Database and Application Migration UGO

Quick Start

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Contents

1 Logging In to the Console

Procedure

Step 1 Log in to the UGO console.

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

For details about the regions supported by UGO, see **Global Products and Services**.

Step 3 In the service list, choose **Databases** > **Database and Application Migration UGO**. The UGO dashboard page is displayed.

----End

2 Operation Guide

This section describes the UGO dashboard page, migration process, and project statuses.

Dashboard

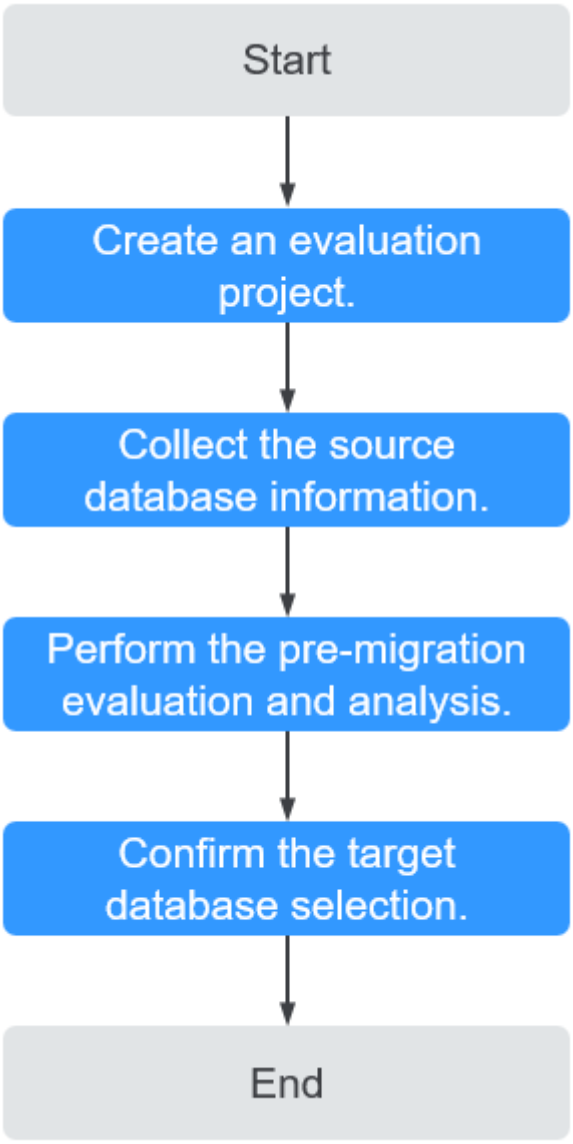
On the dashboard page, you can view UGO overview and application scenarios, database migration process guidance, and evaluation and migration project statuses. The service overview and process guidance are displayed by default. You can also hide them.

You can view statuses and quantity of existing projects. You can also click a status to view all projects in this status.

Migration Process

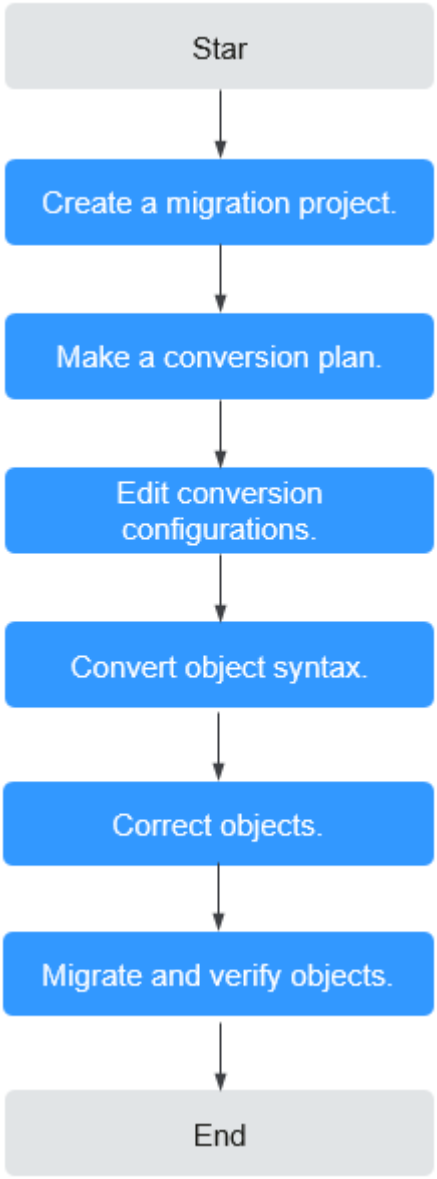
A complete database object migration consists of evaluation and migration. The processes are as follows.

Figure 2-1 Evaluation process



For details, see **Evaluation Project**.

Figure 2-2 Migration process



For details, see **Migration Project**.

Task Statuses

There are multiple task statuses that indicate different evaluation phases.

Different statuses are displayed in different colors in the dashboard. The following table describes the statuses.

Table 2-1 Evaluation project statuses

Project	Status	Description
Evaluation project	In progress	The project has been created, but the target database has not been selected.

Project	Status	Description
	Stopped	The project being created or re-evaluated was manually stopped.
	Completed	A target database has been selected and confirmed.
	Failed	An exception occurs during the evaluation.

Table 2-2 Migration project statuses

Project	Status	Description
Migration project	Ready	The project passes the permission check of the target database.
	Not ready	The project failed to pass the permission check of the target database.

3 Evaluation Project

3.1 Overview

During the evaluation project, you configure parameter to make UGO connect to the source database. UGO collects source database basic information, performance data, and SQL statements of specific object types. Then, UGO generates a source database profiling, analyzes the source database features, and evaluates syntax compatibility between the source and target databases based on collected data. Finally, UGO recommends different types of target databases with specific specifications, estimates the migration workloads, evaluate migration risks based on compatibility, performance, object complexity, and application scenarios.

3.2 Source Database Preparation and Authorization Tips

During evaluation project creation, UGO will check the permissions of the source database. Before creating an evaluation task, perform the following operations.

- To ensure that the DDLs returned by DBMS_METADATA.GET_DDL are consistent, you can perform the following settings on the Oracle source database:
  - Ensure that there are no collation clauses (which will affect USER, TABLE, CLUSTER, VIEW, MATERIALIZED_VIEW, PROCEDURE, FUNCTION, PACKAGE, TYPE, and TRIGGER).
    In the SQLPlus: Run **EXECUTE DBMS_METADATA.SET_TRANSFORM_PARAM(dbms_metadata.SESSION_TRANSFORM, 'COLLATION_CLAUSE', 'NEVER');**
  - Make table constraints and indexes a part of the CREATE TABLE statements.
    In the SQLPlus: Run **EXECUTE DBMS_METADATA.SET_TRANSFORM_PARAM(dbms_metadata.SESSION_TRANSFORM, 'CONSTRAINTS_AS_ALTER', false);**
- You have permissions to create an evaluation project. To obtain permissions, see **Permission Management**.
- The source database must pass the following pre-check items.

  - Oracle as the source database: DBMS_METADATA, Dynamic View, and Schema Object Count Check permissions.
  - MySQL as the source database: query permissions and PROCESS permissions on the MySQL system database and all permissions on the databases to be migrated. In MySQL 8.0 and later versions, if there are stored procedures and functions in the source database, SHOW_ROUTINE permissions are required.
  - GoldenDB as the source database: query permissions and PROCESS permissions on the GoldenDB system database and all permissions on the databases to be migrated. For stored procedures and functions, the SHOW_ROUTINE permission is also required.
  - Microsoft SQL Server as the source database: VIEW DEFINITION permissions.

NOTE

MySQL or GoldenDB as the source database: If a user is granted to the global SELECT permissions and SHOW_ROUTINE permissions. No other permissions are required.

3.3 Step 1: Create an Evaluation Project

Scenarios

This section describes how to create an evaluation project. An evaluation project evaluates source databases and then help you migrate the database objects of source databases to the selected target databases.

Suggestions

- Use a database in a non-production environment.
- GoldenDB as the source database: Create an evaluation task as a CN user.

Constraints

- If the source database type is MySQL or GoldenDB, the username cannot contain special characters, such as single quotation marks ('), double quotation marks ("), and backslashes (\).
- If the source database type is MySQL or GoldenDB, the schema name cannot contain double quotation marks ("). Otherwise, the migration fails.
- UGO cannot evaluate overloaded functions with the same name in the same source database.
- Each user can create up to 10 evaluation projects.

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 Read **Source Database Preparation and Authorization Tips** and click **Create**.

Step 5 Enter the basic information on the **Basic Information** page. For details about the parameters, see **Table 3-1**.

After the basic information is entered, the **Test** button is available.

Figure 3-1 Evaluation project creation

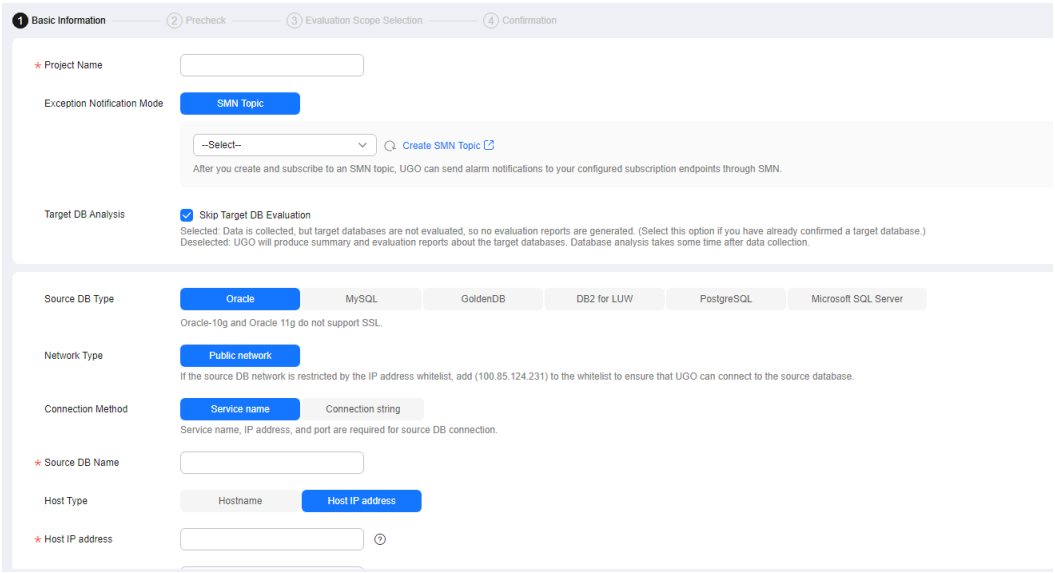


Table 3-1 Parameter description

Parameter	Description
Project Name	Enter a project name. The name is unique. It can contain 5 to 50 characters and must start with a letter and end with a digit or letter. Only letters (case-insensitive), digits, 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 Operation** 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.
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 *Enterprise Management User Guide*.

Parameter	Description
(Optional) Target DB Analysis	• Select **Skip Target DB Evaluation**: UGO only collects data. The target databases will not be evaluated, so no evaluation reports are generated. There are only recommended target databases on the **Target DB Analysis** tab page when you **view evaluation project details**. Select this option if you already have a confirmed target database. If you need to re-evaluate the task after the evaluation project is created, go to the evaluation project list page, locate the project and choose **More** > **Re-Evaluate** in the **Operation** column. After the re-evaluation task is complete, click the project name to go to the **Source DB Analysis** page. On the **Target DB Analysis** page, the **Re-Evaluate** button is displayed. For details, see **Viewing Evaluation Project Details**. • Deselect **Skip Target DB Evaluation**: UGO will analyze different target databases to produce summary and evaluation reports. Database analysis takes some time after data collection. This option is selected by default. **NOTE** If the source database type is Microsoft SQL Server, this option is selected by default and cannot be deselected.
(Optional) Source DB Type	Select a source database type. Currently, the following source database types are supported: ORACLE 10g/11g/12c/18c/19c/21c, MySQL 5.5/5.6/5.7/8.0, GoldenDB, PostgreSQL 10/11/12/13/14/15, Microsoft SQL Server-2012/2014/2016/2017/2019, and Informix-11/12. If you want to select GoldenDB, Microsoft SQL Server 2012/14/16/17/19, or PostgreSQL 10/11/12/13/14/15 as the source database, submit an application by choosing **Service Tickets > Create Service Ticket** in the upper right corner of the management console. **NOTE** If the source database type is MySQL, run the following command on the source database to enable the CPU count function. **SET GLOBAL innodb_monitor_enable = cpu_n;**
(Optional) Network Type	**Public Network**: An elastic IP address (EIP) is used to connect to the source database. If the source database network is restricted by the IP address whitelist, add the EIP to the source database network whitelist to ensure that the UGO can connect to the source database. • EIP in CN South-Guangzhou: 124.71.59.255 • EIP in AP-Singapore: 110.238.109.54 • EIP in LA-Santiago: 159.138.116.198

Parameter	Description
(Optional) Connection Method	Select **Service name** or **Connection string**. **Service name** is used by default. The following uses the service name as an example. Subsequent parameters vary depending on your selection of this parameter. • Oracle: Compatible with JDBC formats of IPv4: – ip:port:databaseName – ip:port/databaseName – jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=ip)(PORT=port)))(CONNECT_DATA=(SERVICE_NAME=databaseName))) – jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCPS)(HOST=ip)(PORT=port)))(CONNECT_DATA=(SERVICE_NAME=databaseName))) • MySQL: Compatible with JDBC formats of IPv4: – jdbc:mysql://ip:port/databaseName?useUnicode=true&characterEncoding=UTF-8 – jdbc:mysql://ip:port/databaseName?useUnicode=true&characterEncoding=UTF-8&useSSL=true&requireSSL=true – jdbc:mysql://ip:port/databaseName?useUnicode=true&characterEncoding=UTF-8&allowPublicKeyRetrieval=true – jdbc:mysql://address=(protocol=tcp)(host=ip)(port=port)/databaseName?useUnicode=true&characterEncoding=UTF-8 – jdbc:mysql://address=(protocol=tcp)(host=ip)(port=port)/databaseName?useUnicode=true&characterEncoding=UTF-8&useSSL=true&requireSSL=true – jdbc:mysql://address=(protocol=tcp)(host=ip)(port=port)/databaseName?useUnicode=true&characterEncoding=UTF-8&allowPublicKeyRetrieval=true • PostgreSQL: Compatible with JDBC formats of IPv4: – jdbc:postgresql://ip:port/databaseName • GoldenDB Compatible with JDBC formats of IPv4: – jdbc:mysql://ip:port/databaseName?useUnicode=true&characterEncoding=UTF-8 – jdbc:mysql://ip:port/databaseName?useUnicode=true&characterEncoding=UTF-8&useSSL=true&requireSSL=true

Parameter	Description
	– jdbc:mysql://ip:port/databaseName?useUnicode=true&characterEncoding=UTF-8&allowPublicKeyRetrieval=true – jdbc:mysql://address=(protocol=tcp)(host=ip)(port=port)/databaseName?useUnicode=true&characterEncoding=UTF-8 – jdbc:mysql://address=(protocol=tcp)(host=ip)(port=port)/databaseName?useUnicode=true&characterEncoding=UTF-8&useSSL=true&requireSSL=true – jdbc:mysql://address=(protocol=tcp)(host=ip)(port=port)/databaseName?useUnicode=true&characterEncoding=UTF-8&allowPublicKeyRetrieval=true **NOTE** ● For connection string, the standard JDBC is used to connect to the source database. ● If the source database type is Microsoft SQL Server, only **Service name** can be selected for connection.
Host Type	Select **Hostname** or **Host IP address**.
Hostname or Host IP Address	● Enter the host name or host IP address based on the selected host type. ● Hostname: ● You can enter multiple hostnames and use commas (,) to separate them. All hostnames can contain up to 1,024 characters. ● Format of a hostname: – example.com – {part1}.{part2}.{part3} ● A hostname can consist of multiple parts and each part is separated by periods(.). A hostname can contain up to 253 characters. ● Each {part}: 1. Can contain 1 to 127 characters. 2. Can contain lowercase characters, uppercase characters, numbers, and hyphens (-). 3. Must start with a lowercase character, uppercase character, or number. 4. Cannot end with a digit ranging from 0 to 9 or a hyphen (-).

Parameter	Description
Source DB Name	Enter the name of the database to be evaluated. The name can contain 2 to 128 characters and must start with a letter, digit, period (.), underscore (_), or hyphen (-). Only letters, digits, periods (.), underscores (_), hyphens (-), dollar signs ($), and number signs (#) are allowed. The name can be enclosed in double quotation marks (""). **NOTE** This parameter is not displayed when the source database type is MySQL.
Hostname or Host IP Address	Enter the host name or host IP address based on the selected host type. IPv6 is not supported.
Host Port	Enter a database port. The port number ranges from 5 to 65535.
Username	Enter the username of the source database. It can contain up to 128 characters. You are advised to use the administrator username. The username can contain 2 to 128 characters and must start with a letter, digit, period (.), underscore (_), or hyphen (-). Only letters, digits, periods (.), underscores (_), hyphens (-), dollar signs ($), and number signs (#) are allowed. The username can be enclosed in double quotation marks ("").
Password	Enter the password of the source database. The value contains up to 50 characters.
(Optional) SSL Type	Select **No SSL**. Currently, **One-way SSL** is unavailable. ● **No SSL**: The SSL security protocol is disabled. There may be potential security risks. ● **One-way SSL**: The target database will be authenticated and transmission will be encrypted. – **Upload**: Upload the root certificate file in JKS format. – **Trust Store Password**: Enter the password of the trust store used to access the certificate. **NOTE** ● If the source database type is a PostgreSQL, only PEM SSL certificates can be uploaded, and the trust password is not required. ● If the source database type is Oracle 10g or 11g, one way SSL is not supported. ● If you select **One-way SSL**, ensure that the uploaded file and entered password are correct, which are private information of users. ● Secure Socket Layer (SSL) is an encryption-based Internet security protocol for establishing an encrypted link between a server and a client. It provides privacy, authentication, and integrity to Internet communications.

Parameter	Description
Data Collected From (Optional)	If the source database type is Oracle, select **DBA views** or **All views** (default value). • **DBA views**: UGO collects data from objects in the entire source DB instance. • **All views**: UGO collects data from all objects owned and accessed by the source DB user.
(Optional) Tags	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***. Enter a key and a value, and click **Add**. You can add up to 20 tags. For details, see **Managing Tags**.

Step 6 Click **Test** next to the **Test Connection** field.

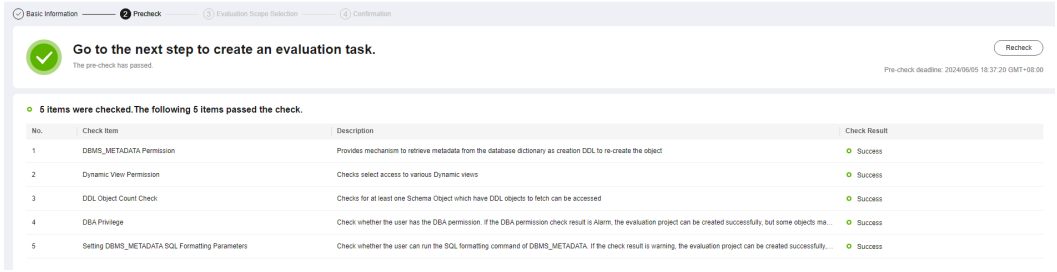
- If the connection test succeeds, the **Next** button will be available.
- If the connection test fails, error message "Unable to connect to DB" will be displayed.

Step 7 (Optional) Test network stability. A successful network stability test only means that there is a little network latency or packet loss, or no packet loss at the current time. It takes 10s to 15s to complete.

Step 8 Click **Next** to go to the **Precheck** page.

All check item results are displayed. If the result of a check item is **Failed** or **Alarm**, the related reasons and suggestions are displayed. You can also click **Recheck** to check the permissions again.

Figure 3-2 Prechecking permissions of Oracle database



NOTE

If any item fails to be checked, the failure cause and modification suggestions are displayed. After the modification is complete, click **Recheck**.

Oracle as the source database type:

- If the permission check for **DBMS_METADATA**, **Dynamic View** or **Schema Object Count Check** fails, the next step cannot be performed.
- If **Check Result** is **Alarm**, some objects could not be collected because of insufficient permissions, but the evaluation project can still be created successfully.
- If the check result of **DBMS_METADATA SQL Formatting Parameters** is **Alarm**, the evaluation project can be successfully created, but the collected SQL format may be incorrect. As a result, the evaluation and conversion fail.

MySQL or GoldenDB as the source database type: The check result of **show_rountine** can be **Alarm** and the check results of remaining check items must be **Success**. Otherwise, you cannot go to the next step.

Microsoft SQL Server as the source database type: All check item results must be **Success**, or you cannot go to the next step.

Step 9 After all check items are passed, click **Next** to go to the **Evaluation Scope Selection** page.

Figure 3-3 Selecting evaluation scope

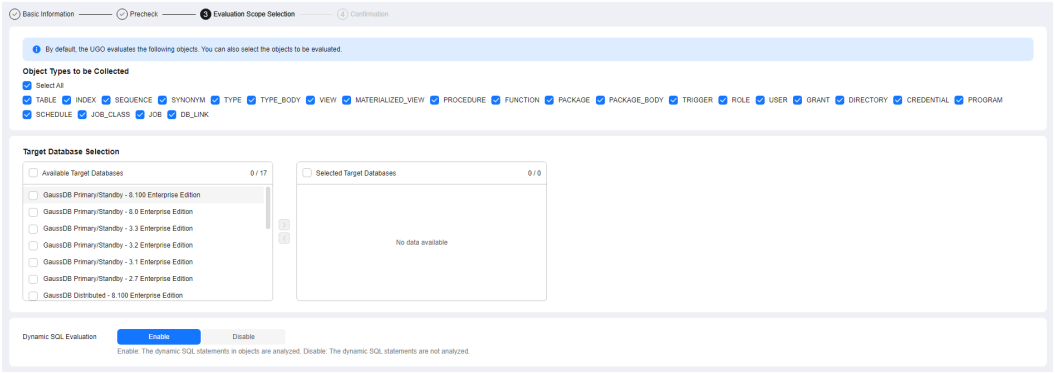


Table 3-2 Parameter description

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 as required. **NOTE** If the source database type is MySQL and its version is earlier than 8.0, there are no ROLE objects in the source database. UGO does not collect ROLE objects. If the source database type is GoldenDB, there are no ROLE objects in the source database. UGO does not collect ROLE objects.
Target Database Selection	Select your required target databases. To select all target databases, click  . The target databases that you did not select will not be evaluated.

Parameter	Description
Dynamic SQL Evaluation	**Enable**: The dynamic SQL statements in objects are analyzed. **Disable**: The dynamic SQL statements are not analyzed. Currently, UGO only identifies dynamic SQL statements and does not perform any processing.
Schemas to be Collected	(Optional) Manually select schemas to be collected and click  . You can also select all schemas. If there are many schemas, you can search for them by schema name. The names and number of selected schemas are displayed on the right list. **NOTICE** • If there are multiple schemas with the same name (case-insensitive), select one of them. • Oracle Lightweight Jobs are collected as part of PROGRAM object type.

NOTE

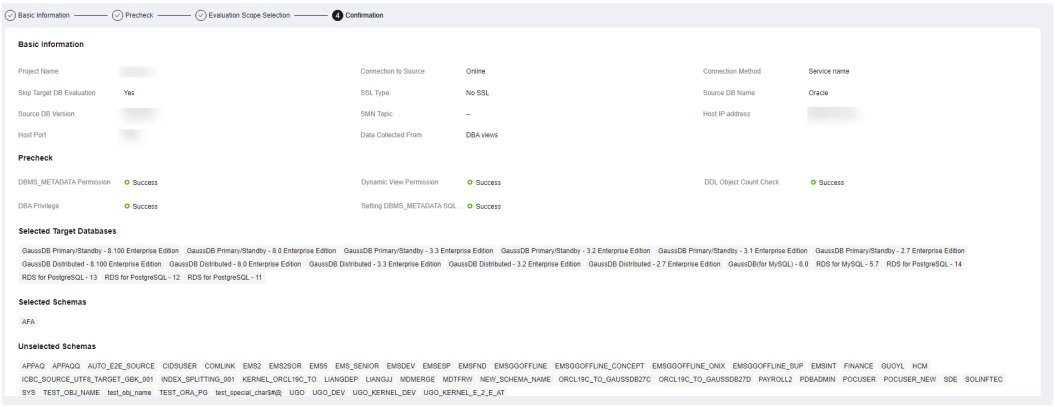
- Only the database objects are collected within the user permission scope, that is, within the selected schemas.
- After you select object types to be collected, UGO will evaluate their compatibility with the target object types and then migrate them.
- All collected data is stored in the source database 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 UGO, the data is deleted.
- Dynamic SQL evaluation is available only for Oracle databases.

Step 10 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.
- If the source database type is GoldenDB, the database configuration and instance quantity are not displayed.

If Microsoft SQL Server is the source database type, the following information is not displayed: database OS, connection string, database time zone, database configuration, and database memory.

Figure 3-4 Confirming information (Oracle as the source database type)

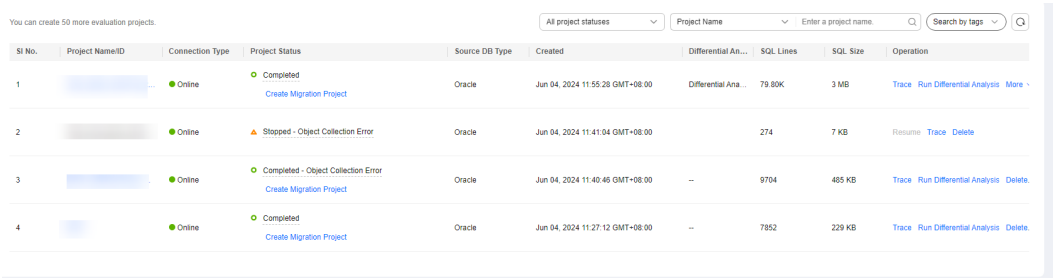


Step 11 Verify the settings and click **Create**. A message is displayed, indicating that the project is created.

Step 12 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 **Project Status** column. You can stop a project that is being evaluated or resume a stopped project.

Figure 3-5 Viewing the created project



NOTE

- You can create up to 10 evaluation projects.
- Before **Project Status** of an evaluation project becomes **In progress. Confirm Target DB Pending**, you can stop and continue the creation of the project. When **Project Status** becomes **In progress. Confirm Target DB Pending**, you can **confirm a target database** or re-evaluate objects as needed. However, if the source database type is GoldenDB, re-evaluation is not supported.
- The evaluation time varies depending on the number of objects selected.
- After the evaluation is complete, you can click the project name to view its details. For details, see **Viewing Project Details**.
- 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.

----End

3.4 Step 2: Confirm the Target Database

This section describes how to confirm the target database.

NOTICE

The source database syntax is complex and flexible, so the workload evaluation and object evaluation statistics are for reference only.

Prerequisites

The source database is successfully evaluated.

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 Locate the project whose **Project Status** is **In progress. Confirm Target DB Pending**, and click the project name or click **Confirm Target DB Pending**.

Step 4 On the displayed page, select your desired target database and click **Confirm DB Selection**.

Step 5 Click **Confirm**.

Step 6 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 remain the current page.

----End

NOTE

- After you confirm the target database, **Confirm DB Selection** and **Re-Evaluate** buttons are unavailable. The confirmed target database cannot be modified. Exercise caution when you select a target database.
- After you confirm the target database, **Project Status** changes to **Completed. Create Migration Project**.

4 Migration Project

4.1 Overview

In a migration project, you select the evaluation task to be migrated and ensure that UGO can connect to the target database. Based on migration risk reports generated by UGO, you configure a migration solution. Then, UGO converts the SQL statements of the source database to those of the target database. Finally, the converted SQL statements are verified and applied in the target database. UGO helps you migrate heterogeneous databases easily and quickly.

4.2 Step 1: Create a Migration Project

Scenarios

This section describes how to create a migration project based on an evaluation project of the source database to migrate the objects from the source database to the target database.

Suggestions

You are advised to use a database in a non-production environment as the target database.

Constraints

- System databases are maintained by the database itself and no creations can be performed on them. The MySQL system databases include **performance_schema**, **information_schema**, **mysql**, and **sys**. The GoldenDB system databases include **information_schema**, **mysql**, **performance_schema**, and **sys**. The PostgreSQL system databases include **postgres**.
- If the name of an object on the source database exceeds 63 bytes, the object name will be truncated after the object is migrated to the target database GaussDB.

- If you use a system database to create a migration project, the permission check may fail.
- Each user can create up to 10 migration projects.
- You need to select the target database to which the source database objects are to be migrated, and enter the target database information.
- Each migration project corresponds to an evaluation project. You can create multiple migration projects based on an evaluation project.

Prerequisites

- You have permissions to create a migration project in the UGO console. To obtain permissions, see **Permission Management**.
- There is at least one evaluation project whose **Evaluation Status** is **Completed. Create Migration Project**.
- The target database to be connected is normal and has no arrears or suspension.
- The target database user must have the permission to create, delete, and modify databases objects, such as schemas, tables, programs, indexes, users, functions, and views. For details, see **Viewing the Permission Check Report**.

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 Project** page, enter the required information. For details, see **Table 4-1**.

Figure 4-1 Creating a migration project

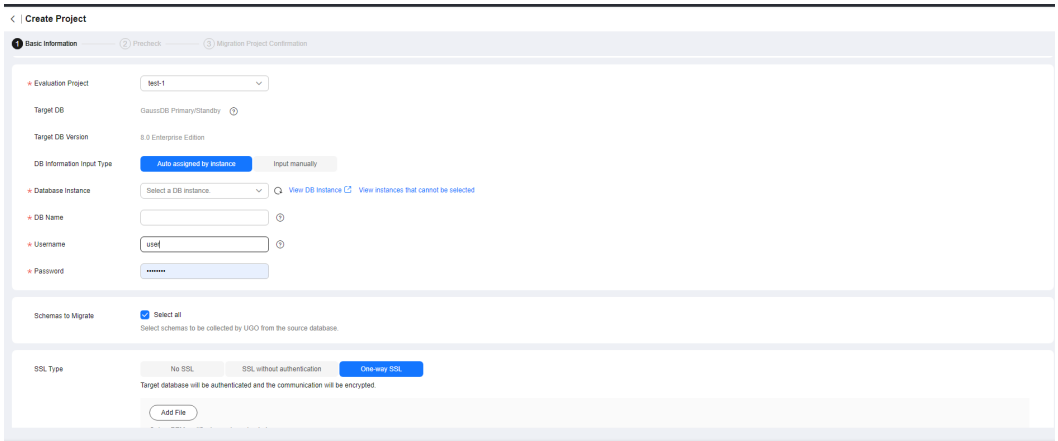


Table 4-1 Parameter description

Parameter	Description
Project Name	The project name must be unique. The name is unique. It can contain 5 to 50 characters and must start with a letter and end with a digit or letter. Only letters (case-insensitive), digits, 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 Operation** 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. **Notification scenario:** When the account is frozen or unfrozen, SMN can be used to send notifications.
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 *Enterprise Management User Guide*.
Permissions Check	• By default, **Skip Permission Check** is not selected. – If the target database is not GaussDB and the permission check is skipped, the generated permission check report will have no content. – If the target database is GaussDB, If you do not select **Skip Permission Check**, you need to modify the items that failed to pass the check. After all check items are passed, the **Next** button on the **Precheck** page is available. If you select **Skip Permission Check**, the results of the failed check items change to **Warning**. The **Next** button on the **Precheck** page is available. **NOTE** To create objects in the target database, you must have certain database permissions, such as those needed for creating tables and functions. If you skip the permission check, the system does not check whether you have these permissions. The migration may fail due to lack of permissions when SQL statements are converted on the target database.

Parameter	Description
Evaluation Project	Select an evaluation project from the drop-down list. • **Target DB**: The confirmed target database type is displayed. Each tenant can connect to a maximum of five target databases at the same time. • **Target DB Version**: The confirmed target database version is displayed. • **DB Information Input Type** **NOTE** When the target database is GaussDB Primary/Standby 3.1 Enterprise Edition, select **Input manually** .
Database Instance	Select an instance. • **Database Instance**: Select a DB instance of the target database. If no DB instance is available, create one on the console. **View DB Instance**: Click **View DB Instance** to go to the instance list page of the target database and view instance information. **View instances that cannot be selected**: Click **View instances that cannot be selected**. A dialog box is displayed, showing the unavailable instance names and reasons. • **DB Name**: Enter the database name based on the selected target DB instance. The name contains up to 50 characters. **NOTE** If the target database type is GaussDB, you are advised to select a GaussDB database that is compatible with the source database. • **Username**: Enter the username of the target database. It is recommended that the user has administrator. • **Password**: Enter the password of the target database.

Parameter	Description
Hostname and IP Address	When **DB Information Input Type** is set to **Input manually** • **Network Type**: An elastic IP address (EIP) is used to connect to the source database. If the target database network is restricted by the IP address whitelist, add the EIP to the target database network whitelist to ensure that UGO can connect to the target database. EIP in CN South-Guangzhou: 124.71.59.255 EIP in AP-Singapore: 110.238.109.54 EIP in LA-Santiago: 159.138.116.198 • Enter the host name or host IP address based on the selected host type. • **Host IP Address**: Enter the IP address of the target database host. If the target database is GaussDB Primary/Standby, 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 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. • **Hostname**: Enter the host name of the target database. • You can enter multiple hostnames and use commas (,) to separate them. All hostnames can contain up to 1,024 characters. • Format of a hostname: – example.com – {part1}.{part2}.{part3} • A hostname can consist of multiple parts and each part is separated by periods(.). A hostname can contain up to 253 characters. • Each {part}: 1. Can contain 1 to 127 characters. 2. Can contain lowercase characters, uppercase characters, numbers, and hyphens (-). 3. Must start with a lowercase character, uppercase character, or number.

Parameter	Description
	4. Cannot end with a digit ranging from 0 to 9 or a hyphen (-). • **Host Port**: Enter the port of the target database. • **DB Name**: Enter the database name. The name contains up to 50 characters. • **Username**: Enter the username of the target database. It is recommended that the user has administrator. • **Password**: Enter the password of the target database.
Schemas to Migrate	• Select **Select all**: Select schemas to be collected by UGO from the source database. • Deselect **Select all**: whether to reselect the schemas selected in the evaluation project. By default, **Select all** is selected.
(Optional) SSL Type	• **No SSL**: SSL is disabled and there may be potential security risks. • **SSL without authentication**: Transmission will be encrypted without authentication. • **One-way SSL**: The target database will be authenticated and transmission will be encrypted. – **Upload a SQL file**: Click **Add File**. On the displayed page, select **All Files (*.*)** for the file type, select the root certificate of the target database in JKS format, and upload it. – **Trust Store Password**: Enter the password of the trust store used to access the certificate. **NOTE** • If you select **One-way SSL**, enter the correct uploaded file and entered password, which are private information of users. If the target database type is GaussDB or PostgreSQL, upload a PEM root certificate file. No password is required. • Secure Socket Layer (SSL) is an encryption-based Internet security protocol for establishing an encrypted link between a server and a client. It provides privacy, authentication, and integrity to Internet communications.
(Optional) Tags	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***. Enter a key and a value, and click **Add**. A maximum of 10 tags can be added. For details, see **Managing Tags**.

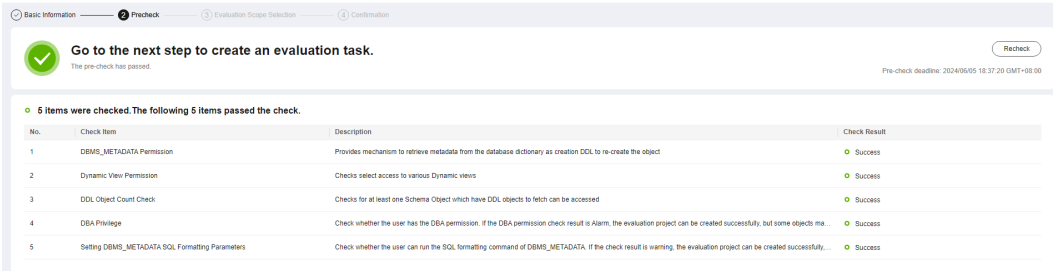
Step 5 Click **Test Connection**.

- If the connection test is successful, the **Next** button is available.

- If the connection test fails, an error message is displayed.

Step 6 Click **Next** to go to the **Precheck** page.

Figure 4-2 Performing a pre-check



- Compatibility mode check: If the source database is Oracle, MySQL, GoldenDB, or Postgres and target database is GaussDB, the system checks the GaussDB compatibility mode. If the selected compatibility mode is different from that of the source database, the system notifies you of risks. This check result does not affect subsequent operations.

  Table 4-2 Compatibility

No.	Compatibility
1	Oracle, MySQL, or Postgres as the source database and GaussDB as the target database: If the compatibility mode does not match, a compatibility message is displayed.
2	GoldenDB as the source database and GaussDB (MySQL compatibility mode) as the target database: If the compatibility mode does not match, a compatibility message is displayed.
3	GaussDB not as the target database: The compatibility check is not be performed.
4	Oracle, GoldenDB, MySQL, or Postgres not as the source database and GaussDB as the target database: The compatibility check is successful and a compatibility message is displayed.

- Character set check: The system checks the character sets of the source and target databases. This check result does not affect subsequent operations. **Table 4-3** and **Table 4-5** describe the character set compatibility.

  Table 4-3 Character set compatibility between Oracle and GaussDB

Source Database	Target Database	Compatibility Result
SQL_ASCII	SQL_ASCII	Success

Source Database	Target Database	Compatibility Result
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF8	Alarm
	UTF32	Alarm
	Other character sets	Alarm
US7ASCII	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF8	Alarm
	UTF32	Alarm
	Other character sets	Alarm
ISO-8859-1	SQL_ASCII	Alarm
	ISO-8859-1	Success
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF8	Alarm
	UTF32	Alarm
	Other character sets	Alarm
LATIN1	SQL_ASCII	Alarm

Source Database	Target Database	Compatibility Result
	ISO-8859-1	Alarm
	LATIN1	Success
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF8	Alarm
	UTF32	Alarm
	Other character sets	Alarm
GB2312	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Success
	GBK	Success
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
ZHS16GBK	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Success
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
GBK	SQL_ASCII	Alarm

Source Database	Target Database	Compatibility Result
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Success
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
ZHS32GB18030	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
GB18030	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
AL16UTF16	SQL_ASCII	Alarm

Source Database	Target Database	Compatibility Result
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
UTF16	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
AL32UTF8	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
UTF8	SQL_ASCII	Alarm

Source Database	Target Database	Compatibility Result
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
UTF32	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
Other character sets	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF8	Alarm
	UTF32	Alarm
	Other character sets	Alarm

Table 4-4 Character set compatibility between MySQL and GaussDB

Source Database	Target Database	Compatibility Result
ISO-8859-1/LATIN1	SQL_ASCII	Alarm
	ISO-8859-1	Success
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF8	Alarm
	UTF32	Alarm
	Other character sets	Alarm
GB2312	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Success
	GBK	Success
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
GBK	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Success
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success

Source Database	Target Database	Compatibility Result
	Other character sets	Alarm
GB18030	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
UTF16	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
UTF8	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success

Source Database	Target Database	Compatibility Result
	Other character sets	Alarm
UTF32	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
ascii	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF8	Alarm
	UTF32	Alarm
	Other character sets	Alarm
utf8mb3	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Success
	UTF16	Success
	UTF8	Success
	UTF32	Success

Source Database	Target Database	Compatibility Result
	Other character sets	Alarm
utf8mb4	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
UTF16LE	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF8	Success
	UTF32	Success
	Other character sets	Alarm
Other character sets	SQL_ASCII	Alarm
	ISO-8859-1	Alarm
	LATIN1	Alarm
	GB2312	Alarm
	GBK	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF8	Alarm
	UTF32	Alarm

Source Database	Target Database	Compatibility Result
	Other character sets	Alarm

Table 4-5 Character set compatibility between Oracle and MySQL

Source Database	Target Database	Compatibility Result
SQL_ASCII	ASCII	Success
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF16LE	Alarm
	UTF8	Alarm
	UTF32	Alarm
	UTF8MB4	Alarm
	Other character sets	Alarm
US7ASCII	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF16LE	Alarm
	UTF8	Alarm
	UTF32	Alarm
	UTF8MB4	Alarm
	Other character sets	Alarm
ISO-8859-1	ASCII	Alarm

Source Database	Target Database	Compatibility Result
	LATIN1/ISO-8859-1	Success
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF16LE	Alarm
	UTF8	Alarm
	UTF32	Alarm
	UTF8MB4	Alarm
	Other character sets	Alarm
LATIN1	ASCII	Alarm
	LATIN1/ISO-8859-1	Success
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Alarm
	UTF16LE	Alarm
	UTF8	Alarm
	UTF32	Alarm
	UTF8MB4	Alarm
	Other character sets	Alarm
GB2312	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Success
	GBK	Success
	UTF8MB3	Success
	GB18030	Success
	UTF16	Success

Source Database	Target Database	Compatibility Result
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
ZHS16GBK	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Success
	UTF8MB3	Success
	GB18030	Success
	UTF16	Success
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
GBK	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Success
	UTF8MB3	Success
	GB18030	Success
	UTF16	Success
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
ZHS32GB18030	ASCII	Alarm

Source Database	Target Database	Compatibility Result
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Success
	UTF8MB3	Success
	GB18030	Success
	UTF16	Success
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
GB18030	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Success
	UTF16	Success
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
AL16UTF16	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Success

Source Database	Target Database	Compatibility Result
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
UTF16	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
AL32UTF8	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
UTF8	ASCII	Alarm

Source Database	Target Database	Compatibility Result
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
UTF32	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Success
	UTF16LE	Success
	UTF8	Success
	UTF32	Success
	UTF8MB4	Success
	Other character sets	Alarm
Other character sets	ASCII	Alarm
	LATIN1/ISO-8859-1	Alarm
	GB2312	Alarm
	GBK	Alarm
	UTF8MB3	Alarm
	GB18030	Alarm
	UTF16	Alarm

Source Database	Target Database	Compatibility Result
	UTF16LE	Alarm
	UTF8	Alarm
	UTF32	Alarm
	UTF8MB4	Alarm

NOTE

Character set compatibility result:

- **Alarm**: The character sets of the source and target databases are incompatible.
- **Success**: The character sets of the source and target databases are compatible.

- Separation of permissions: If the target database type is GaussDB, separation of permissions will be checked. After separation of permissions is enabled, the system administrator (or the user with SYSADMIN permissions) does not have the **CREATEROLE** capability (of the security administrator) or **AUDITADMIN** capability (of the audit administrator). This means that the system administrator cannot create roles and users, and view and maintain database audit logs. After separation of permissions is enabled, a user with SYSADMIN permissions cannot migrate USER, ROLE, and GRANT.

  NOTE

  - This check item is displayed only when the target database type is GaussDB, separation of permissions is enabled, and the migration is performed by a user with SYSADMIN permissions.
  - After separation of permissions is enabled, if a user with SYSADMIN permissions still has the security administrator (CREATEROLE) permissions and audit administrator permissions, this means that permission model is switched repeatedly. If you need to switch model from non-separation of permissions to separation of permissions, review the permissions of existing users and tailor some permissions as needed.

- sysadmin permissions: This check item is only displayed when the target database type is GaussDB, separation of permissions is disabled, the migration user is SYSADMIN. The check result must be **Success**.
- Schema creation permissions: This check item is only displayed when the target database is GaussDB and the migration user is not SYSADMIN. It is used to check whether the migration user has the permissions to create schemas in the target database. Database objects must be created in schemas.

  GRANT CREATE ON DATABASE *<db_name>* **TO** *<user>***;**

  NOTE

  When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user is used to grant permissions.

  This check item is mandatory.

- User and role creation and modification permissions: This check item is only displayed when the target database is GaussDB, the migration user is not

SYSADMIN, and USER, ROLE, and GRANT objects are migrated. It is used to check whether the migration user has the permissions to create or modify users and roles in the target DB instance.

ALTER USER *<user>* **WITH CREATEROLE;**

NOTE

When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user is used to grant permissions.

This check item is mandatory.

- Public schema creation permissions: This check item is only displayed when the target database is GaussDB and the migration user is a common user or SYSADMIN (used when separation of permission is enabled). The check item involves complex permissions, such permission combination.

  In GaussDB 2.7 or earlier, CREATE permissions on public schemas are required to create objects such as tables, views, indexes, sequences, packages, types, and triggers.

  In GaussDB 3.1 or later, the user SYSADMIN (used when separation of permission is enabled) must have the CREATE permissions on public schemas to create objects such as tables, views, indexes, sequences, packages, types, and triggers.

  In GaussDB 3.1 or later, a common user must have the CREATE permissions on public schemas and the ANY permissions of objects, to create objects such as tables, views, indexes, sequences, packages, types, and triggers.

  In separation of permissions, only initial users have the permissions to create functions, stored procedures, and synonyms on public schemas.

  In non-separation of permissions, initial and sysadmin users have the permissions to create functions, stored procedures, and synonyms on public schemas.

  CREATE permissions: **GRANT CREATE ON SCHEMA public TO** *<user>***;**

  ANY permissions:

  GRANT CREATE ANY TABLE TO *<user>;*//Users can create tables or views in public and user schemas.

  GRANT CREATE ANY SEQUENCE TO *<user>***;**//Users can create sequences in public and user schemas.

  GRANT CREATE ANY INDEX TO *<user>***;**//Users can create indexes in public and user schemas.

  GRANT CREATE ANY PACKAGE TO *<user>***;**//Users can create packages in public and user schemas.

  GRANT CREATE ANY TYPE TO *<user>***;**//Users can create types in public and user schemas.

  GRANT CREATE ANY TRIGGER TO *<user>***;**//Users can create triggers in public and user schemas.

NOTE

- A DB instance contains multiple databases. Each database has its own public schema. Permission assignment must be performed in the corresponding database.
- When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user is used to grant permissions.
- This check item is not mandatory. Based on the GaussDB permission design, the check result is always **Warning**.

- Existing schema check permissions: This check item is only displayed when the target database is GaussDB and the migration user is a common user or SYSADMIN (used when separation of permission is enabled).

  It is used to check whether the migration user has the permissions to grant the owner of the existing schemas to the migration user.

  GRANT *<schema_owner>* **TO** *<user>*

  NOTE

  When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user or schema owner is used to grant permissions.

  If the migration user does not have sufficient permissions, the schema owner cannot be queried.

- GRANT tablespace permissions: This check item is only displayed when the target database is GaussDB, the migration user is not SYSADMIN, and GRANT objects are migrated.

  Statements:

  GRANT *<privilege>* **ON TABLESPACE** *<tablespace_name>* **TO** *<user>***;**

  GRANT *<privilege>* **ON TABLESPACE** *<tablespace_name>* **TO** *<user>* **WITH GRANT OPTION;**

  If **WITH GRANT OPTION** is specified, a grantee can grant this permission to others.

  Permissions include CREATE, ALTER, DROP, COMMENT, CREATE WITH GRANT OPTION, ALTER WITH GRANT OPTION, DROP WITH GRANT OPTION and COMMENT WITH GRANT OPTION.

  NOTE

  When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user is used to grant permissions.

- GRANT database permissions: This check item is only displayed when the target database is GaussDB, the migration user is not SYSADMIN, and GRANT objects are migrated.

  Statements:

  GRANT *<privilege>* **ON DATABASE** *<db_name>* **TO** *<user>***;**

  GRANT <privilege> ON DATABASE <db_name> TO <user> WITH GRANT OPTION;

  If **WITH GRANT OPTION** is specified, a grantee can grant this permission to others.

  Permissions include CREATE, CONNECT, TEMPORARY, ALTER, DROP, COMMENT, CREATE WITH GRANT OPTION, CONNECT WITH GRANT OPTION,

ALTER WITH GRANT OPTION, TEMPORARY WITH GRANT OPTION, DROP WITH GRANT OPTION and COMMENT WITH GRANT OPTION.

NOTE

When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user is used to grant permissions.

- GRANT ANY permissions: This check item is only displayed when the target database is GaussDB, the migration user is not SYSADMIN, and GRANT objects are migrated. It checks whether the migration user can grant the ANY permissions to other users in the target database.

  GRANT *<privilege>* **TO** *<user>* **WITH ADMIN OPTION;**

  If **WITH ADMIN OPTION** is specified, the granted user can grant the permission to other roles or users.

  Permissions include CREATE ANY TABLE, ALTER ANY TABLE, DROP ANY TABLE, SELECT ANY TABLE, UPDATE ANY TABLE, INSERT ANY TABLE, DELETE ANY TABLE, CREATE ANY SEQUENCE, ALTER ANY SEQUENCE, DROP ANY SEQUENCE, SELECT ANY SEQUENCE, CREATE ANY INDEX, ALTER ANY INDEX, DROP ANY INDEX, CREATE ANY FUNCTION, EXECUTE ANY FUNCTION, CREATE ANY PACKAGE, EXECUTE ANY PACKAGE, CREATE ANY TYPE, ALTER ANY TYPE, DROP ANY TYPE, CREATE ANY SYNONYM, DROP ANY SYNONYM, CREATE ANY TRIGGER, ALTER ANY TRIGGER and DROP ANY TRIGGER.

  NOTE

  A DB instance contains multiple databases. The ANY permissions are bound to databases. You need to grant the ANY permissions in the corresponding database.

  When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user is used to grant permissions.

- GRANT pg_catalog Schema permissions: This check item is only displayed when the target database is GaussDB, the migration user is not SYSADMIN, and GRANT objects are migrated. It checks whether the migration user can grant the permissions to create database connections in the target database to other users.

  GRANT *<privilege>* **TO** *<user>* **WITH ADMIN OPTION;**

  NOTE

  A DB instance contains multiple databases. Each database has its own pg_catalog schema. Permission assignment must be performed in the corresponding database.

  When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user is used to grant permissions.

- GRANT database link permissions: This check item is only displayed when the target database is GaussDB, the migration user is not SYSADMIN, and GRANT objects are migrated. It checks whether the migration user can grant the permissions to create database connections in the target database to other users.

  GRANT CREATE PUBLIC DATABASE LINK TO *<user>* WITH GRANT OPTION;

NOTE

A DB instance contains multiple databases. You need to grant permissions in the corresponding database.

When separation of permissions is enabled, initial user is used to grant permissions. When separation of permissions is disabled, SYSADMIN user is used to grant permissions.

- GRANT role and user permissions: This check item is only displayed when the target database is GaussDB, the migration user is not SYSADMIN, and GRANT objects are migrated. If the check result is **Alarm**, check whether the migration user has the permissions to grant or modify other users' permissions.

  NOTE

  User SYSADMIN created after separation of permissions is disabled to perform migration tasks.

- GUC parameter check for the target database: This check item is only displayed when the target database version is GaussDB 3.1 or later and the source database version is Oracle, Microsoft SQL Server, DB2 for LUW or MySQL. Check whether the GUC parameters are configured. For details about the check items, see **Table 4-6**.

  NOTE

  - The GUC parameter check is performed based on the target database version you selected during evaluation project creation, instead of the target database version that is actually connected.
  - If the target database is GaussDB Primary/Standby (M-compatibility), GUC parameter check is not supported.

Table 4-6 Target database GUC parameter check items

Source DB Type	Target DB Version	Check Item
DB2 for LUW	GaussDB 3.1 Primary/ Standby Enterprise Edition	behavior_compat_options, sql_beta_feature, a_format_version, a_format_dev_version
	GaussDB 8.1 Distributed 3.1 Enterprise Edition	behavior_compat_options, sql_beta_feature, a_format_version, a_format_dev_version
	GaussDB Primary/ Standby 3.2 Enterprise Edition	behavior_compat_options, plsql_compile_check_options, sql_beta_feature, a_format_version, a_format_dev_version

Source DB Type	Target DB Version	Check Item
	GaussDB Distributed 3.2 Enterprise Edition	behavior_compat_options, sql_beta_feature, a_format_version, a_format_dev_version
	GaussDB Primary/ Standby 3.3 Enterprise Edition	behavior_compat_options, plsql_compile_check_options, sql_beta_feature, a_format_version, a_format_dev_version
	GaussDB Distributed 3.3 Enterprise Edition	behavior_compat_options, sql_beta_feature, a_format_version, a_format_dev_version
	GaussDB Primary/ Standby 8.0 Enterprise Edition	behavior_compat_options, plsql_compile_check_options, sql_beta_feature, a_format_version, a_format_dev_version
	GaussDB Distributed 8.0 Enterprise Edition	behavior_compat_options, sql_beta_feature, a_format_version, a_format_dev_version
	GaussDB Primary/ Standby 8.1 Enterprise Edition	behavior_compat_options, plsql_compile_check_options, sql_beta_feature, a_format_version, a_format_dev_version
	GaussDB Distributed 8.1 Enterprise Edition	behavior_compat_options, sql_beta_feature, a_format_version, a_format_dev_version
MySQL	GaussDB 3.1 Primary/ Standby Enterprise Edition	-
	GaussDB Primary/ Standby 3.2 Enterprise Edition	b_format_behavior_compat_options

Source DB Type	Target DB Version	Check Item
	GaussDB Distributed 3.2 Enterprise Edition	-
	GaussDB Primary/ Standby 3.3 Enterprise Edition	b_format_behavior_compat_options
	GaussDB Primary/ Standby 8.0 Enterprise Edition	b_format_version,b_format_dev_version
	GaussDB Distributed 8.0 Enterprise Edition	b_format_version,b_format_dev_version
	GaussDB Primary/ Standby 8.1 Enterprise Edition	b_format_version,b_format_dev_version
	GaussDB Distributed 8.1 Enterprise Edition	b_format_version,b_format_dev_version
Oracle	GaussDB 3.1 Primary/ Standby Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB 8.1 Distributed 3.1 Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Primary/ Standby 3.2 Enterprise Edition	behavior_compat_options,plsql_compile_check_options,sql_beta_feature,a_format_version,a_format_dev_version

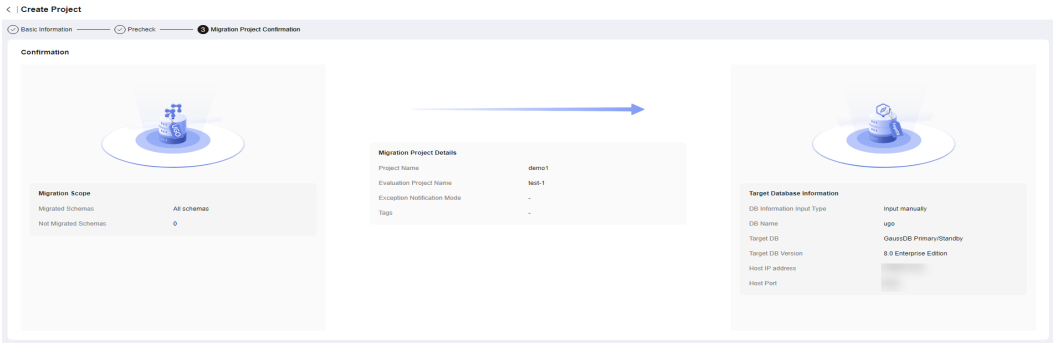
Source DB Type	Target DB Version	Check Item
	GaussDB Distributed 3.2 Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Primary/ Standby 3.3 Enterprise Edition	behavior_compat_options,plsql_compile_check_options,sql_beta_feature,IntervalStyle,a_format_version,a_format_dev_version
	GaussDB Distributed 3.3 Enterprise Edition	behavior_compat_options,sql_beta_feature,IntervalStyle,a_format_version,a_format_dev_version
	GaussDB Primary/ Standby 8.0 Enterprise Edition	behavior_compat_options,plsql_compile_check_options,sql_beta_feature,IntervalStyle,a_format_version,a_format_dev_version
	GaussDB Distributed 8.0 Enterprise Edition	behavior_compat_options,sql_beta_feature,IntervalStyle,a_format_version,a_format_dev_version
	GaussDB Primary/ Standby 8.1 Enterprise Edition	behavior_compat_options,plsql_compile_check_options,sql_beta_feature,IntervalStyle,a_format_version,a_format_dev_version
	GaussDB Distributed 8.1 Enterprise Edition	behavior_compat_options,sql_beta_feature,IntervalStyle,a_format_version,a_format_dev_version
Microsoft SQL Server	GaussDB 3.1 Primary/ Standby Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB 8.1 Distributed 3.1 Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version

Source DB Type	Target DB Version	Check Item
	GaussDB Primary/ Standby 3.2 Enterprise Edition	behavior_compat_options,plsql_compile_check_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Distributed 3.2 Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Primary/ Standby 3.3 Enterprise Edition	behavior_compat_options,plsql_compile_check_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Distributed 3.3 Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Primary/ Standby 8.0 Enterprise Edition	behavior_compat_options,plsql_compile_check_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Distributed 8.0 Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Primary/ Standby 8.1 Enterprise Edition	behavior_compat_options,plsql_compile_check_options,sql_beta_feature,a_format_version,a_format_dev_version
	GaussDB Distributed 8.1 Enterprise Edition	behavior_compat_options,sql_beta_feature,a_format_version,a_format_dev_version

- Database write permissions: If the target database is GaussDB, the system checks whether the data node is normal. If the target database is read-only, this check item is displayed. The check result is not passed.

Step 7 Click **Next** in the lower right corner.

Figure 4-3 Confirming information



The database migration scope, migration project details, and target database information are displayed.

- The migration scope includes schemas that were migrated and not migrated.
- Migration project details include the project name, evaluation project name, enterprise project, exception notification mode, and tags.
- Target database information.
  - If **DB Information Input Type** is **Input manually**, the following information is displayed: database information input mode, database name, target database name, target database version, host IP address, and host port.
  - If **DB Information Input Type** is **Auto assigned by instance**, the following information is displayed: database information input mode, database name, target database name, target database version, and database instance.

Step 8 Confirm the information and click **Create**.

NOTE

You can create up to 10 migration projects.

Step 9 After the creation is successful, click **OK** to go to the **Object Migration** page.

NOTE

After a migration project is created, the permission check is automatically triggered. If the permission check is successful, the project status is **Ready**.

If the permission check fails, the project status is **Not ready**. You can manually perform **a permission check**.

----End

4.3 Step 2: Select Objects for Migration

Constraints

- If the source database type is Oracle and the target database type is distributed GaussDB, you can select a distributed mapping for TABLE objects.

- If the source database type is GoldenDB or MySQL (its version is earlier than 8.0), there are no ROLE objects in the source database. UGO does not collect ROLE objects and the number of ROLE objects displayed is 0.
- If you want to migrate data, you are advised to skip the trigger migration temporarily. Otherwise, triggers may change data during the migration. After the data migration is complete, migrate the triggers.

Prerequisites

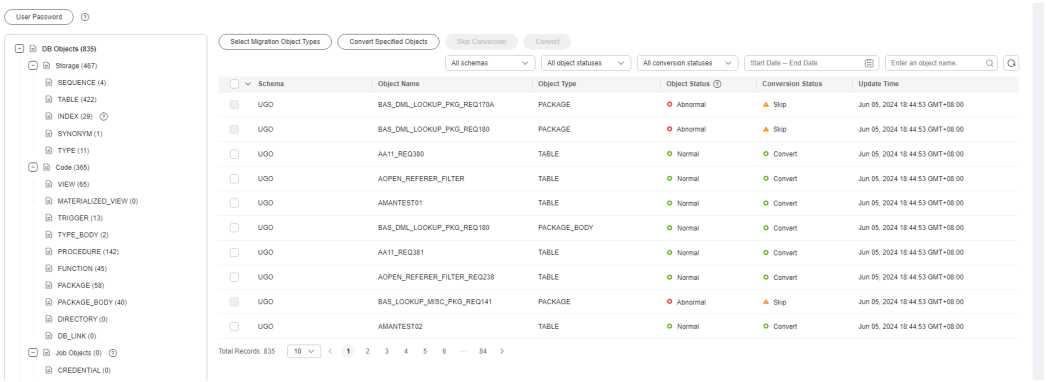
- The project status is **Ready**, the target database information is correct, and the connection test is successful.
- The target database user must have the permission to create, delete, and modify databases objects, such as schemas, tables, programs, indexes, users, functions, and views. For details, see **Viewing the Permission Check Report**.

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 about the object information, see **Viewing Evaluation Project Details**.

Figure 4-4 Configuring a conversion plan



- You can search for objects by date or object name, or filter objects by schema, object status, or conversion status.

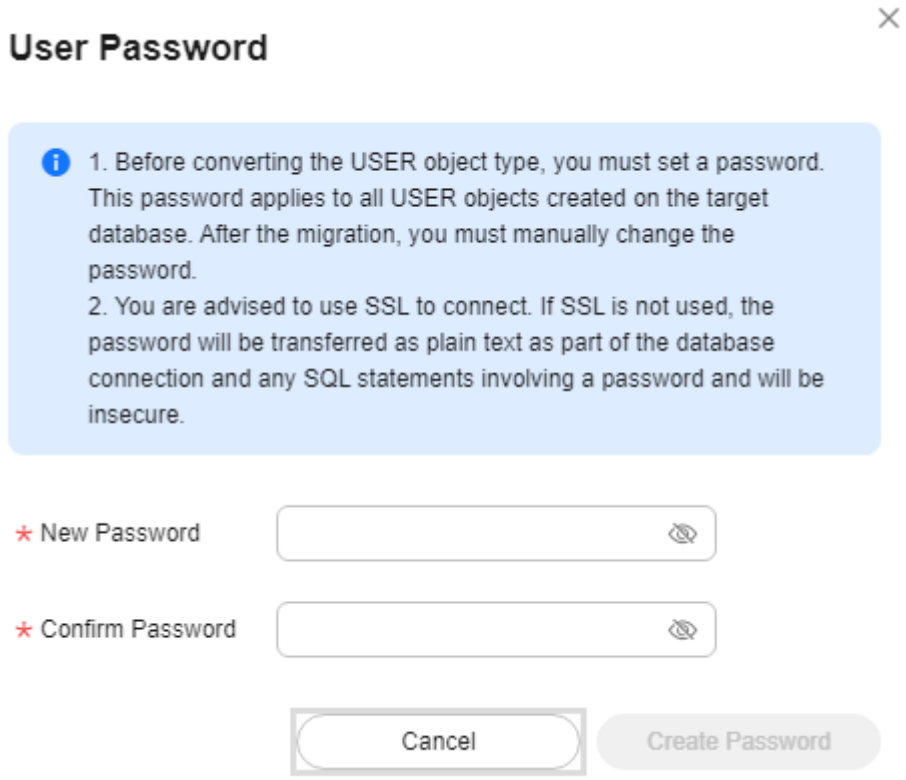
Step 2 Select object types to be migrated.

- To select the type of objects to be migrated, click **Select Migration Object Types**. At least one object type must be selected for migration.
- If **Object Status** of objects is **Abnormal**, their **Conversion Status** is **Skip**. It means that abnormal objects cannot be converted.
- If your migration task is created in versions later than 2.23.T1031, the object status cannot be **Duplicate**. Objects that should be in the **Duplicate** state are now in the **Normal** state and they are converted and migrated by default. However, objects in historical migration tasks remain in the **Duplicate** state after the version upgrade. The **Duplicate** option is no longer displayed in the **Object Status** drop-down list for new and historical migration tasks.

- Oracle as the source database type and GaussDB as the target database type: If you locate an object whose type is USER and click **Skip Conversion**, the following message is displayed, indicating that after USER migration is ignored, you need to locate the **Support for connection** feature in the **Conversion Config** page, and set sysadmin as the user to create and execute the GaussDB script. Otherwise, the migration may fail.

Step 3 (Optional) Click **User Password** in the upper left corner and configure the password.

Figure 4-5 Configuring 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**.
- You are advised to use SSL connection. If non-SSL connection is used, 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.

----End

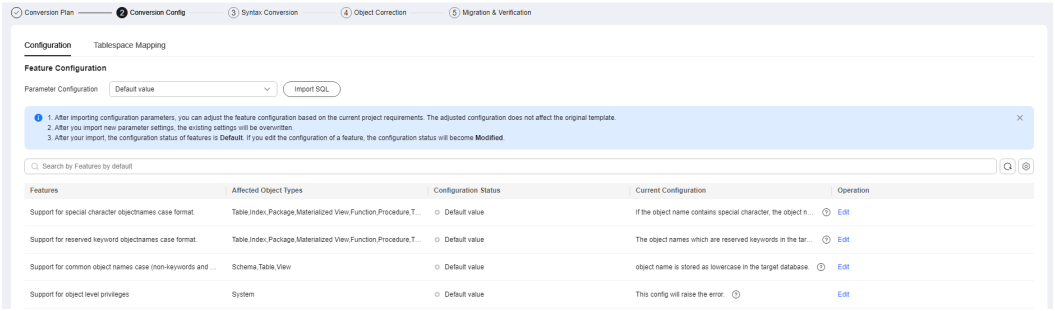
4.4 Step 3: Edit Object Conversion Configurations and Tablespace Mappings

Procedure

Step 1 Click **Next** to go to the **Conversion Config** page.

View the detailed configurations. For details about edit conversion configurations and table mappings, see **Editing Conversion Configurations**.

Figure 4-6 Editing conversion configurations



----End

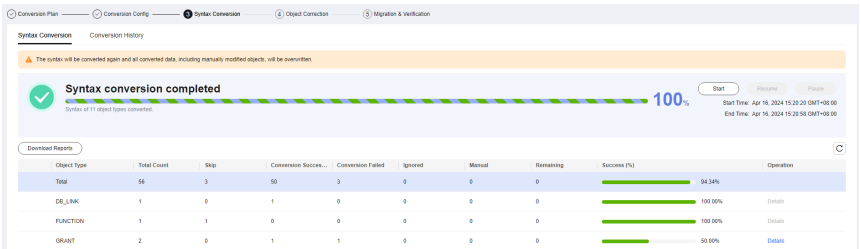
4.5 Step 4: Start Syntax Conversion and Correct Objects

Procedure

Step 1 Click **Next** to go to the **Syntax Conversion** page.

Step 2 Click **Start** to start the migration. 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 4-7 Syntax conversion



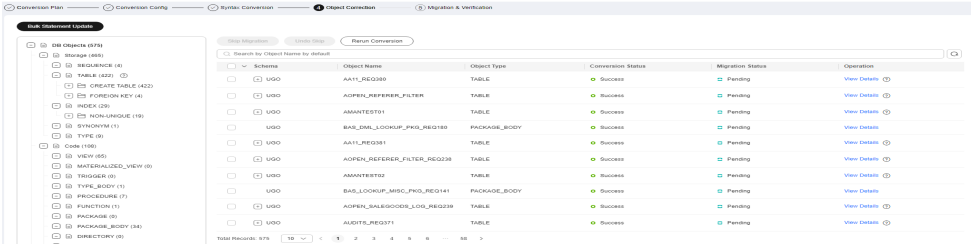
- The progress is displayed in a progress bar and as a percentage.
- Click **Download Reports**, locate the required report, and click **Download** to download the report to the local PC for analysis.
  - **Conversion Error Report**: This report contains details about objects that could not be converted 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. However, there are function differences after the conversion.
  - **Anonymized Conversion Risk Report**: This report contains details about objects, in anonymized form, that were converted with risks based the selected configuration options. However, there are function differences after the conversion.
  - **Converted SQL Parsing Failure Report**: This report contains the details about objects that could not be parsed using the conversion script for the target database syntax.
  - **Anonymous Converted SQL Parsing Failure Report**: This report contains details about objects, in anonymized form, that could not be parsed using the conversion script for the target database syntax.
- 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.
- For details about how to view the migration history, see **Viewing Syntax Conversion History**.
- Click **Pause** to pause the process. You can query the migration tasks that have been executed in the conversion history.
- Click **Start** to start a new conversion process. Click **Resume** to continue the conversion process.

WARNING

Starting a syntax conversion will overwrite any data that was previously converted, including manually modified objects. Exercise caution when performing this operation. To start the conversion, click **Start** and in the displayed dialog box, click **OK**.

Step 3 Click **Next** to go to the **Object Correction** page.

Figure 4-8 Object correction



- You can search for objects by name, schema, migration status, or conversion status.
- For the source database Oracle, MySQL, or PostgreSQL, you can locate an object whose **Conversion Status** is **Failed** and click its object name to view the object migration success rate.

  If **Migration Supported** is set to **No**, you can query other failed objects that also contain the same syntax point in **Apply Filter** column.
- Locate objects and click **Skip Migration** to ignore the objects that you do not want to verify.
- 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 2**.

  If the source database type is MySQL, after table objects are converted, the subobjects **CREATE TABLE** and **CREATE INDEX** are displayed. If the source database type is Oracle, after table objects are converted, the subobjects **CREATE TABLE** and **FOREIGN_KEY** are displayed. You can migrate or modify the subobjects separately. The number of subobjects is not counted in the total number of converted objects.
  - Not all subobjects are displayed. To view the status and content of all subobjects, click the parent object to view details.
  - Subobject splitting depends on the conversion function of UGO. If an error occurs during script parsing or conversion, the conversion cannot be performed and objects are not split.
- If the conversion status of a parent object is **Success**, the conversion status of its all subobjects is **Success**. If the conversion status of a parent object is **Failed**, the conversion status of at least one its subobject is **Failed**. If the conversion status of a parent object is **Manual**, the conversion status of at least one its subobject is **Manual**. If the migration status of a parent object is **Success** after the migration, the migration status of its subobjects is **Success** or **Ignore**. If the migration status of a parent object is **Failed** after the migration, the migration status of at least one its subobject is **Failed**. If the migration status of all subobjects is **Ignore**, the migration status of the parent object is **Ignore**.

NOTICE

When **Migration Status** of objects is **Success** and you re-run the conversion, an error message indicating that the objects already exist in the target database will be displayed. To avoid this problem, manually delete these objects from the target database. If you select a new DB object type, all objects of the selected type are converted again.

- Batch update: You can click **Bulk Statement Update** to search for and modify objects with the similar issues in batches. For details, see **Updating Statements in Batches**.
- Locate an object and click **Modify** or **View Details** in the **Operation** column.

- Click **View Details** to view the conversion or migration error information, source database, target database, and comparison information of the object. You can also copy the detailed code.
- Click **Modify** to manually modify objects one by one. For details, see **Modifying Objects**.

NOTE

- Select the schema that can be ignored and click **Skip Migration**. Their **Migration Status** changes to **Ignore**. You can also click **Undo Skip** to roll back to the original status.
- If there are features commented out in the migration, that may affect functions. You can click **View Details** to see the details.

----End

4.6 Step 5: Start Project Migration and View Migration Result

Procedure

Step 1 Click **Next** to go to the **Migration & Verification** page.

NOTICE

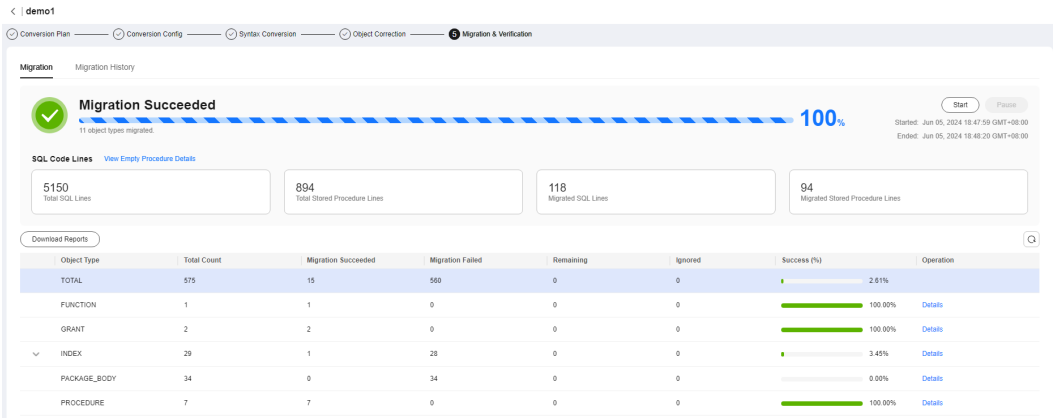
Correct all failed conversion items in the **Object Correction** page before starting migration verification.

Step 2 Click **Start** to start the verification. The migration progress is displayed in a progress bar and as a percentage.

After the migration verification is complete, the total number of SQL lines, the number of successfully migrated SQL lines, and the number of failed SQL lines are displayed.

For details about how to view the migration history, **Viewing Migration History**.

Figure 4-9 Verification



- If a message is displayed, indicating that there were errors or risks during the migration, the system will automatically stop the verification process.
- After the migration is stopped, click **Start** to continue the migration.
- **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. If the source database type is MySQL, data related to subobjects is not included in the migration report.
  - **Migration/Verification Report**: This report includes a summary of object statuses during migration and verification.
  - **Migration/Verification Error Report**: This report includes failure details, such as statuses, migrated statements, and error details for each object.
  - **Anonymized Migration/Verification Error Report**: This report consists of failure details, such as statuses, migrated statements, and error details for each object, but the original statement and migrated 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 3 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.

----End

5 SQL Audit

5.1 Overview

SQL audit helps customers detect potential code issues in SQL standardization, design rationality, and performance in the development phase to prevent bad SQL statements from flowing into the production environment. UGO provides more than 200 audit rules for various objects such as DML, DDL, and PL/SQL. These rules can be flexibly combined to form templates based on service requirements. GaussDB and MySQL audit templates are supported. The SQL statements to be audited can be obtained by writing a single statement, uploading code files in batch (automatic SQL extraction), and directly connecting to a database.

5.2 Step 1: Create a Data Source

Scenarios

You can create a data source for database audit and other data sources scenarios.

Prerequisites

The data source to be created must be connected successfully.

Procedure

Step 1 Log in to the UGO console.

Step 2 In the navigation pane, choose **Data Source Management**.

Step 3 Click **Create Data Source** in the upper right corner.

Step 4 Configure parameters as needed.

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

Figure 5-1 Creating a data source

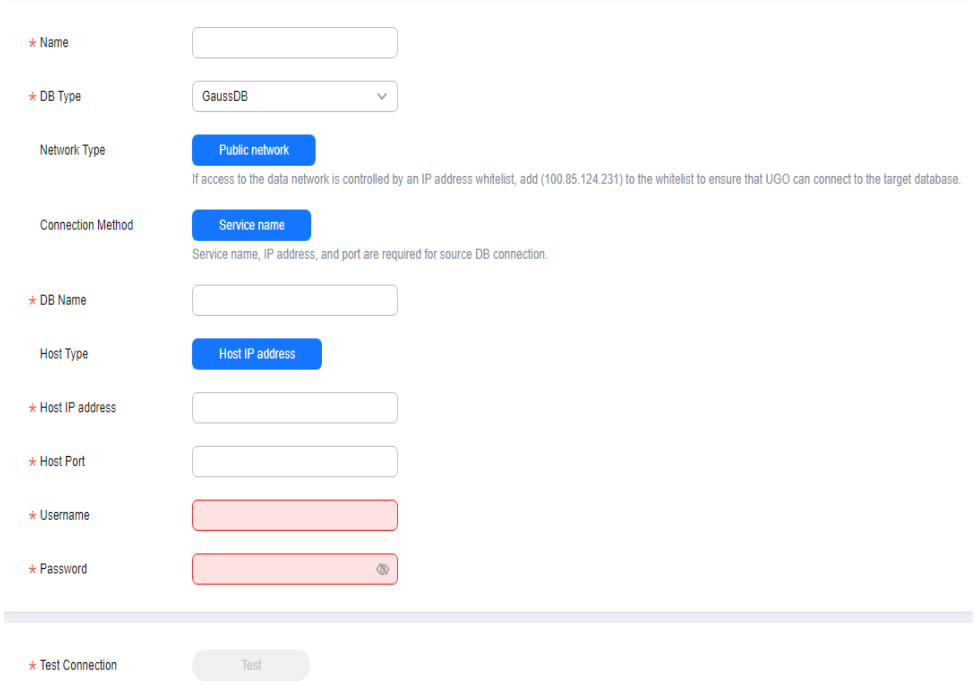


Table 5-1 Parameter description

Parameter	Description
Name	Name displayed in the data source management list. The name must be unique and contain 5 to 50 characters. Only letters, digits, underscores (_), and hyphens (-) are allowed. The name must start with a letter and end with a digit or letter.
DB Type	Type of the source database to be configured. Currently, only GaussDB and MySQL are available.
Network Type	**Public Network**: An elastic IP address (EIP) is used to connect to the source database.
Connection Method	Only the server name can be used for connection.
DB Name	Name of the database to be managed.
Host Type	Only the host IP address can be used.
Host IP Address	Enter the IP address of the host. The IP address can be an IPv4 or IPv6 address. **NOTE** When **DB Type** is set to **MySQL**, IPv6 address can be used.
Host Port	Port of the database to be managed.

Parameter	Description
Username	Username of the database to be managed. The username can contain 2 to 128 characters and must start with a letter, digit, period (.), underscore (_), or hyphen (-). Only letters, digits, periods (.), underscores (_), hyphens (-), dollar signs ($), and number signs (#) are allowed. The username can be enclosed in single quotation marks (').
Password	Password of the database to be managed. The password can contain a maximum of 50 characters.

Step 5 Click **Test**. If the test is successful, **Connected** is displayed, and the **Create** button in the lower right corner is available.

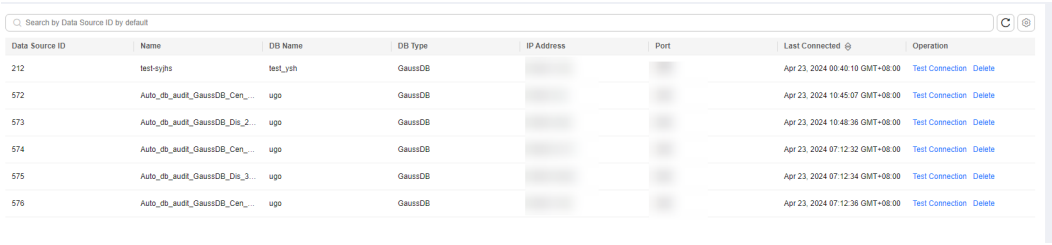
If the test failed dut to network faults or insufficient permissions, an error is displayed. You cannot create a data source.

Step 6 Click **Create**. A displayed dialog box is displayed, indicating the data source was created.

Step 7 Click **Close** to go to the **Data Source Management** page. View the data source you created in the list.

You can search for a data source by data source ID, data source name, database name, database type, IP address, or port.

Figure 5-2 Viewing a data source



----End

5.3 Step 2: Create a Rule Template

Scenarios

You can create rule templates based on different service scenarios.

Constraints

All rules in the templates are meet requirements.

Up to 10 rule templates can be created.

Procedure

Step 1 Log in to the UGO console.

Step 2 In the navigation pane on the left, choose **SQL Audit** > **Rules**. The **Templates** page is displayed by default.

Step 3 Click **Create Template**. In the displayed dialog box, configure parameters as needed.

Figure 5-3 Creating a rule template

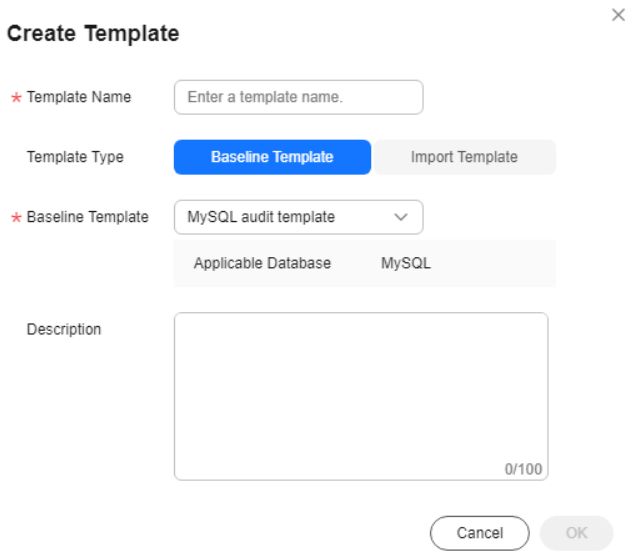


Table 5-2 Parameter description

Parameter	Description
Template Name	The template name cannot be same as the existing template names. The name must contain 5 to 50 characters, start with a letter, digit, and end with a digit or letter. Only letters (case-insensitive), digits, underscores (_), and hyphens (-) are allowed.
Template Type	You can select **Baseline Template** or **Import Template**.

Parameter	Description
Import Template	You need to import a local file template. The file requirements are as follows: 1. The file size cannot exceed 1 MB. 2. The file name can contain only digits, letters, underscores (_), and hyphens (-). 3. The file name cannot exceed 240 characters. 4. The columns must be arranged according to the sequence in the template. It is recommended that the data format of each column be TEXT to prevent deviation during data conversion. 5. No blank line is allowed between two rows of data, or the data after the blank line will be invalid. The number of rows cannot exceed 200, or the data after 200th row will be invalid. **NOTICE** You are advised to modify rules in the exported Excel file template. For details, see **Table 5-3**. You are advised to modify the value of the **Threshold**, **Risk Level**, and **Suggestion** columns.
Baseline Template	You can select any existing template as the baseline template. The applicable database cannot be changed.
Description	(Optional) The description contains up to 100 characters.

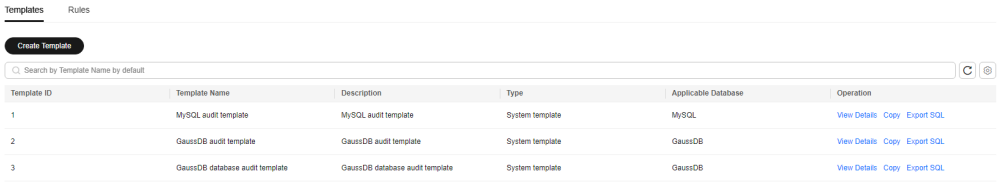
Table 5-3 Example of file template

Rule Name	Rule ID	Description	Applicable Database	Audited Object Type	Severity	Threshold	Suggestion
Do not use too many combined index fields.	10055	The number of composite index fields cannot exceed the threshold. Audit object: CREATE INDEX	gauss	sqltext	Major	5	-

Step 4 Click **OK**.

The created template is displayed in the template list. Up to 10 custom templates can be created.

Figure 5-4 Viewing the template you created



----End

5.4 Step 1: Create an Audit Task

5.4.1 Creating a Text Audit Task

Scenarios

You want to check whether a SQL statement complies with specifications and affects performance.

To use this function, submit an application.

Constraints

- Only four types of nested statements can be audited. For details, see **Table 5-4**.
- When WITH AS is used, only SELECT subqueries are supported.
- The table name and table alias must be different. The aliases of different tables must be different.
- Tables in views cannot be audited.
- Database system tables and views cannot be audited.
- You cannot use # or /* in entered statements, table structures, and thresholds.

Table 5-4 Supported nested statements

No.	SQL Statement
1	select id, (select *subquery*) as name from table;
2	select id from table where id in (select *subquery*);
3	select * from table1, (select ...);
4	with e as (select ...) select * from e;

Rule Constraints

- In all UPDATE and DELETE rules, multiple tables cannot be updated and deleted at a time.

- Multi-table UPDATE and DELETE operations are audited based on the rule **Do not use a single UPDATE or DELETE statement to update or delete multiple tables**.
- For rules **In the PL/pgSQL, use uppercase for keywords and lowercase for non-keywords** and **In SQL statements, use uppercase for keywords and lowercase for non-keywords**, you are not advised to use object names as non-reserved keywords, or the audit may be inaccurate. For example: in **SELECT ID FROM name**, **name** is a non-reserved keyword.
- When object names are used as filtering criteria for querying system views, use lowercase object names. For details about supported system views, see **Table 5-5**.
- Exercise caution when deleting database objects and data. For supported SQL Syntax, see **Table 5-6**.

Table 5-5 View audit

View Name	Schema	Object Name Column
adm_arguments	pg_catalog, sys	owner, object_name, package_name, argument_name
adm_audit_object	pg_catalog, sys	username, owner, obj_name, action_name
adm_audit_session	pg_catalog, sys	username, action_name
adm_audit_statement	pg_catalog, sys	username, obj_name, action_name
adm_col_comments	pg_catalog, sys	owner, table_name, column_name, schema
adm_col_privs	pg_catalog, sys	grantor, owner, grantee, table_schema, table_name, column_name, privilege
adm_coll_types	pg_catalog, sys	owner, type_name, elem_type_mod, elem_type_owner, elem_type_name
adm_constraints	pg_catalog, sys	owner, constraint_name, table_name, index_owner, index_name
adm_indexes	pg_catalog, sys	owner, index_name, table_name, table_owner, tablespace_name
adm_ind_columns	pg_catalog, sys	index_owner, index_name, table_name, table_owner, column_name

View Name	Schema	Object Name Column
adm_objects	pg_catalog, sys	owner, object_name, subobject_name
adm_procedures	pg_catalog, sys	owner, object_name, procedure_name, impltypeowner, impltypename
adm_role_privs	pg_catalog, sys	grantee, granted_role
adm_tab_col_statistics	pg_catalog, sys	owner, table_name, column_name, schema
adm_roles	pg_catalog, sys	role
adm_source	pg_catalog, sys	owner, name
adm_sys_privs	pg_catalog, sys	grantee, privilege
adm_tab_cols	pg_catalog, sys	owner, table_name, column_name, data_type_owner, schema, qualified_col_name
adm_tab_privs	pg_catalog, sys	grantee, owner, table_name, grantor, privilege
adm_tables	pg_catalog, sys	owner, table_name, tablespace_name
adm_tab_columns	pg_catalog, sys	owner, table_name, column_name, data_type_owner, schema
adm_tab_comments	pg_catalog, sys	owner, table_name, column_name, schema
adm_tab_statistics	pg_catalog, sys	owner, table_name
adm_triggers	pg_catalog, sys	owner, trigger_name, table_owner, table_name
adm_type_attrs	pg_catalog, sys	type_name, attr_name, attr_type_name, character_set_name
adm_types	pg_catalog, sys	owner, type_name
adm_users	pg_catalog, sys	username, default_tablespace, temporary_tablespace, default_collation
adm_views	pg_catalog, sys	owner, view_name

View Name	Schema	Object Name Column
db_all_tables	pg_catalog, sys	owner, table_name, tablespace_name
db_arguments	pg_catalog, sys	owner, object_name, package_name, argument_name
db_col_comments	pg_catalog, sys	owner, table_name, column_name, schema
db_col_privs	pg_catalog, sys	grantor, owner, grantee, table_schema, table_name, column_name, privilege
db_coll_types	pg_catalog, sys	owner, type_name, elem_type_mod, elem_type_owner, elem_type_name
db_constraints	pg_catalog, sys	owner, constraint_name, table_name, index_owner, index_name
db_indexes	pg_catalog, sys	owner, index_name, table_name, table_owner, tablespace_name
db_ind_columns	pg_catalog, sys	index_owner, index_name, table_name, table_owner, column_name
db_objects	pg_catalog, sys	owner, object_name, subobject_name
db_procedures	pg_catalog, sys	owner, object_name
db_tab_col_statistics	pg_catalog, sys	owner, table_name, column_name, schema
db_source	pg_catalog, sys	owner, name
db_tab_columns	pg_catalog, sys	owner, table_name, column_name, data_type_owner, schema
db_tab_comments	pg_catalog, sys	owner, table_name, schema
db_tables	pg_catalog, sys	owner, table_name, tablespace_name
db_triggers	pg_catalog, sys	trigger_name, table_owner, table_name
db_types	pg_catalog, sys	owner, type_name

View Name	Schema	Object Name Column
db_users	pg_catalog, sys	username
db_views	pg_catalog, sys	owner, view_name
dict	pg_catalog, sys	table_name
dictionary	pg_catalog, sys	table_name
my_col_comments	pg_catalog, sys	owner, table_name, column_name, schema
my_col_privs	pg_catalog, sys	grantor, owner, grantee, table_schema, table_name, column_name, privilege
my_coll_types	pg_catalog, sys	owner, type_name, elem_type_mod, elem_type_owner, elem_type_name
my_constraints	pg_catalog, sys	owner, constraint_name, table_name, index_owner, index_name
my_indexes	pg_catalog, sys	owner, index_name, table_name, table_owner, tablespace_name
my_ind_columns	pg_catalog, sys	index_owner, index_name, table_name, table_owner, column_name
my_objects	pg_catalog, sys	object_name, subobject_name
my_procedures	pg_catalog, sys	owner, object_name, procedure_name, impltypeowner, impltypename
my_role_privs	pg_catalog, sys	grantee, granted_role
my_tab_col_statistics	pg_catalog, sys	table_name, column_name, schema
my_source	pg_catalog, sys	owner, name
my_tab_columns	pg_catalog, sys	owner, table_name, column_name, data_type_owner, schema
my_tab_comments	pg_catalog, sys	owner, table_name, column_name, schema
my_tab_statistics	pg_catalog, sys	table_name

View Name	Schema	Object Name Column
my_tables	pg_catalog, sys	owner, table_name, tablespace_name
my_triggers	pg_catalog, sys	owner, trigger_name, table_owner, table_name
my_type_attrs	pg_catalog, sys	type_name, attr_name, attr_type_name, character_set_name
my_types	pg_catalog, sys	type_name
my_views	pg_catalog, sys	owner, view_name
pg_indexes	pg_catalog, sys	schemaname, tablename, indexname, tablespace
pg_roles	pg_catalog, sys	rolename
pg_tables	pg_catalog, sys	schemaname, tablename, tableowner, tablespace, tablecreator
pg_user	pg_catalog, sys	username, nodegroup
pg_views	pg_catalog, sys	schemaname, viewname, viewowner
column_privileges	information_schema, sys	grantor, grantee, table_catalog, table_schema, table_name, column_name
columns	information_schema, sys	table_catalog, table_schema, table_name, column_name
constraint_column_usage	information_schema, sys	table_catalog, table_schema, table_name, column_name, constraint_catalog, constraint_schema, constraint_name
constraint_table_usage	information_schema, sys	table_catalog, table_schema, table_name, constraint_catalog, constraint_schema, constraint_name
enabled_roles	information_schema, sys	role_name

View Name	Schema	Object Name Column
schemata	information_schema, sys	catalog_name, schema_name, schema_owner, default_character_set_catalog, default_character_set_schema, default_character_set_name
table_constraints	information_schema, sys	constraint_catalog, constraint_schema, constraint_name, table_catalog, table_schema, table_name
table_privileges	information_schema, sys	grantor, grantee, table_catalog, table_schema, table_name
tables	information_schema, sys	table_catalog, table_schema, table_name, self_referencing_column_name, user_defined_type_catalog, user_defined_type_schema, user_defined_type_name
triggers	information_schema, sys	trigger_catalog, trigger_schema, trigger_name, event_object_catalog, event_object_schema, event_object_table, action_reference_old_table, action_reference_new_table
usage_privileges	information_schema, sys	grantor, grantee, object_catalog, object_schema, object_name
views	information_schema, sys	table_catalog, table_schema, table_name

Table 5-6 SQL syntax that can be audited

DDL Type	SQL syntax
DROP	DROP TABLE, DROP TABLESPACE, DROP AGGREGATE, DROP AUDIT POLICY, DROP CAST, DROP DATABASE, DROP DATA SOURCE, DROP DIRECTORY, DROP EVENT, DROP FOREIGN TABLE, DROP GLOBAL CONFIGURATION, DROP GROUP, DROP MASKING POLICY, DROP MATERIALIZED VIEW, DROP MODEL, DROP OPERATOR, DROP OWNED, DROP PACKAGE, DROP PACKAGE BODY, DROP PROCEDURE, DROP RESOURCE LABEL, DROP RESOURCE POOL, DROP ROLE, DROP ROW LEVEL SECURITY POLICY, DROP RULE, DROP PUBLICATION, DROP SCHEMA, DROP SEQUENCE, DROP FUNCTION, DROP SERVER, DROP SUBSCRIPTION, DROP SYNONYM, DROP TEXT SEARCH CONFIGURATION, DROP TEXT SEARCH DICTIONARY, DROP TRIGGER, DROP TYPE, DROP USER, DROP USER MAPPING, DROP VIEW, DROP WEAK PASSWORD DICTIONARY
ALTER	ALTER DROP PARTITION, ALTER TRUNCATE PARTITION, ALTER DROP COLUMN, ALTER DROP CONSTRAINT, ALTER DROP FOREIGN TABLE, ALTER DROP AUDIT POLICY, ALTER DROP MASKING POLICY, ALTER DROP SERVER, ALTER DROP TEXT SEARCH CONFIGURATION, ALTER DROP USER MAPPING, ALTER DROP DATA SOURCE
TRUNCATE	TRUNCATE

Procedure

Step 1 Log in to the UGO console.

Step 2 In the navigation pane on the left, choose **SQL Audit** > **Statement Audit**. The **SQL Text** page is displayed by default.

Step 3 Configure parameters as needed and view that the **Submit** button is highlighted.

Figure 5-5 Audited Text

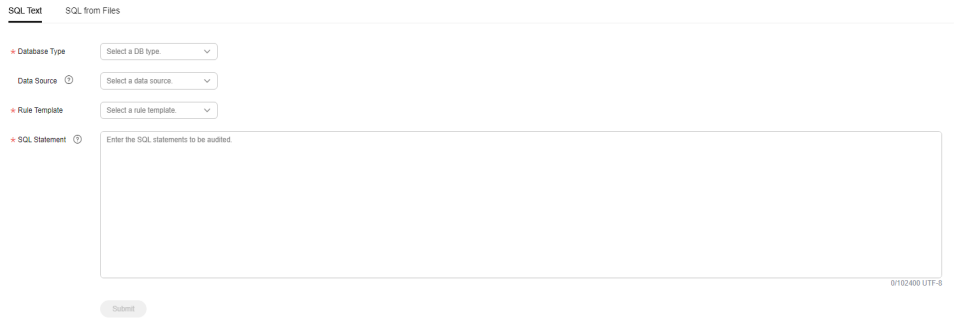
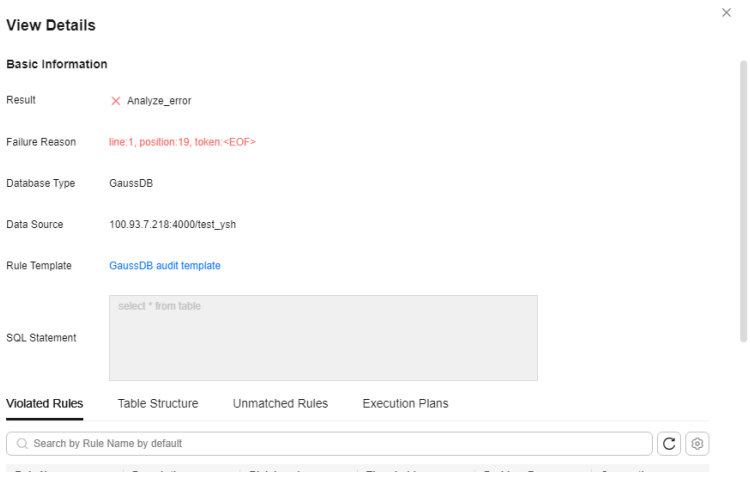


Table 5-7 Parameter description

Parameter	Description
Database Type	Select a database type. Currently, only GaussDB and MySQL are supported.
Data Source	Select a data source type. Currently, only GaussDB and MySQL data sources are supported. This parameter is optional. If no data source is provided, the audit rules that depend on the data source are skipped by default.
Schema	Select a schema. This parameter is optional and only available for GaussDB databases. • If the SQL statement contains a schema name, use the schema in the SQL statement. • If the SQL statement does not contain a schema name, the selected schema is used. • If the SQL statement does not contain a schema name and no schema is selected, use the public schema.
Rule Template	Select a template based on the selected database type. You can set the template information by referring to **Adding a Rule Template**.
SQL Statement	Enter the SQL statement to be audited. • You need to enter a single SQL statement only. Even if there are multiple statements, only the first statement is audited. • The SQL object name can contain only lowercase letters. If you enter an uppercase SQL object name, the system automatically converts it to lowercase letters.

Step 4 Click **Submit**. The **View Details** dialog box is displayed, and a corresponding record is generated in the **history** area

Figure 5-6 Viewing details



You can click the value next to **Rule Template** to go to the specific template information.

If the statement fails to be audited, the cause is displayed.

Failure causes (examples):

- **line:1, position:14, token:table**: indicates that the SQL statement contains the keyword **table**.
- **line:1, position:3, token:<EOF>**: indicates that the SQL statement is incomplete.

----End

5.4.2 Creating a File Audit Task

Scenarios

You want to check whether SQL statements in a file comply with specifications and affect performance.

Constraints

- Only four types of nested statements listed in **Table 5-4** are supported.
- The table name and table alias must be different. The aliases of different tables must be different.
- Tables in views cannot be audited.
- Database system tables and views cannot be audited.
- There is no **#** or **/*** in table structures, statements, and thresholds.
- You cannot click **Retry** when the file is being audited or after the audit is complete.
- If a system template is used, the audit results before and after a version upgrade will be inconsistent. You are advised to use a custom template.
- Up to 110 SQL tasks can be created and up to 10 SQL tasks can be executed concurrently in a given period.

Procedure

Step 1 Log in to the UGO console.

Step 2 In the navigation pane on the left, choose **SQL Audit** > **Statement Audit**. Click the **SQL from Files** tab.

Step 3 Click **Upload File**.

Figure 5-7 Upload a file

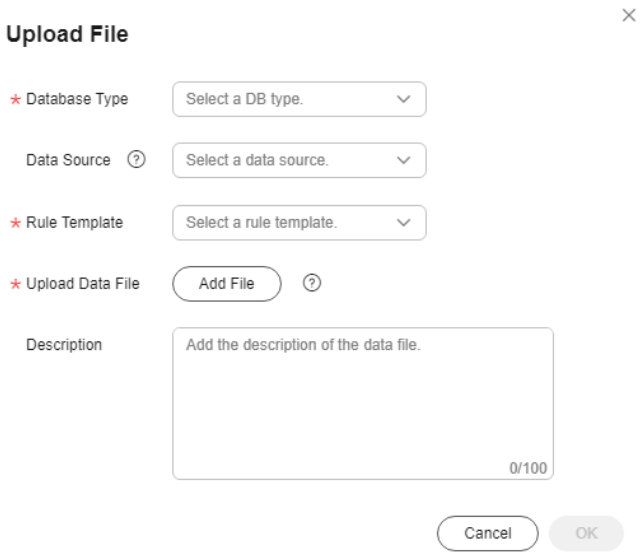


Table 5-8 Parameter description

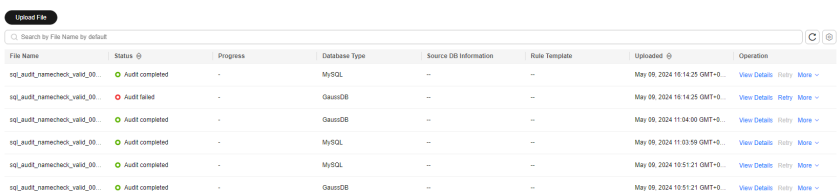
Parameter	Description
Database Type	Select a database type. Currently, only GaussDB and MySQL are supported.
Data Source	Select a data source type. Currently, only GaussDB and MySQL data sources are supported. This parameter is optional. If no data source is provided, the audit rules that depend on the data source are skipped by default.
Schema	Select a schema. This parameter is optional and only available for GaussDB databases. • If the SQL statement contains a schema name, use the schema in the SQL statement. • If the SQL statement does not contain a schema name, the selected schema is used. • If the SQL statement does not contain a schema name and no schema is selected, use the public schema.

Parameter	Description
Rule Template	Select a template based on the selected database type. You can set the template information by referring to **Adding a Rule Template**.
Upload Data File	Upload a SQL file that meets the requirements. Requirements for the file to be uploaded: • The SQL object name can contain only lowercase letters. If you enter an uppercase SQL object name, the system automatically converts it to lowercase letters. • The file can contain only simple SQL statements, such as INSERT, ALTER, DELETE, SELECT operations, and cannot contain stored procedures, functions, triggers, packages, or anonymous blocks, which is regarded as one SQL statement for audit. **NOTE** If there are both simple SQL statements and complex statements, all SQL statements in the entire file are audited as one SQL statement. • Only .zip, .xml, .sql, .java, and .json files can be uploaded. – The file name can contain only digits, letters, underscores (_), and hyphens (-). – Maximum file name length: 240 characters • Max. file size: 5 MB. • File types in a ZIP package: xml, sql, java, and json – Max.size per file: 10 MB – Max. files: 10,000 – The file name can contain only digits, letters, underscores (_), and hyphens (-). – Maximum file name length: 240 characters – Files to be uploaded cannot contain sensitive data such as binary files, passwords, and keys to ensure data security.
Description	(Optional) Enter the description of the file. The description contains up to 100 characters.

Step 4 Click **OK** and view the file task you created on the task list page.

During the creation of a file audit task, if the task is terminated due to UGO restart, you can click **Retry** to continue the task.

Figure 5-8 Viewing file audit task list



The status can be one of the following:

- **Pending**: The SQL audit task is to be scheduled.
- **Collecting objects**: SQL statements scanned in the file and DDL statements in the schema of a specified database.
- **Auditing SQL statements**: The file is being audited.
- **Audit completed**: The audit is complete only after all SQL statements in the file are audited.
- **Audit failed**: An exception occurred during the audit.

----End

5.4.3 Creating a Database Audit Task

Scenarios

You want to check whether database objects for audit meet specifications and affect performance

Prerequisites

A data source has been created and connected successfully.

Constraints

- The audited database objects can only be tables, views, sequences, indexes, functions, procedures, triggers, or packages.
- A maximum of 10,000 schemas can be audited at a time.
- During the database audit, do not delete database objects that are being audited, or audit results may be affected.
- If a system template is used, the audit results before and after a version upgrade will be inconsistent. You are advised to use a custom template.

Procedure

Step 1 Log in to the UGO console.

Step 2 In the navigation pane on the left, choose **SQL Audit** > **Database Audit**.

Step 3 Click **Create Audit Task**.

Figure 5-9 Creating an audit task

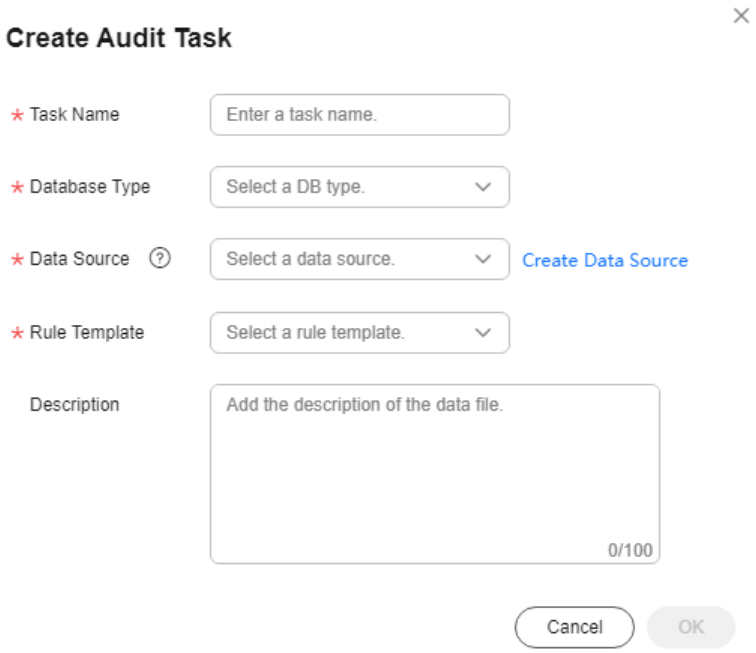
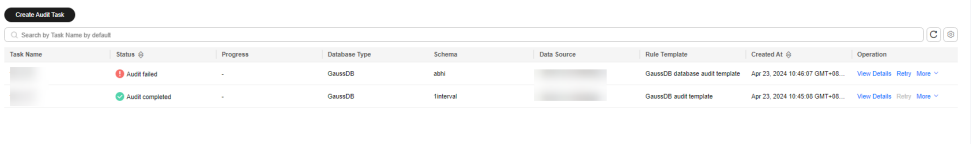


Table 5-9 Parameter description

Parameter	Description
Task Name	Enter a task name, which is mandatory. The name must contain 5 to 50 characters, start with a letter, and end with a digit or letter. Only letters (case-insensitive), digits, underscores (_) are allowed.
Database Type	Select a database type. Only the GaussDB database is supported. This parameter is mandatory.
Data Source	Select a data source. Currently, only GaussDB data sources are supported. This parameter is mandatory. If there is no available data source, click **Create Data Source**.
Schema	Select a schema. This parameter is optional and only available for GaussDB databases. • If this parameter is not specified, all schemas are audited by default. However, up to 10,000 schemas can be audited. • If the parameter is specified, you can select up to 10,000 schemas.
Rule Template	Select a system template or custom template. You can set the template information by referring to **Adding a Rule Template**.
Description	Add the description of the task. The description can contain up to 100 characters. This parameter is optional.

Step 4 Click **OK** and view the file task you created on the task list page.

Figure 5-10 Audit task list



The task status can be:

- **Pending**: The database audit task is to be scheduled.
- **Collecting objects**: SQL statements scanned in the database and DDL statements in the schema of a specified database.
- **Auditing SQL statements**: The database is being audited.
- **Audit completed**: The database audit is complete only after all database objects are audited.
- **Audit failed**: An exception occurred during the audit.

If the audit task is terminated due to UGO restart during the creation of the audit task, you can click **Retry**. If the audit task is terminated during the object collection phase, the system deletes the collected objects and connects to the database again after the retry. If the audit task is terminated during the object audit phase, the audit continues after the retry.

----End

6 Change History

Released On	Description
2024-04-30	Adjusted the UGO GUI and updated all screenshots in this document.
2024-03-30	• Allowed you to import and export rule templates in **Step 2: Create a Rule Template**. • Added the check on the GUC parameters for the target database in **Step 1: Create a Migration Project**.
2024-03-01	Added the audit object package in **Creating a Database Audit Task**.
2023-12-30	• Optimized the migration project procedure in **Migration Project**. • Added the constraint "Exercise caution when deleting database objects and data" in **Creating a Text Audit Task**.
2023-11-30	• Removed the Batch Status Update function, optimized the migration process, and updated the screenshot of the **Object Correction** page in **Step 4: Start Syntax Conversion and Correct Objects**. • Removed the constraint that if the source database type is MySQL, UGO collects only the character sets of the system database in **Step 1: Create a Migration Project**. • Migrated the common user permission check item to the pre-check phase during migration project creation in **Step 1: Create a Migration Project**.

Released On	Description
2023-10-30	• Added the migration from GoldenDB to primary/standby GaussDB 8.0 in **Step 1: Create an Evaluation Project**. To use it, you need to submit an application. • Added the migration from GoldenDB to primary/standby GaussDB 8.0 and optimized the migration process in **Step 1: Create a Migration Project**.
2023-08-30	• Added a pre-check for migration projects and optimized the migration process in **Step 1: Create a Migration Project**. • Added the migration from Oracle and MySQL to GaussDB 8.0 Enterprise Edition in **Step 1: Create an Evaluation Project**. To use it, you need to submit an application.
2023-07-30	• Added character set verification in **Step 1: Create a Migration Project**
2023-06-30	• Optimized the functions displayed in the **Operation** column in **Step 1: Create an Evaluation Project**. • Added compatibility mode check in **Migration Project**.
2023-05-30	• Updated some screenshots in **Step 1: Create an Evaluation Project**. • Updated the export icon in **Step 4: Start Syntax Conversion and Correct Objects**.
2023-04-30	• Added the migration from PostgreSQL 13, 14, and 15 to GaussDB 3.2 Enterprise Edition in **Step 1: Create an Evaluation Project**. To use it, you need to submit an application. • Added **Differential Analysis** and **Incremental Evaluation** items and deleted **Project Status** item in the project list in **Step 1: Create an Evaluation Project**. • Deleted **Dynamic SQL Evaluation with all Single Quotes**, **Dynamic SQL Lower Line Number**, and **Dynamic SQL Upper Line Number** fields in the **Select Assessment Scope page** in **Step 1: Create an Evaluation Project**. • Modified the alarm information during syntax conversion in **Step 4: Start Syntax Conversion and Correct Objects**.

Released On	Description
2023-03-30	• Updated the refresh button icon. • Added prerequisites for creating an evaluation project when the source database type is Oracle in **Step 1: Create an Evaluation Project**. • Added a note that when the source database type is MySQL, schema objects are not migrated by default in **Step 2: Select Objects for Migration**. • Added a note that statements can be updated in batches during object correction in **Step 4: Start Syntax Conversion and Correct Objects**.
2023-02-28	• Optimized the console and updated the GUI elements and screenshots. • Added the migration from Oracle to RDS for PostgreSQL 12, 13, and 14 in **Step 1: Create an Evaluation Project**. • Added the migration from PostgreSQL 11 and 12 to Primary/Standby GaussDB 3.1 Enterprise Edition in **Step 1: Create an Evaluation Project**. • Optimized the description of check items on the precheck page in **Step 1: Create an Evaluation Project**. • Optimized the password rules in **Step 2: Select Objects for Migration**.
2023-01-30	• Optimized the re-conversion process in **Step 4: Start Syntax Conversion and Correct Objects**. • Modified the check items when MySQL is used as the source database type in **Step 1: Create an Evaluation Project**.
2022-12-30	• Added the source database MySQL 5.6 in **Step 1: Create an Evaluation Project**. • Changed GaussDB 2.3 Enterprise Edition to GaussDB 2.7 Enterprise Edition in **Step 1: Create an Evaluation Project**. • Deleted the TPS, QPS, and table complexity displayed in the source database profile in **Step 1: Create an Evaluation Project**. • Added the type of the certificate to be uploaded for the target database GaussDB in **Step 1: Create a Migration Project**.

Released On	Description
2022-11-30	• Added the target database Primary/Standby GaussDB 3.1 Enterprise Edition and modified the screenshot in **Step 1: Create an Evaluation Project**. • Added such a description that when the target database is Primary/Standby GaussDB 3.1 Enterprise Edition, **DB Information Input Type** is set to **Manually Input** in **Step 1: Create a Migration Project**. • Added the description that **One Way SSL** is not suitable for the target database GaussDB in **Step 1: Create a Migration Project**.
2022-10-30	• Updated the pre-check items of the source database MySQL in **Step 1: Create an Evaluation Project**. • Added a notice that SQL object types are not collected for object evaluation in **Step 1: Create an Evaluation Project**. • Updated the description of conversion configurations in **Step 2: Select Objects for Migration**. • Allowed **Select Instance** for **DB Information Input Type** when the target database type is GaussDB in **Step 1: Create a Migration Project**.
2022-09-30	• Updated GaussDB versions, GUI elements and screenshots in **Step 1: Create an Evaluation Project**. • Updated the GUI elements and screenshots in **Step 1: Create a Migration Project**.
2022-08-30	• Added the description of MySQL and DB2 for LUW as source database types in **Step 1: Create an Evaluation Project**. • Updated the GUI elements in **Step 1: Create an Evaluation Project**. • Updated the GUI elements in **Step 1: Create a Migration Project**. • Updated **Summary Report** to **Migrate and Verify Report** in **Step 5: Start Project Migration and View Migration Result**.
2022-07-30	Added source database types and updated screenshots in **Step 1: Create an Evaluation Project**.

Released On	Description
2022-06-30	• Added **Source Database Preparation and Authorization Tips** in **Step 1: Create an Evaluation Project**. • Updated creation and pre-check pages in **Step 1: Create an Evaluation Project**. • Added user password usage restrictions and report description in **Step 1: Create a Migration Project**. • Updated GUI elements in **Step 4: Start Syntax Conversion and Correct Objects**.
2022-05-30	This issue is the first official release.