GaussDB

Best Practices

Issue	01
Date	2025-08-18

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1 Backup and Restoration Best Practices

1.1 Overview

GaussDB ensures high availability, but accidental or intentional deletion of a database or table will result in data loss across both primary and standby nodes, making it unrecoverable from the standby node. In this case, you can only restore the deleted data from backup. GaussDB enables data restoration from backup, either to the state it was in when the backup was created or to a specific point in time.

This section outlines typical accidental operations and their corresponding recovery methods. For details, see **Table 1-1**. It also presents typical use cases and performance specifications for backup and restoration. For details, see **Table 1-2**. You can choose different data restoration methods based on service requirements.

Restoration Methods for Misoperations

Table 1-1 Restoration methods for different misoperations

Scenario	Restoration Method	Restoration Scope	Instructions
An instance is deleted by mistake.	Locate the deleted instance in the recycle bin and rebuild it.	All databases and tables	**Restoring an Instance from the Recycle Bin**
	If a manual backup was created before the instance was deleted, restore the instance on the **Backups** page.	All databases and tables	**Restoring an Instance from a Backup**

Scenario	Restoration Method	Restoration Scope	Instructions
A table is deleted by mistake.	Use the database and table restoration method to restore the table.	• All databases and tables • Certain databases and tables	• **Restoring Databases or Tables to a Specific Point in Time** • **Restoring Databases or Tables Using a Backup**
A database is deleted by mistake.	Use the database and table restoration method to restore the database.	• All databases and tables • Certain databases and tables	
An entire table is overwritten, or the columns, rows, or data in a table is deleted or modified by mistake.	Use the database and table restoration method to restore table data.	• All databases and tables • Certain databases and tables	

Backup and Restoration Use Cases and Performance Specifications

Table 1-2 Backup and restoration use cases and performance specifications

Use Case	Key Performance Factor	Typical Data Volume	Performance Specifications
DB instance backup	• Data size • Network configuration	Data volume: Petabytes Object quantity: about 1 million	OBS backup and restoration specifications: 1. In a standard environment, a full backup or restoration of 2 TB of data can be completed within 8 hours. 2. With the right hardware, plenty of OBS bandwidth, a high compression ratio, and independent deployment, the full backup or restoration duration can be calculated using the following formula: • Distributed instances Backup or restoration duration = (Total data volume of the DB instance/Number of shards)/min(Disk I/O read bandwidth, Compression bandwidth, Single-thread OBS transmission bandwidth/Compression ratio) • Centralized instances Backup or restoration duration = Total data volume of the DB instance/min(Disk I/O read bandwidth, Compression bandwidth, Single-thread OBS transmission bandwidth/Compression ratio)

Use Case	Key Performance Factor	Typical Data Volume	Performance Specifications

			NOTE
			• min() means that the smallest of the values listed is used.
			• Disk read bandwidth:
			  • SATA SSD: 200 MB/s to 300 MB/s
			  • SAS SSD: ~500 MB/s
			  • NVMe SSD: ~1 GB/s
			  Reserving enough bandwidth for database workloads is critical, or backup tasks may severely degrade performance.
			• Compression bandwidth: LZ4 compression is used by default. Generally, the compression bandwidth ranges from 300 MB/s to 400 MB/s. The compression level ranges from 1 (default) to 9. Higher levels slow down compression and cause the backup to take longer. The exact time varies depending on data attributes.
			• Single-thread OBS transmission bandwidth: 100 MB/s to 300 MB/s in unrestricted mode or the specified limit in speed-restricted mode.
			• Compression ratio: LZ4 compression is used by default, achieving a compression ratio between 0.1 and 0.5. The compression ratio depends on various data attributes.
			• Setting the parallel upload parameter to **2** or higher increases CPU and other resource usage during backups. Backup performance improves based on the ratio of OBS single-stream transmission bandwidth to total OBS bandwidth. However, if single-stream bandwidth multiplied by the parallel upload parameter exceeds the total bandwidth, no further performance gains are achieved.
			3. During the restoration of a backup set for hash bucket tables undergoing scale-out and redistribution in a distributed instance: Restoration time (excluding the redistribution process after restoration) ≤ 2 x Restoration duration of a backup set with the same data volume in the same way during non-scale-out + Redistribution duration of hash bucket tables with the same data volume.
			When restoring a backup set for hash bucket tables undergoing scale-out and redistribution, there are three steps:
			• Step 1: Restore the full backups of all nodes, restore all incremental backups of

Use Case	Key Performance Factor	Typical Data Volume	Performance Specifications
			the old DNs before scale-out, and replay logs. ● Step 2: Physically migrate the hash bucket files to be redistributed from the old DNs to the new DNs. ● Step 3: Restore all incremental backups of the new DNs and replay logs. 4. The time it takes to start up a distributed instance after data restoration depends on the number of sequences and databases involved. ● During startup after restoration, the sequence information of each database is obtained and set in ETCD. Most of the time is spent on acquiring sequence information and configuring sequences in ETCD. – Connecting to each database to acquire sequence information: The more the databases, the longer the time required. – Configuring sequences in ETCD: The more the sequences, the longer the time required. ● Updating PGXC catalog information: When you connect to each database to update the pgxc_class and pgxc_slice catalog information, the more the databases, the longer the time required.

Use Case	Key Performance Factor	Typical Data Volume	Performance Specifications
Database-level physical restoration	• Data size • Network configuration	-	Database-level physical restoration based on OBS consists of four steps: • Step 1: Read all data for database-level restoration from the backup media. In a standard Huawei Cloud environment, 2 TB of data can be read within 8 hours. • Step 2: Run VACUUM FREEZE on database-level data in the auxiliary database. The VACUUM FREEZE performance is as follows: – Distributed instances: 1,400 GB/hour per shard. Parallel replication is allowed between shards. – Centralized instances: 1,400 GB/hour. • Step 3: Replicate the database-level data after VACUUM FREEZE to each DN replica of the production instance. The replication performance is as follows: – Distributed instances: Replication performance = Data volume of a single shard/min(Network bandwidth, Disk I/O bandwidth). Parallel replication is allowed between shards. – Centralized instances: Replication performance = Database-level data volume to be restored/min(Network bandwidth, Disk I/O bandwidth) • Step 4: Import data to the production instance. The import performance is as follows: – Distributed instances: Depending on the data volume per shard and disk I/O bandwidth. Parallel replication is allowed between shards. – Centralized instances: Depending on the database-level data volume to be restored and disk I/O bandwidth. Recommended scenarios: • Performance: For equivalent data volumes, database-level physical restoration achieves approximately 70% of the performance of instance-level physical restoration. If the total

Use Case	Key Performance Factor	Typical Data Volume	Performance Specifications
			database-level data requiring restoration is below 70% of the instance-level data volume, database-level physical restoration is recommended. ● Availability: During a database-level restoration, other databases within the same instance remain operational, ensuring higher availability compared to an instance-level restoration. For uninterrupted access to other databases throughout the process, database-level physical restoration is recommended. Impacts: ● Before a database-level data import, ensure that flow control is disabled and the GUC parameter **recovery_time_target** is set to **0**. Note that during this process, the throughput of the production environment may be impacted, typically reduced to 50% of its peak capacity, or, in extreme cases, as low as 25%. ● To avoid impacting services, perform fine-grained restorations during off-peak hours.

Use Case	Key Performance Factor	Typical Data Volume	Performance Specifications
Table-level physical restoration	• Data size • Network configuration • Table storage type • Table attribute (column) type	-	Table-level physical restoration based on OBS consists of three steps: • Step 1: Read all data for table-level restoration from the backup media. In a standard Huawei Cloud environment, 2 TB of data can be read within 8 hours. • Step 2: Export table data from the auxiliary database to a local file. The export performance is about 25 MB/s. • Step 3: Import the locally exported file into the production instance. When the GUC parameter **page_version_check** is set to **off**, the import speed is about 25 MB/s (setting this parameter to **memory** reduces the performance by about 15%). Additionally, factors such as the row count, table indexes, and triggers can further decrease import speeds to roughly 10 MB/s. Recommended scenarios: • Performance: For equivalent data volumes, table-level physical restoration operates at approximately one-fifth the speed of instance-level restoration. Table-level physical restoration is recommended when the total data requiring restoration is below one-fifth of the instance-level data volume and does not exceed 1 TB. • Availability: During a table-level restoration, other databases and tables within the same instance remain operational, ensuring higher availability compared to an instance-level restoration. For uninterrupted access to other databases and tables throughout the process, table-level physical restoration is recommended. Impacts: • During a table-level restoration, the throughput of the production environment may be impacted, typically reduced to 50% of its peak capacity, or, in extreme cases, as low as 25%. • To avoid impacting services, perform fine-grained restorations during off-peak hours.

1.2 Instance Restoration

1.2.1 Restoring an Instance from the Recycle Bin

Scenarios

The recycle bin retains a backup generated when an instance was deleted. If the backup has not expired, you can restore the deleted instance by rebuilding it from the recycle bin.

Procedure

Step	Description
Step 1: Prepare Data	Use Data Admin Service (DAS) to create a database and table and insert data into the table.
Step 2: Delete the Instance	Delete the instance.
Step 3: Restore the Instance from the Recycle Bin	Restore the deleted instance from the recycle bin.
Step 4: Check the Results	Log in to the DAS console and check whether the data was restored.

Step 1: Prepare Data

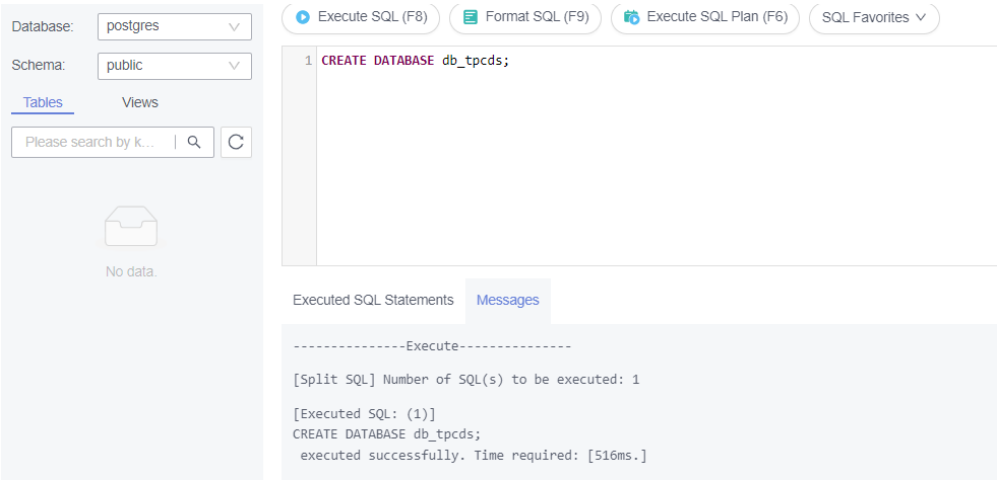
1. Log in to the management console.
2. Click  in the upper left corner and select a region and project.
3. Click  in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.

   Alternatively, click the instance name on the **Instances** page. On the displayed **Basic Information** page, click **Log In** in the upper right corner.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. On the menu bar on top, choose **SQL Operations** > **SQL Query**.
7. In the SQL execution window, run the following statement to create a database:

   ```
   CREATE DATABASE db_tpcds;
   ```

   If information shown in the following figure is displayed, the creation was successful.

Figure 1-1 Creating a database



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

8. Use SQL statements to create a table and insert data.
   - Create a schema.
     ```
     CREATE SCHEMA myschema;
     ```
     Switch to the newly created schema in the upper left corner.
   - 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 into the table.
     ```
     INSERT INTO myschema.mytable values (100);
     ```
9. Query table data.
   ```
   SELECT * FROM myschema.mytable;
   ```

Step 2: Delete the Instance

1. Log in to the management console.
2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance you want to delete, click **More** in the **Operation** column, and choose **Delete**.
5. In the **Delete DB Instance** dialog box, enter **DELETE**, select the confirmation check box in the **Confirm** field, and click **OK**. Refresh the **Instances** page later to confirm that the deletion was successful.

Step 3: Restore the Instance from the Recycle Bin

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

4. In the navigation pane on the left, choose **Recycle Bin**.
5. Locate the instance to be restored and, in the **Operation** column, click **Rebuild**.
6. On the **Rebuild DB Instance** page, select the billing mode, enter the instance name, and specify other parameters such as the AZs and time zone.

Figure 1-2 Billing mode and basic information

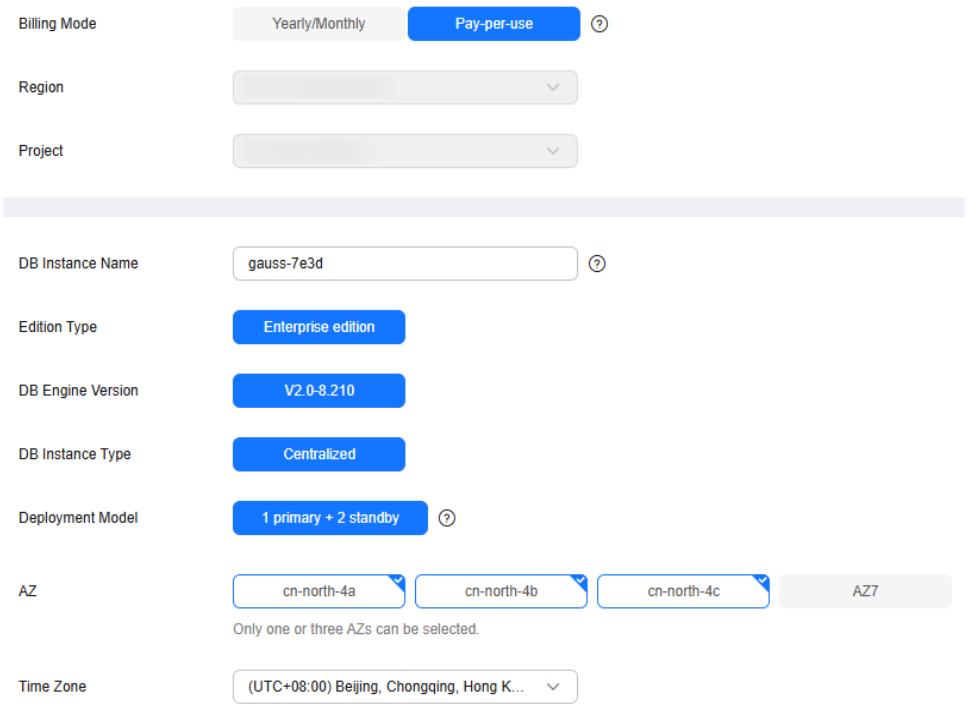


Table 1-3 Parameter description

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.

Parameter	Example Value	Description
DB Instance Name	gauss-7e3d	The instance name is case-sensitive, must start with a letter, and can contain 4 to 64 characters. Only letters, digits, hyphens (-), and underscores (_) are allowed.
Failover Priority	Reliability	This parameter is only available for distributed instances using independent deployment. • **Reliability**: Data consistency is prioritized during a failover. This is recommended for applications with highest priority for data consistency. • **Availability**: Database availability is prioritized during a failover. This is recommended for applications that require their databases to provide uninterrupted online services.
AZ	AZ1	An AZ is a physical region where resources have 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.

7. Configure instance specifications.

Figure 1-3 Specifications and storage

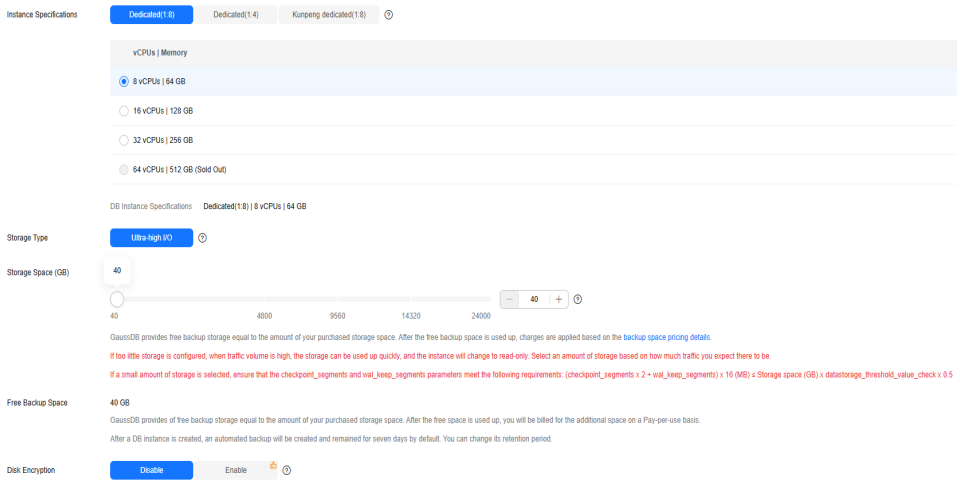
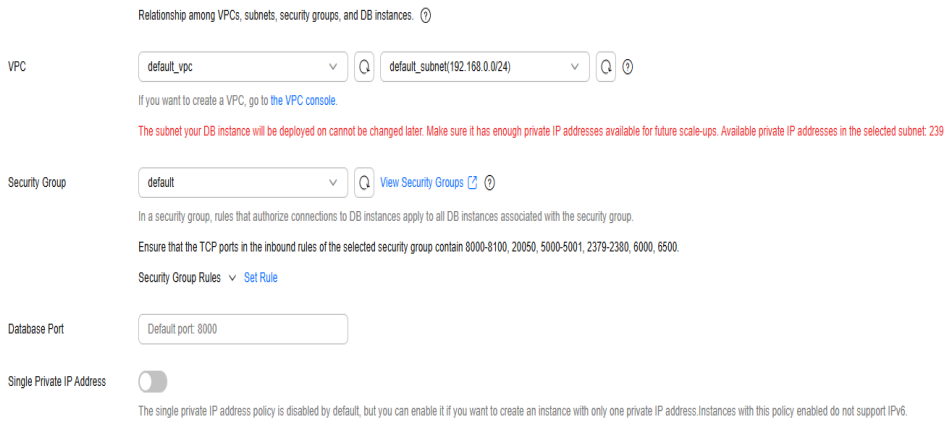


Table 1-4 Parameter description

Parameter	Example Value	Description
Instance Specifications	Dedicated(1:8); 8 vCPUs | 64 GB	The vCPUs and memory of an instance.
Storage Space	40 GB	The storage space contains the file system overhead required for inodes, reserved blocks, and database operations.
Disk Encryption	Disable	Enabling disk encryption improves data security, but slightly affects the read and write performance of the database.

8. Retain the default settings for the network configuration.

Figure 1-4 Network configuration



9. Configure the administrator password.

Figure 1-5 Database configuration

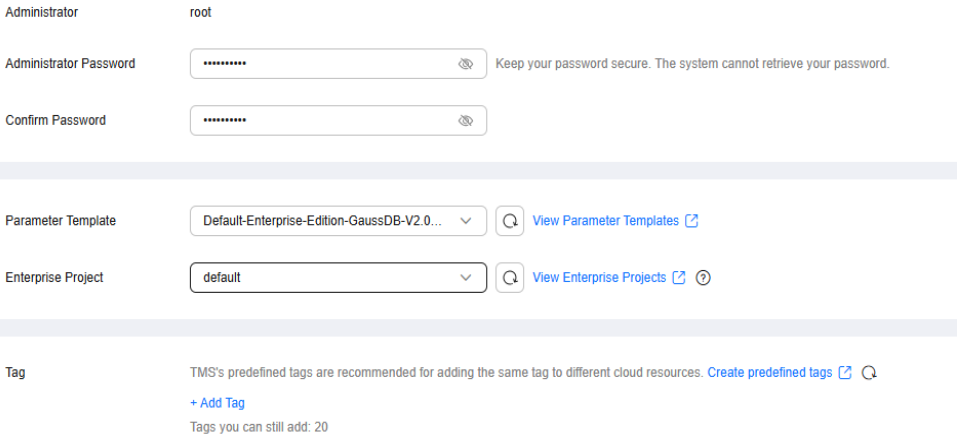


Table 1-5 Parameter description

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.
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. .

10. Click **Next**.
11. Confirm the information and click **Submit**.
12. After the task is submitted, check the instance status on the **Instances** page. The rebuild is complete when the status shows **Available**.

Step 4: Check the Results

1. Log in to the management console.
2. Click  in the upper left corner and select a region and project.
3. Click  in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. Check the database name and table data to verify that the restoration is complete.

1.2.2 Restoring an Instance from a Backup

Scenarios

If a manual backup was created before an instance was deleted, you can restore the instance on the **Backups** page.

Procedure

Step	Description
Step 1: Prepare Data	Use Data Admin Service (DAS) to create a database and table and insert data into the table.
Step 2: Delete the Instance	Delete the instance.
Step 3: Restore an Instance Using a Backup File	Restore your instance data from a backup.
Step 4: Check the Results	Log in to the DAS console and check whether the data was restored.

Step 1: Prepare Data

1. Log in to the management console.
2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.

   Alternatively, click the instance name on the **Instances** page. On the displayed **Basic Information** page, click **Log In** in the upper right corner.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. On the menu bar on top, choose **SQL Operations** > **SQL Query**.
7. In the SQL execution window, run the following statement to create a database:

   ```
   CREATE DATABASE db_tpcds;
   ```

   If information shown in the following figure is displayed, the creation was successful.

Figure 1-6 Creating a database

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

8. Use SQL statements to create a table and insert data.
   - Create a schema.
     ```
     CREATE SCHEMA myschema;
     ```
     Switch to the newly created schema in the upper left corner.
   - 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 into the table.
     ```
     INSERT INTO myschema.mytable values (100);
     ```
9. Query table data.
   ```
   SELECT * FROM myschema.mytable;
   ```

Step 2: Delete the Instance

1. Log in to the management console.
2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance you want to delete, click **More** in the **Operation** column, and choose **Delete**.
5. In the **Delete DB Instance** dialog box, enter **DELETE**, select the confirmation check box in the **Confirm** field, and click **OK**. Refresh the **Instances** page later to confirm that the deletion was successful.

Step 3: Restore an Instance Using a Backup File

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

4. In the navigation pane, choose **Backups**. On the **Backups** page, locate the backup to be restored and click **Restore** in the **Operation** column.
5. Set **Restoration Method** to **Create New Instance** and click **OK**.
6. On the **Create New Instance** page, select the billing mode, enter the instance name, and specify other parameters such as the AZs and time zone.

Figure 1-7 Billing mode and basic information

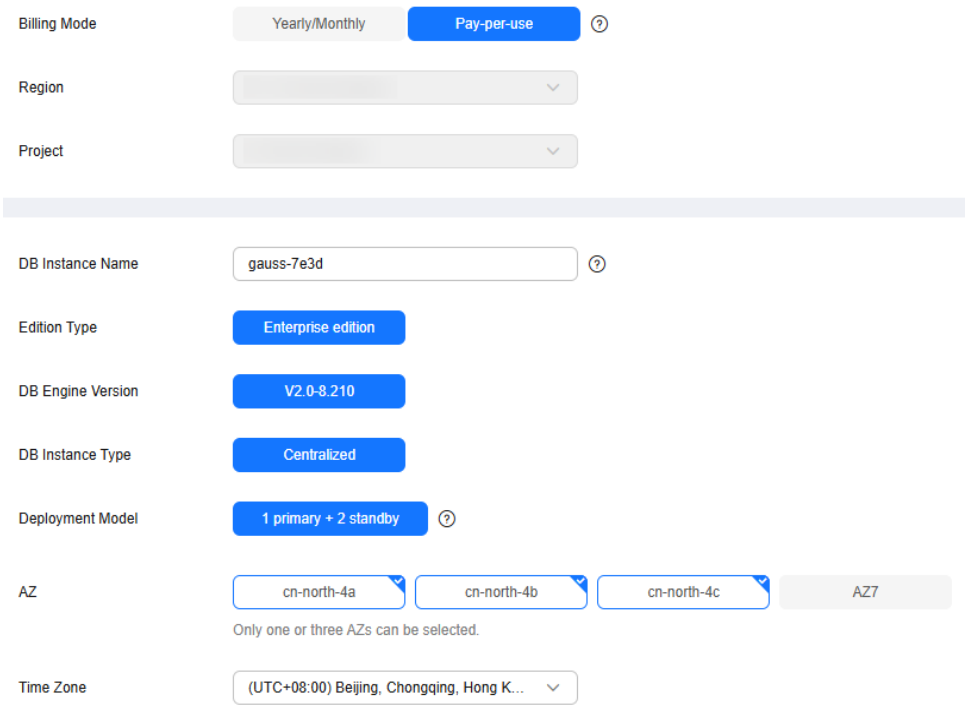


Table 1-6 Parameter description

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.

Parameter	Example Value	Description
DB Instance Name	gauss-7e3d	The instance name is case-sensitive, must start with a letter, and can contain 4 to 64 characters. Only letters, digits, hyphens (-), and underscores (_) are allowed.
Failover Priority	Reliability	This parameter is only available for distributed instances using independent deployment. • **Reliability**: Data consistency is prioritized during a failover. This is recommended for applications with highest priority for data consistency. • **Availability**: Database availability is prioritized during a failover. This is recommended for applications that require their databases to provide uninterrupted online services.
AZ	AZ1	An AZ is a physical region where resources have 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.

7. Configure instance specifications.

Figure 1-8 Specifications and storage

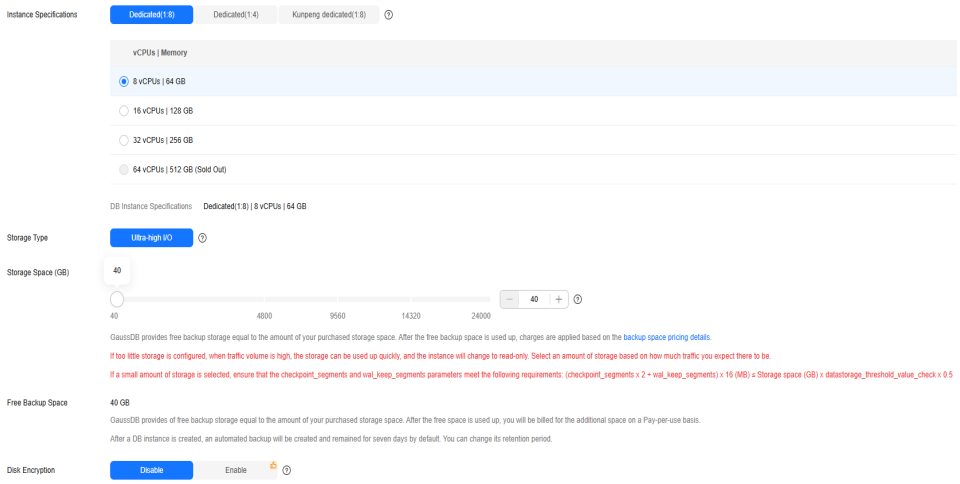
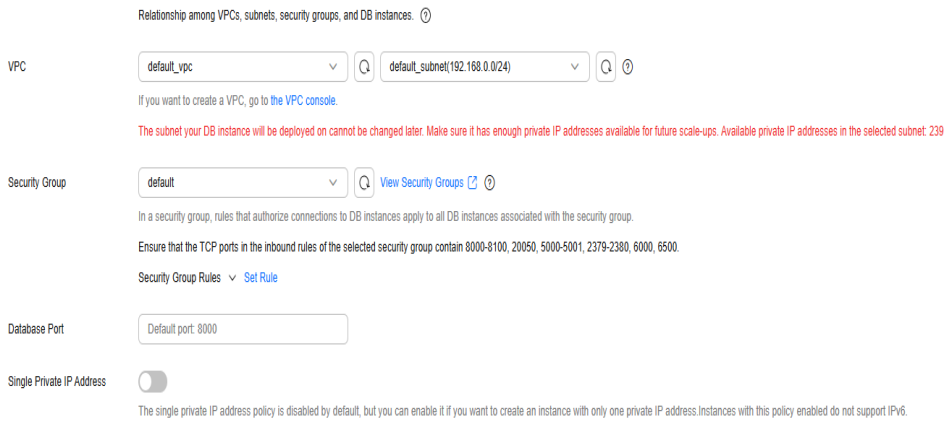


Table 1-7 Parameter description

Parameter	Example Value	Description
Instance Specifications	Dedicated(1:8); 8 vCPUs | 64 GB	The vCPUs and memory of an instance.
Storage Space	40 GB	The storage space contains the file system overhead required for inodes, reserved blocks, and database operations.
Disk Encryption	Disable	Enabling disk encryption improves data security, but slightly affects the read and write performance of the database.

8. Retain the default settings for the network configuration.

Figure 1-9 Network configuration



9. Configure the administrator password.

Figure 1-10 Database configuration

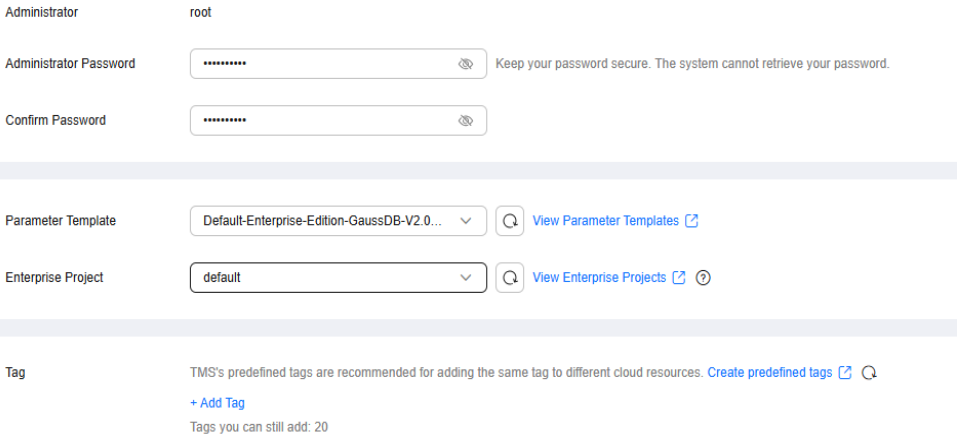


Table 1-8 Parameter description

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.
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. .

10. Click **Next**.
11. Confirm the information and click **Submit**.
12. After the task is submitted, check the instance status on the **Instances** page. The restoration is complete when the status shows **Available**.

Step 4: Check the Results

1. Log in to the management console.
2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. Check the database name and table data to verify that the restoration is complete.

1.3 Database and Table Restoration

1.3.1 Restoring Databases or Tables to a Specific Point in Time

Scenarios

When a table-level automated backup policy is enabled, you can use existing backups to restore lost table data to a specific point in time in the case of accidental or intentional deletions.

Procedure

Step	Description
Step 1: Prepare Data	Use Data Admin Service (DAS) to create a database and table and insert data into the table.
Step 2: Delete Table Data	Delete the instance.
Step 3: Restore Table Data	Restore the deleted table data using table-level point-in-time recovery (PITR).
Step 4: Check the Results	Log in to the DAS console and check whether the data was restored.

Step 1: Prepare Data

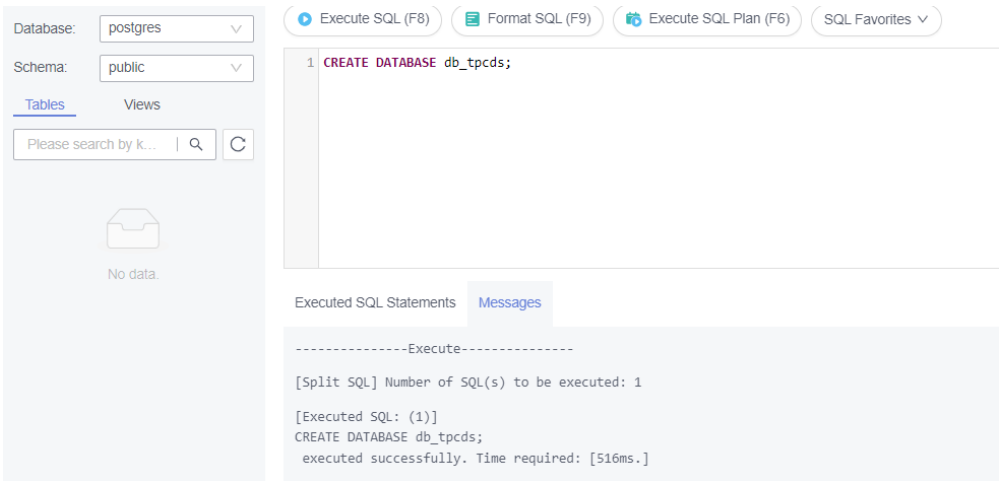
1. Log in to the management console.
2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.

   Alternatively, click the instance name on the **Instances** page. On the displayed **Basic Information** page, click **Log In** in the upper right corner.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. On the menu bar on top, choose **SQL Operations** > **SQL Query**.
7. In the SQL execution window, run the following statement to create a database:

   ```
   CREATE DATABASE db_tpcds;
   ```

   If information shown in the following figure is displayed, the creation was successful.

Figure 1-11 Creating a database



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

8. Use SQL statements to create a table and insert data.
   - Create a schema.
     ```
     CREATE SCHEMA myschema;
     ```
     Switch to the newly created schema in the upper left corner.
   - 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 into the table.
     ```
     INSERT INTO myschema.mytable values (100);
     ```
9. Query table data.
   ```
   SELECT * FROM myschema.mytable;
   ```

Step 2: Delete Table Data

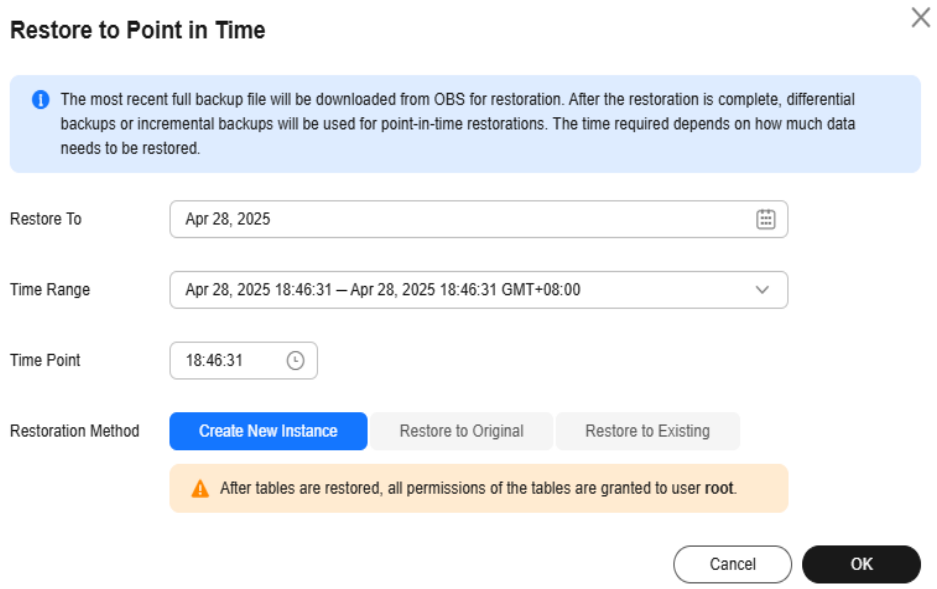
1. Log in to the management console.
2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.

   Alternatively, click the instance name on the **Instances** page. On the displayed **Basic Information** page, click **Log In** in the upper right corner.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. On the menu bar on top, choose **SQL Operations** > **SQL Query**.
7. Delete table data.
   ```
   DELETE FROM myschema.mytable WHERE firstcol = 100;
   ```

Step 3: Restore Table Data

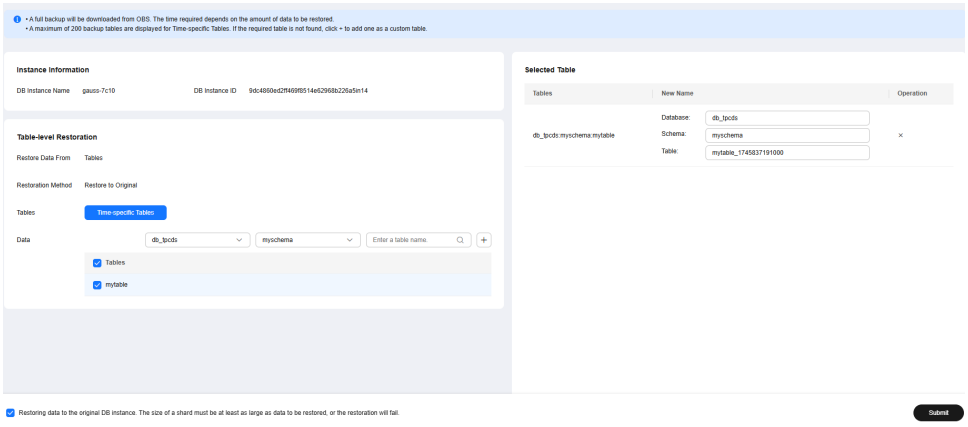
1. Log in to the management console.
2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, click the name of the instance to access the **Basic Information** page.
5. In the navigation pane, choose **Backups**. On the displayed page, click the **Table Backup** tab.
6. Click **Restore to Point in Time**. In the displayed dialog box, specify the time range and point for restoration, and set **Restoration Method** to **Restore to Original**.

Figure 1-12 Restoring data to a specified point in time



7. Select the tables to be restored and click **Submit**.

Figure 1-13 Selecting tables to be restored



8. Go to the **Instances** page and check that the target instance is in the **Restoring** state. When the instance status changes to **Available**, the restoration is complete.

Step 4: Check the Results

1. Log in to the management console.
2. Click  in the upper left corner and select a region and project.
3. Click  in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.

5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. Check the database name and table data to verify that the restoration is complete.

1.3.2 Restoring Databases or Tables Using a Backup

Scenarios

When a table-level automated backup policy is enabled or a manual backup is available, you can restore tables to the exact state captured by an existing backup, recovering any accidentally or intentionally deleted data.

Procedure

Step	Description
Step 1: Prepare Data	Use Data Admin Service (DAS) to create a database and table and insert data into the table.
Step 2: Delete Table Data	Delete the instance.
Step 3: Restore Table Data	Restore the deleted table data using a table-level backup.
Step 4: Check the Results	Log in to the DAS console and check whether the data was restored.

Step 1: Prepare Data

1. Log in to the management console.
2. Click  in the upper left corner and select a region and project.
3. Click  in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.

   Alternatively, click the instance name on the **Instances** page. On the displayed **Basic Information** page, click **Log In** in the upper right corner.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. On the menu bar on top, choose **SQL Operations** > **SQL Query**.
7. In the SQL execution window, run the following statement to create a database:

   ```
   CREATE DATABASE db_tpcds;
   ```

   If information shown in the following figure is displayed, the creation was successful.

Figure 1-14 Creating a database

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

8. Use SQL statements to create a table and insert data.
   - Create a schema.
     ```
     CREATE SCHEMA myschema;
     ```
     Switch to the newly created schema in the upper left corner.
   - 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 into the table.
     ```
     INSERT INTO myschema.mytable values (100);
     ```
9. Query table data.
   ```
   SELECT * FROM myschema.mytable;
   ```

Step 2: Delete Table Data

1. Log in to the management console.
2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.

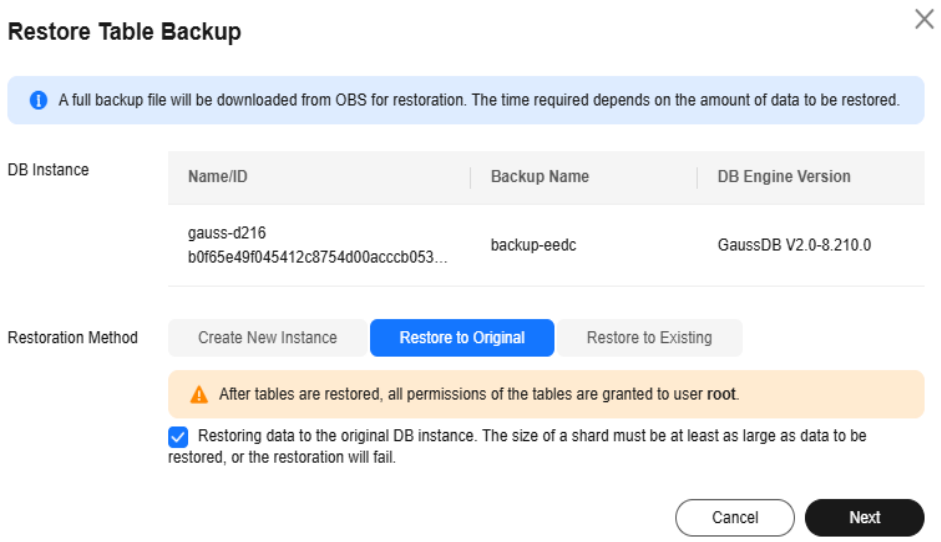
   Alternatively, click the instance name on the **Instances** page. On the displayed **Basic Information** page, click **Log In** in the upper right corner.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. On the menu bar on top, choose **SQL Operations** > **SQL Query**.
7. Delete table data.
   ```
   DELETE FROM myschema.mytable WHERE firstcol = 100;
   ```

Step 3: Restore Table Data

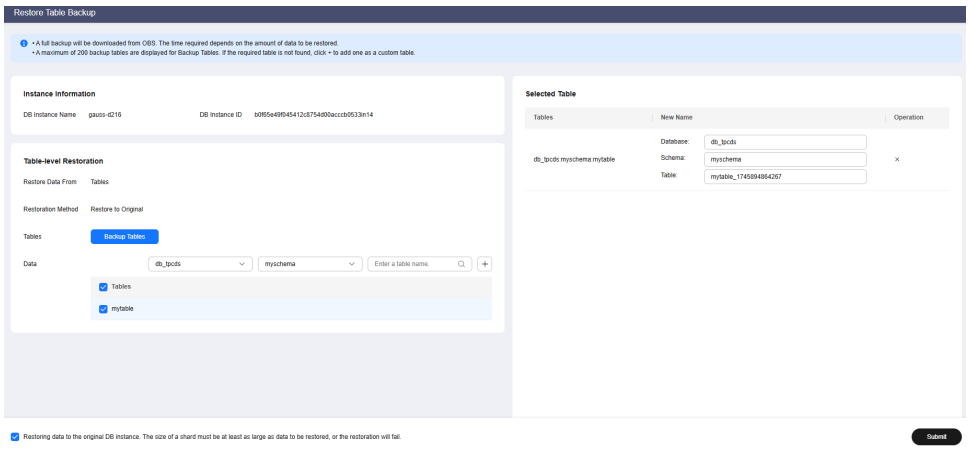
1. Log in to the management console.

2. Click in the upper left corner and select a region and project.
3. Click in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, click the name of the instance to access the **Basic Information** page.
5. In the navigation pane, choose **Backups**. On the displayed page, click the **Table Backup** tab.
6. Locate the backup and click **Restore** in the **Operation** column.
7. Set **Restoration Method** to **Restore to Original**, and click **Next**.

Figure 1-15 Restore Table Backup



8. Select the tables to be restored and click **Submit**.



9. Go to the **Instances** page and check that the target instance is in the **Restoring** state. When the instance status changes to **Available**, the restoration is complete.

Step 4: Check the Results

1. Log in to the management console.
2. Click  in the upper left corner and select a region and project.
3. Click  in the upper left corner of the page and choose **Databases** > **GaussDB**.
4. On the **Instances** page, locate the instance and, in the **Operation** column, click **Log In** to access the DAS console.
5. Enter the database username and password and click **Test Connection**. After the connection test is successful, click **Log In**.
6. Check the database name and table data to verify that the restoration is complete.

