GaussDB(for MySQL)

Best Practices

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Contents

1 Overview

This document provides best practices for GaussDB(for MySQL) and guides you through buying DB instances that meet your service requirements.

Reference	Overview
Migrating Data from ECS-hosted MySQL to GaussDB(for MySQL)	This section describes how to migrate data from a ECS-hosted MySQL database to Huawei Cloud GaussDB(for MySQL).
Migrating Data from Other Cloud MySQL to GaussDB(for MySQL)	This section describes how to migrate data from other cloud MySQL databases to Huawei Cloud GaussDB(for MySQL).
Enabling Read/Write Splitting for a GaussDB(for MySQL) Instance	This section describes user authentication, connection pool configuration, and scenarios where read requests are routed to the primary node when read/write splitting is enabled for a GaussDB(for MySQL) instance.
Security Best Practices	This section describes multiple security capabilities provided by GaussDB(for MySQL) to improve the overall security defense and protect stored data from leakage and tampering both at rest and in transit.

2 From ECS-hosted MySQL to GaussDB(for MySQL)

2.1 Overview

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

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 GaussDB(for MySQL) instance. **Figure 2-1** shows the deployment architecture when the ECS-hosted MySQL and GaussDB(for MySQL) instances are in the same VPC.

If the ECS-hosted MySQL and GaussDB(for MySQL) 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 2-2**.

Figure 2-1 Deployment architecture in the same VPC

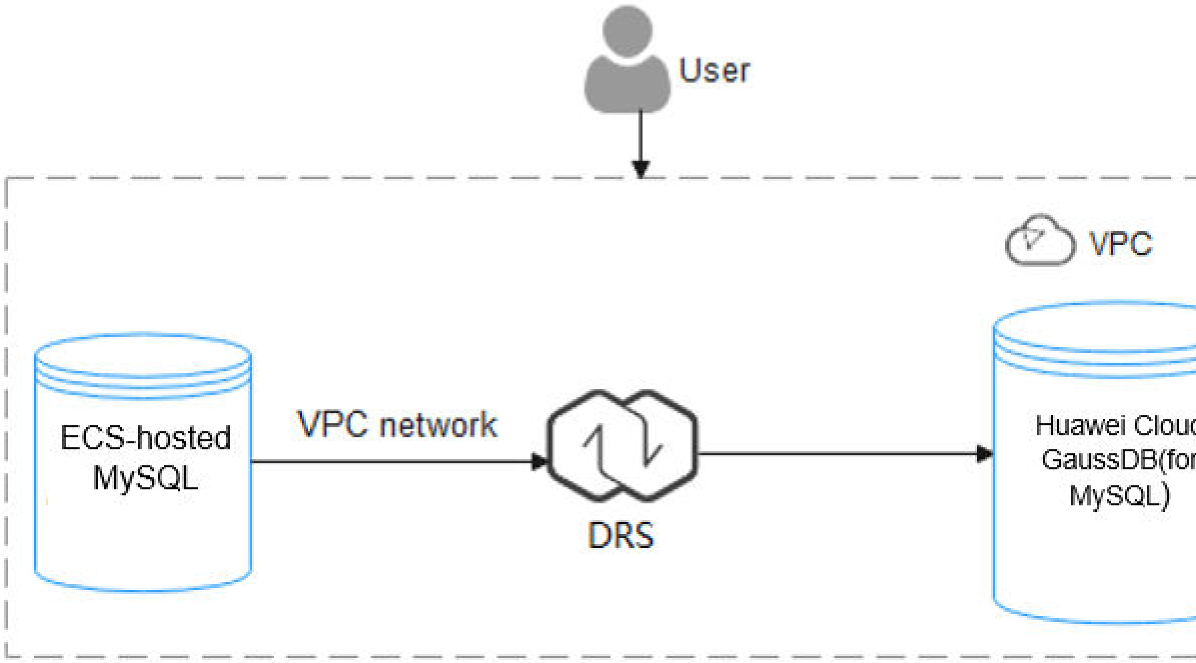
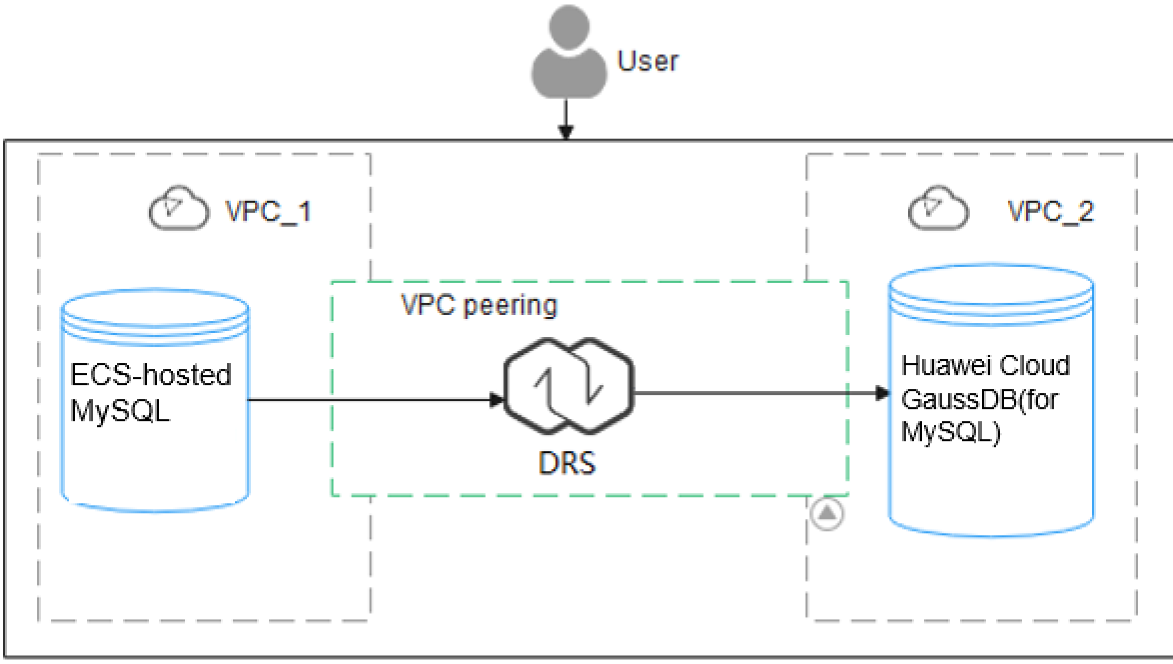


Figure 2-2 Deployment architecture in different VPCs



GaussDB(for MySQL) 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)
- GaussDB(for MySQL)
- 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 GaussDB(for MySQL) data migration, see **From MySQL to GaussDB(for MySQL)**.

2.2 Resource Planning

Table 2-1 Resource planning

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

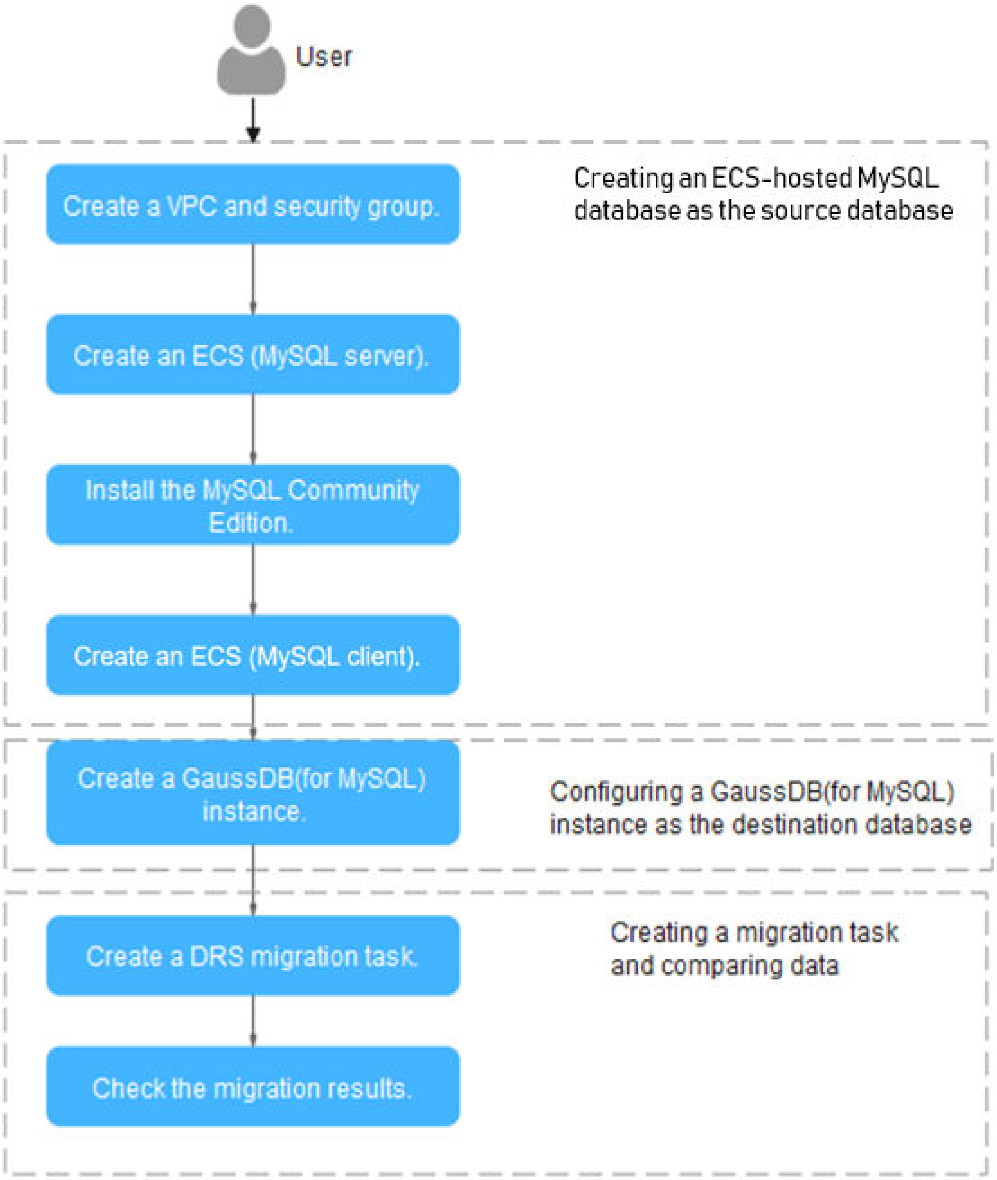
Category	Subcategory	Planned Value	Remarks
ECS (MySQL server)	ECS name	ecs-mysql	Customize a name for easy identification.
	Specifications	s6.xlarge.2 4 vCPUs |8 GiB	Select specification based on service requirements. For details, see **x86 ECS Specifications and Types**
	OS	CentOS 7.6 64	-
	System disk	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.
GaussDB(for MySQL)	Instance name	gauss-mysql	Customize a name for easy identification.
	DB engine	GaussDB(for MySQL)	-
	DB engine version	MySQL 8.0	-
	AZ type	Single-AZ	-
	AZ	AZ6	-
	Instance specifications	Dedicated Edition	-
	CPU architecture	x86 8 vCPUs | 32 GB	-
DRS migration task	Task name	DRS-gaussdbformysql	Customize a name for easy identification.

Category	Subcategory	Planned Value	Remarks
	Source DB engine	MySQL	In this example, take a MySQL instance (community edition) installed on an ECS as the source database.
	Destination DB engine	GaussDB(for MySQL)	In this example, take a GaussDB(for MySQL) instance as the destination database.
	Network type	Public	In this example, select the public network.

2.3 Operation Guide

Figure 2-3 shows the process of creating a MySQL server, buying a GaussDB(for MySQL) instance, and migrating data from the MySQL server to the GaussDB(for MySQL) instance.

Figure 2-3 Flowchart


User
Create a VPC and security group.
Create an ECS (MySQL server).
Install the MySQL Community Edition.
Create an ECS (MySQL client).
Creating an ECS-hosted MySQL database as the source database
Create a GaussDB(for MySQL) instance.
Configuring a GaussDB(for MySQL) instance as the destination database
Create a DRS migration task.
Check the migration results.
Creating a migration task and comparing data

2.4 Procedure

2.4.1 ECS-hosted MySQL Server

This chapter describes how to build a MySQL server. In this practice, the tasks involved are as follows:

1. Creating a VPC and security group
2. Creating an ECS (MySQL server)
3. Installing a MySQL database (community edition)

4. Creating an ECS (MySQL client)

2.4.1.1 Creating a VPC and Security Group

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

Creating a VPC

Step 1 Log in to the **management console**.

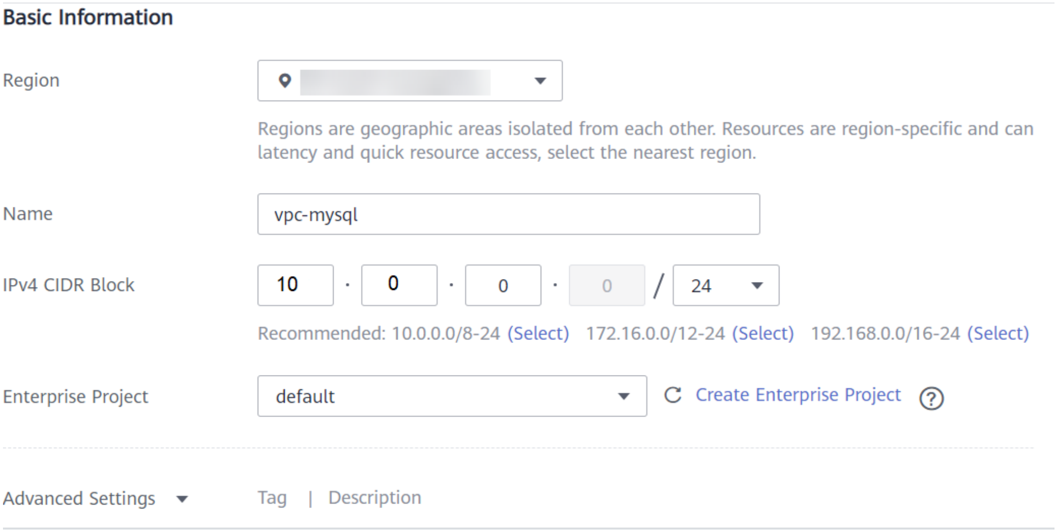
Step 2 Click 📍 in the upper left corner of the management console and select **AP-Singapore**.

Step 3 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: [redacted]

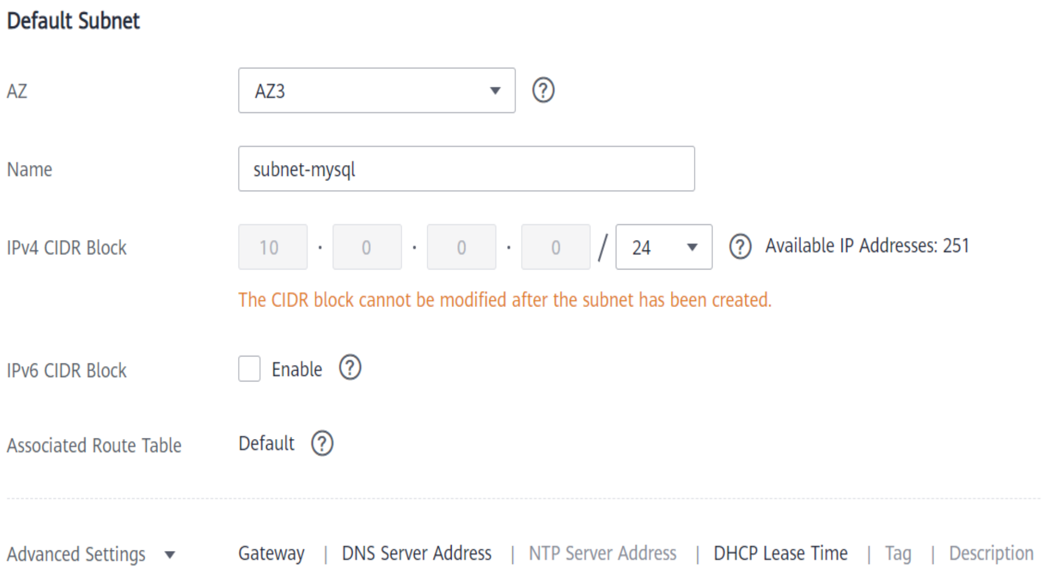
Regions are geographic areas isolated from each other. Resources are region-specific and can latency and quick resource access, select the nearest region.

Name: vpc-mysql

IPv4 CIDR Block: 10 . 0 . 0 . 0 / 24

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

Enterprise Project: default



Default Subnet

AZ: AZ3 ▾ ?

Name: subnet-mysql

IPv4 CIDR Block: 10 . 0 . 0 . 0 / 24 ▾ ? Available IP Addresses: 251

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

IPv6 CIDR Block: □ Enable ?

Associated Route Table: Default ?

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

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**.

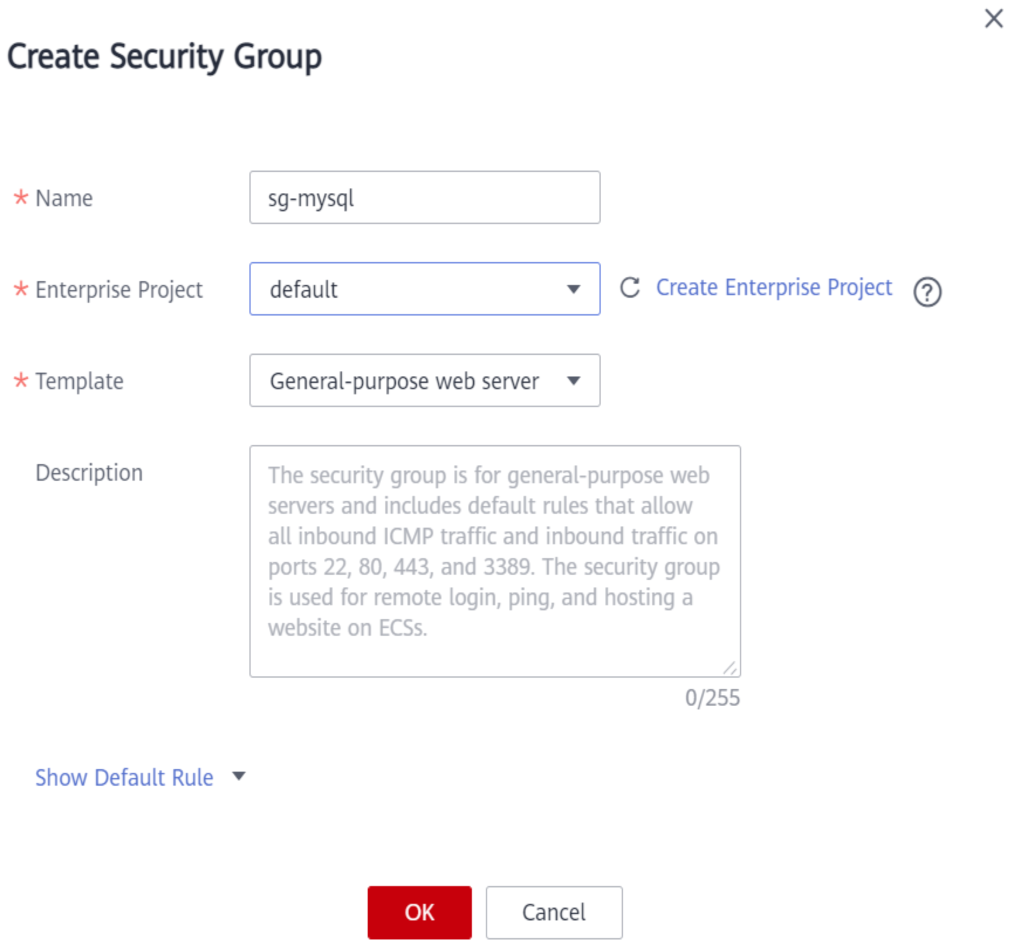
Step 3 Click ☰ in the upper left corner of the page and choose **Networking > Virtual Private Cloud** .

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.



Create Security Group

* Name: sg-mysql

* Enterprise Project: default

* Template: General-purpose web server

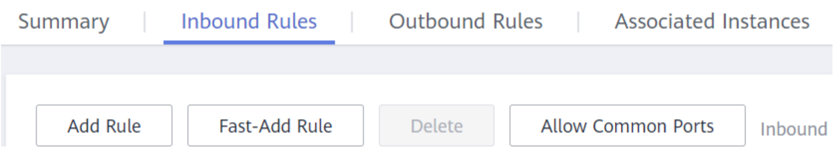
Description: The security group is for general-purpose web servers and includes default rules that allow all inbound ICMP traffic and inbound traffic on ports 22, 80, 443, and 3389. The security group is used for remote login, ping, and hosting a website on ECSs.

0/255

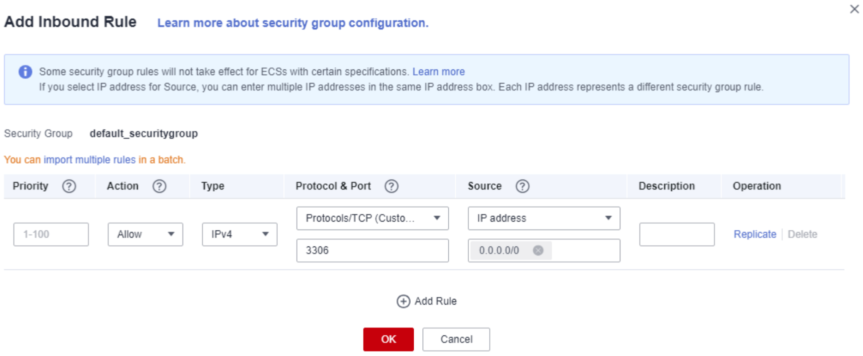
Step 7 Click **OK**.

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 in the same IP address box. Each IP address represents a different security group rule.

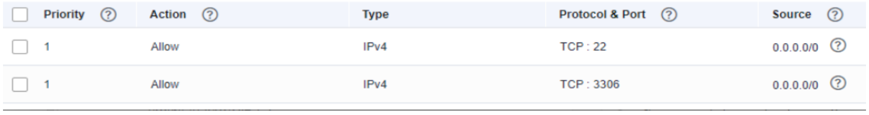
Security Group default_securitygroup

You can import multiple rules in a batch.

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

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
□	1	Allow	IPv4	TCP : 22	0.0.0.0/0
□	1	Allow	IPv4	TCP : 3306	0.0.0.0/0

----End

2.4.1.2 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**.

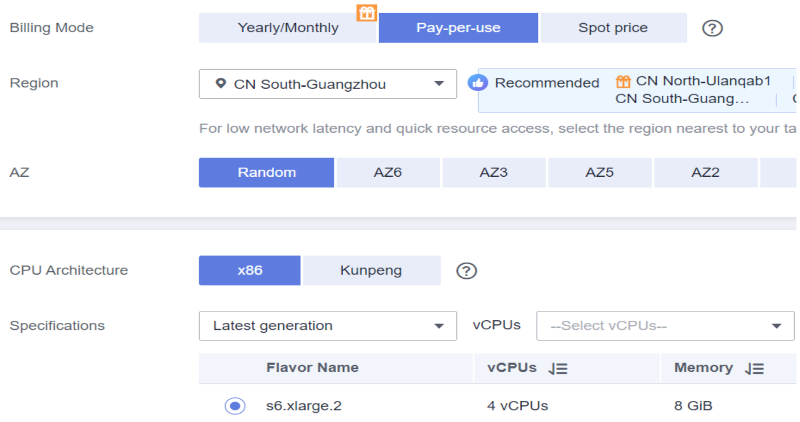
Step 2 Click in the upper left corner of the management console and select **AP-Singapore**.

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.



Billing Mode: Yearly/Monthly | Pay-per-use | Spot price

Region: CN South-Guangzhou

For low network latency and quick resource access, select the region nearest to your ta

AZ: Random | AZ6 | AZ3 | AZ5 | AZ2

CPU Architecture: x86 | Kunpeng

Specifications: Latest generation

vCPUs: --Select vCPUs--

	Flavor Name	vCPUs	Memory
●	s6.xlarge.2	4 vCPUs	8 GiB

2. Select the image and disk specifications.

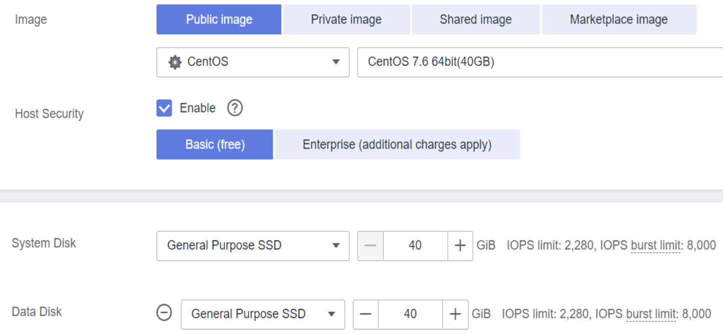


Image: Public image | Private image | Shared image | Marketplace image

CentOS ▾ | CentOS 7.6 64bit(40GB)

Host Security: ☑ Enable ⓘ

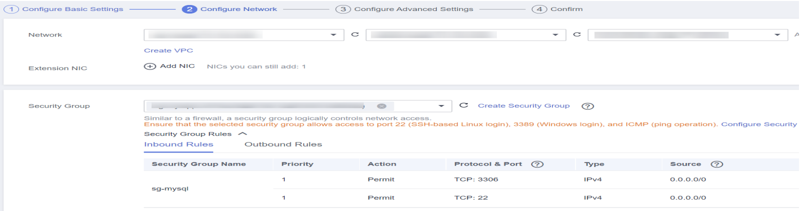
Basic (free) | Enterprise (additional charges apply)

System Disk: General Purpose SSD ▾ — 40 + GiB IOPS limit: 2,280, IOPS burst limit: 8,000

Data Disk: ⊖ General Purpose SSD ▾ — 40 + GiB IOPS limit: 2,280, IOPS burst limit: 8,000

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

1. Select the VPC and security group created in **Creating a VPC and Security Group**.



Network: [redacted] ▾ C [redacted] ▾ C [redacted] ▾

Create VPC

Extension NIC: ⊕ Add NIC NICs you can still add: 1

Security Group: [redacted] ▾ C Create Security Group ⓘ

Similar to a firewall, a security group logically controls network access.

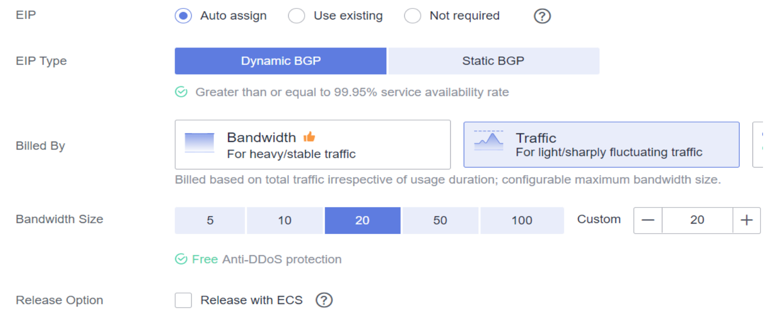
Ensure that the selected security group allows access to port 22 (SSH-based Linux login), 3389 (Windows login), and ICMP (ping operation). Configure Security

Security Group Rules ^

Inbound Rules | Outbound Rules

Security Group Name	Priority	Action	Protocol & Port	Type	Source
sg-mysql	1	Permit	TCP: 3306	IPv4	0.0.0.0/0
	1	Permit	TCP: 22	IPv4	0.0.0.0/0

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



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

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

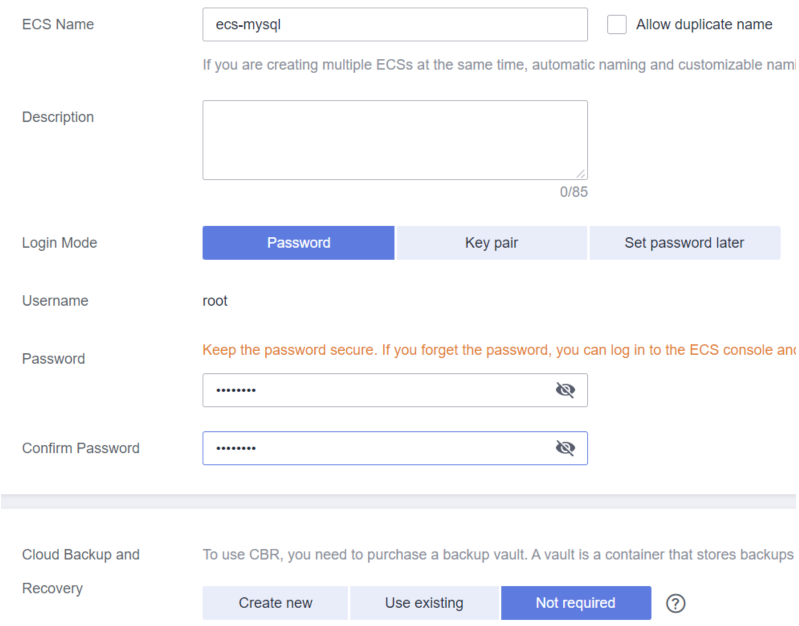
Bandwidth Size: 5 | 10 | 20 | 50 | 100 | Custom — 20 +

✓ Free Anti-DDoS protection

Release Option: □ Release with ECS ⓘ

Step 7 Click **Next: Configure Advanced Settings**.

Specify **ECS Name** and **Password**.



ECS Name: ecs-mysql □ Allow duplicate name

If you are creating multiple ECSs at the same time, automatic naming and customizable nami

Description: 0/85

Login Mode: Password | Key pair | Set password later

Username: root

Password: Keep the password secure. If you forget the password, you can log in to the ECS console anc

••••••••

Confirm Password: ••••••••

Cloud Backup and Recovery: To use CBR, you need to purchase a backup vault. A vault is a container that stores backups

Create new | Use existing | Not required

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

2.4.1.3 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

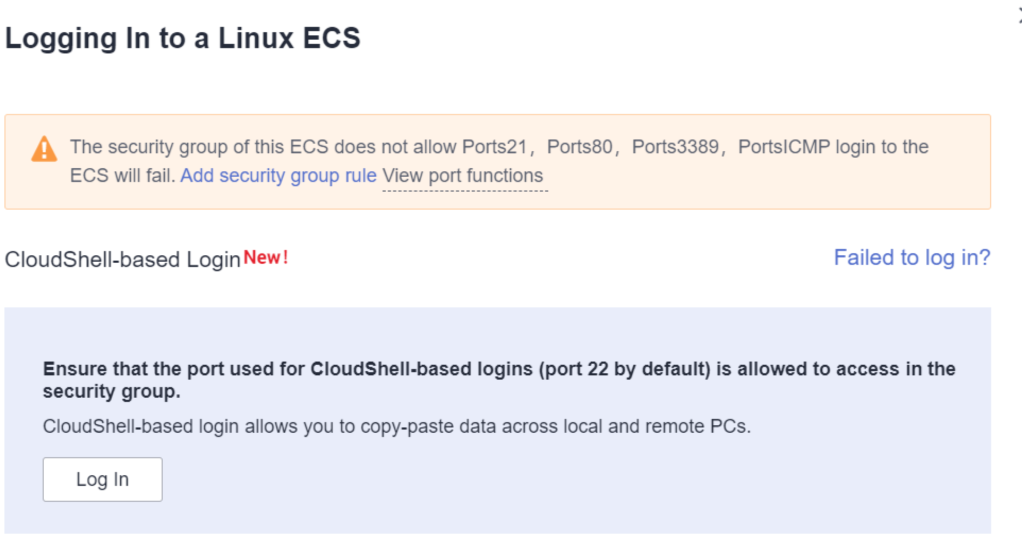
Step 1 Log in to the **management console**.

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**.



Logging In to a Linux ECS

The security group of this ECS does not allow Ports21，Ports80，Ports3389，PortsICMP login to the ECS will fail. Add security group rule View port functions

CloudShell-based Login New!

Failed to log in?

Ensure that the port used for CloudShell-based logins (port 22 by default) is allowed to access in the security group.

CloudShell-based login allows you to copy-paste data across local and remote PCs.

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

NOTE

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

----End

Initializing Disks

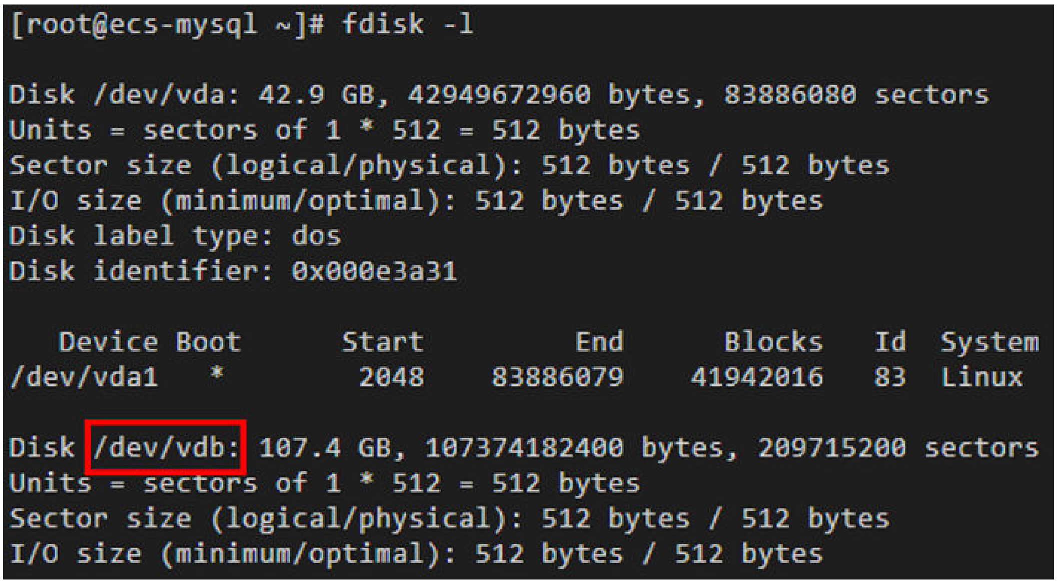
Step 1 Create the **mysql** folder.

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

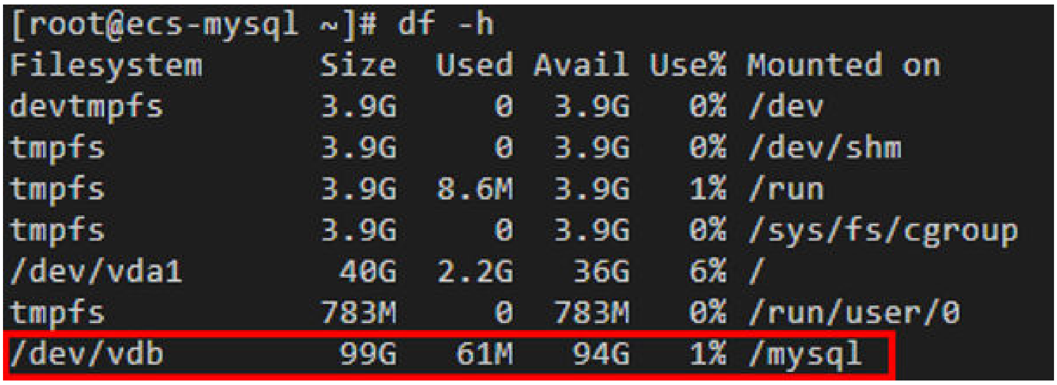
Step 4 Attach the disk.

mount /dev/vdb /mysql

Step 5 Check whether the disk is attached.

df -h

If the following output is returned, the disk is 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

2.4.1.4 Creating an ECS and Installing the MySQL Client on It

Step 1 This section describes how to create an ECS for the MySQL client. For details, see **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

2.4.2 Cloud Migration

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

2.4.2.1 Creating a GaussDB(for MySQL) Instance

This section describes how to create a GaussDB(for MySQL) instance. The GaussDB(for MySQL) instance must be in the same VPC and security group as the ECS-hosted MySQL server.

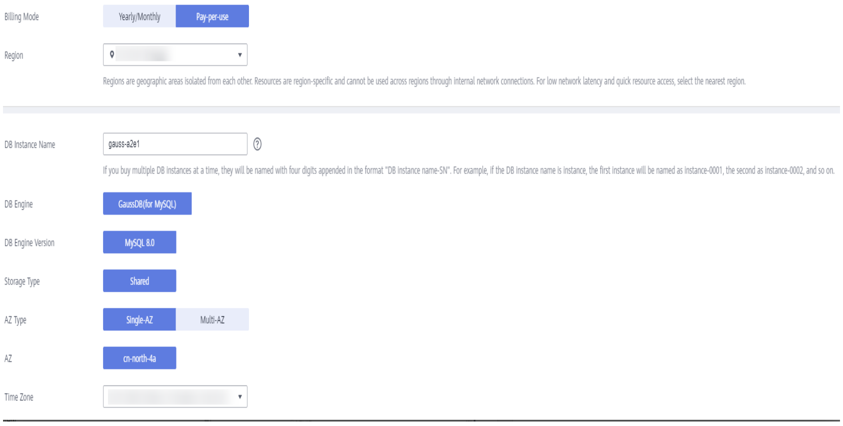
Step 1 Log in to the **management console**.

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, choose **Databases** > **GaussDB(for MySQL)**.

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]

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: gauss-a2e1

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: [✓ GaussDB(for MySQL)]

DB Engine Version: [✓ MySQL 8.0]

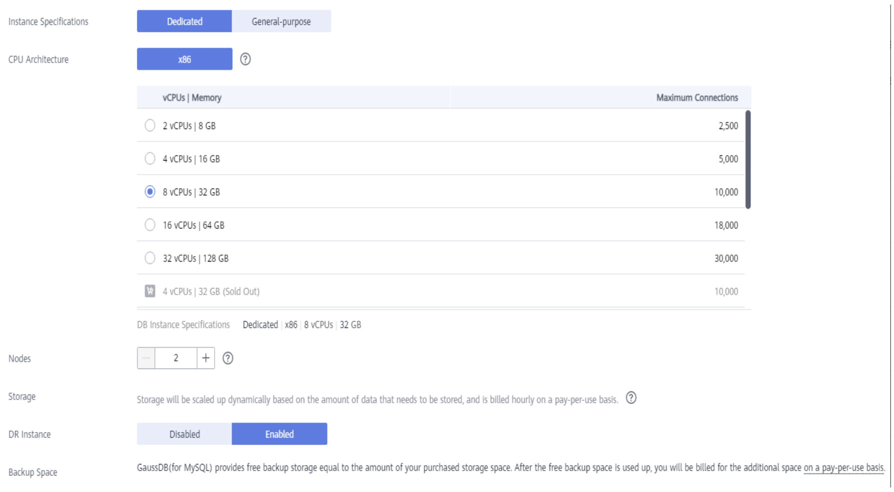
Storage Type: [✓ Shared]

AZ Type: [✓ Single-AZ] Multi-AZ

AZ: [✓ cn-north-4a]

Time Zone:

Step 6 Configure instance specifications.



Instance Specifications: Dedicated | General-purpose

CPU Architecture: x86

vCPUs | Memory	Maximum Connections
○ 2 vCPUs | 8 GB	2,500
○ 4 vCPUs | 16 GB	5,000
● 8 vCPUs | 32 GB	10,000
○ 16 vCPUs | 64 GB	18,000
○ 32 vCPUs | 128 GB	30,000
4 vCPUs | 32 GB (Sold Out)	10,000

DB Instance Specifications: Dedicated | x86 | 8 vCPUs | 32 GB

Nodes: 2

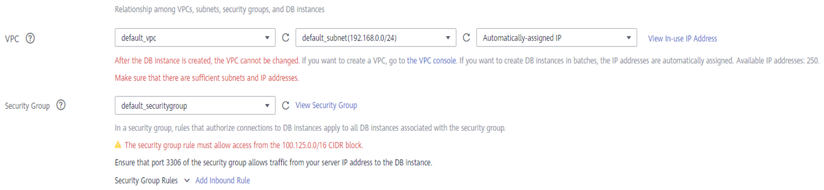
Storage: Storage will be scaled up dynamically based on the amount of data that needs to be stored, and is billed hourly on a pay-per-use basis.

DR Instance: Disabled | Enabled

Backup Space: GaussDB(for MySQL) provides free backup storage equal to the amount of your purchased 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**.



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

VPC: default_vpc | default_subnet(192.168.0.0/24) | Automatically-assigned IP | View In-use IP Address

After the DB instance is created, the VPC cannot be changed. If you want to create a VPC, go to the VPC console. If you want to create DB instances in batches, the IP addresses are automatically assigned. Available IP addresses: 250.

Make sure that there are sufficient subnets and IP addresses.

Security Group: default_securitygroup | View Security Group

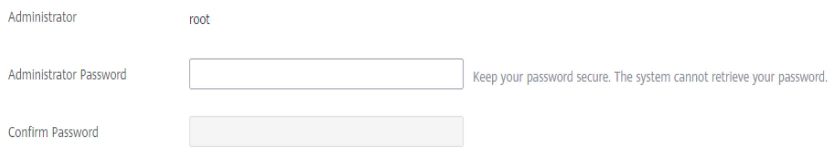
In a security group, rules that authorize connections to DB instances apply to all DB instances associated with the security group.

⚠ The security group rule must allow access from the 100.125.0.0/16 CIDR block.

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

Security Group Rules | Add Inbound Rule

Step 8 Configure the instance password.

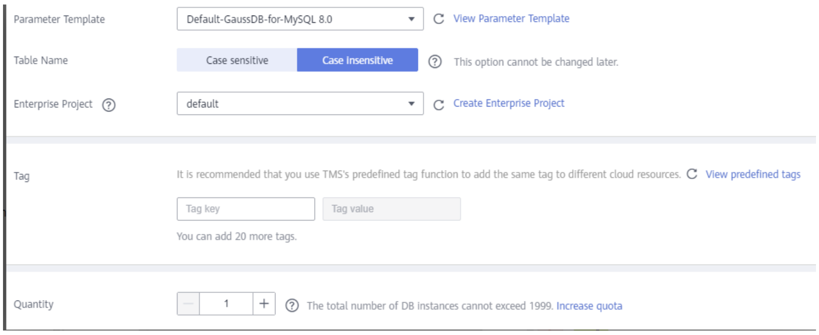


Administrator: root

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

Confirm Password:

Step 9 Configure an enterprise project.



Parameter Template: Default-GaussDB-for-MySQL 8.0 | View Parameter Template

Table Name: Case sensitive | Case insensitive — This option cannot be changed later.

Enterprise Project: default | 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

Tag key | Tag value

You can add 20 more tags.

Quantity: 1 — The total number of DB instances cannot exceed 1999. Increase quota

Step 10 Click **Next**.

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

Step 12 Return to the instance list.

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

----End

2.4.2.2 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 GaussDB(for MySQL) instance.

Step 1 Log in to the **management console**.

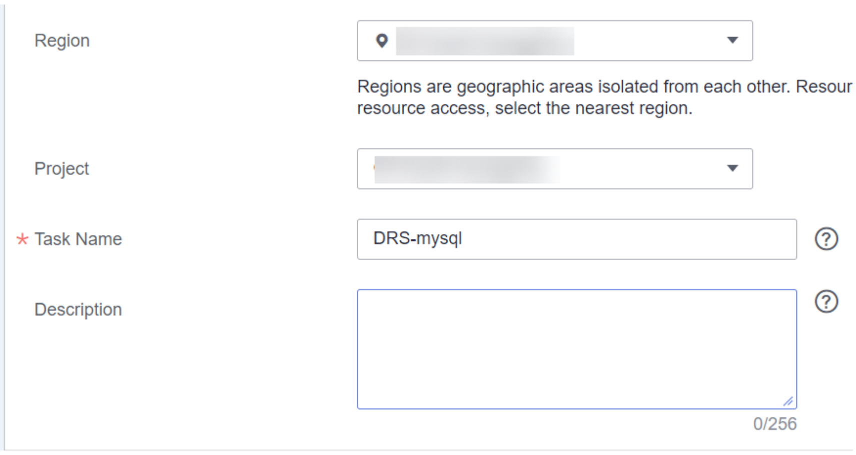
Step 2 Click in the upper left corner of the management console and select **AP-Singapore**.

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.



Region

Regions are geographic areas isolated from each other. Resour resource access, select the nearest region.

Project

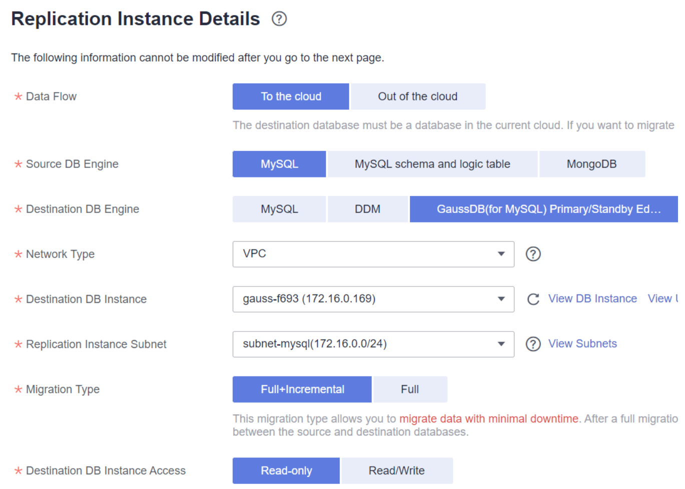
* Task Name: DRS-mysql

Description

0/256

2. Configure replication instance details as needed.

   Set **Destination DB Instance** to the GaussDB(for MySQL) instance created in **Creating a GaussDB(for MySQL) Instance**.



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

* Source DB Engine: MySQL | MySQL schema and logic table | MongoDB

* Destination DB Engine: MySQL | DDM | GaussDB(for MySQL) Primary/Standby Ed...

* Network Type: VPC

* Destination DB Instance: gauss-f693 (172.16.0.169) View DB Instance View l

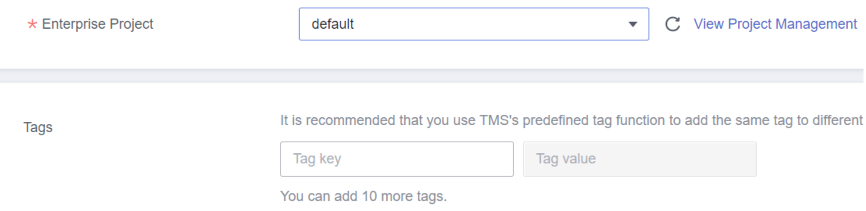
* Replication Instance Subnet: subnet-mysql(172.16.0.0/24) View Subnets

* Migration Type: Full+Incremental | Full

This migration type allows you to migrate data with minimal downtime. After a full migratio between the source and destination databases.

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

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



* Enterprise Project: default View Project Management

Tags: It is recommended that you use TMS's predefined tag function to add the same tag to different

Tag key | Tag value

You can add 10 more tags.

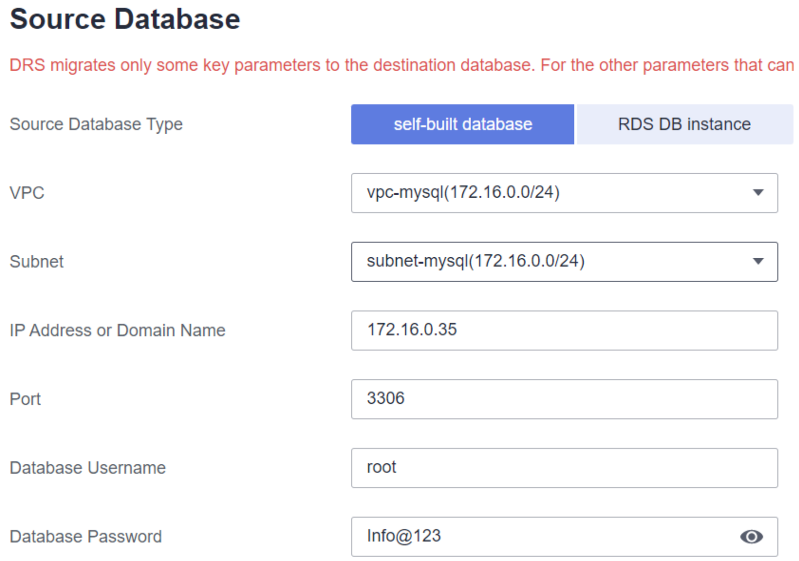
Step 6 Click **Create Now**.

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.



Source Database

DRS migrates only some key parameters to the destination database. For the other parameters that can

Source Database Type: self-built database | RDS DB instance

VPC: vpc-mysql(172.16.0.0/24)

Subnet: subnet-mysql(172.16.0.0/24)

IP Address or Domain Name: 172.16.0.35

Port: 3306

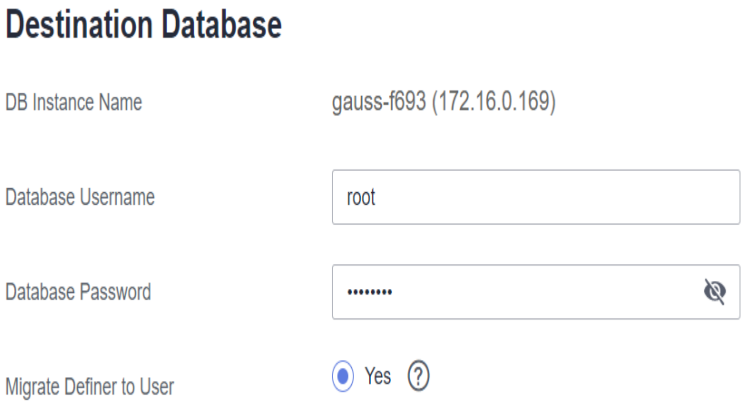
Database Username: root

Database Password: Info@123

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.



Destination Database

DB Instance Name	gauss-f693 (172.16.0.169)
Database Username	root
Database Password	••••••••
Migrate Definer to User	● Yes

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**.

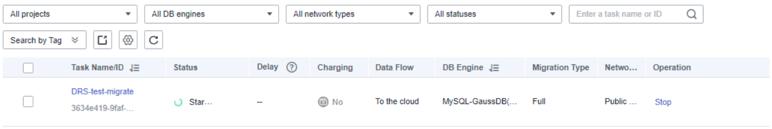
Step 11 View pre-check results.

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.



	Task Name/ID	Status	Delay	Charging	Data Flow	DB Engine	Migration Type	Netwo...	Operation
□	DRS-test-migrate 3634e419-9faf-...	Star...	--	No	To the cloud	MySQL-GaussDB(...	Full	Public ...	Stop

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

----End

2.4.2.3 Checking the Migration Results

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

Method 1: (Automatically) **View 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): **View the migration results on the GaussDB(for MySQL) console.** Log in to the destination database to check whether the databases, tables, and data are migrated. Manually confirm the data migration status.

Viewing Migration Results on the DRS Console

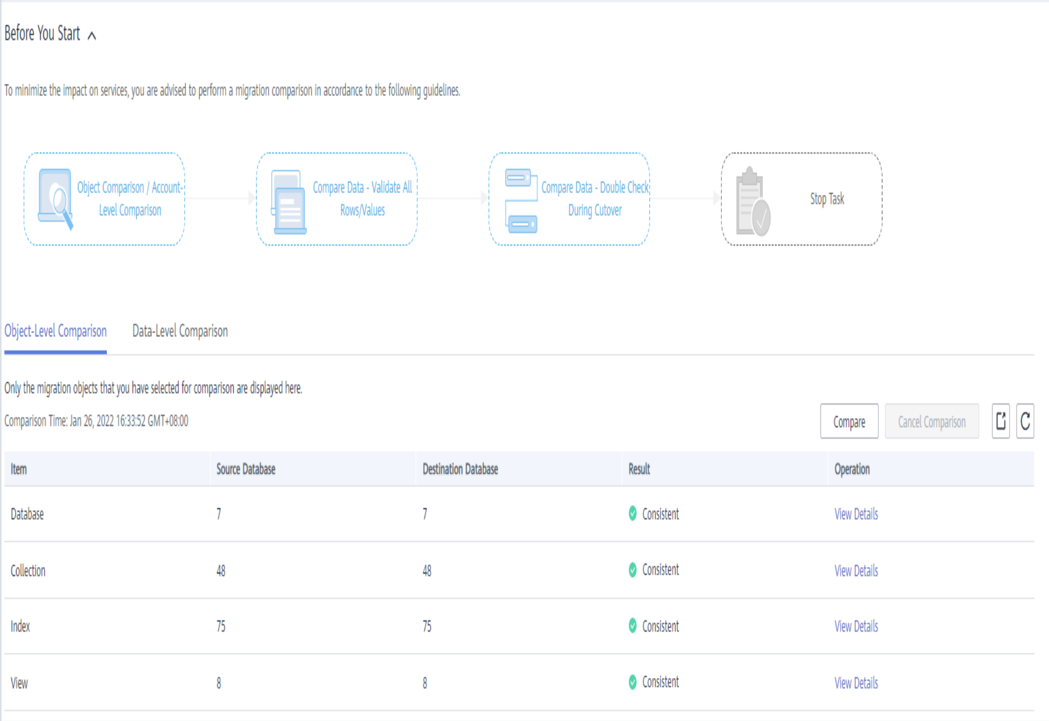
Step 1 Log in to the **management console**.

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

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

Step 4 Click the target DRS instance name.

Step 5 Click **Migration Comparison**.



Before You Start ^

To minimize the impact on services, you are advised to perform a migration comparison in accordance to the following guidelines.

Object Comparison / Account-Level Comparison
Compare Data - Validate All Rows/Values
Compare Data - Double Check During Cutover
Stop Task
Object-Level Comparison
Data-Level Comparison
Compare
Cancel Comparison

Only the migration objects that you have selected for comparison are displayed here.

Comparison Time: Jan 26, 2022 16:33:52 GMT+08:00

Item	Source Database	Destination Database	Result	Operation
Database	7	7	✓ Consistent	View Details
Collection	48	48	✓ Consistent	View Details
Index	75	75	✓ Consistent	View Details
View	8	8	✓ Consistent	View Details

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

Viewing Migration Results on the GaussDB(for MySQL) 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, choose **Databases** > **GaussDB(for MySQL)**.

Step 4 Click **GaussDB(for MySQL)**. Locate the target 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 GaussDB(for MySQL) Performance

After the migration is complete, test GaussDB(for MySQL) performance by referring to **Performance White Paper**.

3 From Other Cloud MySQL to GaussDB(for MySQL)

3.1 Overview

Description

This section includes the following content:

- Create a GaussDB(for MySQL) instance.
- Migrate data from MySQL on other clouds to GaussDB(for MySQL).

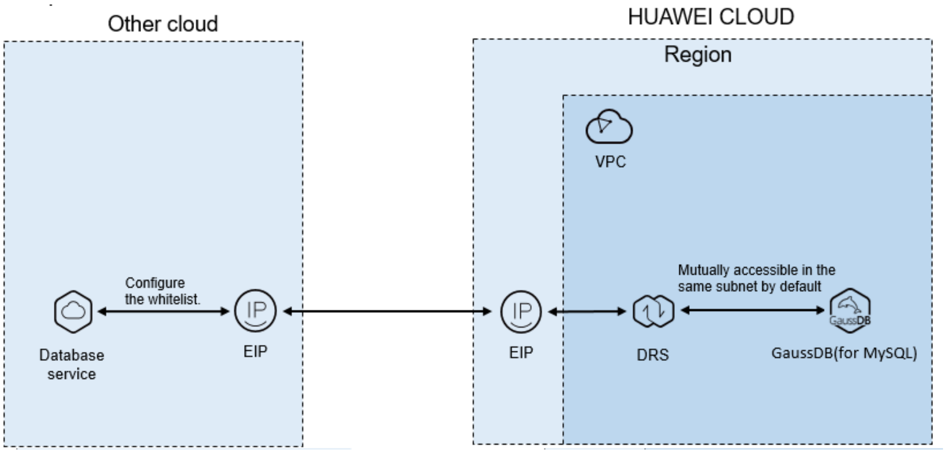
Prerequisites

- 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 GaussDB(for MySQL) instance. Data is migrated from the source to the destination over a public network. For details about the deployment architecture, see **Figure 3-1**.

Figure 3-1 Deployment architecture



Service List

- Virtual Private Cloud (VPC)
- GaussDB(for MySQL)
- 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**.

3.2 Resource Planning

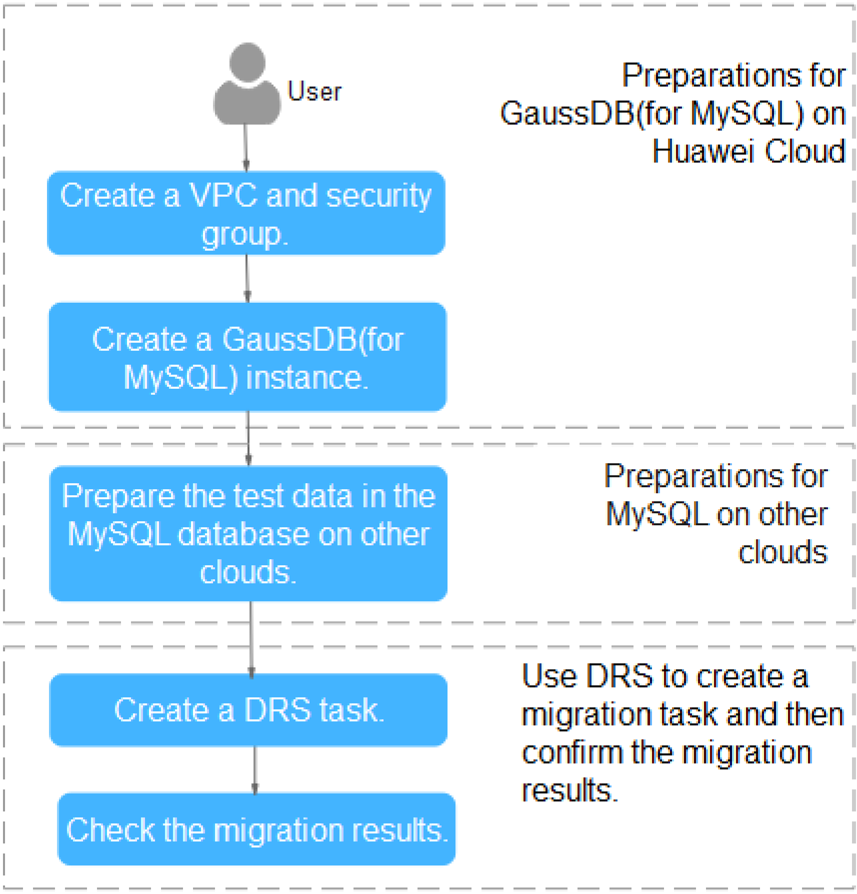
Table 3-1 Resource planning

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	-
GaussDB(for MySQL) 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	GaussDB(for MySQL)	-
	Network type	Public network	Public network is used in this example.

3.3 Operation Process

Figure 3-2 Flowchart


User
Preparations for GaussDB(for MySQL) on Huawei Cloud
Create a VPC and security group.
Create a GaussDB(for MySQL) instance.
Prepare the test data in the MySQL database on other clouds.
Preparations for MySQL on other clouds
Create a DRS task.
Check the migration results.
Use DRS to create a migration task and then confirm the migration results.

3.4 Creating a VPC and Security Group

Create a VPC and security group for a GaussDB(for MySQL) instance.

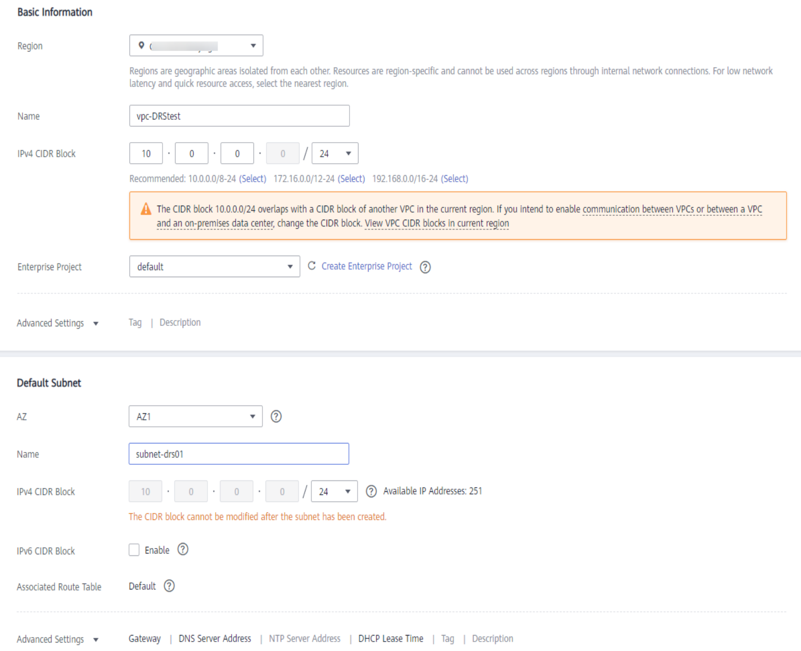
Creating a VPC

Step 1 Log in to the **management console**.

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

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

Step 4 Click **Create VPC**.



Basic Information

Region	([redacted]
	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-DRStest
IPv4 CIDR Block	10 . 0 . 0 . 0 / 24
	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	default
Advanced Settings	Tag | Description

Default Subnet

AZ	AZ1
Name	subnet-drs01
IPv4 CIDR Block	10 . 0 . 0 . 0 / 24 Available IP Addresses: 251
	The CIDR block cannot be modified after the subnet has been created.
IPv6 CIDR Block	□ Enable
Associated Route Table	Default
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**.

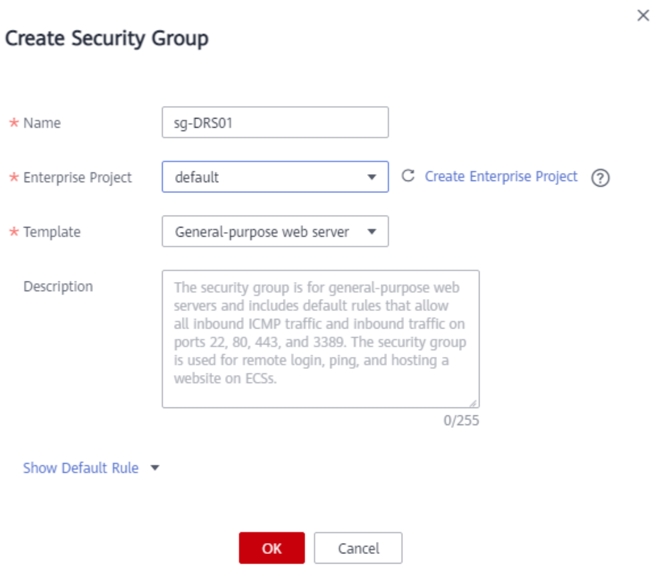
Step 2 Click in the upper left corner of the management console and select region AP-Singapore.

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.



Create Security Group

* Name: sg-DRS01

* Enterprise Project: default

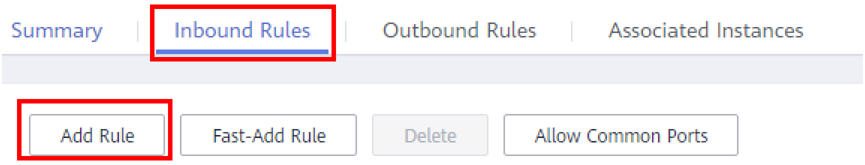
* Template: General-purpose web server

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.

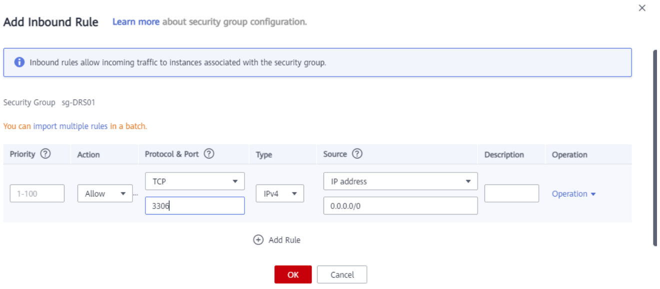
Step 7 Click **OK**.

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.

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 3306	IPv4	IP address 0.0.0.0/0		Operation

----End

3.5 Creating a GaussDB(for MySQL) Instance

This section describes how to create a Huawei Cloud GaussDB(for MySQL) instance.

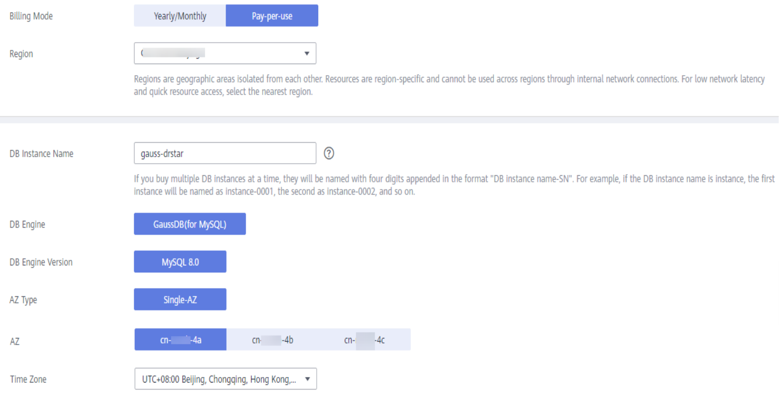
Step 1 Log in to the **management console**.

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

Step 3 Under the service list, choose **Databases** > **GaussDB(for MySQL)**.

Step 4 On the **Instances** page, click **Buy DB Instance**.

Step 5 Configure the instance name and basic information.



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

Region: ([redacted]

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: gauss-drstar

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: GaussDB(for MySQL)

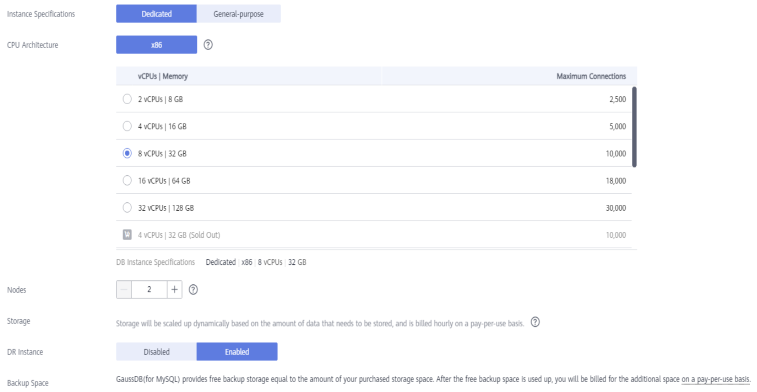
DB Engine Version: MySQL 8.0

AZ Type: Single-AZ

AZ: cn-[redacted]-4a | cn-[redacted]-4b | cn-[redacted]-4c

Time Zone: UTC+08:00 Beijing, Chongqing, Hong Kong,...

Step 6 Configure instance specifications.



Instance Specifications: Dedicated | General-purpose

CPU Architecture: x86

	vCPUs | Memory	Maximum Connections
○	2 vCPUs | 8 GB	2,500
○	4 vCPUs | 16 GB	5,000
●	8 vCPUs | 32 GB	10,000
○	16 vCPUs | 64 GB	18,000
○	32 vCPUs | 128 GB	30,000
☒	4 vCPUs | 32 GB (Sold Out)	10,000

DB Instance Specifications Dedicated | x86 | 8 vCPUs | 32 GB

Nodes: 2

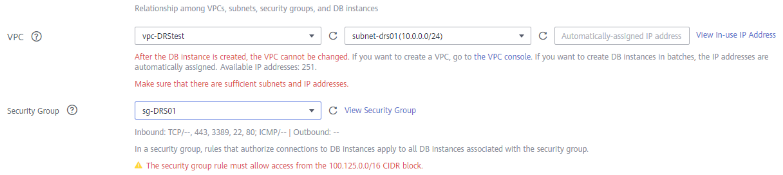
Storage: Storage will be scaled up dynamically based on the amount of data that needs to be stored, and is billed hourly on a pay-per-use basis.

DR Instance: Disabled | Enabled

Backup Space: GaussDB(for MySQL) provides free backup storage equal to the amount of your purchased 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**.



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

VPC: vpc-DRStest | subnet-drs01(10.0.0.0/24) | Automatically-assigned IP address | View In-use IP Address

After the DB instance is created, the VPC cannot be changed. If you want to create a VPC, go to the VPC console. If you want to create DB instances in batches, the IP addresses are automatically assigned. Available IP addresses: 251.

Make sure that there are sufficient subnets and IP addresses.

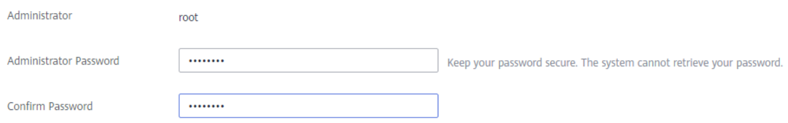
Security Group: sg-DRS01 | View Security Group

Inbound: TCP/--, 443, 3389, 22, 80; ICMP/-- | Outbound: --

In a security group, rules that authorize connections to DB instances apply to all DB instances associated with the security group.

⚠ The security group rule must allow access from the 100.125.0.0/16 CIDR block.

Step 8 Configure the instance password.



Administrator: root

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

Confirm Password: ••••••••

Step 9 Click **Next**. If you do not need to modify your settings, click **Submit**.

Step 10 Return to the instance list. If the instance becomes **Available**, the instance has been created.

----End

3.6 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 GaussDB(for MySQL) instance, the following permissions are required.

Table 3-2 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.

3.7 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 GaussDB(for MySQL) instance.

Pre-migration Check

Before creating a migration task, check the migration conditions.

This section describes how to migrate data from a MySQL database to GaussDB(for MySQL). For details, see **Before You Start**.

Creating a Migration Task

Step 1 Log in to the **management console**.

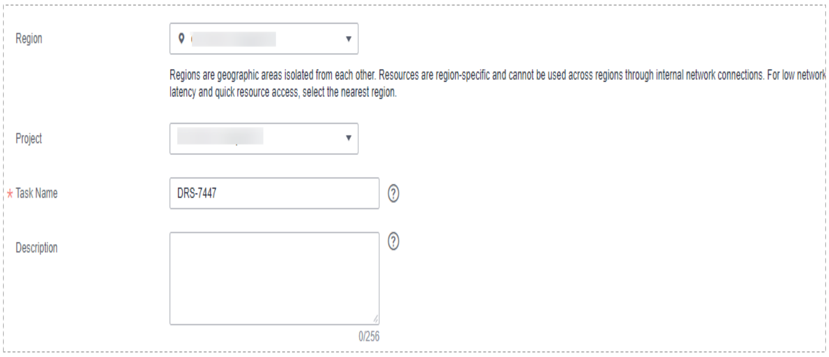
Step 2 Click in the upper left corner of the management console and select region AP-Singapore.

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.



Region: [redacted]

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: [redacted]

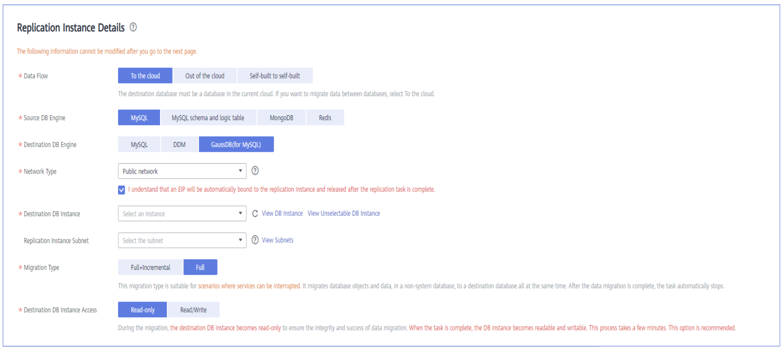
* Task Name: DRS-7447

Description:

0/256

2. Configure replication instance details as needed.

Select the GaussDB(for MySQL) instance created in **Creating a GaussDB(for MySQL) Instance** as the destination database.



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 Self-built to self-built

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 Redis

* Destination DB Engine: MySQL DDM [✓ GaussDB(for MySQL)]

* 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: Select an instance

Replication Instance Subnet: Select the subnet

* Migration Type: Full+Incremental [✓ Full]

This migration type is suitable for scenarios where services can be interrupted. It migrates database objects and data, in a non-system database, to a destination database all at the same time. After the data migration is complete, the task automatically stops.

* Destination DB Instance Access: [✓ Read-only] Read/Write

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.

Step 6 Click **Create Now**.

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

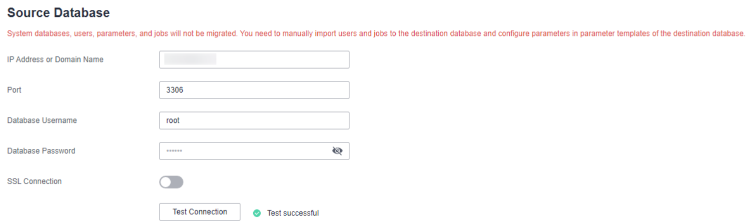
Step 7 Configure a whitelist for the source database to manage network access.

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.

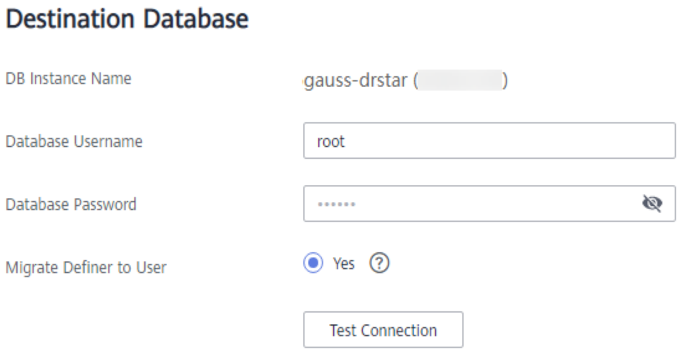


Source Database

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	[redacted]
Port	3306
Database Username	root
Database Password	••••••
SSL Connection	

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



Destination Database

DB Instance Name	gauss-drstar ([redacted])
Database Username	root
Database Password	••••••
Migrate Definer to User	● Yes

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**.

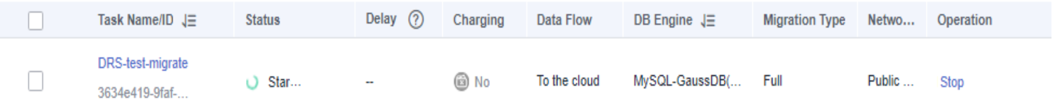
Step 11 Click **Next**. On the **Check Task** page, check the migration task.

- 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.



□	Task Name/ID	Status	Delay	Charging	Data Flow	DB Engine	Migration Type	Netwo...	Operation
□	DRS-test-migrate 3634e419-9faf-...	Star...	--	No	To the cloud	MySQL-GaussDB(...	Full	Public ...	Stop

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

NOTE

- Currently, MySQL to GaussDB(for MySQL) 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

3.8 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 GaussDB(for MySQL) 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

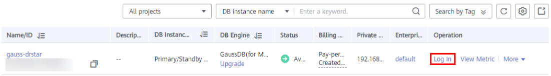
Checking the Migration Results on the GaussDB(for MySQL) Console

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** > **GaussDB(for MySQL)**.

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



Name/ID	Descrip...	DB Instanc...	DB Engine	Status	Billing ...	Private ...	Enterpri...	Operation
gauss-drstar [redacted]	--	Primary/Standby ...	GaussDB(for M... Upgrade	Av...	Pay-per... Created...	192.168...	default	Log In View Metric More

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

4 Enabling Read/Write Splitting for a GaussDB(for MySQL) Instance

4.1 User Authentication

You must have the remote login permission before using a database proxy to log in to databases.

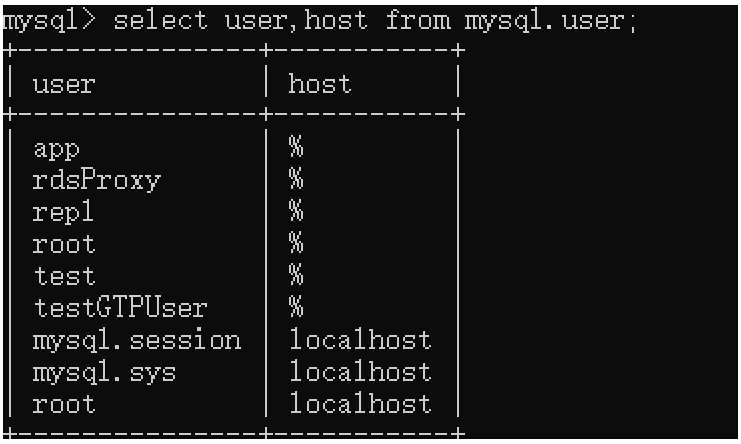
Procedure

Step 1 Connect to a GaussDB(for MySQL) instance.

- **Connecting to a DB Instance Using DAS (Recommended)**
- **Connecting to a DB Instance over a Private Network**
- **Connecting to a DB Instance over a Public Network**

Step 2 Check whether the host of the used account contains a proxy address.

```
SELECT user,host FROM mysql.user;
```



```
mysql> select user,host from mysql.user;
+---------------+-----------+
| user          | host      |
+---------------+-----------+
| app           | %         |
| rdsProxy      | %         |
| repl          | %         |
| root          | %         |
| test          | %         |
| testGTPUser   | %         |
| mysql.session | localhost |
| mysql.sys     | localhost |
| root          | localhost |
+---------------+-----------+
```

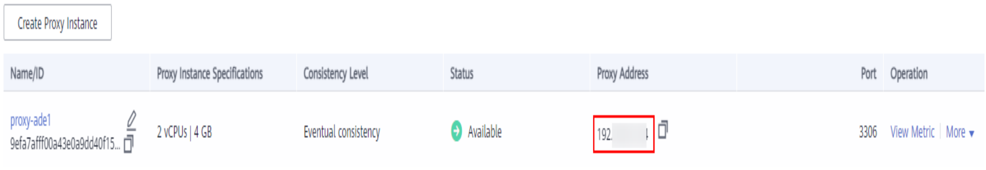
Obtaining a proxy address:

1. **Log in to the management console.**

2. Click in the upper left corner and select a region and a project.
3. Click ☰ in the upper left corner of the page, choose **Databases** > **GaussDB(for MySQL)**.
4. On the **Instances** page, click the instance name to go to the **Basic Information** page.
5. In the navigation pane on the left, choose **Database Proxy**. Using either of following methods to obtain the proxy address:

   Method 1: In the proxy instance list, locate the proxy instance and view the value in the **Proxy Address** column.

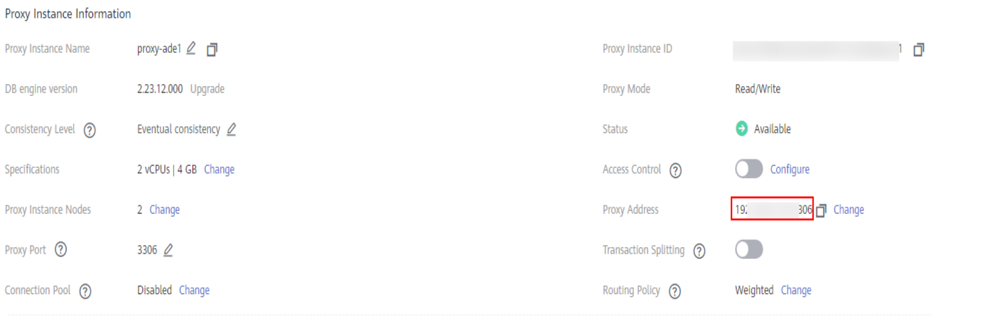
   Figure 4-1 Viewing the proxy address in the proxy instance list page

Name/ID	Proxy Instance Specifications	Consistency Level	Status	Proxy Address	Port	Operation
proxy-ade1 9efa7afff00a43e0a9dd40f15...	2 vCPUs | 4 GB	Eventual consistency	Available	192.[redacted]	3306	View Metric | More ▾

   Method 2: In the proxy instance list, click the name of the proxy instance to go to the **Basic Information** page. In the **Proxy Instance Information** area, view the **Proxy Address** field.

   Figure 4-2 Viewing the proxy address in the proxy instance information page

   Proxy Instance Information

Proxy Instance Name	proxy-ade1	Proxy Instance ID	[redacted]1
DB engine version	2.23.12.000 Upgrade	Proxy Mode	Read/Write
Consistency Level	Eventual consistency	Status	Available
Specifications	2 vCPUs | 4 GB Change	Access Control	Configure
Proxy Instance Nodes	2 Change	Proxy Address	19[redacted]306 Change
Proxy Port	3306	Transaction Splitting	
Connection Pool	Disabled Change	Routing Policy	Weighted Change

Step 3 If the host does not contain the CIDR block where the database proxy is located, assign the remote access permission to the host. For example, allowing user **root** to access the GaussDB(for MySQL) server from the IP address range starting with 192.168.0.

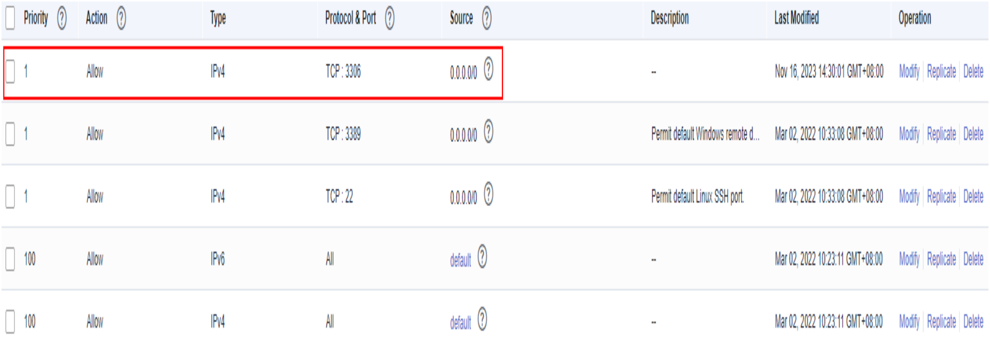
Alternatively, you can set global permissions on the **User Management** page of the DAS console. For details, see **Editing a User**.

Step 4 When modifying a security group, ensure that the inbound and outbound rules allow access of the proxy address. The default port is **3306**.

1. **Log in to the management console.**
2. Click in the upper left corner and select a region and a project.
3. Click ☰ in the upper left corner of the page, choose **Databases** > **GaussDB(for MySQL)**.

4. On the **Instances** page, click the instance name to go to the **Basic Information** page.
5. In the **Network Information** area, click the security group name.
6. On the **Inbound Rules** tab, check whether access through port **3306** is allowed by default.

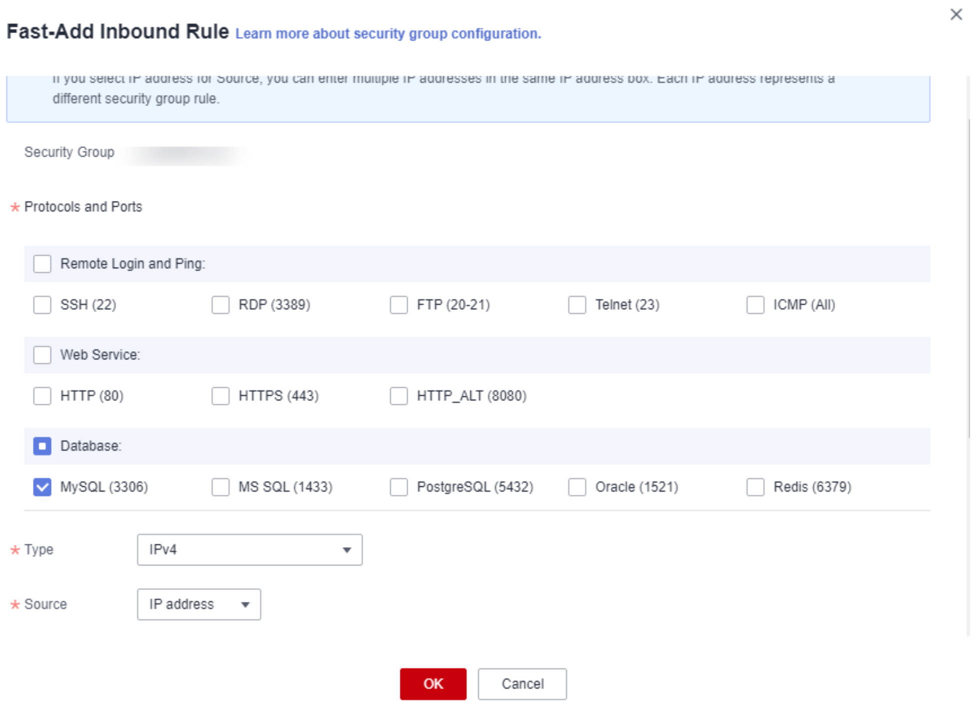
Figure 4-3 Allowing access through port 3306



□ Priority ⓘ	Action ⓘ	Type	Protocol & Port ⓘ	Source ⓘ	Description	Last Modified	Operation
□ 1	Allow	IPv4	TCP : 3306	0.0.0.0/0 ⓘ	--	Nov 16, 2023 14:30:01 GMT+08:00	Modify | Replicate | Delete
□ 1	Allow	IPv4	TCP : 3389	0.0.0.0/0 ⓘ	Permit default Windows remote d...	Mar 02, 2022 10:33:08 GMT+08:00	Modify | Replicate | Delete
□ 1	Allow	IPv4	TCP : 22	0.0.0.0/0 ⓘ	Permit default Linux SSH port.	Mar 02, 2022 10:33:08 GMT+08:00	Modify | Replicate | Delete
□ 100	Allow	IPv6	All	default ⓘ	--	Mar 02, 2022 10:23:11 GMT+08:00	Modify | Replicate | Delete
□ 100	Allow	IPv4	All	default ⓘ	--	Mar 02, 2022 10:23:11 GMT+08:00	Modify | Replicate | Delete

If this rule does not exist, click **Fast-Add Rule**. In the displayed dialog box, select **MySQL (3306)** and click **OK**.

Figure 4-4 Fast adding port 3306



Fast-Add Inbound Rule Learn more about security group configuration.

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 [redacted]

* Protocols and Ports

□ Remote Login and Ping:

□ SSH (22) □ RDP (3389) □ FTP (20-21) □ Telnet (23) □ ICMP (All)

□ Web Service:

□ HTTP (80) □ HTTPS (443) □ HTTP_ALT (8080)

■ Database:

☑ MySQL (3306) □ MS SQL (1433) □ PostgreSQL (5432) □ Oracle (1521) □ Redis (6379)

* Type: IPv4

* Source: IP address

NOTE

When you use the MySQL 8.0 client to access the read/write splitting of the database, the error message "auth user failed" may be displayed.

Add **--default-auth=mysql_native_password** when connecting to the database.

----End

4.2 Connection Pool Configuration

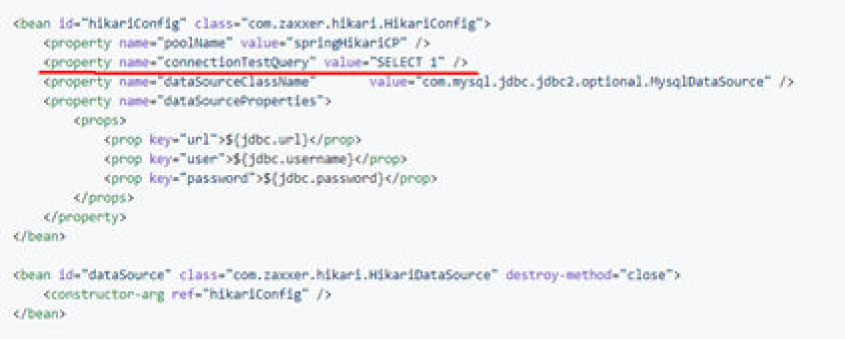
When the connection pool is used, you need to configure the following parameters to ensure that some connections will not be used even though they are disconnected due to timeout.

- For JDBC connection pool and Druid connection pool:

  testOnBorrow = **true**

- For HikariCP connection pool:

  connectionTestQuery = **SELECT 1**



```
<bean id="hikariConfig" class="com.zaxxer.hikari.HikariConfig">
    <property name="poolName" value="springHikariCP" />
    <property name="connectionTestQuery" value="SELECT 1" />
    <property name="dataSourceClassName"      value="com.mysql.jdbc.jdbc2.optional.MysqlDataSource" />
    <property name="dataSourceProperties">
        <props>
            <prop key="url">${jdbc.url}</prop>
            <prop key="user">${jdbc.username}</prop>
            <prop key="password">${jdbc.password}</prop>
        </props>
    </property>
</bean>

<bean id="dataSource" class="com.zaxxer.hikari.HikariDataSource" destroy-method="close">
    <constructor-arg ref="hikariConfig" />
</bean>
```

4.3 Routing Read Requests to the Primary Node

- If there are SELECT statements in transactions, the transaction requests are routed to the primary node. If **SET AUTOCOMMIT=0** is added before a SELECT statement, the transaction requests are routed to the primary node.
- If all read replicas are abnormal or the read weights allocated to the read replicas are 0, requests will be routed to the primary node. You can set read weights allocated to read replicas and primary node after read/write splitting is enabled.
- During the execution of SQL statements:
  - If multi-statements (for example, **insert xxx;select xxx**) are executed, all subsequent requests will be routed to the primary node. To restore the read/write splitting function, disconnect the connection from your applications and establish a connection again.
  - Read operations with locks (for example, **SELECT for UPDATE**) will be routed to the primary node.
  - When **/*FORCE_MASTER*/** is used, requests will be routed to the primary node.
  - If **the HANDLER statement** is executed, all subsequent requests will be routed to the primary node by default. To restore read/write splitting, disconnect the connection and reestablish a connection.

5 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 GaussDB(for MySQL). You can continuously evaluate the security status of your GaussDB(for MySQL) resources, enhance their overall security defense by combining multiple security capabilities provided by GaussDB(for MySQL), and protect data stored in GaussDB(for MySQL) from leakage and tampering both at rest and in transit.

Make security configurations from the following dimensions to meet your service needs.

Connecting to a DB Instance over a Private Network

1. **Connecting a DB instance over DAS**

   Data Admin Service (DAS) enables you to connect to and manage DB instances with ease on a web-based console. By default, you have the permissions required for remote login. It is recommended that you use DAS to log in to DB instances. DAS is secure and convenient. For details, see **Connecting to a DB Instance Using DAS (Recommended)**.

2. **Connecting a DB instance over the private IP address**

   If your application is deployed on an ECS that is in the same region and VPC as a DB instance, you are advised to use the private IP address of the DB instance to connect to the ECS for high security and performance. For details, see **Connecting to a DB Instance over a Private Network**.

Configuring Access Control Permissions

Access control can prevent your data from being stolen or damaged.

1. **Configuring only the minimum permissions for IAM users with different roles**

   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. For details, see **Permissions Management**.

2. **Configuring security group rules**

   After a DB instance is created, you can configure inbound and outbound security group rules to control access to and from your instance. This can prevent untrusted third parties from connecting to your DB instance. For details, see **Configuring Security Group Rules**.

3. **Using a non-default port**

   The default port of GaussDB(for MySQL) is 3306, which is vulnerable to scanning attacks. You are advised to change it to a non-default port. For details, see **Changing a Database Port**.

4. **Periodically changing the administrator password**

5. **Using different non-administrator accounts to manage databases**

   You can create different read-only or read/write accounts for database management based on actual requirements. For details, see **Creating a Database Account**.

6. **Enabling multi-factor authentication for critical operations**

   GaussDB(for MySQL) supports critical operation protection. After this function is enabled, the system authenticates your identity when you perform critical operations like deleting a DB instance, to further secure your data and configurations. For details, see **Critical Operation Protection**.

Building Disaster Recovery Capabilities

Build restoration and disaster recovery (DR) capabilities in advance to prevent data from being deleted or damaged accidentally in the event of failures.

1. **Configuring an automated backup policy**

   When you create a DB instance, an automated backup policy is enabled by default. For security purposes, the automated backup policy cannot be disabled. After the instance is created, you can customize the automated backup policy as required. GaussDB(for MySQL) backs up data based on the automated backup policy you configure. GaussDB(for MySQL) backs up data at the DB instance level, rather than the database level. If a database is faulty or data is damaged, you can still restore it from backup to ensure data reliability. Backing up data affects the database read and write performance, so you are advised to set the automated backup time window to off-peak hours. For details, see **Configuring a Same-Region Backup Policy**.

2. **Enabling cross-region backup**

   GaussDB(for MySQL) can store backups in a different region from the DB instance for disaster recovery. If the DB instance ever fails, you can use backups in the other region to restore data to a new DB instance. For details, see **Configuring a Cross-Region Backup Policy**.

Keeping Data in Transit Safe

1. **Using HTTPS to access data**

   Hypertext Transfer Protocol Secure (HTTPS) is a protocol that guarantees the confidentiality and integrity of communications between clients and servers. You are advised to use HTTPS for data access.

2. **Using SSL to connect to a DB instance**

   Secure Socket Layer (SSL) is an encryption-based Internet security protocol for establishing secure links between a server and a client. It provides privacy, authentication, and integrity to Internet communications. SSL encrypts data to prevent data theft and maintains data integrity to ensure that data is not modified in transit. For details, see **Configuring SSL**.

Auditing GaussDB(for MySQL) Operation Logs to Check Exceptions

1. **Enabling CTS to record all GaussDB(for MySQL) access operation**

   Cloud Trace Service (CTS) records operations on cloud resources in your account. You can use the logs generated by CTS to perform security analysis, track resource changes, audit compliance, and locate faults.

   After you enable CTS and configure a tracker, CTS can record management and data traces of GaussDB(for MySQL) for auditing. For details, see **Key Operations Supported by CTS**.

2. **Enabling SQL Explorer to record all SQL statements**

   Enabling SQL Explorer will allow GaussDB(for MySQL) to store all SQL statement logs for analysis. For details, see **Enabling or Disabling SQL Explorer**.

3. **Using Cloud Eye for real-time monitoring on security events**

   Huawei Cloud Eye is available to monitor your DB instance, report alarms, and send notifications in real time, so that you can have a clear understanding of the status and alarm events of your DB instance.

   You do not need to separately subscribe to Cloud Eye. It starts automatically once you create a resource (a GaussDB(for MySQL) DB instance, for example).

   For details, see **What Is Cloud Eye?**

Using the Latest SDKs for Better Experience and Security

You are advised to use the latest version of SDK to better use GaussDB(for MySQL) and protect your data. To download the latest SDK for each language, see **SDK Overview**.