

Database and Application Migration UGO(UGO) 25.1.0

Best Practices

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1 Migrating Schemas from Oracle to GaussDB

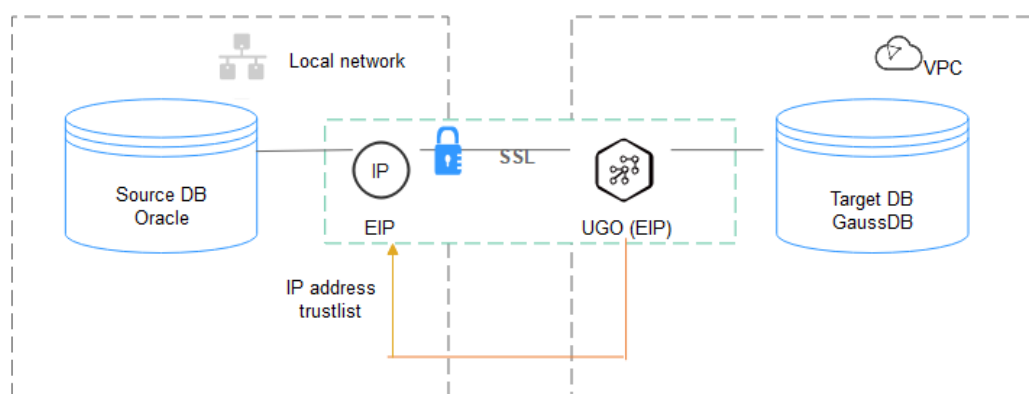
1.1 Purpose

Scenario

Database and Application Migration UGO (referred to as UGO) can help you migrate the schemas of on-premises Oracle databases to Huawei Cloud GaussDB instances. UGO provides database evaluation and object migration for simple, cost-effective database migration.

This document describes how to use UGO to migrate schemas of an on-premises Oracle-11g database to a Huawei Cloud GaussDB Distributed V2.0-2.7 Enterprise Edition instance. Currently, only the public network can be used to connect source and target databases.

Figure 1-1 Public network+SSL connection



Resolved Issues

- Enterprise workloads have been growing and evolving fast, and traditional databases lack the scalability needed to keep up. Enterprises need distributed databases.
- Building a traditional database means purchasing and installing servers, systems, databases, and other software. The O&M is expensive and difficult.
- The performance for complex queries on traditional databases is poor.
- Database schema migration is costly and requires professional knowledge.

Service List

- Database and Application Migration UGO (UGO)
- Virtual Private Cloud (VPC)
- GaussDB
- Data Admin Service (DAS)

Notes on Usage

- The details shown in the resource planning table are just examples. The actual resource details will depend on your specific migration.
- The end-to-end test data is for reference only.
- Oracle syntax is complex and flexible, so the workload evaluation and object evaluation statistics are for reference only.

1.2 Resource Planning

Category	Subcategory	Planned Value	Remarks
VPC	VPC name	vpc-src-172	Specify a name that is easy to identify.
	Region	Test region	For low network latency and quick resource access, select the region nearest to you.
	AZ	AZ3	-
	Subnet	172.16.0.0/16	Select a subnet with sufficient network resources.
	Subnet name	subnet-src-172	Specify a name that is easy to identify.
Oracle	Name	orcl	Specify a name that is easy to identify.
	Specifications	16 vCPUs 32 GB	-

Category	Subcategory	Planned Value	Remarks
	Database version	11.2.0.1	-
	Database user	ugo	Specify a user with at least CONNECT, SELECT_CATALOG_ROLE, and ANY DICTIONARY permissions
GaussDB	Instance name	Auto-ugo-gaussdbv5-tar-1	Specify a name that is easy to identify.
	Database version	GaussDB Distributed V2.0-2.7 Enterprise Edition	-
	Instance type	Distributed (1 CN, 3 DN shards, and 3 replicas)	Select a distributed instance for the test.
	Storage type	Ultra-high I/O	-
	AZ	AZ3	Select a single AZ for the test. For the actual migration, you are advised to select multiple AZs to improve instance availability.
	Specifications	General-purpose 2 vCPUs 16 GB	Select small specifications for the test. For the actual migration, you are advised to configure specifications based on service requirements.
	Destination database name	ugo	Specify a name for easy identification, but the name must be compatible with the Oracle database name.
UGO migration task	Database evaluation project	Oracle-GaussDB	Specify a name that is easy to identify.
	Object migration project	Oracle-GaussDB	Specify a name that is easy to identify.
	Source DB engine	Oracle	-

Category	Subcategory	Planned Value	Remarks
	Target DB engine	GaussDB Distributed V2.0-2.7 Enterprise Edition	-
	Network type	Public network	Select the public network for the test.

1.3 Process Flow

Figure 1-2 shows the main operation process. A complete database object migration consists of database evaluation (Figure 1-3) and object migration (Figure 1-4).

Figure 1-2 Process flow

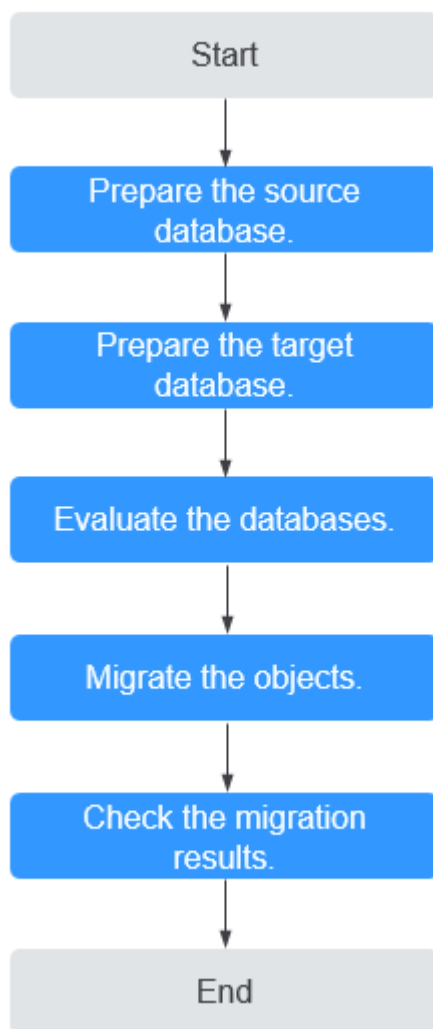


Figure 1-3 Evaluation process flow

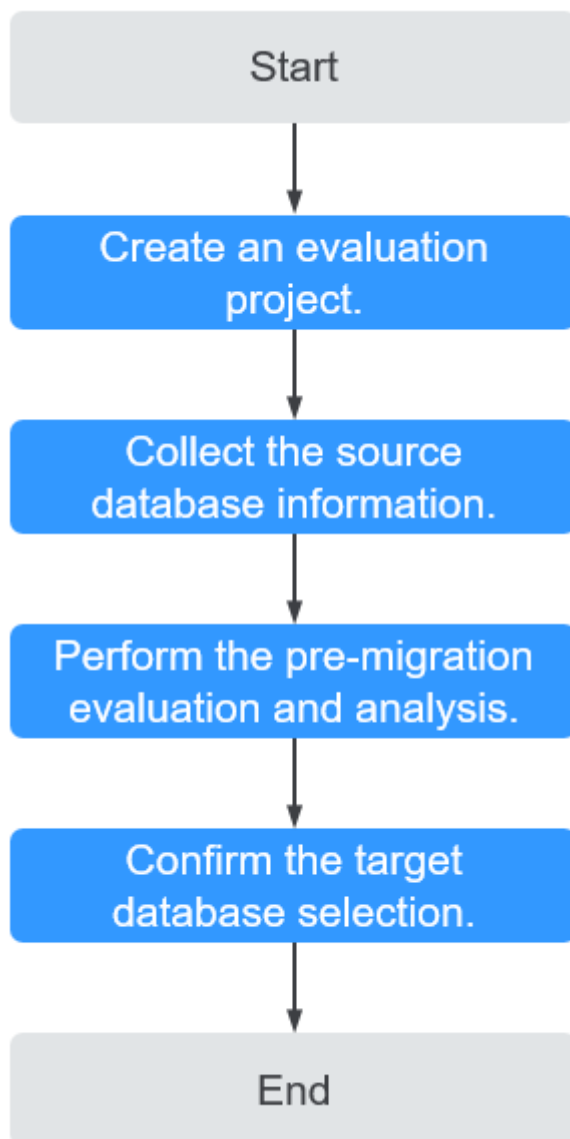
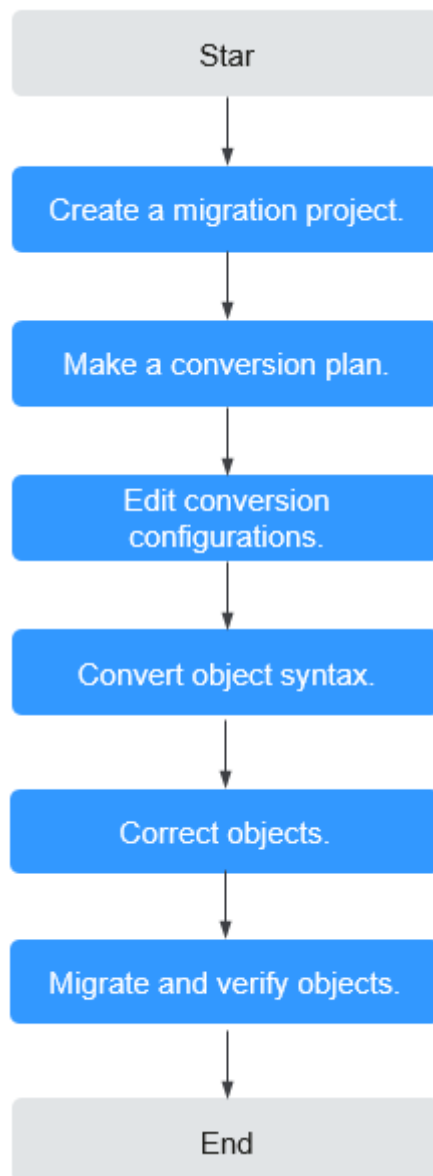


Figure 1-4 Migration process flow



1.4 Object Migration

1.4.1 Preparing for the Migration

Permissions

- The permission check for the source database must be passed. [Table 1-1](#) lists the permissions that need to be checked when the source database type is Oracle.

Table 1-1 Required checks

Check Item	Description	Mandatory
DBMS_MET ADATA	<p>Permission to retrieve metadata from the Oracle database dictionary. This permission is used to obtain the DDL of schema objects.</p> <p>Granting the DBA permission:</p> <ol style="list-style-type: none"> 1. Create a user. CREATE USER user IDENTIFIED BY password; 2. Grant the login permission to the user. GRANT CONNECT TO user; 3. Grant the DBA permission to the user. GRANT DBA TO user; 	Yes
Dynamic View	<p>Permission to access various dynamic performance views. This permission is used to obtain basic database information.</p> <p>DBA permission needs to be granted.</p>	Yes
Schema Objects	<p>Permission to check schema objects to be evaluated. At least one object needs to be evaluated.</p>	Yes
DBA	<p>DBA permission required for subsequent operations.</p>	<p>No</p> <p>If Check Result is Alarm, some objects could not be collected because of permissions, but the evaluation project can still be created successfully.</p>

- When connecting to the target database, you must have the permissions needed to create, delete, and modify databases objects, such as schemas, tables, programs, indexes, users, functions, and views.
- You have the permissions needed to create an evaluation project. For details, see [Permission Management](#).

Network Settings

- Network settings for a source database:
Currently, schemas of Oracle databases can be migrated to Huawei Cloud GaussDB databases only over a public network.

You need to enable public access for your on-premises Oracle database.

- Network settings for a target database:

If a source database attempts to access the GaussDB database over a public network, no additional network settings are required.

Security Rules

- EIP of a UGO instance:

Log in to the UGO console. Choose **Schema Migration > DB Evaluation** and click **Create Project**. On the **Basic Details** tab page, you can see the EIP.

Network Type

Public network

If the source DB network is restricted by the IP address whitelist, add () to the whitelist to ensure that UGO can connect to the source database.

- Security rules for a source database:

Add the UGO instance EIP to the trustlist of the source Oracle database.

- Security rules for the target database:

Add the UGO instance EIP to the trustlist of the target GaussDB database.

NOTE

The preceding database trustlist is used only for UGO-based collection and migration. After the collection and migration, you can delete the EIP from the trustlist.

Other

- You are advised to use a database in a non-production environment.
- You have obtained the IP address, port number, username, and password of the Oracle database to be migrated.
- System databases are maintained by the database system. An object cannot be created on the system databases, so they are not recommended for object migration.
- The target database to be connected is normal and has no arrears or suspension.


1.4.2 Creating a GaussDB Instance

NOTE

- If a VPC and a security group are available, skip [Creating a VPC](#) and [Creating a Security Group](#).
- For details about how to create a GaussDB instance, see [Buying a GaussDB Instance](#).

Creating a VPC

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

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

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

The VPC console is displayed.

Step 4 Click Create VPC.

Basic Information

Region: [Dropdown]

Name: vpc-5d2a

IPv4 CIDR Block: 192.168.0.0 / 16

Recommended: 10.0.0.0/8-24 | 172.16.0.0/12-24 | 192.168.0.0/16-24

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

Advanced Settings (Optional)

Tag: -- Description: --

Subnet Setting1

Subnet Name: subnet-5d2d

AZ: AZ1(center) | AZ2(center) | AZ3(center)

IPv4 CIDR Block: 192.168.0.0 / 24 Available IP Addresses: 251

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

IPv6 CIDR Block (Optional) Enable

Associated Route Table: Default

Advanced Settings (Optional)

Gateway: 192.168.0.1 | DNS Server Address: 100.79.1.250 | Domain Name: -- | IPv4 DHCP Lease Time: Limited, 1250day | 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 [console](#).

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

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

The VPC console is displayed.

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

Step 5 Click **Create Security Group**.

Step 6 Configure parameters as needed.

Create Security Group ×

Name

sg-1871

Template

General-purpose web se... ▾

Tag (Optional)

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.

Description (Optional)

Inbound ICMP and other traffic on ports 22, 80, 443, and 3389 are allowed. Such a security group is used for remote login, ping, and hosting websites on ECSs.

0/255 ✎

[Hide Default Rule](#) ^

Inbound

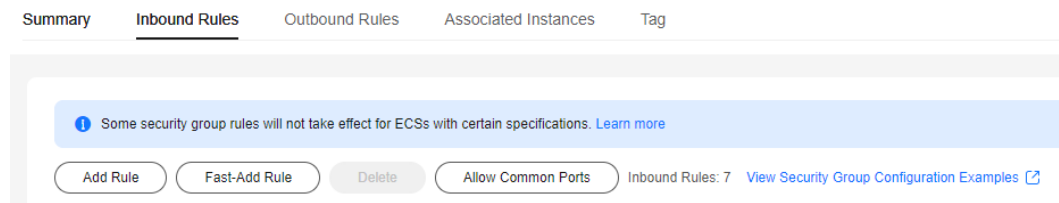
Outbound

Priority	Action	Type	Protocol & ...	Source
1	Allow	IPv4	TCP: 22	0.0.0.0/0
1	Allow	IPv4	TCP: 3389	0.0.0.0/0
1	Allow	IPv4	TCP: 80	0.0.0.0/0
1	Allow	IPv4	TCP: 443	0.0.0.0/0
1	Allow	IPv4	ICMP: All	0.0.0.0/0
1	Allow	IPv4	All	sg-1871
1	Allow	IPv6	All	sg-1871

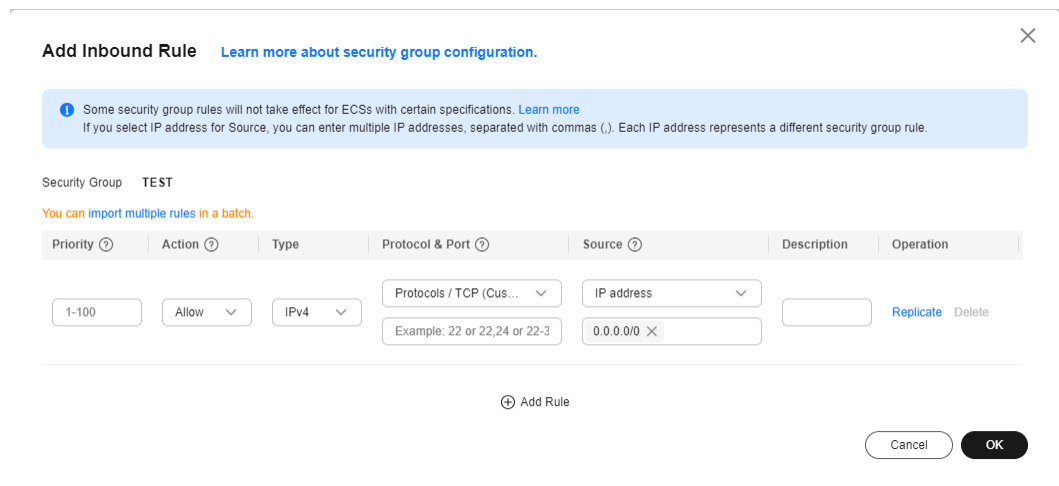
Step 7 Click **OK**.

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

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




Step 10 Configure an inbound rule, add the IP address of the source database, and click **OK**.



----End

Creating a GaussDB Instance

- Step 1** Log in to the [console](#).
- Step 2** Click  in the upper left corner of the console and select the region **AP-Singapore**.
- Step 3** Under the service list, choose **Databases > GaussDB**.
- Step 4** In the navigation pane on the left, click **Instances**.
- Step 5** Click **Buy DB Instance**.
- Step 6** Configure the instance name and basic information.

The screenshot shows the configuration page for a GaussDB instance. Key settings include:

- Billing Mode:** Yearly/Monthly (selected), Pay-per-use.
- Region:** A dropdown menu.
- Project:** A dropdown menu.
- DB Instance Name:** gauss-7e0b.
- Resource:** Enterprise edition (selected), Basic edition.
- DB Engine Version:** 8.103 (selected), 3.226.
- DB Instance Type:** Distributed (selected), Primary/Standby.
- Deployment:** Independent (selected).
- Log Nodes Supported:** Yes.
- Transaction Consistency:** Strong consistency (selected), Eventual consistency.
- Failover Priority:** Reliability (selected), Availability.
- Replicas:** 3 (selected).
- Shards:** 3 (selected).
- Coordinator Nodes:** 3 (selected).
- AZ:** az5, az3, az5, az7, az2 (selected).
- Time Zone:** (UTC+08:00) Beijing, Chongqing, Hong K...

Step 7 Configure instance specifications.

The screenshot shows the Instance Specifications page. Key settings include:

- Instance Specifications:** Dedicated (selected).
- Flavor Name:** 8 vCPUs | 64 GB (Sold Out), 16 vCPUs | 128 GB (Sold Out), 32 vCPUs | 256 GB (Sold Out), 64 vCPUs | 512 GB (Sold Out).
- Storage Type:** Ultra-High I/O (selected).
- Storage Space (GB):** 120 (selected).
- Free Backup Space:** 120 GB.
- Disk Encryption:** Disable (selected), Enable.

Select small specifications for the test. You are advised to configure specifications based on service requirements in actual use.

Step 8 Select a VPC and security group for the instance and configure the database port.

The screenshot shows the VPC and Security Group configuration page. Key settings include:

- VPC:** default_vpc.
- Security Group:** default.
- Database Port:** Default port: 8000.

Step 9 Configure password and other information.

The screenshot shows the password and other information configuration page. Key settings include:

- Administrator:** root.
- Administrator Password:** A password field with a strength indicator.
- Confirm Password:** A password field.
- Parameter Template:** Default: Enterprise-Edition-GaussDB-8.10...
- Tag:** TMS's predefined tags are recommended for adding the same tag to different cloud resources.

Step 10 Click **Next**.


Step 11 Go to the instance list.

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

----End

Creating a database in the GaussDB Instance

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

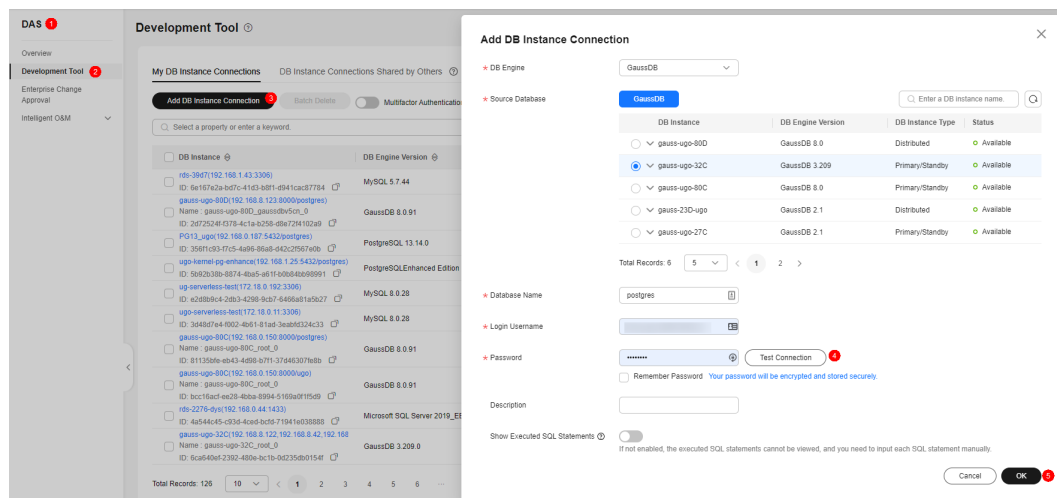
Step 2 Click  in the upper left corner of the console and select the region **AP-Singapore**.

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

Step 4 In the navigation pane on the left, click **Development Tool** to go to the login list page.

Step 5 Click **Add Login**.

Step 6 On the displayed page, select the DB engine, source database, and target DB instance, enter the login username, password, and description (optional), and enable **Collect Metadata Periodically** and **Show Executed SQL Statements**.



Step 7 Click **Test Connection**.

If a message is displayed indicating connection successful, continue with the operation. If a message is displayed indicating a connection failed and the failure cause is provided, make modifications based on the error message.

Step 8 Click **OK**.

Step 9 Locate the added instance, click **Log In** in the **Operation** column.

DB Instance ID	DB Engine Version	Source Database	Login Username	Remember	Description	Created	Additional Users	Operation
	MySQL 5.7.44	RDS	root	Yes		Aug 26, 2024 17:45:42 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	GaussDB 8.0.91	GaussDB	root	Yes		Jul 31, 2024 15:35:55 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	PostgreSQL 13.14.0	RDS	root	Yes	created by sysic rds instance	Jul 19, 2024 17:35:59 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	PostgreSQLEnhanced Edition	RDS	root	No	created by sysic rds instance	Apr 24, 2024 11:29:46 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	MySQL 8.0.28	RDS	root	No	created by sysic rds instance	Mar 26, 2024 10:57:57 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	MySQL 8.0.28	RDS	root	No	created by sysic rds instance	Mar 26, 2024 10:28:56 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	GaussDB 8.0.91	GaussDB	root	Yes		Feb 01, 2024 18:12:33 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	GaussDB 8.0.91	GaussDB	root	Yes		Feb 01, 2024 18:12:30 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	Microsoft SQL Server 2019_EE	RDS	rsuror	Yes	created by sysic rds instance	Jan 29, 2024 17:03:58 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M
	GaussDB 3.209.0	GaussDB	root	Yes	created by sysic gaussdb instance	Jan 29, 2024 16:07:59 GMT+08:00	View (0)	Log In Modify Delete Intelligent O&M

Step 10 Choose **SQL Operation > SQL Window** on the top menu bar.

Step 11 Run the following statement to create a database compatible with Oracle:
ugo indicates the database name. Replace it based on the site requirements.

CREATE DATABASE ugo DBCOMPATIBILITY 'ORA';

----End

1.4.3 Creating a Database Evaluation Project

Create a database evaluation project and select a target database.

Procedure

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

Step 2 In the navigation pane on the left, choose **Schema Migration > DB Evaluation**.

Step 3 Click **Create Project** in the upper right corner.

Step 4 Configure the basic information on the **Basic Information** page. For details, see [Table 1-2](#).

After the basic information is configured, the **Test Connection** button is available.

Figure 1-5 Creating an evaluation project

Table 1-2 Parameter description

Parameter	Description
Project Name	Name displayed in the project list. In this example, the name is Oracle-GaussDB . The name must contain 5 to 50 characters, start with a letter, and end with a letter or number. Only letters, numbers, underscores (_), and hyphens (-) are allowed.
(Optional) Exception Notification Mode	SMN Topic Specifies whether to report exceptions through Simple Message Notification (SMN). To create an SMN topic, see Creating a Topic . NOTE Follow-up Operations After the topic is created, you can add a subscription . After the subscription has been confirmed, alarm notifications will be sent to the subscription endpoint via SMN.
Source DB Type	Select Oracle .

Parameter	Description
(Optional) Network Type	<p>Public Network: An elastic IP address (EIP) is used to connect to the source database.</p> <p>If the source database network is restricted by an IP address whitelist, add the EIP to the source database network whitelist to ensure that the UGO can connect to the source database.</p> <p>EIP in AP-Singapore: 110.238.109.54</p>
(Optional) Connection Method	<p>Select Service Name or Connection string. Service Name is used by default. Service Name is used as an example.</p> <p>Subsequent parameters vary depending on your selection of this parameter.</p> <p>NOTE For connection string, the standard JDBC is used to connect to the source database.</p>
(Optional) Host Type	Use Host IP Address as an example.
Source DB Name	Enter the name of the database to be evaluated.
Hostname or Host IP Address	Enter the host name or host IP address based on the selected host type.
Host Port	Enter a database port.
User Name	Enter the username of the source database. You are advised to use the administrator username.
Password	Enter the password of the source database. The password can contain up to 50 characters.
(Optional) SSL Type	<p>Select No SSL. Currently, One Way SSL is unavailable.</p> <ul style="list-style-type: none"> ● No SSL: SSL is disabled. There may be potential security risks. ● One Way SSL: The target database will be authenticated and the transmission will be encrypted. <ul style="list-style-type: none"> - Upload: Upload the root certificate file in JKS format. - Trust Store Password: Enter the password of the trust store used to access the certificate. <p>NOTE</p> <ul style="list-style-type: none"> ● If you select One Way SSL, enter the correct uploaded file and entered password, which are private information of users. ● Secure Socket Layer (SSL) is an encryption-based Internet security protocol for encrypting the connection between a server and a client. It ensures the privacy, authentication, and integrity of Internet communications.

Parameter	Description
(Optional) Tag	<p>Use predefined tags in Tag Management Service (TMS). Predefined tags are visible to all service resources that support the tagging function. For details, see Tag Management Service User Guide.</p> <p>Enter a key and a value, and click Add.</p> <p>A maximum of 20 tags can be added. For details, see Managing Tags.</p>

Step 5 Click **Test** next to the **Test Connection** field.

- If the connection succeeds, the **Next** button is available.
- If the connection test fails, the message "Unable to connect to DB" is displayed.

Step 6 (Optional) Click **Test** next to **Network Stability**. A successful network stability test only means that there is little network latency or packet loss, or no packet loss at the current time. It takes 10s to 15s to complete.

Step 7 Click **Next**.

The check result of each check item is displayed. You can also click **Recheck** to check the permissions again.

Figure 1-6 Precheck



NOTE

If there are any failed checks, click **Details**, modify the item based on the information provided, and click **Re-verification**.

Step 8 After all check items are passed, click **Next**.

Figure 1-7 Selecting evaluation scope

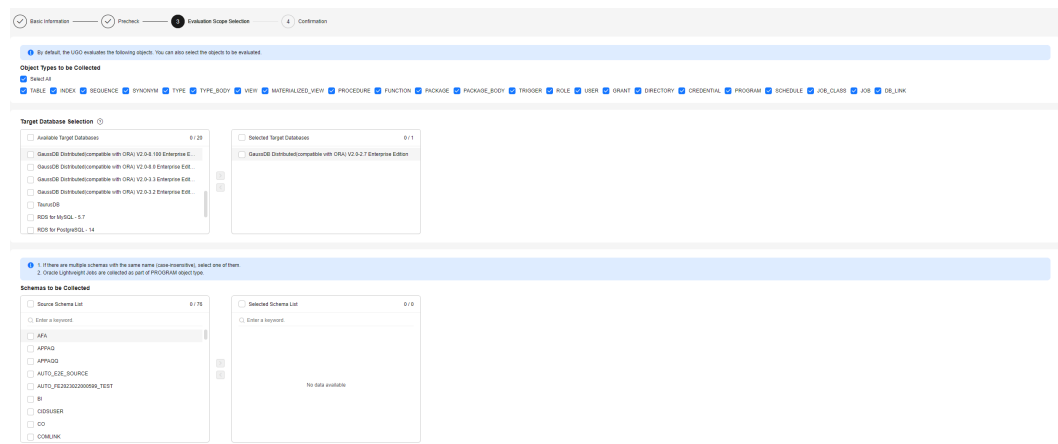



Table 1-3 Parameter description

Parameter	Description
Object Types to be Collected	By default, all object types are selected. You can also manually select the object types to be collected if needed.
Target Database Selection	Select GaussDB Distributed (compatible with ORA) V2.0-2.7 Enterprise Edition .
Schemas to be Collected	<p>Manually select schemas to be collected and click . You can also select all schemas.</p> <p>If there are many schemas, you can search for them by name. The names and number of selected schemas are displayed on the right.</p> <p>NOTICE</p> <ul style="list-style-type: none"> If there are multiple schemas with the same name (case-insensitive), select one of them. The collected Oracle lightweight Jobs will be used as the PROGRAM object type.

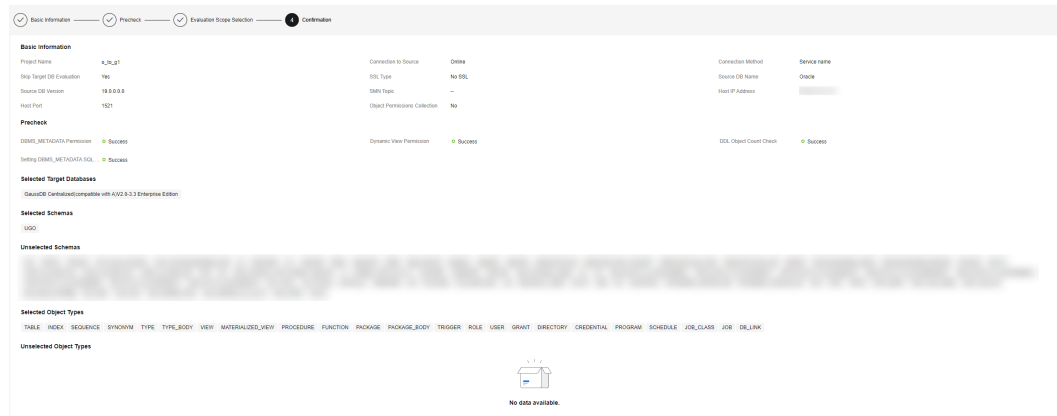
 **NOTE**

- Only the database objects are collected within the permission scope, that is, within the selected schemas.
- After you select object types to be collected, UGO will evaluate their compatibility with the target object types and then migrate them.
- All collected data is stored in the source database of the tenant. The database password encrypted before being saved. Related data is visible only to you on the UGO console.
- After you delete migration tasks or deregister from UGO, the data is deleted.

Step 9 Click **Next** to go to the **Confirmation** page.

The basic information, pre-check results, selected target databases, selected and unselected schemas and object types are displayed.

Figure 1-8 Confirming the information



Step 10 Verify the settings and click **Create**. A message is displayed, indicating that the project is created successfully.

Step 11 Click **OK** to go to the **DB Evaluation** page. You can view the evaluation project you created in the list.

Data collection, project evaluation, pre-migration evaluation are required. You can view the status in the **Evaluation Status** column.

Figure 1-9 Viewing the created project

SI No.	Project Name	Connection Type	Project Status	Source DB Type	Created	Differential Analysis	SQL Lines	SQL Size	Operation
1		Online	In progress - Object Collection Error Confirm Target DB Pending	Oracle	16:23:32 GMT+08:00	Differential Analysis	28	1 KB	Trace, Re-Evaluate, More
2		Online	Completed Create Migration Project	Oracle	15:53:03 GMT+08:00	-	1420	49 KB	Trace, Run Differential Analysis, Delete
3		Online	Completed Create Migration Project	Oracle	15:38:29 GMT+08:00	-	1420	49 KB	Trace, Run Differential Analysis, Delete
4		Online	Completed Create Migration Project	Oracle	15:37:51 GMT+08:00	-	1420	49 KB	Trace, Run Differential Analysis, Delete

NOTE

- Before **Evaluation Status** of an evaluation project becomes **Evaluation - Success. Confirm Target DB Pending**, you can stop and then continue the creation of the project. When **Evaluation Status** is **Evaluation - Success. Confirm Target DB Pending**, you can confirm a target database or re-evaluate objects as needed.
- The evaluation time varies depending on the number of objects selected.
- After the evaluation is complete, click a project to **view the database evaluation result**.
- During data collection, the system periodically automatically retries the connection to the source database. Next connection retry time: Current time + Time required for checking the connection and network stability + Sleep retry interval. After a connection test, there is several second delay before a network stability check can be performed. You may see a few seconds difference between the two retry times.

Step 12 When **Evaluation Status** is **Evaluation - Success. Confirm Target DB Pending**, and click the project name or click **Confirm Target DB Pending**.

Step 13 On the **Target DB Analysis** tab page, select **GaussDB Distributed (compatible with ORA) V2.0-2.7 Enterprise Edition** and click **Confirm DB Selection**.

Step 14 Click **Confirm**.

Step 15 After the target database is confirmed, a dialog box is displayed. You can click:

- **Create Now** to go to the **Create Migration Project** page.
- **Create Later** to stay on the current page.

----End

Follow-up Operations

You can [view details about the evaluation project](#).

1.4.4 Creating an Object Migration Project

Create an object migration task based on the created evaluation project.

Procedure

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

Step 2 In the navigation pane on the left, choose **Schema Migration > Object Migration**.

Step 3 Click **Create Project** in the upper right corner.

Step 4 On the **Create Migration Project** page, enter the required information. For details, see [Table 1-4](#).

Figure 1-10 Creating a migration project

The screenshot shows the 'Basic Information' step of the migration project creation process. It includes the following fields and options:

- Project Name:** A text input field with the placeholder "--Enter--".
- Exception Notification Mode:** A button labeled "SMN Topic". Below it is a dropdown menu with "--Select--" and a "Create SMN Topic" link. A note states: "After you create and subscribe to an SMN topic, UGO can send alarm notifications to your configured subscription endpoints through SMN."
- Evaluation Project:** A dropdown menu showing "Auto_fication_and_rollback_0...".
- Target DB:** "GaussDB Distributed".
- Target DB Version:** "V2.0-8.0 Enterprise Edition".
- DB Connection Mode:** Three buttons: "Public network" (selected), "VPC Endpoint", and "Auto assigned by instance". A note below says: "If the target DB network is restricted by the IP address whitelist, add (100.85.124.231) to the whitelist to ensure that UGO can connect to the target database."
- Host Type:** Two buttons: "Hostname" and "Host IP Address" (selected).
- Host IP Address:** A text input field with a help icon.
- Host Port:** A text input field.
- DB Name:** A text input field with a help icon.
- Username:** A text input field with a help icon.
- Password:** A text input field with a visibility icon.
- Schemas to Migrate:** A checked checkbox labeled "Select all". A note below says: "Select schemas to be collected by UGO from the source database."
- SSL Type:** Three buttons: "No SSL", "SSL without authentication", and "One-way SSL" (selected). A note below says: "Target database will be authenticated and the communication will be encrypted."

Table 1-4 Parameter description

Parameter	Description
Project Name	The project name must be unique. In this example, the project name is Oracle-GaussDB . The name must contain 5 to 50 characters, start with a letter, and end with a letter or number. Only letters, numbers, underscores (_), and hyphens (-) are allowed.
(Optional) Exception Notification Mode	SMN Topic Specifies whether to report exceptions through Simple Message Notification (SMN). To create an SMN topic, see Creating a Topic . NOTE Follow-up Operations After the topic is created, you can add a subscription . After the subscription has been confirmed, alarm notifications will be sent to the subscription endpoint via SMN.

Parameter	Description
Enterprise Project	If you have been associated with an enterprise project, select the target project from the Enterprise Project drop-down list. You can also go to the project management console to create a project. For details about how to create a project, see <i>Enterprise Management User Guide</i> .
Evaluation Project	Select an evaluation project where the target database has been confirmed. <ul style="list-style-type: none"><li data-bbox="608 573 1422 674">● Target DB: The confirmed target database type is displayed. Each tenant can connect to up to five target databases at the same time.<li data-bbox="608 685 1406 752">● Target DB Version: The confirmed target database version is displayed.

Parameter	Description
DB Connection Mode	<p>If you select Public network, the target database will be connected using an EIP. Select Hostname or Host IP Address for Host Type and Set Host Port.</p> <ul style="list-style-type: none"> ● If the target database network is restricted by the IP address trustlist, add the EIP to the target database network trustlist to ensure that UGO can connect to the target database. <ul style="list-style-type: none"> - EIP in AP-Singapore: 110.238.109.54 - EIP in LA-Santiago: 159.138.116.198 ● Host IP Address: Enter the IP address of the target database host. <ul style="list-style-type: none"> - If the target database type is GaussDB Centralized, you can enter only the IP address of the primary node or the IP addresses of the primary node and multiple standby nodes. Use commas (,) to separate the IP addresses. When you connect to the database, the system automatically selects the IP address of the primary node. - If the target database type is GaussDB Distributed, you can enter one or more CN IP addresses separated by commas (,). The first IP address is preferentially used to connect to the database. If the previous IP address is abnormal, the next IP address will be used to connect to the database. If the first IP address of the CN can be connected but the CN node is abnormal and cannot be written, the connection test is normal, but an error message is displayed during permission check and object migration. ● Host Name: Enter a host name. <ul style="list-style-type: none"> - The host name cannot be empty. - You can enter multiple host names and use commas (,) to separate them. All host names can contain up to 1,024 characters. - A host name can contain a maximum of 253 characters and cannot contain the following special characters: !@#\$%^&*()+= []{} \; <> , ? / <p>If you select VPC Endpoint for DB Connection Mode, you also need to set VPC Endpoint and Port Mapping.</p> <ul style="list-style-type: none"> ● Click View VPC Endpoint to go to the VPC Endpoint management page and view the VPC endpoints. ● For details about how to configure VPC Endpoint, see Connecting to the Target Database Using VPC Endpoint. <p>If you select Auto assigned by instance, select a value from the Database Instance drop-down list.</p> <ul style="list-style-type: none"> ● Click View DB Instance to go to the instance management page of the target database and view instance information.

Parameter	Description
	<ul style="list-style-type: none"> Click View instances that cannot be selected. A dialog box is displayed, showing the unavailable instance names and reasons.
DB Name	<p>Enter a database name.</p> <p>The name contains 2 to 128 characters, including letters, digits, periods (.), underscores (_), hyphens (-), dollar signs (\$), and number signs (#). The value must start with a letter, digit, period (.), underscore (_), or hyphen (-) and can contain quotation marks (").</p>
Username	Enter a username for logging in to a target database. A user with administrator permissions is recommended.
Password	Enter a password for logging in to a target database.
Schemas to Migrate	<ul style="list-style-type: none"> If you select Select all, all schemas will be collected by UGO from the source database. If you deselect Select all, you need to reselect schemas in the evaluation project. <p>By default, Select all is selected.</p>
(Optional) SSL Type	<ul style="list-style-type: none"> No SSL: SSL is disabled and there may be potential security risks. SSL No Auth: Transmission will be encrypted without authentication. One Way SSL: The target database will be authenticated and the transmission will be encrypted.
(Optional) Tag	<p>Use predefined tags in Tag Management Service (TMS). Predefined tags are visible to all service resources that support the tagging function. For details, see Tag Management Service User Guide.</p> <p>Enter a key and a value, and click Add.</p> <p>A maximum of 10 tags can be added. For details, see Managing Tags.</p>

Step 5 Click **Test Connection**.

- If the connection test is successful, the **Create** button is available.
- If the connection test fails, an error message is displayed.

Step 6 Click **Create** in the lower right corner.

Step 7 After the project is created, click **OK** to go to the **Object Migration** page.

ID	Project Name	Evaluation Project	Target DB Type	Created	Operation
1	AUTO_MYSQL_TO_GAUSSDB_FOR_ORI_3_2	AUTO_MYSQL_TO_GAUSSDB_FOR_ORI_3_2	GaussDB Distributed 3.2 Enterprise Edition	Nov 07, 2024 06:51:18 GMT+08:00	Migrate Delete
2	AUTO_ORACLE_TO_GAUSSDB_FOR_ORI_3_2	AUTO_ORACLE_TO_GAUSSDB_FOR_ORI_3_2	GaussDB Distributed 3.2 Enterprise Edition	Nov 06, 2024 21:38:52 GMT+08:00	Migrate Delete

----End

1.4.5 Migrating Objects

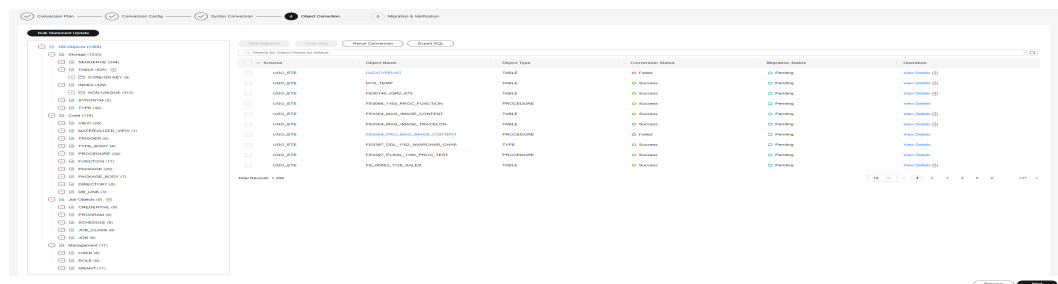
Migrate the objects based on the created migration task.

Procedure

Step 1 On the **Object Migration** page, locate the project that you want to migrate and click **Migrate** in the **Operation** column.

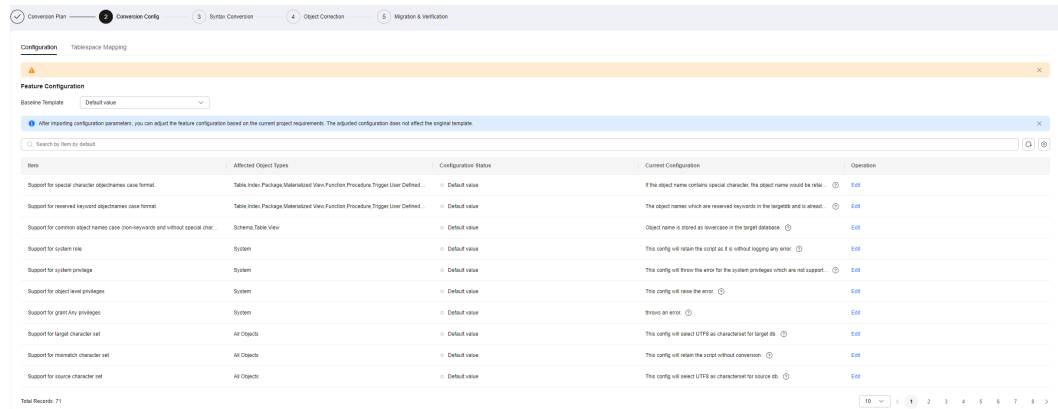
On the **Conversion Plan** page, the collection objects and types for the project are displayed on the left. For details, see [Viewing the Database Evaluation Result](#).


Figure 1-11 Conversion plan



- User password:
 - If you want to convert the object type USER, you must set a password to complete the conversion. The same password will be used for all USER object creation on the target database. After the migration, the individual user passwords must be changed manually. If you do not want to convert the object type USER, select the desired USER objects and click **Skip Conversion**. Then, the **Conversion Status** of the objects becomes **Skip**. To continue the conversion, select the desired objects and click **Convert**.
 - SSL connection must be selected. If Non-SSL connection is selected, the password will be transmitted as plain text as part of the database connection and any SQL statements involving a password will be insecure.
 - After the password is configured, it cannot be changed again until after the migration is complete.
 - The password can consist of 8 to 32 characters and contain at least three types of the following characters: uppercase letters, lowercase letters, digits, and special characters (~!@#%\$^&*()-_ =+|[{}];;<.>/?). Spaces are not allowed. The password can contain up to three consecutive characters.
- If **Object Status** of objects is **Abnormal**, their **Conversion Status** is **Skip**. You can change the status to **Convert**. If **Object Status** of objects is **Duplicate**, these objects are not migrated by default.

Step 2 Click **Next** to go to the **Conversion Config** page.

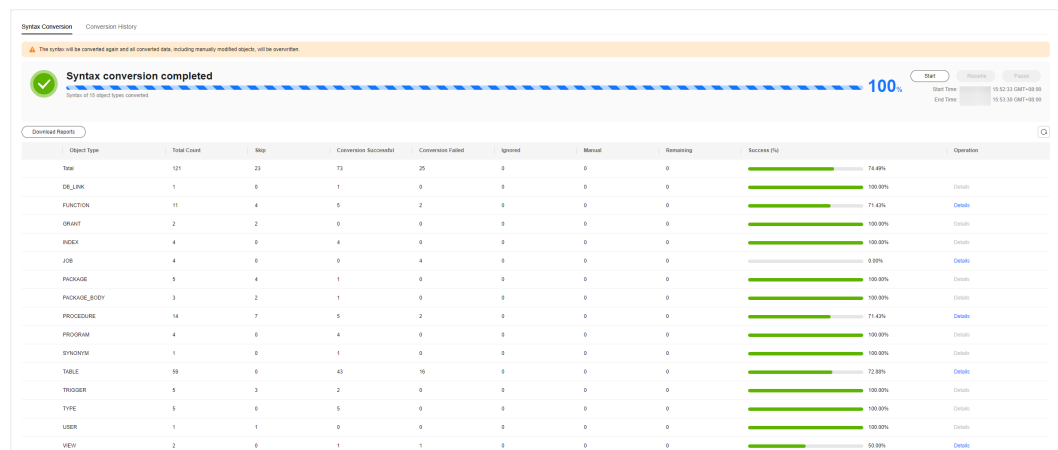


- Select a value from the **Baseline Template** drop-down list.
 - Two templates are preset: default template and maximum compatibility template.
 - After you select a template, the preset values in the template are imported to the configuration item list.
- Set the configuration items based on the actual conversion scenario.
 - In the **Current Configuration** column, move the cursor to  of each feature to view the impact of the feature. You can click **View Sample** to view details about the configuration information and the current configuration conversion example.
 - Locate a feature and click **Edit** in the **Operation** column to modify the current configuration of the feature and click **OK**.
 - After you import configuration parameters, the configuration status of features is **Default**. If you edit the configuration of a feature, the configuration status will become **Modified**.
 - If the custom template of your project is deleted, your project still uses the template configurations, but **default value** is displayed for **Parameter Configuration**.
- When **Category** is set to **Customize template**, you can select an existing template or create a template. The template name can contain 5 to 50 characters and can only include letters, numbers, underscores (_), and hyphens (-). It must start with a letter and end with a letter or number.
- After you select a template, locate a feature and click **Edit Configuration** in the **Operation** column to modify the current configuration of the feature. If the target database version and deployment mode in different migration projects are the same, you can apply or modify a template you created in previous projects.

Step 3 Click **Next** to go to the **Syntax Conversion** page.

Step 4 Click **Start** to start the conversion. The following information is displayed: object type, the number of total objects, the number of objects converted successfully, the number of objects that failed to be converted, conversion start time, and conversion end time.

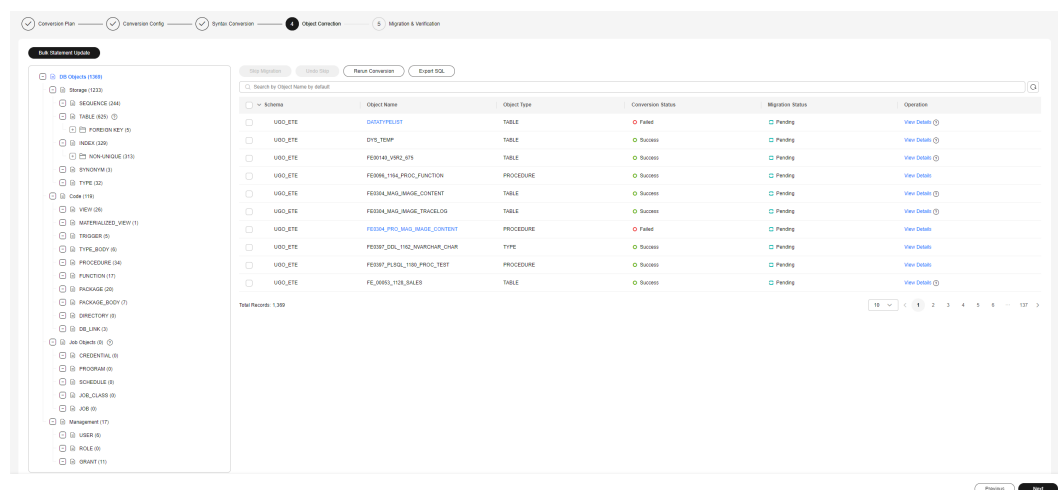
Figure 1-12 Syntax conversion



- Click **Download Reports**, locate the required report, and click **Download** to download the report to the local PC for analysis.
 - **Conversion Error Report:** This report contains details about objects that could not be converted to equivalent syntax in the target database.
 - **Anonymized Conversion Error Report:** This report contains the details about objects, in anonymized form, that could not be converted to equivalent syntax in the target database.
 - **Conversion Risk Report:** This report contains the details about objects that were converted with risks based on selected configuration options.
 - **Anonymized Conversion Risk Report:** This report contains details about objects, in anonymized form, that were converted with risks based on the selected configuration options. However, there are function differences after the conversion.
- Locate an object type that failed to be converted, and click **Details** in the **Operation** column to go to the **Object Correction** page to view details about the object type.

Step 5 Click **Next** to go to the **Object Correction** page.

Figure 1-13 Object correction



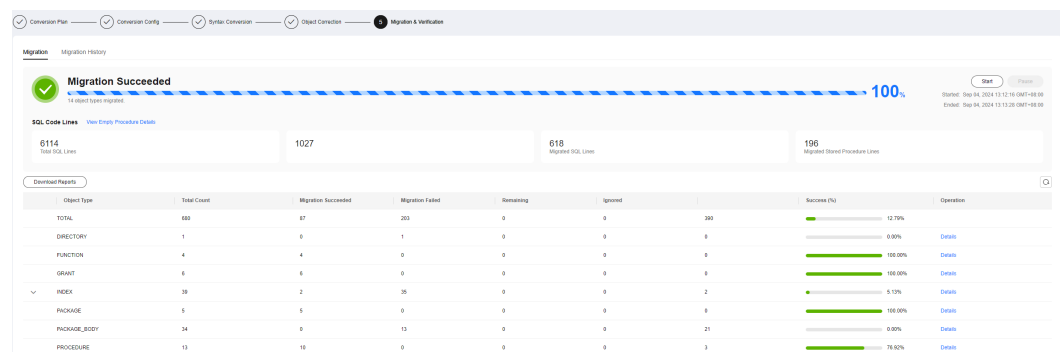
- Select object types or objects you want to rerun conversion for and click **Rerun Conversion**. The SQL modification of other objects is not overwritten. On the **Rerun Conversion page**, select the objects you want to rerun conversion, and click **Rerun Conversion** to perform **Step 4**.
- Batch update: You can click **Batch Statement Update** to search for and modify objects with the similar issues in batches. For details, see **Updating Statements in Batches**.
- Locate the object that failed to be migrated and click **View Details** in the **Operation** column. On the displayed page, view the conversion error message and modify the target SQL statements.

NOTE

- If you select a schema to be ignored and click **Skip Migration**, the **Conversion Status** or **Migration Status** changes to **Ignore**. You can also click **Undo Skip** to change the status back.
- If you click **Ignore**, the migration status of the object changes to **Ignore**. If you click **Undo Skip**, the migration status changes to **Manual**.
- If there are features commented out in the migration, functions may be affected. You can click **Modify** to see the details.

Step 6 Click **Next**. The **Migration & Verification** page is displayed. Click **Start** to start the verification. The migration progress is displayed in a progress bar and as a percentage. When the migration progress reaches 100%, the migration is complete.

Figure 1-14 Verification



- If a message is displayed, indicating that there were errors or risks during migration, the verification will automatically stop.
- **View Empty Stored Procedure:** You can view objects that fail to be created and failure occurrences.
- Click **Download Reports**, locate the required report, and click **Download** to download the report to the local PC for analysis. Data related to sub-objects is not included in the migration report.
 - **Migration statistical report:** This report includes a summary of object statuses during migration and verification.
 - **Migration error report:** This report includes failure details, such as statuses, migrated statements, and error details for each object.

- **Anonymized error report:** This report consists of failure details, such as statuses, migrated statements, and error details for each object, but the original and migrated SQL statements will be anonymized.
 - **Full migration report:** This report includes failure details, such as statuses, migrated statements, and error details for each object.
 - **Anonymized full migration report:** This report contains migration details, such as statuses, migrated statements, error details for each object, but the original and migrated SQL statements will be anonymized..
- Locate an object type that failed to be migrated, click **Details** to return to the object correction page and view details about the object type.

Step 7 After the migration verification is complete, if any item fails the verification, return to the object correction page. You can modify the items one by one or click **Bulk Statement Update** to modify them in batches.

NOTE

If no items fail the verification, the **Batch Statement Update** and **Modify** buttons on the **Object Correction** page are unavailable.

----End

Follow-up Operations

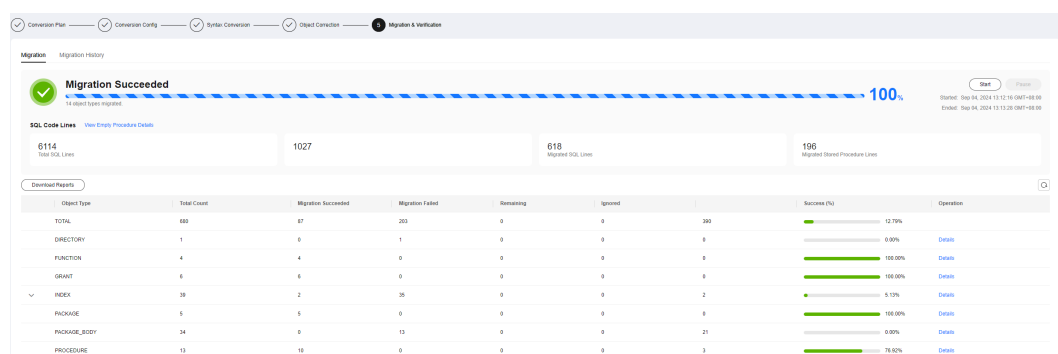
- You can view the conversion success rates and SQL statements. For details, see [Viewing Syntax Conversion History](#) and [Viewing Migration Project Details](#).
- After the migration is complete, you can delete the corresponding database evaluation and object migration project. When the projects are deleted, the database connection information and source database schema information are also deleted. Deleted projects cannot be recovered. Exercise caution when performing this operation.

1.4.6 Checking the Migration Result

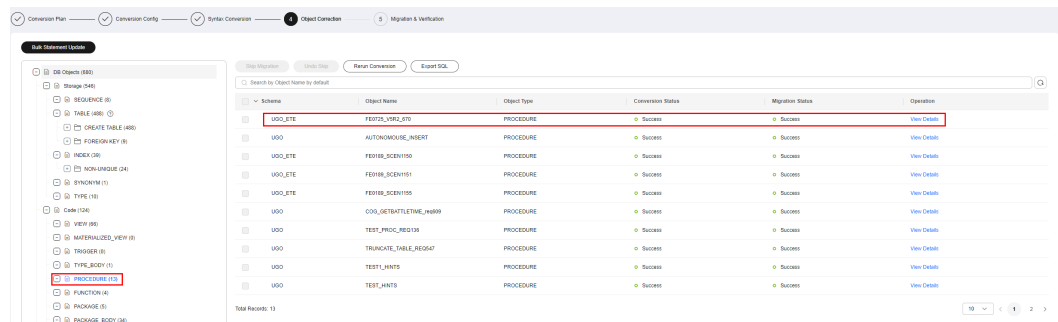
This section uses the PROCEDURE object type as an example to describe how to confirm the migration results.

Procedure

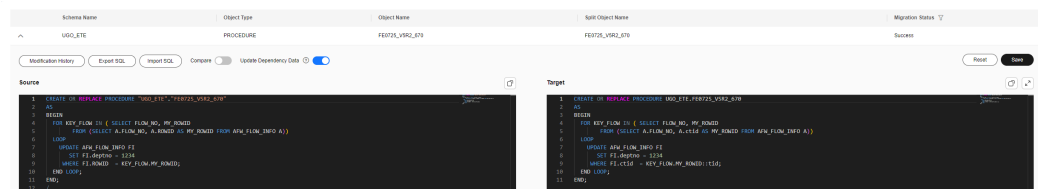
Step 1 When the migration verification progress reaches 100%, view the migration results of PROCEDURE.



Step 2 Go to the **Object Correction** page, select **PROCEDURE**, and locate an object in the object list. **PROC_REQ197** is used as an example.



Step 3 Click **View Details** in the **Operation** column to view the details and the SQL statements.



Step 4 Use DAS to connect to **ugo** in the **Auto-ugo-gaussdbv5-tar-1** instance.

For details about how to connect to a DB instance, see [Adding Login Information](#).

Step 5 Verify schema **ugo_ete** is displayed.

Step 6 On the **Objects** tab, view stored procedure **fe0725_v5r2_670**.

----End

Follow-up Operations

- You can use [Data Replication Service \(DRS\)](#) to migrate data online. It is a complete solution where UGO works with DRS to migrate heterogeneous databases with complex stored procedures and functions to Huawei Cloud databases. For details about how to use DRS to migrate data from Oracle to GaussDB, see [Using DRS to Migrate Data from Oracle to GaussDB](#).
- After the migration is complete, test the performance of the target database. For details, see [GaussDB Performance White Paper](#).