GaussDB

Getting Started

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Contents

1 Buying a GaussDB Instance and Connecting to It Through the DAS Console (Recommended)

Data Admin Service (DAS) enables you to manage instances on a web-based console, simplifying database management and improving working efficiency. You can connect to and manage instances through DAS.

This section describes how to use DAS to connect to a GaussDB instance you have bought on the GaussDB management console. For more methods of connecting to an instance, see **Connecting to a GaussDB Instance**.

Operation Process

Step	Description
Preparations	Sign up for a HUAWEI ID, enable Huawei Cloud services, make sure you have a valid payment method configured, create IAM users, and grant them specific GaussDB permissions.
Step 1: Buy an Instance	Configure basic information about a GaussDB instance and submit the purchase request.
Step 2: Log In to a GaussDB Instance Through DAS	Connect to the GaussDB instance using Data Admin Service (DAS).

Preparations

1. **Sign up for a HUAWEI ID and enable Huawei Cloud services**.
2. Before purchasing DB instances, ensure that your account balance is sufficient. **Top up your account** if required.
3. For fine-grained permissions management on Huawei Cloud resources, use Identity and Access Management (IAM) to create a user or user group and grant it specific operation permissions. For details, see **Creating a User and Granting Permissions**.

Buying an 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 ☰ in the upper left corner of the page and choose **Databases** > **GaussDB**.

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

Step 5 On the displayed page, set **Billing Mode**, enter **DB Instance Name**, select **Edition Type**, **DB Engine Version**, **DB Instance Type**, and **Deployment Model**, and complete other configurations.

Figure 1-1 Billing mode and basic information

Table 1-1 Description

Parameter	Example Value	Description
Billing Mode	Pay-per-use	GaussDB provides yearly/monthly billing and pay-per-use billing. ● **Yearly/Monthly**: You pay upfront for the amount of time you expect to use the DB instance for. You will need to make sure you have a top-up account with a sufficient balance or have a valid payment method configured first. ● **Pay-per-use**: You can start using the DB instance first and then pay as you go. Pricing is listed on a per-hour basis, but bills are calculated based on the actual usage duration.
Region and Project	CN-Hong Kong	Region where the tenant is located. **NOTE** Products in different regions cannot communicate with each other over a private network. After the DB instance is created, you cannot change its region.
DB Instance Name	**gauss-d0a7**	The instance name must start with a letter and can contain 4 to 64 characters. Only letters (case-sensitive), digits, hyphens (-), and underscores (_) are allowed.
Edition Type	**Enterprise edition**	GaussDB provides **Basic edition** and **Enterprise edition**. The basic edition lacks certain advanced features that are available in the enterprise edition. The basic edition delivers the same level of performance as the enterprise edition at a more affordable price. This edition is ideal for users who prioritize cost and do not need advanced features.
DB Engine Version	**V2.0-8.103**	GaussDB database version.
DB Instance Type	**centralized**	● **Distributed**: You can add nodes for distributed instances as needed to handle large volumes of concurrent requests. ● **Centralized**: Centralized instances are suitable for scenarios with small and stable volumes of data, where data reliability and service availability are extremely important.

Parameter	Example Value	Description
Deployment Model	1 primary + 2 standby	• Distributed instances – **Independent**: Database components are deployed on different nodes. This model is suitable for where high availability and stability are required and the instance scale is large. – **Combined**: Different database components are deployed on the same node. This option is available only when **Edition Type** is **Basic edition**. • centralized – **HA (1 primary + 2 standby)**: 3-node deployment where there is a shard. The shard contains one primary DN and two standby DNs. – **Single**: single-node deployment where there is only one CMS component and one DN. To create a single-replica instance, ensure that the instance version is V2.0-2.2 or later. – **1 primary + 1 standby + 1 log**: 3-node deployment where there is one shard with three replicas. The shard contains one primary DN, one standby DN, and one log-dedicated DN. This model is available only for instances of version V2.0-3.200 or later.
AZ	AZ1	An AZ is a physical region where resources have their own independent power supply and networks. AZs are physically isolated but interconnected through an internal network.
Time Zone	(UTC+08:00) Beijing, Chongqing, Hong Kong, Urumqi	You need to select a time zone for your instance based on the region it is hosted in.

Step 6 Configure instance specifications.

Figure 1-2 Specifications and storage
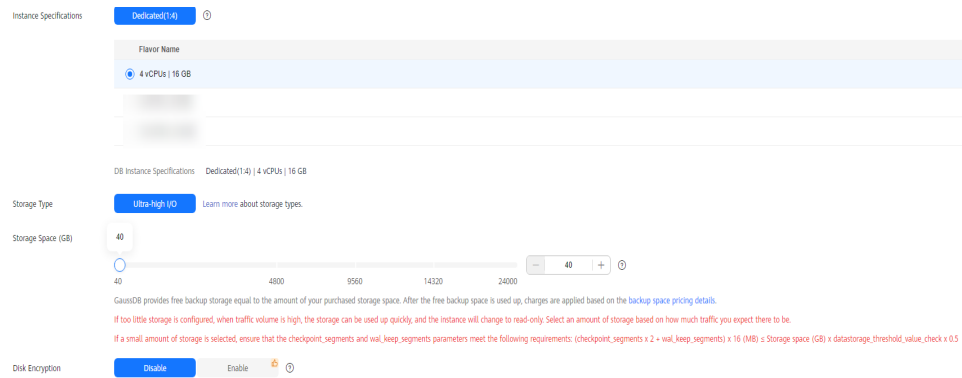
Table 1-2 Parameters

Parameter	Example Value	Description
Instance Specifications	Dedicated(1:4), 4 vCPUs | 16 GB	The vCPUs and memory of an instance.
Storage Type	Ultra-high I/O	The storage type determines the read/write speed of an instance. The higher the maximum throughput is, the higher the instance read/write speed can be.
Storage Space	40 GB	The storage space contains the file system overhead required for inodes, reserved blocks, and database operation.
Disk Encryption	Disable	Enabling disk encryption improves data security, but slightly affects the read and write performance of the database. If a shared KMS key is used, the corresponding CTS event is **createGrant**. Only the key owner can receive this event.

Step 7 Retain the default settings for the network information.

Figure 1-3 Network configuration

Step 8 Configure the instance password and enterprise project.

Figure 1-4 Database configuration

Table 1-3 Parameters

Parameter	Example Value	Description
Administrator Password	-	Enter a strong password and periodically change it to improve security, preventing security risks such as brute force cracking.
Confirm Password	-	Enter the administrator password again.

Parameter	Example Value	Description
Enterprise Project	default	If the instance has been associated with an enterprise project, select the target project from the **Enterprise Project** drop-down list. You can also go to the Enterprise Project Management console to create a project. For details, see ***Enterprise Management User Guide**.

Step 9 Click **Next**, confirm the instance information, and click **Submit**.

Step 10 Go to the instance list.

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

----End

Logging In to a GaussDB Instance Through DAS

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 ☰ in the upper left corner of the page and choose **Databases** > **GaussDB**.

Step 4 On the **Instances** page, locate the DB instance you want to log in to and click **Log In** in the **Operation** column.

Alternatively, click the DB instance name on the **Instances** page. On the displayed **Basic Information** page, click **Log In** in the upper right corner of the page.

Step 5 On the **Custom Login** page, select the node to be logged in to. Enter the correct database username and password, and click **Test Connection**. After the connection test is successful, click **Log In**.

Figure 1-5 Login page
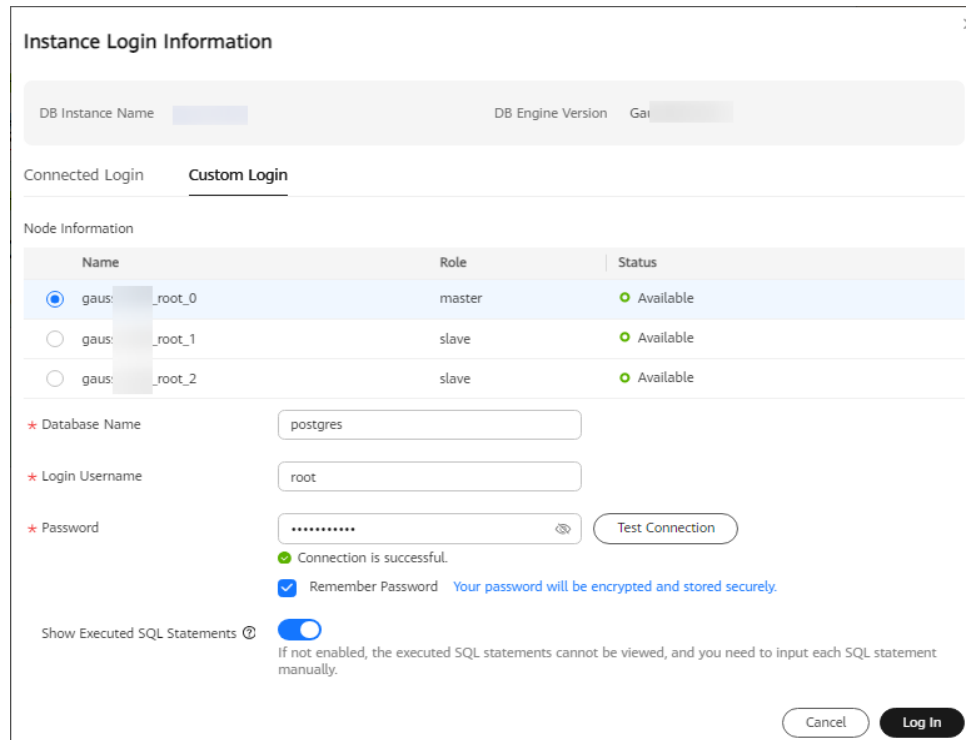
Table 1-4 Parameters

Parameter	Example Value	Description
Login Username	root	Username of the GaussDB database account. The default administrator is **root**.
Database Name	postgres	Name of the database to connect to. The default management database is **postgres**.
Password	-	Password of the database user.
Show Executed SQL Statements	Enabled	You are advised to enable **Show Executed SQL Statements**. With it enabled, you can view the executed SQL statements under **SQL Operations** > **SQL History** and execute them again without entering the SQL statements.

----End

Getting Started with SQL

After logging in to an instance, you can create database users, databases, and tables through DAS.

Step 1 Create a database user.

Only administrators that are created during the instance installation can access the initial database by default. You can also create other database users.

CREATE USER *joe* **WITH PASSWORD "xxxxxxxxx";**

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

Figure 1-6 Creating a database user
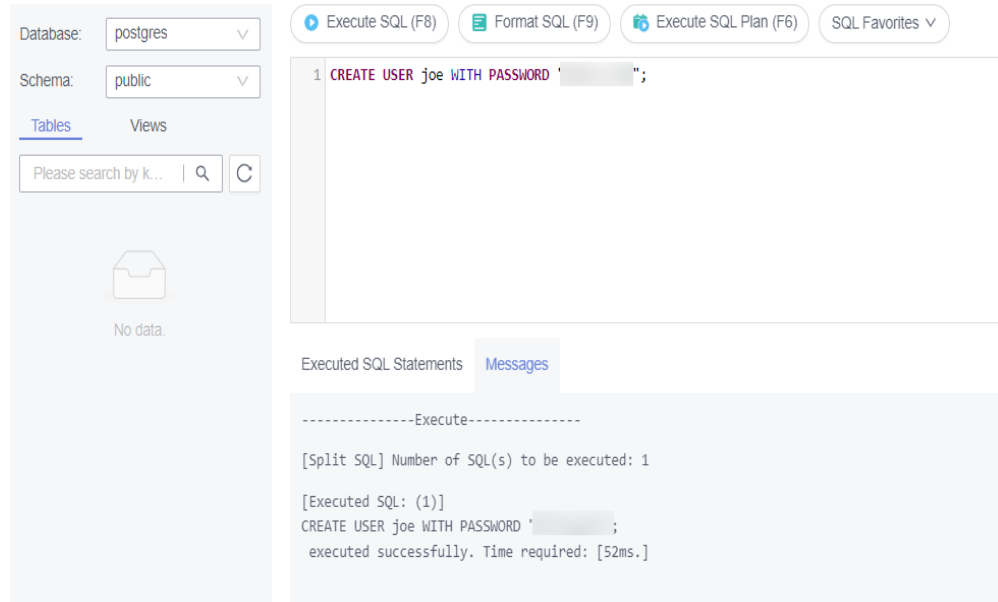
In this case, you have created a user named **joe**, and the user password is **xxxxxxx**.

For more information about database users, see **Users and Permissions**.

Step 2 Create a database.

CREATE DATABASE *db_tpcds*;

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

Figure 1-7 Creating a database

Switch to the newly created database in the upper left corner.

Figure 1-8 Switching to the new database
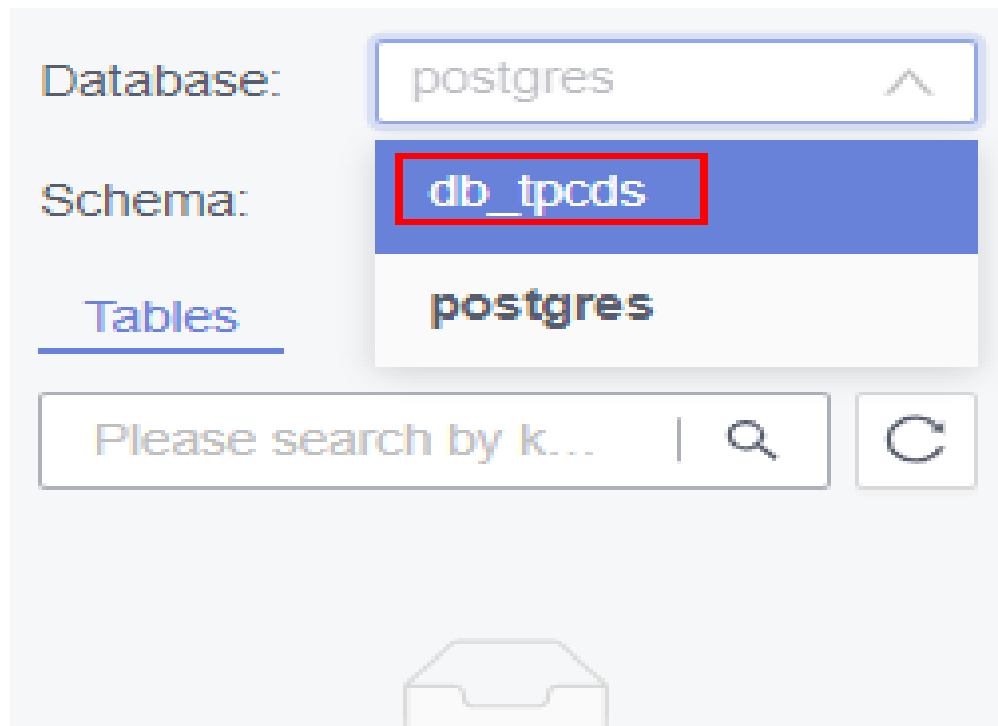
Step 3 Create a table.

- Run the following command to create a schema:

  CREATE SCHEMA *myschema*;

- Create a table named **mytable** that has only one column. The column name is **firstcol** and the column type is integer.

  CREATE TABLE myschema.mytable *(firstcol int)*;

- Insert data to the table.

  INSERT INTO myschema.mytable values (100);

- View data in the table.

  SELECT * FROM myschema.mytable;

Note:

- By default, new database objects, such as the **mytable** table, are created in the *$user* schema. For more information about schemas, see **Creating and Managing Schemas**.

- For details about how to create a table, see **Creating and Managing Tables**.

- In addition to the created tables, a database contains many system catalogs. These system catalogs contain information about instance installation as well as the queries and processes running in GaussDB. You can collect information about the database by querying the system catalogs. For details about querying system catalogs, see **Querying a System Catalog**.

Step 4 In the **db_tpcds** database, run the following statement as user **root** to grant all permissions of the **db_tpcds** database to user **joe**:

GRANT ALL ON DATABASE db_tpcds **TO** joe;

GRANT USAGE ON schema myschema **TO** joe;

GRANT ALL ON TABLE myschema.mytable **TO** joe;

Step 5 Log in to the **db_tpcds** database as user **joe**.

Step 6 After login, insert data into the table and verify the data.

INSERT INTO myschema.mytable values (200);

SELECT * FROM myschema.mytable;

Figure 1-9 Inserting and verifying data
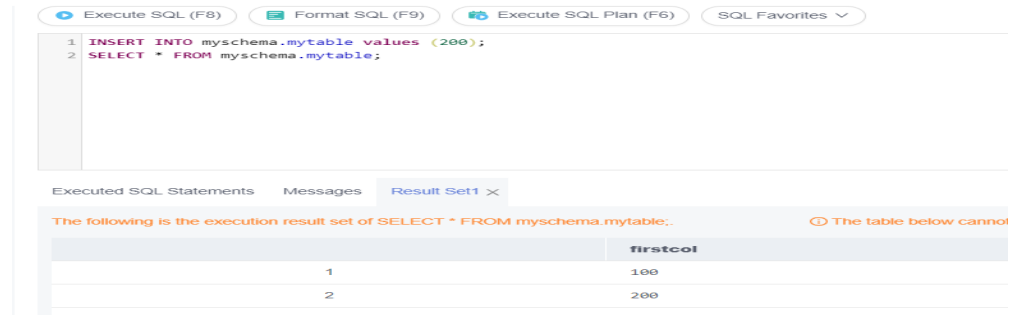
----**End**

Follow-up Operations

After logging in to the instance, you can create alarm rules, set automated backup policies, create databases, and migrate data. For details, see:

- **Creating an Alarm Rule**
- **Setting an Automated Backup Policy**
- **Creating a Database Using SQL**
- **Creating a Database Through an API**
- **Managing GaussDB Databases Through DAS**
- **Migrating Data to GaussDB**

FAQ

Question: What can I do if the DAS console is not displayed after I click **Log In** in the **Operation** column of an instance on the **Instances** page?

Solution: Set your browser to allow pop-ups and try again.

2 Buying and Connecting to the GaussDB Instance Using gsql

This section describes how to use the gsql client to connect to a GaussDB instance you have bought on the GaussDB management console. For more methods of connecting to an instance, see **Connecting to a GaussDB Instance**.

Operation Process

Step	Description
Preparations	Sign up for a HUAWEI ID, enable Huawei Cloud services, make sure you have a valid payment method configured, create IAM users, and grant them specific GaussDB permissions.
Step 1: Buy an Instance	Configure basic information about a GaussDB instance and submit the purchase request.
Step 2: Buy an ECS	Buy an ECS that is in the same region and VPC as your GaussDB instance.
Step 3: Obtain the Driver Package	Download the driver package that matches the version of your instance.
Step 4: Connect to the Database	Use gsql to connect to GaussDB.

Preparations

1. **Sign up for a HUAWEI ID and enable Huawei Cloud services**.

2. Before purchasing DB instances, ensure that your account balance is sufficient. **Top up your account** if required.

3. For fine-grained permissions management on Huawei Cloud resources, use Identity and Access Management (IAM) to create a user or user group and grant it specific operation permissions. For details, see **Creating a User and Granting Permissions**.

Buying an 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 ☰ in the upper left corner of the page and choose **Databases** > **GaussDB**.

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

Step 5 On the displayed page, set **Billing Mode**, enter **DB Instance Name**, select **Edition Type**, **DB Engine Version**, **DB Instance Type**, and **Deployment Model**, and complete other configurations.

Figure 2-1 Billing mode and basic information

Table 2-1 Description

Parameter	Example Value	Description
Billing Mode	Pay-per-use	GaussDB provides yearly/monthly billing and pay-per-use billing. ● **Yearly/Monthly**: You pay upfront for the amount of time you expect to use the DB instance for. You will need to make sure you have a top-up account with a sufficient balance or have a valid payment method configured first. ● **Pay-per-use**: You can start using the DB instance first and then pay as you go. Pricing is listed on a per-hour basis, but bills are calculated based on the actual usage duration.
Region and Project	CN-Hong Kong	Region where the tenant is located. **NOTE** Products in different regions cannot communicate with each other over a private network. After the DB instance is created, you cannot change its region.
DB Instance Name	**gauss-d0a7**	The instance name must start with a letter and can contain 4 to 64 characters. Only letters (case-sensitive), digits, hyphens (-), and underscores (_) are allowed.
Edition Type	**Enterprise edition**	GaussDB provides **Basic edition** and **Enterprise edition**. The basic edition lacks certain advanced features that are available in the enterprise edition. The basic edition delivers the same level of performance as the enterprise edition at a more affordable price. This edition is ideal for users who prioritize cost and do not need advanced features.
DB Engine Version	**V2.0-8.103**	GaussDB database version.
DB Instance Type	**centralized**	● **Distributed**: You can add nodes for distributed instances as needed to handle large volumes of concurrent requests. ● **Centralized**: Centralized instances are suitable for scenarios with small and stable volumes of data, where data reliability and service availability are extremely important.

Parameter	Example Value	Description
Deployment Model	1 primary + 2 standby	- Distributed instances **Independent**: Database components are deployed on different nodes. This model is suitable for where high availability and stability are required and the instance scale is large. **Combined**: Different database components are deployed on the same node. This option is available only when **Edition Type** is **Basic edition**. - centralized **HA (1 primary + 2 standby)**: 3-node deployment where there is a shard. The shard contains one primary DN and two standby DNs. **Single**: single-node deployment where there is only one CMS component and one DN. To create a single-replica instance, ensure that the instance version is V2.0-2.2 or later. **1 primary + 1 standby + 1 log**: 3-node deployment where there is one shard with three replicas. The shard contains one primary DN, one standby DN, and one log-dedicated DN. This model is available only for instances of version V2.0-3.200 or later.
AZ	AZ1	An AZ is a physical region where resources have their own independent power supply and networks. AZs are physically isolated but interconnected through an internal network.
Time Zone	(UTC+08:00) Beijing, Chongqing, Hong Kong, Urumqi	You need to select a time zone for your instance based on the region it is hosted in.

Step 6 Configure instance specifications.

Figure 2-2 Specifications and storage
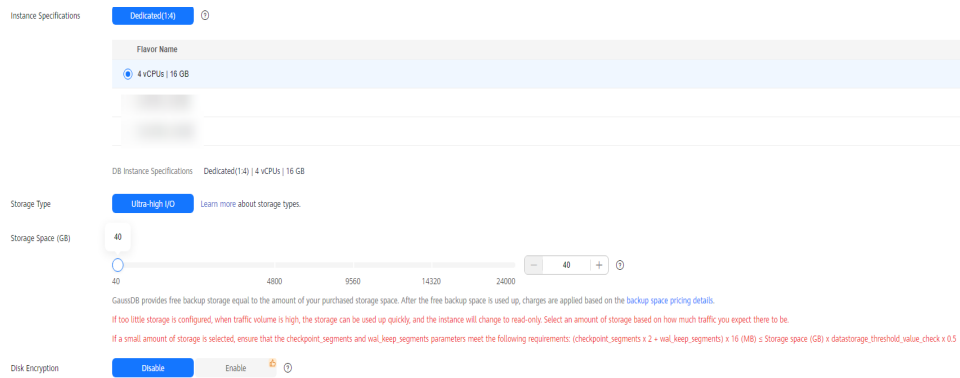
Table 2-2 Parameters

Parameter	Example Value	Description
Instance Specifications	Dedicated(1:4), 4 vCPUs | 16 GB	The vCPUs and memory of an instance.
Storage Type	Ultra-high I/O	The storage type determines the read/write speed of an instance. The higher the maximum throughput is, the higher the instance read/write speed can be.
Storage Space	40 GB	The storage space contains the file system overhead required for inodes, reserved blocks, and database operation.
Disk Encryption	Disable	Enabling disk encryption improves data security, but slightly affects the read and write performance of the database. If a shared KMS key is used, the corresponding CTS event is **createGrant**. Only the key owner can receive this event.

Step 7 Retain the default settings for the network information.

Figure 2-3 Network configuration

Step 8 Configure the instance password and enterprise project.

Figure 2-4 Database configuration

Table 2-3 Parameters

Parameter	Example Value	Description
Administrator Password	-	Enter a strong password and periodically change it to improve security, preventing security risks such as brute force cracking.
Confirm Password	-	Enter the administrator password again.

Parameter	Example Value	Description
Enterprise Project	default	If the instance has been associated with an enterprise project, select the target project from the **Enterprise Project** drop-down list. You can also go to the Enterprise Project Management console to create a project. For details, see *Enterprise Management User Guide*.

Step 9 Click **Next**, confirm the instance information, and click **Submit**.

Step 10 Go to the instance list.

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

----End

Buying an ECS

GaussDB provides the gsql tool to help you connect to the database using the command-line interface (CLI). You need to create an ECS in advance for installing the gsql tool.

1. **Log in to the management console**.
2. Click **Buy ECS**.
3. Configure basic settings and click **Next: Configure Network**.
   - **Region**: Select the region of the GaussDB instance to be connected.
   - **Billing Mode**: **Pay-per-use**
   - **AZ**: Select the AZ of the GaussDB instance to be connected.
   - **Image**: **EulerOS** and **EulerOS 2.5 64bit(40 GiB)**
   - Retain the default values for other parameters.

Figure 2-5 Basic settings
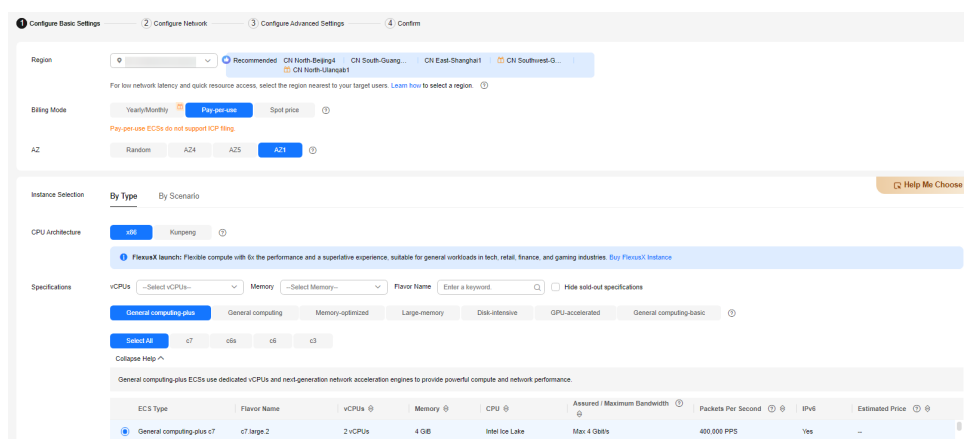
Figure 2-6 Selecting an image
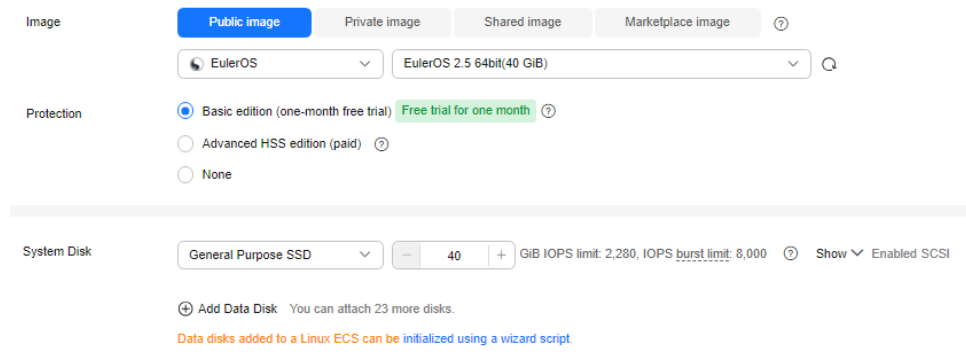
4. Configure the ECS network and click **Next: Configure Advanced Settings**.
   – **Network**: Select the VPC of the GaussDB instance to be connected.
   – **Security Group**: Select the security group of the GaussDB instance to be connected.
   – **EIP**: **Do Not Use**

Figure 2-7 Network configuration
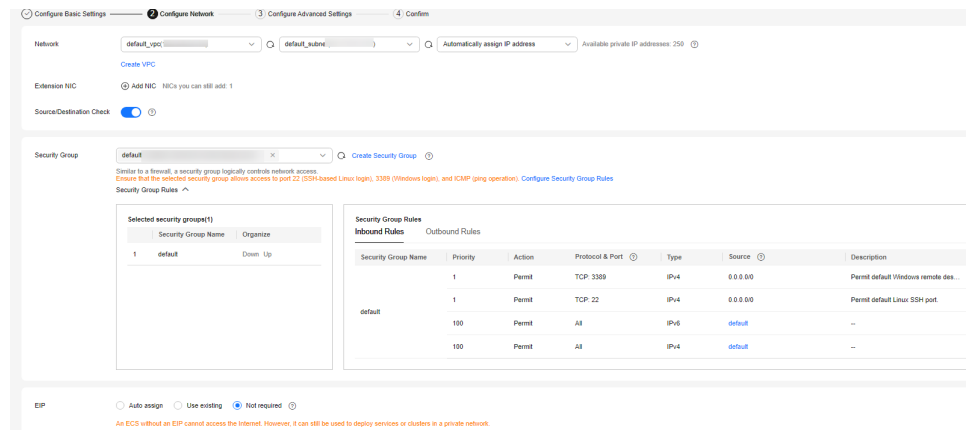
5. Configure a password for the ECS, set other parameters as required, and click **Next: Confirm**.
   – **ECS Name**: Enter a name that is easy to identify.
   – **Password**: Set a strong password to improve security.
   – **Confirm Password**: Enter the password again.
   – Retain the default values for other parameters.

Figure 2-8 Advanced settings

6. Confirm the configuration and click **Apply Now**.
7. View the purchased ECS.

Obtaining the Driver Package

Download particular packages listed in **Table 2-4** based on the version of your instance.

Table 2-4 Driver package download list

Version	Download Address
V2.0-8.x	**Driver package** **Verification package for the driver package**
V2.0-3.x	**Driver package** **Verification package for the driver package**
V2.0-2.x	**Driver package** **Verification package for the driver package**

To prevent a software package from being tampered with during transmission or storage, download the corresponding verification package and perform the following steps to verify the software package:

1. Upload the software package and verification package to the same directory on a Linux VM.

2. Run the following command to verify the integrity of the software package:

   cat *GaussDB_driver.zip.sha256* **| sha256sum --check**

   If **OK** is displayed in the command output, the verification is successful.

   GaussDB_driver.zip: OK

Connecting to a Database

- **Non-SSL connection**

  a. Log in as the **root** user to the ECS you have created.

  b. Upload the client tool package and configure gsql environment variables.

     i. Run the following command to create the **/tmp/tools** directory for storing the client tool package:

        mkdir */tmp/tools*

     ii. Download the **GaussDB_driver.zip** driver package of the required version by referring to **Obtaining the Driver Package**, and upload it to the **/tmp/tools** directory of the created ECS.

     iii. Run the following commands to decompress the **GaussDB_driver.zip** driver package:

        cd */tmp/tools*
        unzip GaussDB_driver.zip

     iv. Run the following commands to copy the decompressed **GaussDB-Kernel_***_EULER_64bit-Gsql.tar.gz** client tool package to the **/tmp/tools** directory:

        📖 **NOTE**

        This section uses the gsql tool package suitable for the centralized instances running on Euler2.5_x86_64 as an example. The relative path of the tool package varies depending on where you decompressed it.

        cd */tmp/tools/GaussDB_driver/Centralized/Euler2.5_X86_64/*
        cp GaussDB-Kernel_***_EULER_64bit-Gsql.tar.gz */tmp/tools*

     v. Run the following commands to decompress the package:

        cd */tmp/tools*
        tar -zxvf GaussDB-Kernel_***_EULER_64bit-Gsql.tar.gz

     vi. Configure environment variables.

        Run the following command to open the **~/.bashrc** file:

        vim ~/.bashrc

        Press **G** to move the cursor to the last line, press **i** to enter Insert mode, and type the following information. Then, press **Esc** to exit Insert mode, and run **:wq** to save the settings and exit.

        export PATH=/tmp/tools/**bin:$PATH**
        export LD_LIBRARY_PATH=/tmp/tools/**lib:$LD_LIBRARY_PATH**

        Run the following command to make the environment variables take effect permanently:

> source ~/.bashrc

   c. Enter the password when prompted to connect to the database.

After an instance is created, a **postgres** database is generated by default. Database **postgres** is used an example.

> **gsql -d** *postgres* **-h** *10.0.0.0* **-U** *root* **-p** *8000*
> Password for user root:

- *postgres* indicates the name of the database to be connected.

- *10.0.0.0* indicates the IP address of the instance. On the **Basic Information** page of the instance to be connected, obtain the IP address in the **Node List** area.

- *root* indicates the username used to log in to the database.

- *8000* indicates the port number of the database. On the **Basic Information** page of the instance to be connected, obtain the database port in the **Network Information** area.

For more information about gsql commands, see ***Tool Reference***.

- **SSL connection**

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

   b. Click ⊚ in the upper left corner and select a region and project.

   c. Click ☰ in the upper left corner of the page and choose **Databases** > **GaussDB**.

   d. On the **Instances** page, click the name of the target instance. In the **Configuration** area on the **Basic Information** page, click ⬆ next to the **SSL** field to download the root certificate or certificate bundle.

   e. Upload the root certificate to the ECS or save it to the device to be connected to the GaussDB instance.

Import the root certificate to the Linux ECS. For details, see **How Can I Import the Root Certificate to a Windows or Linux OS?**

   f. Connect to a GaussDB instance.

A Linux ECS is used in this example. Run the following command to set environment variables on the ECS:

> export PGSSLMODE=*\<sslmode\>*
> export PGSSLROOTCERT=*\<ca-file-directory\>*

gsql -h *\<host\>* **-p** *\<port\>* **-d** *\<database\>* **-U** *\<user\>*

Table 2-5 Parameters

Parameter	Description
\<host\>	IP address of the DB instance. To obtain the IP address, click the instance name on the **Instances** page to go to the **Basic Information** page of the instance. The IP address can be found in the **IP Address** column of the **Node List** area.

Parameter	Description
<port>	Database port in use. The default value is **8000**. To obtain this parameter, go to the **Basic Information** page of the DB instance. The port number can be found in the **Database Port** field in the **Network Information** area.
<database>	Name of the database to be connected. The default management database is **postgres**.
<user>	Username of the GaussDB database account. The default administrator is **root**.
<ca-file-directory>	Path of the CA certificate for SSL connection.
<sslmode>	SSL connection mode. Set it to **verify-ca** to use a CA to check whether the service is trusted.

For example, to connect to a **postgres** database through an SSL connection as user **root**, run the following commands on the ECS:

```
export PGSSLMODE="verify-ca"
export PGSSLROOTCERT="/home/Ruby/ca.pem"
```

gsql -d *postgres* **-h** *10.0.0.0* **-U** *root* **-p** *8000*

```
Password for user root:
```

For more information about gsql commands, see **Tool Reference**.

g. Check the command output after you log in to the database. If information similar to the following is displayed, the SSL connection has been established.

```
SSL connection (cipher: DHE-RSA-AES256-GCM-SHA384, bits: 256)
```

Follow-up Operations

After logging in to the instance, you can create alarm rules, set automated backup policies, create databases, and migrate data. For details, see:

- **Creating an Alarm Rule**
- **Setting an Automated Backup Policy**
- **Creating a Database Using SQL**
- **Creating a Database Through an API**
- **Managing GaussDB Databases Through DAS**
- **Migrating Data to GaussDB**

3 GaussDB Common Practices

After buying and connecting to a GaussDB instance, you can use GaussDB as required by referring to the common practices provided in this section.

Table 3-1 Common best practices of GaussDB

Practice		Description
Developmen t and design proposal	**Database Object Naming Conventions**	This practice describes the restrictions on naming database objects.
	Database Object Design	This practice describes the principles for designing databases, schemas, tables, fields, constraints, views, and joined tables.
	Tool Interconnection	This practice describes notes about configuring tools.
	SQL Compilation	This practice describes the principles for performing DDL operations, loading and unloading data, converting types, and performing queries.
Database usage	**Creating a Database Account**	This practice describes how to use CREATE USER and ALTER USER to create and manage database users, respectively. Data is not shared between users.
	Creating and Managing Databases	This practice describes how to use CREATE DATABASE and ALTER DATABASE to create and manage database users, respectively.

Practice		Description
	Creating and Managing Tablespaces	The administrator can use tablespaces to control the layout of disks where a database is installed. This practice describes how to use SQL syntax to create and manage tablespaces.
	Creating and Managing Tables	A table is created in a database and can be stored in different databases. Tables under different schemas in a database can have the same name. This practice describes how to use SQL syntax to create tables.
	Querying System Catalogs	In addition to the created tables, GaussDB contains many system catalogs. These system catalogs contain information about instance installation as well as the queries and processes running in GaussDB. This practice describes how to collect information about the databases by querying system catalogs.
Data migration	**Using DRS to Migrate Data from Oracle Database to GaussDB**	This practice describes how to use DRS to migrate data from Oracle databases to GaussDB.
Data backup	**Configuring an Automated Backup Policy**	This practice describes how to enable the system to automatically create backups for a DB instance during a backup window and save the backups based on the configured retention period.
	Creating a Manual Backup	This practice describes how to create manual backups for a DB instance. These backups can be used to restore data for improved reliability.
	Deleting a Manual Backup	You can delete manual backups for instances and tables to release storage space. This practice describes how to delete manual backups of an instance.
Data restoration	**Restoring a Backup File to a GaussDB Instance**	This practice describes how to use an automated or manual backup to restore a DB instance to how it was when the backup was created. The restoration is at the instance level.

Practice		Description
	Restoring a GaussDB Instance to a Specific Point in Time	This practice describes how to use an automated backup to restore instance data to a specified point in time.