synchronization Process

**Figure 4-3** Flowchart



## Synchronization Suggestions (Important)

- Database synchronization is closely impacted by a wide range of environmental and operational factors. To ensure the synchronization goes smoothly, you are advised to perform a test run before the actual synchronization to help you detect and resolve any potential issues in advance. Recommendations on how to minimize any potential impacts on your data base are provided in this section.

- It is strongly recommended that you start a task during off-peak hours. A less active database is easier to synchronize successfully. If the data is fairly static, there is less likely to be any severe performance impacts during the synchronization.

## Notes on Synchronization (Important)

---

### NOTICE

Before creating a real-time synchronization task, read this section carefully.

---

For details, see [Precautions](#) in *Real-Time Synchronization*.

## Synchronization Preparations

1. Permissions

**Table 4-1** lists the permissions required for the source and destination databases when you synchronize a PostgreSQL database from another cloud to the current cloud.

**Table 4-1** Account permissions

| Synchronization Type | Full                                                                                                                                                                                                                                                                         | Full+Incremental                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source               | <p>The CONNECT permission for databases, the USAGE permission for schemas, the SELECT permission for tables, the SELECT permission for sequences, and the SELECT permission for system table <b>catalog pg_catalog.pg_authid</b> (used for synchronizing user passwords)</p> | <p>The CONNECT permission for databases, the USAGE permission for schemas, the SELECT permission for tables, the SELECT permission for sequences, the SELECT permission for system table <b>catalog pg_catalog.pg_authid</b> (used for synchronizing user passwords), the UPDATE, DELETE, and TRUNCATE permissions for tables that do not have primary keys, and the permission to create replication connections</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• The UPDATE, DELETE, and TRUNCATE permissions for tables that do not have primary keys are only used to temporarily lock tables to ensure data consistency after the migration.</li> <li>• To add the permission to create replication connections, perform the following steps:               <ol style="list-style-type: none"> <li>1. Add <b>host replication &lt;src_user_name&gt; &lt;drs_instance_ip&gt;/32 md5</b> before all configurations in the <b>pg_hba.conf</b> file of the source database.</li> <li>2. Run <b>select pg_reload_conf();</b> in the source database as user SUPERUSER, or restart the DB instance to apply the changes.</li> </ol> </li> </ul> |

| Synchronization Type | Full                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Full+Incremental |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Destination          | <ul style="list-style-type: none"> <li>● <b>Database-level:</b> The CREATEDB permission is required.</li> <li>● <b>Table-level:</b> <ul style="list-style-type: none"> <li>- To synchronize databases, the CREATEDB permission is required.</li> <li>- To synchronize a schema, the CONNECT and CREATE permissions for the database that contains the schema are required.</li> <li>- To synchronize objects in a schema, the CONNECT permission for the database that contains the schema, and the USAGE and CREATE permissions for the schema that contain the objects are required.</li> </ul> </li> <li>● Synchronization user: The CREATEROLE permission is required.</li> <li>● Synchronization user permissions: The default privilege cannot be modified. Otherwise, the object permissions of the destination database may be inconsistent with those of the source database.</li> </ul> <p><b>NOTE</b><br/>To synchronize event triggers, text search parsers, and text search templates, the destination database version must be RDS for PostgreSQL 11.11 or later, and the destination database user must be user root or a member of user root.</p> |                  |

- Source database permissions:  
The source PostgreSQL database account must have all the required permissions listed in [Table 4-1](#). If the permissions are insufficient, create a user that has all of the permissions on the source database.
- Destination database permissions:  
If the destination database is a PostgreSQL database on the current cloud, the initial account can be used.

2. Network settings

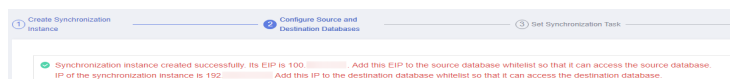
Enable public accessibility for the source database.

- Source database network settings:  
Enable public accessibility for the source PostgreSQL database.
- Destination database network settings:

By default, the destination database and the DRS replication instance are in the same VPC and can communicate with each other. No further configuration is required.

3. Security rules

- Source database security group settings:  
The synchronization instance needs to be able to access the source database, which means that the EIP of the replication instance must be on the whitelist of the source PostgreSQL instance.  
Before configuring the network whitelist, you need to obtain the EIP of the synchronization instance.  
After creating a synchronization instance on the DRS console, you can find the EIP on the **Configure Source and Destination Databases** page, as shown in [Figure 4-4](#).

**Figure 4-4** Synchronization Instance EIP

- You can also add 0.0.0.0/0 to the source database whitelist to allow any IP address to access the source database but this action may result in security risks.
- After the synchronization is complete, you can delete the rules.
- Destination database security group settings:  
By default, the destination database and the DRS synchronization instance are in the same VPC and can communicate with each other. No further configuration is required.

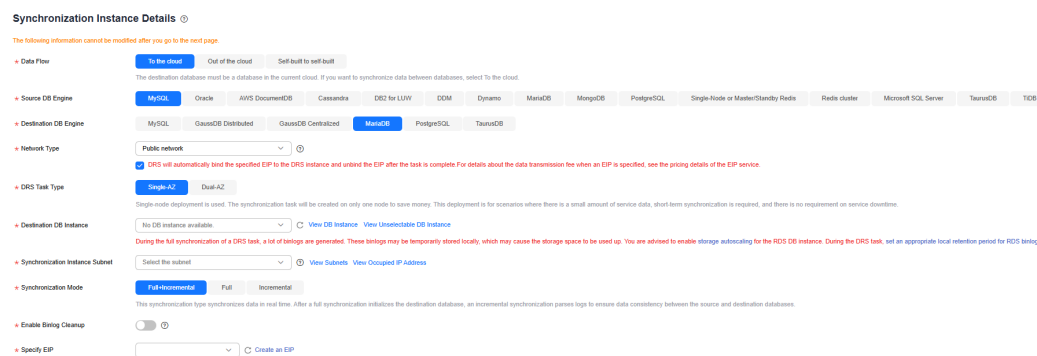
#### 4. Other

DRS can synchronize only some types of DDL statements of PostgreSQL. For details, see [related guides](#). Properly plan the source database services. Do not perform DDL operations that are not supported during synchronization.

## Procedure

### Step 1 Create a synchronization task.

1. Log in to the management console and choose **Databases > Data Replication Service** to go to the DRS console.
2. On the **Data Synchronization Management** page, click **Create Synchronization Task**.
3. On the displayed page, specify the task name, description, and synchronization instance details.

**Figure 4-5** Synchronization instance information



**Table 4-2** Task settings

| Parameter   | Description                                                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Region      | The region where the replication instance is deployed. You can change the region. To reduce latency and improve access speed, select the region closest to your workloads. |
| Project     | The project corresponds to the current region and can be changed.                                                                                                          |
| Task Name   | The task name consists of 4 to 50 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).             |
| Description | The description consists of a maximum of 256 characters and cannot contain the following special characters: =<>&'\\"/>                                                    |

**Table 4-3** Synchronization instance settings

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Flow               | <b>To the cloud</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Source DB Engine        | Select <b>PostgreSQL</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Destination DB Engine   | Select <b>PostgreSQL</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Network Type            | Select <b>Public network</b> . Enabling SSL is recommended. It may slow down the synchronization by 20% to 30% but it ensures data security.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Destination DB Instance | The RDS for PostgreSQL instance you created.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Synchronization Mode    | <ul style="list-style-type: none"><li>- Full+Incremental<br/>This synchronization mode allows you to synchronize data in real time. After a full synchronization initializes the destination database, an incremental synchronization parses logs to ensure data consistency between the source and destination databases.</li><li>- Full<br/>All objects and data in non-system databases are synchronized to the destination database at a time. This mode is applicable to scenarios where service interruption is acceptable.</li><li>- Incremental</li></ul> <b>NOTE</b><br>If you select the <b>Full+Incremental</b> synchronization mode, ongoing changes made to the data will be synchronized to the destination database in real time, ensuring that the source database remain accessible. |

- On the **Configure Source and Destination Databases** page, wait until the synchronization instance is created. Then, specify source and destination database information and click **Test Connection** for both the source and destination databases to check whether they have been connected to the synchronization instance. After the connection tests are successful, select the check box before the agreement and click **Next**.

**Figure 4-6** Source and destination database details

**Source Database**

System databases, users, parameters, and jobs will not be migrated. You need to manually import users and jobs to the destination database and configure parameters in parameter templates of the destination database.

IP Address or Domain Name:

Port:

Database Username:

Database Password:

SSL Connection:

If you want to enable SSL connection, ensure that SSL has been enabled on the source database, and related parameters have been correctly configured.

Test Connection This button is available only after the replication instance is created successfully.

---

**Destination Database**

DB Instance Name: pg-12-for-autotest (  )

Database Username:

Database Password:

Test Connection This button is available only after the replication instance is created successfully.

**Table 4-4** Source database settings

| Parameter                 | Description                                                                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IP Address or Domain Name | The IP address or domain name of the source database.                                                                                                              |
| Port                      | The port of the source database.<br>Range: 1 - 65535                                                                                                               |
| Database Username         | A username for the source database.                                                                                                                                |
| Database Password         | The password for the database username.                                                                                                                            |
| SSL Connection            | To improve data security during synchronization over a public network, you are advised to enable SSL to encrypt synchronization links and upload a CA certificate. |

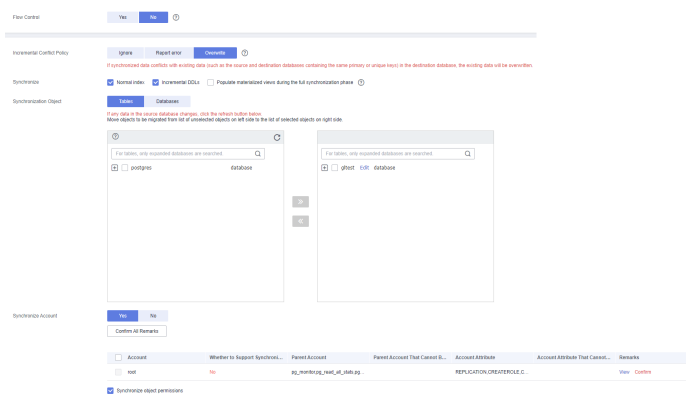
**Table 4-5** Destination database settings

| Parameter        | Description                                                                                                                                   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| DB Instance Name | The RDS for PostgreSQL instance you have selected during the synchronization instance creation is displayed by default and cannot be changed. |

| Parameter         | Description                                                             |
|-------------------|-------------------------------------------------------------------------|
| Database Username | The username for accessing the destination RDS for PostgreSQL instance. |
| Database Password | The password for the database username.                                 |

5. On the **Set Synchronization Task** page, select the synchronization object and user.

**Figure 4-7** Synchronization mode



**Table 4-6** Synchronization object

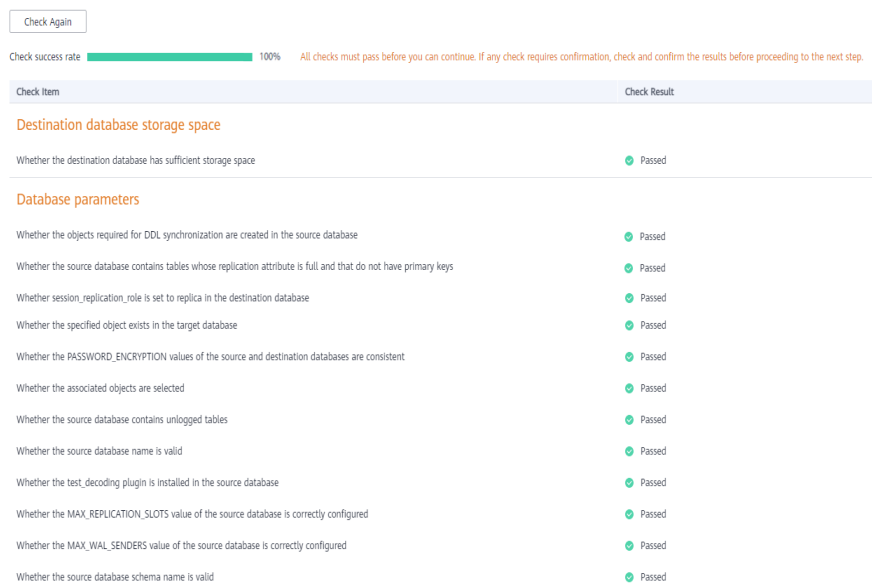
| Parameter    | Description                                 |
|--------------|---------------------------------------------|
| Flow Control | You can choose whether to control the flow. |

| Parameter                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incremental Conflict Policy | <p>The real-time synchronization function provides conflict policies for you to choose from if the synchronized data conflicts with existing data (such as the source and destination databases containing the same primary or unique keys) in the destination database.</p> <p>Select any of the following conflict policies:</p> <ul style="list-style-type: none"><li>- <b>Ignore</b><br/>The system will skip the conflicting data and continue the subsequent synchronization process.</li><li>- <b>Report error</b><br/>The synchronization task will be stopped and fail.</li><li>- <b>Overwrite</b><br/>Conflicting data will be overwritten.</li></ul> <p>In the following scenarios, you can select <b>Ignore</b> or <b>Overwrite</b>. In other scenarios, you are advised to select <b>Report error</b>.</p> <ul style="list-style-type: none"><li>- Data already exists in the destination database.</li><li>- Multiple source databases are synchronized to one destination database.</li><li>- Data in the destination database is updated manually.</li></ul> |
| Synchronize                 | <p>Available options: <b>Index</b>, <b>Incremental DDLs</b>, and <b>Populate materialized views during the full synchronization phase</b></p> <p><b>Populate materialized views during the full synchronization phase:</b> This option takes effect only for materialized views that was populated in the source database. This operation affects the full synchronization performance. You perform this operation after the full synchronization is complete.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Synchronization Object      | <p>DRS supports database- and table-level synchronization. You can select databases or tables for synchronization based on your service requirements. A single task can synchronize objects from only one database. Database name mapping is supported.</p> <ul style="list-style-type: none"><li>- Database-level synchronization synchronizes all objects in the source database to the destination database.</li><li>- Table-level synchronization synchronizes the selected table objects to the destination database.</li></ul> <p><b>NOTE</b></p> <p>If you select table-level synchronization, the selected table may have dependencies on other objects in the database. If the referenced objects are not selected and do not exist in the destination database, the task will fail. Ensure that all referenced objects are selected before synchronization or select database-level synchronization.</p>                                                                                                                                                           |

| Parameter           | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Synchronize Account | <p>During the synchronization, you can synchronize accounts based on your service requirements.</p> <p>There are two types of accounts: accounts that can be synchronized and accounts that cannot be synchronized. For accounts that cannot be synchronized, you can view details in the <b>Remarks</b> column and determine whether to synchronize accounts and permissions based on your service requirements.</p> |

6. On the **Check Task** page, check the synchronization task.
  - If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.  
For details about how to handle check failures, see [Checking Whether the Source Database Is Connected](#) in *Data Replication Service User Guide*.
  - If all check items are successful, click **Next**.

**Figure 4-8** Task Check



**NOTE**

You can proceed to the next step only when all checks are successful. If there are any items that require confirmation, view and confirm the details first before proceeding to the next step.

7. On the **Confirm Task** page, specify **Start Time** and click **Next**.

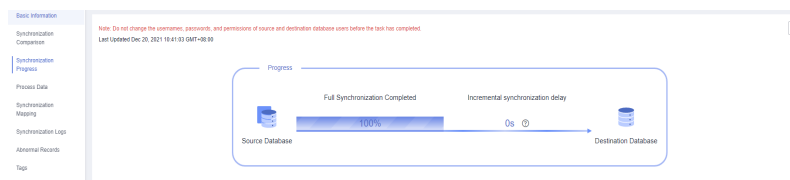
**NOTE**

- Set **Start Time** to **Start upon task creation** or **Start at a specified time** based on site requirements.
  - After a synchronization task is started, the performance of the source and destination databases may be affected. You are advised to start a synchronization task during off-peak hours.
8. After the task is submitted, go back to the **Data Synchronization Management** page to view the task status.

**Step 2** Manage the migration task.

The migration task contains two phases: full migration and incremental migration. You can manage them in different phases.

- Full synchronization  
Viewing the synchronization progress: Click the target full synchronization task, and on the **Migration Progress** tab, you can see the synchronization progress of the structure, data, indexes, and synchronization objects. When the progress reaches 100%, the synchronization is complete.
- Incremental synchronization
  - Viewing the synchronization delay: After the full synchronization is complete, an incremental synchronization starts. On the **Data Synchronization Management** page, click the target synchronization task. On the displayed page, click **Synchronization Progress** to view the synchronization delay of the incremental synchronization. If the synchronization delay is 0s, the destination database is being synchronized with the source database in real time. You can also view the data consistency on the **Synchronization Comparison** tab.

**Figure 4-9** Viewing the synchronization delay

- Viewing the synchronization comparison results: To minimize service downtime, click the name of an incremental synchronization task. On the **Synchronization Comparison** page, create a comparison task. For details, see [Comparing Migration Items](#) in *Data Replication Service User Guide*.

**Step 3** Cut over services.

You are advised to start the cutover process during off-peak hours. At least one complete data comparison is performed during off-peak hours. To obtain accurate comparison results, start data comparison at a specified time point during off-peak hours. If it is needed, select **Start at a specified time** for **Comparison Time**. Due to slight time difference and continuous operations on data, inconsistent comparison results may be generated, reducing the reliability and validity of the results.

1. Interrupt services first. If the workload is not heavy, you may not need to interrupt the services.

2. Run the following statement on the source database and check whether any new sessions execute SQL statements within the next 1 to 5 minutes. If there are no new statements executed, the service has been stopped.

```
select * from pg_stat_activity;
```

#### NOTE

The process list queried by the preceding statement includes the connection of the DRS synchronization instance. If no additional session executes SQL statements, the service has been stopped.

3. On the **Synchronization Progress** page, view the synchronization delay. When the delay is displayed as 0s and remains stable for a period, then you can perform a data-level comparison between the source and destination databases. For details about the time required, refer to the results of the previous comparison.
  - If there is enough time, compare all objects.
  - If there is not enough time, use the data-level comparison to compare the tables that are frequently used and that contain key business data or inconsistent data.
4. Determine an appropriate time to cut the services over to the destination database. After services are restored and available, the synchronization is complete.

#### **Step 4** Complete the synchronization.

1. Stop the synchronization task. After databases and services are synchronized to the destination database, to prevent operations on the source database from being synchronized to the destination database to overwrite data, you can stop the synchronization task. This operation only deletes the synchronization instance, and the synchronization task is still displayed in the task list. You can view or delete the task. You will not be charged for the synchronization task after the task is stopped.
2. Delete the synchronization task. After the synchronization task is complete, you can delete it. After the synchronization task is deleted, it will not be displayed in the task list.

----End

## 4.2 From ECS-hosted PostgreSQL to RDS for PostgreSQL

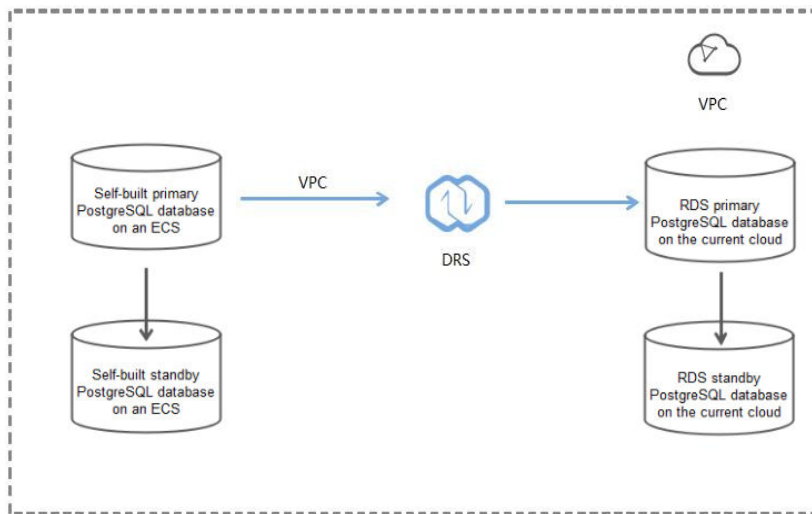
DRS helps you synchronize data from PostgreSQL databases on ECSs to PostgreSQL instances on the current cloud. With DRS, you can synchronize databases online with zero downtime and your services and databases can remain operational during migration.

This section describes how to use DRS to synchronize data from a PostgreSQL database on an ECS to a PostgreSQL instance on the current cloud. The following network scenarios are supported:

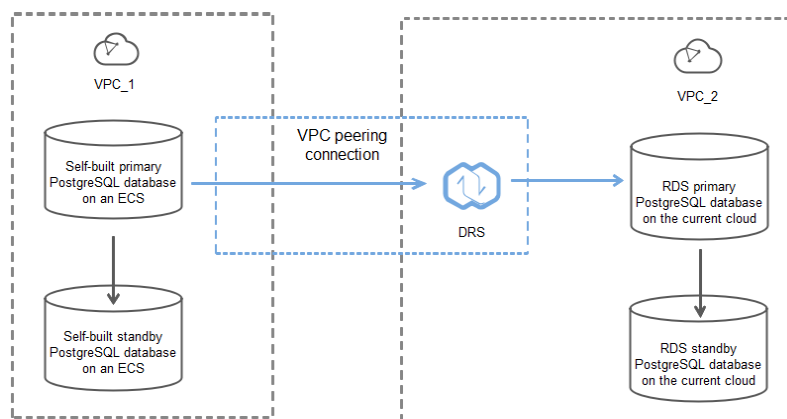
- Source and destination databases are in the same VPC.
- Source and destination databases are in different VPCs.

## Diagram

**Figure 4-10** Source and destination databases in the same VPC



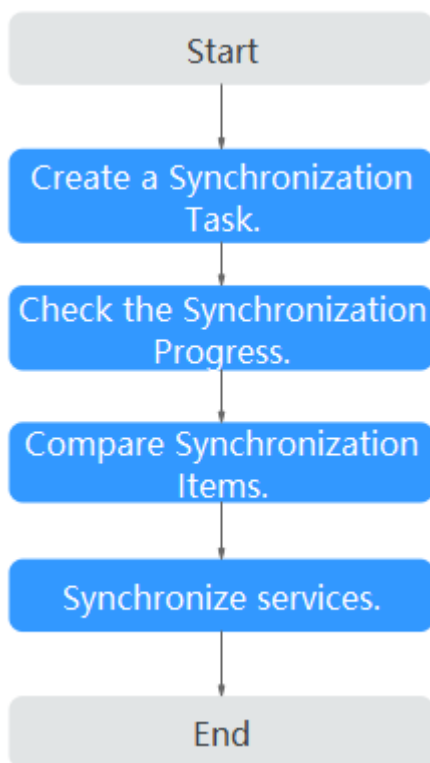
**Figure 4-11** Source and destination databases in the same region and different VPCs





## Synchronization Process

Figure 4-12 Flowchart



### Synchronization Suggestions (Important)

- Database synchronization is closely impacted by a wide range of environmental and operational factors. To ensure the synchronization goes smoothly, you are advised to perform a test run before the actual synchronization to help you detect and resolve any potential issues in advance. Recommendations on how to minimize any potential impacts on your data base are provided in this section.
- It is strongly recommended that you start a task during off-peak hours. A less active database is easier to synchronize successfully. If the data is fairly static, there is less likely to be any severe performance impacts during the synchronization.

### Notes on Synchronization (Important)

---

**NOTICE**

Before creating a real-time synchronization task, read this section carefully.

---

For details, see [Precautions](#) in *Real-Time Synchronization*.

## Synchronization Preparations

1. Permissions

**Table 4-7** lists the source and destination database user permissions required in full and incremental synchronization from PostgreSQL databases on ECS to the PostgreSQL DB instances on the current cloud.

**Table 4-7** Account permissions

| Synchronization Type | Full                                                                                                                                                                                                                                                                         | Full+Incremental                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source               | <p>The CONNECT permission for databases, the USAGE permission for schemas, the SELECT permission for tables, the SELECT permission for sequences, and the SELECT permission for system table <b>catalog pg_catalog.pg_authid</b> (used for synchronizing user passwords)</p> | <p>The CONNECT permission for databases, the USAGE permission for schemas, the SELECT permission for tables, the SELECT permission for sequences, the SELECT permission for system table <b>catalog pg_catalog.pg_authid</b> (used for synchronizing user passwords), the UPDATE, DELETE, and TRUNCATE permissions for tables that do not have primary keys, and the permission to create replication connections</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• The UPDATE, DELETE, and TRUNCATE permissions for tables that do not have primary keys are only used to temporarily lock tables to ensure data consistency after the migration.</li> <li>• To add the permission to create replication connections, perform the following steps:               <ol style="list-style-type: none"> <li>1. Add <b>host replication &lt;src_user_name&gt; &lt;drs_instance_ip&gt;/32 md5</b> before all configurations in the <b>pg_hba.conf</b> file of the source database.</li> <li>2. Run <b>select pg_reload_conf();</b> in the source database as user SUPERUSER, or restart the DB instance to apply the changes.</li> </ol> </li> </ul> |

| Synchronization Type | Full                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Full+Incremental |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Destination          | <ul style="list-style-type: none"> <li>● <b>Database-level:</b> The CREATEDB permission is required.</li> <li>● <b>Table-level:</b> <ul style="list-style-type: none"> <li>– To synchronize databases, the CREATEDB permission is required.</li> <li>– To synchronize a schema, the CONNECT and CREATE permissions for the database that contains the schema are required.</li> <li>– To synchronize objects in a schema, the CONNECT permission for the database that contains the schema, and the USAGE and CREATE permissions for the schema that contain the objects are required.</li> </ul> </li> <li>● Synchronization user: The CREATEROLE permission is required.</li> <li>● Synchronization user permissions: The default privilege cannot be modified. Otherwise, the object permissions of the destination database may be inconsistent with those of the source database.</li> </ul> <p><b>NOTE</b><br/>To synchronize event triggers, text search parsers, and text search templates, the destination database version must be RDS for PostgreSQL 11.11 or later, and the destination database user must be user root or a member of user root.</p> |                  |

- Source database permissions:  
The source database user must have all the required permissions listed in [Table 4-7](#). If the permissions are insufficient, create a user that has all of the permissions on the source database.
  - Destination database permissions:  
If the destination database is a PostgreSQL database on the current cloud, the initial account can be used.
2. Network settings
- The source and destination databases must be in the same region.
  - The source and destination databases can be either in the same VPC or different VPCs.
    - If the source and destination databases are in different VPCs, the subnets of the source and destination databases are required to be in different CIDR blocks. You need to create a VPC peering connection between the two VPCs. For details, see [VPC Peering Connection Creation Procedure](#).

- If the source and destination databases are in the same VPC, the networks are interconnected by default.
- 3. Security rules
  - In the same VPC, the network is connected by default. You do not need to set a security group.
  - In different VPCs, establish a VPC peering connection between the two VPCs. You do not need to set a security group.
- 4. Other
 

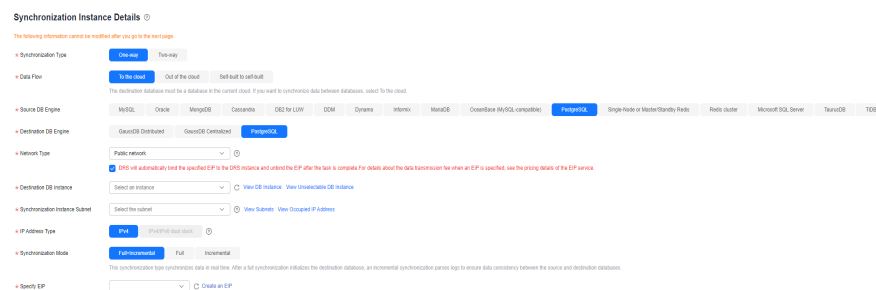
DRS can synchronize only some types of DDL statements of PostgreSQL. For details, see [related guides](#). Properly plan the source database services. Do not perform DDL operations that are not supported during synchronization.

## Procedure

### Step 1 Create a synchronization task.

1. Log in to the management console and choose **Databases > Data Replication Service** to go to the DRS console.
2. On the **Data Synchronization Management** page, click **Create Synchronization Task**.
3. On the displayed page, specify the task name, description, and synchronization instance details.

**Figure 4-13** Synchronization instance details



**Table 4-8** Task settings

| Parameter   | Description                                                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Region      | The region where the replication instance is deployed. You can change the region. To reduce latency and improve access speed, select the region closest to your workloads. |
| Project     | The project corresponds to the current region and can be changed.                                                                                                          |
| Task Name   | The task name consists of 4 to 50 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).             |
| Description | The description consists of a maximum of 256 characters and cannot contain the following special characters: =<>&'\\"                                                      |

**Table 4-9** Synchronization instance settings

| Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Flow               | <b>To the cloud</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Source DB Engine        | Select <b>PostgreSQL</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Destination DB Engine   | Select <b>PostgreSQL</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Network Type            | Select a VPC network. Enabling SSL is recommended. It may slow down the synchronization by 20% to 30% but it ensures data security.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Destination DB Instance | The PostgreSQL instance you purchased.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Synchronization Type    | <ul style="list-style-type: none"><li>- Full+Incremental<br/>This synchronization mode allows you to synchronize data in real time. After a full synchronization initializes the destination database, an incremental synchronization parses logs to ensure data consistency between the source and destination databases.</li><li>- Full<br/>All objects and data in non-system databases are synchronized to the destination database at a time. This mode is applicable to scenarios where service interruption is acceptable.</li><li>- Incremental</li></ul> <p><b>NOTE</b><br/>If you select the <b>Full+Incremental</b> synchronization type, data generated during the full synchronization will be synchronized to the destination database with zero downtime, ensuring that both the source and destination databases remain accessible.</p> |

4. On the **Configure Source and Destination Databases** page, wait until the synchronization instance is created. Then, specify source and destination database information. You are advised to click **Test Connection** for both the source and destination databases to check whether they have been connected to the synchronization instance. After the connection tests are successful, select the check box before the agreement and click **Next**.

 **NOTE**

- Source databases are classified into two types: self-built databases on ECSs and RDS DB instances. Configure parameters based on different scenarios.
- Scenario 1: Self-built databases on ECS - source database configuration

**Figure 4-14** Self-build on ECS - source database information

The screenshot shows the 'Source Database' configuration interface. At the top, there are two tabs: 'Self-built on ECS' (selected) and 'RDS DB instance'. Below the tabs, there are several input fields: 'VPC' (a dropdown menu), 'Subnet' (a dropdown menu), 'IP Address or Domain Name' (a text input), 'Port' (a text input), 'Database Username' (a text input with 'root' entered), 'Database Password' (a masked text input), 'SSL Connection' (a toggle switch that is turned on), and 'Encryption Certificate' (a dropdown menu with a 'Select' button). A 'Test Connection' button is located at the bottom, and a green checkmark indicates the test was successful. A small note below the 'Database Password' field states: 'DRS migrates only some key parameters to the destination database. For the other parameters that cannot be migrated, you need to use parameter templates to configure them on the destination database.'

**Table 4-10** Self-build on ECS - source database information

| Parameter                 | Description                                                                                                                                                                                                                                                 |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source Database Type      | Select <b>Self-built on ECS</b> .                                                                                                                                                                                                                           |
| VPC                       | A dedicated virtual network in which the source database is located. It isolates networks for different services. You can select an existing VPC or create a VPC.                                                                                           |
| Subnet                    | A subnet provides dedicated network resources that are logically isolated from other networks, improving network security. The subnet must be in the AZ where the source database resides. You need to enable DHCP for creating the source database subnet. |
| IP Address or Domain Name | The IP address or domain name of the source database.                                                                                                                                                                                                       |
| Port                      | Enter an integer ranging from 1 to 65535, which indicates the port number of the source database.                                                                                                                                                           |
| Database Username         | A username for the source database.                                                                                                                                                                                                                         |
| Database Password         | The password for the database username.                                                                                                                                                                                                                     |
| SSL Connection            | To improve data security during synchronization over a public network, you are advised to enable SSL to encrypt synchronization links and upload a CA certificate.                                                                                          |

- Scenario 2: RDS DB instance - source database configuration

**Figure 4-15** RDS DB instance - source database information

**Source Database**

System databases, users, parameters, and jobs will not be migrated. You need to manually import users and jobs to the destination database and configure parameters in parameter templates of the destination database.

Source Database Type:  Self-built on ECS  RDS DB Instance

DB Instance Name:  [View DB Instance](#) [View Unselectable DB Instance](#)

Database Username:

Database Password:

**Table 4-11** RDS DB instance - source database information

| Parameter            | Description                                                                  |
|----------------------|------------------------------------------------------------------------------|
| Source Database Type | Select an RDS DB instance.                                                   |
| DB Instance Name     | Select the PostgreSQL instance to be synchronized as the source DB instance. |
| Database Username    | A username for the source database.                                          |
| Database Password    | The password for the database username.                                      |

**Figure 4-16** Destination database settings

**Destination Database**

DB Instance Name:

Database Username:

Database Password:

**Table 4-12** Destination database settings

| Parameter         | Description                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| DB Instance Name  | The RDS for PostgreSQL instance you have selected during the synchronization instance creation is displayed by default and cannot be changed. |
| Database Username | The username for accessing the destination PostgreSQL DB instance.                                                                            |
| Database Password | The password for the database username.                                                                                                       |

5. On the **Set Synchronization Task** page, select the synchronization object and user.



Figure 4-17 Synchronization mode

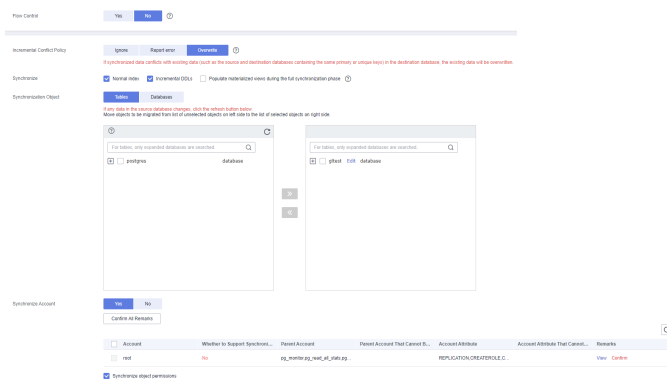
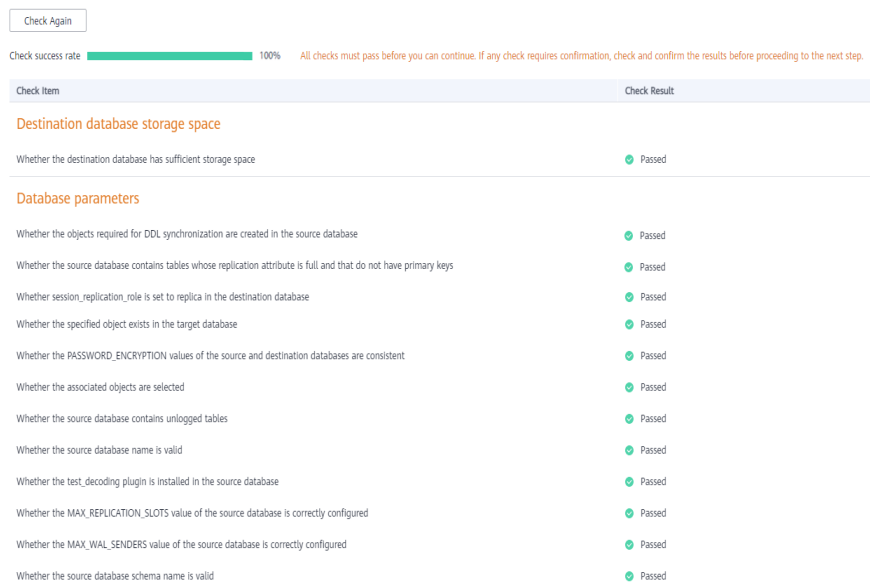


Table 4-13 Synchronization object

| Parameter                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incremental Conflict Policy | <p>The real-time synchronization function provides conflict policies for you to choose from if the synchronized data conflicts with existing data (such as the source and destination databases containing the same primary or unique keys) in the destination database.</p> <p>Select any of the following conflict policies:</p> <ul style="list-style-type: none"> <li>– <b>Ignore</b><br/>The system will skip the conflicting data and continue the subsequent synchronization process.</li> <li>– <b>Report error</b><br/>The synchronization task will be stopped and fail.</li> <li>– <b>Overwrite</b><br/>Conflicting data will be overwritten.</li> </ul> <p>In the following scenarios, you can select <b>Ignore</b> or <b>Overwrite</b>. In other scenarios, you are advised to select <b>Report error</b>.</p> <ul style="list-style-type: none"> <li>– Data already exists in the destination database.</li> <li>– Multiple source databases are synchronized to one destination database.</li> <li>– Data in the destination database is updated manually.</li> </ul> |
| Synchronize                 | <p>Available options: <b>Index</b>, <b>Incremental DDLs</b>, and <b>Populate materialized views during the full synchronization phase</b></p> <p><b>Populate materialized views during the full synchronization phase:</b> This option takes effect only for materialized views that was populated in the source database. This operation affects the full synchronization performance. You perform this operation after the full synchronization is complete.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Parameter              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Synchronization Object | <p>Objects can be synchronized at the database or table level. You can synchronize the entire database or some tables based on service requirements. For a single task, you can synchronize objects in only one database of an instance. Database name mapping is supported.</p> <ul style="list-style-type: none"><li>– Database-level synchronization synchronizes all objects in the source database to the destination database.</li><li>– Table-level synchronization synchronizes the selected table objects to the destination database.</li></ul> <p><b>NOTE</b><br/>If you select table-level synchronization, the selected table may have dependencies on other objects in the database. If the referenced objects are not selected and do not exist in the destination database, the task will fail. Ensure that all referenced objects are selected before synchronization or select database-level synchronization.</p> |
| Synchronize Account    | <p>During the synchronization, you can synchronize accounts based on your service requirements.</p> <p>There are two types of accounts: accounts that can be synchronized and accounts that cannot be synchronized. For accounts that cannot be synchronized, you can view details in the <b>Remarks</b> column and determine whether to synchronize accounts and permissions based on your service requirements.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

6. On the **Check Task** page, check the synchronization task.
  - If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.  
For details about how to handle check failures, see [Checking Whether the Source Database Is Connected](#) in *Data Replication Service User Guide*.
  - If all check items are successful, click **Next**.

**Figure 4-18** Task Check**NOTE**

You can proceed to the next step only when all checks are successful. If there are any items that require confirmation, view and confirm the details first before proceeding to the next step.

7. On the **Confirm Task** page, specify **Start Time** and click **Next**.

**NOTE**

- Set **Start Time** to **Start upon task creation** or **Start at a specified time** based on site requirements.
- After a synchronization task is started, the performance of the source and destination databases may be affected. You are advised to start a synchronization task during off-peak hours.

8. After the task is submitted, go back to the **Data Synchronization Management** page to view the task status.

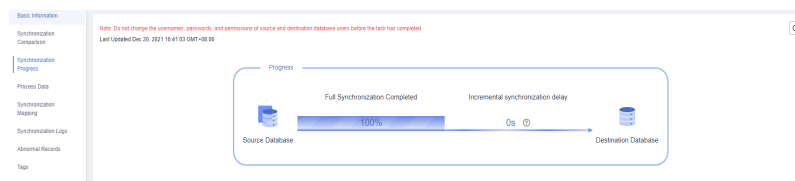
**Step 2** Manage the migration task.

The migration task contains two phases: full migration and incremental migration. You can manage them in different phases.

- Full synchronization  
Viewing the synchronization progress: Click the target full synchronization task, and on the **Migration Progress** tab, you can see the synchronization progress of the structure, data, indexes, and synchronization objects. When the progress reaches 100%, the synchronization is complete.
- Incremental synchronization
  - Viewing the synchronization delay: After the full synchronization is complete, an incremental synchronization starts. On the **Data Synchronization Management** page, click the target synchronization task. On the displayed page, click **Synchronization Progress** to view the synchronization delay of the incremental synchronization. If the synchronization delay is 0s, the destination database is being

synchronized with the source database in real time. You can also view the data consistency on the **Synchronization Comparison** tab.

**Figure 4-19** Viewing the synchronization delay



- Viewing the synchronization comparison results: To minimize service downtime, click the name of an incremental synchronization task. On the **Synchronization Comparison** page, create a comparison task. For details, see [Comparing Migration Items](#) in *Data Replication Service User Guide*.

### Step 3 Cut over services.

You are advised to start the cutover process during off-peak hours. At least one complete data comparison is performed during off-peak hours. To obtain accurate comparison results, start data comparison at a specified time point during off-peak hours. If it is needed, select **Start at a specified time** for **Comparison Time**. Due to slight time difference and continuous operations on data, inconsistent comparison results may be generated, reducing the reliability and validity of the results.

1. Interrupt services first. If the workload is not heavy, you may not need to interrupt the services.
2. Run the following statement on the source database and check whether any new sessions execute SQL statements within the next 1 to 5 minutes. If there are no new statements executed, the service has been stopped.

```
select * from pg_stat_activity;
```

#### NOTE

The process list queried by the preceding statement includes the connection of the DRS synchronization instance. If no additional session executes SQL statements, the service has been stopped.

3. On the **Synchronization Progress** page, view the synchronization delay. When the delay is displayed as 0s and remains stable for a period, then you can perform a data-level comparison between the source and destination databases. For details about the time required, refer to the results of the previous comparison.
  - If there is enough time, compare all objects.
  - If there is not enough time, use the data-level comparison to compare the tables that are frequently used and that contain key business data or inconsistent data.
4. Determine an appropriate time to cut the services over to the destination database. After services are restored and available, the synchronization is complete.

### Step 4 Complete the synchronization.

1. Stop the synchronization task. After databases and services are synchronized to the destination database, to prevent operations on the source database

from being synchronized to the destination database to overwrite data, you can stop the synchronization task. This operation only deletes the synchronization instance, and the synchronization task is still displayed in the task list. You can view or delete the task. You will not be charged for the synchronization task after the task is stopped.

2. Delete the synchronization task. After the synchronization task is complete, you can delete it. After the synchronization task is deleted, it will not be displayed in the task list.

----End

## 4.3 From On-Premises PostgreSQL to RDS for PostgreSQL

DRS supports data synchronization from on-premises MySQL databases to RDS for PostgreSQL instances. With DRS, you can synchronize databases online with zero downtime and your services and databases can remain operational during migration.

This section describes how to configure DRS to migrate data from an on-premises PostgreSQL database to a RDS for PostgreSQL instance. The following network types are supported:

- VPN
- Public network

### Diagram

Figure 4-20 VPN network

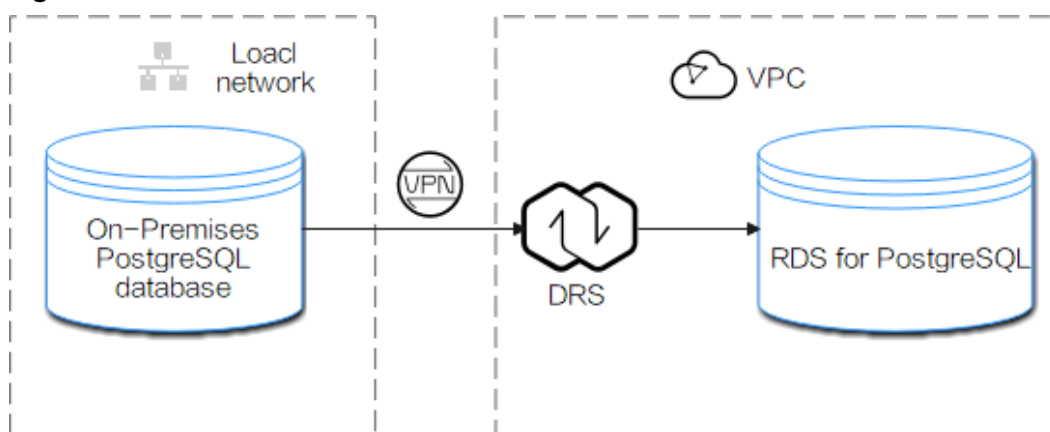
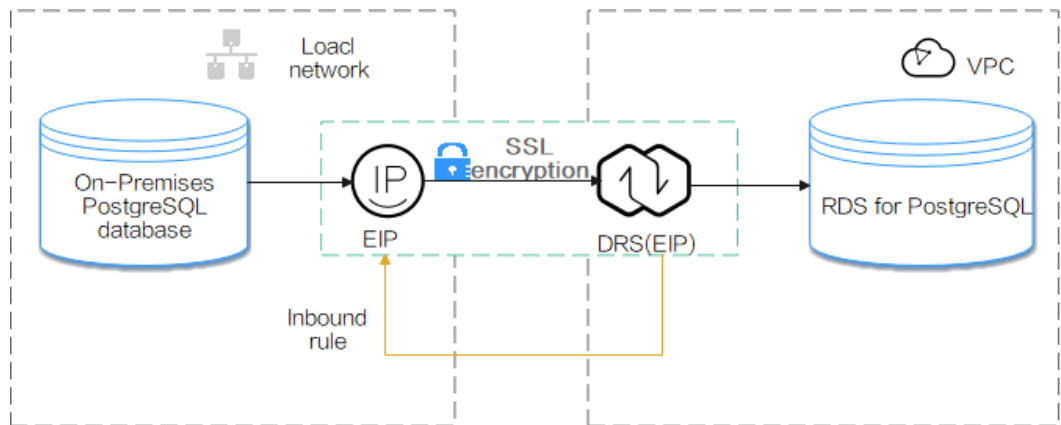
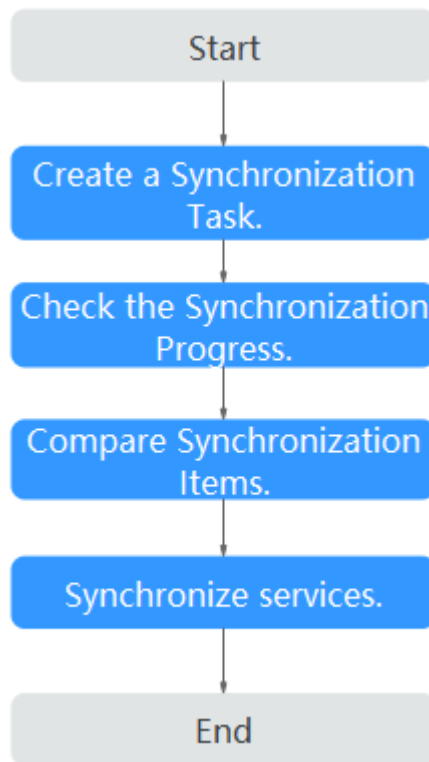


Figure 4-21 Public network+SSL connection



## Synchronization Process

Figure 4-22 Flowchart



## Synchronization Suggestions (Important)

- Database synchronization is closely impacted by a wide range of environmental and operational factors. To ensure the synchronization goes smoothly, you are advised to perform a test run before the actual synchronization to help you detect and resolve any potential issues in advance. Recommendations on how to minimize any potential impacts on your data base are provided in this section.
- It is strongly recommended that you start a task during off-peak hours. A less active database is easier to synchronize successfully. If the data is fairly static,

there is less likely to be any severe performance impacts during the synchronization.

## Notes on Synchronization (Important)

---

**NOTICE**

Before creating a real-time synchronization task, read this section carefully.

---

For details, see [Precautions](#) in *Real-Time Synchronization*.

## Synchronization Preparations

1. Permissions

**Table 4-14** lists the source and destination database user permissions required in full and incremental synchronizations from on-premises PostgreSQL databases to PostgreSQL DB instances on the current cloud.

**Table 4-14** Account permissions

| Synchronization Type | Full                                                                                                                                                                                                                                                                         | Full+Incremental                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source               | <p>The CONNECT permission for databases, the USAGE permission for schemas, the SELECT permission for tables, the SELECT permission for sequences, and the SELECT permission for system table <b>catalog pg_catalog.pg_authid</b> (used for synchronizing user passwords)</p> | <p>The CONNECT permission for databases, the USAGE permission for schemas, the SELECT permission for tables, the SELECT permission for sequences, the SELECT permission for system table <b>catalog pg_catalog.pg_authid</b> (used for synchronizing user passwords), the UPDATE, DELETE, and TRUNCATE permissions for tables that do not have primary keys, and the permission to create replication connections</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• The UPDATE, DELETE, and TRUNCATE permissions for tables that do not have primary keys are only used to temporarily lock tables to ensure data consistency after the migration.</li> <li>• To add the permission to create replication connections, perform the following steps:               <ol style="list-style-type: none"> <li>1. Add <b>host replication &lt;src_user_name&gt; &lt;drs_instance_ip&gt;/32 md5</b> before all configurations in the <b>pg_hba.conf</b> file of the source database.</li> <li>2. Run <b>select pg_reload_conf();</b> in the source database as user SUPERUSER, or restart the DB instance to apply the changes.</li> </ol> </li> </ul> |



| Synchronization Type | Full                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Full+Incremental |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Destination          | <ul style="list-style-type: none"> <li>● <b>Database-level:</b> The CREATEDB permission is required.</li> <li>● <b>Table-level:</b> <ul style="list-style-type: none"> <li>- To synchronize databases, the CREATEDB permission is required.</li> <li>- To synchronize a schema, the CONNECT and CREATE permissions for the database that contains the schema are required.</li> <li>- To synchronize objects in a schema, the CONNECT permission for the database that contains the schema, and the USAGE and CREATE permissions for the schema that contain the objects are required.</li> </ul> </li> <li>● Synchronization user: The CREATEROLE permission is required.</li> <li>● Synchronization user permissions: The default privilege cannot be modified. Otherwise, the object permissions of the destination database may be inconsistent with those of the source database.</li> </ul> <p><b>NOTE</b><br/>To synchronize event triggers, text search parsers, and text search templates, the destination database version must be RDS for PostgreSQL 11.11 or later, and the destination database user must be user root or a member of user root.</p> |                  |

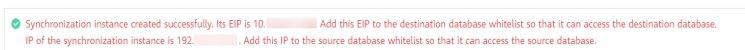
- Source database permissions:  
The source database user must have all the required permissions listed in [Table 4-14](#). If the permissions are insufficient, create a user that has all of the permissions on the source database.
- Destination database permissions:  
If the destination database is a RDS for PostgreSQL instance, the initial account can be used.

2. Network settings

- Source database network settings:  
You can synchronize data from on-premises PostgreSQL databases to RDS for PostgreSQL databases on the current cloud through a VPN or public network. Enable public accessibility or establish a VPN for the on-premises PostgreSQL databases based on your service requirements. You are advised to synchronize data through a public network, which is more convenient and cost-effective.
- Destination database network settings:

- If you want to access the destination databases through a VPN, enable the VPN service first so that the source database can communicate with the destination database.
  - If the source database attempts to access the destination database through a public network, no further configuration is required.
3. Security rules
- a. Source database security group settings:
- If the synchronization is performed over a public network, add the EIP of the DRS synchronization instance to the network whitelist of the source PostgreSQL database to enable the source database to communicate with the current cloud. Before configuring the network whitelist, you need to obtain the EIP of the synchronization instance. The IP address on the **Configure Source and Destination Databases** page is the EIP of the synchronization instance.

**Figure 4-23** Synchronization instance EIP



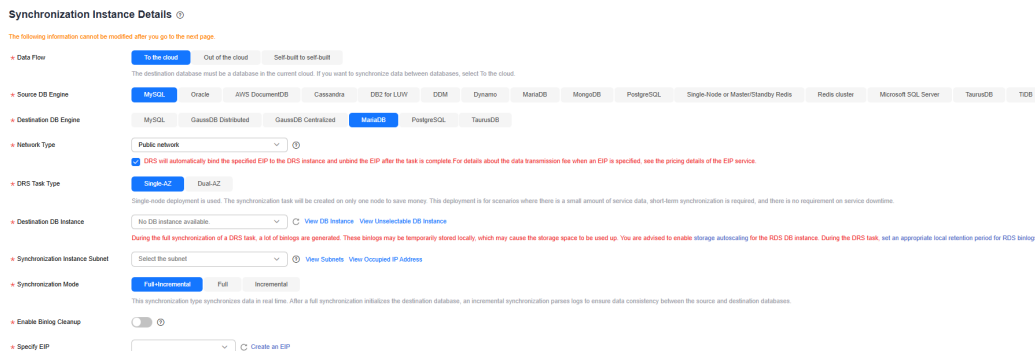
- If the synchronization is performed over a VPN network, add the private IP address of the DRS synchronization instance to the network whitelist of the source database to enable the source database to communicate with the destination database. The IP address on the **Configure Source and Destination Databases** page is the private IP address of the synchronization instance. If you do take this step, then once the synchronization is complete, you should delete this item from the whitelist or your system will be insecure.
- b. Destination database security group settings:
- By default, the destination database and the DRS synchronization instance are in the same VPC and can communicate with each other. No further configuration is required.
4. Other
- DRS can synchronize only some types of DDL statements of PostgreSQL. For details, see [related guides](#). Properly plan the source database services. Do not perform DDL operations that are not supported during synchronization.

## Procedure

### Step 1 Create a synchronization task.

1. Log in to the management console and choose **Databases > Data Replication Service** to go to the DRS console.
2. On the **Data Synchronization Management** page, click **Create Synchronization Task**.
3. On the displayed page, specify the task name, description, and synchronization instance details.

**Figure 4-24** Synchronization instance information



**Table 4-15** Task settings

| Parameter   | Description                                                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Region      | The region where the replication instance is deployed. You can change the region. To reduce latency and improve access speed, select the region closest to your workloads. |
| Project     | The project corresponds to the current region and can be changed.                                                                                                          |
| Task Name   | The task name consists of 4 to 50 characters, starts with a letter, and can contain only letters (case-insensitive), digits, hyphens (-), and underscores (_).             |
| Description | The description consists of a maximum of 256 characters and cannot contain the following special characters: =<>&'\\"                                                      |

**Table 4-16** Synchronization instance settings

| Parameter               | Description                                                                                                                                  |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Data Flow               | <b>To the cloud</b>                                                                                                                          |
| Source DB Engine        | Select <b>PostgreSQL</b> .                                                                                                                   |
| Destination DB Engine   | Select <b>PostgreSQL</b> .                                                                                                                   |
| Network Type            | Select <b>Public network</b> . Enabling SSL is recommended. It may slow down the synchronization by 20% to 30% but it ensures data security. |
| Destination DB Instance | The RDS for PostgreSQL instance you created.                                                                                                 |

| Parameter            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Synchronization Mode | <ul style="list-style-type: none"> <li>- Full+Incremental<br/>This synchronization mode allows you to synchronize data in real time. After a full synchronization initializes the destination database, an incremental synchronization parses logs to ensure data consistency between the source and destination databases.</li> <li>- Full<br/>All objects and data in non-system databases are synchronized to the destination database at a time. This mode is applicable to scenarios where service interruption is acceptable.</li> <li>- Incremental</li> </ul> <p><b>NOTE</b><br/>If you select the <b>Full+Incremental</b> synchronization mode, ongoing changes made to the data will be synchronized to the destination database in real time, ensuring that the source database remain accessible.</p> |

4. On the **Configure Source and Destination Databases** page, wait until the synchronization instance is created. Then, specify source and destination database information and click **Test Connection** for both the source and destination databases to check whether they have been connected to the synchronization instance. After the connection tests are successful, select the check box before the agreement and click **Next**.

**Figure 4-25** Source and destination database details

**Source Database**  
System databases, users, parameters, and jobs will not be migrated. You need to manually import users and jobs to the destination database and configure parameters in parameter templates of the destination database.

IP Address or Domain Name

Port

Database Username

Database Password

SSL Connection

If you want to enable SSL connection, ensure that SSL has been enabled on the source database, and related parameters have been correctly configured.

This button is available only after the replication instance is created successfully.

---

**Destination Database**

DB Instance Name

Database Username

Database Password

This button is available only after the replication instance is created successfully.

**Table 4-17** Source database settings

| Parameter                 | Description                                           |
|---------------------------|-------------------------------------------------------|
| IP Address or Domain Name | The IP address or domain name of the source database. |
| Port                      | The port of the source database.<br>Range: 1 - 65535  |

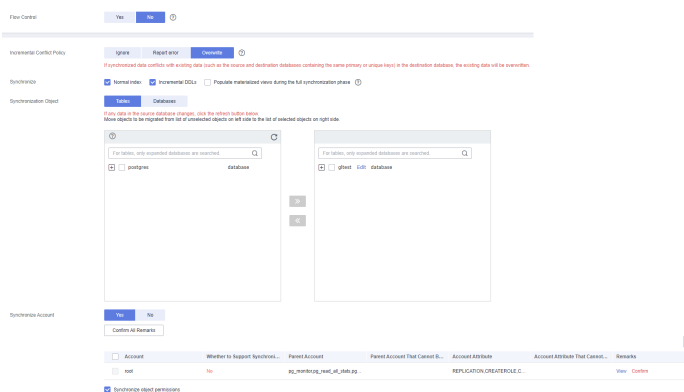
| Parameter         | Description                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Database Username | A username for the source database.                                                                                                                                |
| Database Password | The password for the database username.                                                                                                                            |
| SSL Connection    | To improve data security during synchronization over a public network, you are advised to enable SSL to encrypt synchronization links and upload a CA certificate. |

**Table 4-18** Destination database settings

| Parameter         | Description                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| DB Instance Name  | The RDS for PostgreSQL instance you have selected during the synchronization instance creation is displayed by default and cannot be changed. |
| Database Username | The username for accessing the destination RDS for PostgreSQL instance.                                                                       |
| Database Password | The password for the database username.                                                                                                       |

5. On the **Set Synchronization Task** page, select the synchronization object and user.

**Figure 4-26** Synchronization mode



**Table 4-19** Synchronization object

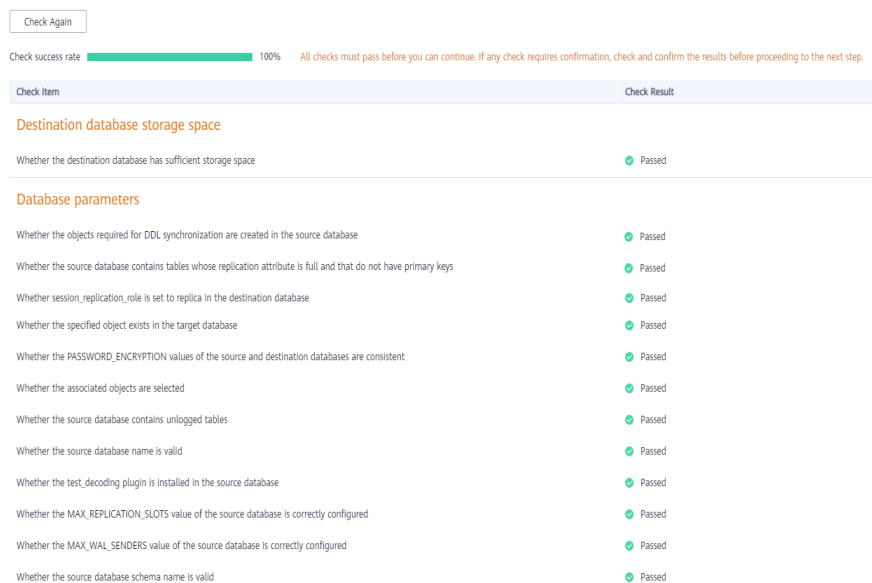
| Parameter    | Description                                 |
|--------------|---------------------------------------------|
| Flow Control | You can choose whether to control the flow. |

| Parameter                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incremental Conflict Policy | <p>The real-time synchronization function provides conflict policies for you to choose from if the synchronized data conflicts with existing data (such as the source and destination databases containing the same primary or unique keys) in the destination database.</p> <p>Select any of the following conflict policies:</p> <ul style="list-style-type: none"><li>- <b>Ignore</b><br/>The system will skip the conflicting data and continue the subsequent synchronization process.</li><li>- <b>Report error</b><br/>The synchronization task will be stopped and fail.</li><li>- <b>Overwrite</b><br/>Conflicting data will be overwritten.</li></ul> <p>In the following scenarios, you can select <b>Ignore</b> or <b>Overwrite</b>. In other scenarios, you are advised to select <b>Report error</b>.</p> <ul style="list-style-type: none"><li>- Data already exists in the destination database.</li><li>- Multiple source databases are synchronized to one destination database.</li><li>- Data in the destination database is updated manually.</li></ul> |
| Synchronize                 | <p>Available options: <b>Index</b>, <b>Incremental DDLs</b>, and <b>Populate materialized views during the full synchronization phase</b></p> <p><b>Populate materialized views during the full synchronization phase:</b> This option takes effect only for materialized views that was populated in the source database. This operation affects the full synchronization performance. You perform this operation after the full synchronization is complete.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Synchronization Object      | <p>DRS supports database- and table-level synchronization. You can select databases or tables for synchronization based on your service requirements. A single task can synchronize objects from only one database. Database name mapping is supported.</p> <ul style="list-style-type: none"><li>- Database-level synchronization synchronizes all objects in the source database to the destination database.</li><li>- Table-level synchronization synchronizes the selected table objects to the destination database.</li></ul> <p><b>NOTE</b></p> <p>If you select table-level synchronization, the selected table may have dependencies on other objects in the database. If the referenced objects are not selected and do not exist in the destination database, the task will fail. Ensure that all referenced objects are selected before synchronization or select database-level synchronization.</p>                                                                                                                                                           |

| Parameter           | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Synchronize Account | <p>During the synchronization, you can synchronize accounts based on your service requirements.</p> <p>There are two types of accounts: accounts that can be synchronized and accounts that cannot be synchronized. For accounts that cannot be synchronized, you can view details in the <b>Remarks</b> column and determine whether to synchronize accounts and permissions based on your service requirements.</p> |

6. On the **Check Task** page, check the synchronization task.
  - If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.  
For details about how to handle check failures, see [Checking Whether the Source Database Is Connected](#) in *Data Replication Service User Guide*.
  - If all check items are successful, click **Next**.

**Figure 4-27** Task Check



**NOTE**

You can proceed to the next step only when all checks are successful. If there are any items that require confirmation, view and confirm the details first before proceeding to the next step.

7. On the **Confirm Task** page, specify **Start Time** and click **Next**.

**NOTE**

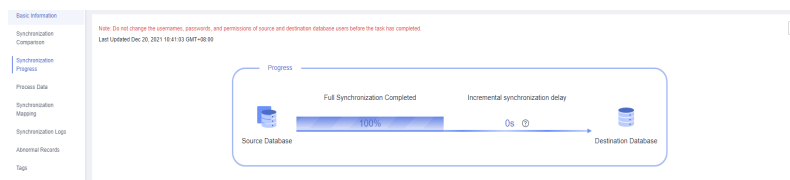
- Set **Start Time** to **Start upon task creation** or **Start at a specified time** based on site requirements.
  - After a synchronization task is started, the performance of the source and destination databases may be affected. You are advised to start a synchronization task during off-peak hours.
8. After the task is submitted, go back to the **Data Synchronization Management** page to view the task status.

**Step 2** Manage the migration task.

The migration task contains two phases: full migration and incremental migration. You can manage them in different phases.

- Full synchronization  
Viewing the synchronization progress: Click the target full synchronization task, and on the **Migration Progress** tab, you can see the synchronization progress of the structure, data, indexes, and synchronization objects. When the progress reaches 100%, the synchronization is complete.
- Incremental synchronization
  - Viewing the synchronization delay: After the full synchronization is complete, an incremental synchronization starts. On the **Data Synchronization Management** page, click the target synchronization task. On the displayed page, click **Synchronization Progress** to view the synchronization delay of the incremental synchronization. If the synchronization delay is 0s, the destination database is being synchronized with the source database in real time. You can also view the data consistency on the **Synchronization Comparison** tab.

**Figure 4-28** Viewing the synchronization delay



- Viewing the synchronization comparison results: To minimize service downtime, click the name of an incremental synchronization task. On the **Synchronization Comparison** page, create a comparison task. For details, see [Comparing Migration Items](#) in *Data Replication Service User Guide*.

**Step 3** Cut over services.

You are advised to start the cutover process during off-peak hours. At least one complete data comparison is performed during off-peak hours. To obtain accurate comparison results, start data comparison at a specified time point during off-peak hours. If it is needed, select **Start at a specified time** for **Comparison Time**. Due to slight time difference and continuous operations on data, inconsistent comparison results may be generated, reducing the reliability and validity of the results.

1. Interrupt services first. If the workload is not heavy, you may not need to interrupt the services.



2. Run the following statement on the source database and check whether any new sessions execute SQL statements within the next 1 to 5 minutes. If there are no new statements executed, the service has been stopped.

```
select * from pg_stat_activity;
```

#### NOTE

The process list queried by the preceding statement includes the connection of the DRS synchronization instance. If no additional session executes SQL statements, the service has been stopped.

3. On the **Synchronization Progress** page, view the synchronization delay. When the delay is displayed as 0s and remains stable for a period, then you can perform a data-level comparison between the source and destination databases. For details about the time required, refer to the results of the previous comparison.
  - If there is enough time, compare all objects.
  - If there is not enough time, use the data-level comparison to compare the tables that are frequently used and that contain key business data or inconsistent data.
4. Determine an appropriate time to cut the services over to the destination database. After services are restored and available, the synchronization is complete.

#### Step 4 Complete the synchronization.

1. Stop the synchronization task. After databases and services are synchronized to the destination database, to prevent operations on the source database from being synchronized to the destination database to overwrite data, you can stop the synchronization task. This operation only deletes the synchronization instance, and the synchronization task is still displayed in the task list. You can view or delete the task. You will not be charged for the synchronization task after the task is stopped.
2. Delete the synchronization task. After the synchronization task is complete, you can delete it. After the synchronization task is deleted, it will not be displayed in the task list.

----End

## 4.4 From On-premises MySQL to GaussDB Distributed

### Description

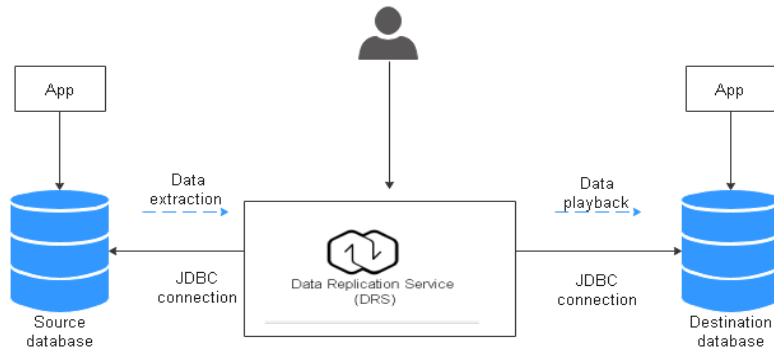
You can use real-time synchronization of DRS to synchronize on-premises MySQL to Huawei Cloud GaussDB. Full+incremental synchronization can ensure that data is always in sync between the source MySQL and the destination GaussDB.

### Problems

- Enterprise workloads have been growing and evolving fast, and traditional databases lack the scalability needed to keep up. Enterprises need distributed databases.
- Building a traditional database means purchasing and installing servers, systems, databases, and other software. The O&M is expensive and difficult.

- Traditional databases are poor in complex queries.
- It is hard for traditional databases to smoothly synchronize data with no downtime.

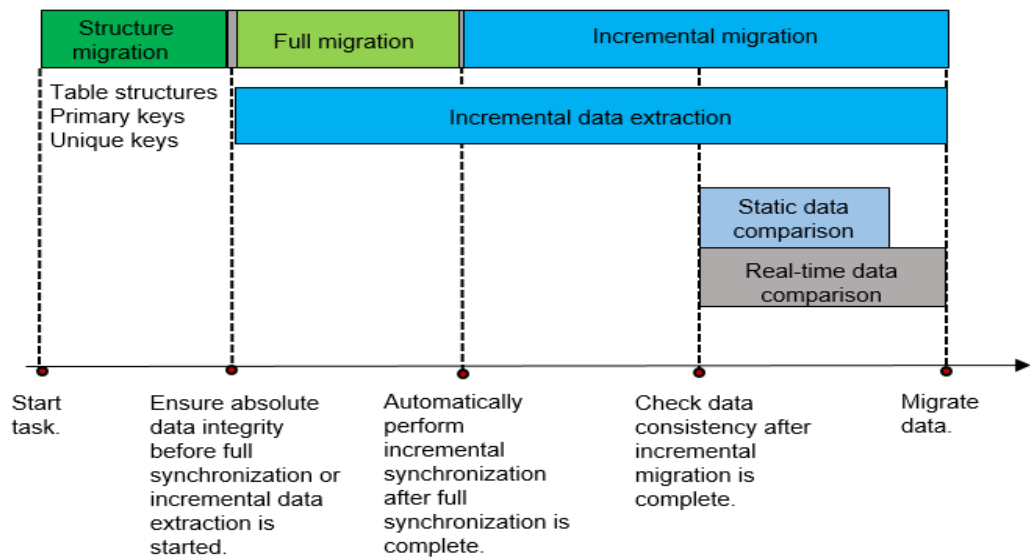
## Service architecture



## Synchronization Principles

A full+incremental synchronization task includes the following operations:

1. In the full synchronization phase, tables, primary keys, and unique keys are synchronized.
2. Incremental data extraction is started to ensure that the incremental data generated during full data synchronization is completely extracted to the DRS instance.
3. A full synchronization is started.
4. An incremental synchronization is automatically started after the full synchronization is complete. The replay starts from the position where the full synchronization starts.
5. A comparison task is started after the incremental replay is complete to check the data consistency. Real-time comparison is supported.
6. Workloads synchronization is started if the data is consistent between the source and destination databases.



### Service List

- Virtual Private Cloud (VPC)
- GaussDB
- Data Replication Service (DRS)
- Data Admin Service (DAS)

### Notes on Usage

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- The end-to-end test data in this document is for reference only.
- Full synchronization is used to synchronize data. Incremental synchronization is used to synchronize data between the source and destination databases in real time.

### Prerequisites

- You have registered with Huawei Cloud and completed account authentication.
- Your account balance is greater than or equal to \$0 USD.
- You have set up an on-premises MySQL database for testing.
- You have obtained the IP address, port number, account, and password of the MySQL database to be synchronized.

## Resource Planning

**Table 4-20** Resource planning

| Category                            | Subcategory             | Planned Value                                   | Remarks                                                                                                                                 |
|-------------------------------------|-------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| VPC                                 | VPC name                | vpc-src-172                                     | Specify a name that is easy to identify.                                                                                                |
|                                     | Region                  | Test region                                     | For low network latency and quick resource access, select the region nearest to you.                                                    |
|                                     | AZ                      | AZ 3                                            | -                                                                                                                                       |
|                                     | Subnet CIDR block       | 172.16.0.0/16                                   | Select a subnet with sufficient network resources.                                                                                      |
|                                     | Subnet name             | subnet-src-172                                  | Specify a name that is easy to identify.                                                                                                |
| On-premises MySQL (source database) | Database version        | 5.7.38                                          | -                                                                                                                                       |
|                                     | Database user           | test_info                                       | Specify a database user. The following minimum permissions are required: SELECT, LOCK TABLES, REPLICATION SLAVE and REPLICATION CLIENT. |
| GaussDB                             | Instance name           | Auto-drs-gaussdbv5-tar-1                        | Specify a name that is easy to identify.                                                                                                |
|                                     | Database version        | GaussDB 1.3 Enterprise Edition                  | -                                                                                                                                       |
|                                     | Instance type           | Distributed (1 CN, 3 DN shards, and 3 replicas) | Select a distributed instance for the test.                                                                                             |
|                                     | Deployment model        | Independent                                     | -                                                                                                                                       |
|                                     | Transaction consistency | Strong consistency                              | -                                                                                                                                       |
|                                     | Shards                  | 3                                               | -                                                                                                                                       |

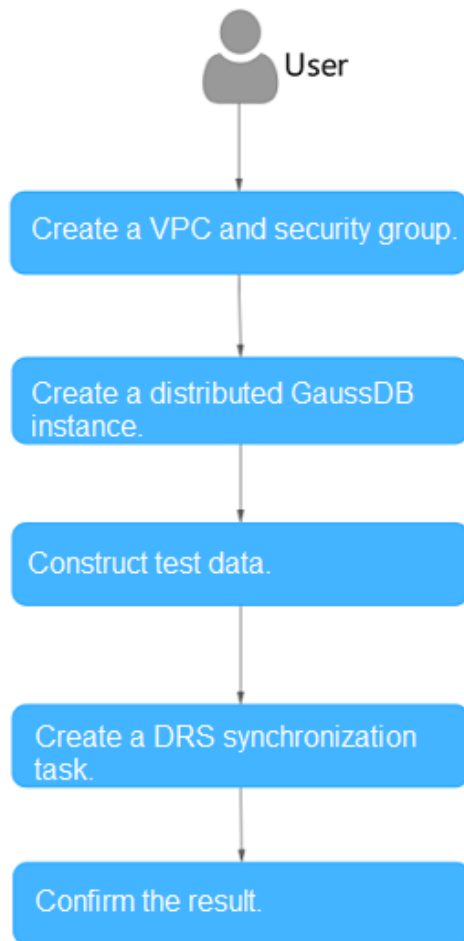
| Category                               | Subcategory             | Planned Value                       | Remarks                                                                                                                                                            |
|----------------------------------------|-------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | Coordinator nodes       | 3                                   | -                                                                                                                                                                  |
|                                        | Storage type            | Ultra-high I/O                      | -                                                                                                                                                                  |
|                                        | AZ                      | AZ 2                                | In this example, a single AZ is select. You are advised to select multiple AZs to improve instance availability in actual use.                                     |
|                                        | Instance specifications | General-enhanced II 8 vCPUs   64 GB | Small specifications are selected for this test instance. You are advised to configure specifications based on service requirements in actual use.                 |
|                                        | Storage space           | 480 GB                              | A small storage space is selected for this test instance. You are advised to configure the storage space based on service requirements in actual use.              |
|                                        | Disk encryption         | Disable                             | In this example, disk encryption is disabled. Enabling disk encryption improves the security of data, but may slightly affect the database read/write performance. |
| Logging in to the database through DAS | DB engine               | GaussDB                             | -                                                                                                                                                                  |
|                                        | Database source         | GaussDB                             | Select the GaussDB instance created in this example.                                                                                                               |
|                                        | Database name           | postgres                            | -                                                                                                                                                                  |
|                                        | Username                | root                                | -                                                                                                                                                                  |
|                                        | Password                | -                                   | Password of the <b>root</b> user of the GaussDB instance created in this example                                                                                   |

| Category                 | Subcategory               | Planned Value      | Remarks                                                                                            |
|--------------------------|---------------------------|--------------------|----------------------------------------------------------------------------------------------------|
| DRS synchronization task | Task name                 | DRS-test-info      | Specify a name that is easy to identify.                                                           |
|                          | Destination database name | test_database_info | Specify a name that is easy to identify. The name must be compatible with the MySQL database name. |
|                          | Source DB engine          | MySQL              | -                                                                                                  |
|                          | Destination DB engine     | GaussDB            | -                                                                                                  |
|                          | Network type              | Public network     | Public network is used in this example.                                                            |

## Flowchart

[Figure 4-29](#) shows the main operation flowchart.


Figure 4-29 Flowchart



## Creating a VPC

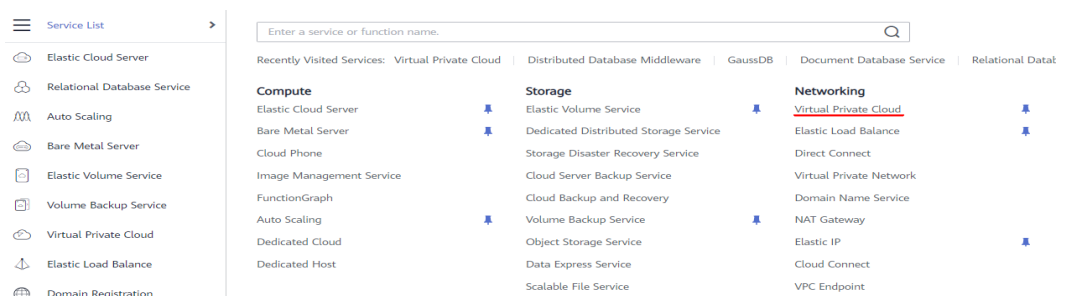
Create a VPC to prepare network resources for creating a GaussDB instance.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.



### Step 4 Click Create VPC.

**Basic Information**

Region: 📍 CN North-Beijing1

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Name:

CIDR Block:  ·  ·  ·  /

Recommended: [10.0.0.0/8-24 \(Select\)](#) [172.16.0.0/12-24 \(Select\)](#) [192.168.0.0/16-24 \(Select\)](#)

**⚠️** The CIDR block 192.168.0.0/16 overlaps with a CIDR block of another VPC in the current region. If you intend to enable communication between VPCs or between a VPC and an on-premises data center, change the CIDR block. [View VPC CIDR blocks in current region](#)

Enterprise Project: --Select-- [Create Enterprise Project](#)

---

Advanced Settings ▼ Tag | Description

**Default Subnet**

AZ: AZ3 ?

Name:

CIDR Block:  ·  ·  ·  /  ? Available IP Addresses: 251

The CIDR block cannot be modified after the subnet has been created.

Associated Route Table: Default ?

---

Advanced Settings ▼ Gateway | DNS Server Address | DHCP Lease Time | Tag | Description

---

[+](#) Add Subnet

**Step 5** Configure parameters as needed and click **Create Now**.

**Step 6** Return to the VPC list and check whether the VPC is created.


If the VPC status becomes available, the VPC has been created.

----End

## Creating a Security Group

Create a security group for creating a GaussDB instance.

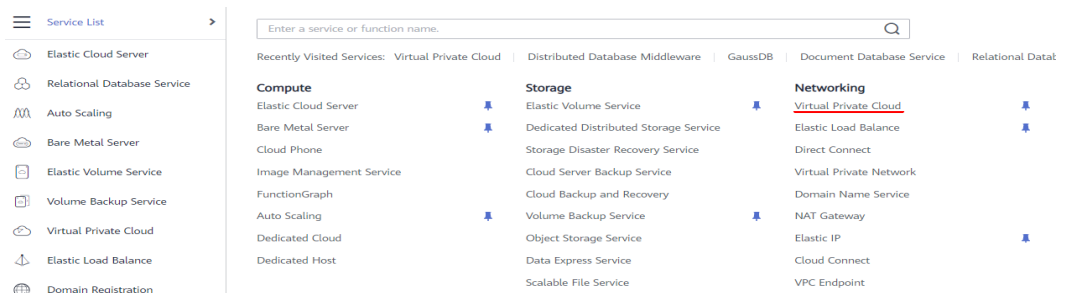
**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.



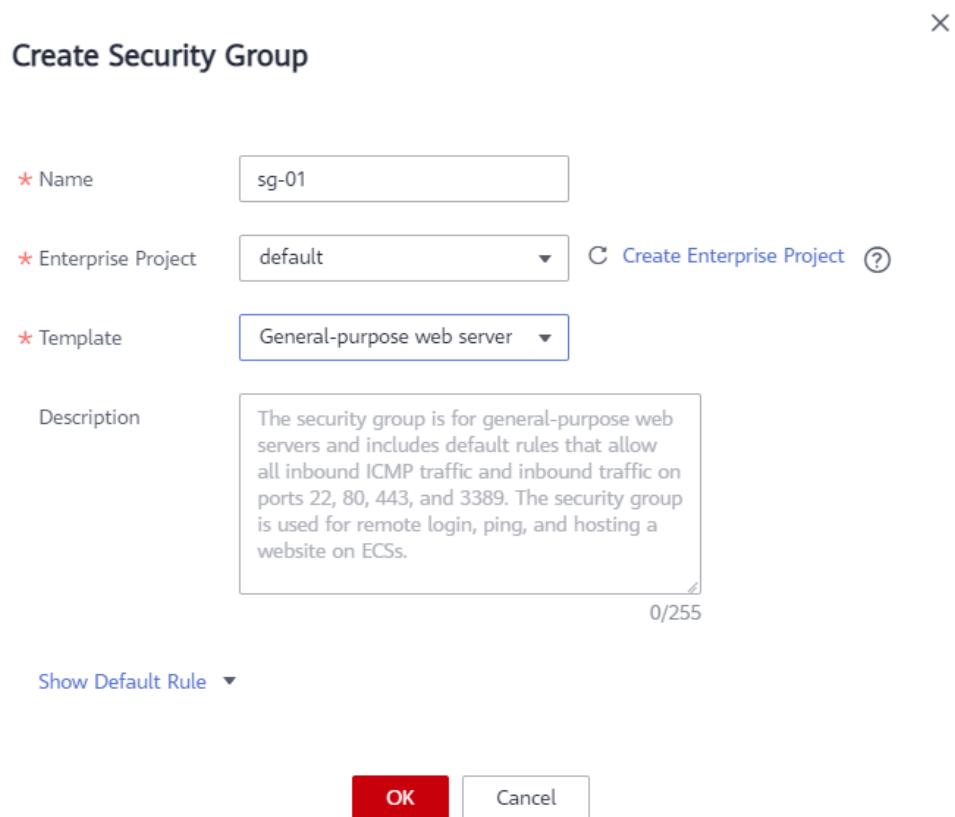
The VPC console is displayed.



**Step 4** Choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

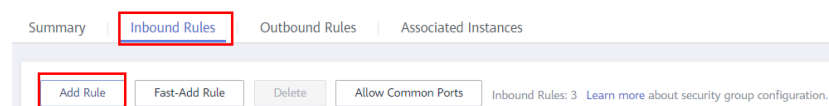
**Step 6** Configure parameters as needed.



**Step 7** Click **OK**.

**Step 8** Return to the security group list and click the security group name (**sg-01** in this example).

**Step 9** Click the **Inbound Rules** tab, and then click **Add Rule**.




**Step 10** Configure an inbound rule, add the IP address of the source database, and click **OK**.

----End

## Creating a Distributed GaussDB Instance

This section describes how to create a distributed GaussDB instance as the destination database.

**Step 1** Log in to the [management console](#).

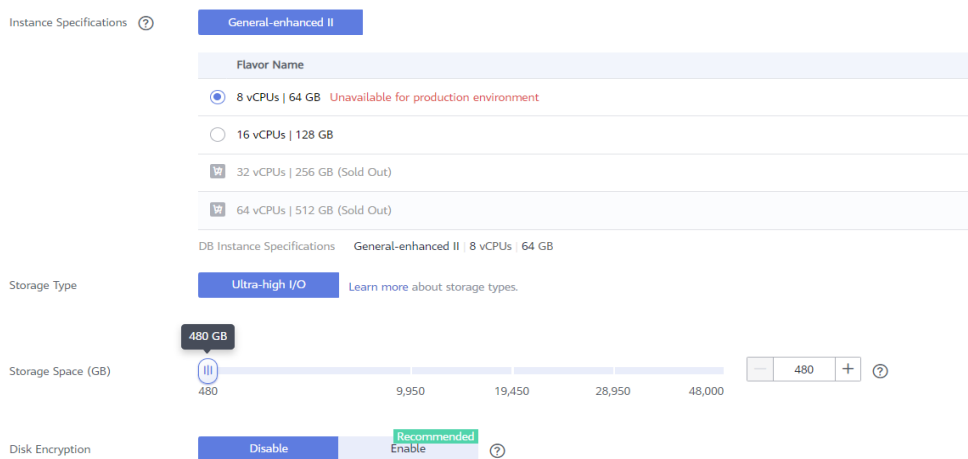
**Step 2** Click  in the upper left corner and select a region.

**Step 3** Under the service list, choose **Databases > GaussDB**.

**Step 4** Click **Buy DB Instance**.

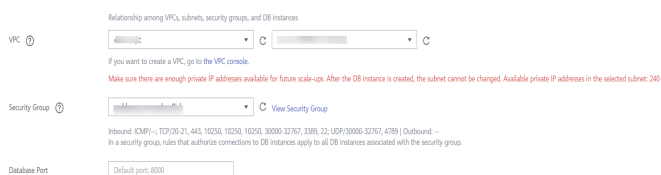
**Step 5** Configure the instance name and basic information.

**Step 6** Configure instance specifications.

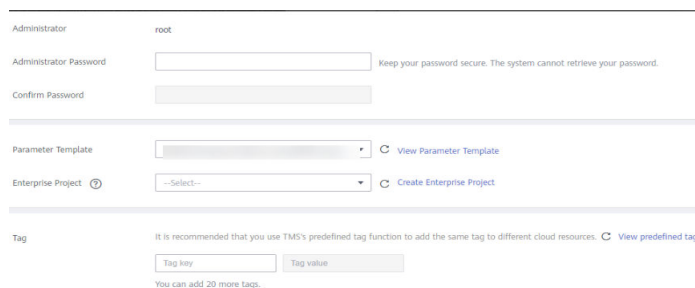


Select small specifications for this test instance. You are advised to configure specifications based on service requirements in actual use.

**Step 7** Select a VPC and security group (created in [Creating a VPC](#) and [Creating a Security Group](#)) for the instance and configure the database port.



**Step 8** Configure password and other information.



**Step 9** Click **Next**, confirm the information, and click **Submit**.

**Step 10** Go to the instance list.

If the instance status becomes available, the instance has been created.

----End

## Constructing Test Data

Before the synchronization, prepare some data types in the source database for verification after the synchronization is complete.

For details about the data types supported by DRS, see [MySQL->GaussDB](#).

Perform the following steps to construct data in the source database:

**Step 1** Use a database connection tool to connect to the source MySQL database based on its IP address.

**Step 2** Construct data in the source database based on data types supported by DRS.

1. Create a test user.

```
create user test_info identified by xxx;
```

*test\_info* indicates the user created for the test, and *xxx* indicates the password of the user.

2. Create a database named **test\_info** under the user.

```
CREATE DATABASE test_info;
```

3. Create a table in the **test\_info** database.

```
CREATE TABLE `test_info`.`test_table` (
```

```
 `id` int NOT NULL,
```

```
 `c1` char(10) DEFAULT NULL,
```

```
 `c2` varchar(10) DEFAULT NULL,
```

```
 `c3` binary(10) DEFAULT NULL,
```

```
 `c4` varbinary(10) DEFAULT NULL,
```

```
 `c5` tinyblob,
```

```
 `c6` mediumblob,
```

```
 `c7` longblob,
```

```
 `c8` tinytext,
```

```
 `c9` text,
```

```
 `c10` mediumtext,
```

```
 `c11` longtext,
```

```
 `c12` enum('1','2','3') DEFAULT NULL,
```

```
 `c13` set('1','2','3') DEFAULT NULL,
```

```
 `c14` tinyint DEFAULT NULL,
```

```
 `c15` smallint DEFAULT NULL,
```

```
 `c16` mediumint DEFAULT NULL,
```

```
 `c17` bigint DEFAULT NULL,
```

```
 `c18` float DEFAULT NULL,
```

```
 `c19` double DEFAULT NULL,
```

```
 `c20` date DEFAULT NULL,
```

```
 `c21` datetime DEFAULT NULL,
```

```
 `c22` timestamp,
```

```
 `c23` time DEFAULT NULL,
```

```
 `c24` year DEFAULT NULL,
```

```
 `c25` bit(10) DEFAULT NULL,
```

```
 `c26` json DEFAULT NULL,
```



```
 `c27` decimal(10,0) DEFAULT NULL,
```

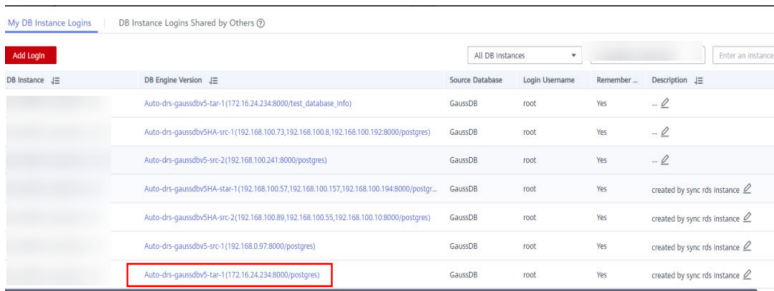
```
 `c28` decimal(10,0) DEFAULT NULL,
```

```
 PRIMARY KEY (`id`)
```

- );
- Assign permissions to the user.  
**GRANT SELECT, LOCK TABLES ON <database>.<table> to test\_info;**  
**GRANT REPLICATION SLAVE, REPLICATION CLIENT ON \*.\* to test\_info;**  
 In the preceding command, *test\_info* indicates the user created for this test, *<database>* indicates the name of the database to be synchronized, and *<table>* indicates the name of the table to be synchronized. Replace them based on the site requirements.
  - Insert two rows of data into the table.  
**insert into test\_info.test\_table values**  
**(1,'a','b','111','111','tinyblob','mediumblob','longblob','tinytext','text','mediumtext','longtext','1','3',1,2,3,4,1.123,1.1234,'2024-03-08','2024-03-08**  
**08:00:00','2024-03-08**  
**08:00:00','08:00:00','2024','1010',{'a':"b"},1.23,1.234);**  
**insert into test\_info.test\_table values**  
**(2,'a','b','111','111','tinyblob','mediumblob','longblob','tinytext','text','mediumtext','longtext','1','3',1,2,3,4,1.123,1.1234,'2024-03-08','2024-03-08**  
**08:00:00','2024-03-08**  
**08:00:00','08:00:00','2024','1010',{'a':"b"},1.23,1.234);**

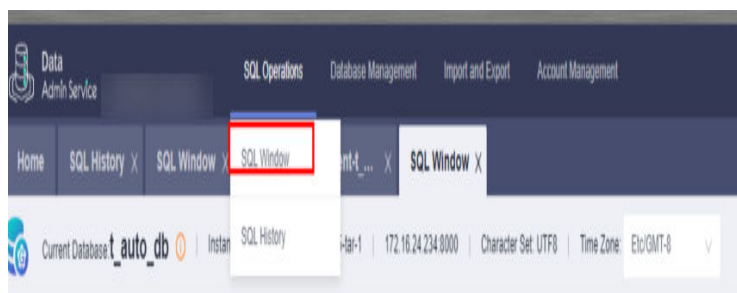
**Step 3** Create a database in the destination GaussDB instance.

- Log in to the [management console](#).
- Click  in the upper left corner and select a region.
- Click  in the upper left corner of the page and choose **Databases > Data Admin Service**.
- In the navigation pane on the left, click **Development Tool** to go to the login list page.
- Click **Add Login**.
- On the displayed page, select the DB engine, source database, and target DB instance, enter the login username, password, and description (optional), and enable **Collect Metadata Periodically** and **Show Executed SQL Statements**. If **Collect Metadata Periodically** is enabled, select **Remember Password**.
- Click **Test Connection** to check whether the connection is successful.  
 If a message is displayed indicating connection successful, continue with the operation. If a message is displayed indicating connection failed and the failure cause is provided, make modifications according to the error message.
- Click **OK**.
- Locate the added instance, click **Log In** in the **Operation** column.



| DB Instance                                                                                                                        | DB Engine Version | Source Database | Login Username | Remember | Description                  |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------|----------------|----------|------------------------------|
| Auto-drs-gaussdbv5-tar-1(172.16.24.234:8000)(test_database_info)                                                                   |                   | GaussDB         | root           | Yes      |                              |
| Auto-drs-gaussdbv5HA-sec-1(192.168.100.73,192.168.100.8,192.168.100.192,192.168.100.192,192.168.100.192,192.168.100.192)(postgres) |                   | GaussDB         | root           | Yes      |                              |
| Auto-drs-gaussdbv5-sec-2(192.168.100.241,8000)(postgres)                                                                           |                   | GaussDB         | root           | Yes      |                              |
| Auto-drs-gaussdbv5HA-star-1(192.168.100.57,192.168.100.157,192.168.100.194,8000)(postgres)                                         |                   | GaussDB         | root           | Yes      | created by sync rds instance |
| Auto-drs-gaussdbv5HA-sec-2(192.168.100.89,192.168.100.55,192.168.100.10,8000)(postgres)                                            |                   | GaussDB         | root           | Yes      | created by sync rds instance |
| Auto-drs-gaussdbv5-sec-1(192.168.0.97,8000)(postgres)                                                                              |                   | GaussDB         | root           | Yes      | created by sync rds instance |
| Auto-drs-gaussdbv5-tar-1(172.16.24.234:8000)(postgres)                                                                             |                   | GaussDB         | root           | Yes      | created by sync rds instance |

10. Choose **SQL Operations** > **SQL Window** on the top menu bar.



11. Run the following statement to create a database compatible with MySQL:  
**test\_database\_info** indicates the database name. Replace it based on the site requirements.  

```
CREATE DATABASE test_database_info DBCOMPATIBILITY 'mysql';
```

----End


## Performing a Pre-Check

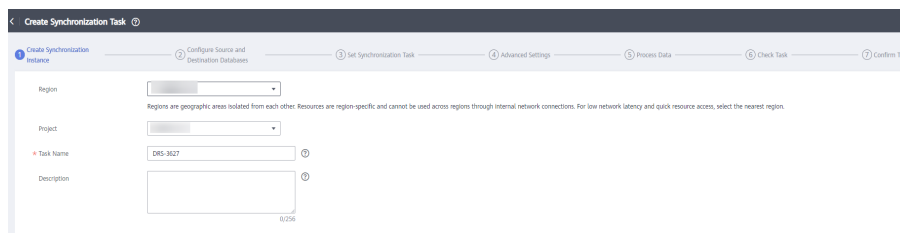
Before creating a task, check whether synchronization conditions are met.

Before synchronization, refer to [Precautions](#).

## Creating a DRS Synchronization Task

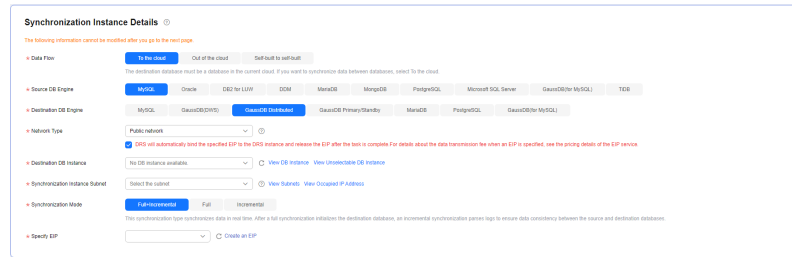
This section describes how to create a DRS instance and synchronize data from the **test\_info** database in the on-premises MySQL database to the **test\_database\_info** database in the GaussDB instance.

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner and select a region.  
Select the region where the destination instance is deployed.
- Step 3** Click the service list icon on the left and choose **Databases** > **Data Replication Service**.
- Step 4** In the navigation pane on the left, choose **Data Synchronization Management**.  
On the displayed page, click **Create Synchronization Task**.
- Step 5** Configure synchronization instance information.
  1. Select a region, and project, and enter a task name.



2. Specify **Data Flow**, **Source DB Engine**, **Destination DB Engine**, **Network Type**, **DRS Task Type**, **Destination DB Instance**, **Synchronization Instance**

**Subnet (optional), Synchronization Mode, Specifications, AZ, and Tags (optional).**



3. Click **Create Now**.

**Step 6** Configure the source and destination database information.

1. Enter the IP address, port number, username, and password of the source database.

Click **Test Connection**.

Source Database

System databases, users, parameters, and jobs will not be migrated. You need to manually import users and jobs to the destination database and configure parameters in parameter templates of the destination database.

IP Address or Domain Name:

Port:

Database Username:

Database Password:

SSL Connection:

2. Enter the username and password of the destination database.

Click **Test Connection**.

Destination Database

DB Instance Name: Auto-drs-gaussdbv5-tar-1 (172.16.24.234:8000)

Database Username:

Database Password:

This button is available only after the replication instance is created successfully.

3. Click **Next**. In the displayed box, read the message carefully and click **Agree**.

✕

**Notice**

I acknowledge that the IP addresses, domain names, ports, usernames, and passwords of involved databases will be temporarily collected and used in this task. These items will be deleted after the task is deleted.

**Step 7** Configure the synchronization task.

1. Select the object type for full synchronization. If the table structure to be synchronized has not been created in the destination database, select **Table**

**structure** (the table structure contains primary keys and unique keys) for **Synchronization Object Type**. Otherwise, deselect **Table structure**. Select **Index** for **Synchronization Object Type** based on the site requirements.

Synchronization Object Type  Table structure  Data  Index

*When you manually create a table structure in the destination database, for details about the data type, see [Mapping Data Types](#).*

2. Specify **Incremental Conflict Policy**.

- **Ignore**: The system will ignore the conflicting data and continue the subsequent synchronization process. If you select **Ignore**, data in the source database may be inconsistent with that in the destination database.
- **Report error**: The synchronization task will be stopped and fail. You can view the details in synchronization logs.
- **Overwrite**: Conflicting data will be overwritten.

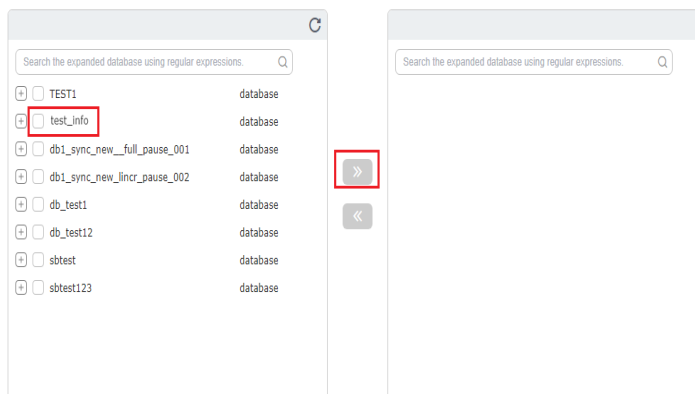
Incremental Conflict Policy    ⓘ

*If synchronized data conflicts with existing data (such as the source and destination databases containing the same primary or unique keys) in the destination database, the existing data will be overwritten.*

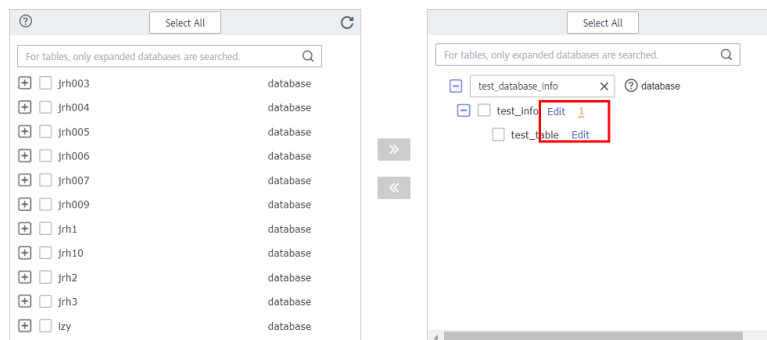
3. Select the databases and tables of the source database to be synchronized. In this test, select the **test\_table** table from the **test\_info** database.

Synchronization Object

*If any data in the source database changes, click the refresh button below.  
Move objects to be migrated from list of unselected objects on left side to the list of selected objects on right side.*



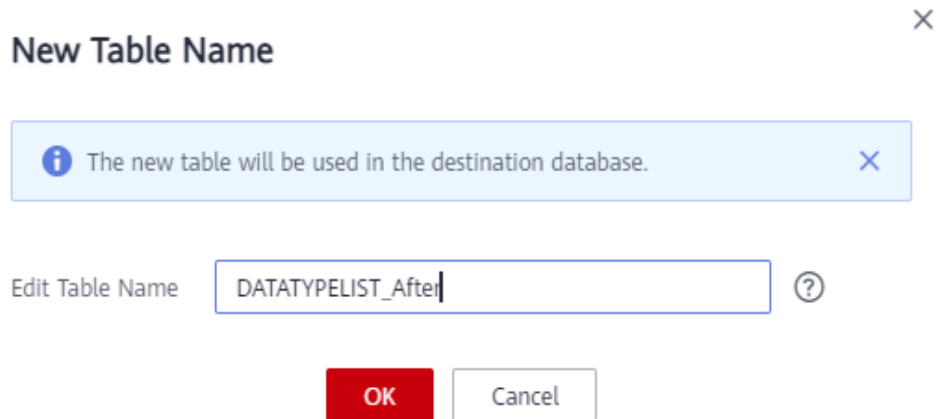
4. Locate the database and table, respectively, and click **Edit** to change the database name and table name.



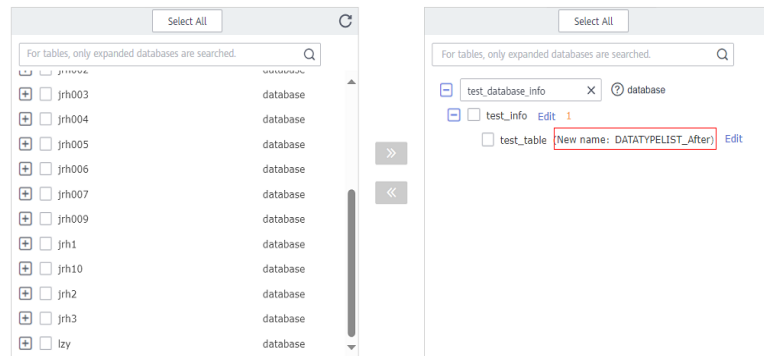
5. On the displayed box, enter a new name, for example, **DATATYPELIST\_After**.



The name cannot include special characters. Otherwise, an error will be reported during SQL statement execution after the synchronization.

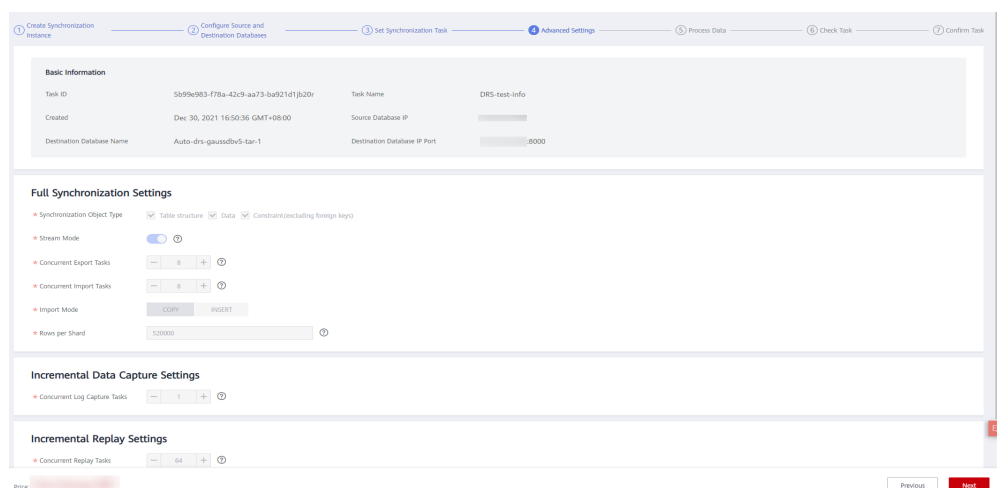


6. Confirm the settings and click **Next**.



**Step 8** Confirm advanced settings.

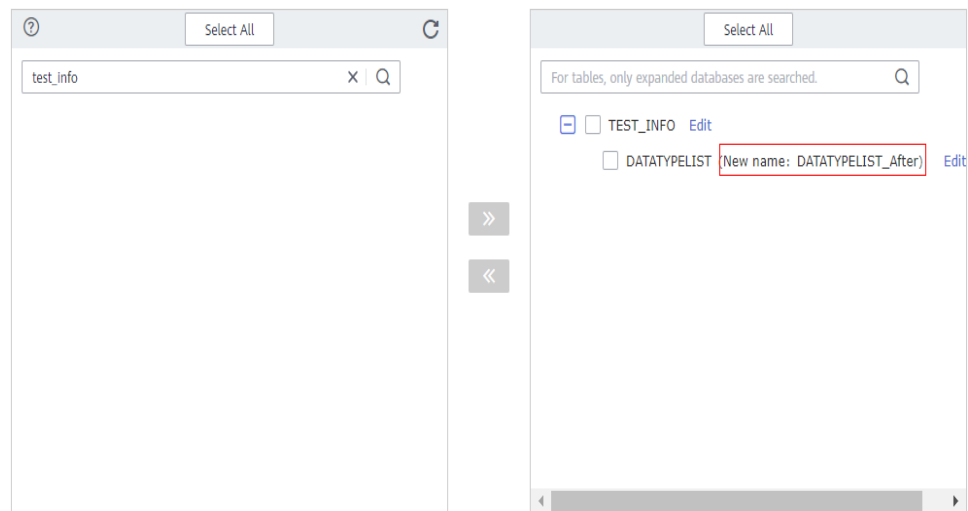
The information on the **Advanced Settings** page is for confirmation only and cannot be modified. After confirming the information, click **Next**.



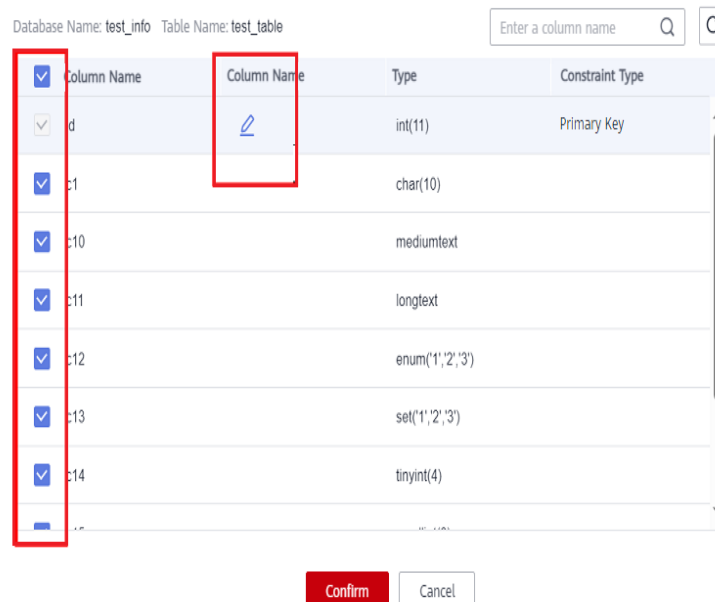
**Step 9** Process data.

On the **Processing Columns** tab, select the column to be synchronized and change its name, for example, change **c1** to **new-line**.

1. Click **Edit** next to the table to be processed.



2. Edit the **c1** column.



3. Enter the new name **new-line** and click **Confirm**.
4. Click **Next**.

**Step 10** Perform a pre-check.

1. After all settings are complete, perform a pre-check to ensure that the synchronization is successful.
2. If any check item fails, review the cause and rectify the fault. Then, click **Check Again**.

Check Again

Check success rate  100% All checks must pass before you can continue. If any check requires confirmation, check and confirm the results before proceeding to the next step.

| Check Item                                                                                | Check Result |
|-------------------------------------------------------------------------------------------|--------------|
| <b>Database parameters</b>                                                                |              |
| Whether the source database contains unsupported table field types                        | Passed       |
| Whether the destination database is compatible with the source database                   | Passed       |
| Whether the character set of the source database matches that of the destination database | Passed       |
| Whether the destination database has sufficient available connections                     | Passed       |
| Whether the selected objects exist in the destination database                            | Passed       |
| Whether the destination database contains the configured databases                        | Passed       |
| Whether there are source database foreign keys                                            | Passed       |
| Whether tables to be migrated contain primary keys                                        | Passed       |
| Whether existing data meets the constraints                                               | Passed       |
| Whether the source database character set is supported                                    | Passed       |
| Whether the source database has sufficient available connections                          | Passed       |
| Whether the source database container type is correct                                     | Passed       |
| Whether archive logs are enabled on the source database                                   | Passed       |
| Whether the source database name is valid                                                 | Passed       |
| Whether the supplementary log is enabled for the source database.                         | Passed       |
| Whether OGG log reading is enabled on the source database                                 | Passed       |
| Whether the source database table name is valid                                           | Passed       |

3. If all check items pass the pre-check, click **Next**.

### Step 11 Confirm the task.

1. Check that all configured information is correct.


The screenshot shows a configuration page for a task. At the top, there are two buttons: "Start upon task creation" (highlighted in blue) and "Start at a specified time". Below this, there is a "Send notifications" section with a toggle switch turned on and a note: "If disabled, DRS alarms, such as task failure, high latency, and frozen, cannot be received." There is also a "Stop Abnormal Task After" field set to "14" with a note: "Abnormal tasks run longer than the period you set (unit: day) will automatically stop." The "Details" section contains a table:


| Product Name            | Configuration                                                                                                |
|-------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>Task Information</b> |                                                                                                              |
| Name                    | DRS test job                                                                                                 |
| Description             | Source Database IP Address or Domain Name: 10.154.218.91 Destination DB Instance Name: Auto-dr-qaasdb5-gar-1 |
| Synchronization Mode    | FullIncremental Synchronization                                                                              |
| Data Flow               | To the cloud                                                                                                 |

2. Click **Submit**. In the display box, select **I have read the precautions**.

3. Click **Submit**.

### Notice ×

 During the synchronization, do not perform any operations on the destination DB instance through the management console. To ensure migration success, we strongly recommend that you read the [migration precautions](#) carefully before starting migration tasks and follow the instructions to ensure migration stability.

 If the task status is abnormal for more than 14 days, the task automatically stops. Pay attention to the alarms you received and handle the task in time to resume the download and avoid task retry failure.

I have read the precautions.

**Submit**

**Step 12** After the task is submitted, view and manage it.

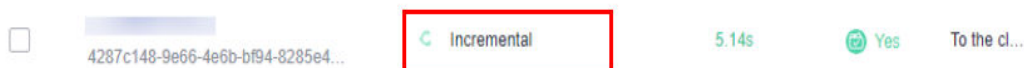
After the task is created, return to the task list to view the status of the created task.

----End

## Verifying Data After Synchronization

When the task status changes to **Incremental**, the full synchronization is complete. You can log in GaussDB and view the data synchronization result.

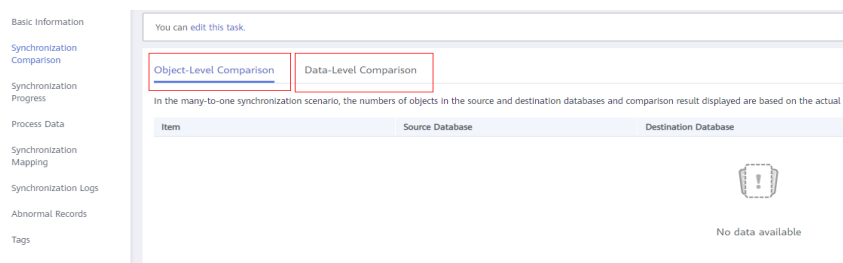
**Step 1** Wait until the synchronization task status becomes **Incremental**.



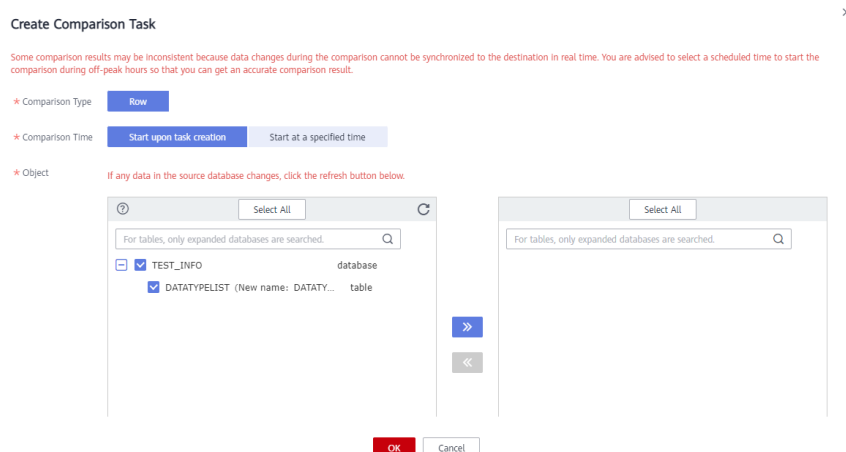
**Step 2** Click the task name to go to the **Basic Information** page.

**Step 3** Verify data consistency.

1. Choose **Synchronization Comparison** > **Object-Level Comparison** to view the database and table synchronization results.



2. Choose **Synchronization Comparison** > **Data-Level Comparison**, click **Create Comparison Task**, and view the synchronization results of the rows in the table.

**Step 4** Connect to `test_database_info` in GaussDB using DAS.

For details about how to connect to an instance through DAS, see [Adding Login Information](#).

**Step 5** Run the following statement to query the full synchronization result:

```
SELECT * FROM test_info.datatypelist_after;
```

After the schema in MySQL is synchronized, it will be used as the schema in GaussDB. Therefore, it is required to add the schema in the query statement for exact query.

All data types in the table were successfully synchronized and the data is correct.

**Step 6** Verify incremental synchronization.

In full+incremental synchronization, after the full synchronization is complete, the data that is written to the source database after the task is created can still be synchronized to the destination database until the task is stopped. The following describes how to synchronize incremental data from the source database to the destination database.

1. Use a database connection tool to connect to the source MySQL database based on its IP address.
2. Run the following statement to insert a data record into the source database:

Insert a data record whose ID is 3.

```
insert into test_info.test_table values
(3,'a','b','111','111','tinyblob','mediumblob','longblob','tinytext','text','mediumtext','longtext','1','3',1,2,3,4,
1.123,1.1234,'2024-03-08','2024-03-08 08:00:00','2024-03-08
08:00:00','08:00:00','2024','1010','{"a":"b"}',1.23,1.234);
```

3. Run the following statement in the destination database to query the result:  

```
SELECT * FROM test_info.datatypelist_after;
```

The new data in the source database has been synchronized to the destination database in real time.

**Step 7** Stop the synchronization task.

After data is completely synchronized to the destination database, stop the synchronization task.

1. Locate the task and click **Stop** in the **Operation** column.

2. In the display box, click **Yes**.

----End

## 4.5 From On-premises Oracle to GaussDB Distributed

### 4.5.1 Purpose

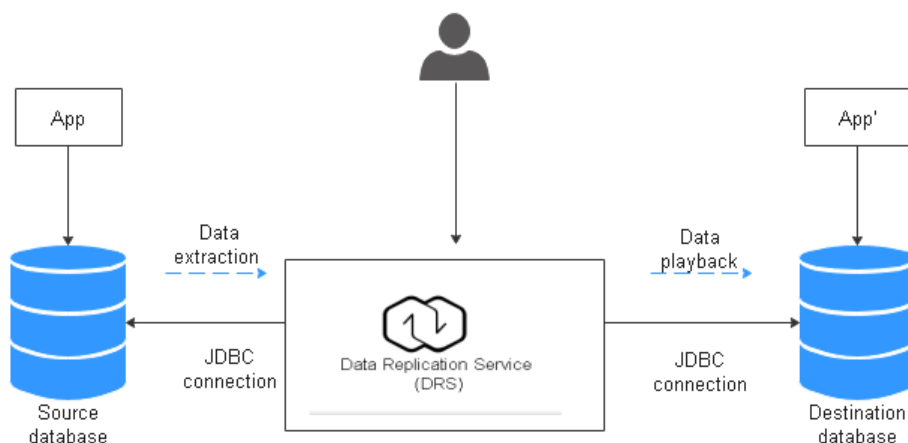
#### Description

You can use real-time synchronization of DRS to synchronize on-premises Oracle to Huawei Cloud GaussDB. Full+incremental synchronization can ensure that data is always in sync between the source Oracle and the destination GaussDB.

#### Problems

- With the rapid increase of enterprise workloads, traditional databases have poor scalability and distributed databases are required.
- Building traditional databases require purchasing and install servers, systems, databases, and other software. Its O&M is expensive and difficult.
- The performance of complex queries for traditional databases is poor.
- It is hard for traditional databases to smoothly migrate data without interrupting services.

#### Migration Architecture

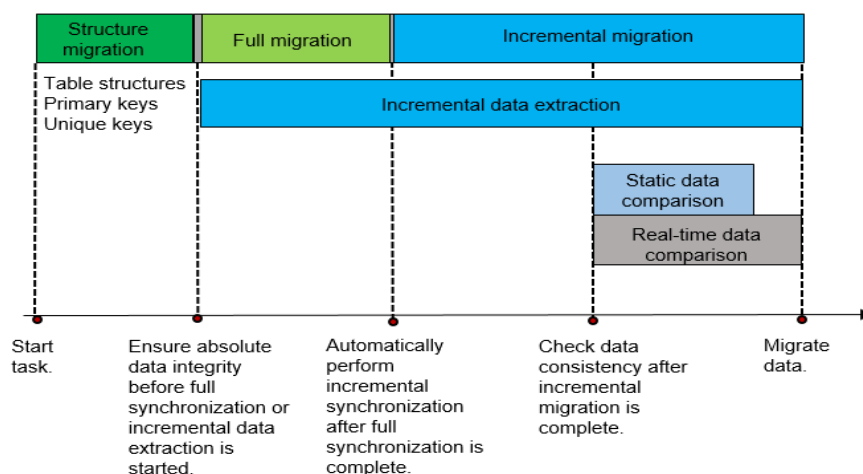


#### Migration Principles

Perform the following operations to complete full and incremental synchronization:

1. In the full synchronization phase, migrate tables, primary keys, and unique keys.

2. Start incremental data extraction to ensure that the incremental data generated during full data synchronization is completely extracted to the DRS instance.
3. Start the full migration task.
4. Automatically perform incremental synchronization after the full migration is complete. The playback starts from the location where the full migration starts.
5. Start the comparison task after the incremental replay is complete to check the data consistency. Real-time comparison is supported.
6. Start migration if the data is consistent.



## Service List

- Virtual Private Cloud (VPC)
- GaussDB
- Data Replication Service (DRS)
- Data Admin Service (DAS)

## Notes on Usage

- The resource planning in this document is for demonstration only. Adjust it as needed.
- The end-to-end test data in this document is for reference only.
- Full synchronization is used to migrate data. Incremental synchronization is used to synchronize data between the source and destination databases in real time.

## Prerequisites

- You have registered with Huawei Cloud and completed account authentication.
- Your account balance is greater than or equal to \$0 USD.
- You have set up an on-premises Oracle database for testing.
- You have obtained the IP address, port number, account, and password of the Oracle database to be migrated.

## 4.5.2 Resource Planning

**Table 4-21** Resource planning

| Category | Subcategory      | Planned Value                                   | Remarks                                                                                                                                                                                              |
|----------|------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VPC      | VPC name         | vpc-src-172                                     | Customize a name for easy identification.                                                                                                                                                            |
|          | Region           | Test region                                     | For low network latency and quick resource access, select the region nearest to you.                                                                                                                 |
|          | AZ               | AZ3                                             | -                                                                                                                                                                                                    |
|          | Subnet           | 172.16.0.0/16                                   | Select a subnet with sufficient network resources.                                                                                                                                                   |
|          | Subnet name      | subnet-src-172                                  | Customize a name for easy identification.                                                                                                                                                            |
| Oracle   | Name             | orcl                                            | Customize a name for easy identification.                                                                                                                                                            |
|          | Specifications   | 16 vCPUs   32 GB                                | -                                                                                                                                                                                                    |
|          | Database version | 11.2.0.1                                        | -                                                                                                                                                                                                    |
|          | Database user    | test_info                                       | Customize a user. However, the user must have the following permissions during migration: CREATE SESSION, SELECT ANY TRANSACTION, SELECT ANY TABLE, SELECT ANY DICTIONARY, and EXECUTE_CATALOG_ROLE. |
| GaussDB  | Instance name    | Auto-drs-gaussdbv5-tar-1                        | Customize a name for easy identification.                                                                                                                                                            |
|          | Database version | GaussDB 1.3 Enterprise Edition                  | -                                                                                                                                                                                                    |
|          | Instance type    | Distributed (1 CN, 3 DN shards, and 3 replicas) | Select a distributed instance for the test.                                                                                                                                                          |
|          | Deployment model | Independent                                     | -                                                                                                                                                                                                    |



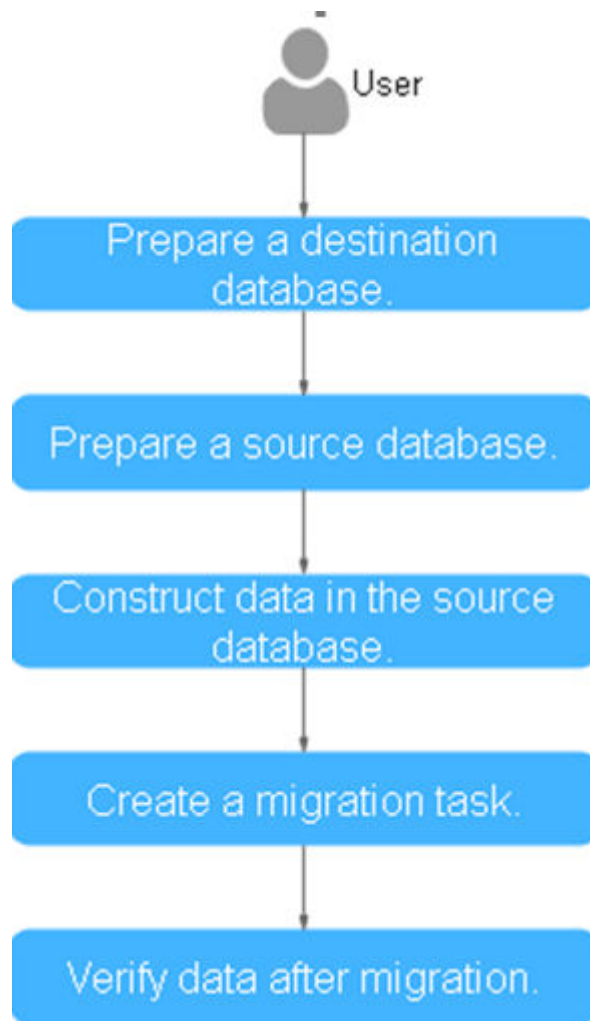
| Category                               | Subcategory             | Planned Value                       | Remarks                                                                                                                                                             |
|----------------------------------------|-------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | Transaction consistency | Strong consistency                  | -                                                                                                                                                                   |
|                                        | Shards                  | 3                                   | -                                                                                                                                                                   |
|                                        | Coordinator nodes       | 3                                   | -                                                                                                                                                                   |
|                                        | Storage type            | Ultra-high I/O                      | -                                                                                                                                                                   |
|                                        | AZ                      | AZ2                                 | Select a single AZ for the test. You are advised to select multiple AZs to improve instance availability in actual use.                                             |
|                                        | Instance specifications | General-enhanced II 8 vCPUs   64 GB | Select small specifications for the test. You are advised to configure specifications based on service requirements in actual use.                                  |
|                                        | Storage space           | 480G                                | Select a small storage space for the test. You are advised to configure storage space based on service requirements in actual use.                                  |
|                                        | Disk encryption         | Disable                             | In this example, disk encryption is disabled. Enabling disk encryption improves data security, but slightly affects the read and write performance of the database. |
| Logging in to the database through DAS | DB engine               | GaussDB                             | -                                                                                                                                                                   |
|                                        | Database source         | GaussDB                             | Select the GaussDB instance created in this example.                                                                                                                |
|                                        | Database name           | postgres                            | -                                                                                                                                                                   |
|                                        | Username                | root                                | -                                                                                                                                                                   |

| Category           | Subcategory               | Planned Value      | Remarks                                                                                                  |
|--------------------|---------------------------|--------------------|----------------------------------------------------------------------------------------------------------|
|                    | Password                  | -                  | Password of the <b>root</b> user of the GaussDB instance created in this example                         |
| DRS migration task | Migration task name       | DRS-test-info      | Customize a name for easy identification.                                                                |
|                    | Destination database name | test_database_info | Customize a name for easy identification, but the name must be compatible with the Oracle database name. |
|                    | Source DB engine          | Oracle             | -                                                                                                        |
|                    | Destination DB engine     | GaussDB            | -                                                                                                        |
|                    | Network type              | Public             | Select the public network for the test.                                                                  |

### 4.5.3 Operation Process

Figure 4-30 shows the main operation flowchart.

Figure 4-30 Operation flowchart




## 4.5.4 Creating a VPC and Security Group

Create a VPC and security group for a GaussDB instance.

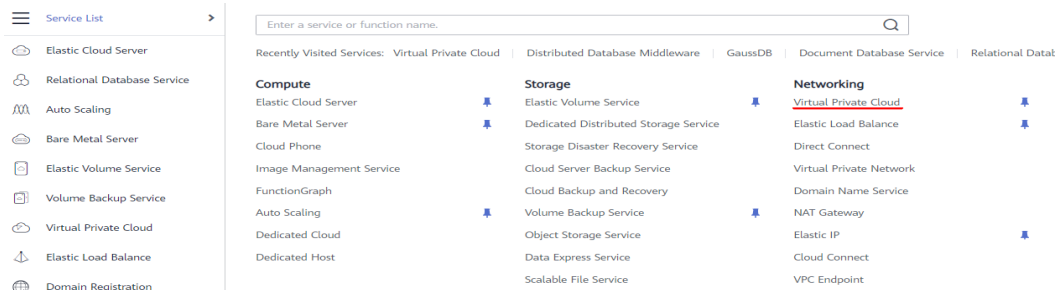
### Creating a VPC

**Step 1** Log in to the [management console](#).

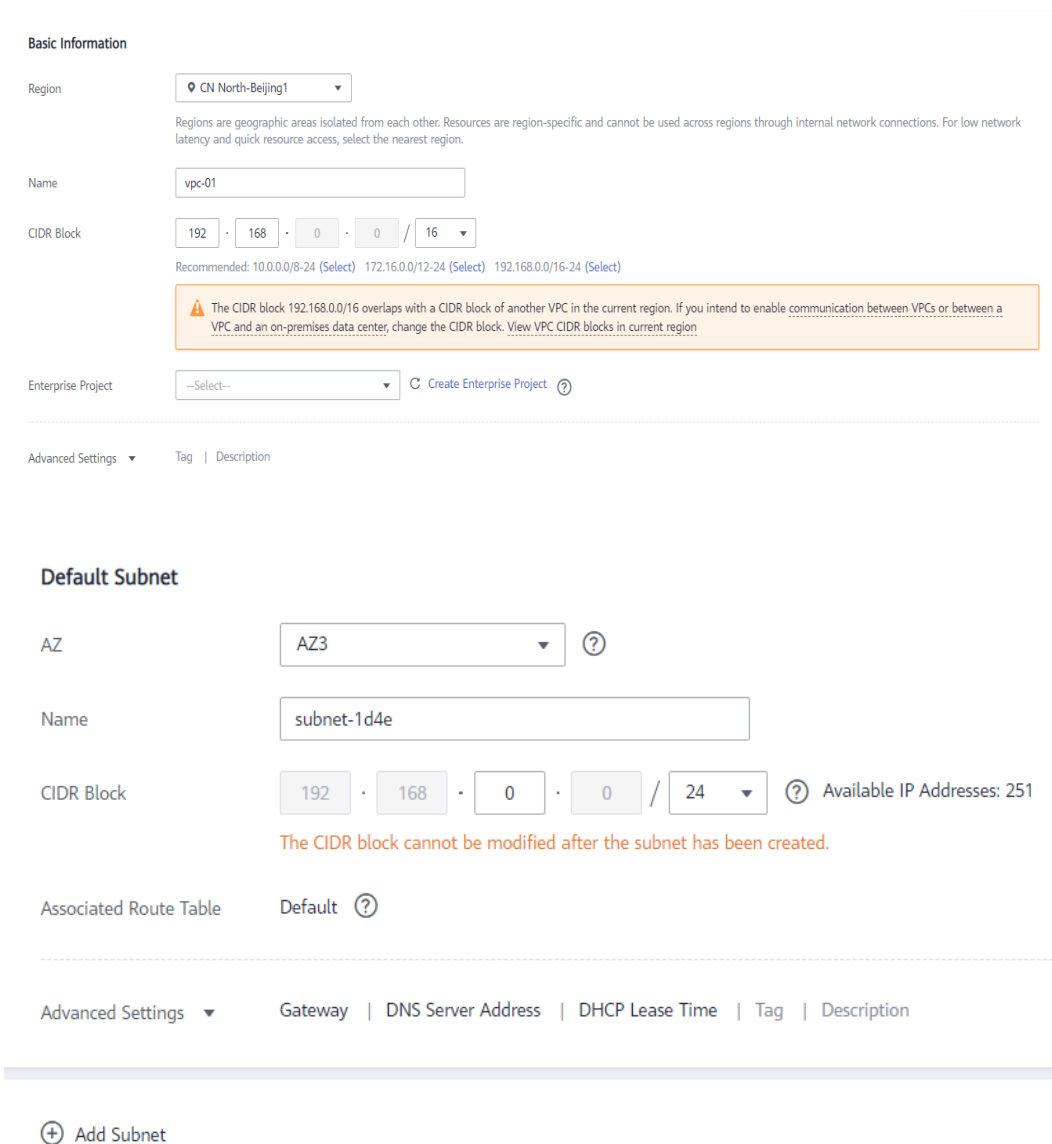
**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.



**Step 4 Click Create VPC.**



**Step 5** Configure parameters as needed and click **Create Now**.


**Step 6** Return to the VPC list and check whether the VPC is created.

If the VPC status becomes available, the VPC has been created.

----End

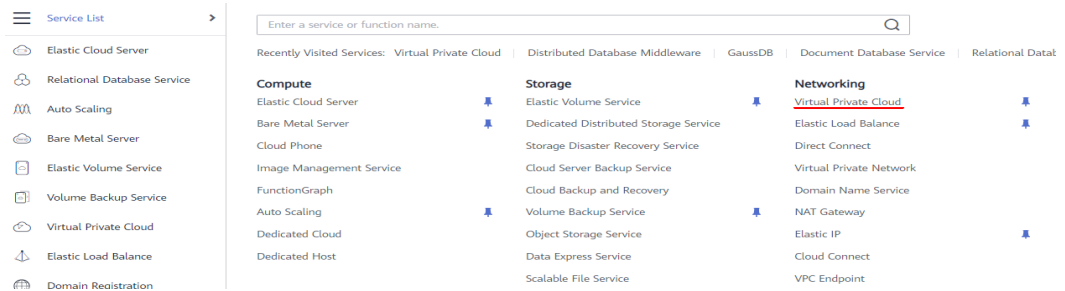
## Creating a Security Group

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.



**Step 4** Choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Configure parameters as needed.

### Create Security Group

✕

★ Name

★ Enterprise Project  [Create Enterprise Project](#) ?

★ Template

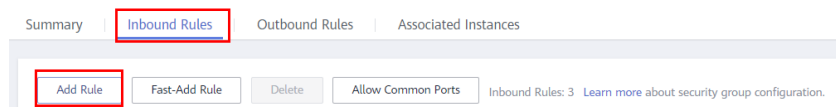
Description  0/255

[Show Default Rule](#) ▼

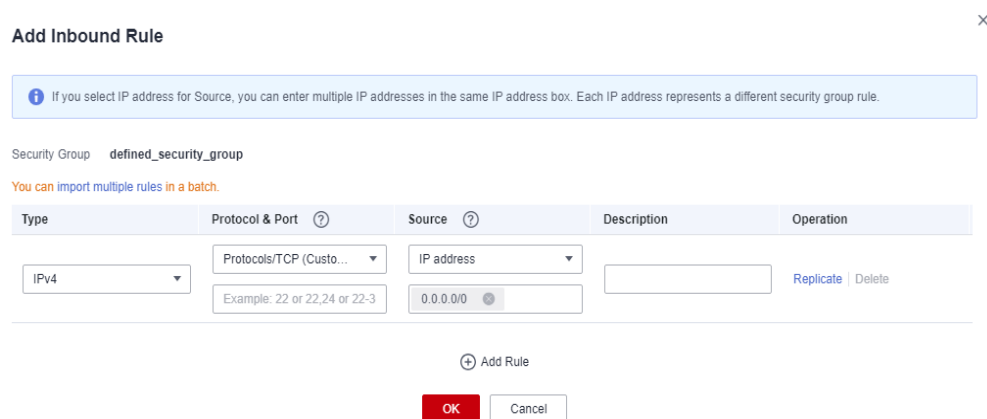
**Step 7** Click **OK**.

**Step 8** Return to the security group list and click the security group name (**sg-01** in this example).

**Step 9** Click the **Inbound Rules** tab, and then click **Add Rule**.



**Step 10** Configure an inbound rule, add the IP address of the source database, and click **OK**.




----End

## 4.5.5 Creating a GaussDB Instance

This section describes how to create a GaussDB instance as the destination database.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Under the service list, choose **Databases > GaussDB**.

**Step 4** Click **Buy DB Instance**.

**Step 5** Configure the instance name and basic information.

Billing Mode: **Pay-as-you-go** (Monthly, Pre-paid)

Region: **cn-north-1**

Project: **default**

DB Instance Name: **gwsh-test**

Edition Type: **Enterprise edition** (Basic edition)

| DB Engine Version | V2.0-8.202 | V2.0-8.201 | V2.0-8.200 | V2.0-8.112 | V2.0-8.110 | V2.0-8.105 | V2.0-8.102 | V2.0-8.101 | V2.0-8.100 | V2.0-8.5   |
|-------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| V2.0-8.1          | V2.0-8.0   | V2.0-3.300 | V2.0-3.227 | V2.0-3.226 | V2.0-3.223 | V2.0-3.222 | V2.0-3.221 | V2.0-3.220 | V2.0-3.200 | V2.0-3.207 |
| V2.0-3.201        | V2.0-3.103 | V2.0-3.100 | V2.0-2.8   | V2.0-2.7   | V2.0-2.3   | V2.0-1.4   |            |            |            |            |

The current engine uses Huawei Cloud EulerOS by default. A DB relationship cannot be created between instances using this engine and those running EulerOS.

DB Instance Type: **Distributed** (Centralized)

Deployment Model: **Independent**

Log Nodes Supported:  Yes

Transaction Consistency: **Strong consistency** (Eventual consistency)

Follower Priority: **Reliability** (Availability)

Replicas: **3**

Shards: **3**

Coordinator Nodes: **3**

If Coordinator Nodes is set to 1, the instance can only be used for testing.

AZ: **az1**, **az2**, **az3**, az4, az5

Only one or three AZs can be selected.

Time Zone: **(UTC+08:00) Beijing, Chongqing, Hong K...**

### Step 6 Configure instance specifications.

Instance Specifications: **General-enhanced II**

Flavor Name

- 8 vCPUs | 64 GB** Unavailable for production environment
- 16 vCPUs | 128 GB
- 32 vCPUs | 256 GB (Sold Out)
- 64 vCPUs | 512 GB (Sold Out)

DB Instance Specifications: **General-enhanced II | 8 vCPUs | 64 GB**

Storage Type: **Ultra-high I/O** Learn more about storage types.

Storage Space (GB): **480** GB

Disk Encryption: **Recommended Enable** (Disable)

Select small specifications for the test. You are advised to configure specifications based on service requirements in actual use.

### Step 7 Select a VPC and security group (created in [Creating a VPC and Security Group](#)) for the instance and configure the database port.

Relationship among VPCs, subnets, security groups, and DB instances

VPC: **gwsh-test**

Security Group: **gwsh-test-sg**

Database Port: **Default port: 8000**

In a security group, rules that authorize connections to DB instances apply to all DB instances associated with the security group.

### Step 8 Configure password and other information.

**Step 9** Click **Next**, confirm the information, and click **Submit**.

**Step 10** Go to the instance list.

If the instance status becomes available, the instance has been created.

----End

## 4.5.6 Generating Test Data

Before the synchronization, prepare some data types in the source database for verification after the synchronization is complete.

The following table lists data types supported by DRS.

**Table 4-22** Data type mapping

| Source Data Type | Destination Data Type | Sync (Source Data Type as Primary Key) | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key)                      | Comparison (Source Data Type as Non-Primary Key)                  | Remarks |
|------------------|-----------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|---------|
| CHAR             | character             | Supported                              | Supported                                  | Supported. The spaces before and after the character are ignored. | Supported. The spaces before and after the character are ignored. | -       |



| Source Data Type | Destination Data Type | Sync (Source Data Type as Primary Key) | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key)                      | Comparison (Source Data Type as Non-Primary Key)                  | Remarks                                                                                             |
|------------------|-----------------------|----------------------------------------|--------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| VARCHAR          | character varying     | Supported                              | Supported                                  | Supported                                                         | Supported                                                         | The precision ranges of the source and destination databases are different, causing precision loss. |
| VARCHAR2         | character varying     | Supported                              | Supported                                  | Supported                                                         | Supported                                                         | -                                                                                                   |
| NCHAR            | character             | Supported                              | Supported                                  | Supported. The spaces before and after the character are ignored. | Supported. The spaces before and after the character are ignored. | -                                                                                                   |
| NVARCHAR2        | nvarchar2             | Supported                              | Supported                                  | Supported                                                         | Supported                                                         | -                                                                                                   |
| NUMBER           | numeric               | Supported                              | Supported                                  | Supported                                                         | Supported                                                         | -                                                                                                   |
| NUMBER (6,3)     | numeric(6,3)          | Supported                              | Supported                                  | Supported                                                         | Supported                                                         | -                                                                                                   |
| NUMBER (6,0)     | Integer               | Supported                              | Supported                                  | Supported                                                         | Supported                                                         | -                                                                                                   |
| NUMBER (3)       | smallint              | Supported                              | Supported                                  | Supported                                                         | Supported                                                         | -                                                                                                   |
| NUMBER (6,-2)    | integer               | Supported                              | Supported                                  | Supported                                                         | Supported                                                         | -                                                                                                   |

| Source Data Type | Destination Data Type | Sync (Source Data Type as Primary Key)                                                         | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks                                                                                             |
|------------------|-----------------------|------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| BINARY_FLOAT     | real                  | Unsupported (The destination database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Supported                                        | The precision ranges of the source and destination databases are different, causing precision loss. |
| BINARY_DOUBLE    | double precision      | Unsupported (The destination database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Supported                                        | -                                                                                                   |

| Source Data Type | Destination Data Type | Sync (Source Data Type as Primary Key)                                                         | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks                                                                                             |
|------------------|-----------------------|------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| FLOAT            | real                  | Unsupported (The destination database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Supported                                        | The precision ranges of the source and destination databases are different, causing precision loss. |
| INT              | numeric               | Supported                                                                                      | Supported                                  | Supported                                    | Supported                                        | -                                                                                                   |
| INTEGER          | numeric               | Supported                                                                                      | Supported                                  | Supported                                    | Supported                                        | -                                                                                                   |

| Source Data Type | Destination Data Type          | Sync (Source Data Type as Primary Key) | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks                                                                                                                                                                                                                                    |
|------------------|--------------------------------|----------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DATE             | date                           | Supported                              | Supported                                  | Unsupported                                  | Supported                                        | If a table with date type is created in the destination database, the data type precision range in the source database is different from that in the destination database, causing precision loss. Therefore, comparison is not supported. |
| TIMESTAMP        | timestamp(6) without time zone | Supported                              | Supported                                  | Unsupported                                  | The value is accurate to six decimal places.     | The maximum precision supported by the source database is 6.                                                                                                                                                                               |

| Source Data Type | Destination Data Type       | Sync (Source Data Type as Primary Key)                                                         | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks                                                 |
|------------------|-----------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|---------------------------------------------------------|
| TIMESTAMP_TZ     | timestamp(6) with time zone | Unsupported (The source database does not support creating tables using the primary key.)      | Supported                                  | Unsupported                                  | Filter this column.                              | -                                                       |
| TIMESTAMP_LTZ    | timestamp(6) with time zone | Unsupported (The destination database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Filter this column.                              | -                                                       |
| INTERVAL_YM      | interval year to month      | Supported                                                                                      | Supported                                  | Unsupported                                  | Unsupported                                      | Incremental synchronization does not support this type. |

| Source Data Type | Destination Data Type  | Sync (Source Data Type as Primary Key)                                                    | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks                                                                                                              |
|------------------|------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| INTERVAL_DS      | interval day to second | Supported                                                                                 | Supported                                  | Unsupported                                  | Unsupported                                      | Incremental synchronization does not support this type. The maximum precision supported by the source database is 6. |
| BLOB             | bytea                  | Unsupported (The source database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Filter this column.                              | -                                                                                                                    |

| Source Data Type | Destination Data Type | Sync (Source Data Type as Primary Key)                                                    | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks |
|------------------|-----------------------|-------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|---------|
| CLOB             | text                  | Unsupported (The source database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Filter this column.                              | -       |
| NCLOB            | text                  | Unsupported (The source database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Filter this column.                              | -       |

| Source Data Type | Destination Data Type | Sync (Source Data Type as Primary Key)                                                    | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks |
|------------------|-----------------------|-------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|---------|
| LONG             | text                  | Unsupported (The source database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Filter this column.                              | -       |
| LONG_RAW         | bytea                 | Unsupported (The source database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Filter this column.                              | -       |



| Source Data Type | Destination Data Type | Sync (Source Data Type as Primary Key)                                                         | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks                                                                 |
|------------------|-----------------------|------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|
| RAW              | bytea                 | Unsupported (The destination database does not support creating tables using the primary key.) | Supported                                  | Unsupported                                  | Supported                                        | -                                                                       |
| RowID            | character varying(18) | Supported                                                                                      | Supported                                  | Supported                                    | Supported                                        | -                                                                       |
| BFILE            | -                     | Unsupported                                                                                    | Unsupported                                | Unsupported                                  | Unsupported                                      | Restrictions on the source database: The bfile type is not supported.   |
| XMLTYPE          | -                     | Unsupported                                                                                    | Unsupported                                | Unsupported                                  | Unsupported                                      | Restrictions on the source database: The xmltype type is not supported. |

| Source Data Type | Destination Data Type | Sync (Source Data Type as Primary Key) | Sync (Source Data Type as Non-Primary Key) | Comparison (Source Data Type as Primary Key) | Comparison (Source Data Type as Non-Primary Key) | Remarks                                                                      |
|------------------|-----------------------|----------------------------------------|--------------------------------------------|----------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------------|
| UROWID           | -                     | Unsupported                            | Unsupported                                | Unsupported                                  | Unsupported                                      | Full and incremental synchronizations are not supported.                     |
| sdo_geometry     | -                     | Unsupported                            | Unsupported                                | Unsupported                                  | Unsupported                                      | Restrictions on the source database: The sdo_geometry type is not supported. |
| NUMBER(*, 0)     | numeric               | Supported                              | Supported                                  | Supported                                    | Supported                                        | -                                                                            |

Perform the following steps to generate data in the source database:

**Step 1** Use a database connection tool to connect to the source Oracle database based on its IP address.

**Step 2** Construct data in the source database based on data types supported by DRS.

1. Create a test user.

```
create user test_info identified by xxx;
```

*test\_info* indicates the user created for the test, and *xxx* indicates the password of the user.

2. Assign permissions to the user.

```
grant dba to test_info;
```

3. Create a data table under the user.

```
CREATE TABLE test_info.DATATYPELIST(
 ID INT,
 COL_01_CHAR_____E CHAR(100),
 COL_02_NCHAR_____E NCHAR(100),
 COL_03_VARCHAR____E VARCHAR(1000),
 COL_04_VARCHAR2___E VARCHAR2(1000),
```

```
COL_05_NVARCHAR2_E NVARCHAR2(1000),
COL_06_NUMBER___ E NUMBER(38,0),
COL_07_FLOAT____ E FLOAT(126),
COL_08_BFLOAT___ E BINARY_FLOAT,
COL_09_BDOUBLE__ E BINARY_DOUBLE,
COL_10_DATE_____ E DATE DEFAULT SYSTIMESTAMP,
COL_11_TS_____ E TIMESTAMP(6),
COL_12_TSTZ_____ E TIMESTAMP(6) WITH TIME ZONE,
COL_13_TSLTZ____ E TIMESTAMP(6) WITH LOCAL TIME ZONE,
COL_14_CLOB_____ E CLOB DEFAULT EMPTY_CLOB(),
COL_15_BLOB_____ E BLOB DEFAULT EMPTY_BLOB(),
COL_16_NCLOB_____ E NCLOB DEFAULT EMPTY_CLOB(),
COL_17_RAW_______ E RAW(1000),
COL_19_LONGRAW___ E LONG RAW,
COL_24_ROWID_____ E ROWID,
PRIMARY KEY(ID)
);
```



4. Insert two rows of data.

```
insert into test_info.DATATYPELIST
values(4,'huawei','xian','Shannxi','zhongguo','shijie',
666,12.321,1.123,2.123,sysdate,sysdate,sysdate,sysdate,'hw','cb','df','FF','FF',
,'AAAYEVAAJAAAACrAAA');
```

```
insert into test_info.DATATYPELIST values(2,'Migrate-
test','test1','test2','test3','test4',
666,12.321,1.123,2.123,sysdate,sysdate,sysdate,sysdate,'hw','cb','df','FF','FF',
,'AAAYEVAAJAAAACrAAA');
```

5. Make the above statements take effect.  
**commit;**

### Step 3 Create a database at the destination server.

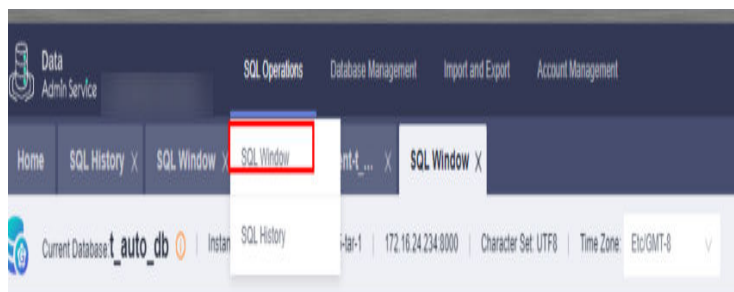
1. Log in to the [management console](#).
2. Click  in the upper left corner and select a region.
3. Click  in the upper left corner of the page and choose **Databases > Data Admin Service**.
4. In the navigation pane on the left, click **Development Tool** to go to the login list page.
5. Click **Add Login**.
6. On the displayed page, select the DB engine, source database, and target DB instance, enter the login username, password, and description (optional), and enable **Collect Metadata Periodically** and **Show Executed SQL Statements**. If **Collect Metadata Periodically** is enabled, select **Remember Password**.
7. Click **Test Connection** to check whether the connection is successful.

If a message is displayed indicating connection successful, continue with the operation. If a message is displayed indicating connection failed and the failure cause is provided, make modifications according to the error message.

8. Click **OK**.
9. Locate the added instance, click **Log In** in the **Operation** column.

| DB Instance                                                                              | DB Engine Version | Source Database | Login Username | Remember ... | Description                  |
|------------------------------------------------------------------------------------------|-------------------|-----------------|----------------|--------------|------------------------------|
| Auto-drs-gaussdbv5-tar-1(172.16.24.234:8000)test_database_info                           |                   | GaussDB         | root           | Yes          |                              |
| Auto-drs-gaussdbv5HA-sec-1(192.168.100.73,192.168.100.8,192.168.100.192,8000)postgres    |                   | GaussDB         | root           | Yes          |                              |
| Auto-drs-gaussdbv5-sec-2(192.168.100.241:8000)postgres                                   |                   | GaussDB         | root           | Yes          |                              |
| Auto-drs-gaussdbv5HA-star-1(192.168.100.57,192.168.100.157,192.168.100.194,8000)postgres |                   | GaussDB         | root           | Yes          | created by sync rds instance |
| Auto-drs-gaussdbv5HA-sec-2(192.168.100.89,192.168.100.55,192.168.100.16,8000)postgres    |                   | GaussDB         | root           | Yes          | created by sync rds instance |
| Auto-drs-gaussdbv5-sec-1(192.168.0.97,8000)postgres                                      |                   | GaussDB         | root           | Yes          | created by sync rds instance |
| Auto-drs-gaussdbv5-tar-1(172.16.24.234:8000)postgres                                     |                   | GaussDB         | root           | Yes          | created by sync rds instance |

10. Choose **SQL Operations** > **SQL Window** on the top menu bar.



11. Run the following statement to create a database compatible with Oracle:  
**test\_database\_info** indicates the database name. Replace it based on the site requirements.

```
CREATE DATABASE test_database_info DBCOMPATIBILITY 'ORA';
```

----End

## 4.5.7 Synchronizing Databases

This section describes how to create a DRS instance and synchronize data from the **test\_info** database on the local Oracle to the **test\_database\_info** database on GaussDB instance.


### Pre-Check

Before creating a task, check the synchronization conditions.

Before synchronization, refer to [Precautions](#).

### Creating a Synchronization Task

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

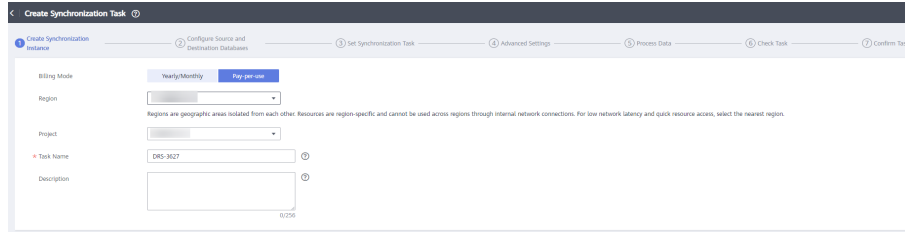
Select the region where the destination instance is deployed.

**Step 3** Click the service list icon on the left and choose **Databases** > **Data Replication Service**.

**Step 4** In the navigation pane on the left, choose **Data Synchronization Management**. On the displayed page, click **Create Synchronization Task**.

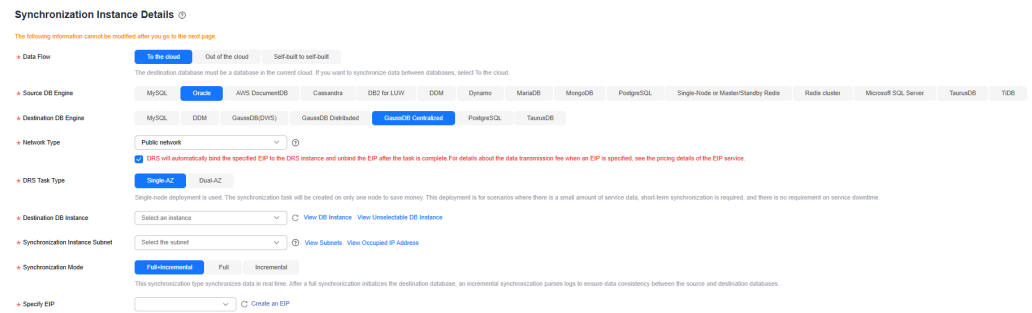
**Step 5** Configure synchronization instance information.

1. Select a region, and project, and enter a task name.



2. Specify **Data Flow**, **Source DB Engine**, **Destination DB Engine**, **Network Type**, **DRS Task Type**, **Destination DB Instance**, **Synchronization Instance Subnet** (optional), **Synchronization Mode**, **Specifications**, **AZ**, and **Tags** (optional).

**Figure 4-31** Synchronization instance details

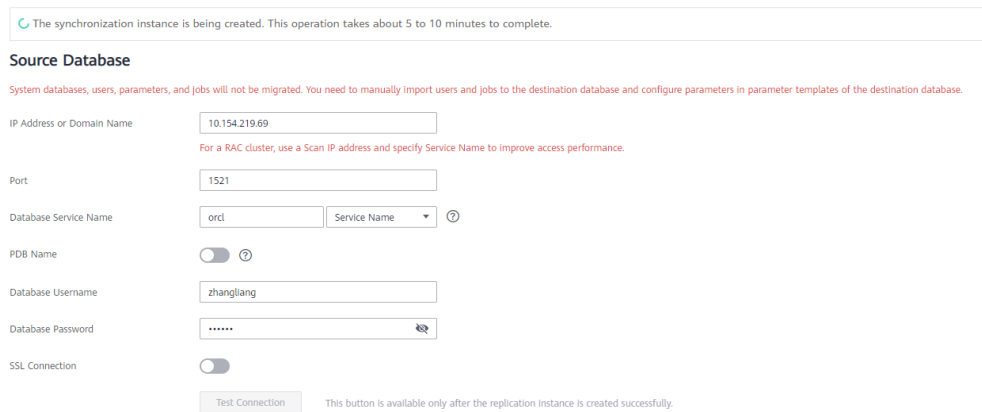


3. Click **Create Now**.

**Step 6** Configure the source and destination database information.

1. Enter the IP address, port number, username, and password of the source database.

Click **Test Connection**.



2. Enter the username and password of the destination database. Click **Test Connection**.

**Destination Database**

DB Instance Name: Auto-drs-gaussdbv5-tar-1 (172.16.24.234:8000)

Database Username:

Database Password:

This button is available only after the replication instance is created successfully.

3. Click **Next**. In the displayed box, read the message carefully and click **Agree**.

✕

**Notice**

I acknowledge that the IP addresses, domain names, ports, usernames, and passwords of involved databases will be temporarily collected and used in this task. These items will be deleted after the task is deleted.

**Step 7** Configure the synchronization task.

1. Select the databases and tables of the source database to be migrated. For example, select the **DATATYPELIST** table from the **test\_info** database.

**Basic Information**

|                           |                                      |                              |                    |
|---------------------------|--------------------------------------|------------------------------|--------------------|
| Task ID                   | 5b99e983-f78a-42c9-aa73-ba921d11b20r | Task Name                    | DRS-test-info      |
| Created                   | Dec 30, 2021 16:50:36 GMT+08:00      | Source Database IP           | 10.154.219.69      |
| Destination Database Name | Auto-drs-gaussdbv5-tar-1             | Destination Database IP Port | 172.16.24.234:8000 |

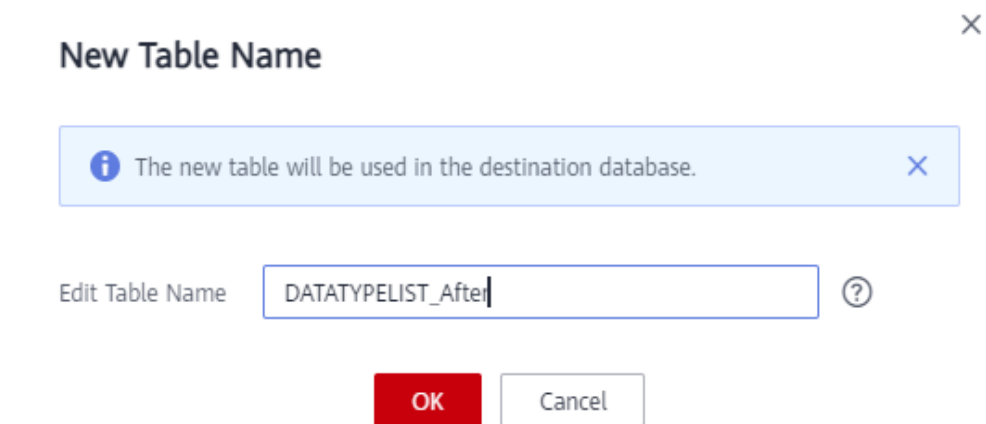
Flow Control:   ⓘ

Synchronization Object: **Tables** | Import object file

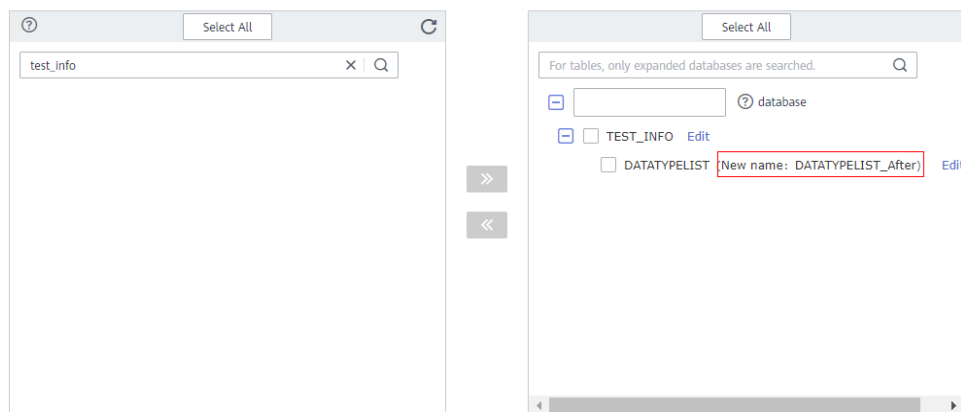
Only some DDL statements can be synchronized. For details, see precautions of the current scenario in Real-Time Synchronization > Before You Start. After objects are synchronized, they will be saved in the destination database with their names in all lowercase. If any data in the source database changes, click the refresh button below. More objects to be migrated from list of unselected objects on left side to the list of selected objects on right side.

2. Locate the database and table, respectively, and click **Edit** to change the database name and table name.

- On the displayed box, enter a new name, for example, **DATATYPELIST\_After**. The name cannot include special characters. Otherwise, an error will be reported during SQL statement execution after the migration.

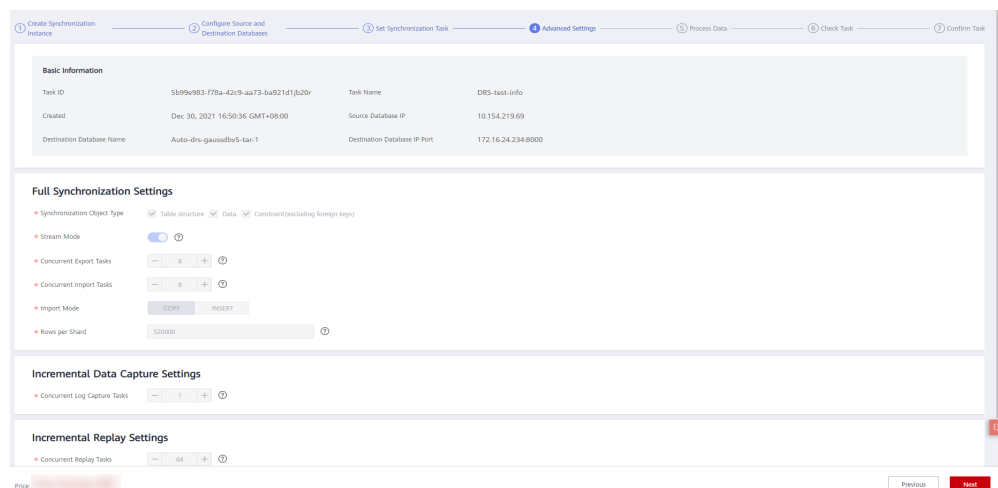


- Confirm the settings and click **Next**.



### Step 8 Confirm advanced settings.

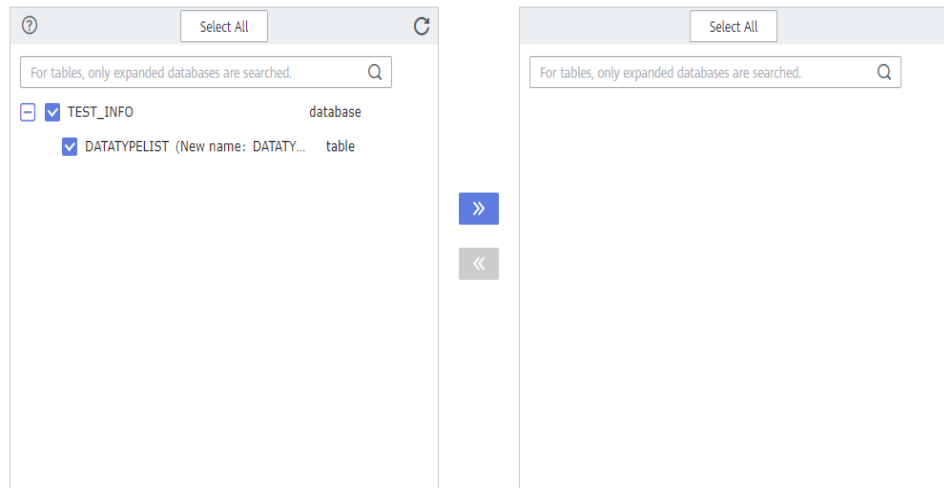
The information on the **Advanced Settings** page is for confirmation only and cannot be modified. After confirming the information, click **Next**.



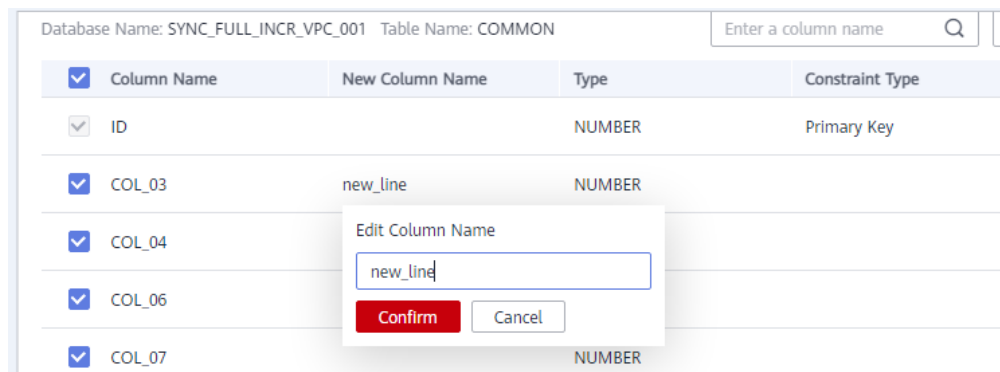
**Step 9** Process data.

On this page, you can process the table to be migrated. Select the column to be migrated and change its name, for example, change **COL\_01\_CHAR\_\_\_\_\_E** to **new-line**.

1. Select the table to be processed.

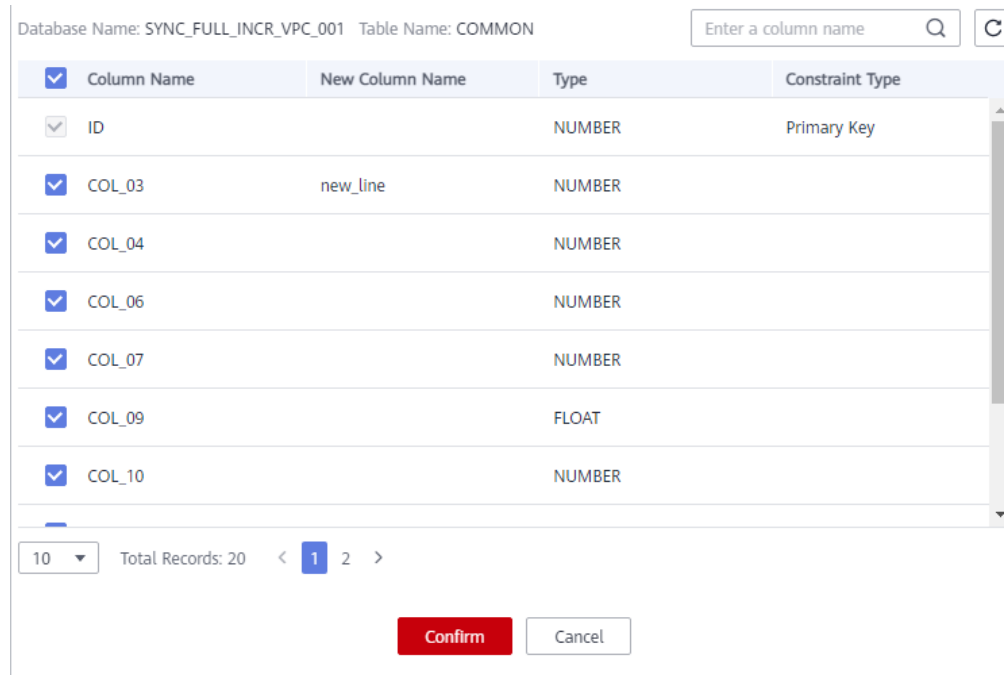


2. Edit the **COL\_01\_CHAR\_\_\_\_\_E** column.



3. Enter the new name **new-line** and click **Confirm**.

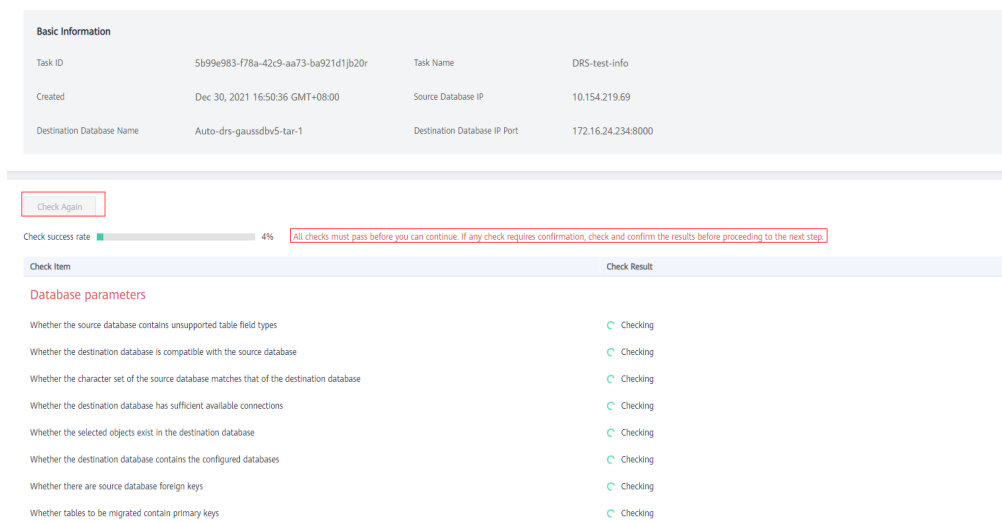




4. Click **Next**.

**Step 10** Perform a pre-check.

1. After all settings are complete, perform a pre-check to ensure that the migration is successful.



2. If any check fails, review the cause and rectify the fault. Then, click **Check Again**.

Check Again

Check success rate  100% All checks must pass before you can continue. If any check requires confirmation, check and confirm the results before proceeding to the next step.

| Check Item                                                                                | Check Result |
|-------------------------------------------------------------------------------------------|--------------|
| <b>Database parameters</b>                                                                |              |
| Whether the source database contains unsupported table field types                        | Passed       |
| Whether the destination database is compatible with the source database                   | Passed       |
| Whether the character set of the source database matches that of the destination database | Passed       |
| Whether the destination database has sufficient available connections                     | Passed       |
| Whether the selected objects exist in the destination database                            | Passed       |
| Whether the destination database contains the configured databases                        | Passed       |
| Whether there are source database foreign keys                                            | Passed       |
| Whether tables to be migrated contain primary keys                                        | Passed       |
| Whether existing data meets the constraints                                               | Passed       |
| Whether the source database character set is supported                                    | Passed       |
| Whether the source database has sufficient available connections                          | Passed       |
| Whether the source database container type is correct                                     | Passed       |
| Whether archive logs are enabled on the source database                                   | Passed       |
| Whether the source database name is valid                                                 | Passed       |
| Whether the supplementary log is enabled for the source database.                         | Passed       |
| Whether OGG log reading is enabled on the source database                                 | Passed       |
| Whether the source database table name is valid                                           | Passed       |

3. If all check items pass the pre-check, click **Next**.

### Step 11 Confirm the task.

1. Check whether all configured information is correct.

Start Time Start open task creation Start at a specified time ⓘ

Send Notifications  ⓘ If disabled, DRS alarms, such as task failure, high latency, and frozen, cannot be received.

\* Stop Abnormal Tasks After  ⓘ Abnormal tasks run longer than the period you set (unit: day) will automatically stop.

Details

| Product Name            | Configuration                                                                                                   |
|-------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Task Information</b> |                                                                                                                 |
| Name                    | DRS-test-info                                                                                                   |
| Description             | Source Database IP Address or Domain Name: 10.154.219.69 Destination DB Instance Name: Auto-drs-gaussdbv5-tar-1 |
| Synchronization Mode    | Full-Incremental synchronization                                                                                |
| Data Flow               | To the cloud                                                                                                    |

2. Click **Start Task**. In the display box, select **I have read the precautions**.

3. Click **Submit**.

### Notice



During the synchronization, do not perform any operations on the destination DB instance through the management console. To ensure migration success, we strongly recommend that you read the [migration precautions](#) carefully before starting migration tasks and follow the instructions to ensure migration stability.



If the task status is abnormal for more than 14 days, the task automatically stops. Pay attention to the alarms you received and handle the task in time to resume the download and avoid task retry failure.

I have read the precautions.

**Submit**

**Step 12** After the task is submitted, view and manage it.

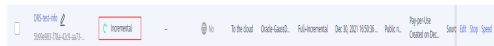
After the task is created, return to the task list to view the status of the created task.

----End

## 4.5.8 Verifying Data

When the task status changes to **Incremental**, the full synchronization is complete. You can log in GaussDB and view the data migration result.

**Step 1** Wait until the migration task status becomes **Incremental**.



**Step 2** Click the task name to go to the **Basic Information** page.

**Step 3** On the **Synchronization Progress** page, view the full synchronization result.

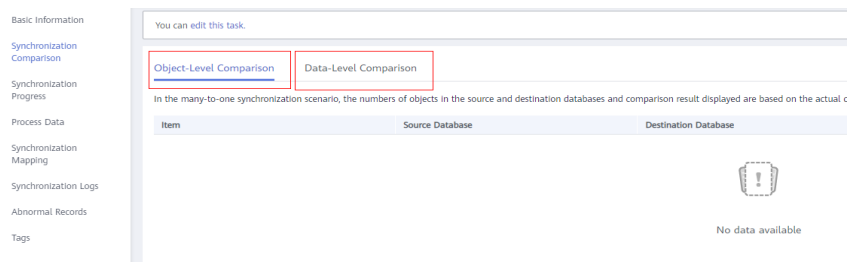
As shown in the following figure, the **DATATYPELIST** table in the **TEST\_INFO** database has been migrated to **shard\_0**. Two rows were migrated successfully.

The screenshot shows the 'Synchronization Progress' page for a task. At the top, a progress bar indicates 'Full Synchronization Completed' at 100% and 'Incremental synchronization in progress'. Below this, a table provides synchronization information:

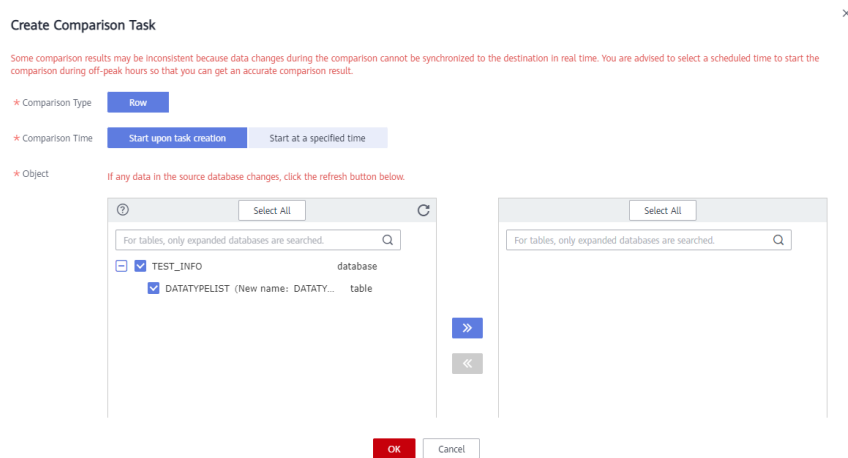
| Database Name | Table Name   | Shard/Partition Name | Exported Rows | Imported Rows | Synchronized                | Last Updated                | Shard Start Value | Shard End Value |
|---------------|--------------|----------------------|---------------|---------------|-----------------------------|-----------------------------|-------------------|-----------------|
| TEST_INFO     | DATATYPELIST | shard_0_0            | 2             | 2             | Dec 30, 2021 17:24:39 GM... | Dec 30, 2021 17:24:43 GM... | --                | --              |

**Step 4** Verify data consistency.

1. Choose **Synchronization Comparison > Object-Level Comparison** to view the database and table migration results.



2. Choose **Synchronization Comparison > Data-Level Comparison**, click **Create Comparison Task**, and view the migration results of the rows in the table.



**Step 5** Connect to the destination database **test\_database\_info** through DAS.

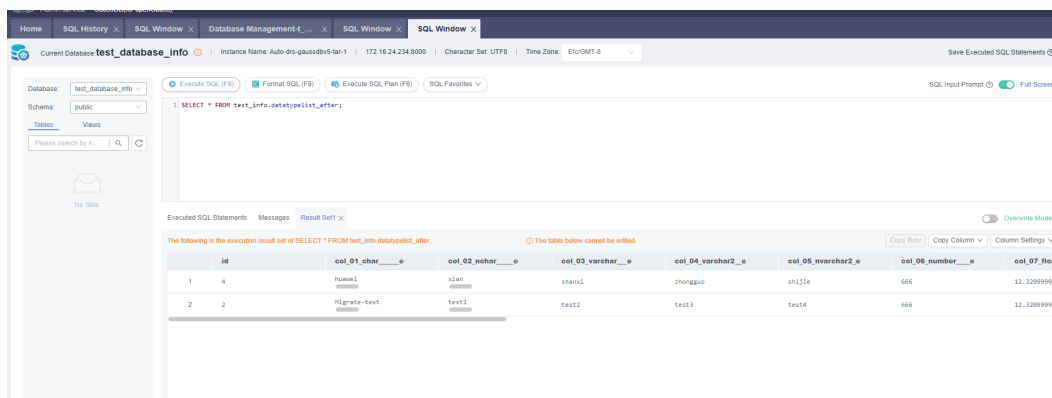
For details about how to connect to an instance through DAS, see [Adding Login Information](#).

**Step 6** Query the full synchronization result.

```
SELECT * FROM test_info.datatype1ist_after;
```

After the schema in Oracle is migrated, it will be used as the schema in GaussDB. Therefore, it is required to add the schema in the query statement for exact query.

As shown in the following figure, all data types in the table were successfully migrated and the data is correct.



**Step 7** Verify incremental synchronization.

In the migration type of full and incremental synchronization, after the full synchronization is complete, the data that is written to the source database after the task is created can still be synchronized to the destination database until the task is complete. The following describes how to synchronize incremental data from the source database to the destination database.

1. Use a database connection tool to connect to the source Oracle database based on its IP address.
2. Run the following statement to insert a data record into the source database:

Insert a data record whose ID is 1.

```
insert into test_info.DATATYPELIST values(1,'Migrate-test','test1','test2','test3','test4',
666,12.321,1.123,2.123,sysdate,sysdate,sysdate,sysdate,'hw','cb','df','FF','FF','AAAYEVAAJAAACrAAA');
commit;
```

3. Run the following statement in the destination database to query the result:  
SELECT \* FROM test\_info.datatypelist\_after;

As shown in the following figure, the new data inserted in the source database has been synchronized to the destination database in real time.

**Step 8** Stop the migration task.

After data is completely migrated to the destination database, stop the migration task.


1. Locate the task and click **Stop** in the **Operation** column.





2. In the display box, click **Yes**.

×

## Stop Task

 Are you sure you want to stop this task?

| Name          | Status                                                                                        |
|---------------|-----------------------------------------------------------------------------------------------|
| DRS-test-info |  Incremental |

 If you forcibly stop a task, the migration task will be stopped first.×

Force stop task

Description:

- Once this task is stopped, it cannot be recovered.

Yes No

----End

## 4.6 From On-premises Oracle to GaussDB Centralized

### 4.6.1 Purpose

#### Description

This practice uses UGO syntax migration and DRS real-time synchronization to synchronize on-premises Oracle to Huawei Cloud GaussDB. You can create a full +incremental synchronization task to synchronize data from the source Oracle to the destination GaussDB.

#### Problems

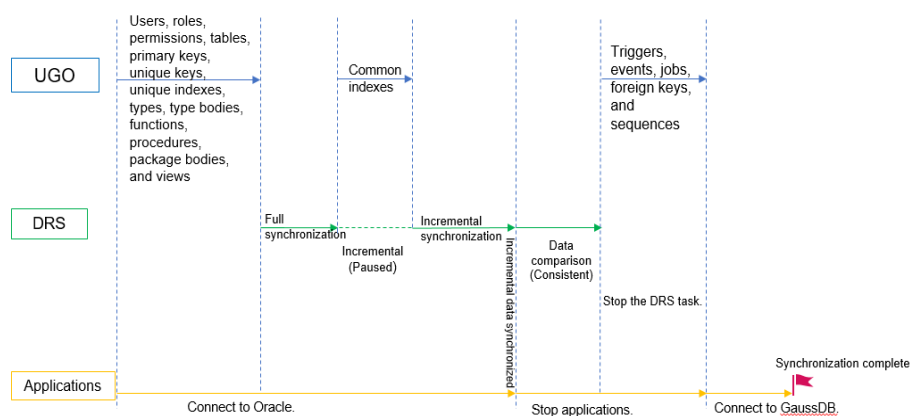
- With the rapid increase of enterprise workloads, traditional databases have poor scalability and distributed databases are required.
- Building traditional databases require purchasing and install servers, systems, databases, and other software. Its O&M is expensive and difficult.
- The performance of complex queries for traditional databases is poor.

- It is hard for traditional databases to smoothly synchronize data with no downtime.

## Migration Principles

In this practice, UGO is used to migrate heterogeneous database schemas, and DRS is used to only synchronize data. The principles are as follows:

1. UGO is used to synchronize basic objects.
2. DRS is used to perform full synchronization and suspend the task after the task enters the incremental phase.
3. UGO is used to synchronize common indexes.
4. DRS is used to resume incremental synchronization. After data is synchronized, stop services on the source end for data comparison to ensure data consistency. Then, you need to stop the DRS task.
5. Finally, UGO is used to migrate triggers, events, jobs, foreign keys, and sequences, and services are migrated to GaussDB.



## Service List

- Virtual Private Cloud (VPC)
- GaussDB
- Database and Application Migration UGO (UGO)
- Data Replication Service (DRS)
- Data Admin Service (DAS)

## Notes on Usage

- The resource planning in this document is for demonstration only. Adjust it as needed.
- The end-to-end test data in this document is for reference only.
- Full synchronization is used to migrate data. Incremental synchronization is used to synchronize data between the source and destination databases in real time.

## Prerequisites

- You have registered with Huawei Cloud and completed account authentication.
- Your account balance is greater than or equal to \$0 USD.
- You have set up an on-premises Oracle database for testing.
- You have obtained the IP address, port number, account, and password of the Oracle database to be migrated.

## 4.6.2 Resource Planning

**Table 4-23** Resource planning

| Category | Subcategory      | Planned Value    | Remarks                                                                                                                                                                                              |
|----------|------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VPC      | VPC name         | vpc-src-172      | Customize a name for easy identification.                                                                                                                                                            |
|          | Region           | Test region      | For low network latency and quick resource access, select the region nearest to you.                                                                                                                 |
|          | AZ               | AZ3              | -                                                                                                                                                                                                    |
|          | Subnet           | 172.16.0.0/16    | Select a subnet with sufficient network resources.                                                                                                                                                   |
|          | Subnet name      | subnet-src-172   | Customize a name for easy identification.                                                                                                                                                            |
| Oracle   | Name             | orcl             | Customize a name for easy identification.                                                                                                                                                            |
|          | Specifications   | 16 vCPUs   32 GB | -                                                                                                                                                                                                    |
|          | Database version | 11.2.0.1         | -                                                                                                                                                                                                    |
|          | Database user    | test_info        | Customize a user. However, the user must have the following permissions during migration: CREATE SESSION, SELECT ANY TRANSACTION, SELECT ANY TABLE, SELECT ANY DICTIONARY, and EXECUTE_CATALOG_ROLE. |
| GaussDB  | Instance name    | gauss-b193-cent  | Customize a name for easy identification.                                                                                                                                                            |



| Category                               | Subcategory             | Planned Value                       | Remarks                                                                                                                                                             |
|----------------------------------------|-------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | Database version        | GaussDB 2.7 Enterprise Edition      | -                                                                                                                                                                   |
|                                        | Instance type           | Primary/Standby                     | In this example, a primary/standby instance is used.                                                                                                                |
|                                        | Deployment model        | Independent                         | -                                                                                                                                                                   |
|                                        | Transaction consistency | Strong consistency                  | -                                                                                                                                                                   |
|                                        | Storage type            | Ultra-high I/O                      | -                                                                                                                                                                   |
|                                        | AZ                      | AZ2                                 | Select a single AZ for the test. You are advised to select multiple AZs to improve instance availability in actual use.                                             |
|                                        | Instance specifications | General-enhanced II 8 vCPUs   64 GB | Select small specifications for the test. You are advised to configure specifications based on service requirements in actual use.                                  |
|                                        | Storage space           | 480G                                | Select a small storage space for the test. You are advised to configure storage space based on service requirements in actual use.                                  |
|                                        | Disk encryption         | Disable                             | In this example, disk encryption is disabled. Enabling disk encryption improves data security, but slightly affects the read and write performance of the database. |
| Logging in to the database through DAS | DB engine               | GaussDB                             | -                                                                                                                                                                   |
|                                        | Database source         | GaussDB                             | Select the GaussDB instance created in this example.                                                                                                                |

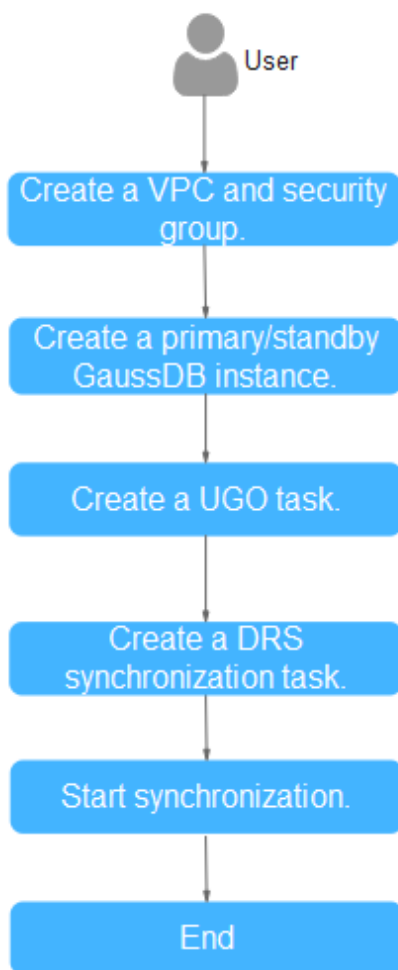
| Category           | Subcategory                 | Planned Value                 | Remarks                                                                                                  |
|--------------------|-----------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------|
|                    | Database name               | postgres                      | -                                                                                                        |
|                    | Username                    | root                          | -                                                                                                        |
|                    | Password                    | -                             | Password of the <b>root</b> user of the GaussDB instance created in this example                         |
| UGO migration task | Database evaluation project | Oracle-Centralized            | Customize a name for easy identification.                                                                |
|                    | Object migration project    | Oracle-GaussDB-Centralized    | Customize a name for easy identification.                                                                |
|                    | Source DB engine            | Oracle 11g                    | -                                                                                                        |
|                    | Target DB engine            | GaussDB Primary/Standby - 2.8 | -                                                                                                        |
|                    | Network type                | Public Network                | Select the public network for the test.                                                                  |
| DRS migration task | Migration task name         | DRS-test-info                 | Customize a name for easy identification.                                                                |
|                    | Destination database name   | test_database_info            | Customize a name for easy identification, but the name must be compatible with the Oracle database name. |
|                    | Source DB engine            | Oracle                        | -                                                                                                        |
|                    | Destination DB engine       | GaussDB Centralized           | -                                                                                                        |

| Category | Subcategory  | Planned Value | Remarks                                 |
|----------|--------------|---------------|-----------------------------------------|
|          | Network type | Public        | Select the public network for the test. |

### 4.6.3 Operation Process

Figure 4-32 shows the main operation flowchart.

Figure 4-32 Flowchart



## 4.6.4 Preparations

### Permissions Required for UGO

- The permission check for the source database must be passed. [Table 4-24](#) lists the permissions that need to be checked when the source database type is Oracle.

**Table 4-24** Required checks

| Checked Item   | Description                                                                                                                       | Mandatory                                                                                                                                                                |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DBMS_METADATA  | Permission to retrieve metadata from the Oracle database dictionary. This permission is used to obtain the DDL of schema objects. | Yes                                                                                                                                                                      |
| Dynamic View   | Permission to access various dynamic performance views. This permission is used to obtain basic database information.             | Yes                                                                                                                                                                      |
| Schema Objects | Permission to check schema objects to be evaluated. At least one object needs to be evaluated.                                    | Yes                                                                                                                                                                      |
| DBA            | DBA permission required for subsequent operations.                                                                                | No<br>If <b>Check Result</b> is <b>Alarm</b> , some objects could not be collected because of permissions, but the evaluation project can still be created successfully. |

- When connecting to the target database, you must have the permissions needed to create, delete, and modify databases objects, such as schemas, tables, programs, indexes, users, functions, and views.
- You have the permissions needed to create an evaluation project. For details, see [Permission Management](#).

For more information about permissions required for UGO, see [Here](#).

### Permissions Required for DRS

- The permissions required by DRS for connecting to the Oracle database must meet the following requirements to ensure smooth data synchronization:

- Full synchronization requires the following permissions: CREATE SESSION, SELECT ANY DICTIONARY, and SELECT for a single table (GRANT SELECT ON <userName.tbName> to drsUser).
- Full+incremental synchronization and incremental synchronization:
  - Oracle 12c or later in tenant mode:

To synchronize a container database (CDB) of Oracle 12c or later, you must have the following permissions: CREATE SESSION, SELECT ANY DICTIONARY, SELECT for a single table (GRANT SELECT ON <userName.tbName> to drsUser), EXECUTE\_CATALOG\_ROLE, SELECT ANY TRANSACTION, and LOGMINING.

To synchronize a pluggable database (PDB) of Oracle 12c or later, you must have the following permissions: CREATE SESSION, SELECT ANY DICTIONARY, SELECT for a single table (GRANT SELECT ON <userName.tbName> to drsUser), EXECUTE\_CATALOG\_ROLE, SELECT ANY TRANSACTION, LOGMINING, and CREATE SESSION, SELECT ANY DICTIONARY, EXECUTE\_CATALOG\_ROLE, SELECT ANY TRANSACTION, LOGMINING and SET CONTAINER (GRANT SET CONTAINER TO <userName> CONTAINER=ALL) permissions for a CDB.
  - Oracle 12c or later in non-tenant mode:

You must have the following permissions: CREATE SESSION, SELECT ANY DICTIONARY, SELECT for a single table (GRANT SELECT ON <userName.tbName> to drsUser), EXECUTE\_CATALOG\_ROLE, SELECT ANY TRANSACTION, and LOGMINING.
  - To synchronize a database of Oracle 11g or earlier, you must have the following permissions: CREATE SESSION, SELECT ANY DICTIONARY, SELECT for a single table (GRANT SELECT ON <userName.tbName> to drsUser), EXECUTE\_CATALOG\_ROLE, and SELECT ANY TRANSACTION.
- During incremental synchronization, enable PK, UI, or ALL supplemental logging for the source Oracle database at the database level or table level. If supplemental logging is enabled at table level, enable supplemental logging again after you rebuild or rename tables. During the synchronization, ensure that the preceding settings are always enabled.
- Oracle 12c or later does not support incremental synchronization using accounts whose ORACLE\_MAINTAINED is Y (except system/sys), because accounts with this attribute do not have the permission to parse logs.
- The permissions required by DRS for connecting to the GaussDB database must meet the following requirements to ensure smooth data synchronization:
  - Database-level permissions: Log in to the postgres base database as user **root** or user **DATABASE** with the Sysadmin role, and grant the CREATE and CONNECT permissions to user **DATABASE**.

Statement: **GRANT CREATE, CONNECT ON DATABASE <database> TO <user>**

- Schema-level permissions: Log in to the database as user **root** or user **DATABASE** with the Sysadmin role, or the owner of the database, and grant the CREATE and USAGE permissions of the schema to the user.  
Statement: **GRANT CREATE, USAGE ON SCHEMA <schema> TO <user>**
- Table-level permissions: Log in to the database as user **root** or user **DATABASE** with the Sysadmin role, or the owner of the database, and grant the DML permission for tables in the schema to the user. (The SELECT permission is required only for tables without primary keys.)  
Statement for granting the DML permission on all tables in the schema: **GRANT SELECT, UPDATE, INSERT, DELETE, INDEX, ALTER ON ALL TABLES IN SCHEMA <schema> TO <user>**  
Statement for granting the DML permission on a specified table in the schema: **GRANT SELECT, UPDATE, INSERT, DELETE, INDEX, ALTER ON TABLE <schema.table> TO <user>**

For more information about permissions required for DRS, see [Here](#).

## Network Settings


Plan the network properly to ensure that the source Oracle database can be accessed by UGO and DRS.

### 4.6.5 Creating a VPC and Security Group

Create a VPC and security group for a GaussDB instance.

#### Creating a VPC

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** Click **Create VPC**.

Basic Information


Region


Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Name

IPv4 CIDR Block

Recommended: [10.0.0.0/8-24 \(Select\)](#) [172.16.0.0/12-24 \(Select\)](#) [192.168.0.0/16-24 \(Select\)](#)

 The CIDR block 192.168.0.0/16 overlaps with a CIDR block of another VPC in the current region. If you intend to enable communication between VPCs or between a VPC and an on-premises data center, change the CIDR block. [View VPC CIDR blocks in current region](#)

Enterprise Project  [Create Enterprise Project](#) 

---

Advanced Settings ▾ Tag | Description

### Default Subnet

AZ

AZ3



Name

subnet-1d4e

CIDR Block

192

· 168

· 0

· 0

/ 24



Available IP Addresses: 251

The CIDR block cannot be modified after the subnet has been created.

Associated Route Table

Default



Advanced Settings



Gateway



DNS Server Address



DHCP Lease Time



Tag



Description

**Step 5** Configure parameters as needed and click **Create Now**.


**Step 6** Return to the VPC list and check whether the VPC is created.

When its status becomes available, the VPC is created.

----End

## Creating a Security Group

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** In the navigation pane, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Configure parameters as needed.

✕

### Create Security Group

\* Name

\* Enterprise Project  [Create Enterprise Project](#) ?

\* Template

Description 

The security group is for general-purpose web servers and includes default rules that allow all inbound ICMP traffic and inbound traffic on ports 22, 80, 443, and 3389. The security group is used for remote login, ping, and hosting a website on ECSs.

 0/255

[Show Default Rule](#) ▼

**Step 7** Click **OK**.

**Step 8** Return to the security group list and click the security group name (**sg-01** in this example).

**Step 9** Click the **Inbound Rules** tab, and then click **Add Rule**.

Summary **Inbound Rules** | Outbound Rules | Associated Instances

Inbound Rules: 9 [Learn more about security group configuration.](#)

**Step 10** Configure an inbound rule, add the IP address of the source database, and click **OK**.

✕

#### Add Inbound Rule

ℹ If you select IP address for Source, you can enter multiple IP addresses in the same IP address box. Each IP address represents a different security group rule.

Security Group `defined_security_group`

You can import multiple rules in a batch.

| Type                              | Protocol & Port ?                                                                                   | Source ?                                                                        | Description          | Operation                                          |
|-----------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------|----------------------------------------------------|
| <input type="text" value="IPv4"/> | <input type="text" value="Protocols/TCP (Custo..."/><br><small>Example: 22 or 22,24 or 22-3</small> | <input type="text" value="IP address"/><br><input type="text" value="0.0.0.0"/> | <input type="text"/> | <a href="#">Replicate</a>   <a href="#">Delete</a> |

⊕ Add Rule


----End



## 4.6.6 Creating a GaussDB Instance

This section describes how to create a GaussDB instance as the destination database.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Under the service list, choose **Databases > GaussDB**.

**Step 4** In the navigation pane on the left, choose **GaussDB > Instances**.

**Step 5** Click **Buy DB Instance**.

**Step 6** Configure the instance name and basic information.

**Step 7** Configure instance specifications.

Select small specifications for the test. You are advised to configure specifications based on service requirements in actual use.

**Step 8** Select a VPC and security group (created in [Creating a VPC and Security Group](#)) for the instance and configure the database port.

Relationship among VPCs, subnets, security groups, and DB instances

VPC

If you want to create a VPC, go to the [VPC console](#).

**Make sure there are enough private IP addresses available for future scale-ups. After the DB instance is created, the subnet cannot be changed. Available private IP addresses in the selected subnet: 240**

Security Group  [View Security Group](#)

Inbound: ICMP/--; TCP/20-21, 443, 10250, 10250, 30000-32767, 3389, 22; UDP/30000-32767, 4789 | Outbound: --  
In a security group, rules that authorize connections to DB instances apply to all DB instances associated with the security group.

Database Port

**Step 9** Configure password and other information.

Administrator

Administrator Password  Keep your password secure. The system cannot retrieve your password.

Confirm Password

---

Parameter Template  [View Parameter Template](#)

Enterprise Project  [Create Enterprise Project](#)

---

Tag It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. [View predefined tags](#)

You can add 20 more tags.

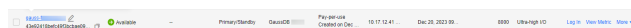
**Step 10** Click **Next**, confirm the information, and click **Submit**.

**Step 11** Go to the instance list.

If the instance status becomes available, the instance has been created.

**Step 12** Create a database in the destination GaussDB instance.

1. In the GaussDB instance list, locate the DB instance and click **Log In** in the **Operation** column.



2. In the displayed dialog box, enter the password and click **Test Connection**.
3. After the connection test is successful, click **Log In**.

**Instance Login Information**

DB Instance Name  DB Engine Version

\* Login Username

\* Database Name

\* Password

Remember Password Your password will be encrypted and stored securely.

Description

Collect Metadata Periodically

If not enabled, DAS can query the real-time structure information only from databases, which may affect the real-time performance of databases.

Show Executed SQL Statements

If not enabled, the executed SQL statements cannot be viewed, and you need to input each SQL statement manually.

4. After the login is successful, click **Create Database**, enter required information as needed, and click **OK**.

The screenshot shows the GaussDB console interface. At the top, there is a 'Home' tab and a header bar with the GaussDB logo, 'DB Instance Name: gauss-c1b3', and 'DB Engine Version: GaussDB'. Below this is a 'Database List' section with a '+ Create Database' button. A modal dialog titled 'Create Database' is open, featuring a close button (X) in the top right corner. The dialog contains the following fields and options:

- Name**: A required text input field with the placeholder 'Database Name'. Below it, a warning message states: 'Only user databases can be created'.
- Character Set**: A dropdown menu currently set to 'UTF8'.
- Template**: A dropdown menu currently set to 'template0'.
- Collation**: An empty text input field.
- Ctype**: An empty text input field.
- DBCOMPATIBILITY**: A dropdown menu currently set to 'Oracle'.

At the bottom of the dialog, there are two buttons: 'OK' and 'Cancel'.

5. Prepare permissions for logging in to GaussDB by referring to [Preparations](#).

----End

## 4.6.7 Creating a UGO Task

### 4.6.7.1 Creating a Database Evaluation Project

**Step 1** [Log in to the UGO console](#).

**Step 2** In the navigation pane on the left, choose **Schema Migration > DB Evaluation**.

**Step 3** Click **Create Project** in the upper right corner.

**Step 4** Read **Source Database Preparation and Authorization Tips** and click **Create**.

**Step 5** Configure the basic information.

After the basic information is configured, the **Test** button next to **Test Connection** is available.

**Step 6** Click **Test** next to the **Test Connection** field.

If the connection test succeeds, the **Next** button will be available.

If the connection test fails, the message "Unable to connect to DB" is displayed.

**Step 7** (Optional) Click **Test** next to **Network Stability**. A successful network stability test only means that there is little network latency or packet loss, or no packet loss at the current time. It takes 10s to 15s to complete.

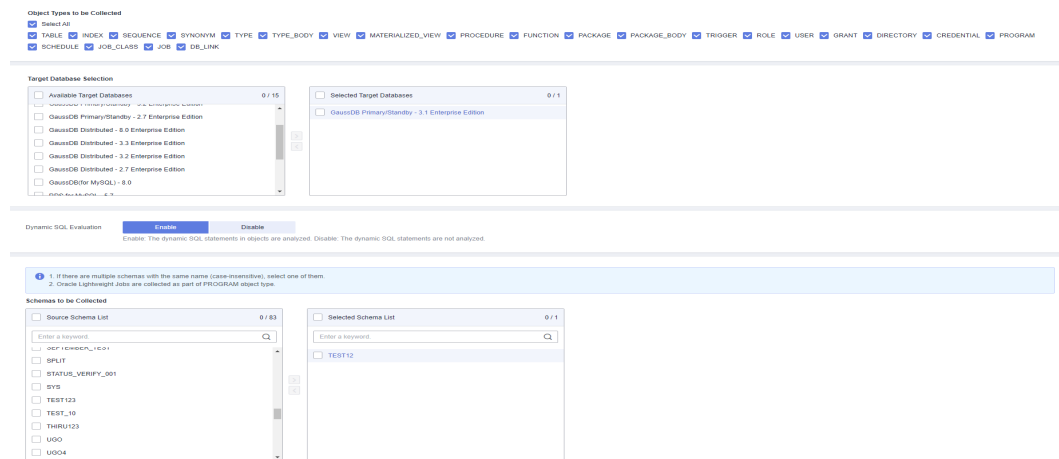
**Step 8** Click **Next** to go to the **Precheck** page.

The check result of each check item is displayed. You can also click **Recheck** to check the permissions again.

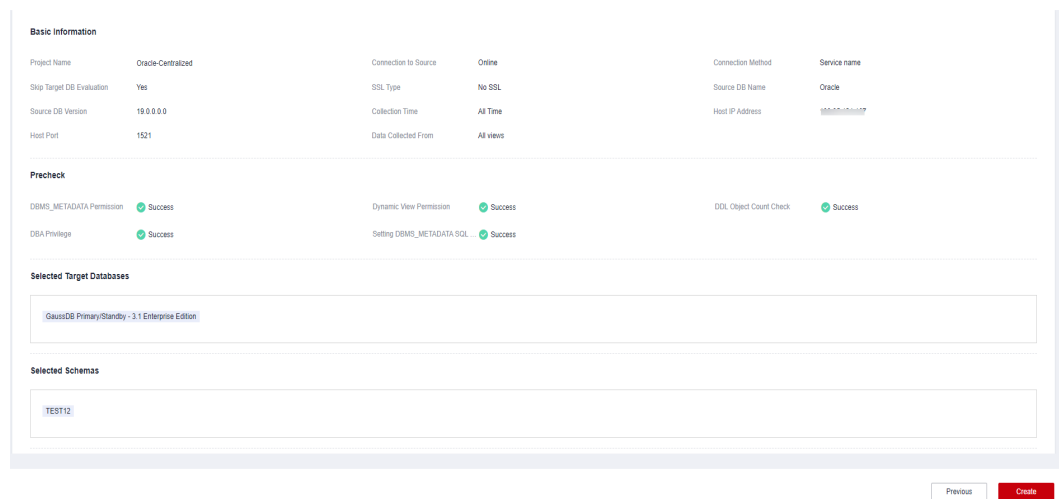
| No. | Check Item                                         | Description                                                                                                                                                             | Check Result |
|-----|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1   | DBMS_METADATA Permission                           | Permission check to retrieve metadata from the database dictionary as a user SYS to re-create the object                                                                | Success      |
| 2   | Dynamic View Permission                            | Checks select access to various Dynamic views                                                                                                                           | Success      |
| 3   | DDL Object Check                                   | Checks for all recent one System Check which have DDL objects to which can be accessed                                                                                  | Success      |
| 4   | DBA Privilege                                      | Check whether the user has the DBA permission. If the DBA permission check result is success, the evaluation object can be created successfully, but some objects in... | Success      |
| 5   | Setting DBMS_METADATA Schema Formatting Parameters | Check whether the user can use the SQL Formatting commands of DBMS_METADATA. If the check result is success, the evaluation object can be created successfully          | Success      |

**Step 9** After all check items are passed, click **Next** to go to the **Evaluation Scope Selection** page.

**Step 10** Select the object types to be collected, target database versions, and source database schemas.



**Step 11** Click **Next** to go to the **Confirmation** page.



**Step 12** Confirm the settings and click **Create**. A message is displayed, indicating that the project is created successfully.

**Step 13** Click **OK** to go to the **DB Evaluation** page. View the evaluation project you created in the list.

| SI No. | Project Name       | Connection Type | Project Status                           | Source DB Type | Created                    | Differential An... | SQL Size | Created By | Operation              |
|--------|--------------------|-----------------|------------------------------------------|----------------|----------------------------|--------------------|----------|------------|------------------------|
| 1      | Oracle-Centralized | Online          | In progress<br>Confirm Target DB Pending | Oracle         | Dec 20, 2023 10:36:07 G... | --                 | 630 B    | admin      | Trace Re-Evaluate More |

**Step 14** When **Project Status** is **In progress**. **Confirm Target DB Pending**, click **Confirm Target DB Pending**.

**Step 15** On the **Target DB Analysis** page, select **GaussDB Primary/Standby-2.7** (select target database as needed) as the target database, and click **Confirm DB Selection**.

**Step 16** In the displayed dialog box, click **Confirm**.

**Step 17** After the target database is confirmed, a dialog box is displayed. Click: **Create Now** to go to the page for migration project creation.

**Create Later** to stay on the current page.

----End

### 4.6.7.2 Creating an Object Migration Project

**Step 1** [Log in to the UGO console.](#)

**Step 2** In the navigation pane on the left, choose **Schema Migration > Object Migration**.

**Step 3** Click **Create Project** in the upper right corner.

**Step 4** Configure required information.

The screenshot shows the 'Basic Information' configuration page for creating an Object Migration Project. The page is divided into several sections:

- Project Name:** Oracle-GaussDB-Centralized
- Evaluation Project:** Oracle-Centralized (dropdown menu)
- Target DB:** GaussDB Primary/Standby
- Target DB Version:** 8.0 Enterprise Edition
- Host IP Address:** [Redacted] ?
- Host Port:** 4000
- DB Name:** ugo ?
- Username:** root ?
- Password:** [Redacted]
- Schemas to Migrate:**  Select all  
Select schemas to be collected by UGO from the source database.
- SSL Type:** No SSL (selected), SSL without authentication, One-way SSL  
If you do not select SSL, there may be potential security risks.
- Test Connection:** Test Connection button  
Test the connection between UGO and the target DB.  
Connection Status: ● Connected  
Database Version: GaussDB Primary/Standby 8.0 Enterprise Edition

**Step 5** Click **Test Connection**.

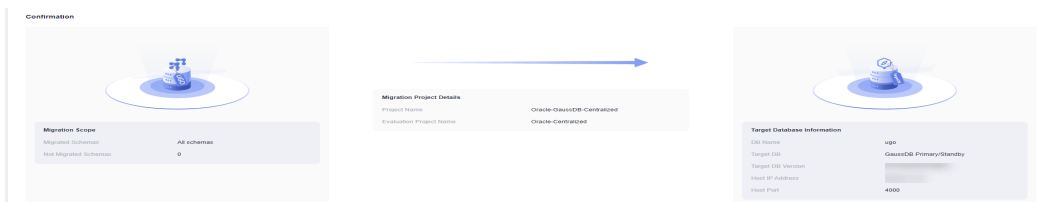
If the connection test is successful, the **Create** button is available.

If the connection test fails, an error message is displayed.

**Step 6** Click **Next** to go to the **Precheck** page.



**Step 7** After the pre-check items are passed, click **Next** in the lower right corner to confirm the settings.



**Step 8** Confirm the settings and click **Create**. On the object migration list page, view that the **Project Status** of the project is **Ready**.

| SI No. | Project Name   | Evaluation Project | Project Status | Target DB Type                             | Created                         | Created By | Operation                                    |
|--------|----------------|--------------------|----------------|--------------------------------------------|---------------------------------|------------|----------------------------------------------|
| 1      | Oracle-Class01 | Oracle-Cent0102    | Ready          | GaussDB Primary/Standby Enterprise Edition | Dec 20, 2023 11:21:00 GMT+08:00 | admin      | Migrate, Change Target DB Connection, Delete |

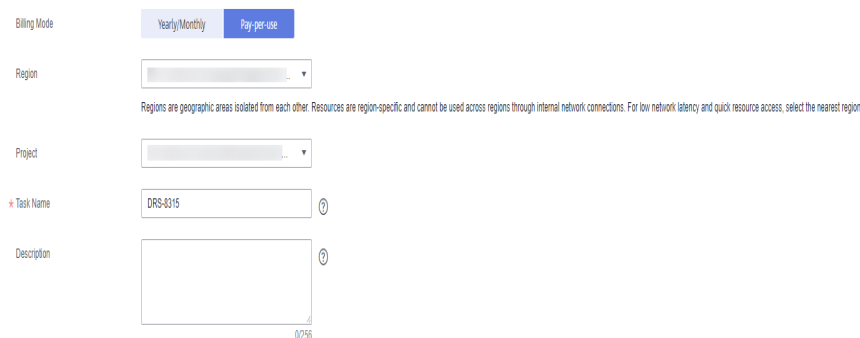
----End

## 4.6.8 Creating a DRS Task

This section describes how to create a DRS task. Before creating a DRS task, you need to understand the prerequisites, suggestions, and precautions. For details, see [Precautions](#).

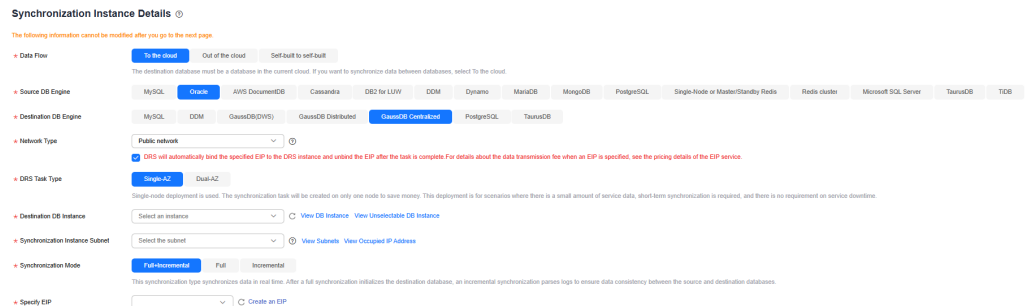
### Procedure

- Step 1** Log in to the [management console](#).
- Step 2** Click in the upper left corner and select a region.  
Select the region where the destination instance is deployed.
- Step 3** Under the service list, choose **Databases > Data Replication Service**.
- Step 4** In the navigation pane on the left, choose **Data Synchronization Management**.  
On the displayed page, click **Create Synchronization Task**.
- Step 5** Configure synchronization instance information.
  1. Select a region, and project, and enter a task name.



- Specify **Data Flow, Source DB Engine, Destination DB Engine, Network Type, Destination DB Instance, Synchronization Instance Subnet** (optional), **Synchronization Mode, Specifications, AZ, and Tags** (optional).

Figure 4-33 Synchronization instance details



- Click **Create Now** and wait until the task status changes to **Configuring**.

| Task Name | Status      | Detail | DB Engine | Created                         | Created By | Operation                                    |
|-----------|-------------|--------|-----------|---------------------------------|------------|----------------------------------------------|
| Task Name | Configuring |        | MySQL     | Dec 20, 2023 11:21:00 GMT+08:00 | admin      | Migrate, Change Target DB Connection, Delete |

----End

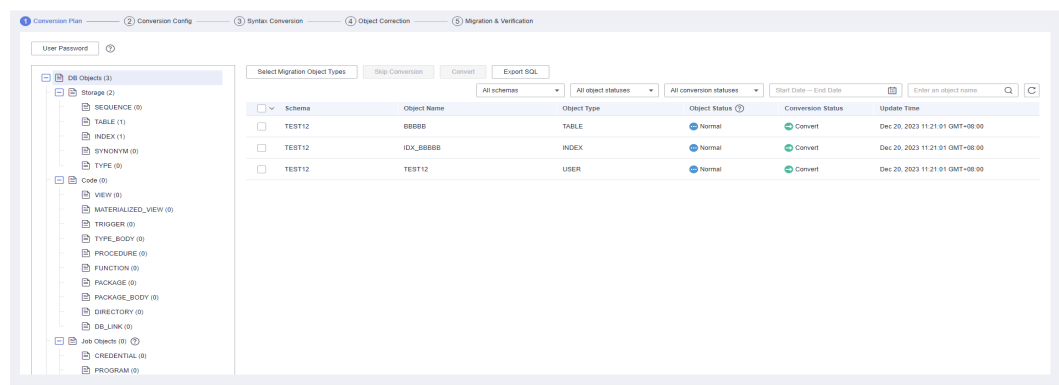
## 4.6.9 Starting Synchronization

### 4.6.9.1 UGO Schema Migration Phase 1: Tables, Primary Keys, Unique Keys/Indexes

- On the **Object Migration** page, locate the project that you created in **Creating an Object Migration Project** and click **Migrate** in the **Operation** column.

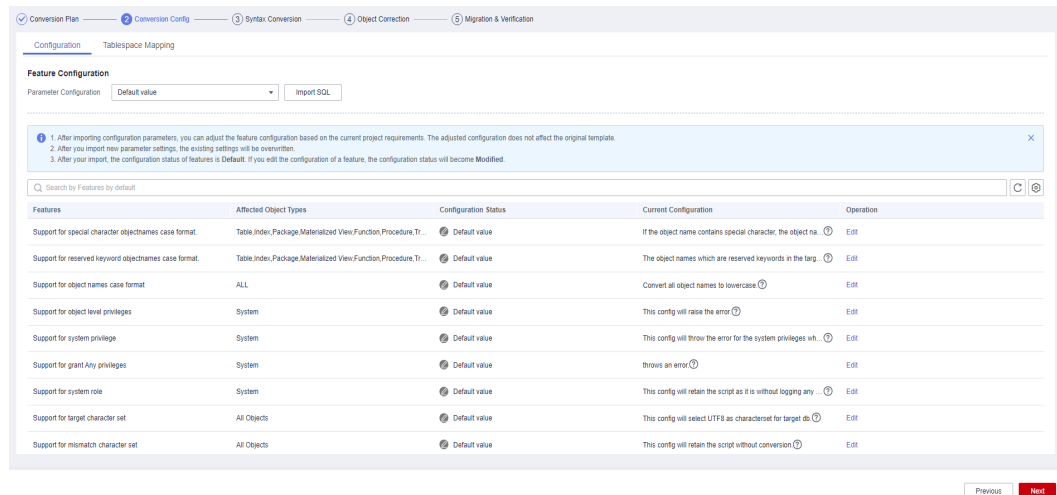
| SI No. | Project Name  | Evaluation Project | Project Status | Target DB Type                             | Created                         | Created By | Operation                                    |
|--------|---------------|--------------------|----------------|--------------------------------------------|---------------------------------|------------|----------------------------------------------|
| 1      | Oracle-Clauss | Oracle-Centralized | Ready          | GaussDB Primary/Standby Enterprise Edition | Dec 20, 2023 11:21:00 GMT+08:00 | admin      | Migrate, Change Target DB Connection, Delete |

- On the **Conversion Plan** page, the collection objects and types for the project are displayed.

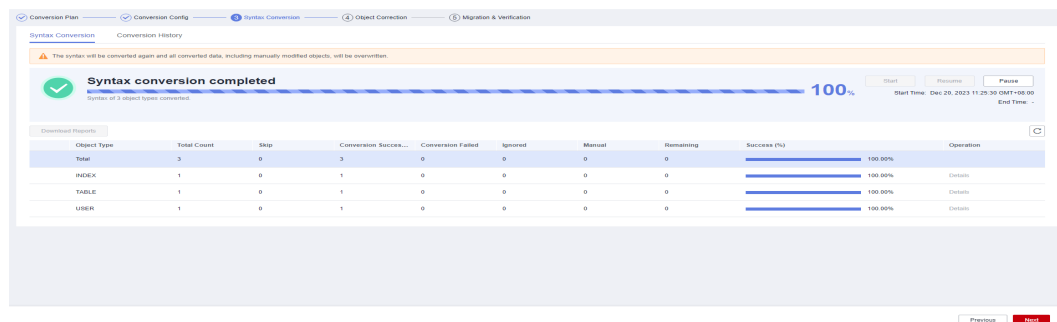


- Click **Next** to go to the **Conversion Config** page. Locate a feature and click **Edit** in the **Operation** column.

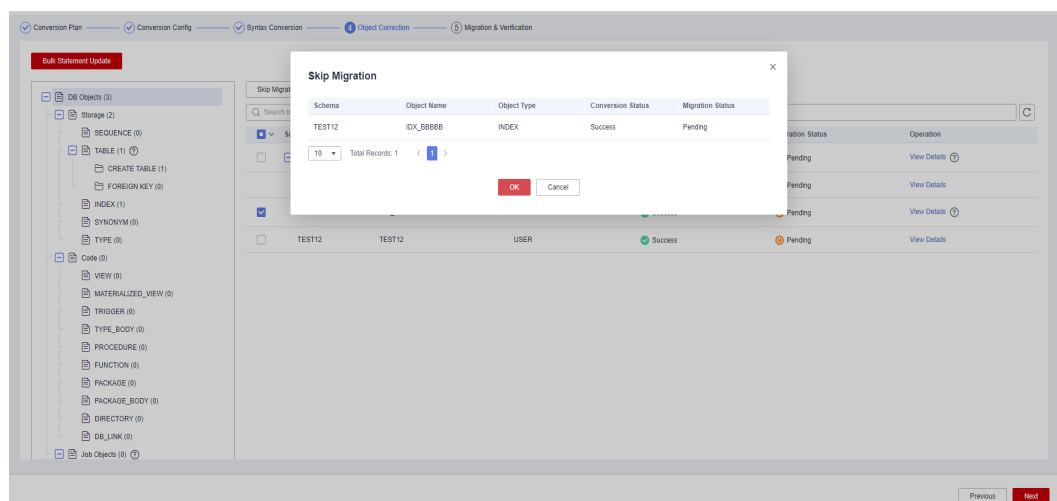




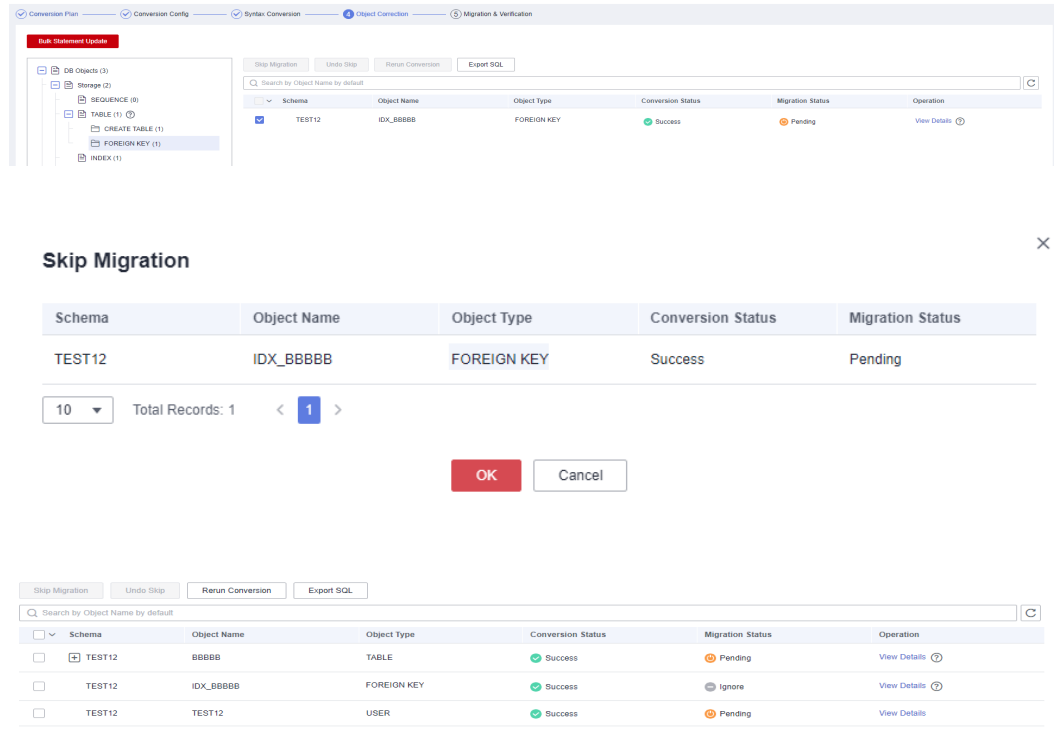
**Step 4** Click **Next** to go to the **Syntax Conversion** page. Click **Start** to convert the syntax.



**Step 5** Click **Next** to go to the **Object Correction** page. Select the objects to be skipped. In this phase, users, roles, permissions, tables, primary keys, unique keys, unique indexes, types, type bodies, functions, procedures, package bodies, and views can be migrated. You need to select objects that are not migrated and click **Skip Migration**.



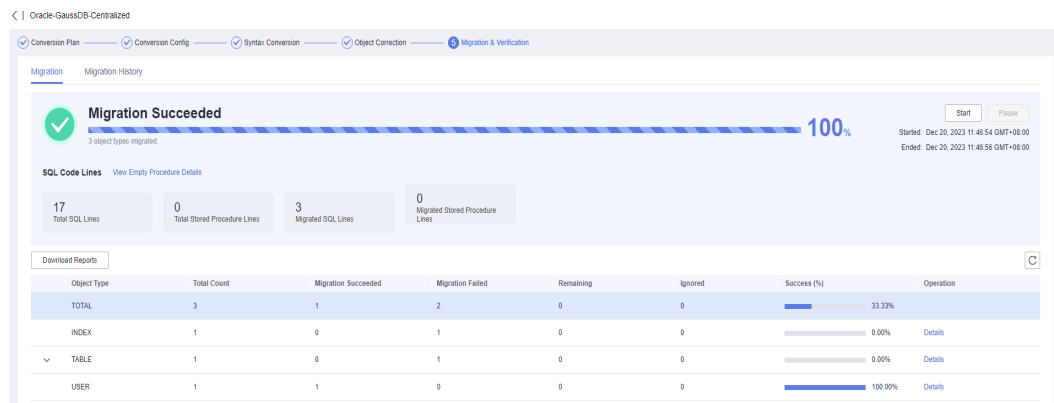
For example, if the target database supports foreign keys, you can skip migrating them. In the object tree on the left, click **FOREIGN KEY**, select the FOREIGN KEY objects on the right, and click **Skip Migration**.



**Step 6** Click **Next** to go to the **Migration & Verification** page. Click **Start** on the right to start the migration. Ensure that all objects except ignored objects are successfully migrated.

**NOTE**

Do not click **Finish** in the lower right corner because other objects need to be migrated later.



----End

### 4.6.9.2 DRS Synchronization Phase 1: Full Synchronization

**Step 1** Select the full+incremental task created in section **Creating a DRS Task** and configure source and destination database information.

1. Enter the IP address, port number, username, and password of the source database.

Click **Test Connection**.

**Source Database**

System databases, users, parameters, and jobs will not be migrated. You need to manually import users and jobs to the destination database and configure parameters in parameter templates of the destination database.

Database Type: Self-built on ECS

VPC: vpc-src View VPC

Subnet: subnet- View Subnets

IP Address or Domain Name: [input field]

Port: [input field]

Database Service Name: ord Service Name

PDB Name: [input field]

Database Username: [input field]

Database Password: [password field]

SSL Connection: [checkbox]

Test Connection

2. Enter the username and password of the destination database.

Click **Test Connection**.

**Destination Database**

DB Instance Name: [input field]

Database Username: [input field]

Database Password: [password field]

Test Connection Test successful

3. Click **Next**. In the displayed box, read the message carefully and click **Agree**.

**Notice**

I acknowledge that the IP addresses, domain names, ports, usernames, and passwords of involved databases will be temporarily collected and used in this task. These items will be deleted after the task is deleted.

Agree Cancel

**Step 2** Set the synchronization task.

1. Select the databases and tables of the source database to be synchronized. In this practice, all tables in **test** are selected.

Flow Control: Yes No

Synchronize DDLs: Default Custom

Synchronization Object: Tables Import object file

Select All

|                          |                               |          |
|--------------------------|-------------------------------|----------|
| <input type="checkbox"/> | AUTO_DM12ORACLE_RETRY         | database |
| <input type="checkbox"/> | AUTO_DRS_MULTITABLES01000     | database |
| <input type="checkbox"/> | AUTO_DRS_MULTITABLES05000     | database |
| <input type="checkbox"/> | AUTO_DRS_MULTITABLES10000     | database |
| <input type="checkbox"/> | AUTO_DRS_MULTITABLES50000     | database |
| <input type="checkbox"/> | AUTO_DRS_NCLOB                | database |
| <input type="checkbox"/> | AUTO_DRS_ORA                  | database |
| <input type="checkbox"/> | AUTO_ORACLE2DDM_DB_1          | database |
| <input type="checkbox"/> | AUTO_ORACLE2DDM_NORMAL        | database |
| <input type="checkbox"/> | AUTO_RESTART_BUG2023011203312 | database |
| <input type="checkbox"/> | A_SYNC_FULL_RESET_001         | database |
| <input type="checkbox"/> | A_SYNC_FULL_RETRY_001         | database |
| <input type="checkbox"/> | BAICHAO                       | database |

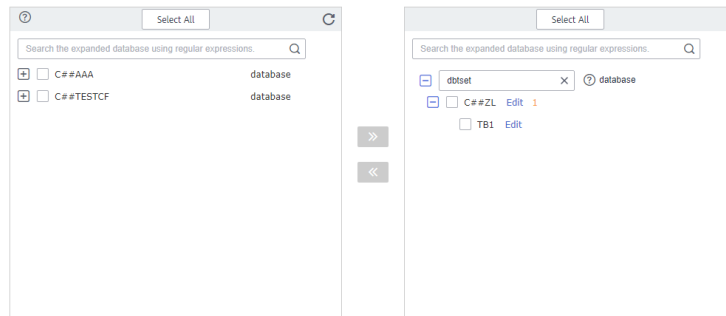
Select All

Search the expanded database using regular expressions

database

AUTO\_DRS\_STRESS Edit

2. Locate the database and table, respectively, and click **Edit** to change the database name and table name.



3. Click **Next**.

**Step 3** On the **Advanced Settings** page, in the **Full Synchronization Settings** area, only select **Data** for **Synchronization Object Type**.

### Full Synchronization Settings

\* Synchronization Object Type  Table structure  Data  Index(Normal index, cannot contain primary keys, unique keys or foreign keys)

Check this if you need to migrate the table structure.

\* Stream Mode  ?

\* Concurrent Task Configuration  ?

\* Concurrent Export Tasks  ?

\* Concurrent Import Tasks  ?

\* Import Mode

\* Rows per Shard  ?

\* Character Adapt for Structure Migration  Auto adapt the character length  Keep the character length in the original database ?

### Incremental Data Capture Settings

\* Concurrent Log Capture Tasks  ?

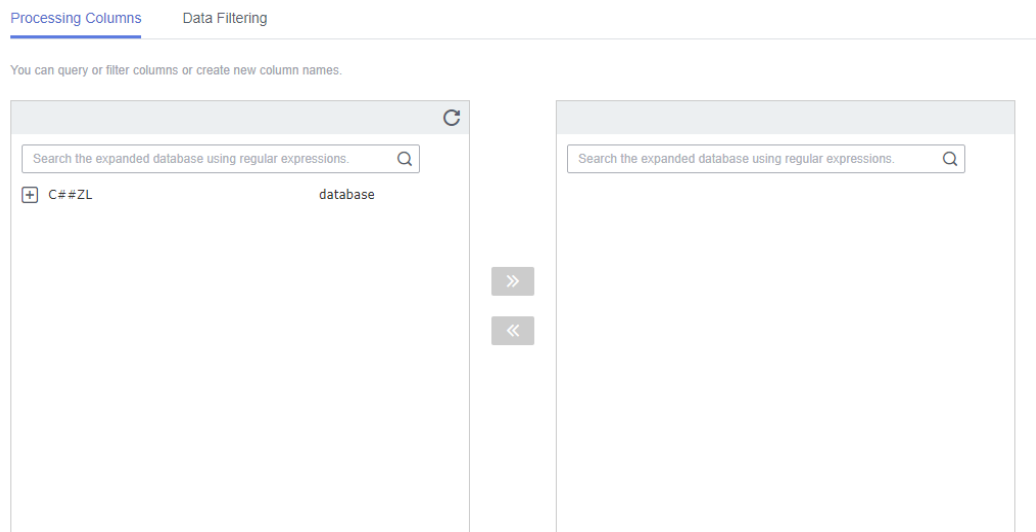
### Incremental Replay Settings

\* Concurrent Replay Tasks  ?

\* Replay Policy

\* Conflict Policy

**Step 4** (Optional) Process data based on the site requirements.



**Step 5** After all settings are complete, perform a pre-check to ensure that the synchronization is successful. If any check fails, review the cause and rectify the fault. Then, click **Check Again**.

If all check items are successful, click **Next**.

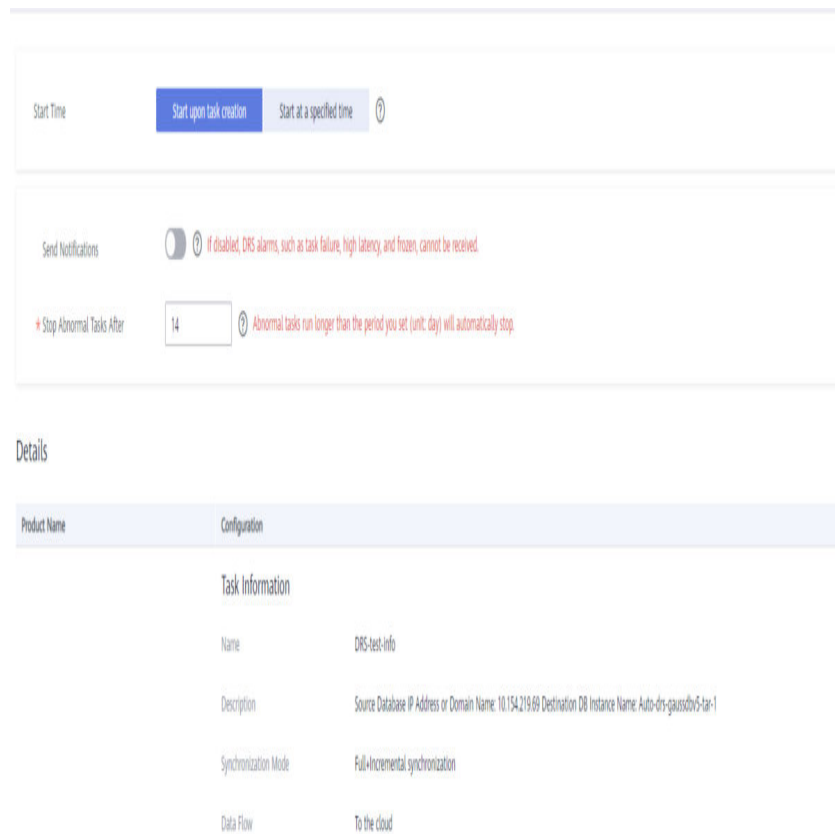
Check Again

Check success rate  100% All checks must pass before you can continue. If any check requires confirmation, check and confirm the results before proceeding to the next step.

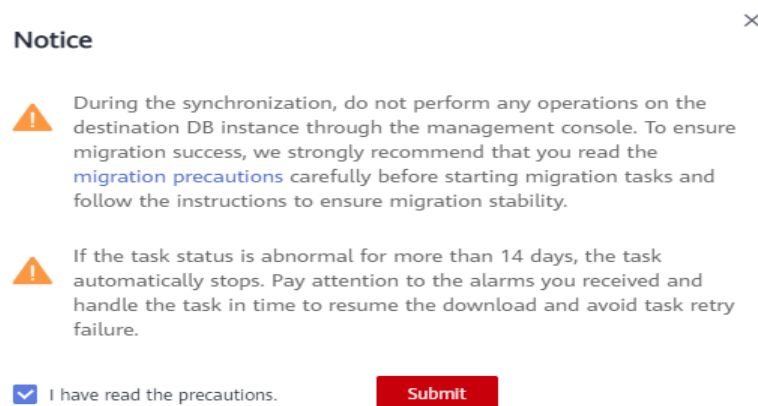
| Check Item                                                                                | Check Result |
|-------------------------------------------------------------------------------------------|--------------|
| <b>Database parameters</b>                                                                |              |
| Whether the source database contains unsupported table field types                        | Passed       |
| Whether the destination database is compatible with the source database                   | Passed       |
| Whether the character set of the source database matches that of the destination database | Passed       |
| Whether the destination database has sufficient available connections                     | Passed       |
| Whether the selected objects exist in the destination database                            | Passed       |
| Whether the destination database contains the configured databases                        | Passed       |
| Whether there are source database foreign keys                                            | Passed       |
| Whether tables to be migrated contain primary keys                                        | Passed       |
| Whether existing data meets the constraints                                               | Passed       |
| Whether the source database character set is supported                                    | Passed       |
| Whether the source database has sufficient available connections                          | Passed       |
| Whether the source database container type is correct                                     | Passed       |
| Whether archive logs are enabled on the source database                                   | Passed       |
| Whether the source database name is valid                                                 | Passed       |
| Whether the supplementary log is enabled for the source database.                         | Passed       |
| Whether OGG log reading is enabled on the source database                                 | Passed       |
| Whether the source database table name is valid                                           | Passed       |

**Step 6** Confirm the task.

1. Check whether all configured information is correct.



2. Click **Submit**. In the display box, select **I have read the precautions**.
3. Click **Submit**.

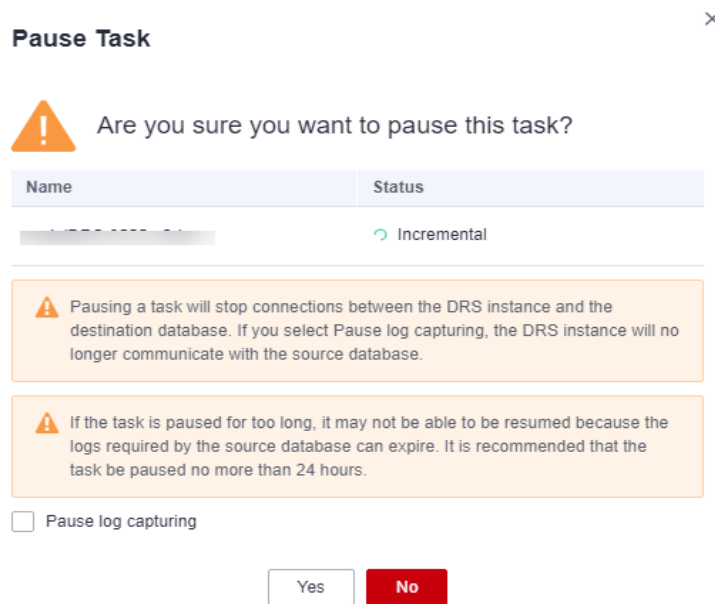


**Step 7** After the task is submitted, view and manage it.

1. After the task is created, return to the task list to view the task status. After the status changes to **Incremental**, click **Pause**.



2. In the displayed dialog box, deselect **Pause log capturing** and click **Yes**.



3. The DRS task enters the **Paused** state.



----End

### 4.6.9.3 UGO Schema Migration Phase 2: Common Indexes

**Step 1** Select the task in **UGO Schema Migration Phase 1: Tables, Primary Keys, Unique Keys/Indexes**. On the **Object Correction** page, select the indexes to be migrated (or click **INDEX** in the object tree on the left and select displayed indexes on the right), and click **Undo Skip**. **Migration Status** of the selected indexes changes to **Manual**.

| Schema | Object Name | Object Type | Conversion Status | Migration Status | Operation    |
|--------|-------------|-------------|-------------------|------------------|--------------|
| TEST12 | BBBBB       | TABLE       | Manual            | Manual           | View Details |
| TEST12 | IDX_BBBBB   | INDEX       | Manual            | Manual           | View Details |
| TEST12 | TEST12      | USER        | Success           | Success          | View Details |

**Step 2** Click **Next** to go to the **Migration & Verification** page. Click **Start** to migrate indexes.

Ensure that all indexes are successfully migrated.

**NOTE**

Do not click **Finish** in the lower right corner because other objects need to be migrated later.

| Object Type | Total Count | Migrate Succeeded | Migration Failed | Remaining | Ignored | Success (%) | Operation |
|-------------|-------------|-------------------|------------------|-----------|---------|-------------|-----------|
| TOTAL       | 11          | 10                | 0                | 0         | 1       | 90.91%      |           |
| FUNCTION    | 1           | 1                 | 0                | 0         | 0       | 100.00%     | Details   |
| INDEX       | 2           | 2                 | 0                | 0         | 0       | 100.00%     | Details   |
| PROCEDURE   | 1           | 1                 | 0                | 0         | 0       | 100.00%     | Details   |
| TABLE       | 5           | 5                 | 0                | 0         | 0       | 100.00%     | Details   |

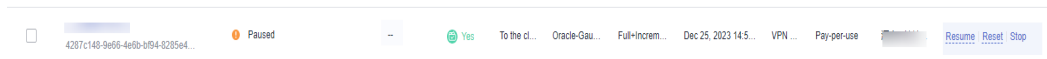
  

| Object Type  | Total Count | Migration Succeeded | Migration Failed | Remaining | Ignored | Success (%) | Operation |
|--------------|-------------|---------------------|------------------|-----------|---------|-------------|-----------|
| CREATE TABLE | 5           | 5                   | 0                | 0         | 0       | 100.00%     |           |
| FOREIGN KEY  | 1           | 0                   | 0                | 0         | 1       | 0.00%       |           |
| TRIGGER      | 1           | 0                   | 0                | 0         | 1       | 0.00%       | Details   |
| VIEW         | 1           | 1                   | 0                | 0         | 0       | 100.00%     | Details   |

----End

### 4.6.9.4 DRS Synchronization Phase 2: Incremental Synchronization

**Step 1** Locate the task paused in **DRS Synchronization Phase 1: Full Synchronization** and click **Resume** in the **Operation** column.



**Step 2** The task enters the incremental synchronization phase. If the incremental synchronization delay is less than 30s, all data is about to be synchronized. Disconnect the service system of the source Oracle database to ensure that no data is written to the source Oracle database. Wait for about 1 minute after the disconnection.



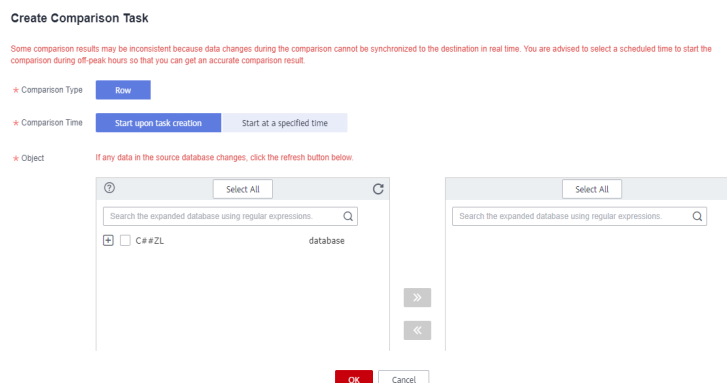
**Step 3** Compare data. Click the task name and choose **Synchronization Comparison**.

1. On the **Object-Level Comparison** tab, click **Compare** to compare synchronization objects in the source Oracle database and destination GaussDB database.

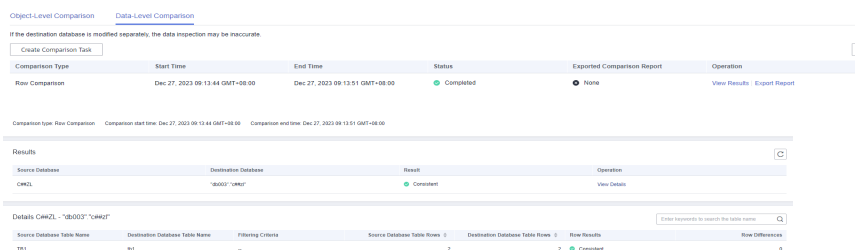
| Item     | Source Database | Destination Database | Result     | Operation    |
|----------|-----------------|----------------------|------------|--------------|
| Database | 1               | 1                    | Consistent | View Details |
| Table    | 1               | 1                    | Consistent | View Details |

2. On the **Data-Level Comparison** tab, click **Create Comparison Task**, select the tables whose rows to be compared, and click **OK**.





3. After the comparison task is complete, click **View Results** to view the row comparison details.

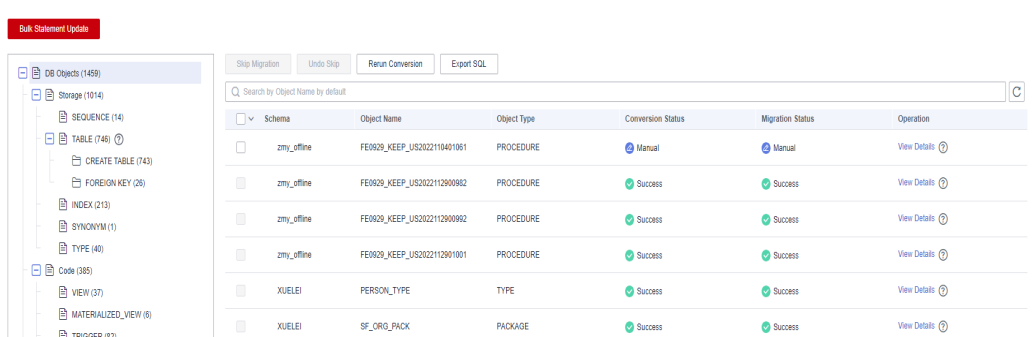


**Step 4** After confirming that the data is consistent in the source and destination databases, locate the task and click **Stop** in the **Operation** column to stop the DRS task.

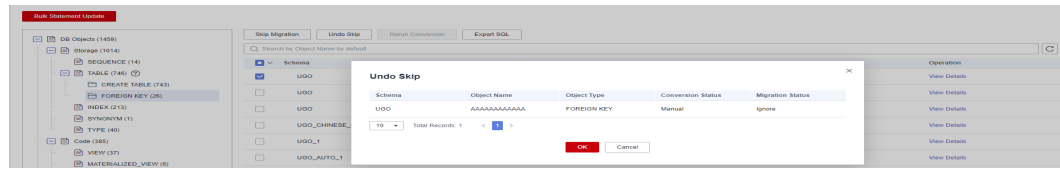
----End

### 4.6.9.5 UGO Schema Migration Phase 3: Triggers, Events, Tasks, Foreign Keys, and Sequences

**Step 1** Select the task in **UGO Schema Migration Phase 2: Common Indexes**. On the **Object Correction** page, select TRIGGER, EVENT, TASK, and FOREIGN KEY objects and click **Undo Skip**. **Migration Status** of the selected objects changes to **Manual**.



For FOREIGN KEY objects, select **FOREIGN KEY** in the object tree on the left and select displayed foreign keys on the right.



| Schema | Object Name  | Object Type | Conversion Status | Migration Status | Operation                    |
|--------|--------------|-------------|-------------------|------------------|------------------------------|
| UGO    | AAAAAAAAAAAA | FOREIGN KEY | Manual            | Manual           | <a href="#">View Details</a> |

**Step 2** Click **Next** to go to the **Migration & Verification** page. Click **Start** to migrate the selected objects.

| Object Type  | Total Count | Migration Succeeded | Migration Failed | Remaining | Ignored | Success (%) | Operation               |
|--------------|-------------|---------------------|------------------|-----------|---------|-------------|-------------------------|
| TOTAL        | 11          | 10                  | 0                | 0         | 1       | 90.91%      |                         |
| FUNCTION     | 1           | 1                   | 0                | 0         | 0       | 100.00%     | <a href="#">Details</a> |
| INDEX        | 2           | 2                   | 0                | 0         | 0       | 100.00%     | <a href="#">Details</a> |
| PROCEDURE    | 1           | 1                   | 0                | 0         | 0       | 100.00%     | <a href="#">Details</a> |
| TABLE        | 5           | 5                   | 0                | 0         | 0       | 100.00%     | <a href="#">Details</a> |
| CREATE TABLE | 5           | 5                   | 0                | 0         | 0       | 100.00%     |                         |
| FOREIGN KEY  | 1           | 1                   | 0                | 0         | 0       | 100.00%     |                         |
| TRIGGER      | 1           | 1                   | 0                | 0         | 0       | 100.00%     | <a href="#">Details</a> |
| VIEW         | 1           | 1                   | 0                | 0         | 0       | 100.00%     | <a href="#">Details</a> |

**Step 3** After the migration is successful, connect the service system to the target database GaussDB for data writing.

----End

## 4.7 From On-Premises Oracle to DDM

### 4.7.1 Overview

#### Description

You can use real-time synchronization of DRS to synchronize data from on-premises Oracle databases to Huawei Cloud DDM. Full+incremental synchronization can ensure that data is always in sync between the source Oracle database and the destination DDM instance.

#### Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is greater than or equal to \$0 USD.

#### Service List

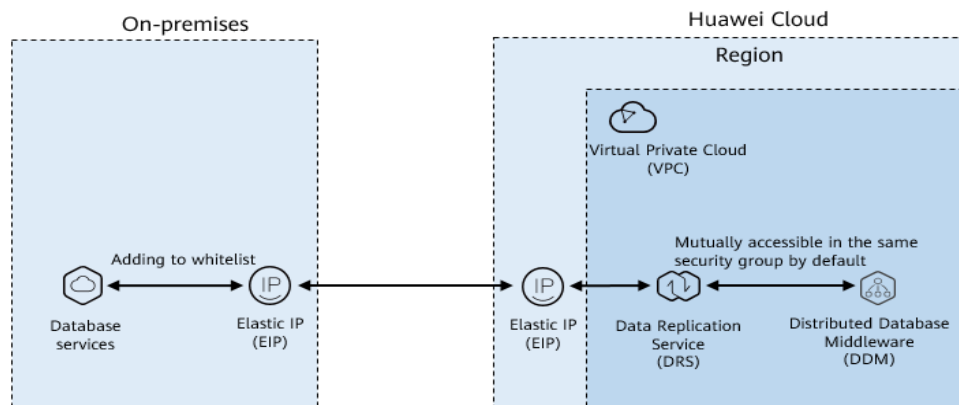
- Virtual Private Cloud (VPC)

- Distributed Database Middleware (DDM)
- Data Replication Service (DRS)
- Data Admin Service (DAS)

## Deployment Architecture

In this example, the source database is an on-premises Oracle database, and the destination database is a Distributed Database Middleware (DDM) instance on Huawei Cloud. DRS synchronizes data from the source database to the destination database through the public network. For details about the deployment architecture, see [Figure 4-34](#).

**Figure 4-34** Synchronizing data through the public network



## Before You Start

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- The test data is for reference only. For more information about DRS, click [here](#).

## 4.7.2 Resource Planning

**Table 4-25** Resource planning

| Category | Subcategory | Plan        | Description                                                         |
|----------|-------------|-------------|---------------------------------------------------------------------|
| VPC      | VPC name    | vpc-DRStar  | Specify a name that is easy to identify.                            |
|          | Region      | Test region | To achieve lower network latency, select the region nearest to you. |
|          | AZ          | AZ 3        | -                                                                   |

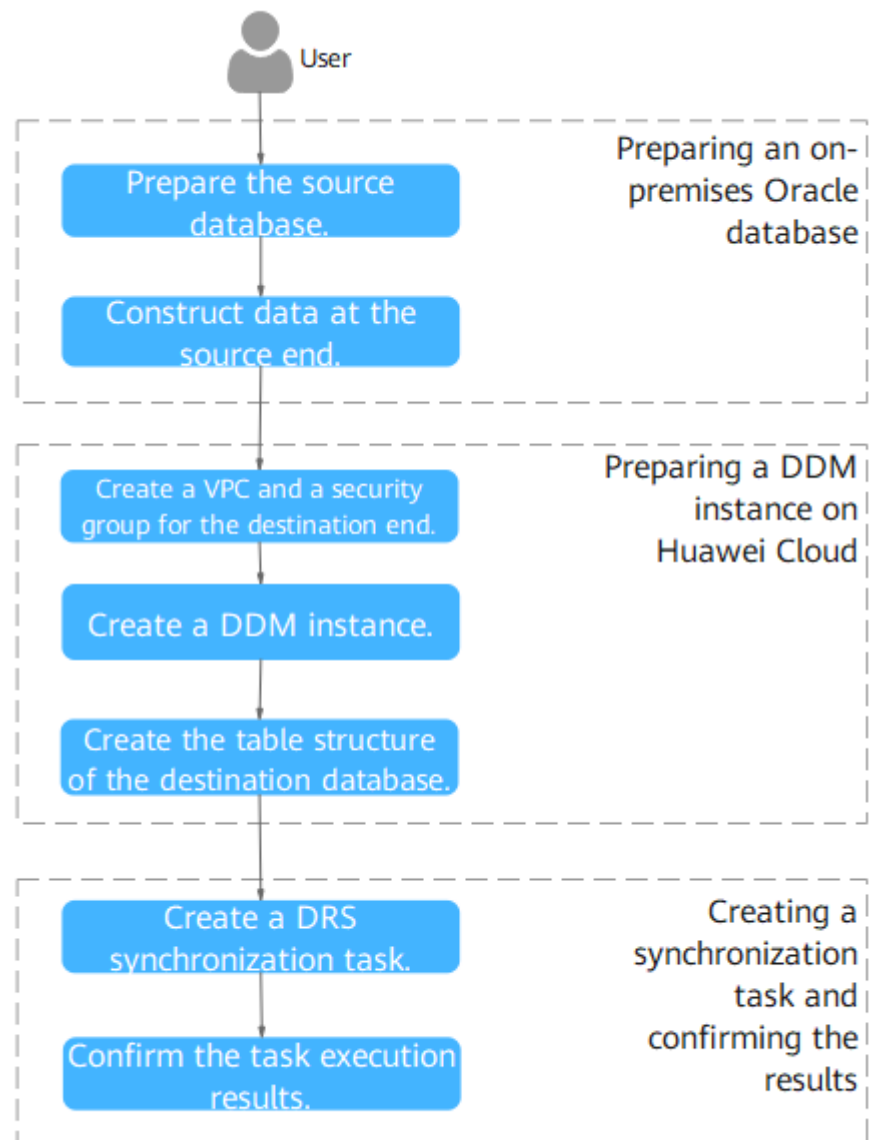
| Category                                      | Subcategory         | Plan                           | Description                                                                                                                 |
|-----------------------------------------------|---------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|                                               | Subnet              | 192.168.0.0/24                 | Select a subnet with sufficient network resources.                                                                          |
|                                               | Subnet name         | subnet-drs01                   | Specify a name that is easy to identify.                                                                                    |
| Oracle (source database)                      | Name                | orcl                           | Specify a name that is easy to identify.                                                                                    |
|                                               | Specifications      | 16vCPUs   32GB                 | -                                                                                                                           |
|                                               | Database version    | 11.2.0.1                       | -                                                                                                                           |
|                                               | Database user       | test_info                      | You can customize a user with the minimum permissions. For details, see <a href="#">here</a> .                              |
| DDM (destination database)                    | DDM instance name   | ddm-DRS-AUTOTEST-001           | Specify a name that is easy to identify.                                                                                    |
|                                               | Region              | Test region                    | To achieve lower network latency, select the region nearest to you.                                                         |
|                                               | AZ                  | AZ 3                           | You can select one or more AZs. You are advised to create the instance across different AZs to improve service reliability. |
|                                               | Node specifications | General-enhanced 4 vCPU   8 GB | -                                                                                                                           |
|                                               | Nodes               | 1                              | A single node has high availability risks. In practice, you are advised to create at least two nodes.                       |
| RDS instance associated with the DDM instance | RDS instance name   | rds_ddm01                      | Specify a name that is easy to identify.                                                                                    |
|                                               | Region              | Test region                    | To achieve lower network latency, select the region nearest to you.                                                         |
|                                               | Database version    | MySQL 5.7                      | -                                                                                                                           |

| Category                 | Subcategory               | Plan                           | Description                                                                                                                                                |
|--------------------------|---------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | Instance type             | Single                         | A single instance is used in this example.<br>To improve service reliability, select a primary/standby instance.                                           |
|                          | Storage type              | SSD                            | -                                                                                                                                                          |
|                          | AZ                        | AZ 3                           | A single instance is used in this example.<br>To improve service reliability, create a primary/standby RDS instance and then deploy them in different AZs. |
|                          | Specifications            | General-purpose 4 vCPUs   8 GB | -                                                                                                                                                          |
| DRS synchronization task | Synchronization task name | DRS-OracleToDDM                | Specify a name that is easy to identify.                                                                                                                   |
|                          | Source DB engine          | Oracle                         | In this example, the source database is an Oracle database.                                                                                                |
|                          | Destination DB engine     | DDM                            | In this example, the destination database is a DDM instance.                                                                                               |
|                          | Network type              | Public network                 | Public network is used in this example.                                                                                                                    |

### 4.7.3 Operation Process

**Figure 4-35** shows the process of creating a DDM instance and synchronizing data from an Oracle database to DDM.

Figure 4-35 Flowchart



#### 4.7.4 Preparing for the Source Oracle Database

Before the synchronization, prepare some data types in the source database for verification after the synchronization is complete.

The following table lists data types supported by DRS.

**Table 4-26** Data type mapping

| <b>Data Type (Oracle)</b>      | <b>Condition</b>               | <b>Data Type (DDM)</b>                 | <b>Whether to Support Mapping</b> |
|--------------------------------|--------------------------------|----------------------------------------|-----------------------------------|
| CHAR(n)                        | $n \leq 255$                   | CHAR(n)                                | Yes                               |
| CHAR(n)                        | $n > 255$                      | VARCHAR(n)                             | Yes                               |
| VARCHAR(Size)                  | Length (row size) $\leq 65535$ | VARCHAR(n)                             | Yes                               |
| VARCHAR(Size)                  | Length (row size) $> 65535$    | TEXT                                   | Yes                               |
| VARCHAR2(n)                    | -                              | VARCHAR(n)                             | Yes                               |
| NCHAR(n)                       | $n \leq 255$                   | NCHAR(n)                               | Yes                               |
| NCHAR(n)                       | $n > 255$                      | NVARCHAR(n)                            | Yes                               |
| NVARCHAR2(n)                   | -                              | NVARCHAR(n)                            | Yes                               |
| NUMBER(p,s)                    | $s > 0$                        | NUMBER(p,s)                            | Yes                               |
| NUMBER(p,s)                    | $s \leq 0$                     | NUMBER(p-s,0)                          | Yes                               |
| BINARY_FLOAT                   | -                              | FLOAT                                  | Yes                               |
| BINARY_DOUBLE                  | -                              | DOUBLE                                 | Yes                               |
| FLOAT(b)                       | $b \leq 99$                    | DECIMAL( $b*0.30103*2$ , $b*0.30103$ ) | Yes                               |
| FLOAT(b)                       | $b > 99$                       | DOUBLE                                 | Yes                               |
| DATE                           | -                              | DATETIME                               | Yes                               |
| TIMESTAMP                      | -                              | TIMESTAMP                              | Yes                               |
| TIMESTAMP WITH LOCAL TIME ZONE | -                              | TIMESTAMP                              | Yes                               |
| TIMESTAMP WITH TIME ZONE       | -                              | TIMESTAMP                              | Yes                               |
| INTERVAL                       | Incremental                    | VARCHAR(30)                            | No                                |
| INTERVAL                       | Full; 6 digit precision        | VARCHAR(30)                            | Yes                               |
| BLOB                           | -                              | LONGBLOB                               | Yes                               |
| CLOB                           | -                              | LONGTEXT                               | Yes                               |
| NCLOB                          | -                              | LONGTEXT                               | Yes                               |

| Data Type (Oracle) | Condition | Data Type (DDM) | Whether to Support Mapping |
|--------------------|-----------|-----------------|----------------------------|
| LONG               | -         | LONGTEXT        | Yes                        |
| LONG_RAW           | -         | LONGBLOB        | Yes                        |
| RAW                | -         | VARBINARY       | Yes                        |
| ROWID              | -         | VARCHAR(18)     | Yes                        |

Perform the following steps to generate data in the source database:

**Step 1** Use a database connection tool to connect to the source Oracle database based on its IP address.

**Step 2** Construct data in the source database based on its supported data types.

1. Create a test user.

```
create user test_info identified by xxx;
```

*test\_info* indicates the user created for the test, and *xxx* indicates the password of the user.

2. Assign permissions to the user.

```
grant dba to test_info;
```

3. Create a data table under the user.

```
CREATE TABLE test_info.table3(
ID INT,
COL01 CHAR(100),
COL02 NCHAR(100),
PRIMARY KEY(ID)
);
```

4. Insert two rows of data.

```
insert into test_info.table3 values(4,'huawei','xian');
insert into test_info.table3 values(2,'DRS-test','test1');
insert into test_info.table3 values(1,'huawei','xian');
```

5. Make the above statements take effect.

```
commit;
```

----End

## 4.7.5 Preparing for the Destination DDM Instance

### 4.7.5.1 Creating a VPC and Security Group

Create a VPC and security group to prepare for the destination DDM instance.

#### Creating a VPC

**Step 1** Log in to the [management console](#).

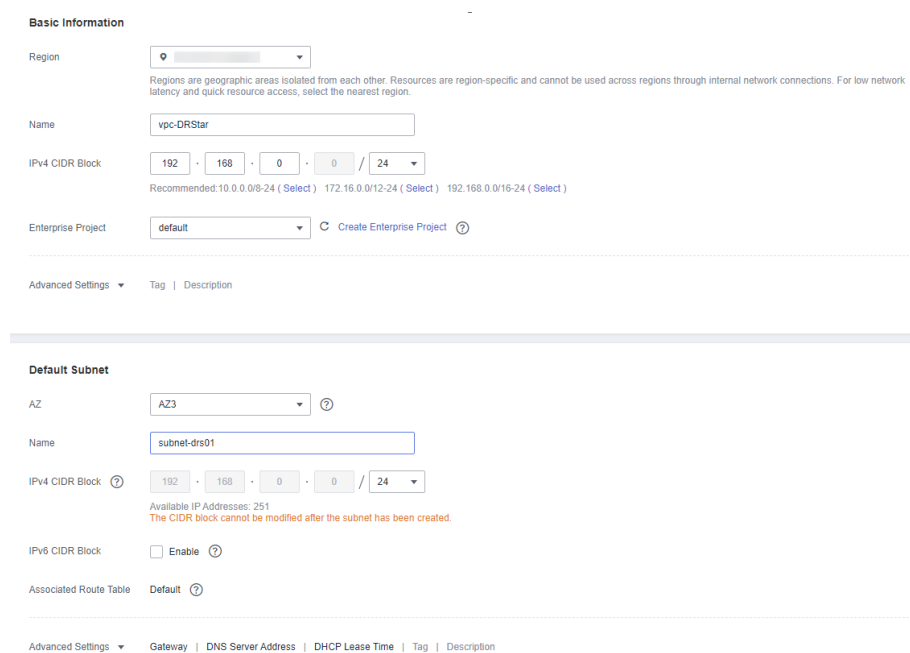


**Step 2** Click  in the upper left corner and select a region and project.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** Click **Create VPC**.



The screenshot shows the 'Basic Information' section of the VPC console. It includes a 'Region' dropdown menu, a 'Name' text input field containing 'vpc-DRStar', an 'IPv4 CIDR Block' input field with '192.168.0.0/24', and an 'Enterprise Project' dropdown menu set to 'default'. Below this is the 'Advanced Settings' section, which is currently collapsed. The 'Default Subnet' section is visible below, showing an 'AZ' dropdown set to 'AZ3', a 'Name' text input field containing 'subnet-drs01', an 'IPv4 CIDR Block' input field with '192.168.0.0/24', and an 'IPv6 CIDR Block' checkbox that is unchecked. The 'Associated Route Table' is set to 'Default'.

**Step 5** Configure parameters as needed and click **Create Now**.

**Step 6** Return to the VPC list and check whether the VPC is created.

When its status becomes available, the VPC is created.

----End

## Creating a Security Group

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region and project.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** In the navigation pane, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Specify the security group name and other information, and click **OK**.

×

### Create Security Group

\* Name

\* Enterprise Project  [Create Enterprise Project](#) ?

\* Template

Description 


The security group is for general-purpose web servers and includes default rules that allow all inbound ICMP traffic and inbound traffic on ports 22, 80, 443, and 3389. The security group is used for remote login, ping, and hosting a website on ECSs.

 0/255

[Show Default Rule](#) ▼

----End

#### 4.7.5.2 Creating a DDM Instance

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner and select a region and project.
- Step 3** Click the service list icon on the left and choose **Databases > Distributed Database Middleware**.
- Step 4** On the displayed page, in the upper right corner, click **Buy DDM Instance**.
- Step 5** Specify the instance information and specifications as required.

Billing Mode  Yearly/Monthly  Pay-per-use ?

Region  ?

AZ  AZ1  AZ2  AZ3 ?

---

Instance Name  ?

Time Zone

Node Class  General-enhanced Kunpeng general computing-plus ?

**CPU/Memory**

8 vCPUs | 16 GB

16 vCPUs | 32 GB

32 vCPUs | 64 GB

Instance Nodes

Selecting at least 2 nodes is recommended because a single node cannot provide the same level of availability.

- Step 6** Select a VPC and security group for the instance and configure the database port. The VPC and security group have been created in [Creating a VPC and Security Group](#).

VPC:   [View VPC](#)

You cannot change its VPC after a DDM Instance is created. Exercise caution when selecting a VPC. The DDM instance, the ECS where the application is deployed, and the underlying DB instances must be in the same VPC.

Security Group:

To ensure network connectivity, select the same security group as the associated DB instances, and the ECS where your application is deployed. [Learn more](#)

**Step 7** After the configuration is complete, click **Next** at the bottom of the page.

**Step 8** Confirm your settings.

- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.

**Step 9** Go to the **Instances** page to view and manage the instance.

The default database port is **5066** and can be changed after a DDM instance is created. If the status of the instance is **Running**, the instance has been created.


----End

### 4.7.5.3 Creating an RDS for MySQL Instance

Create an RDS for MySQL instance associated with the DDM instance.

#### Procedure

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region and project.

**Step 3** Click the service list icon on the left and choose **Databases > Relational Database Service**.

**Step 4** Click **Buy DB Instance**.

**Step 5** Configure the instance name and basic information.

Billing Mode:  Yearly/Monthly  Pay per use

Region:

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

DB Instance Name:

If you buy multiple DB instances at a time, they will be named with four digits appended in the format "DB instance name-SN". For example, if the DB instance name is instance, the first instance will be named as instance-0001, the second as instance-0002, and so on.

DB Engine:  MySQL  PostgreSQL  Microsoft SQL Server

DB Engine Version:  8.0  5.7  5.6

DB Instance Type:  Primary/Standby  Single

Single-node architecture is cost-effective and suitable for developing and testing of microsites, and small- and medium-sized enterprises, or for learning about RDS.

Storage Type:  Cloud SSD

AZ:  AZ1  AZ2  AZ3

Time Zone:

**Step 6** Configure instance specifications.

Instance Class:  General-purpose  Dedicated  Kunpeng general-enhanced

| vCPU   Memory                                   | Recommended Connections | TPS/QPS        | IPv6          |
|-------------------------------------------------|-------------------------|----------------|---------------|
| <input type="radio"/> 2 vCPUs   4 GB            | 1,500                   | 334   6,673    | Not supported |
| <input type="radio"/> 2 vCPUs   8 GB            | 2,500                   | 552   11,039   | Not supported |
| <input checked="" type="radio"/> 4 vCPUs   8 GB | 2,500                   | 756   15,122   | Not supported |
| <input type="radio"/> 4 vCPUs   16 GB           | 5,000                   | 1,062   21,249 | Not supported |
| <input type="radio"/> 8 vCPUs   16 GB           | 5,000                   | 1,338   26,756 | Not supported |

DB Instance Specifications: General-purpose | 4 vCPUs | 8 GB, Recommended Connections: 2500, TPS/QPS: 756 | 15122

Storage Space (GB):

RDS provides free backup storage space of the same size as your purchased storage space. After the free backup space is used up, charges are applied based on the OBS pricing details.

Enable autoscaling Trigger If Available Storage Drops To:  Autoscaling Limit:  GB

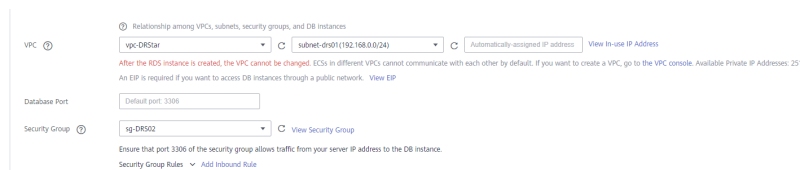
If available storage drops to 10% or less, your storage will autoclave by 15% (in increments of 10 GB) of your allocated storage. If your account balance is insufficient, autoscaling will fail.

Disk Encryption:  Enable  Disable

- Step 7** Select a VPC and security group for the instance and configure the database port.  
The VPC and security group have been created in [Creating a VPC and Security Group](#).

**CAUTION**

The RDS for MySQL instance must be in the same VPC and subnet as your DDM instance.



- Step 8** Configure the instance password.

|                        |                          |                                          |                                                                      |
|------------------------|--------------------------|------------------------------------------|----------------------------------------------------------------------|
| Password               | <input type="password"/> | <input type="button" value="Configure"/> | <input type="button" value="Skip"/>                                  |
| Administrator          | root                     |                                          |                                                                      |
| Administrator Password | <input type="password"/> |                                          | Keep your password secure. The system cannot retrieve your password. |
| Confirm Password       | <input type="password"/> |                                          |                                                                      |

- Step 9** Click **Next**.

- Step 10** Confirm your settings.


- To modify your settings, click **Previous**.
- If you do not need to modify your settings, click **Submit**.

- Step 11** Return to the instance list.

If the instance status becomes available, the instance has been created.

----End

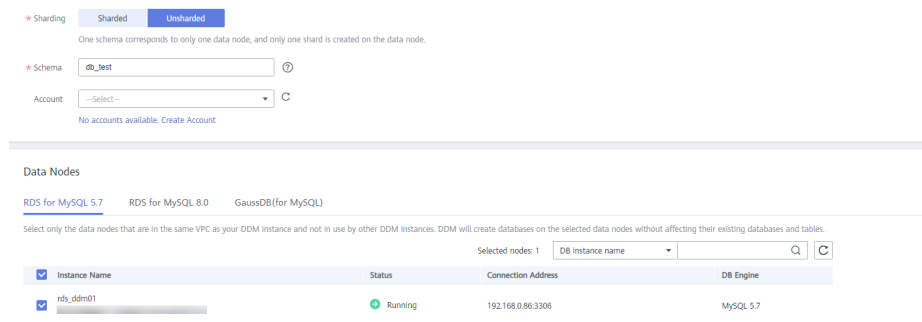
#### 4.7.5.4 Creating a Schema and Associating It with the RDS for MySQL Instance

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner and select a region and project.
- Step 3** Click the service list icon on the left and choose **Databases > Distributed Database Middleware**.
- Step 4** On the **Instances** page, locate the required DDM instance and click **Create Schema** in the **Operation** column.
- Step 5** On the displayed page, specify a sharding method, enter a schema name, set the number of shards, select the required DDM accounts, and click **Next**.

In this example, the schema is unsharded, and the schema name is **db\_test**.


**CAUTION**

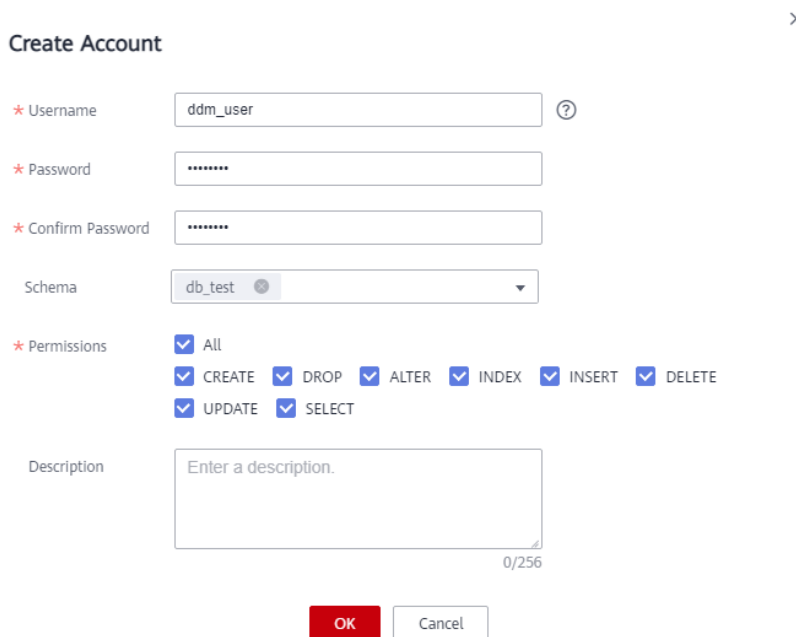
Currently, only data can be synchronized from Oracle to DDM. To synchronize table structures and other objects, you need to create schemas in the destination DDM instance based on table structures of the source Oracle database.



----End

### 4.7.5.5 Creating a DDM Account

- Step 1** Log in to the [management console](#).
  - Step 2** Click  in the upper left corner and select a region and project.
  - Step 3** Click the service list icon on the left and choose **Databases > Distributed Database Middleware**.
  - Step 4** On the **Instances** page, locate the required DDM instance and click its name.
  - Step 5** In the navigation pane, choose **Accounts**.
  - Step 6** On the displayed page, click **Create Account** and configure parameters as needed.
- For details about the permissions required by the DDM account, see [Precautions](#)



**Step 7** Click **OK**.


----End

### 4.7.5.6 Creating Table Structures in the Destination Database

Currently, only data can be synchronized from the source Oracle database to the destination DDM instance. Source table structures and other objects cannot be synchronized, so you need to create table structures and indexes in the destination database based on the table structures of the source schema. For more details, see [Precautions](#).

#### Procedure

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region and project.

**Step 3** Click the service list icon on the left and choose **Databases > Distributed Database Middleware**.

**Step 4** On the displayed page, enter the username and password created in [Creating a DDM Account](#), and click **Test Connection**.

**Step 5** After the connection is successful, click **Log In** to log in to the DDM instance.

**Step 6** Click the **db\_test** schema created in [Creating a Schema and Associating It with the RDS for MySQL Instance](#).

**Step 7** Run the following SQL statements in database **db\_test** to create table **table3** with the same structure as the source:

```
CREATE TABLE `db_test`.`table3`(
ID INT,
COL01 CHAR(100),
COL02 NCHAR(100),
PRIMARY KEY(ID));
```

----End

### 4.7.6 Creating a DRS Synchronization Task

This section describes how to create a DRS task and synchronize data from an on-premises Oracle database to Huawei Cloud DDM.

#### Pre-Check

Before creating a task, check whether synchronization conditions are met.

In this example, data is synchronized to DDM. For more details, see [Precautions](#).

#### Procedure

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region and project.

**Step 3** Click the service list icon on the left and choose **Databases > Data Replication Service**.

**Step 4** In the upper right corner, click **Create Synchronization Task**.

**Step 5** Configure synchronization task parameters.

1. Specify a synchronization task name.

2. Enter the synchronization task information and select the destination database.

Select the DDM instance created in [Creating a DDM Instance](#) as the destination database.

**Figure 4-36** Synchronization instance details

**Step 6** Click **Create Now**.

The synchronization instance is being created. It takes about 5 to 10 minutes.

**Step 7** Configure source and destination database information.

1. Configure the source database information and click **Test Connection**. If a successful test message is returned, the database is connected.

- Configure the destination database information and click **Test Connection**. If a successful test message is returned, the database is connected.

### Destination Database

DB Instance Name ddm-DRS-AUTOTEST-001 ( )

Database Username

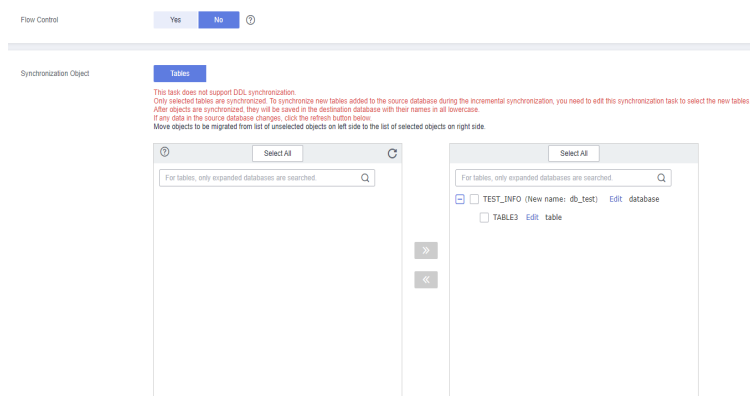
Database Password

**Step 8** Click **Next**.

**Step 9** On the **Set Synchronization Task** page, select the synchronization objects.

- Set **Flow Control** to **No**.
- Set **Synchronization Object** to **Tables**.

Select the databases and tables of the source database to be synchronized. In this best practice, **table3** in **test\_info** is selected and synchronized to **table3** in **db\_test**.



**Step 10** Click **Next**. On the **Check Task** page, check the synchronization task.

- If any check fails, review the cause and rectify the fault. After the fault is rectified, click **Check Again**.
- If all check items are successful, click **Next**.

**Step 11** Click **Submit**.

Return to the **Data Synchronization Management** page and check the synchronization task status.

It takes several minutes to complete.

| Task Name/ID                                 | Status   | Delay | Charging | Data Flow    | DB Engine  | Synchronizat...  | Created                 | Network... | Billing Mode                    | Description     | Enterp... | Operation |
|----------------------------------------------|----------|-------|----------|--------------|------------|------------------|-------------------------|------------|---------------------------------|-----------------|-----------|-----------|
| DRS-OracleToDDM<br>ba8b8bfa-c533-4136-945... | Starting | --    | Yes      | To the cloud | Oracle-DDM | Full-Incremental | Nov 08, 2022 15:49:4... | Public ... | Pay-per-Use<br>Created on No... | Source Datab... | default   | Stop      |

If the status changes to **Full synchronization**, the synchronization task has been started.



**NOTE**

- For synchronization from Oracle to DDM, full synchronization and full+incremental synchronization modes are supported.
- If you create a full synchronization task, the task automatically stops after the full data is synchronized to the destination.
- If you create a full+incremental synchronization task, a full synchronization is executed first. After the full synchronization is complete, an incremental synchronization starts.
- During the incremental synchronization, data is continuously synchronized, so the task will not automatically stop.

----End

## 4.7.7 Confirming Synchronization Results

You can use either of the following methods to check the synchronization results:

1. DRS compares synchronization objects and data and provides comparison results. For details, see [Viewing Synchronization Results on the DRS Console](#).
2. Log in to the destination side to check whether the databases, tables, and data are synchronized. Confirm the data synchronization status. For details, see [Viewing Synchronization Results on the DDM Console](#).

### Viewing Synchronization Results on the DRS Console

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region and project.

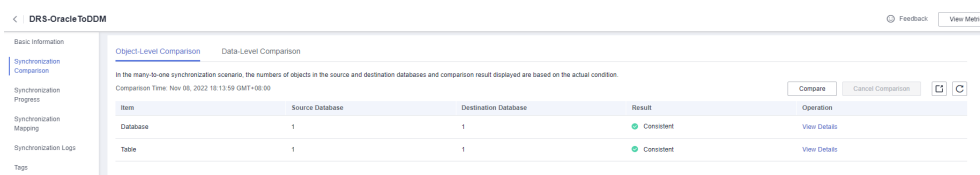
**Step 3** Click the service list icon on the left and choose **Databases > Data Replication Service**.

**Step 4** Locate the required DRS instance and click its name.

**Step 5** In the navigation pane on the left, choose **Synchronization Comparison**.

**Step 6** Click the **Object-Level Comparison** tab and check whether some objects are missing.

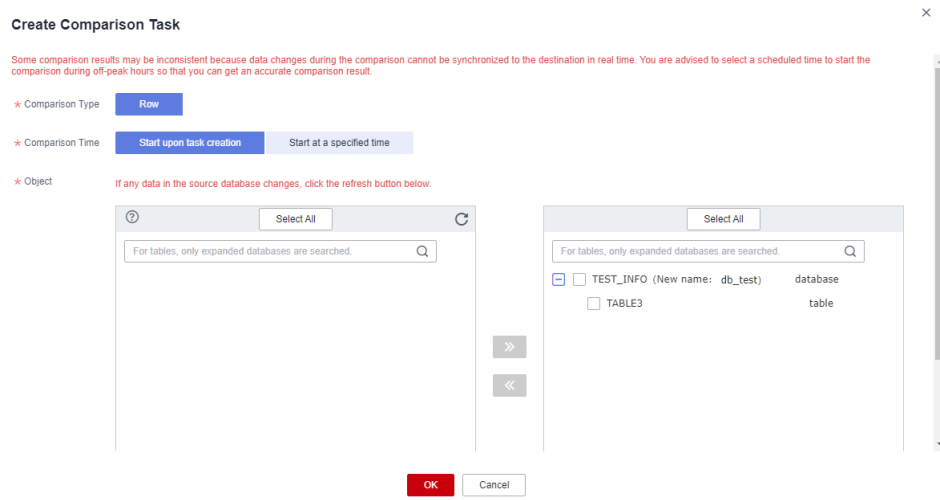
Click **Compare**. After the comparison is complete, view the comparison results.



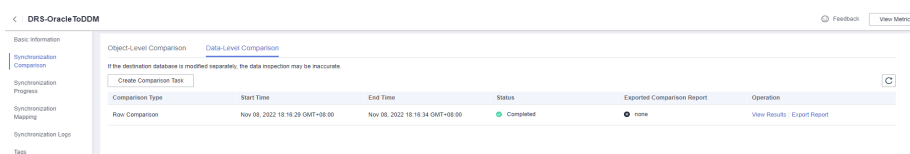
| Item     | Source Database | Destination Database | Result     | Operation                    |
|----------|-----------------|----------------------|------------|------------------------------|
| Database | 1               | 1                    | Consistent | <a href="#">View Details</a> |
| Table    | 1               | 1                    | Consistent | <a href="#">View Details</a> |

**Step 7** Click the **Data-Level Comparison** tab and check whether the number of rows of synchronized objects is consistent.

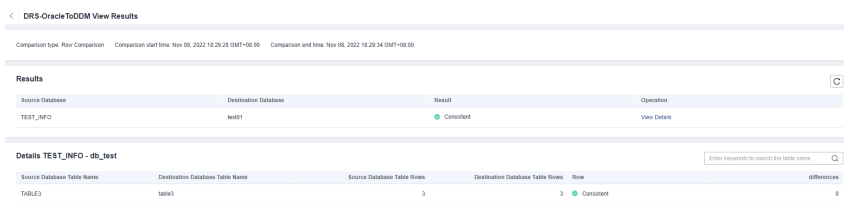
1. Click **Create Comparison Task**.
2. In the displayed dialog box, select the comparison type, time, and object.



3. After the comparison task is complete, view the data comparison results.



4. To view the comparison details, click **View Results** next to the comparison task.



----End

## Viewing Synchronization Results on the DDM Console

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region and project.

**Step 3** Click the service list icon on the left and choose **Databases > Distributed Database Middleware**.

**Step 4** Locate the target DDM instance and click **Log In** in the **Operation** column.

**Step 5** In the displayed dialog box, enter the password and click **Test Connection**.

**Step 6** After the connection is successful, click **Log In**.

**Step 7** View destination database and table names and check whether all data is synchronized.

----End

## 4.8 From RDS for MySQL to Kafka

### 4.8.1 Overview

#### Description

In this section, we will create a DRS synchronization task to synchronize the incremental data from the source RDS for MySQL database to the destination Kafka database. This section also describes:

- How to create an RDS for MySQL instance.
- How to create DMS for Kafka.
- How to create a DRS synchronization task.

#### Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is greater than or equal to \$0 USD.

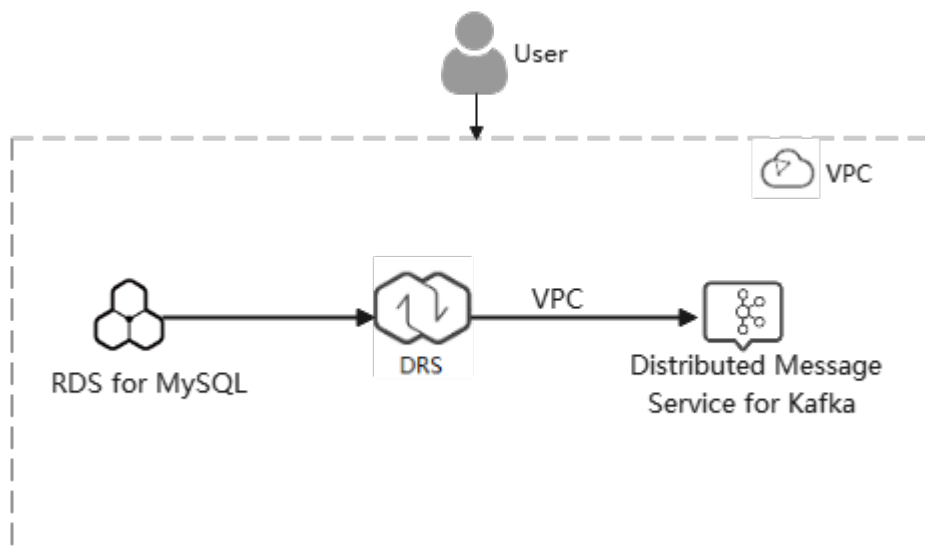
#### Service List

- Virtual Private Cloud (VPC)
- Relational Database Service (RDS)
- DMS for Kafka
- Data Replication Service (DRS)
- Data Admin Service (DAS)

#### Deployment Architecture

In this example, the source is an RDS for MySQL instance, and the destination is a DMS for Kafka in the same region. Incremental data of the source database is synchronized to the destination database in a VPC. For details about the deployment architecture, see [Figure 4-37](#).

Figure 4-37 VPC network



### Before You Start

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- The test data is for reference only. For more information about DRS, click [here](#).

## 4.8.2 Resource and Cost Planning

Table 4-27 Resource planning

| Category              | Subcategory       | Plan         | Description                                                         |
|-----------------------|-------------------|--------------|---------------------------------------------------------------------|
| VPC                   | VPC name          | vpc-DRStest  | Specify a name that is easy to identify.                            |
|                       | Region            | AP-Singapore | To achieve lower network latency, select the region nearest to you. |
|                       | AZ                | AZ 1         | -                                                                   |
|                       | Subnet            | 10.0.0.0/24  | Select a subnet with sufficient network resources.                  |
|                       | Subnet name       | subnet-drs01 | Specify a name that is easy to identify.                            |
| RDS (source database) | RDS instance name | rds-mysql    | Specify a name that is easy to identify.                            |
|                       | DB engine version | MySQL 5.7    | -                                                                   |

| Category                     | Subcategory               | Plan                              | Description                                                                                                                                                                                             |
|------------------------------|---------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | Instance type             | Single                            | A single instance is used in this example.<br>To improve service reliability, select a primary/standby instance.                                                                                        |
|                              | Storage type              | SSD                               | -                                                                                                                                                                                                       |
|                              | AZ                        | AZ 3                              | A single instance is used in this example.<br>To improve service reliability, create a primary and standby instance and then locate them in two different AZs.                                          |
|                              | Specifications            | General-purpose<br>4 vCPUs   8 GB | -                                                                                                                                                                                                       |
| Kafka (destination database) | Kafka instance name       | kafka-drs                         | Specify a name that is easy to identify.                                                                                                                                                                |
|                              | Version                   | 2.3.0                             | -                                                                                                                                                                                                       |
|                              | AZ                        | AZ 3                              | You can select one, three, or more AZs. You are advised to create the instance across different AZs to improve service reliability.                                                                     |
|                              | Specifications            | c6.2u4g.cluster                   | -                                                                                                                                                                                                       |
|                              | Brokers                   | 3                                 | -                                                                                                                                                                                                       |
|                              | Storage space             | High I/O, 200 GB                  | The storage space is used to store messages (including replicas). Kafka uses three replicas by default. In addition to storing messages, some space needs to be reserved for storing logs and metadata. |
| DRS synchronization task     | Synchronization task name | DRS-MySQLToKafka                  | Custom                                                                                                                                                                                                  |
|                              | Source DB engine          | MySQL                             | In this example, the source is an RDS for MySQL instance.                                                                                                                                               |
|                              | Destination DB engine     | Kafka                             | In this example, the destination database is Kafka.                                                                                                                                                     |
|                              | Network Type              | VPC                               | In the practice, select the VPC network.                                                                                                                                                                |

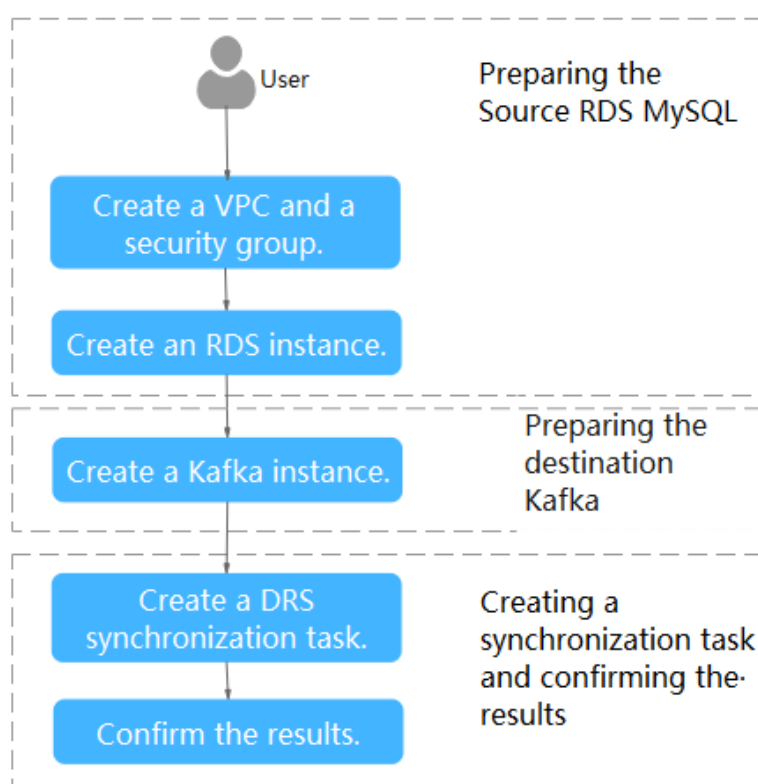
**NOTE**

For details about the prices of the preceding resources, see [Pricing Details](#). You can use the [price calculator](#) provided by Huawei Cloud to quickly calculate the reference price based on your desired specifications.

### 4.8.3 Operation Process

**Figure 4-38** shows the process of creating an RDS for MySQL instance and synchronizing the incremental data from an RDS for MySQL instance to Kafka.


**Figure 4-38** Flowchart



### 4.8.4 Creating a VPC and Security Group

Create a VPC and security group for an RDS for MySQL and Kafka instances.

#### Creating a VPC

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select AP-Singapore.
- Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.  
The VPC console is displayed.

### Step 4 Click Create VPC.

**Basic Information**

Region

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Name

IPv4 CIDR Block

Recommended: 10.0.0.0/8-24 (Select) 172.16.0.0/12-24 (Select) 192.168.0.0/16-24 (Select)

⚠ The CIDR block 10.0.0.0/24 overlaps with a CIDR block of another VPC in the current region. If you intend to enable communication between VPCs or between a VPC and an on-premises data center, change the CIDR block. [View VPC CIDR blocks in current region](#)

Enterprise Project  [Create Enterprise Project](#) ?

---

Advanced Settings ▾ Tag | Description

---

**Default Subnet**

AZ  ?

Name

IPv4 CIDR Block  ? Available IP Addresses: 251

The CIDR block cannot be modified after the subnet has been created.

IPv6 CIDR Block  Enable ?

Associated Route Table  ?

---

Advanced Settings ▾ Gateway | DNS Server Address | NTP Server Address | DHCP Lease Time | Tag | Description

**Step 5** Configure parameters as needed and click **Create Now**.


**Step 6** Return to the VPC list and check whether the VPC is created.

If the VPC status becomes available, the VPC has been created.

----End

## Creating a Security Group

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select AP-Singapore.

**Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** In the navigation pane, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Configure parameters as needed.

**Create Security Group** [Close]

\* Name:

\* Enterprise Project:  [Create Enterprise Project](#) ?

\* Template:

Description:  0/255

[Show Default Rule](#) ▾

**Step 7** Click **OK**.

**Step 8** Return to the security group list and click the security group name (**sg-DRS01** in this example).

**Step 9** Click the **Inbound Rules** tab, and then click **Add Rule**.

Summary | **Inbound Rules** | Outbound Rules | Associated Instances

**Step 10** Configure an inbound rule to allow access from database port **3306**.

**Add Inbound Rule** [Learn more](#) about security group configuration. [Close]

**i** Inbound rules allow incoming traffic to instances associated with the security group.

Security Group: sg-DRS01

You can import multiple rules in a batch.

| Priority | Action | Protocol & Port | Type | Source                  | Description | Operation   |
|----------|--------|-----------------|------|-------------------------|-------------|-------------|
| 1-100    | Allow  | TCP<br>3306     | IPv4 | IP address<br>0.0.0.0/0 |             | Operation ▾ |




----End

## 4.8.5 Preparing for Source RDS for MySQL

### 4.8.5.1 Creating an RDS for MySQL Instance

Create an RDS for MySQL instance, and select the VPC and security group you configured for the instance.

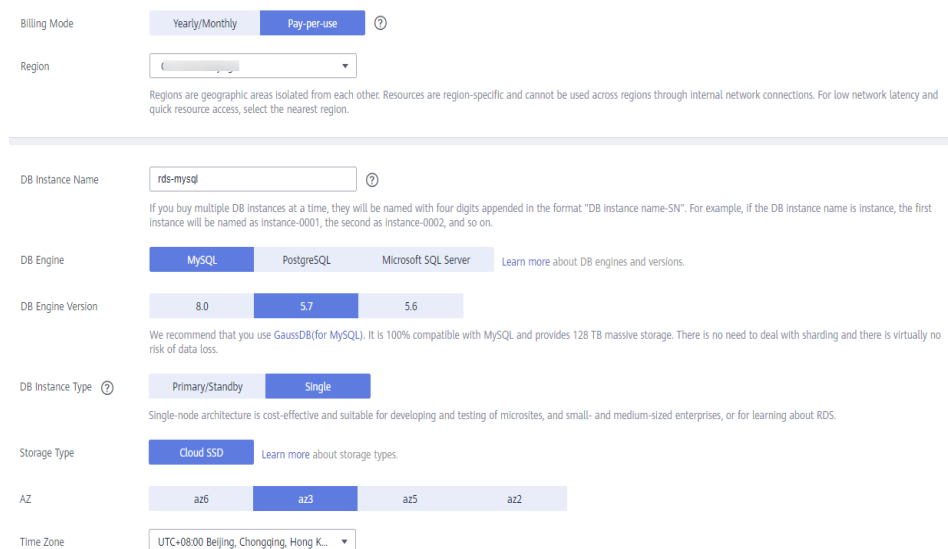
**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select AP-Singapore.

**Step 3** Under the service list, choose **Databases > Relational Database Service**.

**Step 4** Click **Buy DB Instance**.

**Step 5** Configure the instance name and basic information.



Billing Mode: Yearly/Monthly | Pay-per-use ⓘ

Region:

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

---

DB Instance Name:  ⓘ

If you buy multiple DB instances at a time, they will be named with four digits appended in the format "DB instance name-SN". For example, if the DB instance name is instance, the first instance will be named as instance-0001, the second as instance-0002, and so on.

DB Engine: MySQL | PostgreSQL | Microsoft SQL Server | [Learn more about DB engines and versions.](#)

DB Engine Version: 8.0 | 5.7 | 5.6

We recommend that you use GaussDB(for MySQL). It is 100% compatible with MySQL and provides 128 TB massive storage. There is no need to deal with sharding and there is virtually no risk of data loss.

DB Instance Type ⓘ: Primary/Standby | Single

Single-node architecture is cost-effective and suitable for developing and testing of microsites, and small- and medium-sized enterprises, or for learning about RDS.

Storage Type: Cloud SSD | [Learn more about storage types.](#)

AZ: az6 | az3 | az5 | az2

Time Zone:

**Step 6** Configure instance specifications.

Instance Class **General-purpose**

| vCPU   Memory                                   | Maximum Connections | TPS/QPS        | IPv6          |
|-------------------------------------------------|---------------------|----------------|---------------|
| <input type="radio"/> 2 vCPUs   4 GB            | 1,500               | 334   6,673    | Not supported |
| <input checked="" type="radio"/> 2 vCPUs   8 GB | 2,500               | 552   11,039   | Not supported |
| <input type="radio"/> 4 vCPUs   8 GB            | 2,500               | 756   15,122   | Not supported |
| <input type="radio"/> 4 vCPUs   16 GB           | 5,000               | 1,062   21,249 | Not supported |
| <input type="radio"/> 8 vCPUs   16 GB           | 5,000               | 1,338   26,756 | Not supported |
| <input type="radio"/> 8 vCPUs   32 GB           | 10,000              | 2,117   42,335 | Not supported |

DB Instance Specifications: General-purpose | 2 vCPUs | 8 GB, Maximum Connections: 2500, TPS/QPS: 552 | 11039

Storage Space (GB):  (Range: 40 to 4,000)

Disk Encryption:  Disable  **Recommended Enable**

**Step 7** Select a VPC and security group for the instance and configure the database port. The VPC and security group have been created in [Creating a VPC and Security Group](#).

Relationship among VPCs, subnets, security groups, and DB instances

VPC:  Subnet:  IP Address:

Database Port:

Security Group:

**Step 8** Configure information such as the instance password and parameter template.

Password:

Administrator:

Administrator Password:  Keep your password secure. The system cannot retrieve your password.

Confirm Password:

**Step 9** Click **Next**, confirm the information, and click **Submit**.


**Step 10** Return to the instance list.

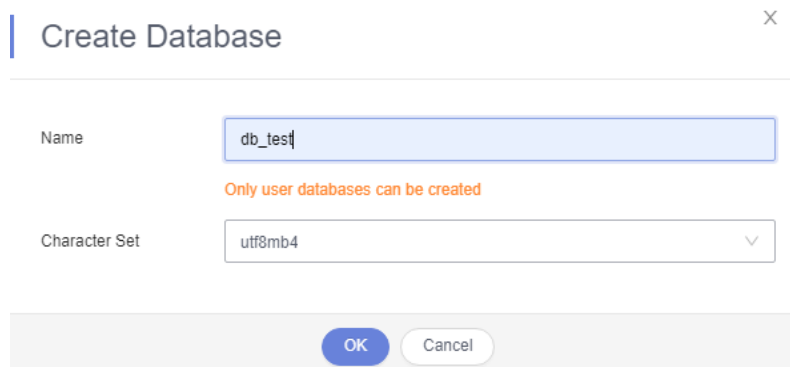
If the instance status becomes available, the instance has been created.

----End

### 4.8.5.2 Generating Test Data

**Step 1** Log in to the [management console](#).

- Step 2** Click  in the upper left corner of the management console and select AP-Singapore.
- Step 3** Under the service list, choose **Databases > Relational Database Service**.
- Step 4** Select an RDS instance and choose **More > Log In**.
- Step 5** In the displayed dialog box, enter the password and click **Test Connection**.
- Step 6** After the connection is successful, click **Log In**.
- Step 7** Click **Create Database** to create the **db\_test** database.



Create Database

Name

Only user databases can be created

Character Set

OK Cancel

- Step 8** Run the following statement in the db\_test database to create the corresponding table **table3**:

```
CREATE TABLE `db_test`.`table3` (
 `Column1` INT(11) UNSIGNED NOT NULL,
 `Column2` TIME NULL,
 `Column3` CHAR NULL,
 PRIMARY KEY (`Column1`)
) ENGINE = InnoDB
 DEFAULT CHARACTER SET = utf8mb4
 COLLATE = utf8mb4_general_ci;
```



SQL Preview

```
1 CREATE TABLE `db_test`.`table3` (
2 `Column1` INT(11) UNSIGNED NOT NULL,
3 `Column2` TIME NULL,
4 `Column3` CHAR NULL,
5 PRIMARY KEY (`Column1`)
6) ENGINE = InnoDB
7 DEFAULT CHARACTER SET = utf8mb4
8 COLLATE = utf8mb4_general_ci;
```

Execute Back


----End

## 4.8.6 Preparing for Destination Kafka

### 4.8.6.1 Creating a Kafka Instance

This section describes how to create a Kafka instance.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner of the management console and select AP-Singapore.

**Step 3** Click the service list icon on the left and choose **Middleware > Distributed Message Service (for Kafka)**.

**Step 4** Click **Buy Instance**.

**Step 5** Select the instance region and AZ.

Billing Mode:  Yearly/Monthly  Pay-per-use

Region:

For low network latency and quick resource access, select the region nearest to your target users. Note that resources cannot be shared across regions without Cloud Connect (CC) or Virtual Private Network (VPN).

Project:

AZ:  AZ1  AZ2  AZ3  AZ4  AZ5

Select one AZ or at least three AZs. Do not select two AZs. [Learn more](#)

The more AZs selected, the better the reliability and SLA coverage.

**Step 6** Configure the instance name and specifications.

Instance Name:

Enterprise Project:  [View Enterprise Project](#)

Version:  2.3.0  1.1.0

CPU Architecture:  x86

| Flavor Name                                      | ECS Flavor   | TPS Limit per Broker | Maximum Partitions per Brok... | Recommended Consumer Gr... |
|--------------------------------------------------|--------------|----------------------|--------------------------------|----------------------------|
| <input checked="" type="radio"/> c6.2v4g.cluster | c6.large.2   | 30,000               | 250                            | 4,000                      |
| <input type="radio"/> c6.4v8g.cluster            | c6.xlarge.2  | 100,000              | 500                            | 4,000                      |
| <input type="radio"/> c6.8v16g.cluster           | c6.2xlarge.2 | 150,000              | 1,000                          | 4,000                      |
| <input type="radio"/> c6.12v24g.cluster          | c6.3xlarge.2 | 200,000              | 1,500                          | 4,000                      |
| <input type="radio"/> c6.16v32g.cluster          | c6.4xlarge.2 | 250,000              | 2,000                          | 4,000                      |

To ensure stable services, choose a bandwidth 30% higher than what is required under normal conditions.

common\_current\_spec: c6.2v4g.cluster | ECS Flavor c6.large.2 | TPS Limit per Broker 30,000 | Maximum Partitions per Broker 250 | Recommended Consumer Groups per Broker 4,000

Instances created with the selected specifications do not support dynamic enabling/disabling of dumping.

Brokers:

**Step 7** Select the storage space and capacity threshold policy.

Storage Space:   GB [?](#)

Total storage space: 600 GB

After the instance is created, you cannot change the disk type or reduce the storage space. [Learn more](#) about disk types.

Capacity Threshold Policy:  Automatically delete  Stop production [?](#)

**Step 8** Select the VPC and security group.

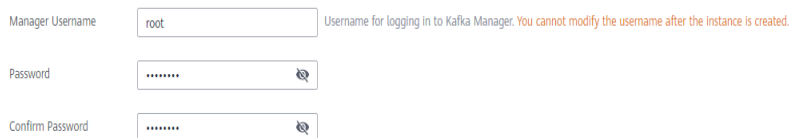
The VPC and security group have been created in [Creating a VPC and Security Group](#).

VPC:   [?](#)

You cannot change the selected VPC and subnet after the instance is created. You can also create a new VPC.

Security Group:  [Manage Security Group](#) [?](#)

**Step 9** Configure the instance password.



**Step 10** Click **Buy**, confirm the information, and click **Submit**.

**Step 11** Return to the instance list.

If the status of the Kafka instance is **Running**, the instance has been created.

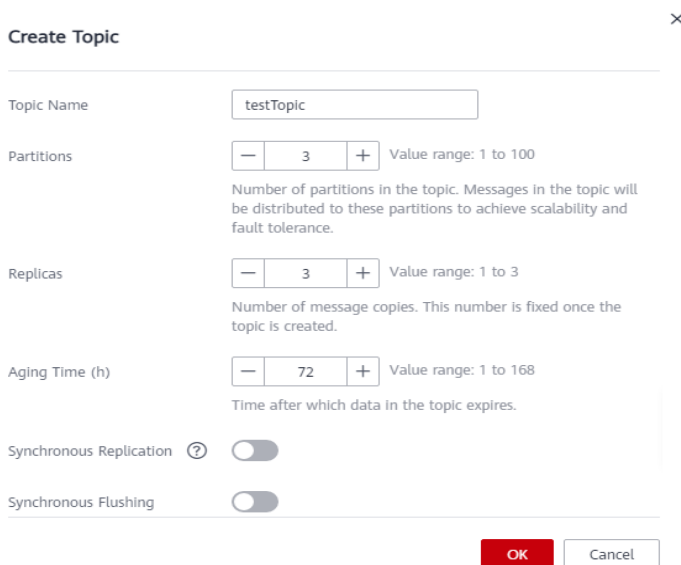
----End

### 4.8.6.2 Creating a Topic

**Step 1** Click a Kafka instance.

**Step 2** Choose **Topics**, and click **Create Topic**.

**Step 3** In the dialog box that is displayed, enter a topic name, specify other parameters, and click **OK**.



----End

### 4.8.7 Creating a DRS Synchronization Task


This section describes how to create a DRS instance and synchronize incremental data from RDS for MySQL to Kafka.

#### Pre-Check

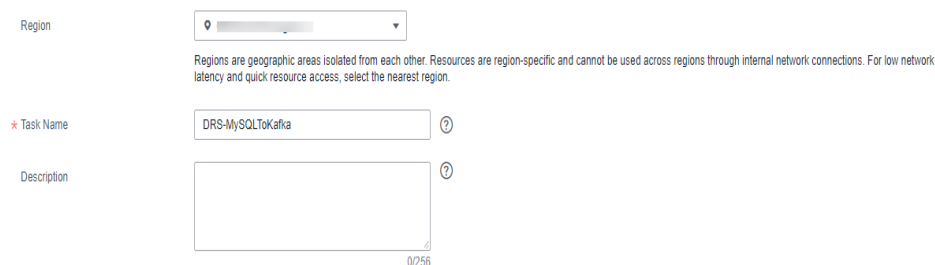
Before creating a task, check the synchronization conditions.

In this example, data is synchronized from RDS for MySQL to Kafka. For details, see [Precautions](#).

## Procedure

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner of the management console and select AP-Singapore.
- Step 3** Under the service list, choose **Databases > Data Replication Service**.
- Step 4** Choose **Data Synchronization Management** and click **Create Synchronization Task**.
- Step 5** Configure synchronization task parameters.

### 1. Task name



Region:

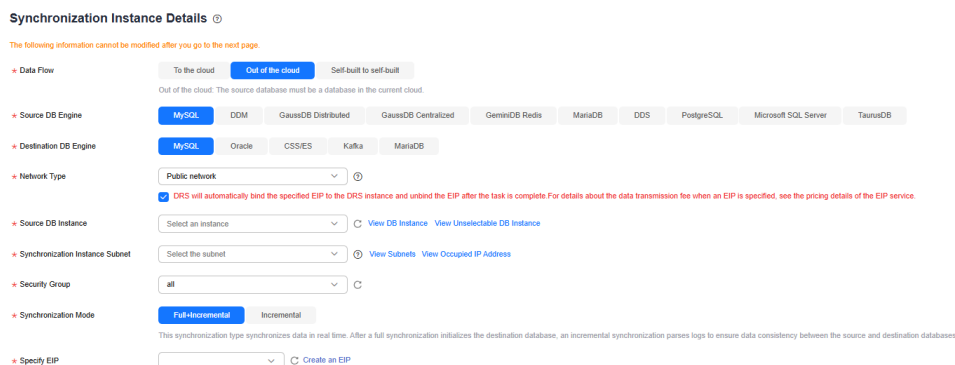
Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

\* Task Name:

Description:

2. Select the source database, destination database, and network information. Select the RDS instance created in [Preparing for Source RDS for MySQL](#) as the source database.

**Figure 4-39** Synchronization instance details



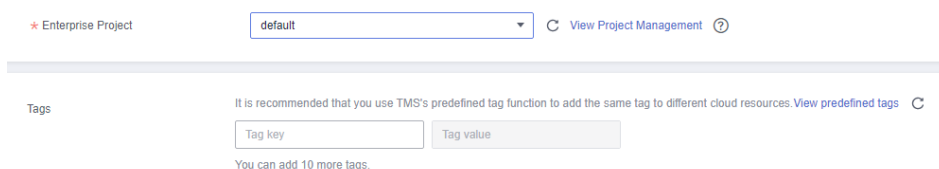
**Synchronization Instance Details**

The following information cannot be modified after you go to the next page.

- Data Flow:** To the cloud (selected), Out of the cloud, Self-built to self-built
- Source DB Engine:** MySQL (selected), DDM, GaussDB Distributed, GaussDB Centralized, GeminiDB Redis, MariaDB, DDS, PostgreSQL, Microsoft SQL Server, TaurusDB
- Destination DB Engine:** MySQL (selected), Oracle, CSS/ES, Kafka, MariaDB
- Network Type:** Public network (selected)
- Source DB Instance:** Select an instance (dropdown), View DB Instance, View Unselectable DB Instance
- Synchronization Instance Subnet:** Select the subnet (dropdown), View Subnets, View Occupied IP Address
- Security Group:** all (dropdown)
- Synchronization Mode:** Full-Incremental (selected), Incremental
- Specify EIP:** (dropdown), Create an EIP

This synchronization type synchronizes data in real time. After a full synchronization initializes the destination database, an incremental synchronization parses logs to ensure data consistency between the source and destination databases.

### 3. Set Enterprise Project to default.



\* Enterprise Project:  View Project Management

---

Tags: It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. View predefined tags

Tag key:  Tag value:

You can add 10 more tags.

**Step 6** Click **Create Now**.

The synchronization instance is being created. It takes about 5 to 10 minutes.

**Step 7** Configure source and destination database information.

1. Configure source database information.

2. Click **Test Connection**.

If a successful test message is returned, the database is connected.

**Source Database**

DB Instance Name: rds-mysql ( )

Database Username: root

Database Password: [masked]

Test Connection [Test successful]

3. Select the VPC and subnet where the destination database is located, and enter the Kafka IP address and port number.

4. Click **Test Connection**.

If a successful test message is returned, the database is connected.

**Destination Database**

VPC: vpc-DRStest(10.0.0.0/24) [View VPC]

Subnet: subnet-drs01(10.0.0.0/24) [View Subnets]

IP Address or Domain Name: [ ] [?]

Ensure that the entered addresses belong to the same DB instance.

Test Connection [Test successful]

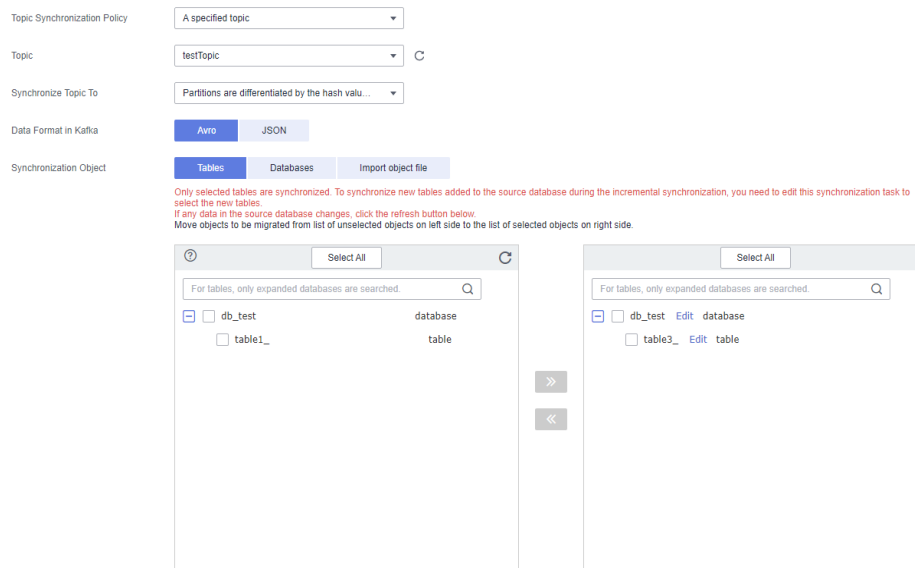
**Step 8** Click **Next**.

**Step 9** Select the synchronization information, policy, message format, and object, and the format of the message sent to the Kafka.

The following table lists the settings.

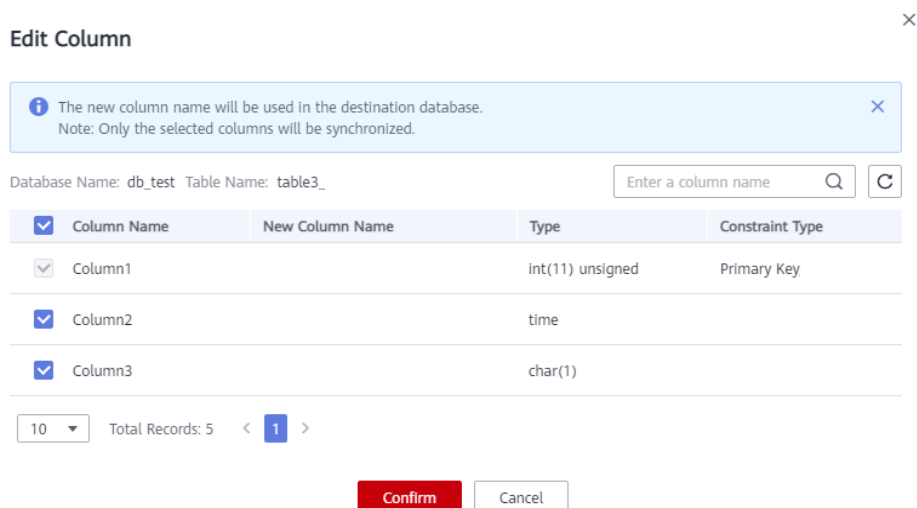
**Table 4-28** Sync Settings

| Type                         | Setting                                                                                 |
|------------------------------|-----------------------------------------------------------------------------------------|
| Topic Synchronization Policy | Deliver the content to a topic named <b>testTopic</b> .                                 |
| Synchronize Topic To         | Partitions are differentiated by the hash values of the database and table names        |
| Data Format in Kafka         | You can select the JSON format. For details, see <a href="#">Kafka Message Format</a> . |
| Synchronization Object       | Select <b>table3_</b> under <b>db_test</b> .                                            |



**Step 10** Click **Next**.

**Step 11** Select a data processing mode. Data synchronization from RDS for MySQL to Kafka supports only column-based processing, which provides column-level query and filtering capabilities.




**Step 12** Click **Next** and wait for the check results.

**Step 13** If the check is complete and the check success rate is 100%, click **Next**.



Check Again

Check success rate  100%  
All checks must pass before you can continue. If any check requires confirmation, check and confirm the results before proceeding to the next step.

| Check Item                                                                                       | Check Result |
|--------------------------------------------------------------------------------------------------|--------------|
| <b>Database parameters</b>                                                                       |              |
| Whether tables structures are consistent                                                         | ✔ Passed     |
| Whether the source database binlog is row-based                                                  | ✔ Passed     |
| Whether the binlog_row_image value of the source database is FULL                                | ✔ Passed     |
| Checking the expire_logs_days parameter setting in the source database                           | ✔ Passed     |
| Whether the source database binlog is enabled                                                    | ✔ Passed     |
| Whether the source database tables use storage engines not supported by the destination database | ✔ Passed     |
| Whether the log_slave_updates value is ON on the source database                                 | ✔ Passed     |

**Step 14** After confirming that the synchronization task information is correct, click **Next**.

Return to the **Data Synchronization Management** page and check the synchronization task status.

It takes several minutes to complete.

| <input type="checkbox"/> | Task Name/ID                             | Status      | Charging | Data Flow     | DB Engine   | Synchroniza... | Netwo... | Description     | Enterp... | Operation       |
|--------------------------|------------------------------------------|-------------|----------|---------------|-------------|----------------|----------|-----------------|-----------|-----------------|
| <input type="checkbox"/> | DRS-MySQLToKafka<br>1f1c1e78-fcda-430... | Incremental | Yes      | Out of the... | MySQL-Kafka | Incremental    | VPC      | Source Datab... | default   | Edit Stop Pause |

If the status changes to **Incremental**, the synchronization task has been started.

#### NOTE

- In this example, **Synchronization Mode** is set to **Incremental** for the task from RDS for MySQL to Kafka. After the task is started, the status is **Incremental**.
- If the created task is a full+incremental synchronization task, the task enters the full synchronization state after being started. After the full synchronization is complete, the task enters the incremental synchronization state.
- Incremental synchronization continuously synchronizes incremental data and does not stop automatically.


----End

## 4.8.8 Confirming the Results

In this practice, DRS continuously synchronizes the incremental data generated in the source database to the destination database until you stop the task. The following describes how to verify the synchronization results by inserting data to the source RDS for MySQL database and viewing the data received by Kafka.

### Procedure

**Step 1** Log in to the [management console](#).

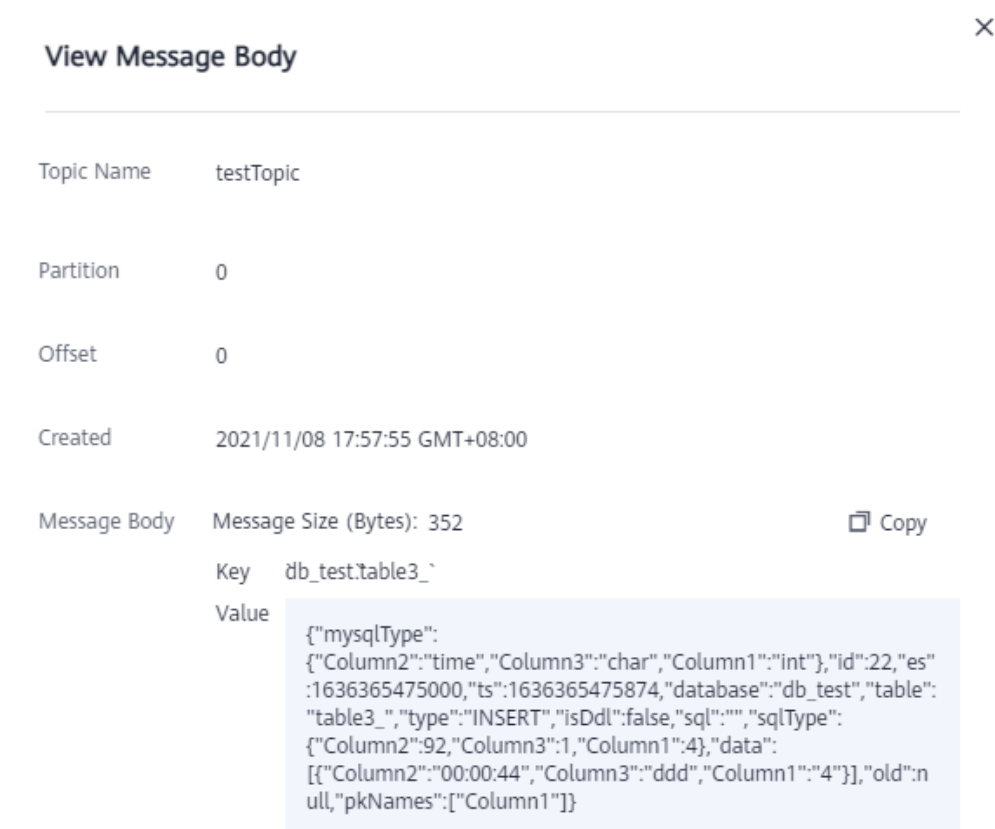
**Step 2** Click  in the upper left corner of the management console and select AP-Singapore.

**Step 3** Under the service list, choose **Databases > Relational Database Service**.

- Step 4** Locate the required RDS instance and choose **More > Log In**.
- Step 5** In the displayed dialog box, enter the password and click **Test Connection**.
- Step 6** After the connection is successful, click **Log In**.
- Step 7** Run the following statement to insert data to the **db\_test.table3\_** table.  
INSERT INTO `db\_test`.`table3\_` (`Column1`,`Column2`,`Column3`) VALUES(4,'00:00:44','ddd');



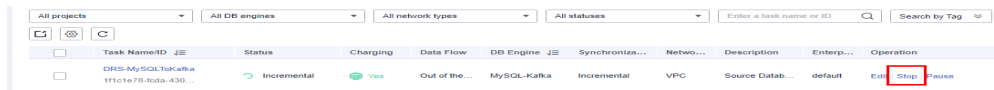
- Step 8** In the Service List, choose **Application > Distributed Message Service for Kafka** to open the Kafka console.
- Step 9** Click a Kafka instance.
- Step 10** Click the **Message Query** tab, select the Kafka topic, view the received data in JSON format.



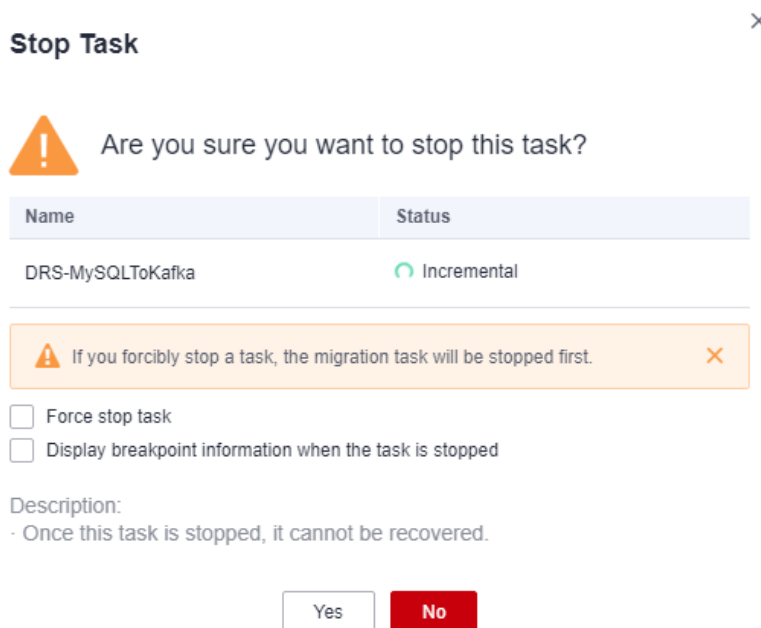
**Step 11** Stop the synchronization task.

If all data has been synchronized to the destination database, you can stop the current task.

1. Locate the task and click **Stop** in the **Operation** column.



2. In the display box, click **Yes**.



----End

## 4.9 From GaussDB Distributed to Kafka

### Description

This practice describes how to create a DRS synchronization task to synchronize incremental data from GaussDB Distributed to Kafka.

### Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is greater than or equal to \$0 USD.
- You have logged in to the DRS console.

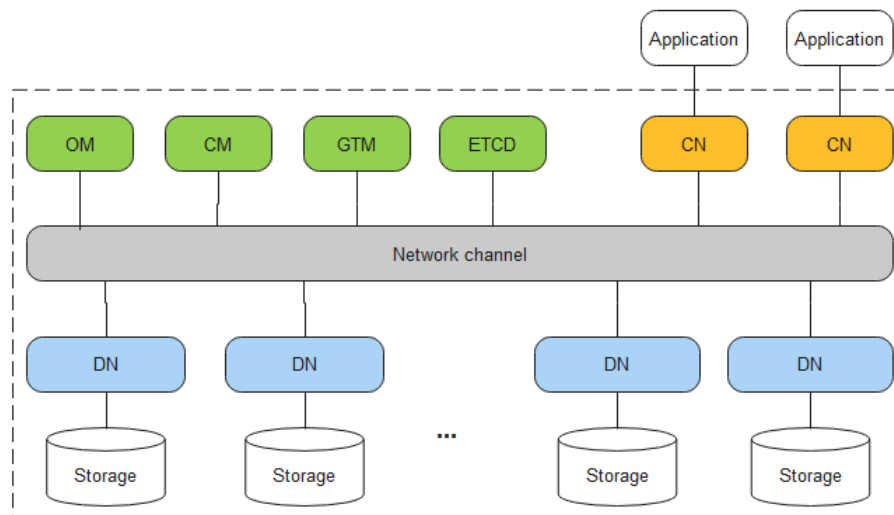
### Service List

- Virtual Private Cloud (VPC)
- GaussDB Distributed

- DMS for Kafka
- Data Replication Service (DRS)

## Architecture of a Distributed GaussDB Instance

**Figure 4-40** Logical architecture of a distributed GaussDB instance



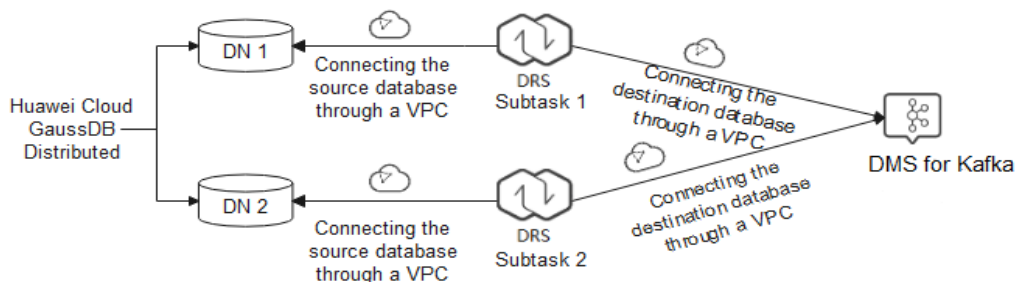
GaussDB consists of Global Transaction Manager (GTM), Operation Manager (OM), Cluster Manager (CM), Coordinator Node (CN), and Data Node (DN). An application sends a SQL query request to a CN. The SQL statement can be **INSERT**, **DELETE/DROP**, **UPDATE**, or **SELECT**. The CN uses the optimizer of the database to generate an execution plan and sends the plan to DNs. Each DN processes data based on the execution plan. After the processing is complete, DNs return the result set to the CN for summary. Finally, the CN returns the summary result to the application.

You can add nodes for distributed instances as needed to handle large volumes of concurrent requests. For details, see [Adding Nodes](#).

## DRS synchronization network diagram

In this example, the source is a distributed GaussDB instance, and the destination is a DMS for Kafka instance. Incremental data of the source database is synchronized to the destination database through a VPC. The following figure shows the deployment architecture.

**Figure 4-41** Data synchronization from GaussDB Distributed to Kafka through a VPC



### Notes on Usage

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- The test data is for reference only. For more information about DRS, click [here](#).

### Resource Planning

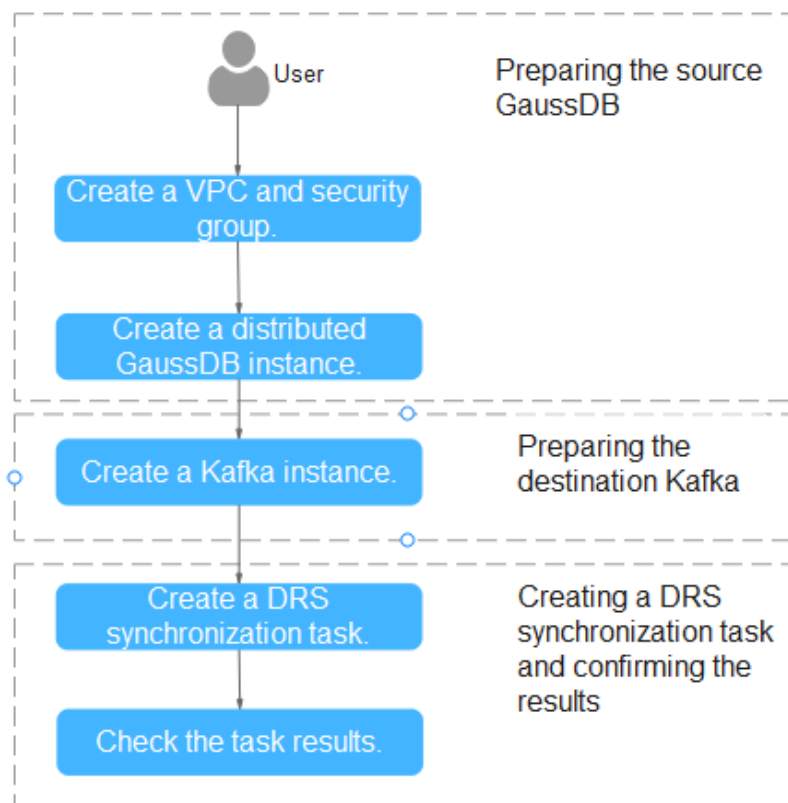
**Table 4-29** Resource planning

| Category                  | Subcategory       | Planned Value       | Description                                                                    |
|---------------------------|-------------------|---------------------|--------------------------------------------------------------------------------|
| VPC                       | VPC name          | vpc-DRStest         | Specify a name that is easy to identify.                                       |
|                           | Subnet CIDR block | 10.0.0.0/24         | Select a subnet with sufficient network resources.                             |
|                           | Region            | AP-Singapore        | To achieve lower network latency, select the region nearest to you.            |
|                           | Subnet name       | subnet-drs01        | Specify a name that is easy to identify.                                       |
| GaussDB (source database) | Instance name     | drs-gaussdbv5-src-1 | Specify a name that is easy to identify.                                       |
|                           | DB engine version | GaussDB 8.102       | -                                                                              |
|                           | DB instance type  | Distributed         | Select a proper instance type based on its description.                        |
|                           | Storage type      | Ultra-high I/O      | GaussDB supports ultra-high I/O storage with a maximum throughput of 350 MB/s. |

| Category                           | Subcategory               | Planned Value               | Description                                                                                                                                                                                             |
|------------------------------------|---------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    | Specifications            | Dedicated<br>8vCPUs   64 GB | Select the specifications as needed.                                                                                                                                                                    |
| Kafka<br>(destination<br>database) | Kafka instance name       | kafka-drs                   | Specify a name that is easy to identify.                                                                                                                                                                |
|                                    | Version                   | 2.3.0                       | -                                                                                                                                                                                                       |
|                                    | AZ                        | AZ 3                        | You can select one, three, or more AZs. You are advised to create the instance across different AZs to improve service reliability.                                                                     |
|                                    | Specifications            | c6.2u4g.cluster             | -                                                                                                                                                                                                       |
|                                    | Brokers                   | 3                           | -                                                                                                                                                                                                       |
|                                    | Storage space             | High I/O, 200 GB            | The storage space is used to store messages (including replicas). Kafka uses three replicas by default. In addition to storing messages, some space needs to be reserved for storing logs and metadata. |
| DRS<br>synchronization task        | Synchronization task name | DRS-GaussDBToKafka          | Specify a name that is easy to identify.                                                                                                                                                                |
|                                    | Source DB engine          | GaussDB Distributed         | -                                                                                                                                                                                                       |
|                                    | Destination DB engine     | Kafka                       | In this example, the destination database is a Kafka instance.                                                                                                                                          |
|                                    | Network type              | VPC                         | When creating a task, select <b>VPN or Direct Connect</b> .                                                                                                                                             |

## Flowchart


The following figure shows the process of creating a DRS task and synchronizing the incremental data from a distributed GaussDB instance to Kafka.



## Creating a VPC

Create a VPC to prepare network resources for creating a GaussDB instance.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** Click **Create VPC**.

**Basic Information**

Region:

Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Name:

IPv4 CIDR Block:

Recommended: 10.0.0.0/8-24 (Select) 172.16.0.0/12-24 (Select) 192.168.0.0/16-24 (Select)

⚠ The CIDR block 10.0.0.0/24 overlaps with a CIDR block of another VPC in the current region. If you intend to enable communication between VPCs or between a VPC and an on-premises data center, change the CIDR block. View VPC CIDR blocks in current region

Enterprise Project:  [Create Enterprise Project](#)

---

**Advanced Settings**

Tag | Description

---

**Default Subnet**

AZ:

Name:

IPv4 CIDR Block:  Available IP Addresses: 251

The CIDR block cannot be modified after the subnet has been created.

IPv6 CIDR Block:  Enable

Associated Route Table:

---

Advanced Settings | Gateway | DNS Server Address | NTP Server Address | DHCP Lease Time | Tag | Description

**Step 5** Configure parameters as needed and click **Create Now**.

**Step 6** Return to the VPC list and check whether the VPC is created.


If the VPC status becomes available, the VPC has been created.

----End

## Creating a Security Group

Create a security group for creating a GaussDB instance.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** In the navigation pane, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Configure parameters as needed.



✕

### Create Security Group

★ Name

★ Enterprise Project  [Create Enterprise Project](#) ?

★ Template

Description 

The security group is for general-purpose web servers and includes default rules that allow all inbound ICMP traffic and inbound traffic on ports 22, 80, 443, and 3389. The security group is used for remote login, ping, and hosting a website on ECSs.

0/255

[Show Default Rule](#) ▼

OK
Cancel


**Step 7** Click **OK**.

----End

## Creating a Distributed GaussDB Instance

The following describes how to create a distributed GaussDB instance as the destination database.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Databases > GaussDB**.

**Step 4** Click **Buy DB Instance**.

**Step 5** Configure the instance name and basic information.

Billing Mode Pay-as-you-go Pre-paid ⓘ

Region  Regions are geographic areas isolated from each other. Resources are region-specific and cannot be used across regions through internal network connections. For low network latency and quick resource access, select the nearest region.

Project

---

DB Instance Name  ⓘ

Edition Type Enterprise edition Basic edition

DB Engine Version 

|           |           |           |           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| V2.0-R202 | V2.0-R202 | V2.0-R201 | V2.0-R200 | V2.0-R112 | V2.0-R110 | V2.0-R105 | V2.0-R102 | V2.0-R101 | V2.0-R100 | V2.0-R05  |
| V2.0-R1   | V2.0-R0   | V2.0-S300 | V2.0-S227 | V2.0-S226 | V2.0-S223 | V2.0-S222 | V2.0-S221 | V2.0-S220 | V2.0-S208 | V2.0-S207 |
| V2.0-S201 | V2.0-S200 | V2.0-S103 | V2.0-S100 | V2.0-S    | V2.0-S27  | V2.0-S23  | V2.0-S14  |           |           |           |

The current engine uses Huawei Cloud EulerOS by default. A DB relationship cannot be created between instances using this engine and those running EulerOS.

DB Instance Type Distributed Centralized

Deployment Model Independent ⓘ

Log Nodes Supported  Yes

Transaction Consistency Strong consistency Eventual consistency ⓘ

Failover Priority Reliability Availability

Replicas  ⓘ

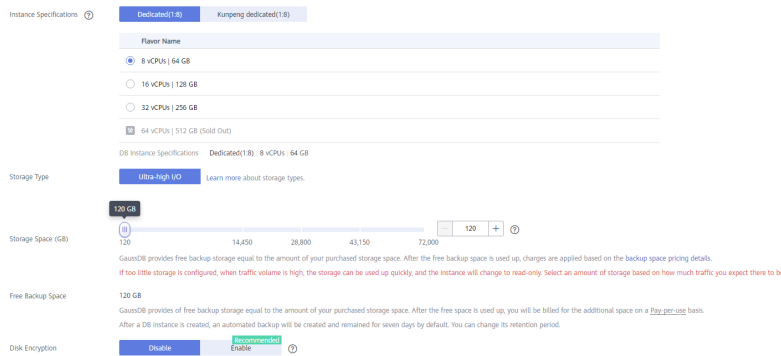
Shards

Coordinator Nodes  ⓘ If Coordinator Nodes is set to 1, the instance can only be used for testing.

AZ az1 az2 az3 az4 az5 Only one or three AZs can be selected.

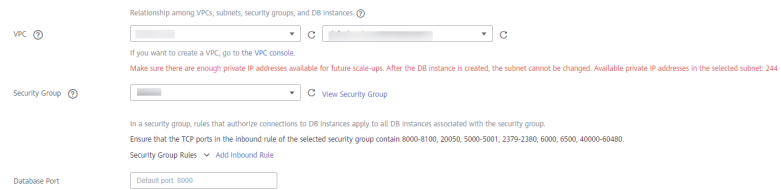
Time Zone

**Step 6** Configure instance specifications.

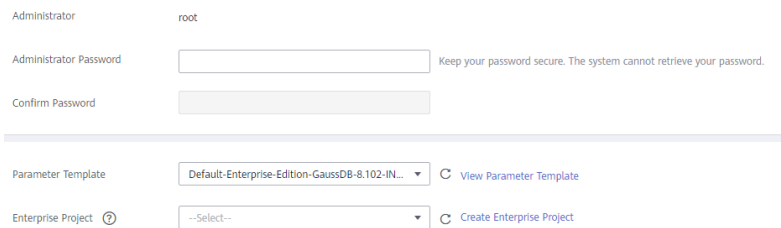


Select small specifications for this test instance. You are advised to configure specifications based on service requirements in actual use.

**Step 7** Select a VPC and security group (created in [Creating a VPC](#) and [Creating a Security Group](#)) for the instance and configure the database port.



**Step 8** Configure password and other information.



**Step 9** Click **Next**, confirm the information, and click **Submit**.


**Step 10** Go to the instance list.

If the instance status becomes available, the instance has been created.

----End

**Constructing Test Data for the GaussDB Instance**

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Databases > GaussDB**.

**Step 4** Select the target GaussDB instance and choose **More > Log In**.

**Step 5** In the displayed dialog box, enter the password and click **Test Connection**.

**Step 6** After the connection is successful, click **Log In**.

**Step 7** Click **Create Database** to create the **db\_test** database.

**Step 8** Run the following statement in **db\_test** to create table **schema\_test.table1**:


```
create table schema_test.table1(c1 int primary key,c2 varchar(10),c3 TIMESTAMP(6));
```

----End

## Creating a Kafka Instance

The following describes how to create a Kafka instance.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Middleware > Distributed Message Service (for Kafka)**.

**Step 4** Click **Buy Instance**.

**Step 5** Select the instance region and AZ.

**Step 6** Configure the instance name and specifications.

Instance Name: kafka-drs

Enterprise Project: default

Version: 2.3.0

CPU Architecture: x86

| Flavor Name                                      | ECS Flavor   | TPS Limit per Broker | Maximum Partitions per Brok... | Recommended Consumer Gr... |
|--------------------------------------------------|--------------|----------------------|--------------------------------|----------------------------|
| <input checked="" type="radio"/> c5.2u4g.cluster | c5.large.2   | 30,000               | 250                            | 4,000                      |
| <input type="radio"/> c5.4u8g.cluster            | c5.xlarge.2  | 100,000              | 500                            | 4,000                      |
| <input type="radio"/> c5.8u16g.cluster           | c5.2xlarge.2 | 150,000              | 1,000                          | 4,000                      |
| <input type="radio"/> c5.12u24g.cluster          | c5.3xlarge.2 | 200,000              | 1,500                          | 4,000                      |
| <input type="radio"/> c5.16u32g.cluster          | c5.4xlarge.2 | 250,000              | 2,000                          | 4,000                      |

Brokers: 3

**Step 7** Select the storage space and capacity threshold policy.

Storage Space: High I/O, 200 GB

Capacity Threshold Policy: Automatically delete

**Step 8** Select a VPC and security group (created in **Creating a VPC** and **Creating a Security Group**) for the instance.

VPC: vpc-DRStest, subnet-drs01

Security Group: sg-DRS01

**Step 9** Configure the instance password.

Manager Username: root

Password: [masked]

Confirm Password: [masked]

**Step 10** Click **Buy**, confirm the information, and click **Submit**.

**Step 11** Go to the instance list.

If the status of the Kafka instance becomes **Running**, the instance has been created.

----End

**Creating a Kafka Topic**

**Step 1** Click a Kafka instance.

**Step 2** Choose **Topics**, and click **Create Topic**.

**Step 3** In the dialog box that is displayed, enter a topic name, specify other parameters, and click **OK**.

**Create Topic**
✕

---

Topic Name

Partitions  Value range: 1 to 100

Number of partitions in the topic. Messages in the topic will be distributed to these partitions to achieve scalability and fault tolerance.

Replicas  Value range: 1 to 3

Number of message copies. This number is fixed once the topic is created.

Aging Time (h)  Value range: 1 to 168

Time after which data in the topic expires.

Synchronous Replication

Synchronous Flushing

OK
Cancel

----End

## Creating a DRS Synchronization Task

- Step 1** Log in to the [management console](#).
- Step 2** Click in the upper left corner and select a region.
- Step 3** Click the service list icon on the left and choose **Databases > Data Replication Service**.
- Step 4** Choose **Data Synchronization Management** and click **Create Synchronization Task**.
- Step 5** Configure synchronization task parameters.
  1. Specify a synchronization task name.

Billing Mode  Yearly/Monthly  Pay-per-use

Region

Regions are geographic areas isolated from each other. For low network latency and quick resource access, select the nearest region.

Project

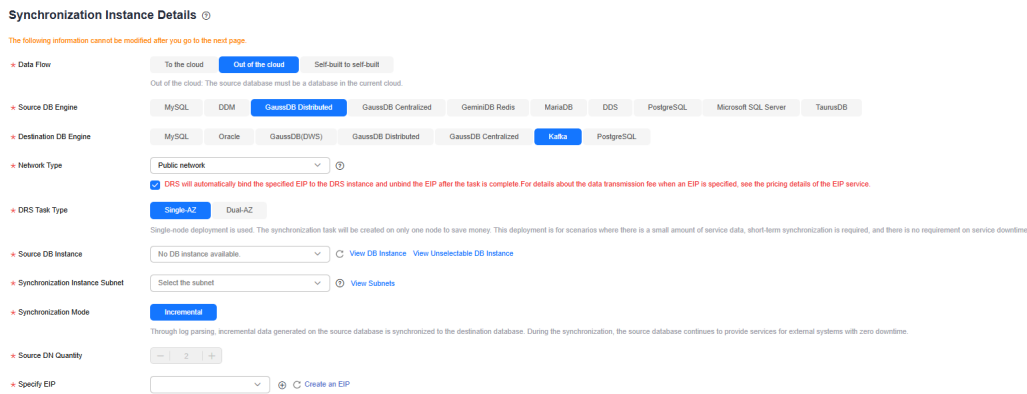
\* Task Name  ?

Description  ?

0/256

2. Select the source database, destination database, and network information. Select the GaussDB instance created in [Creating a Distributed GaussDB Instance](#) as the source database.

Figure 4-42 Synchronization instance details



3. Select specifications and AZ.



**Step 6** Click **Create Now**.

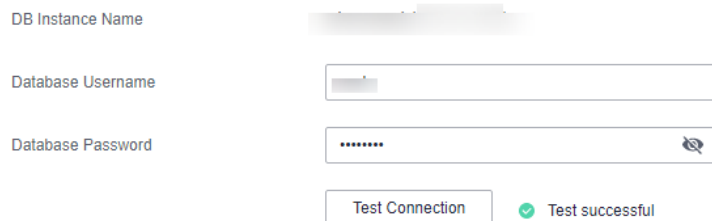
The synchronization instance is being created. It takes about 5 to 10 minutes.

**Step 7** Configure source and destination database information.

1. Configure source database information.
2. Click **Test Connection**.

If a successful test message is returned, the database is connected.

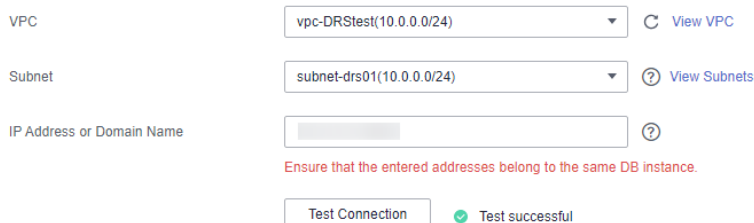
**Source Database**



3. Select the VPC and subnet where the destination database is located, and enter the Kafka IP address and port number.
4. Click **Test Connection**.

If a successful test message is returned, the database is connected.

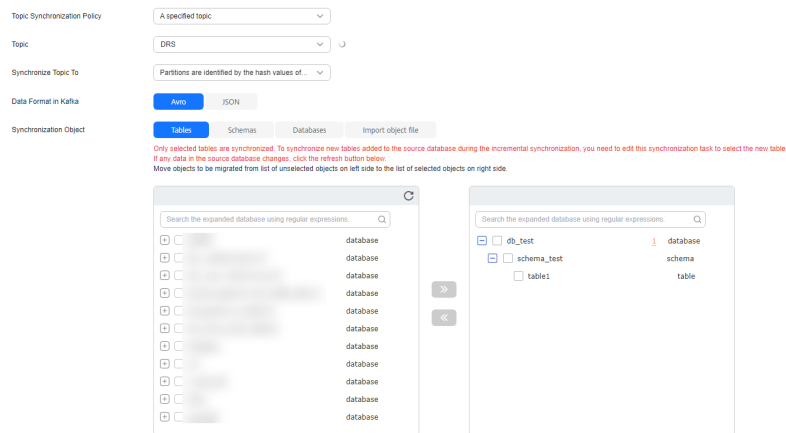
**Destination Database**



**Step 8** Click **Next**.

**Step 9** Select the synchronization information, policy, message format, and object, and the format of the message sent to the Kafka.

The following table lists the settings.



**Table 4-30** Synchronization settings

| Type                         | Setting                                                                                                                                                                                                            |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic Synchronization Policy | Deliver the content to a topic named <b>testTopic</b> . Different topic policies correspond to different Kafka partition policies. For details, see <a href="#">Topic and Partition Synchronization Policies</a> . |
| Synchronize Topic To         | <b>Partition 0</b><br>Different topic policies correspond to different Kafka partition policies. For details, see <a href="#">Topic and Partition Synchronization Policies</a> .                                   |
| Data Format in Kafka         | You can select the JSON format. For details, see <a href="#">Kafka Message Format</a> .                                                                                                                            |
| Synchronization Object       | Select <b>schema_test.table1</b> in the <b>db_test</b> database.                                                                                                                                                   |

**Step 10** Click **Next** and wait for the check results.

**Step 11** If the check is complete and the check success rate is 100%, click **Next**.

**Step 12** After confirming that the synchronization task information is correct, click **Next**.

Return to the **Data Synchronization Management** page and check the synchronization task status.

It takes several minutes to complete.

If the status changes to **Incremental**, the synchronization task has been started.

 NOTE


- In this example, **Synchronization Mode** is set to **Incremental** for the task from GaussDB Distributed to Kafka. After the task is started, the status is **Incremental**.
- If you create a full+incremental synchronization task, a full synchronization is executed first. After the full synchronization is complete, an incremental synchronization starts.
- During the incremental synchronization, data is continuously synchronized, so the task will not automatically stop.

----End

## Confirming the Results

In this practice, DRS continuously synchronizes the incremental data generated in the source database to the destination database until you stop the task. The following describes how to verify the synchronization results by inserting data to the source GaussDB database and viewing the data received by Kafka.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Databases > GaussDB**.

**Step 4** Locate the required GaussDB instance and choose **More > Log In**.

**Step 5** In the displayed dialog box, enter the password and click **Test Connection**.

**Step 6** After the connection is successful, click **Log In**.

**Step 7** Run the following statement to insert data to the **db\_test.schema\_test.table1** table.

```
insert into schema_test.table1 values(1,'testKafka',current_timestamp(6));
update schema_test.table1 set c2 ='G2K' where c1 =1;
delete schema_test.table1 where c1 =1;
```

**Step 8** On the Kafka client, check the received data in JSON format.

```
./kafka-console-consumer.sh --bootstrap-server ip:port --topic testTopic --from-beginning
```

```

{"columnType":{"c3":"timestamp without time zone","c1":"integer","c2":"character varying"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","opt
ype":"INSERT","id":145,"res":"1711442532656","ts":"1711442533338","database":"db_test","table":"table1","type":"INSERT","isDDL":false,"sql":"","sqlType":{"c3":"16","c1":"3","c2"
10},"data":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"testKafka"},"old":null,"pkNames":["c1"]}
{"columnType":{"c3":"timestamp without time zone","c1":"integer","c2":"character varying"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","opt
ype":"UPDATE","id":181,"res":"1711442854170","ts":"1711442854724","database":"db_test","table":"table1","type":"UPDATE","isDDL":false,"sql":"","sqlType":{"c3":"16","c1":"3","c2"
10},"data":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"G2K"},"old":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"testKafka"},"pkNames":["c1"]}
{"columnType":{"c1":"integer"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","optype":"DELETE","id":187,"res":"1711442877418","ts":"1711442877979"
,"database":"db_test","table":"table1","type":"DELETE","isDDL":false,"sql":"","sqlType":{"c1":"3"},"data":null,"old":{"c1":"1"},"pkNames":["c1"]}
^CProcessed a total of 3 message
root@auto-km-kafka bjin# ./kafka-console-consumer.sh --bootstrap-server 192.168.1.10:9092 --topic testTopic --from-beginning
{"columnType":{"c3":"timestamp without time zone","c1":"integer","c2":"character varying"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","opt
ype":"INSERT","id":145,"res":"1711442532656","ts":"1711442533338","database":"db_test","table":"table1","type":"INSERT","isDDL":false,"sql":"","sqlType":{"c3":"16","c1":"3","c2"
10},"data":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"testKafka"},"old":null,"pkNames":["c1"]}
{"columnType":{"c3":"timestamp without time zone","c1":"integer","c2":"character varying"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","opt
ype":"UPDATE","id":181,"res":"1711442854170","ts":"1711442854724","database":"db_test","table":"table1","type":"UPDATE","isDDL":false,"sql":"","sqlType":{"c3":"16","c1":"3","c2"
10},"data":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"G2K"},"old":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"testKafka"},"pkNames":["c1"]}
{"columnType":{"c1":"integer"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","optype":"DELETE","id":187,"res":"1711442877418","ts":"1711442877979"
,"database":"db_test","table":"table1","type":"DELETE","isDDL":false,"sql":"","sqlType":{"c1":"3"},"data":null,"old":{"c1":"1"},"pkNames":["c1"]}

```

**Step 9** Stop the synchronization task.

If all data has been synchronized to the destination database, you can stop the current task.

1. Locate the task and click **Stop** in the **Operation** column.
2. In the display box, click **Yes**.

----End



## Topic and Partition Synchronization Policies

Table 4-31 Topic and partition policies

| Topic Policy                                                                                                    | Available Partition Policies                                                                    | Description                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A specified topic</b><br>Select <b>A specified topic</b> if the data volume of the source database is small. | Partitions are differentiated by the hash values of <i>database_name.schema_name.table_name</i> | This mode is recommended in single-table query scenarios where the read and write performance on the single table can be improved.                                                                                                  |
|                                                                                                                 | Partition 0                                                                                     | If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.                                                                                                                    |
|                                                                                                                 | Partitions are identified by the hash values of the primary key                                 | This mode applies to scenarios where one table corresponds to one topic, preventing table data from being written to the same partition, so that consumers can obtain data from different partitions concurrently.                  |
|                                                                                                                 | Partitions are differentiated by the hash values of <i>database_name.schema_name</i>            | This mode applies to scenarios where one database corresponds to one topic, preventing data of multiple schemas from being written to the same partition, so that consumers can obtain data from different partitions concurrently. |

| Topic Policy                                                                                                                                                                                                                          | Available Partition Policies                                                                | Description                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                       | Partitions are differentiated by the hash values of <i>database_name.DN_sequence_number</i> | This mode applies to scenarios where multiple databases correspond to one topic, preventing data of multiple data nodes from being written to the same partition, so that consumers can obtain data from different partitions concurrently.                                           |
|                                                                                                                                                                                                                                       | Partitions are differentiated by the hash values of <i>non-primary-key columns</i>          | This mode is for when one table corresponds to one topic, preventing table data from being written to the same partition. Users can customize message keys based on the hash values of non-primary-key columns, and consumers can obtain data from different partitions concurrently. |
| <p><b>Automatically generated using the database_name-schema_name-table_name format</b></p> <p>If each table contains a lot of data, select <b>Automatically generated using the database_name-schema_name-table_name format.</b></p> | Partition 0                                                                                 | If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.                                                                                                                                                                      |
|                                                                                                                                                                                                                                       | Partitions are identified by the hash values of the primary key                             | This mode applies to scenarios where one table corresponds to one topic, preventing table data from being written to the same partition, so that consumers can obtain data from different partitions concurrently.                                                                    |

| Topic Policy                                                                                                                                                                                     | Available Partition Policies                                                                    | Description                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                  | Partitions are differentiated by the hash values of <i>non-primary-key columns</i>              | This mode is for when one table corresponds to one topic, preventing table data from being written to the same partition. Users can customize message keys based on the hash values of non-primary-key columns, and consumers can obtain data from different partitions concurrently. |
| <p><b>Automatically generated based on the database name</b></p> <p>If the source database does not contain a lot of data, select <b>Automatically generated based on the database name.</b></p> | Partitions are differentiated by the hash values of <i>database_name.schema_name.table_name</i> | This mode is recommended in single-table query scenarios where the read and write performance on the single table can be improved.                                                                                                                                                    |
|                                                                                                                                                                                                  | Partition 0                                                                                     | If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.                                                                                                                                                                      |
|                                                                                                                                                                                                  | Partitions are differentiated by the hash values of <i>database_name.schema_name</i>            | This mode applies to scenarios where one database corresponds to one topic, preventing data of multiple schemas from being written to the same partition, so that consumers can obtain data from different partitions concurrently.                                                   |
|                                                                                                                                                                                                  | Partitions are differentiated by the hash values of <i>database_name.DN_sequence_number</i>     | This mode applies to scenarios where one database corresponds to one topic, preventing data of multiple DNs from being written to the same partition, so that consumers can obtain data from different partitions concurrently.                                                       |

| Topic Policy                                                                                                                                                                                                                        | Available Partition Policies                                                                    | Description                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Automatically generated using the database_name-schema_name format</b><br>If each schema contains a lot of data, select <b>Automatically generated using the database_name-schema_name format</b> .                              | Partitions are differentiated by the hash values of <i>database_name.schema_name.table_name</i> | This mode is recommended in single-table query scenarios where the read and write performance on the single table can be improved.                                                                                                  |
|                                                                                                                                                                                                                                     | Partition 0                                                                                     | If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.                                                                                                                    |
| <b>Automatically generated using the database_name-DN_sequence_number format</b><br>If there is a large amount of data on each data node, select <b>Automatically generated using the database_name-DN_sequence_number format</b> . | Partitions are differentiated by the hash values of <i>database_name.schema_name.table_name</i> | This mode is recommended in single-table query scenarios where the read and write performance on the single table can be improved.                                                                                                  |
|                                                                                                                                                                                                                                     | Partitions are differentiated by the hash values of <i>database_name.schema_name</i>            | This mode applies to scenarios where one database corresponds to one topic, preventing data of multiple schemas from being written to the same partition, so that consumers can obtain data from different partitions concurrently. |
|                                                                                                                                                                                                                                     | Partition 0                                                                                     | If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.                                                                                                                    |

## 4.10 From GaussDB Centralized to Kafka

### Description

This practice describes how to create a DRS synchronization task to synchronize incremental data from GaussDB Centralized to Kafka.

## Prerequisites

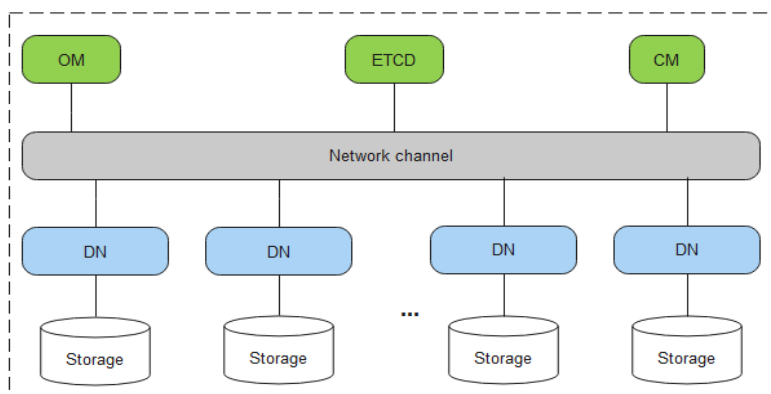
- You have registered with Huawei Cloud.
- Your account balance is greater than or equal to \$0 USD.
- You have logged in to the DRS console.

## Service List

- Virtual Private Cloud (VPC)
- GaussDB Centralized
- DMS for Kafka
- Data Replication Service (DRS)

## Architecture of a Primary/Standby GaussDB Instance

**Figure 4-43** Logical architecture of a primary/standby GaussDB instance



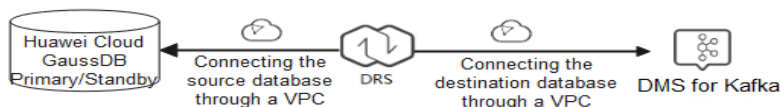
GaussDB Centralized consists of Operation Manager (OM), Cluster Manager (CM), and Data Node (DN). An application sends a task directly to the DN, and the DN returns the result to the application after processing the task.

Primary/Standby instances are suitable for scenarios with small and stable volumes of data, where data reliability and service availability are extremely important.

## DRS synchronization network diagram

In this example, the source is a centralized GaussDB instance, and the destination is a DMS for Kafka instance. Incremental data of the source database is synchronized to the destination database through a VPC. The following figure shows the deployment architecture.

**Figure 4-44** Data synchronization from GaussDB Centralized to Kafka through a VPC



## Notes on Usage

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- The test data is for reference only. For more information about DRS, click [here](#).

## Resource Planning

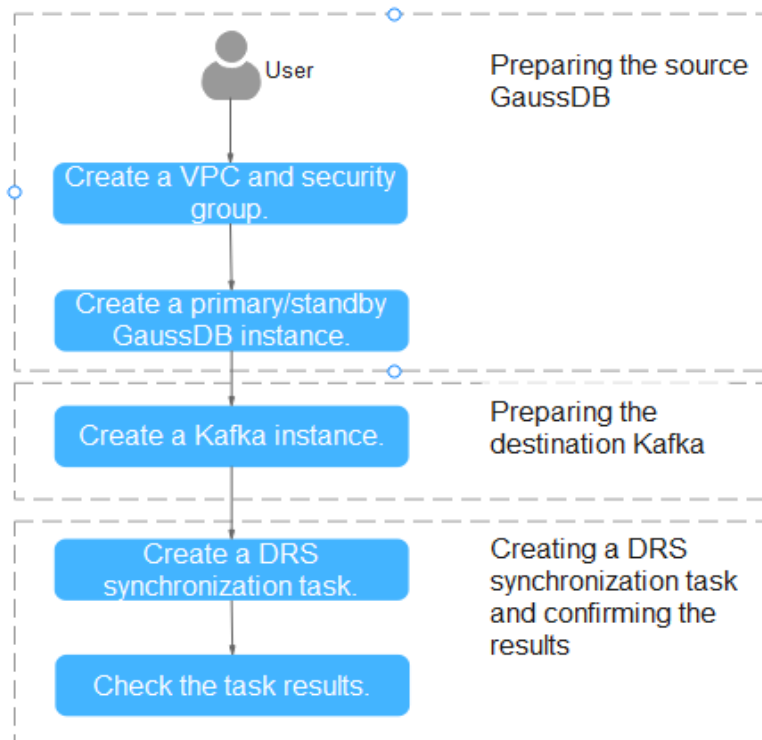
**Table 4-32** Resource planning

| Category                  | Subcategory       | Planned Value                   | Description                                                                    |
|---------------------------|-------------------|---------------------------------|--------------------------------------------------------------------------------|
| VPC                       | VPC name          | vpc-DRStest                     | Specify a name that is easy to identify.                                       |
|                           | Subnet CIDR block | 10.0.0.0/24                     | Select a subnet with sufficient network resources.                             |
|                           | Region            | AP-Singapore                    | To achieve lower network latency, select the region nearest to you.            |
|                           | Subnet name       | subnet-drs01                    | Specify a name that is easy to identify.                                       |
| GaussDB (source database) | Instance name     | drs-gaussdb-src-1               | Specify a name that is easy to identify.                                       |
|                           | DB engine version | GaussDB 8.1.0                   | -                                                                              |
|                           | DB instance type  | Primary/standby                 | Select a proper instance type based on its description.                        |
|                           | Storage type      | Ultra-high I/O                  | GaussDB supports ultra-high I/O storage with a maximum throughput of 350 MB/s. |
|                           | Specifications    | General-purpose 4 vCPUs   16 GB | Select the specifications as needed.                                           |

| Category                     | Subcategory               | Planned Value       | Description                                                                                                                                                                                             |
|------------------------------|---------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kafka (destination database) | Kafka instance name       | kafka-drs           | Specify a name that is easy to identify.                                                                                                                                                                |
|                              | Version                   | 2.3.0               | -                                                                                                                                                                                                       |
|                              | AZ                        | AZ 3                | You can select one, three, or more AZs. You are advised to create the instance across different AZs to improve service reliability.                                                                     |
|                              | Specifications            | c6.2u4g.cluster     | -                                                                                                                                                                                                       |
|                              | Brokers                   | 3                   | -                                                                                                                                                                                                       |
|                              | Storage space             | High I/O, 200 GB    | The storage space is used to store messages (including replicas). Kafka uses three replicas by default. In addition to storing messages, some space needs to be reserved for storing logs and metadata. |
| DRS synchronization task     | Synchronization task name | DRS-GaussDBToKafka  | Specify a name that is easy to identify.                                                                                                                                                                |
|                              | Source DB engine          | GaussDB Centralized | -                                                                                                                                                                                                       |
|                              | Destination DB engine     | Kafka               | In this example, the destination database is a Kafka instance.                                                                                                                                          |
|                              | Network type              | VPC                 | When creating a task, select <b>VPN or Direct Connect</b> .                                                                                                                                             |

## Flowchart


The following figure shows the process of creating a DRS task and synchronizing the incremental data from a centralized GaussDB instance to Kafka.



## Creating a VPC

Create a VPC to prepare network resources for creating a GaussDB instance.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** Click **Create VPC**.



**Basic Information**

Region: [Region]

Name: vpc-drs1test

IPv4 CIDR Block: 10.0.0.0 / 24

Enterprise Project: default

**Advanced Settings**

**Default Subnet**

AZ: az1

Name: subnet-drs01

IPv4 CIDR Block: 10.0.0.0 / 24

IPv6 CIDR Block:  Enable

Associated Route Table: Default

**Step 5** Configure parameters as needed and click **Create Now**.

**Step 6** Return to the VPC list and check whether the VPC is created.


If the VPC status becomes available, the VPC has been created.

----End

## Creating a Security Group

Create a security group for creating a GaussDB instance.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Networking > Virtual Private Cloud**.

The VPC console is displayed.

**Step 4** In the navigation pane, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Step 6** Configure parameters as needed.

✕

### Create Security Group

★ Name

★ Enterprise Project  [Create Enterprise Project](#) ?

★ Template

Description 

The security group is for general-purpose web servers and includes default rules that allow all inbound ICMP traffic and inbound traffic on ports 22, 80, 443, and 3389. The security group is used for remote login, ping, and hosting a website on ECSs.

0/255

[Show Default Rule](#) ▼

OK
Cancel


**Step 7** Click **OK**.

-----End

## Creating a Primary/Standby GaussDB Instance

The following describes how to create a primary/standby GaussDB instance as the destination database.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Databases > GaussDB**.

**Step 4** Click **Buy DB Instance**.

**Step 5** Configure the instance name and basic information.

Billing Mode Pay-as-you-go Prepaid ⓘ

Region

Project

---

DB Instance Name

Edition Type Enterprise edition Basic edition

|            |            |            |            |            |            |            |            |            |            |            |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| V2.0-R.201 | V2.0-R.202 | V2.0-R.201 | V2.0-R.200 | V2.0-R.112 | V2.0-R.110 | V2.0-R.103 | V2.0-R.102 | V2.0-R.101 | V2.0-R.100 | V2.0-R.5   |
| V2.0-R.1   | V2.0-R.0   | V2.0-R.300 | V2.0-R.227 | V2.0-R.208 | V2.0-R.223 | V2.0-R.222 | V2.0-R.221 | V2.0-R.220 | V2.0-R.208 | V2.0-R.207 |
| V2.0-R.201 | V2.0-R.200 | V2.0-R.103 | V2.0-R.100 | V2.0-R.8   | V2.0-R.7   | V2.0-R.3   | V2.0-R.1.4 |            |            |            |

The current engine uses Huawei Cloud EulerOS by default. A DR relationship cannot be created between instances using this engine and those running EulerOS.

DB Instance Type Distributed Centralized

Deployment Model 1 primary + 1 standby + 1 log Single 1 primary + 2 standby ⓘ

Replica Consistency Protocol Full ⓘ

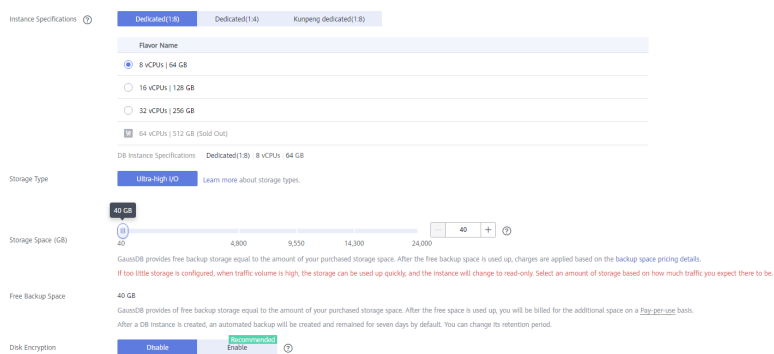
AZ

Only one or three AZs can be selected.

Log AZ az1 az2 az3

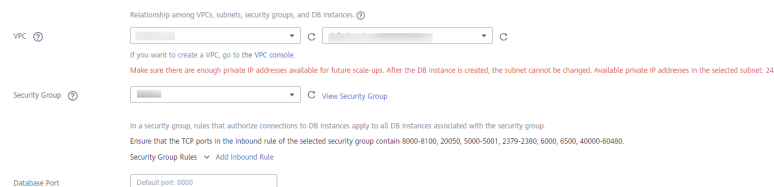
Time Zone

**Step 6** Configure instance specifications.

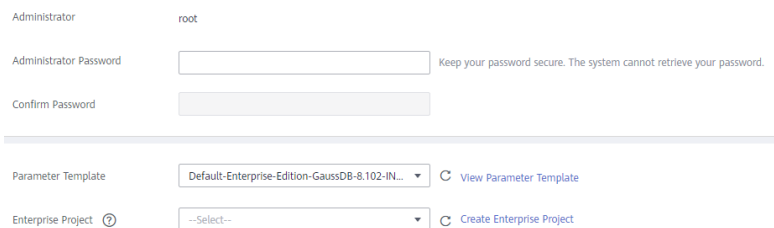


Select small specifications for this test instance. You are advised to configure specifications based on service requirements in actual use.

**Step 7** Select a VPC and security group (created in [Creating a VPC](#) and [Creating a Security Group](#)) for the instance and configure the database port.



**Step 8** Configure password and other information.



**Step 9** Click **Next**, confirm the information, and click **Submit**.


**Step 10** Go to the instance list.

If the instance status becomes available, the instance has been created.

----End

## Constructing Test Data for the GaussDB Instance

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Databases > GaussDB**.

**Step 4** Select the target GaussDB instance and choose **More > Log In**.

**Step 5** In the displayed dialog box, enter the password and click **Test Connection**.

**Step 6** After the connection is successful, click **Log In**.

**Step 7** Click **Create Database** to create the **db\_test** database.

**Create Database** [X]

\* Name:

Only user databases can be created

Character Set:

Template:

Collation:

Ctype:

DBCOMPATIBILITY:

OK Cancel


**Step 8** Run the following statement in **db\_test** to create table **schema\_test.table1**:

```
create table schema_test.table1(c1 int primary key,c2 varchar(10),c3 TIMESTAMP(6));
```

----End

## Creating a Kafka Instance

The following describes how to create a Kafka instance.

- Step 1** Log in to the [management console](#).
- Step 2** Click  in the upper left corner and select a region.
- Step 3** Click the service list icon on the left and choose **Middleware > Distributed Message Service (for Kafka)**.
- Step 4** Click **Buy Instance**.
- Step 5** Select the instance region and AZ.

Billing Mode:  Yearly/Monthly  Pay-per-use

Region:

Project:

AZ:  A21  A22  A23  A25  A26

Select one AZ or at least three AZs. Do not select two AZs. Learn more  
The more AZs selected, the better the reliability and SLA coverage.

**Step 6** Configure the instance name and specifications.

Instance Name: kafka-drs

Enterprise Project: default

Version: 2.3.0

CPU Architecture: x86

| Flavor Name                                      | ECS Flavor   | TPS Limit per Broker | Maximum Partitions per Brok... | Recommended Consumer Gr... |
|--------------------------------------------------|--------------|----------------------|--------------------------------|----------------------------|
| <input checked="" type="radio"/> c5.2u4g.cluster | c5.large.2   | 30,000               | 250                            | 4,000                      |
| <input type="radio"/> c5.4u8g.cluster            | c5.xlarge.2  | 100,000              | 500                            | 4,000                      |
| <input type="radio"/> c5.8u16g.cluster           | c5.2xlarge.2 | 150,000              | 1,000                          | 4,000                      |
| <input type="radio"/> c5.12u24g.cluster          | c5.3xlarge.2 | 200,000              | 1,500                          | 4,000                      |
| <input type="radio"/> c5.16u32g.cluster          | c5.4xlarge.2 | 250,000              | 2,000                          | 4,000                      |

To ensure stable services, choose a bandwidth 30% higher than what is required under normal conditions.

common\_current\_spec: c5.2u4g.cluster | ECS Flavor c5.large.2 | TPS Limit per Broker 30,000 | Maximum Partitions per Broker 250 | Recommended Consumer Groups per Broker 4,000

Instances created with the selected specifications do not support dynamic enabling/disabling of dumping.

Brokers: 3

**Step 7** Select the storage space and capacity threshold policy.

Storage Space: High I/O, 200 GB

Total storage space: 600 GB

After the instance is created, you cannot change the disk type or reduce the storage space. Learn more about disk types.

Capacity Threshold Policy: Automatically delete, Stop production

**Step 8** Select a VPC and security group (created in **Creating a VPC** and **Creating a Security Group**) for the instance.

VPC: vpc-DRStest, subnet-drs01

You cannot change the selected VPC and subnet after the instance is created. You can also create a new VPC.

Security Group: sg-DRS01

**Step 9** Configure the instance password.

Manager Username: root

Password: [masked]

Confirm Password: [masked]

Username for logging in to Kafka Manager. You cannot modify the username after the instance is created.

**Step 10** Click **Buy**, confirm the information, and click **Submit**.

**Step 11** Go to the instance list.

If the status of the Kafka instance becomes **Running**, the instance has been created.

----End

**Creating a Kafka Topic**

**Step 1** Click a Kafka instance.

**Step 2** Choose **Topics**, and click **Create Topic**.

**Step 3** In the dialog box that is displayed, enter a topic name, specify other parameters, and click **OK**.

**Create Topic**
✕

---

Topic Name

Partitions    Value range: 1 to 100

Number of partitions in the topic. Messages in the topic will be distributed to these partitions to achieve scalability and fault tolerance.

Replicas    Value range: 1 to 3

Number of message copies. This number is fixed once the topic is created.

Aging Time (h)    Value range: 1 to 168

Time after which data in the topic expires.

Synchronous Replication  ?

Synchronous Flushing

----End

## Creating a DRS Synchronization Task

- Step 1** Log in to the [management console](#).
- Step 2** Click in the upper left corner and select a region.
- Step 3** Click the service list icon on the left and choose **Databases > Data Replication Service**.
- Step 4** Choose **Data Synchronization Management** and click **Create Synchronization Task**.
- Step 5** Configure synchronization task parameters.

1. Specify a synchronization task name.

Billing Mode  Yearly/Monthly  Pay-per-use

Region

Regions are geographic areas isolated from each other. For low network latency and quick resource access, select the nearest region.

Project

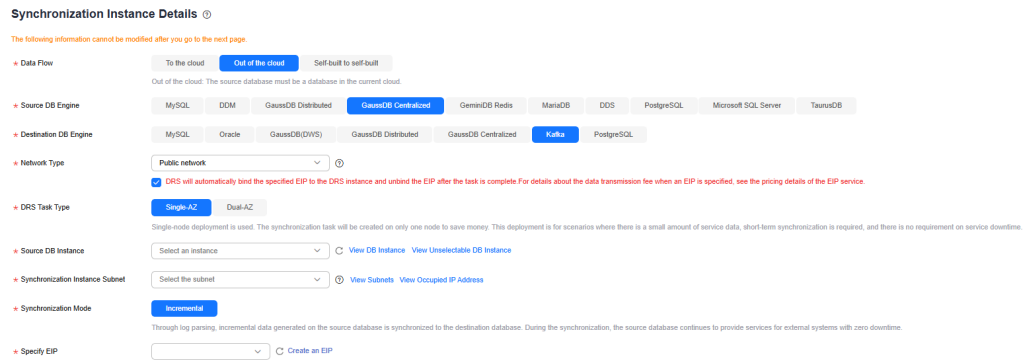
\* Task Name  ?

Description  ?

0/256

2. Select the source database, destination database, and network information. Select the GaussDB instance created in [Creating a Primary/Standby GaussDB Instance](#) as the source database.

**Figure 4-45** Synchronization instance details



3. Select specifications and AZ.



**Step 6** Click **Create Now**.

The synchronization instance is being created. It takes about 5 to 10 minutes.

**Step 7** Configure source and destination database information.

1. Configure source database information.
2. Click **Test Connection**.

If a successful test message is returned, the database is connected.

**Source Database**

DB Instance Name: [Redacted]

Database Username: [Redacted]

Database Password: [Redacted]

**Test Connection** ✔ Test successful

3. Select the VPC and subnet where the destination database is located, and enter the Kafka IP address and port number.
4. Click **Test Connection**.

If a successful test message is returned, the database is connected.

**Destination Database**

VPC: vpc-DRStest(10.0.0.0/24) 🔄 View VPC

Subnet: subnet-drs01(10.0.0.0/24) 🔍 View Subnets

IP Address or Domain Name: [Redacted] 🔍

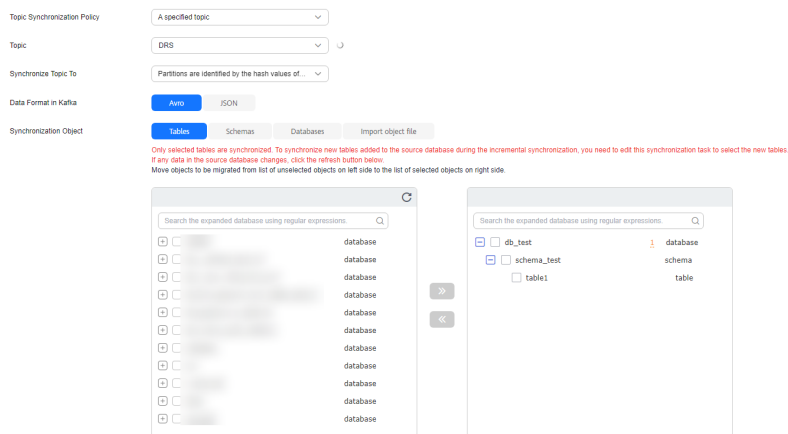
Ensure that the entered addresses belong to the same DB instance.

**Test Connection** ✔ Test successful

**Step 8** Click **Next**.

**Step 9** Select the synchronization information, policy, message format, and object, and the format of the message sent to the Kafka.

The following table lists the settings.



**Table 4-33** Synchronization settings

| Type                         | Setting                                                                                                                                                                                                               |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic Synchronization Policy | Deliver the content to a topic named <b>testTopic</b> .<br>Different topic policies correspond to different Kafka partition policies. For details, see <a href="#">Topic and Partition Synchronization Policies</a> . |
| Synchronize Topic To         | <b>Partition 0</b><br>Different topic policies correspond to different Kafka partition policies. For details, see <a href="#">Topic and Partition Synchronization Policies</a> .                                      |
| Data Format in Kafka         | You can select the JSON format. For details, see <a href="#">Kafka Message Format</a> .                                                                                                                               |
| Synchronization Object       | Select <b>schema_test.table1</b> in the <b>db_test</b> database.                                                                                                                                                      |

**Step 10** Click **Next** and wait for the check results.

**Step 11** If the check is complete and the check success rate is 100%, click **Next**.

**Step 12** After confirming that the synchronization task information is correct, click **Next**.

Return to the **Data Synchronization Management** page and check the synchronization task status.

It takes several minutes to complete.

If the status changes to **Incremental**, the synchronization task has been started.



 NOTE


- In this example, **Synchronization Mode** is set to **Incremental** for the task from GaussDB Primary/Standby to Kafka. After the task is started, the status is **Incremental**.
- If you create a full+incremental synchronization task, a full synchronization is executed first. After the full synchronization is complete, an incremental synchronization starts.
- During the incremental synchronization, data is continuously synchronized, so the task will not automatically stop.

----End

## Confirming the Results

In this practice, DRS continuously synchronizes the incremental data generated in the source database to the destination database until you stop the task. The following describes how to verify the synchronization results by inserting data to the source GaussDB database and viewing the data received by Kafka.

**Step 1** Log in to the [management console](#).

**Step 2** Click  in the upper left corner and select a region.

**Step 3** Click the service list icon on the left and choose **Databases > GaussDB**.

**Step 4** Locate the required GaussDB instance and choose **More > Log In**.

**Step 5** In the displayed dialog box, enter the password and click **Test Connection**.

**Step 6** After the connection is successful, click **Log In**.

**Step 7** Run the following statement to insert data to the **db\_test.schema\_test.table1** table.

```
insert into schema_test.table1 values(1,'testKafka',current_timestamp(6));
update schema_test.table1 set c2 ='G2K' where c1 =1;
delete schema_test.table1 where c1 =1;
```

**Step 8** On the Kafka client, check the received data in JSON format.

```
./kafka-console-consumer.sh --bootstrap-server ip:port --topic testTopic --from-beginning
```

```

{"columnType":{"c3":"timestamp without time zone","c1":"integer","c2":"character varying"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","optType":"INSERT","id":145,"res":"1711442532656","ts":"1711442533338","database":"db_test","table":"table1","type":"INSERT","isDDL":false,"sql":"","sqlType":{"c3":"16","c1":"3","c2":"10"},"data":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"testKafka"},"old":null,"pkNames":["c1"]}
{"columnType":{"c3":"timestamp without time zone","c1":"integer","c2":"character varying"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","optType":"UPDATE","id":181,"res":"1711442854170","ts":"1711442854724","database":"db_test","table":"table1","type":"UPDATE","isDDL":false,"sql":"","sqlType":{"c3":"16","c1":"3","c2":"10"},"data":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"G2K"},"old":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"testKafka"},"pkNames":["c1"]}
{"columnType":{"c1":"integer"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","optType":"DELETE","id":187,"res":"1711442877418","ts":"1711442877979","database":"db_test","table":"table1","type":"DELETE","isDDL":false,"sql":"","sqlType":{"c1":"3"},"data":null,"old":{"c1":"1"},"pkNames":["c1"]}
Processed a total of 3 message
root@auto-km-kafka bjin# ./kafka-console-consumer.sh --bootstrap-server XXXXXXXXXXXX:3092 --topic testTopic --from-beginning
{"columnType":{"c3":"timestamp without time zone","c1":"integer","c2":"character varying"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","optType":"INSERT","id":145,"res":"1711442532656","ts":"1711442533338","database":"db_test","table":"table1","type":"INSERT","isDDL":false,"sql":"","sqlType":{"c3":"16","c1":"3","c2":"10"},"data":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"testKafka"},"old":null,"pkNames":["c1"]}
{"columnType":{"c3":"timestamp without time zone","c1":"integer","c2":"character varying"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","optType":"UPDATE","id":181,"res":"1711442854170","ts":"1711442854724","database":"db_test","table":"table1","type":"UPDATE","isDDL":false,"sql":"","sqlType":{"c3":"16","c1":"3","c2":"10"},"data":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"G2K"},"old":{"c3":"2024-03-26 16:42:12.654","c1":"1","c2":"testKafka"},"pkNames":["c1"]}
{"columnType":{"c1":"integer"},"dbType":"GaussDB(for openGauss) Primary/Standby","schema":"schema_test","optType":"DELETE","id":187,"res":"1711442877418","ts":"1711442877979","database":"db_test","table":"table1","type":"DELETE","isDDL":false,"sql":"","sqlType":{"c1":"3"},"data":null,"old":{"c1":"1"},"pkNames":["c1"]}

```

**Step 9** Stop the synchronization task.

If all data has been synchronized to the destination database, you can stop the current task.

1. Locate the task and click **Stop** in the **Operation** column.
2. In the display box, click **Yes**.

----End

## Topic and Partition Synchronization Policies

Table 4-34 Topic and partition policies

| Topic Policy                                                                                                    | Available Partition Policies                                                                    | Description                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A specified topic</b><br>Select <b>A specified topic</b> if the data volume of the source database is small. | Partitions are differentiated by the hash values of <i>database_name.schema_name.table_name</i> | This mode is recommended in single-table query scenarios where the read and write performance on the single table can be improved.                                                                                                  |
|                                                                                                                 | Partition 0                                                                                     | If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.                                                                                                                    |
|                                                                                                                 | Partitions are identified by the hash values of the primary key                                 | This mode applies to scenarios where one table corresponds to one topic, preventing table data from being written to the same partition, so that consumers can obtain data from different partitions concurrently.                  |
|                                                                                                                 | Partitions are differentiated by the hash values of <i>database_name.schema_name</i>            | This mode applies to scenarios where one database corresponds to one topic, preventing data of multiple schemas from being written to the same partition, so that consumers can obtain data from different partitions concurrently. |

| Topic Policy                                                                                                                                                                                                                          | Available Partition Policies                                                       | Description                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                       | Partitions are differentiated by the hash values of <i>non-primary-key columns</i> | This mode is for when one table corresponds to one topic, preventing table data from being written to the same partition. Users can customize message keys based on the hash values of non-primary-key columns, and consumers can obtain data from different partitions concurrently. |
| <p><b>Automatically generated using the database_name-schema_name-table_name format</b></p> <p>If each table contains a lot of data, select <b>Automatically generated using the database_name-schema_name-table_name format.</b></p> | Partition 0                                                                        | If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.                                                                                                                                                                      |
|                                                                                                                                                                                                                                       | Partitions are identified by the hash values of the primary key                    | This mode applies to scenarios where one table corresponds to one topic, preventing table data from being written to the same partition, so that consumers can obtain data from different partitions concurrently.                                                                    |
|                                                                                                                                                                                                                                       | Partitions are differentiated by the hash values of <i>non-primary-key columns</i> | This mode is for when one table corresponds to one topic, preventing table data from being written to the same partition. Users can customize message keys based on the hash values of non-primary-key columns, and consumers can obtain data from different partitions concurrently. |

| Topic Policy                                                                                                                                                                                                  | Available Partition Policies                                                                           | Description                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Automatically generated based on the database name</b><br/>If the source database does not contain a lot of data, select <b>Automatically generated based on the database name.</b></p>                 | <p>Partitions are differentiated by the hash values of <i>database_name.schema_name.table_name</i></p> | <p>This mode is recommended in single-table query scenarios where the read and write performance on the single table can be improved.</p>                                                                                                  |
|                                                                                                                                                                                                               | <p>Partition 0</p>                                                                                     | <p>If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.</p>                                                                                                                    |
|                                                                                                                                                                                                               | <p>Partitions are differentiated by the hash values of <i>database_name.schema_name</i></p>            | <p>This mode applies to scenarios where one database corresponds to one topic, preventing data of multiple schemas from being written to the same partition, so that consumers can obtain data from different partitions concurrently.</p> |
| <p><b>Automatically generated using the database_name-schema_name format</b><br/>If each schema contains a lot of data, select <b>Automatically generated using the database_name-schema_name format.</b></p> | <p>Partitions are differentiated by the hash values of <i>database_name.schema_name.table_name</i></p> | <p>This mode is recommended in single-table query scenarios where the read and write performance on the single table can be improved.</p>                                                                                                  |
|                                                                                                                                                                                                               | <p>Partition 0</p>                                                                                     | <p>If topics are synchronized to partition 0, strong consistency can be obtained but write performance is impacted.</p>                                                                                                                    |

# 5 Real-Time Disaster Recovery

---

## 5.1 Configuring Remote Single-Active DR for an RDS for MySQL Instance Using DRS

### 5.1.1 Overview

#### Scenarios

This best practice involves two tasks:

- Create an RDS for MySQL instance.
- Use DRS to establish a remote single-active DR relationship for the RDS for MySQL instance.

#### Prerequisites

- You have registered with Huawei Cloud.
- Your account balance is at least \$0 USD.

#### How Cross-Region DR Works

RDS for MySQL instances are deployed in the production and DR data centers. DRS replicates data from the production center to the DR center, keeping data synchronous between your primary instance and the DR instance.

#### Service List

- Virtual Private Cloud (VPC)
- Elastic IP (EIP)
- Relational Database Service (RDS)
- Data Replication Service (DRS)

## Notes on Usage

- The resource planning in this best practice is for demonstration only. Adjust it as needed.
- All settings in this best practice are for reference only. For more information about RDS for MySQL instance DR, see [From MySQL to MySQL \(Single-Active DR\)](#).

## 5.1.2 Resource Planning

**Table 5-1** Resource planning

| Category                                        | Subcategory       | Planned Value   | Description                                                         |
|-------------------------------------------------|-------------------|-----------------|---------------------------------------------------------------------|
| VPC in the production center                    | VPC name          | vpc-01          | Specify a name that is easy to identify.                            |
|                                                 | Region            | CN-Hong Kong    | To achieve lower network latency, select the region nearest to you. |
|                                                 | AZ                | AZ2             | -                                                                   |
|                                                 | Subnet            | 192.168.0.0/24  | Select a subnet with sufficient network resources.                  |
|                                                 | Subnet name       | subnet-3c29     | Specify a name that is easy to identify.                            |
| VPC in the DR center                            | VPC name          | vpc-DR          | Specify a name that is easy to identify.                            |
|                                                 | Region            | AP-Singapore    | To achieve lower network latency, select the region nearest to you. |
|                                                 | AZ                | AZ1             | -                                                                   |
|                                                 | Subnet            | 192.168.0.0/24  | Select a subnet with sufficient network resources.                  |
|                                                 | Subnet name       | subnet-ac27     | Specify a name that is easy to identify.                            |
| RDS for MySQL instance in the production center | Instance name     | rds-database-01 | Specify a name that is easy to identify.                            |
|                                                 | Region            | CN-Hong Kong    | To achieve lower network latency, select the region nearest to you. |
|                                                 | DB engine version | MySQL 8.0       | -                                                                   |

| Category                                | Subcategory             | Planned Value                   | Description                                                                                                                                                                 |
|-----------------------------------------|-------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                         | Instance type           | Single                          | A single instance is used in this example.<br>To improve service reliability, select a primary/standby instance.                                                            |
|                                         | Storage type            | Ultra-high I/O                  | -                                                                                                                                                                           |
|                                         | AZ                      | AZ2                             | AZ2 is selected in this example.<br>To improve service reliability, select the primary/standby instance type and deploy the primary and standby instances in different AZs. |
|                                         | Instance specifications | General-enhanced 2 vCPUs   4 GB | -                                                                                                                                                                           |
| RDS for MySQL instance in the DR center | Instance name           | rds-DR                          | Specify a name that is easy to identify.                                                                                                                                    |
|                                         | Region                  | AP-Singapore                    | To achieve lower network latency, select the region nearest to you.                                                                                                         |
|                                         | DB engine version       | MySQL 8.0                       | -                                                                                                                                                                           |
|                                         | Instance type           | Single                          | A single instance is used in this example.<br>To improve service reliability, select a primary/standby instance.                                                            |
|                                         | Storage type            | Cloud SSD                       | -                                                                                                                                                                           |
|                                         | AZ                      | AZ1                             | AZ1 is selected in this example.<br>To improve service reliability, select the primary/standby instance type and deploy the primary and standby instances in different AZs. |
|                                         | Instance specifications | General-purpose 2 vCPUs   8 GB  | -                                                                                                                                                                           |
| DRS DR task                             | DR task name            | DRS-DR-Task                     | Specify a name that is easy to identify.                                                                                                                                    |

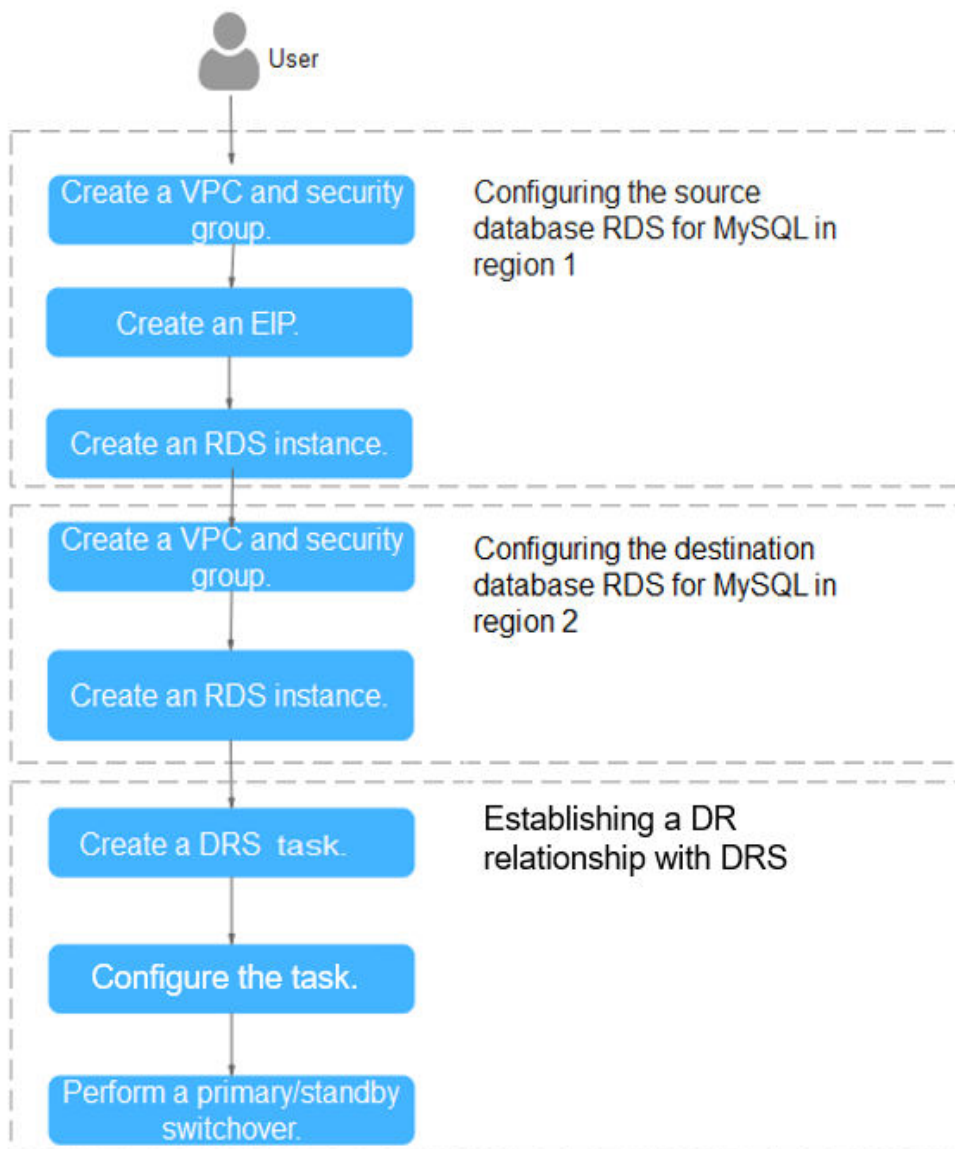
| Category | Subcategory           | Planned Value  | Description                                                                                   |
|----------|-----------------------|----------------|-----------------------------------------------------------------------------------------------|
|          | Source DB engine      | MySQL          | In this example, the primary instance created in CN-Hong Kong is used as the source database. |
|          | Destination DB engine | MySQL          | In this example, the DR instance created in AP-Singapore is used as the destination database. |
|          | Network type          | Public network | Public network is used in this example.                                                       |

### 5.1.3 Operation Process

You can create a single RDS instance and a DR instance and migrate data from the single instance to the DR instance.



Figure 5-1 Flowchart



## 5.1.4 Configuring an RDS for MySQL Instance in the Production Center

### 5.1.4.1 Creating a VPC and Security Group

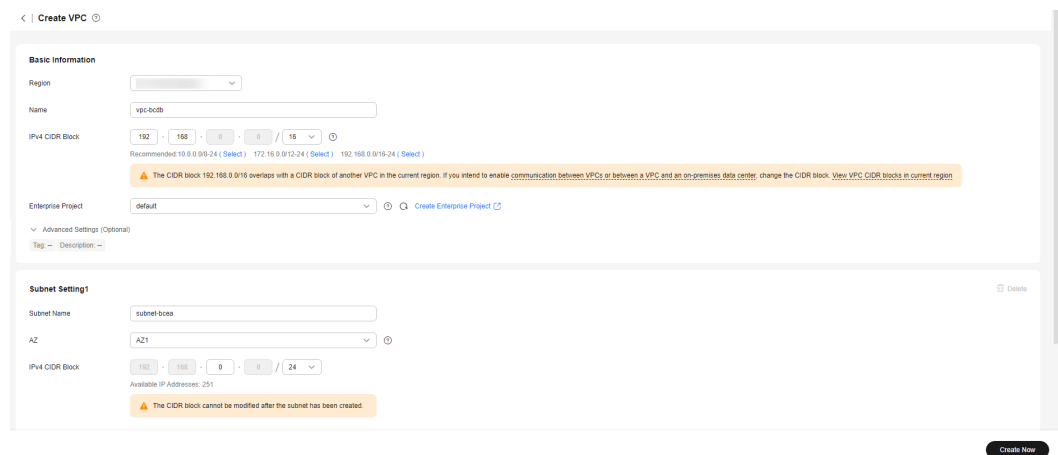
Create a VPC and security group for a DB instance in the production center.

#### Creating a VPC

**Step 1** Go to the [Create VPC](#) page.

**Step 2** Configure the basic information, subnet, and IP address. Select **CN-Hong Kong** for **Region**.

**Figure 5-2** Creating a VPC




**Step 3** Click **Create Now**.

----End

## Creating a Security Group

**Step 1** Log in to the [management console](#).

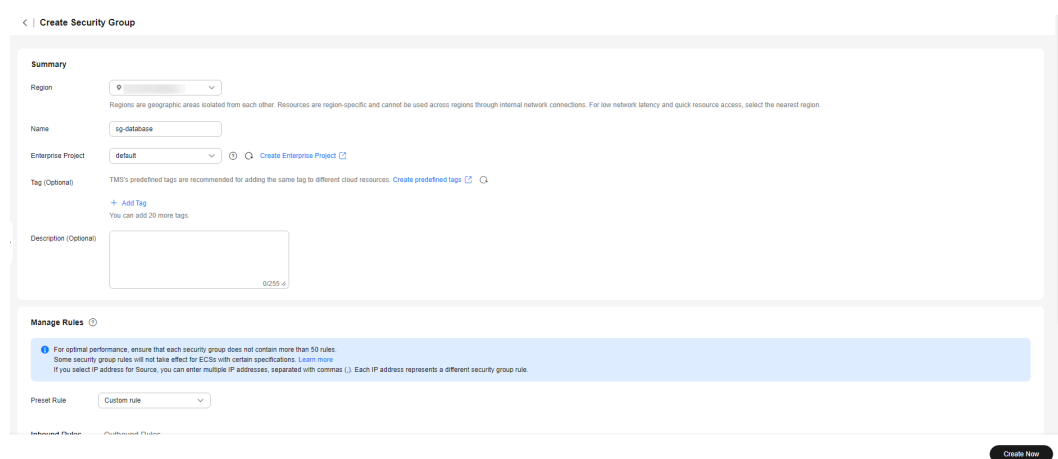
**Step 2** Click  in the upper left corner and select **CN-Hong Kong**.

**Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.

**Step 4** In the navigation pane on the left, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Figure 5-3** Creating a security group



**Step 6** Click **Create Now**.

----End

### 5.1.4.2 Creating an EIP

Create an EIP for your source DB instance. Using the EIP, external systems can access your application and DRS can connect to the source DB instance.

#### Procedure

**Step 1** Go to the [Buy EIP](#) page.

**Step 2** Configure required parameters. Select **CN-Hong Kong** for **Region**.

**Figure 5-4** Buying an EIP

The screenshot shows the 'Buy EIP' configuration interface. Key settings include: Billing Mode: Pay-per-use; Region: CN-Hong Kong; EIP Type: Dynamic EIP; Billed By: Bandwidth (5 Mbps); Bandwidth Name: bandwidth-001; DDoS Protection: Cloud Native Anti-DDoS Basic. A 'Next' button is located at the bottom right.

**Step 3** Click **Next**.

**Step 4** Confirm the information and click **Submit**.

----End

### 5.1.4.3 Creating an RDS for MySQL Instance

Create an RDS for MySQL instance (source database), and select the VPC and EIP you configured for the instance.

#### Procedure

**Step 1** Go to the [Buy DB Instance](#) page.

**Step 2** Select **CN-Hong Kong** for **Region**. Configure instance information and click **Buy**.

Figure 5-5 Selecting a DB engine

Quick Config Custom Config

**Basic Settings**

Billing Mode ⓘ  
 Yearly/Monthly  Pay-per-use

Region

Regions are geographic areas isolated from each other. For low network latency and quick resource access, select the nearest region.

**Engine Options**

DB Engine

DB Engine Version

DB Instance Type

Primary/standby HA architecture is suitable for production databases in large- and medium-sized enterprises, or for applications in Internet, IoT, retail e-commerce, logistics, and gaming industries.

Storage Type

Primary AZ

Multi-AZ deployment provides disaster recovery capabilities across AZs.

Standby AZ

Figure 5-6 Selecting specifications

**Instance Configuration**

Instance Class

| vCPUs   Memory                                  | Recommended Connections | TPS   QPS ⓘ    | IPv6          |
|-------------------------------------------------|-------------------------|----------------|---------------|
| <input checked="" type="radio"/> 2 vCPUs   4 GB | 4,000                   | 580   11,597   | Supported     |
| <input type="radio"/> 2 vCPUs   8 GB            | 6,000                   | 590   11,804   | Supported     |
| <input type="radio"/> 2 vCPUs   16 GB           | 8,000                   | 841   16,859   | Not supported |
| <input type="radio"/> 4 vCPUs   8 GB            | 6,000                   | 1,196   23,914 | Supported     |
| <input type="radio"/> 4 vCPUs   16 GB           | 8,000                   | 1,357   27,159 | Supported     |
| <input type="radio"/> 4 vCPUs   32 GB           | 10,000                  | 1,435   28,701 | Supported     |

DB Instance Specifications: rds.mysql.x1.large.2 ha | 2 vCPUs | 4 GB (Dedicated), Recommended Connections: 4,000, TPS | QPS: 580 | 11,597

Storage Space ⓘ  
 GB

Backup Space  
 GB  
 RDS provides 40 GB of free backup storage, the same size as your purchased storage space.  
 After the free backup space is used up, you will be billed for the additional space. After an instance is created, an automated backup will be created and saved for seven days [Backup Space Billing](#)

Enable autoscaling  
 Additional storage will be billed. [Learn more](#)

Disk Encryption  
 Enabling disk encryption improves the security of data, but may slightly affect the database read/write performance.

**Figure 5-7** Configuring network information as planned

### Basic Settings

DB Instance Name ⓘ

If you buy multiple DB instances at a time, they will be named with four digits appended in the format "DB instance name-SN". For example, if the DB instance name is "instance", the first instance will be named "instance-0001", the second "instance-0002", and so on.

Password

Skip Configure

To log in, you will have to reset the password later on the Basic Information page for this instance.

---

### Connectivity

VPC ⓘ

 Q Create VPC

The VPC an RDS instance is deployed in cannot be changed later. ECSs in different VPCs cannot communicate with each other by default.

Subnet

 Q

IPv6 CIDR block: 2407:c080:1200:217e::/64  
An EIP is required if you want to access DB instances through a public network. [View EIP](#)

IPv4 Address

Addresses available: 251 [View in-use IP Addresses](#)

Database Port

Security Group ⓘ

 Q View Security Group

Ensure that port 3306 of the security group allows traffic from your server IP address to the DB instance. [Create Security Group](#)

Security Group Rules ^

**Figure 5-8** Additional options

### Additional Options

Enterprise Project ⓘ

 Q Create Enterprise Project

Parameter Template

 Q View Parameter Template

⚠ Using a high-performance template tends to result in lost data and replication exceptions after an instance recovers from a crash. There may also be out of memory (OOM) errors with small instance classes in high concurrency scenarios. For details, see the user guide. [View Details](#)

Time Zone

Table Name ⓘ

Case sensitive Case insensitive

Tag

TMS's predefined tags are recommended for adding the same tag to different cloud resources. [Create predefined tags](#)

[+ Add Tag](#)

You can add 20 more tags.

---

### Read Replica

Skip Create

---

### Required Duration and Quantity

Quantity

-  +

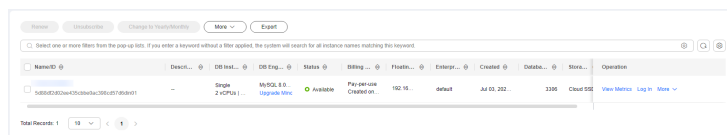
You can create 50 more instances (read replicas included). [Increase Quota](#)

**Step 3** Confirm the settings.

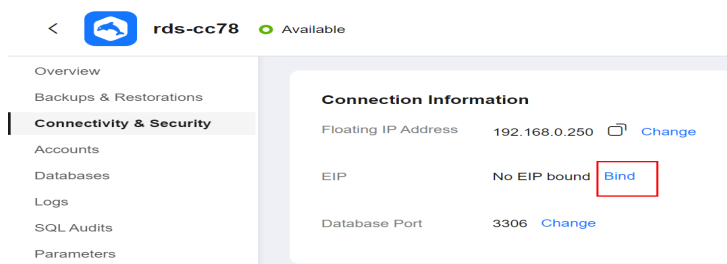
- To modify your settings, click **Previous**.
- If there is no need to modify your settings, click **Submit**.

**Step 4** Bind an EIP to the created instance.

1. On the **Instances** page, click the instance name to go to the **Overview** page.

**Figure 5-9** Locating your instance in the list

2. In the navigation pane on the left, choose **Connectivity & Security**. In the **Connection Information** area, click **Bind** next to the **EIP** field.
3. In the displayed dialog box, all unbound EIPs are listed. Select the EIP you have created for the instance and click **Yes**.

**Figure 5-10** Binding an EIP

----End

## 5.1.5 Configuring an RDS for MySQL Instance in the DR Center

### 5.1.5.1 Creating a VPC and Security Group

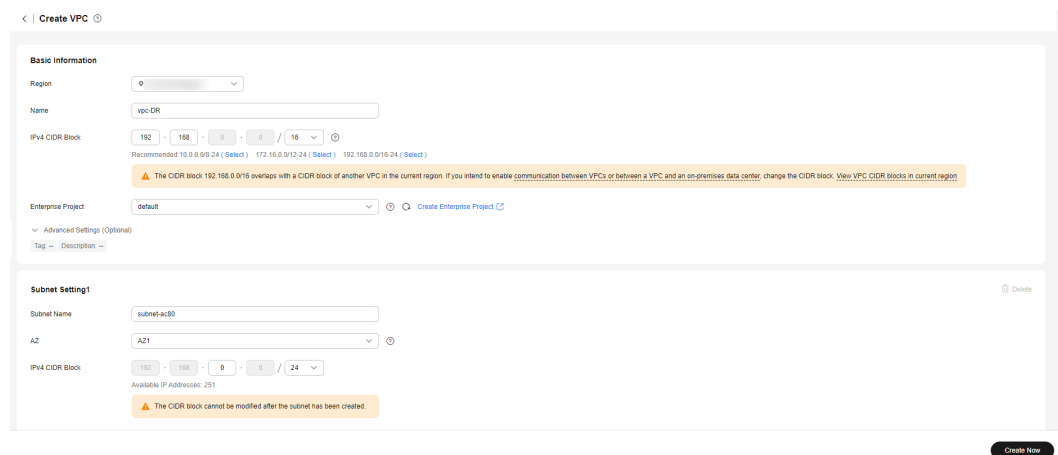
Create a VPC and security group for the DR instance to be configured, ensuring that it is in a different region from the instance created for production center.

#### Creating a VPC

**Step 1** Go to the **Create VPC** page.

**Step 2** Configure the basic information, subnet, and IP address. Select **AP-Singapore** for **Region**.

**Figure 5-11** Creating a VPC




**Step 3** Click **Create Now**.

----End

## Creating a Security Group

**Step 1** Log in to the [management console](#).

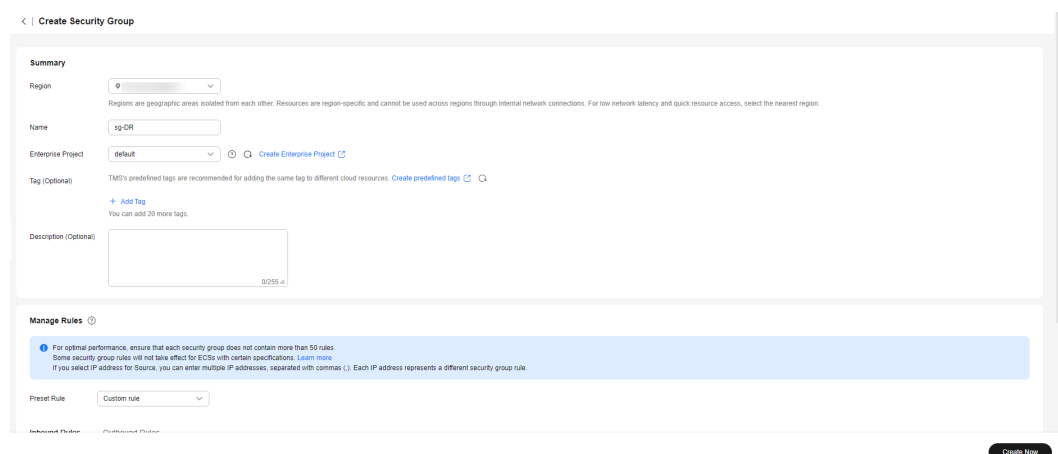
**Step 2** Click  in the upper left corner of the management console and select **AP-Singapore**.

**Step 3** Under the service list, choose **Networking > Virtual Private Cloud**.

**Step 4** In the navigation pane on the left, choose **Access Control > Security Groups**.

**Step 5** Click **Create Security Group**.

**Figure 5-12** Creating a security group



**Step 6** Click **Create Now**.

----End

### 5.1.5.2 Creating an RDS for MySQL Instance

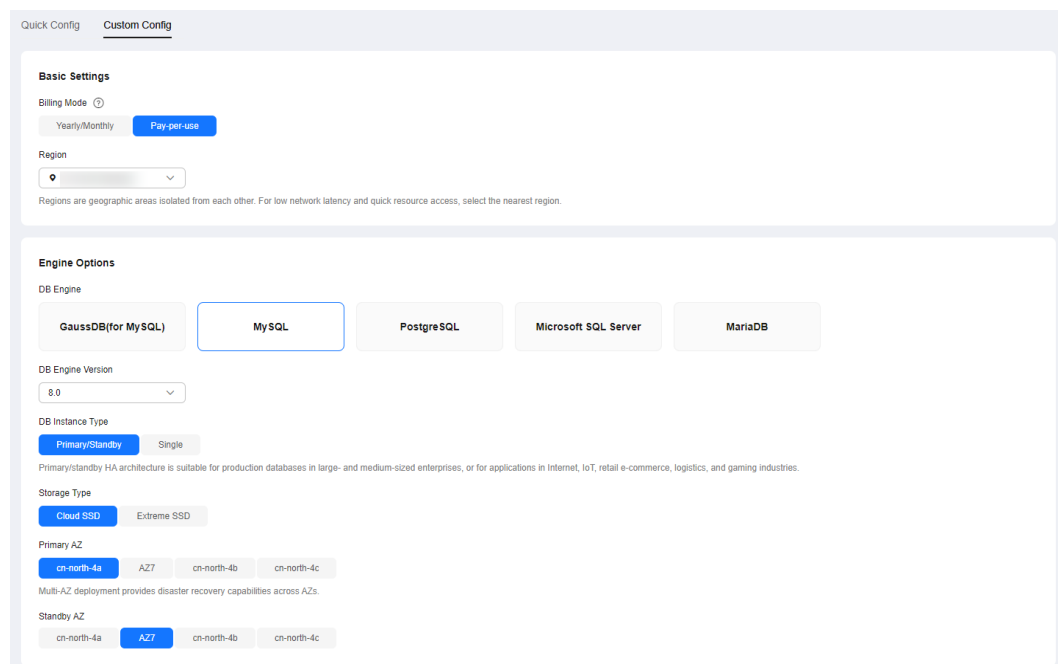
Create an RDS for MySQL instance as a DR instance and select the VPC you configured for the instance.

#### Procedure

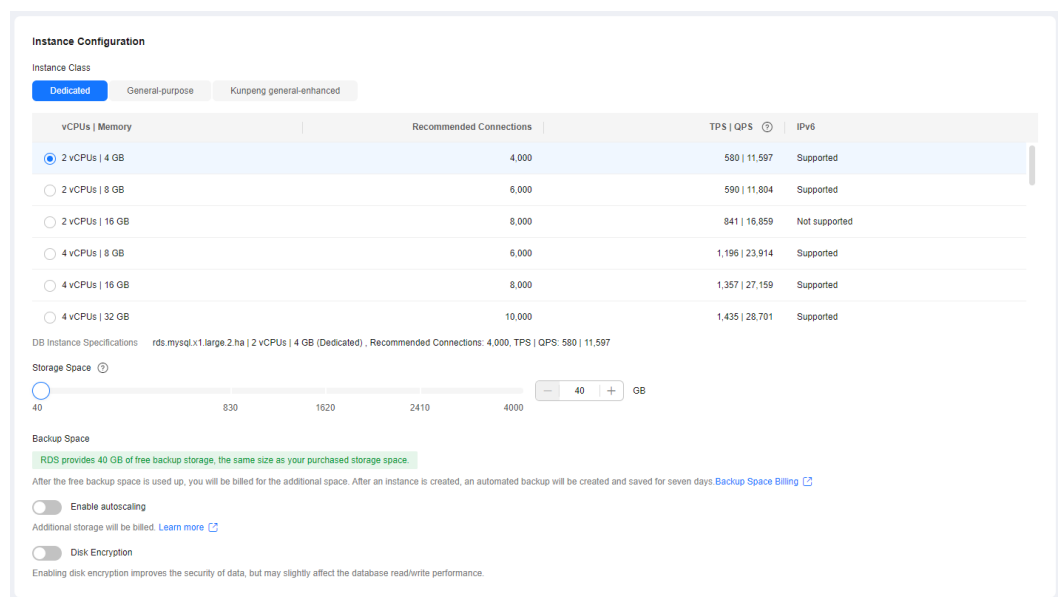
**Step 1** Go to the [Buy DB Instance](#) page.

**Step 2** Select **AP-Singapore** for **Region**. Configure instance information and click **Buy**.

**Figure 5-13** Selecting a DB engine



**Figure 5-14** Selecting specifications





**Figure 5-15** Configuring network information as planned

### Basic Settings

DB Instance Name ⓘ

If you buy multiple DB instances at a time, they will be named with four digits appended in the format "DB instance name-SN". For example, if the DB instance name is "instance", the first instance will be named "instance-0001", the second "instance-0002", and so on.

Password

To log in, you will have to reset the password later on the Basic Information page for this instance.

### Connectivity

VPC ⓘ

  [Create VPC](#)

The VPC an RDS instance is deployed in cannot be changed later. ECSs in different VPCs cannot communicate with each other by default.

Subnet

An EIP is required if you want to access DB instances through a public network. [View EIP](#)

IPv4 Address

Addresses available: 251 [View In-use IP Addresses](#)

Database Port

Security Group ⓘ

  [View Security Group](#)

Ensure that port 3306 of the security group allows traffic from your server IP address to the DB instance. [Create Security Group](#)

Security Group Rules ^

**Figure 5-16** Additional options

The screenshot shows the 'Additional Options' configuration page. It includes the following sections:

- Enterprise Project:** A dropdown menu set to 'default' with a 'Create Enterprise Project' link.
- Parameter Template:** A dropdown menu set to 'Default-HighPerformance-Edition-MySQL-8.0' with a 'View Parameter Template' link.
- Warning:** A yellow warning box stating: 'Using a high-performance template tends to result in lost data and replication exceptions after an instance recovers from a crash. There may also be out of memory (OOM) errors with small instance classes in high concurrency scenarios. For details, see the user guide. View Details'.
- Time Zone:** A dropdown menu set to '(UTC+08:00) Beijing, Chongqing, Hong Kong, Urumqi'.
- Table Name:** Two buttons: 'Case sensitive' (disabled) and 'Case insensitive' (active).
- Tag:** A section with a '+ Add Tag' link and the text 'You can add 20 more tags.'.
- Read Replica:** Two buttons: 'Skip' (active) and 'Create' (disabled).
- Required Duration and Quantity:** A section with a 'Quantity' input field set to '1' and a '+ Increase Quota' link.

**Step 3** Confirm the settings.

- To modify your settings, click **Previous**.
- If there is no need to modify your settings, click **Submit**.

----End

## 5.1.6 Configuring Remote Disaster Recovery

### 5.1.6.1 Creating a DRS Disaster Recovery Task

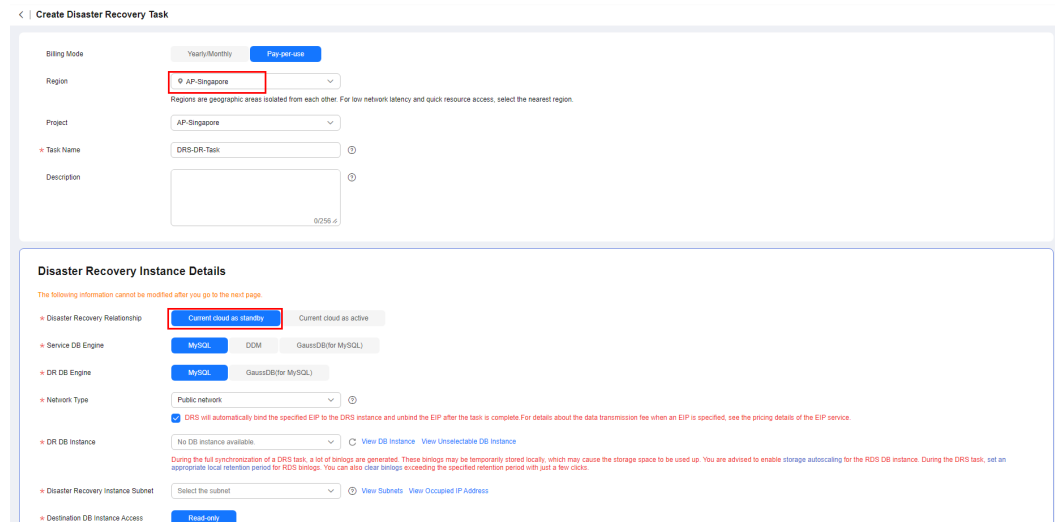
Create a DRS disaster recovery task in the same region as the RDS for MySQL instance configured for the DR center.

#### Procedure

**Step 1** Go to the [Create Disaster Recovery Task](#) page.

**Step 2** Select **AP-Singapore** for **Region**. Set **Disaster Recovery Relationship** to **Current cloud as standby**, and **DR DB Instance** to the RDS for MySQL DR instance created in the AP-Singapore region, and click **Create Now**.

**Figure 5-17** Setting DR instance information



**Step 3** Return to the **Disaster Recovery Management** page and check the status of the task.

----End

### 5.1.6.2 Configuring the Disaster Recovery Task

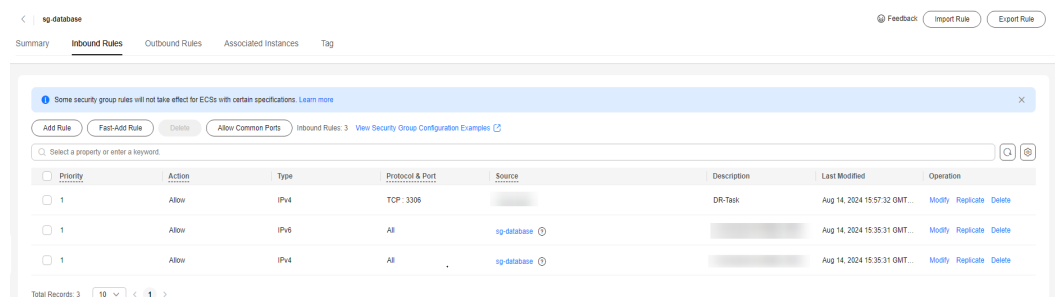
Configure the disaster recovery task, including setting the source and destination databases.

#### Procedure

**Step 1** On the **Disaster Recovery Management** page, locate the created disaster recovery task and click **Edit** in the **Operation** column.

**Step 2** Add the EIP of the DRS instance to the inbound rule of the security group associated with the RDS for MySQL instance in the production center, select TCP, and set the port number to that of the RDS for MySQL instance of the production center.

**Figure 5-18** Adding a security group rule



In the **Source Database** area, set **IP Address or Domain Name** and **Port** to the EIP and port of the RDS for MySQL instance in the production center. When the connection test is successful, click **Next**.

**Figure 5-19** Editing a disaster recovery task

### Source Database

Database Type:  Self-built on ECS  RDS DB instance

IP Address or Domain Name:

Port:

Database Username:

Database Password:

SSL Connection:

Test Connection:  This button is available only after the replication instance is created successfully.

**Step 3** Configure the flow control and click **Next**.

**Figure 5-20** Configuring flow control

Flow Control:  Yes  No

Migrate Definer to User:  Yes  No

**Step 4** Check the disaster recovery task. When the check success rate reaches 100%, click **Next**.

**Step 5** Configure parameters and click **Next**.

**Figure 5-21** Configuring parameters

Parameter Type:  Common parameters  Performance parameters

Select the destination database parameters whose values you want to change to be the same as those in the source database. Some changes take effect only after you restart the destination database. You are advised to restart the destination database before or after the migration.

Save Change

| Parameter Name                                           | Source Database Value | Destination Database Value | Result                                             |
|----------------------------------------------------------|-----------------------|----------------------------|----------------------------------------------------|
| <input type="checkbox"/> connect_timeout                 | 10                    | 10                         | <span style="color: green;">●</span> Consistent    |
| <input type="checkbox"/> explicit_defaults_for_timestamp | OFF                   | OFF                        | <span style="color: green;">●</span> Consistent    |
| <input type="checkbox"/> innodb_flush_log_at_trx_commit  | 1                     | 1                          | <span style="color: green;">●</span> Consistent    |
| <input type="checkbox"/> innodb_lock_wait_timeout        | 50                    | 50                         | <span style="color: green;">●</span> Consistent    |
| <input type="checkbox"/> max_connections                 | 6000                  | 2500                       | <span style="color: orange;">●</span> Inconsistent |
| <input type="checkbox"/> net_read_timeout                | 30                    | 30                         | <span style="color: green;">●</span> Consistent    |
| <input type="checkbox"/> net_write_timeout               | 60                    | 60                         | <span style="color: green;">●</span> Consistent    |
| <input type="checkbox"/> transaction_isolation           | REPEATABLE-READ       | REPEATABLE-READ            | <span style="color: green;">●</span> Consistent    |

**Step 6** Configure **Start Time** and click **Submit**.

**Figure 5-22** Starting the task

The screenshot shows a configuration panel for starting a task. It includes the following elements:

- Start Time:** Two radio buttons. The first, "Start upon task creation", is selected and highlighted in blue. The second is "Start at a specified time".
- Send Notifications:** A toggle switch that is turned on (blue).
- SMN Topic:** A dropdown menu with a downward arrow, a refresh icon, and a help icon.
- Delay Threshold (s):** A toggle switch that is turned off (grey).
- RTO Delay Threshold (s):** A toggle switch that is turned off (grey).
- RPO Delay Threshold (s):** A toggle switch that is turned off (grey).
- Stop Abnormal Tasks After:** A text input field containing the number "14", followed by a help icon and a red warning message: "Abnormal tasks run longer than the period you set (unit: day) will automatically stop."

**Step 7** On the **Disaster Recovery Management** page, check the task status. The status is **Disaster recovery in progress**.

For a task that is in the **Disaster recovery in progress** state, you can use [data comparison](#) to check whether data is consistent before and after the disaster recovery.

----End

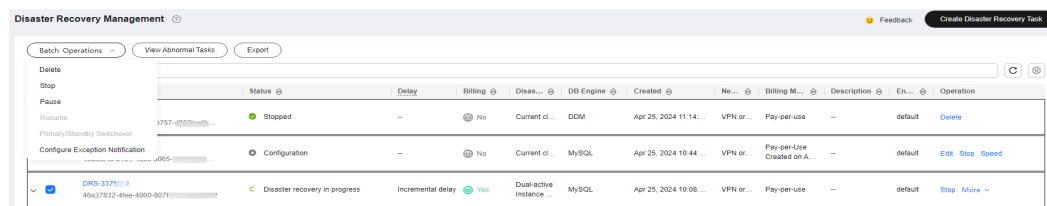
### 5.1.6.3 Performing a Primary/Standby Switchover

If the source database in the production center is faulty, manually switch the DR instance to the read/write state. Then, data is written to the DR instance and synchronized to the source database.

#### Procedure

- Step 1** Find that the source database in the production center is faulty. For example, the source database cannot be connected, the source database execution is slow, or the CPU usage is high.
- Step 2** Receive an SMN email notification.
- Step 3** Check the delay of the DR task.
- Step 4** Check that the services of the source database have been stopped. For details, see [How Do I Ensure that All Services on the Database Are Stopped?](#)
- Step 5** Select the task, click the **Batch Operations** drop-down box in the upper left corner and select **Primary/Standby Switchover**.

**Figure 5-23** Primary/standby switchover



**Step 6** Change the database IP address on your application and use it to connect to the database. Then data is properly read from and written to the database.

----End

# 6 Security Best Practices

---

Security is a shared responsibility between Huawei Cloud and you. Huawei Cloud is responsible for the security of cloud services to provide a secure cloud. As a tenant, you should properly use the security capabilities provided by cloud services to protect data, and securely use the cloud. For details, see [Shared Responsibilities](#).

This section provides actionable guidance for enhancing the overall security of using DRS for data migration. You can continuously evaluate the security status of your DRS tasks for secure data migration and enhance their overall security defense. By doing this, only the minimum permissions required for business can be assigned, and data can be protected from leakage and tampering both in transmission.

Make security configurations from the following dimensions to meet your business needs.

- [Using Fine-Grained Authorization to Control the Usage Scope of DRS Resources](#)
- [Using Secure and Reliable Networks and Encrypted Transmission Protocols](#)
- [Using Network Access Control to Isolate the Network for Data Synchronization](#)
- [Configuring Independent Database Migration Users and Assigning the Minimum Permissions](#)
- [Creating HA Tasks to Improve Service Availability](#)
- [Properly Using Authentication Credentials to Prevent Data Leaks](#)

## Using Fine-Grained Authorization to Control the Usage Scope of DRS Resources

1. **Set only the minimum permissions for IAM users with different roles to prevent data leakage or misoperations caused by excessive permissions.**  
To better isolate and manage permissions, you are advised to configure an independent IAM administrator and grant them the permission to manage IAM policies. The IAM administrator can create different user groups based on your service requirements. User groups correspond to different data access

scenarios. By adding users to user groups and binding IAM policies to user groups, the IAM administrator can grant different data access permissions to employees in different departments based on the principle of least privilege.

2. **Fine-grained authorization is recommended to enable fine-grained control on user permissions.**

Fine-grained policies define permissions by APIs. You are advised to [create a custom policy](#) based on your DRS operation permissions.

## Using Secure and Reliable Networks and Encrypted Transmission Protocols

1. **You are advised to use a secure network, such as a VPN, for data synchronization.**

Do not use an EIP network if possible. Instead, use a secure network, such as a VPN, for data transmission. Configure firewalls, security groups, and ACL rules to reduce the attack surface and improve the network security for data synchronization.

2. **The certificate+SSL connection mode is recommended.**

The certificate+SSL mode is a secure connection mode. It protects the integrity and confidentiality of data during transmission, but slightly affects the read and write performance of the database. In certain scenarios that are sensitive to synchronization performance, you need to balance performance and security.

## Using Network Access Control to Isolate the Network for Data Synchronization

Firewalls, Access Control List (ACL) rules, and security groups are used for network access control to effectively control the network range for DRS to access databases and isolate the network for data synchronization from other networks, ensuring DRS task security.

## Configuring Independent Database Migration Users and Assigning the Minimum Permissions

If you migrate data as user **root** or other service users, permission control may be disordered and permission leakage may occur. When creating a DRS task, you are advised to create independent migration accounts for the source and destination databases and grant the minimum permissions to the migration accounts by referring to the user guide to reduce the risk of account and permission leaks.

## Creating HA Tasks to Improve Service Availability

DRS provides the cross-AZ HA. If the instance in the primary AZ becomes faulty, services can be switched over to the instance in the standby AZ to continue data replication.

## Properly Using Authentication Credentials to Prevent Data Leaks

When you use code or API Explorer to call APIs, you need to obtain a token using the account password or AK/SK information. You need to comply with the secure



encoding rules, properly manage authentication credentials, and do not hardcode authentication information in plaintext.