Data Admin Service

User Guide

Issue 01

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Contents

1 Service Overview

1.1 What Is Data Admin Service?

Data Admin Service (DAS) functions as a database client, allows you to synchronize and edit data and table structures, and provides intelligent SQL input prompts and other database development functions, without the need to install a local client.

1.2 Basic Concepts

Connection Address

An IP address, which is used for the DAS service to connect to databases.

Metadata Collection

DAS periodically collects the metadata of DB instance databases, tables, and fields and stores the collected data in the DAS database.

1.3 Advantages

DAS supports the management of MySQL DB instances. It provides visual GUI operations, making your database management easy and efficient.

Anytime, Anywhere

A DAS web console frees you from installing clients locally and supports access anytime, anywhere.

Kernel Source Code Optimization

The kernel is optimized and enhanced to support functions such as emergent database O&M and SQL explorer, to resolve O&M pain points.

Secure Operations

Built-in security mechanisms guarantee stability of your databases so you can worry less about security and stay focused on operations. For example, if a user executes a slow SQL statement, DAS automatically uses a timeout mechanism to protect databases against jitter caused by long execution time.

Robust Features

With DAS, a wide range of features are available for you to choose from, such as SQL statement diagnosis, scheduled SQL task execution, import and export of up to 1 GB of data, and cross-instance database table structure synchronization. DAS supports multiple types of databases like MySQL.

1.4 Permissions Management

If you need to assign different permissions to employees in your enterprise to access your DAS resources, Identity and Access Management (IAM) is a good choice for fine-grained permissions management. IAM provides identity authentication, permissions management, and access control, helping you secure access to your cloud resources.

With IAM, you can use your account to create IAM users for your employees, and assign permissions to the users to control their access to specific resource types. For example, some software developers in your enterprise need to use DAS but must not delete DAS resources or perform any high-risk operations. To achieve this result, you can create IAM users for the software developers and grant them only the permissions required for using DAS resources.

If your account does not need individual IAM users for permissions management, you may skip over this section.

IAM can be used free of charge. You pay only for the resources in your account.

DAS Permissions

By default, new IAM users do not have permissions assigned. You need to add a user to one or more groups, and attach permissions policies or roles to these groups. Users inherit permissions from the groups they belong to and can perform specified operations on cloud services.

DAS is a project-level service deployed in specific physical regions. To assign GaussDB NoSQL permissions to a user group, specify projects in specific regions where the permissions will take effect. If you select **All projects**, the permissions will be granted for the user group in all projects. When accessing DAS, you need to switch to a region where you have been authorized to use this service.

You can grant users permissions by using roles and policies.

- Roles: A type of coarse-grained authorization mechanism that defines permissions related to users responsibilities. This mechanism provides only a limited number of service-level roles for authorization. When using roles to grant permissions, you need to also assign other roles on which the permissions depend to take effect. However, roles are not ideal for fine-grained authorization and secure access control.

- Policies: A type of fine-grained authorization mechanism that defines permissions required to perform operations on specific cloud resources under certain conditions. This mechanism allows for more flexible policy-based authorization and meets secure access control requirements. For example, you can grant IAM users only the permissions for managing a certain type of database resources.

Table 1-1 lists all the system-defined roles and policies supported by DAS.

Table 1-1 DAS system permissions

Policy Name	Description	Type	Dependency
DAS Administrator	DAS administrator, who has full permissions of DAS	System-defined role	This role depends on the **Tenant Guest** role. The **DAS Administrator** and **Tenant Guest** roles must be assigned in the same project.
DAS FullAccess	Full permissions for DAS	System-defined policy	None

◻ **NOTE**

- DAS depends on other services to implement the management and O&M of databases.
- If you authorize IAM users in fine-grained mode and want to use DAS to manage DB instances, add the DAS FullAccess system policy during authorization.
- With DAS, IAM users can view and manage the DB instances configured in the corresponding services.

By default, users with fine-grained authorization have the permissions to view the database login list of Development Tool, delete database login information, and access Intelligent O&M on DAS. The instances viewed by these users are the same as those configured in the corresponding services.

Table 1-2 describes the common operations supported by each system-defined policy or role of DAS. Select the policy or role you need according to the following tables.

Table 1-2 Common operations supported by each system-defined policy or role of DAS

Operation	DAS Administrator	DAS FullAccess
Logging in to a database instance	Supported	Supported
Adding a login	Supported	Supported
Modifying a login	Supported	Supported

Operation	DAS Administrator	DAS FullAccess
Deleting a database login	Supported	Supported
Viewing the login list in Development Tool	Supported	Supported
Using Intelligent O&M functions	Supported	Supported

Table 1-3 Common DAS operations and supported actions

Operation	Action	Remarks
Logging in to a database instance	das:connections:login	Configure the permissions for other services to query instances based on the instance type. ● rds:instance:list; ● dds:instance:list; ● gaussdb:instance:list;
Obtaining the login information list	das:connections:list	Configure the permissions for other services to query instances based on the instance type. ● rds:instance:list; ● dds:instance:list; ● gaussdb:instance:list;
Adding a login	das:connections:create	Configure the permissions for other services to query instances based on the instance type. ● rds:instance:list; ● dds:instance:list; ● gaussdb:instance:list;
Modifying a database login	das:connections:modify	Configure the permissions for other services to query instances based on the instance type. ● rds:instance:list; ● dds:instance:list; ● gaussdb:instance:list;

Table 1-4 Others permissions DAS depends on

Policy Name	Description	Type	Dependency
Tenant Administrator	Operation permissions: ● All permissions on the account center, billing center, and resource center ● All permissions on all cloud resources owned by the account Configure the OBS policies globally.	System-defined role	None
OBS OperateAccess	Operation permissions: Users with this permission can view buckets, obtain basic bucket information, obtain bucket metadata, view objects, upload objects, download objects, delete objects, and obtain object ACLs. Configure the OBS policies globally.	System-defined policy	None

DAS import and export features require the usage of OBS buckets. You need to obtain required OBS policies before using these features.

● Typically, it is recommended that you configure the Tenant Administrator policy that allows you to perform operations on OBS resources.

● If you do not want employees to have the high-risk permission for creating and deleting buckets, you can configure the OBS OperateAccess policy for the employees so that they can use the DAS features but cannot create and delete OBS buckets.

1.5 Billing

DAS allows you to pay only for what you use. There is no minimum fee.

Billing Items

If you are using Enterprise Charge Approval, you are billed based on the number of DB instances selected. Development Tool and Intelligent O&M are free of charge.

Table 1-5 Billing description

Billing Item	Description
DB Instance	You are billed based on the number of the DB instances you select.

Changing Quota

You can increase your enterprise quota (RDS instances) based on service requirements. After the modification, the price changes accordingly.

📖 NOTE

The DAS service does not allow you to decrease the enterprise quota.

2 Getting Started

2.1 Intelligent O&M

2.1.1 Step 1: Log In to DAS

Procedure

Step 1 Log in to the management console.

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

Step 3 Click in the upper left corner, and under **Databases**, click **Data Admin Service**.

----End

2.1.2 Step 2: Switch to Intelligent O&M

☐ NOTE

The following uses a free instance as an example to describe basic operations of Intelligent O&M. If you want to set a free instance as paid, see **Step 3: Set an Instance as Paid**.

For differences between free and paid instances, see **Billing**.

Procedure

Step 1 In the navigation pane, choose **Intelligent O&M**, on the **Instance Overview** page, click **Synchronize Instances** and then click **Refresh**.

☐ NOTE

Instance synchronization is an asynchronous process, which generally takes several minutes to complete.

Step 2 Locate the instance you want to view and click **Details**.

Step 3 On the displayed page, choose **SQL** > **SQL Explorer**.

📖 NOTE

- **Enable DAS SQL Explorer** must be toggled on so that the system can collect and analyze full SQL statements.
- With **Enable DAS SQL Explorer** toggled on, the instance performance loss is within 5%.

Step 4 Click the **TOP SQL** tab, select **Last 1 hour**, **Last 3 hours**, or **Last 6 hours** or specify a time range no longer than one day, to view the top SQL statements executed.

📖 NOTE

Execution Duration Distribution displays the distribution of the time required to execute all SQL templates in a specific period of time. There are four execution duration ranges. The system calculates execution times of the SQL statements in each execution time range. If you select **Last 1 hour**, the execution duration distribution is updated every 10 seconds. If you select **Last 6 hours**, the distribution is updated every 1 minute. If you select a time range longer than 6 hours, the distribution is updated every 5 minutes. The execution duration ranges of SQL templates are as follows:

- < 100 ms
- 100 ms—500 ms
- 500 ms—1s
- > 1s

Step 5 Select **By instance** or **By node**. If you select **By node**, you can view execution duration distribution of the primary node. You can change node to view the duration distribution of other nodes. The primary node is selected by default.

Step 6 View execution duration details of top SQL templates with the following methods, such as average execution duration, total duration, average lock wait duration, and average scanned rows.

- Hover your mouse at any point in time on the graph to view top SQL templates at that time.
- Enable **Custom Time Range** and select a time range on the graph to view top SQL templates used.

Step 7 In the SQL template list, locate a SQL template and click **Details** to view the total execution times, average scanned rows, average execution duration, and the like.

----End

2.1.3 Step 3: Set an Instance as Paid

Scenarios

Intelligent O&M is available for paid and free instances. You can set your instances based on service requirements. This section describes how to set an instance as a paid instance.

If you want to set only one instance as paid, go to **Setting One Instance as Paid**.

If you want to set more than one instance as paid, go to **Batch Setting Instances as Paid**.

Setting One Instance as Paid

Step 1 In the navigation pane on the left, choose **Intelligent O&M**; on the **Instance Overview** page, locate the instance that you want to set as paid and click **Set as Paid** in the **Operation** column.

Step 2 Carefully read the information displayed in the dialog box and click **OK**.

Step 3 Wait till the request is submitted.

Step 4 On the **Instance Overview** page, check whether the status of the instance changes to **Paid**.

----End

Batch Setting Instances as Paid

Step 1 In the navigation pane on the left, choose **Intelligent O&M**; on the **Instance Overview** page, select the instances that you want to set as paid and click **Batch Set Paid Instance** or **Set Paid Instance**.

Step 2 Carefully read the information displayed in the dialog box, select the instances that you want to set as paid, and click **OK**.

Step 3 On the **Instance Overview** page, check whether the statuses of the instances change to **Paid**.

----End

2.1.4 Step 4: Set the Instance as Free

Scenarios

Intelligent O&M is available for paid and free instances. You can set your instances based on service requirements. This section describes how to set your instances as free instances.

Procedure

Step 1 In the navigation pane on the left, choose **Intelligent O&M**; on the **Instance Overview** page, locate the instance that you want to set as paid and click **Set as Free** in the **Operation** column.

Step 2 Carefully read the information displayed in the dialog box and click **OK**.

Step 3 Check whether a warning is displayed within 24 hours after the instance is set as paid. If yes, set it as free as specified.

Step 4 On the **Instance Overview** page, check whether the status of the instance changes to **Free**.

----End

2.2 Data Management

2.2.1 Overview

Scenarios

This section describes how to manage data on the **Database Management** page.

Procedure

Perform the following operations to manage data on the **Database Management** page:

Step 1: Log In to DAS

Step 2: Add Database Login Information

Step 3: Log In to a Database

Step 4: Manage Data

Figure 2-1 Data management operations
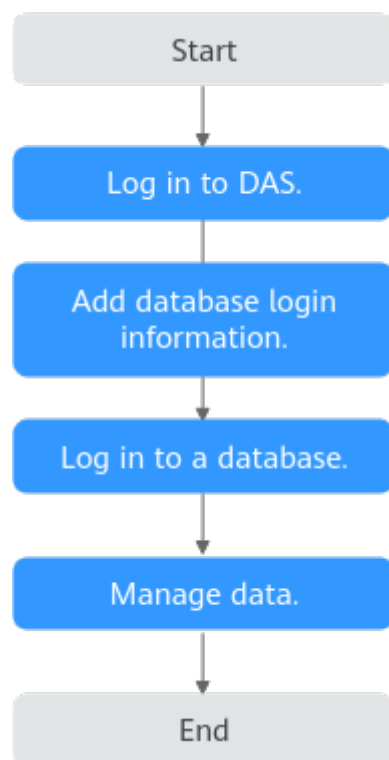
2.2.2 Step 1: Log In to DAS

Procedure

Step 1 Log in to the management console.

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

Step 3 Click ☰ in the upper left corner, and under **Databases**, click **Data Admin Service**.

----End

2.2.3 Step 2: Add Database Login Information

Scenarios

- With DAS, you can create logins to manage databases using a GUI.
- This section uses an RDS DB instance as an example to describe how to add a database login.

Adding RDS DB Instance Login Information

Step 1 In the navigation pane on the left of the DAS console, choose **Development Tool** to go to the login list page.

Step 2 Click **Add Login**.

Step 3 On the displayed page, select the DB engine, source database, and target DB instance, enter the login username, password, and description (optional), and enable **Collect Metadata Periodically** and **Show Executed SQL Statements**.

Step 4 Test the connection as needed. If a message indicating that the connection failed is displayed, modify the connection according to the failure causes contained in the message.

📖 NOTE

- The username and password required for adding the login are the database username and password.
- To delete a password, you can modify or delete the login information.
- You are advised to enable **Collect Metadata Periodically**. If it is disabled, DAS obtains only the structured data from databases in real time, and the performance of databases is affected.

  The collection time cannot be customized. Once **Collect Metadata Periodically** is enabled, DAS automatically collects metadata at 20:00 every day (UTC time). If you are not using a UTC time, convert the time according to your local time zone. You can also click **Collect Now** to collect metadata at any time you want.
- You are advised to enable **Show Executed SQL Statements**. With it enabled, you can view the executed SQL statements under **SQL Operations** > **SQL History** and execute them again without entering the SQL statements.

Step 5 Click **OK**.

----End

2.2.4 Step 3: Log In to a Database

Database Management

Step 1 In the navigation pane on the left of the DAS console, choose **Development Tool** to go to the login list page.

Step 2 Choose **RDS DB instances** and **MySQL** from the drop-down lists in the upper right corner.

Step 3 Locate the MySQL DB instance you want to log in to and click **Log In** in the **Operation** column.

Step 4 On the top menu bar, click **Database Management** and click **Change** to select a database you want to operate.

Step 5 Click the **Objects** tab to view objects such as tables, views, stored procedures, events, triggers, and functions.

----End

2.2.5 Step 4: Manage Data

Tables

Step 1 On the **Objects** tab page, choose **Tables**. Click **Create Table**. On the displayed page, enter a table name, select the storage engine, character set, and collation, enter the comment, and set advanced settings.

Step 2 Ensure the settings are correct and click **Next**. Then add table columns.

Step 3 Click **Next** and add virtual columns, indexes, and foreign keys.

Step 4 Click **Create**. In the **SQL Preview** dialog box, click **Back** if there is any incorrect configuration, and click **Execute** to create the table if all configurations are correct.

----End

Views

Step 1 On the **Objects** tab page, choose **Views**. Click **Create View**. On the displayed page, enter a view name, select the security, check option, and algorithm, and set the definer and view definition statement.

Step 2 Click **Create**. On the **Confirm View Definition Script** page, click **Back** if there is any incorrect configuration, and click **Execute** to create the view if everything is correct.

----End

Stored Procedures

Step 1 On the **Objects** tab page, choose **Stored Procedures**. Click **Create Stored Procedure**. On the displayed page, specify the name and description.

Step 2 Ensure the settings are correct and click **OK**. The SQL preview page is displayed.

Step 3 Click **Option** and configure the SQL security, determinacy, and data access.

Step 4 Ensure the settings are correct, and click **OK** and then **Save**. If you want to modify the SQL statement, click **Cancel** to go back to the SQL preview window.

Step 5 Click **Execute** to create a stored procedure.

----End

Events

Step 1 On the **Objects** tab page, choose **Events**. Click **Create Event**. On the displayed page, enter an event name, specify the status and execution time, and enter the comment and event definition statements.

Step 2 Click **Create**. On the **Confirm View Definition Script** page, click **Back** if there is any incorrect configuration, and click **Execute** to create the event if everything is correct.

----End

Triggers

Step 1 On the **Objects** tab page, choose **Triggers**. Click **Create Trigger**. On the displayed page, enter a trigger name, select the trigger table, trigger condition, and trigger event, and enter the trigger definition statement.

Step 2 Click **Create**. On the **Confirm View Definition Script** page, click **Back** if there is any incorrect configuration, and click **Execute** to create the trigger if everything is correct.

----End

Functions

Step 1 On the **Objects** tab page, choose **Functions**. Click **Create Function**. On the displayed page, enter a function name and set the returned value type and description.

Step 2 Ensure the settings are correct and click **OK**. The SQL preview page is displayed.

Step 3 Click **Option** and configure the SQL security, determinacy, and data access.

Step 4 Ensure the settings are correct, and click **OK** and then **Save**. If you want to modify the SQL statements, click **Cancel** to go back to the SQL preview window. Then click **Execute** to create the function.

----End

3 User Guide

3.1 Permissions Management

3.1.1 Creating a User and Granting Permissions

You can use IAM to implement refined permission control for DAS resources. To be specific, you can:

- Create IAM users for employees from different departments of your enterprise in your account. In this way, each IAM user has a unique security credential to use DAS resources.
- Grant only the permissions required for users to perform a specific task.
- Entrust an account or cloud service to perform efficient O&M on your DAS resources.

If your account does not require individual IAM users, skip this chapter.

Figure 3-1 describes how to grant permissions to a user group.

Prerequisites

Before assigning permissions to user groups, you should learn about DAS system policies and select the policies based on service requirements. For more information about system policies supported by DAS, see **Permissions Management**.

Process Flow

Figure 3-1 Process for granting DAS permissions
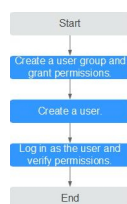
1. Create a user group and assign permissions to it.

   Create a user group on the IAM console, and attach the **DAS FullAccess** policy to the group.

2. Create a user and add it to a user group.

   Create a user on the IAM console and add the user to the group created in **1**.

3. Log in and verify permissions.

   In the service list, choose **Data Admin Service**. On the displayed DAS console, click **Add Login**. If login information can be successfully added, the DAS policy has already taken effect.

3.1.2 DAS Custom Policies

Custom policies can be created to supplement the system-defined policies of DAS.

You can create custom policies in either of the following ways:

- Visual editor: Select cloud services, actions, resources, and request conditions. This does not require knowledge of policy syntax.
- JSON: Edit JSON policies from scratch or based on an existing policy.

For details about how to create custom policies, see **Creating a Custom Policy** in the *Identity and Access Management*. This section describes example custom policies of DAS.

Examples of DAS Custom Policies

Example 1: Assign only DAS permissions.

```
{
    "Version": "1.1",
    "Statement": [
        {
            "Action": [
                "das:*:*"
            ],
            "Effect": "Allow"
        }
    ]
}
```

Example 2: Assign users the permission to use Intelligent O&M but not Development Tool.

```
{
    "Version": "1.1",
    "Statement": [
        {
            "Action": [
                "das:connections:list"
],
            "Effect": "Allow"
        }
    ]
}
```

3.2 Logging In to the DAS Console

Logging In to Console

Step 1 On the login page, enter the account and password to log in to the management console.

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

Step 3 Click ☰ in the upper left corner, and under **Database**, click **Data Admin Service**.

----End

3.3 Adding Login Information

Scenarios

This section describes how to add database login information so that you can log in to a database for visualized data management operations.

📖 **NOTE**

- If you have not logged in to a DB instance through the created login over a year, the system automatically clears all information, including the saved password, of this login.
- You can log in to the same database either on the DAS console or using other clients. Both methods do not affect each other.
- DAS allows you to manage DB instances of different types of engines. An RDS for MySQL instance is used in the following example.

Adding Login Information for RDS DB Instances

Step 1 In the navigation pane on the left of the DAS console, choose **Development Tool** to go to the login list page.

Step 2 Click **Add Login**.

Step 3 On the displayed page, select the DB engine, source database, and target DB instance, enter the login username, password, and description (optional), and enable **Collect Metadata Periodically** and **Show Executed SQL Statements**.

📖 NOTE

- After you specify **Source Database**, the system automatically lists all the DB instances from this source under the current account.
- The username and password required for adding the login are the database username and password.
- To delete the password, you can modify or delete the login.
- You are advised to enable **Collect Metadata Periodically**. If it is disabled, DAS obtains only the structured data from databases in real time, and the performance of databases is affected.

  The collection time cannot be customized. Once **Collect Metadata Periodically** is enabled, DAS automatically collects metadata at 20:00 every day (UTC time). If you are not using a UTC time, convert the time according to your local time zone. You can also click **Collect Now** to collect metadata at any time you want.
- You are advised to enable **Show Executed SQL Statements**. With it enabled, you can view the executed SQL statements under **SQL Operations** > **SQL History** and execute them again without entering the SQL statements.

Step 4 Test the connection as needed. If a message indicating that the connection failed is displayed, modify the connection according to the failure causes contained in the message.

Step 5 Click **OK**.

----End

3.4 Modifying Login Information

Scenarios

DAS allows you to modify login information, such as username and password. You can also choose whether to remember password, or enable or disable periodic metadata collection.

Procedure

Step 1 In the login list of Development Tool, locate the DB instance for which you want to modify its login information and click **Modify** in the **Operation** column.

Step 2 On the displayed page, modify the information as required.

- If you do not want to modify the information, click **Cancel**.
- If you want to modify the information, make the modifications, confirm the settings, and click **OK**.

----End

3.5 Deleting Login Information

Scenarios

Delete the login information you no longer need.

NOTICE

A login represents an entry for managing databases. Deleted logins have no impact on your database performance but cannot be recovered, exercise caution when you perform this operation.

Procedure

Step 1 In the login list of Development Tool, locate the DB instance for which you want to delete its login information and click **Delete** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.6 Logging In to Databases Shared by Others

Scenarios

You have a database instance and want to share it with another account or another user of the same account, but you do not want this other account or user to know the password of the shared login, or view your database instances besides the shared one.

Prerequisites

- There are two accounts, or one account and two IAM users.
- You have obtained the ID of the IAM user.
- You have logged in to the DAS console.

Usage Restrictions

- Users having shared database logins cannot add databases or users.
- Shared databases do not have the data tracking, rollback, and background task features.

Procedure

Step 1 Log in to the DAS console using the username and password of an IAM user.

Step 2 On the overview page, click **Go to Development Tool**.

Step 3 In the right pane, click the **Database Logins Shared by Others** tab.

Step 4 Click **View My User ID**. On the displayed page, copy the user ID.

Step 5 Log in to the DAS console using the username and password of the account.

Step 6 On the overview page, click **Go to Development Tool**.

Step 7 On the **My Database Logins** tab, locate the login you want to share and click the number in the **Additional Users** column.

Step 8 On the displayed **View Additional Users** page, click **Add User**.

Step 9 On the displayed **Add User** page, select the adding method.

- **Manual input**: Enter the ID of the user that you want to share your database login with. If multiple users need to be added, separate their IDs with semicolons (;).
- **Synchronize IAM account**: Select another IAM user of the current account.
- **Synchronize EPS user**: Select the target users from the group of the enterprise project.

Step 10 Confirm the settings and click **OK**.

Step 11 Return to the DAS console and check whether the users are successfully added.

Step 12 Click **Log In** to log in to the shared database.

----End

3.7 MySQL DB Instance Management (Development Tool)

3.7.1 Homepage

3.7.1.1 Overview

Logging In to DAS

Step 1 Obtain the login permission and log in to the DAS console.

Step 2 In the login list of Development Tool, choose **RDS DB instances** and **MySQL** from the drop-down lists, locate the DB instance you want to log in to, and click **Log In** in the **Operation** column.

----End

Function Overview

Table 3-1 Functions

Function	Description
Top menu bar	- SQL Operations - Database Management - Import and Export - Structure Management - Data Scheme - Background Tasks - Account Management

Function	Description
Account information and logout	Displays the current account information and a logout button.
DB instance information	Displays the current database information, such as the DB engine logo, DB instance name, and DB engine version.
Database list	Displays the databases of the current DB instance, including user databases and system databases. ● Allows you to search for a database by name. ● Allows you to create databases.

3.7.1.2 Creating a Database

Procedure

Step 1 In the database list of the **Home** page, click **Create Database**.

Step 2 On the displayed page, enter a database name and select a character set.

Step 3 Click **OK**. The database you create appears in the database list.

----End

3.7.1.3 Dropping a Database

Procedure

Step 1 In the database list, locate the database you want to delete and choose **More** > **Drop** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.7.1.4 Data Dictionary

Prerequisites

The current database contains tables.

Procedure

Step 1 In the database list, locate the target database and click **Data Dictionary** in the **Operation** column.

Step 2 On the displayed page, view the content in **Tables** and **List Table Schema** of the current database.

Step 3   Click **Export in PDF** to download it to your local PC if needed.

----End

3.7.2 SQL Operations

DAS manages database objects through SQL statements, facilitating user operations.

3.7.2.1 SQL Window

Procedure

Step 1   On the top menu bar, choose **SQL Operations** > **SQL Window**.

Step 2   In the navigation pane, select a database, and then specify a table or view.

- **Execute SQL**: executes SQL statements.
- **Execute SQL Plan**: reports the execution of SQL statements to facilitate troubleshooting and optimize SQL processing performance.
- **SQL Favorites**: allows you to add, view, and manage frequently used SQL statements.
- **Format SQL**: improves the readability of SQL statements. Formatting SQL statements enables statements to be displayed in line break mode, but does not change their logic and semantics.

  The formatting takes effect for all the SQL statements in the SQL window. You cannot format only the selected statements.
- **SQL Input Prompt**: helps you to select your desired database, table, or field name as prompted to quickly enter statements in the SQL window.
- Overwrite/Append Mode:
  - **Append Mode:** Each time a SQL statement is executed, the new result set is appended to the previous one.
  - **Overwrite Mode**: Each time a SQL statement is executed, the new result set overwrites the previous one.
- **Full Screen**: shows SQL statements on a full screen.

Step 3   After SQL statements are executed, view SQL execution status on the **Executed SQL Statements**, **Messages**, and **Result Set** tab pages.

----End

3.7.2.2 Executing SQL Statements

Procedure

Step 1   On the top menu bar, choose **SQL Operations** > **SQL Window**. In the SQL window, select a database from the navigation pane.

Step 2   Enter SQL statements in the SQL window and click **Execute SQL**.

- Enabling **SQL Input Prompt** is recommended. It helps you select the required database, table, or field name to enter statements in the SQL window.

- To protect query result sets from being displayed as garbled characters caused by UTF-8, the default encoding format, select an encoding format as needed.
- To execute multiple SQL statements at a time, separate them using semicolons (;). In this case, click **Full Screen** to view the logics in SQL statements clearly.
  - To execute some of the SQL statements, select the statements before executing them.
  - To execute all the SQL statements, do not select any SQL statements or select all of them.

Step 3 View the SQL execution details on **Executed SQL Statements** and **Messages** tab pages, including the SQL execution history, execution status, impact scope, execution progress, and elapsed time.

Step 4 On the **Result Sets** tab, view the execution details. You can perform the following operations on the result sets:

- **Copy Row**/**Copy Column**: copies a row or column for reuse.
- **Column Settings**: customizes the columns to display when there are a large number of columns in the query result.
- **Binary to Hexadecimal**: converts the binary data in the result set into hexadecimal data for display.
- **Refresh**: refreshes the changed data.
- **Row Details**: displays the column field name, value, and type of the selected row.
- **Add**: adds an empty row to the result set.
- **Submit**: views the SQL statements to be modified. After you click **OK**, the result set is updated to the latest.
- **Delete Row**: deletes the selected row, including the data.
- **Export**: allows you to export the data in a SQL or CSV file. A maximum of 10,000 rows of data can be exported.
- **Export More**: redirects you to the data export page and allows you to export over 10,000 rows of data.

📖 **NOTE**

  - If the result set involves a view, you cannot edit the data.
  - If the type of the result set is metadata, the data cannot be edited or displayed on multiple pages.
  - If the result set involves multiple tables, you cannot edit the data.
  - If the result set involves only one table and does not include all the primary key columns of the table or no primary key is found, you cannot edit the data.
  - Virtual tables (for example, tables generated during SQL execution) cannot be edited.

----End

3.7.2.3 Executing SQL Plan

Scenarios

This section describes how to analyze the execution efficiency of the current SQL statement.

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**. In the SQL window, select a database from the navigation pane.

Step 2 Enter SQL statements in the SQL window and click **Execute SQL Plan**.

- On the **Executed SQL Statements** tab page, view the historical SQL executions.
- On the **Messages** tab page, view the execution information, including SQL splitting, execution status, and elapsed time.
- On the **Execution Plan** tab page, view the execution status for each SQL statement.

----End

3.7.2.4 SQL Favorites

Scenarios

DAS allows you to add frequently used SQL statements and view and manage SQL statements.

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**.

Step 2 In the SQL window, click **SQL Favorites**.

- **Add SQL Statement**: allows you to add your desired SQL statements. Specifically, specify the title, select the application scope, enter SQL statements, and click **Save**.
- **Insert SQL Statement**: allows you to insert the SQL statements you have added. If there are no SQL statements stored, this option will not be displayed.
- **Manage SQL Statements**: allows you to manage frequently used SQL statements, including adding, editing, and deleting statements.

----End

3.7.2.5 SQL History

Prerequisites

Enable **Save Executed SQL Statements** after you log in to the DAS console.

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL History**.

Step 2 On the displayed page, search for execution information about the target SQL statement by time range, database name, or keyword.

- To access the **Database Management** page, click a database name.

- To copy and use a SQL statement, click it in the **SQL Statement** column.

- To execute a SQL statement, click **Open in SQL Window** in the **Operation** column.

☐ **NOTE**

After you enable **Save Executed SQL Statements**, executed SQL statements will be recorded in the DAS management host.

----End

3.7.3 Database Management

Function Overview

Table 3-2 Functions

Function	Description
Sidebar	Consists of six types of objects (tables, views, stored procedures, events, triggers, and functions).
Database information	Displays the name, IP address, character set, SQL window, and data dictionary of the current database.
Metadata Collection	Allows DAS to automatically collects only the data such as database names, table names, and field names in an instance (user data in your tables is not included). **NOTE** If there are too many tables, the system will not collect the metadata and display the table list to mitigate the impact on database performance.
List details	Displays the operation area for each type of object.

☐ **NOTE**

You can go to the **Database Management** page in either of the following ways:

- Choose **Database Management** on the top menu bar.

- In the database list of the **Home** page, locate the target database and click **Manage** in the **Operation** column.

Object List

You can manage tables, views, stored procedures, events, triggers, and functions of the MySQL DB instances. The main operations include creating, querying, and modifying objects.

- For details on how to manage tables, see **Table Management**.
- For details on how to manage views, see **View Management**.
- For details on how to manage events, see **Event Management**.
- For details on how to manage stored procedures, see **Stored Procedure Management**.
- For details on how to manage functions, see **Function Management**.
- For details on how to manage triggers, see **Trigger Management**.

3.7.3.1 Table Management

3.7.3.1.1 Creating a Table

Scenarios

A MySQL data table consists of basic information, field/column information, virtual columns, indexes, and foreign keys. The virtual columns, indexes, and foreign keys are optional and can be configured based on service requirements.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Tables** and click **Create Table**.

Step 2 On the displayed page, specify the details under **Basic Information** (**Table Name** is mandatory). Click **Next**.

Step 3 On the **Column** page, click **Add** and set **Column Name**, **Type**, **Length**, **Nullable**, **Primary Key**, **Comment**, and **Extended Information** as needed.

- If you do not need to add virtual columns, indexes, or foreign keys, click **Create** at the bottom of the page. In the displayed **SQL Preview** dialog box, click **Execute**.

  ☐ NOTE

  - Only MySQL 5.6.5 and later support default DATETIME values.
  - In versions earlier than MySQL 5.6.5, leave default values blank. Otherwise, an error occurs.

- If you need to add virtual columns, indexes, and foreign keys, click **Next**. Then, set the column name, type, length, nullable, primary key, expression, storage type, comment, and extended information. If you need to set the table index or foreign key, click **Next**. After the setting, click **Create**.

  ☐ NOTE

  When you create a foreign key, the type of columns in the referenced table must be the same as that of included columns, and must be the primary key or have a unique index.

Step 4 In the **SQL Preview** dialog box, click **Execute** to create a table.

----End

◻ NOTE

- The length of a column name is limited. Enter no more than 64 characters for the MySQL engine.
- In the **Type** column, you can select only the parameters from the drop-down list box.
- In the **Length** column, you can change the length for some types of columns.
- If **Primary Key** is selected, **Nullable** will be grayed out.
- **Auto Increment** can be set for one column only. When it is selected, **Primary Key** must be selected, and a default value cannot be set.

3.7.3.1.2 Opening a Table

Scenarios

If a table has primary keys, you can add, delete, modify, or query table data as you do in Excel.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Tables**, locate the target table, and click **Open** in the **Operation** column.

Step 2 On the table details page, double-click a cell to edit data. After adding or editing data, submit and save the changes.

Table 3-3 Functions

Item	Description
Where Condition	Filters records.
Copy Row	Copies data of the selected row. Specifically, double-click the target row and then click **Copy Row**.
Copy Column	Allows you to copy all data in a column by selecting this column from the **Copy Column** drop-down list.
Column Settings	Allows you to set the columns you want to display.
Binary to Hexadecimal	Prevents binary data in columns from being displayed as garbled characters. If there is binary data in columns, you must select this option.
Refresh	Allows you to update table data manually.
Row Details	Shows the detailed information of a specified row.
Add	Allows you to add rows.
Submit	Allows you to submit and save the changes to data.

Item	Description
Delete Row	Allows you to delete the selected rows.
Export	Exports a maximum of 10,000 data records as CSV or SQL files.

----End

3.7.3.1.3 Viewing Table Details

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and click **View** in the **Operation** column.

Step 3 In the displayed dialog box, view basic table information and SQL statements for creating the database.

----End

3.7.3.1.4 Altering a Table

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and click **Alter** in the **Operation** column.

Step 3 Modify the table information as required. After the modification is complete, click **Alter**.

Step 4 In the **SQL Preview** dialog box, click **Execute**.

----End

3.7.3.1.5 Renaming a Table

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and click **Rename** in the **Operation** column.

Step 3 In the displayed dialog box, enter a new table name and click **OK**.

----End

3.7.3.1.6 Clearing a Table

> **NOTICE**
>
> Cleared tables cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and choose **More** > **Clear** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.7.3.1.7 Dropping a Table

> **NOTICE**
>
> Dropped tables cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and choose **More** > **Drop** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.7.3.1.8 Maintaining a Table

Scenarios

While working with MySQL databases, you do a lot of changes such as data insert, update, and deletion, which may cause table fragmentation. As a result, the database server performance is deteriorated. To handle this, periodic maintenance is required.

Functions

- Check

    The CHECK TABLE statement adds a read-only lock to the table.

Allows you to check whether there are errors in database tables using the CHECK TABLE statement. You can check a table with any of the following methods:

- **Check**: Scan rows to verify that deleted links are valid. Alternatively, calculate a key checksum for the rows and verifies the validity using the obtained checksum.
- **Fast**: Check only tables that have not been closed properly.
- **Quick**: Do not scan rows or check for incorrect links.
- **Changed**: Check only tables that have been changed since the last check or tables that have not been closed properly.
- **Extended**: Search for keywords in each row. This ensures that the table is 100% consistent, but takes a long time.

● Repair

Allows you to use the REPAIR TABLE statement to repair possibly corrupted or incorrect tables. You can repair tables using any of the following three methods:

- **Check**: a simple repair, which repairs data and index files.
- **Quick**: the quickest repair, which repairs only index files, but not data files.
- **Extended**: the slowest repair, which creates indexes row by row to repair data and index files.

Procedure

The following uses the **Check** operation as an example to explain how to maintain tables.

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and choose **More** > **Maintain** > **Check** > **Check** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.7.3.2 View Management

3.7.3.2.1 Creating a View

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Views**.

Step 2 In the upper left corner of the page, click **Create View**.

Step 3 On the displayed page, specify information such as view name and definer, choose security, check option, and algorithm from drop-down lists as required, and click **Create**.

Step 4 In the displayed dialog box, click **Execute**.

----End

3.7.3.2.2 Opening a View

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Views**, locate the target view, and click **Open** in the **Operation** column.

Step 2 Check the view information on the details page or click **Where Condition**.

Table 3-4 Functions

Item	Description
Where Condition	Filters records.
Copy Row	Allows you to copy data of a selected row. Specifically, select the target row and click **Copy Row**.
Copy Column	Allows you to copy data of a selected column. Specifically, click **Copy Column** and select a column from the drop-down list.
Copy	Allows you to copy a piece of data. Specifically, hover the cursor on the data and click **Copy**.
Column Settings	Allows you to set the columns you want to display.
Binary to Hexadecimal	Prevents binary data in columns from being displayed as garbled characters. If there is binary data in columns, you must select this option.
Refresh	Allows you to update table data manually.
Row Details	Shows the detailed information of a specified row.
Add	Allows you to add rows.
Submit	Allows you to submit and save the changes to data.
Delete Row	Allows you to delete the selected rows.
Export	Exports a maximum of 10,000 data records as CSV or SQL files.

☐ NOTE

View data can be only queried, but not be edited, because views do not have primary keys.

----End

3.7.3.2.3 Altering a View

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Views**, locate the target view, and click **Alter** in the **Operation** column.

Step 2 On the displayed page, modify the information including the security, algorithm, and view definition statement and click **Alter**.

Step 3 In the displayed dialog box, click **Execute**.

----End

3.7.3.2.4 Dropping a View

> **NOTICE**
>
> Dropped views cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Views**, locate the target view, and click **Drop View** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.7.3.3 Stored Procedure Management

3.7.3.3.1 Creating a Stored Procedure

Overview

A stored procedure is a set of SQL statements used to implement specific functions. After being compiled, stored procedures are stored in databases. You can execute the stored procedures by specifying their names and related parameters.

Scenarios

A stored procedure consists of a set of SQL statements that can complete specific tasks or process complex services. This section describes how to create a stored procedure. You can use loop statements in a stored procedure to insert objects repeatedly.

Prerequisites

- You have obtained the CREATE ROUTINE permission.
- You have obtained the Execute permission.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Stored Procedures**, and click **Create Stored Procedure**.

Step 2 On the displayed page, enter the stored procedure name and description, and click **OK**.

Step 3 On the displayed page, click **Option**, set required parameters, and click **OK**. Then, save and execute the stored procedure.

Step 4 View the execution status in the **Message** area.

----End

3.7.3.3.2 Altering or Executing a Stored Procedure

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Stored Procedures** on the left, locate the target procedure, and click **Alter or Execute** in the **Operation** column.

Step 2 On the displayed page, click **Option** to set parameters as required and click **OK**. Then, click **Save**.

Step 3 Execute the stored procedure and view the execution status in the **Message** area.

----End

3.7.3.3.3 Dropping a Stored Procedure

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Stored Procedures** on the left, locate the target stored procedure, and click **Drop** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

NOTICE

Dropped stored procedures cannot be recovered. Exercise caution when performing this operation.

----End

3.7.3.3.4 Viewing Stored Procedure Details

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Stored Procedures**.

Step 2 In the right pane, click **View Details**.

----End

3.7.3.4 Event Management

3.7.3.4.1 Creating an Event

Scenarios

This section describes how to create an event to periodically respond to specific operations.

When **event_scheduler** for RDS DB instances is set to **ON** and the event function is enabled, you can perform operations on events.

When **event_scheduler** is set to **OFF**, but the event function is enabled, you can only create events and the events do not take effect.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Events**, and click **Create Event**.

Step 2 Specify an event name (mandatory) and event definition statements (mandatory), set the execution time, status, and comment, and click **Create**.

- **Event Definition Statements**

  Indicates the SQL statements to be executed when a scheduled event is triggered.

- **Dropped upon expiration**

  – Indicates that the events to be executed at a fixed point in time will be deleted after they are executed.

  – Indicates that the events to be periodically executed will be deleted at the specified end time.

Step 3 In the displayed dialog box, click **Execute**. If no error is reported, the event takes effect.

----End

3.7.3.4.2 Altering an Event

Scenarios

This section describes how to alter an event.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Events**, locate the target event, and click **Alter** in the **Operation** column.

Step 2 On the displayed page, modify the required information and click **Alter**.

Step 3 In the displayed dialog box, click **Execute**.

----End

3.7.3.4.3 Dropping an Event

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Events**, locate the target event, and click **Drop** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.7.3.5 Trigger Management

3.7.3.5.1 Creating a Trigger

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, choose **Triggers**, and click **Create Trigger**.

Step 2 On the displayed page, set required parameters and edit trigger definition statements. Then, click **Create**.

Step 3 In the displayed dialog box, click **Execute**.

----End

3.7.3.5.2 Altering a Trigger

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Triggers**, locate the target trigger, and click **Alter** in the **Operation** column.

Step 2 On the displayed page, modify the required parameters and click **Alter**.

Step 3 In the displayed dialog box, click **Execute**.

----End

3.7.3.5.3 Dropping a Trigger

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Triggers**, locate the target trigger, and click **Drop Trigger** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

> **NOTICE**
>
> Dropped triggers cannot be recovered. Exercise caution when performing this operation.

----End

3.7.3.6 Function Management

3.7.3.6.1 Creating a Function

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Functions**, and click **Create Function**.

Step 2 In the displayed dialog box, specify the function name, returned value, and description, and click **OK**.

Step 3 On the displayed page, edit the function body.

Step 4 In the upper left corner, click **Option**. In the displayed dialog box, set required parameters and click **OK**.

Step 5 Click **Save**, or click **Execute** and view the status in the **Message** area.

----End

3.7.3.6.2 Altering or Executing a Function

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the **Objects** page, select **Functions**, locate the target function, and click **Alter or Execute Function** in the **Operation** column.

Step 2 On the displayed page, click **Option** and set parameters as required. Then, click **Save** to save the settings or click **Execute** to invoke the function.

----End

3.7.3.6.3 Dropping a Function

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Functions**, locate the target function, and click **Drop Function** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

> **NOTICE**
>
> Dropped functions cannot be recovered. Exercise caution when performing this operation.

----End

3.7.3.6.4 Viewing Details of a Function

Procedure

Step 1 In the top menu bar, choose **Database Management**. In the navigation pane on the left, choose **Functions**, locate the function whose details you want to view and click **View Function** in the **Operation** column.

Step 2 In the displayed dialog box, view function details and click **Close**.

----End

3.7.4 Import and Export

3.7.4.1 Data Import

Scenarios

Import data from your local PC or OBS bucket for data backup and migration.

Operation Description

Import data into a table for backup or migration. If you import a CSV or SQL file, the file must have the same data type as the target table.

Constraints

- Only one file that is no larger than 1 GB can be imported at a time.
- Data files in the CSV or SQL format can be imported.
- Binary fields such as BINARY, VARBINARY, TINYBLOB, BLOB, MEDIUMBLOB, and LONGBLOB are not supported.

Procedure

Step 1 On the top menu bar, choose **Import and Export** > **Import**.

Step 2 Import a file from your local PC or an OBS bucket.

- From your local PC

  In the upper left corner, click **Create Task**. On the displayed page, select an import type, select **Upload file** for **File Source**, set the attachment storage, and upload the file. Then, set other parameters as required.

  For security purposes, imported files are stored in OBS buckets.

  📖 NOTE

  – To keep your data secure, provide your own OBS bucket to store the attachments you upload. In this way, DAS automatically connects to your OBS bucket for in-memory reading.

  – If you select **Delete the uploaded file upon an import success**, the file you upload will be automatically deleted from the OBS bucket after being imported to the destination database.

- From an OBS bucket

  In the upper left corner, click **Create Task**. On the displayed page, select an import type, select **Choose from OBS** for **File Source**, and select a file from the bucket. Then, set other parameters as required.

  📖 NOTE

  The file uploaded from an OBS bucket will not be deleted upon an import success.

Step 3 After setting the import parameters, click **Create**. Confirm the information again before you click **OK** because original data may be overwritten after data import.

Step 4 View the import progress in the task list or check task details.

----End

3.7.4.2 Data Export

Prerequisites

You have created a user database on the MySQL database management page. For details, see **Creating a Database**.

Scenarios

DAS allows you to export a large amount of data at a time to facilitate data query or to back up data for migration. This section describes how to export data.

Procedure

Step 1 On the login page, enter the account and password to log in to the management console.

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

Step 3 Under **Database**, click **Data Admin Service**.

Step 4 Locate the target database and click **Log In** in the **Operation** column. The homepage of the MySQL database management is displayed.

Step 5 On the top menu bar, choose **Import and Export** > **Export**.

Step 6 On the displayed page, click **Create Task** and choose **Export Database** or **Export SQL Result** as required. The following takes database export as an example.

Alternatively, click **Quick Export** and select the target database. On the displayed page, select a storage path and click **OK**.

Step 7 On the displayed page, set parameters as required in areas **Basic Information** and **Advanced Settings**. Then, select the tables to be exported on the right.

☐ NOTE

- In a SQL result export task, the executed SQL statements cannot exceed 5 MB.

- Databases are classified into user databases and system databases. System database cannot be exported. If system database data is required, deploy system database services in a created user database, so that you can export the system database data from the user database.

- DAS connects to your standby database to export data. This prevents the primary database from being affected by data export. However, if the standby database has a high replication delay, the exported data may not be the latest.

Step 8 After settings are complete, click **OK**.

Step 9 In the task list, view the task ID, type, status, and progress.

Step 10 Click **Details** in the **Operation** column to view task details.

----End

3.7.5 Structure Management

3.7.5.1 Table Structure Comparison and Synchronization

Scenarios

When you perform a migration or verification, you can check the structure difference by comparing and synchronizing table structures.

Procedure

Step 1 On the top menu bar, choose **Structure Management** > **Table Structure Comparison and Synchronization**.

Search for tasks by task status and view task details.

Step 2 On the displayed page, click **Create Task** in the upper left corner.

Step 3 On the displayed page, specify the source database, target instance, target database, error tolerance, and synchronization type. Click **Next**.

Step 4 View comparison objects and click **Compare**.

You can also select the items you want to skip and click **Skip** to cancel the comparison.

Step 5 View the comparison progress. In the comparison item list, click **View Logs** in the **Operation** column to obtain comparison details. You can also click **Download DDL** as needed.

Step 6 Click **Next**. On the **Synchronize** page, view the basic information about this comparison task, such as the source instance, source database, target instance, target database, and synchronization type, and specify the items to be synchronized.

Step 7 Skip synchronization items that may cause high risks and click **Synchronize**.

Step 8 After synchronization is complete, click **View Logs** in the **Operation** column to obtain comparison details. You can download DDL as required.

----End

3.7.6 Data Scheme

3.7.6.1 Data Generator

Scenarios

During the functional testing of a program, a large amount of test data complying with specific rules needs to be inserted into the database. DAS allows you to automatically, efficiently generate test data based on specific rules.

Procedure

Step 1 On the top menu bar, choose **Data Scheme** > **Data Generator**.

Step 2 On the displayed page, click **Create Task**. In the displayed dialog box, configure the required parameters.

- Rows to Generate

  A maximum of 1,000,000 rows of data can be generated.

- Conflict Policy

  If you select **Skip**, the system skips data rows in conflict and continues generating data. If you select **Replace**, the system replaces existing rows with new ones that have the same primary key.

- Generation type

  You can set the rules for randomly generated data based on the column settings. For example, if the column type is time, you can set the start time, end time, and format, or select **Based on current time**.

Step 3 Click **Preview** to check whether the generated data is as expected. If not, modify the settings and click **Generate**. Alternatively, click **Generate** with no modification.

Step 4 In the task list, locate the created task and click **Details**. You can also delete the task as required.

----End

3.7.6.2 Data Tracking and Rollback

Scenarios

- Audit core data changes, collect change statistics, and view sensitive information. For example, you can use this function to query bank statements, statistics on new orders, and key configuration changes.
- Roll back the misoperation to the state before it is operated. For example, you can use the rollback function when the WHERE condition is not added during DBA configuration update, configuration data is deleted by mistake, or a large amount of dirty data and ripple effects are generated due to program bugs.

Procedure

Step 1 On the top menu bar, choose **Data Scheme** > **Data Tracking and Rollback**.

- Search for tasks by time range or database name.
- You can delete tasks as required by selecting check boxes next to task IDs. The deletion operation is synchronized to DAS.
- In the task list, click the task ID to view task details.
- In the task list, locate the target task and click **View Task** in the **Operation** column. Then, you can view task details under **Task Information**, **Log Search**, and **Rollback Task List**.

📖 NOTE

A created task will expire in 15 days. Once the task expires, the system automatically retrieves and deletes the changes in DAS.

Step 2 On the displayed page, click **Create Tracking Task**. In the displayed dialog box, specify task details, including the task name, time range, and database name.

📖 NOTE

- Users who create the tracking task for the first time need to agree to the agreement.
- Task tracking and rollback take three hours by default.

Step 3 Click **Precheck** to obtain the operation details at a specific point in time.

📖 NOTE

- During the pre-check, binlog files are displayed based on time range. RDS DB instances with the backup function enabled periodically back up the binlog file to the OBS bucket. The backup delay is no more than five minutes.
- When you create a tracking task, there may be no changes in the latest five minutes. In this case, you can create a task again later.

Step 4 Click **Read Logs** to obtain log details.

When reading logs, the system initiates binlog parsing and stores log changes for filtering and displaying data.

◻ NOTE

- You can search for logs only after all logs are successfully read.
- If a new task is started before the last tracking task is completely read, it is normal that the log start time is later than the end time.

Step 5 Click **Log Search** to obtain details about the event changes.

Step 6 Create a rollback task if you need to roll back multiple events. Specifically, click **Create Rollback Task** on the **Log Search** tab page. In the displayed dialog box, specify event IDs and storage of rollback statements, set advanced settings as required, and click **OK**.

◻ NOTE

- The start and end event IDs are the ones in the task list and must be entered in ascending order.
- Combing changes

  Changing a record (primary key) three consecutive times (for example, 1->2->3->4) equals the change of 1 to 4 (1->4).
- Statement Type

  Generate event rollback SQL statements: generates SQL statements with reverse changes based on the images before and after data change.

  Obtain the original data before changes: generates rollback tables and insert statements by mirroring before data change.

Step 7 In the rollback task list, view the current rollback task information or create a rollback task.

- Locate the target rollback task and click **View Details** in the **Operation** column to view task details.
- In the **Operation** column, click **Download** to download the compressed data package of the task.

  ◻ NOTE

  Changes (such as insert->delete, delete->insert, update->update) on the same record will be combined or canceled. Therefore, the generated file may have no rollback SQL statements or original data.

----End

3.7.7 Background Tasks

3.7.7.1 Task Scheduling

Scenarios

DAS allows you to execute SQL statements by scheduling tasks. Scheduling types include upon submission, scheduled, and periodic. You can select the scheduling type when creating a task. Error control and transaction control can be performed on SQL statements during scheduling, and task dependency chains can be set for dependent SQL statements.

Procedure

Step 1 On the top menu bar, choose **Background Tasks** > **Task Scheduling**.

> 📖 **NOTE**
>
> You can create a scheduling task only after agreeing to save the SQL statements in the database.

Step 2 On the **Scheduling Tasks** page, click **Create Task**.

Step 3 On the displayed page, set the task name, scheduling type, and execution time tolerance.

Upon submission: Indicates that a scheduled task is executed immediately after being submitted. The task is executed only once.

Scheduled: Indicates that a task is executed at a scheduled point in time after being submitted. The task is executed only once.

Periodic: Indicates that a task is executed periodically at the specified time after being submitted.

Execution Time Tolerance: Indicates the length of time (in seconds) to wait for a task to be executed before it is no longer scheduled. However, this will not affect the task if it is scheduled again later.

Step 4 Under **Add SQL Statements**, click **Add**. On the displayed page, set parameters as needed and click **Save**. Then, submit the task.

> 📖 **NOTE**
>
> After a task is executed, it is automatically displayed in the list of finished tasks.

Step 5 In the scheduling task list, view periodic tasks.

You can search for tasks by status, scheduling type, task ID, or task name.

- **Details**: Click it to view the task information.

  View the execution logs and group details under the group list and view the SQL statements on the group details page.

  Click the name of a periodic task to go to the **Task Information** page. Then, click **Schedule Now** to trigger a scheduling immediately. Additionally, view the execution details on the **Scheduling Execution Records** page.

- **Execution Records**: Click it to view the task execution details and logs.

- **View Logs**: Click it to view log details.

- **Terminate**: Click it to stop a scheduled task. A stopped task will be moved to the **Finished Tasks** list.

- **Pause**: Click it to pause a task. The task status changes from **Scheduling** to **Paused**. You can also click **Resume** to restore the scheduling.

Step 6 On the **Finished Tasks** page, view tasks that are executed upon submission or at scheduled points in time.

You can search for tasks by status, scheduling type, task ID, or task name.

- **Details**: Click it to view the task information.

> View the execution logs and group details under the group list, and view or modify the SQL statements on the group details page.

- **Execution Records**: Click it to view the task execution details, group execution status, SQL statements, and group logs.

- **View Logs**: Click it to view log details.

- **Delete**: Click it to delete a task from the database.

----End

3.7.7.2 Scheduled Backup

Scenarios

Scheduled backup allows you to back up important database tables and data or SQL result sets so that data can be restored timely in case of a data loss.

Procedure

Step 1 On the top menu bar, choose **Background Tasks** > **Scheduled Backup**.

Step 2 On the task list page, click **Set AK/SK** in the upper left corner.

📖 **NOTE**

Storage: The system stores encrypted files in OBS buckets.

AK and **SK**: Access key ID (AK) and secret access key (SK) are required when cloud services are accessed using development tools (APIs, CLI, and SDKs).

Step 3 Select an OBS bucket, enter the AK and SK, and click **Test AK/SK**.

Step 4 After the test succeeded, click **OK**.

Step 5 On the task list page, click **Create DB Backup Task**.

Step 6 Enter a task name, select a task type, and select the database and storage information.

Step 7 Confirm the settings and click **OK**.

Step 8 On the task list page, click **Details** to view the task details.

Step 9 On the task list page, click **Create SQL Result Set Backup Task**.

Step 10 Enter a task name, select a task type, and set the time, backup file format, database, and storage information.

Step 11 Confirm the settings and click **OK**.

Step 12 On the task list page, click **Execution Records** to view the backup status.

Step 13 Click **Details** to view the backup logs.

Step 14 Click **Download** to download the backup file.

Step 15 On the task list page, click **Terminate** or **Pause** to stop or pause a task.

----End

3.7.8 Account Management

3.7.8.1 Database Account Security

To ensure that RDS MySQL databases run properly and prevent account information from being deleted by mistake, DAS hides the following accounts of MySQL database users.

Table 3-5 Accounts to be hidden

Account	Description
mysql.session@localhost	Internal database account configured in MySQL 5.7 or later.
mysql.sys@localhost	Internal database account configured in MySQL 5.7 or later.
mysql.infoschema@localhost	Database account.
root@%	Account configured when you create an RDS MySQL instance.
rdsAdmin@localhost	Management account, which has the highest superuser permission and is used to query and modify DB instance information, rectify faults, as well as migrate and restore data.
rdsBackup@localhost	Backup account, which is used to back up background data.
rdsMetric	Metering account, which is used by watchdog to collect database status data.
rdsRepl	Replication account, which is used to synchronize data from primary DB instances to standby ones or read replicas.
rdsProxy	Proxy account, which is used for authentication when the database is connected using the read/write splitting address. This account is automatically created when read/write splitting is enabled.
drsFull	Account added to the destination database when you start a full migration task.
drsIncremental	Account added to the destination database when you start an incremental migration task.

3.7.8.2 Creating a User

Scenarios

Multiple users with different permissions can be created to access a DB instance or database, but the permissions of these users cannot exceed the operation permissions of the account.

Procedure

Step 1 On the top menu bar, choose **Account Management** > **User Management**.

Step 2 On the displayed page, click **Create User**. Then, configure required information, such as basic information, advanced settings, global permissions, object permissions, and roles, and click **Save**. In the displayed dialog box, click **OK**. For details, see **Table 3-7**.

📖 NOTE

The role function is available only to MySQL 8.0.

You can click **Add DAS IP Address** to add the IP address of the DAS server to the user's host. In the user list, you can view all created users, or locate a user and click **Edit** and **Delete** in the **Operation** column to manage it.

Table 3-6 describes the user permissions briefly. For details about permission usages and explanations, visit the **official website**.
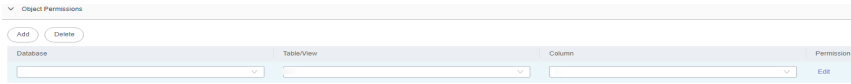
Table 3-6 Permission description

Permission	Description
SELECT	Permission to query a specified object (such as, a global or single database).
INSERT	Permission to insert data into a specified object.
UPDATE	Permission to update data of a specified object.
DELETE	Permission to delete data from a specified object.
CREATE	Permission to create databases and tables for a specified object.
DROP	Permission to delete databases, tables, and views of a specified object.
RELOAD	Permission to execute **FLUSH**.
PROCESS	Permission to execute **SHOW PROCESSLIST** to view all the processes.
GRANT	Permission to grant permissions to another account or reclaim permissions from another account.
REFERENCES	Permission to create foreign keys for a specified object.
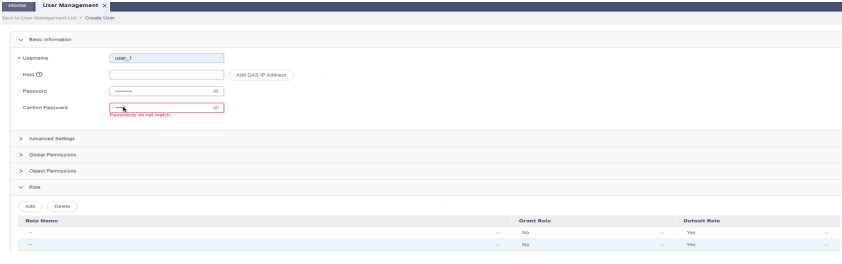
Permission	Description
INDEX	Permission to create or delete index for a specified object.
ALTER	Permission to execute **ALTER TABLE** for a specified object.
SHOW DATABASES	Permission to run the **SHOW DATABASES** command to display all databases.
CREATE TEMPORARY TABLES	Permission to execute **CREATE TEMPORARY TABLE** for a specified object.
LOCK TABLES	Permission to execute **LOCK TABLES** on the tables with the SELECT permission for a specified object.
EXECUTE	Permission to execute a stored procedure for a specified object.
REPLICATION SLAVE	Permission to allow the replica server to read binary log events from the source server.
REPLICATION CLIENT	Permission to query the location of the source server or replica server.
CREATE VIEW	Permission to create or alter a view for a specified object.
SHOW VIEW	Permission to execute **SHOW CREATE VIEW** for a specified object.
CREATE ROUTINE	Permission to create a stored procedure for a specified object.
ALTER ROUTINE	Permission to alter or delete a stored procedure for a specified object.
CREATE USER	Permission to execute **CREATE USER**, **DROP USER**, **RENAME USER**, and **REVOKE ALL PRIVILEGES** for a specified object.
EVENT	Permission to create, modify, delete, or display the event scheduler for a specified object.
TRIGGER	Permission to execute a trigger for a specified object. Only users with this permission can create, delete, execute, or display the triggers of a table.

Table 3-7 User information description

Parameter	Description
Username	Name of the new user

Parameter	Description
Host	Whitelisted IP address allowed to access the database server. If you leave this parameter empty or enter **%**, the user can access all IP addresses. If you enter multiple IP addresses, separate them with commas (,), for example, **192.%,193.%**.
Password	Password of the user. The password: ● Contains 8 to 32 characters. ● Must contain at least three types of lowercase letters, uppercase letters, digits, and the following special characters: ~!@#%^*-_=+?,()& ● Cannot be the username or the username backwards. ● Cannot be a weak password.
Confirm Password	-
Max. Queries Per Hour	Maximum queries that this user can execute within an hour. If this parameter is left empty or set to **0**, there is no limit on the maximum queries.
Max. Updates Per Hour	Maximum updates that this user can execute within an hour. If this parameter is left empty or set to **0**, there is no limit on the maximum updates.
Max. Connections Per Hour	Maximum connections that this user can connect to the database server within an hour. If this parameter is left empty or set to **0**, there is no limit on the maximum connections.
Max. User Connections	Maximum concurrent connections to the server. If this parameter is left empty or set to **0**, there is no limit on the maximum concurrent connections.
SSL Type	Type of authenticating user requests to the server
Issuer	Authority that issues the X.509 certificate used for connecting users to the server
Subject	Subject of the X.509 certificate used for connecting users to the server
Algorithm	Method of encrypting connections between the user and the server
Global Permissions	Permissions granted to the user to perform operations on all databases in the instance
Object Permissions	Permissions granted to the user on specific objects For example,the following settings grant the permission to the user to query the ID of table **user_test** in database **db_test**.

Parameter	Description
Role	Role of the user The role function is available only to MySQL 8.0.
	Role Name: You can select an existing username in this instance.
	Grant Role: Whether the new user can grant permissions of the selected role to another user.
	Default Role: Whether the new user can inherit permissions of the selected role.
	For example, the following settings indicate that **user_2** can inherit permissions of **user@** and can grant permissions of **user@** to another user.

----End

3.7.8.3 Editing User Information

Scenarios

This section describes how to edit user information, including the username, password, global permissions, object permissions, advanced settings, and roles.

📖 **NOTE**

The role function is available only to MySQL 8.0.

Procedure

Step 1 On the top menu bar, choose **Account Management** > **User Management**. In the user list, locate the target user and click **Edit** in the **Operation** column.

Step 2 On the displayed page, edit user information, set global and object permissions, and click **Save**. In the displayed dialog box, click **OK**.

----End

3.7.8.4 Deleting a User

NOTICE

Deleted users cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Account Management** > **User Management**.

Step 2 In the user list, locate the user that you want to delete and click **Delete** in the **Operation** column. In the displayed dialog box, click **Yes**.

----End

3.8 Microsoft SQL Server DB Instance Management (Development Tool)

3.8.1 Homepage

3.8.1.1 Overview

Logging In to a DB Instance

Step 1 Obtain the login permission and log in to the DAS console.

Step 2 In the login list of Development Tool, choose **RDS DB instances** and **Microsoft SQL Server** from the drop-down lists, locate the DB instance you want to log in to, and click **Log In** in the **Operation** column.

----End

Function Overview

Table 3-8 Functions

Function	Description
Top menu bar	• SQL Operations • Database Management • Import and Export • Account Management
Account information and logout	Displays the current account information and a logout button.
DB instance information	Displays the current database information, such as the DB engine logo, DB instance name, and DB engine version.
Database list	Displays the databases of the current DB instance, including user databases and system databases. Allows you to search for a database by name. Allows you to create databases.

3.8.1.2 Creating a Database

Procedure

Step 1 In the database list of the **Home** page, click **Create Database**.

Step 2 On the displayed page, enter a database name and set information including recovery mode, compatibility level, and database read-only.

📖 NOTE

- **Recovery Mode**: Full, indicating a full recovery for the database.
- **Compatibility Level**: Multiple Microsoft SQL Server database versions are available. The compatibility varies with the database version. It is recommended that you select a later version.
- **Containment Type**: The value can be **None** or **Partial**. Microsoft SQL Server 2012 (11.x) and later versions support the containment type.
- **Database Read-Only**: The value can be **False** or **True**. If **True** is selected, a read-only database is created.
- **Allow Snapshot Isolation**: The value can be **False** or **True**. Value **True** indicates that snapshots are isolated in emergent scenarios to protect the database data.
- **Database Files**: By default, row database files and log database files can be added. You can also modify the initial and autogrowth sizes of existing database files if needed.

Step 3 Confirm the settings and click **OK**. The database you create appears in the database list.

----End

3.8.1.3 Dropping a Database

Procedure

Step 1 In the database list, locate the database you want to delete and choose **More** > **Drop** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.8.2 SQL Operations

3.8.2.1 SQL Window

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**.

Step 2 In the navigation pane, select a database, and then specify a table or view.

- **Execute SQL**: executes SQL statements.
- **Execute SQL Plan**: reports the execution of SQL statements to facilitate troubleshooting and optimize SQL processing performance.

- **SQL Favorites**: allows you to add, view, and manage frequently used SQL statements.
- **Format SQL**: improves the readability of SQL statements. Formatting SQL statements enables statements to be displayed in line break mode, but does not change their logic and semantics.

  The formatting takes effect for all the SQL statements in the SQL window. You cannot format only the selected statements.

- **SQL Input Prompt**: helps you to select your desired database, table, or field name as prompted to quickly enter statements in the SQL window.
- Overwrite/Append Mode:
  - **Append Mode:** Each time a SQL statement is executed, the new result set is appended to the previous one.
  - **Overwrite Mode**: Each time a SQL statement is executed, the new result set overwrites the previous one.
- **Full Screen**: shows SQL statements on a full screen.

Step 3 After SQL statements are executed, view SQL execution status on the **Executed SQL Statements**, **Messages**, and **Result Set** tab pages.

----End

3.8.2.2 Executing SQL Statements

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**. In the SQL window, select a database from the navigation pane.

Step 2 Enter SQL statements in the SQL window and click **Execute SQL**.

- Enable **SQL Input Prompt**. It helps you to select a specific database, table, or field name as prompted to enter statements in the SQL window.
- To execute multiple SQL statements at a time, separate them using semicolons (;). In this case, click **Full Screen** to view the logics in SQL statements clearly.
  - To execute some of the SQL statements, select the statements before executing them.
  - To execute all the SQL statements, do not select any SQL statements or select all of them.

Step 3 View the executed SQL statements and the current execution status in the lower part of the page. On the **Messages** tab page, view the execution information, including SQL splitting, execution status, and elapsed time.

Step 4 On the **Result Sets** tab, view the execution details. You can perform the following operations on the result sets:

- **Copy Row**/**Copy Column**: copies a row or column for reuse.
- **Column Settings**: customizes the columns to display when there are a large number of columns in the query result.
- **Refresh**: refreshes the changed data.

- **Row Details**: displays the column field name, value, and type of the selected row.
- **Add**: adds an empty row to the result set.
- **Submit**: views the SQL statements to be modified. After you click **OK**, the result set is updated to the latest.
- **Delete Row**: deletes the selected row, including the data.
- **Export**: allows you to export the data in a SQL or CSV file. A maximum of 10,000 rows of data can be exported.

📖 **NOTE**

- If the result set involves a view, you cannot edit the data.
- If the type of the result set is metadata, the data cannot be edited or displayed on multiple pages.
- If the result set involves multiple tables, you cannot edit the data.
- If the result set involves only one table and does not include all the primary key columns of the table or no primary key is found, you cannot edit the data.
- Virtual tables (for example, tables generated during SQL execution) cannot be edited.

----End

3.8.2.3 Executing SQL Plan

Scenarios

This section describes how to analyze the execution efficiency of the current SQL statement.

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**. On the displayed page, select a database from the navigation pane.

Step 2 Enter SQL statements in the SQL window and click **Execute SQL Plan**.

- On the **Executed SQL Statements** tab page, view the historical SQL executions.
- On the **Messages** tab page, view the execution information, including SQL splitting, execution status, and elapsed time.
- On the **Execution Plan** tab page, view the execution status for each SQL statement.

----End

3.8.2.4 SQL Favorites

Scenarios

DAS allows you to add frequently used SQL statements and view and manage SQL statements.

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**.

Step 2 In the SQL window, click **SQL Favorites**.

- **Add SQL Statement**: allows you to add your desired SQL statements. Specifically, specify the title and enter SQL statements as required, and then click **Save**.

- **Insert SQL Statement**: allows you to insert the SQL statements you have added. If there are no SQL statements stored, this option will not be displayed.

- **Manage SQL Statements**: allows you to manage frequently used SQL statements, including adding, editing, and deleting statements.

----End

3.8.2.5 SQL History

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL History**.

Step 2 On the displayed page, search for execution information about the target SQL statement by time range, database name, or keyword.

- To access the **Database Management** page, click a database name.

- To copy and use a SQL statement, click it in the **SQL Statement** column.

- To execute a SQL statement, click **Open in SQL Window** in the **Operation** column.

◻ **NOTE**

After you enable **Save Executed SQL Statements**, executed SQL statements will be recorded in the DAS management host.

----End

3.8.3 Database Management

Function Overview

Table 3-9 Functions

Function	Description
Database information	Displays the name, IP address, character set, and SQL window of the current database.
Schema list	Allows you to manage data with different schemas in a database.

Functio n	Description
Object list	Consists of five types of objects (tables, views, stored procedures, triggers, and functions).
Metada ta Collecti on	Allows DAS to automatically collects only the data such as database names, table names, and field names in an instance (user data in your tables is not included). **NOTE** If there are too many tables, the system will not collect the metadata and display the table list to mitigate the impact on database performance.
List details	Displays the operation area for each type of object.

☐ **NOTE**

You can go to the **Database Management** page in either of the following ways:

● Choose **Database Management** on the top menu bar.

● In the database list of the **Home** page, locate the target database and click **Manage** in the **Operation** column.

Object List

You can manage tables, views, stored procedures, triggers, and functions of Microsoft SQL Server databases. The main operations include creating, querying, and modifying objects.

● For details on how to manage tables, see **Table Management**.

● For details on how to manage views, see **View Management**.

● For details on how to manage stored procedures, see **Stored Procedure Management**.

● For details on how to manage triggers, see **Trigger Management**.

● For details on how to manage functions, see **Function Management**.

3.8.3.1 Table Management

3.8.3.1.1 Creating a Table

Scenarios

A data table consists of basic information, fields, indexes, foreign keys, and CHECK constraints, among which indexes, foreign keys, and CHECK constraints are optional. Configure these items as required.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Tables** and click **Create Table**.

Step 2 On the displayed **Basic Information** page, specify the table name, schema, table lock escalation, and comment. Click **Next**.

Step 3 On the **Column** page, click **Add** and set **Column Name**, **Type**, **Nullable**, **Primary Key**, and **Extended Information** as needed.

- If you do not need to add indexes, foreign keys, or CHECK constraints, click **Create**.

- If you need to add indexes, foreign keys, or CHECK constraints, click **Next** until all your desired parameters are specified. After the settings are complete, click **Create**.

Step 4 In the **SQL Preview** dialog box, click **Execute** to create a table.

----End

3.8.3.1.2 Opening a Table

Scenarios

If a table has primary keys, you can add, delete, modify, or query table data as you do in Excel.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Tables**, locate the target table, and click **Open** in the **Operation** column.

Step 2 On the table details page, double-click a cell to edit data. After adding or editing data, submit and save the changes.

Table 3-10 Functions

Item	Description
Where Condition	Filters records.
Copy Row	Copies data of the selected row. Specifically, double-click the target row and then click **Copy Row**.
Copy Column	Allows you to copy all data in a column by selecting this column from the **Copy Column** drop-down list.
Column Settings	Allows you to set the columns you want to display.
Refresh	Allows you to update table data manually.
Row Details	Shows the detailed information of a specified row.
Add	Allows you to add rows.
Submit	Allows you to submit and save the changes to data.
Delete Row	Allows you to delete the selected rows.

Item	Description
Export	Exports a maximum of 10,000 data records as CSV or SQL files.

----End

3.8.3.1.3 Viewing Table Details

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and click **View** in the **Operation** column.

Step 3 In the displayed dialog box, view basic table information and DDL information.

----End

3.8.3.1.4 Altering a Table

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and click **Alter** in the **Operation** column.

Step 3 Modify the table information as required. After the modification is complete, click **Alter**.

Step 4 In the **SQL Preview** dialog box, click **Execute**.

----End

3.8.3.1.5 Renaming a Table

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and click **Rename** in the **Operation** column.

Step 3 In the displayed dialog box, enter a new table name and click **OK**.

----End

3.8.3.1.6 Clearing a Table

> **NOTICE**
>
> Cleared tables cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and choose **More** > **Clear** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.8.3.1.7 Dropping a Table

> **NOTICE**
>
> Dropped tables cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** page, select **Tables**, locate the target table, and choose **More** > **Drop** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.8.3.2 View Management

3.8.3.2.1 Creating a View

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Views**, and click **Create View**.

Step 2 On the displayed page, click **Set Template Parameter**. In the displayed dialog box, set parameters as required and click **Apply Template**.

Step 3 Edit the view information. After the editing is complete, click **Save**.

----End

3.8.3.2.2 Dropping a View

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Views**, locate the target view, and click **Drop View** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.8.3.2.3 Opening a View

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Views**, locate the target view, and click **Open** in the **Operation** column.

Step 2 On the displayed page, check the view details directly or using **Where Condition**.

Table 3-11 Functions

Item	Description
Where Condition	Filters records.
Copy Row	Copies data of the selected row. Specifically, double-click the target row and then click **Copy Row**.
Copy Column	Allows you to copy all data in a column by selecting this column from the **Copy Column** drop-down list.
Column Settings	Allows you to set the columns you want to display.
Refresh	Allows you to update table data manually.
Row Details	Shows the detailed information of a specified row.
Export	Exports a maximum of 10,000 data records as CSV or SQL files. If you choose **Export** > **Export More**, the system directs you to the **Export** page, and you can create an export task or quickly export data.

□ NOTE

View data can be only queried, but not be edited, because views do not have primary keys.

----End

3.8.3.2.4 Altering a View

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Views**, locate the target view, and click **Alter** in the **Operation** column.

Step 2 Modify the view information as required and click **Save**.

----End

3.8.3.3 Stored Procedure Management

3.8.3.3.1 Creating a Stored Procedure

Overview

A stored procedure is a set of SQL statements used to implement specific functions. After being compiled, stored procedures are stored in databases. You can execute the stored procedures by specifying their names and related parameters.

Scenarios

A stored procedure consists of a set of SQL statements that can complete specific tasks or process complex services. This section describes how to create a stored procedure. You can use loop statements in a stored procedure to insert objects repeatedly.

Prerequisites

You have obtained the CREATE PROCEDURE permission.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Stored Procedures**, and click **Create Stored Procedure**.

Step 2 On the displayed page, click **Set Template Parameter**. In the displayed dialog box, set parameters as required and click **OK**.

Step 3 Click **Execute**. In the dialog box, set input parameters and click **Execute**.

Step 4 View the execution status on the **Message** and **Result Set** tab pages after the execution of the stored procedure.

----End

3.8.3.3.2 Altering or Executing a Stored Procedure

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Stored Procedures** on the left, locate the target procedure, and click **Alter or Execute** in the **Operation** column.

Step 2 On the displayed page, edit the content and click **Save**.

Step 3 Click **Execute**. In the displayed dialog box, set the input parameters and click **Execute**.

Step 4 View the execution status in the **Message** area.

----End

3.8.3.3.3 Dropping a Stored Procedure

NOTICE

Dropped stored procedures cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Stored Procedures** on the left, locate the target procedure, and click **Drop** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.8.3.3.4 Viewing Stored Procedure Details

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Stored Procedures**, locate the target stored procedure, and click **View Details** in the **Operation** column.

Step 2 In the displayed dialog box, view the stored procedure details.

----End

3.8.3.4 Trigger Management

3.8.3.4.1 Creating a Trigger

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, choose **DB Triggers**, and click **Create Trigger**.

Step 2 On the displayed page, click **Set Template Parameter**. In the displayed dialog box, set parameters as required and click **OK**.

Step 3 Edit the content and click **Save**.

----End

3.8.3.4.2 Altering a Trigger

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **DB Triggers**, locate the target trigger, and click **Alter** in the **Operation** column.

Step 2 On the displayed page, edit the content and click **Save**.

----End

3.8.3.4.3 Dropping a Trigger

NOTICE

Dropped triggers cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Triggers**, locate the target trigger, and click **Drop** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.8.3.5 Function Management

3.8.3.5.1 Creating a Function

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Functions**, select a schema, and click **Create Function**.

Step 2   In the displayed dialog box, select a function type and click **OK**.

Step 3   On the displayed page, click **Set Template Parameter**. In the displayed dialog box, set parameters as required and click **OK**.

Step 4   Click **Save** to complete the creation, or click **Execute** to invoke the function and view the result in the **Message** area.

----End

3.8.3.5.2 Altering or Executing a Function

Procedure

Step 1   On the top menu bar, choose **Database Management**. On the **Objects** page, select **Functions**, locate the target function, and click **Alter or Execute Function** in the **Operation** column.

Step 2   On the displayed page, modify the content as required. Then, click **Save** to complete the modification, or click **Execute** to invoke the function.

Step 3   View the execution result.

----End

3.8.3.5.3 Dropping a Function

> **NOTICE**
>
> Dropped functions cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1   On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Functions**, locate the target function, and click **Drop Function** in the **Operation** column.

Step 2   In the displayed dialog box, click **Yes**.

----End

3.8.3.5.4 Viewing Function Details

Procedure

Step 1   On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Functions**, locate the target function, and click **View Function** in the **Operation** column.

Step 2   In the displayed dialog box, view the function details.

----End

3.8.4 Import and Export

3.8.4.1 Data Import

Scenarios

Import data into a table for backup or migration. If you import a CSV or SQL file, the file must have the same data type as the target table.

Constraints

- Only one file that is no larger than 1 GB can be imported at a time.
- Binary fields such as BINARY, VARBINARY, TINYBLOB, BLOB, MEDIUMBLOB, and LONGBLOB are not supported.

Procedure

Step 1 On the top menu bar, choose **Import and Export** > **Import**.

Step 2 Import a file from your local PC or an OBS bucket.

- From your local PC

In the upper left corner, click **Create Task**. On the displayed page, select an import type, select **Upload file** for **File Source**, set the attachment storage, and upload the file. Then, set other parameters as required.

📖 **NOTE**

- To keep your data secure, provide your own OBS bucket to store the attachments you upload. In this way, DAS automatically connects to your OBS bucket for in-memory reading.
- If you select **Delete the uploaded file upon an import success**, the file you upload will be automatically deleted from the OBS bucket after being imported to the destination database.

- From an OBS bucket

In the upper left corner, click **Create Task**. On the displayed page, select an import type, select **Choose from OBS** for **File Source**, and select a file from the bucket. Then, set other parameters as required.

📖 **NOTE**

The file uploaded from an OBS bucket will not be deleted upon an import success.

Step 3 After the settings are complete, click **Create**. Confirm the information again before you click **OK** because original data may be overwritten after data import.

Step 4 View the import progress in the task list or check task details.

----End

3.8.4.2 Data Export

Scenarios

DAS allows you to export a large amount of data at a time to facilitate data query or to back up data for migration. This section describes how to export data.

Procedure

Step 1 On the top menu bar, choose **Import and Export** > **Export**.

Step 2 On the displayed page, click **Create Task** and choose **Export Database** or **Export SQL Result** as required. The following takes database export as an example.

Alternatively, you can click **Quick Export** to export the specified database information quickly.

Step 3 On the displayed page, set parameters as required in areas **Basic Information** and **Advanced Settings**. Then, select the tables to be exported on the right.

Step 4 After settings are complete, click **OK**.

Step 5 In the task list, view the task ID, type, status, and progress.

Step 6 Click **Details** in the **Operation** column to view task details.

----End

3.8.5 Account Management

3.8.5.1 Creating a Login Name

Scenarios

You can create login accounts with different permissions for databases to improve data management security.

Procedure

Step 1 On the top menu bar, choose **Account Management** > **Login Name**.

Step 2 On the displayed page, click **Create Login Name**. Set parameters on the **Basic Settings**, **Server Roles**, **User Mapping**, **Securables**, and **Status** pages by referring to **Table 3-12**, and click **Save**.

Table 3-12 Login name information

Parameter	Description
Login Name	Name of the account for logging in to the instance
Authentication Type	Select **Microsoft SQL Server Authentication** by default.

Parameter	Description
Password	Password of the login account. The password: • Can contain 8 to 128 characters. • Must contain at least three types of lowercase letters, uppercase letters, digits, and the following special characters: ~!@#%^*-_=+?$ • Cannot contain the login name. • Cannot be a weak password.
Confirm Password	-
Enforce Password Policy	If you select this option, the password must meet security rules of the SQL Server instance.
Default Database	Database that is logged in by default
Default Language	Default language of the database
Server Role	Configure server roles for the login name.
User Mapping	Configure specific permissions for the login name on specific databases.
Securables	Configure server-level permissions for the login name.
Status	If you select **Enable**, you allow the login name to log in to the current instance. If you select **Disable**, you do not allow the login name to log in to the instance.

Step 3 Click **Back to Login Name List** and view the newly-added login name.

Step 4 In the login name list, edit, rename, or delete the created login names as required.

----End

3.8.5.2 Database User Management

Procedure

Step 1 On the top menu bar, choose **Account Management** > **Database User Management**.

Step 2 On the displayed page, select a database and click **Create User**.

Step 3 Configure parameters on **Basic Settings**, **Owned Schemas**, **Membership**, and **Securables** pages by referring to **Table 3-13**, and click **Save**.

Table 3-13 Database user information

Parameter	Description
User Type	You can select **SQL user with login** or **SQL user without login**. Users without login names cannot log in, but they can be assigned permissions.
Username	Name of the database user
Login Name	Login name associated with the database user. When the database user logs in to a database using the login name, the permissions of the login name are also the permissions of the database user.
Default Schema	The first schema that the server searches for when it resolves object names for this database user
Owned Schemas	All schemas owned by the database user
Membership	All roles owned by the database user. If a user has a role, it has all permissions of the role.
Securables	The database user's specific permissions on database objects

Step 4 In the displayed **SQL Preview** dialog box, click **OK**.

Step 5 In the user management list, edit, rename, or delete the created users.

----End

3.8.5.3 Database Role Management

Procedure

Step 1 On the top menu bar, choose **Account Management** > **Database Role Management**.

Step 2 On the displayed page, select a database and click **Create Role**.

Step 3 On the displayed page, configure parameters on the **Basic Settings**, **Owned Schemas**, **Role Member**, and **Securables** pages by referring to **Table 3-14**.

Table 3-14 Database role information

Parameter	Description
Role Name	Name of the database role
Owner	Owner of the role
Owned Schemas	All schemas owned by the database role

Parameter	Description
Role Member	Database users that own the role. If a user has a role, it has all permissions of the role.
Securables	The role's specific permissions on database objects

Step 4 Click **Save**. In the displayed **SQL Preview** dialog box, click **OK**.

Step 5 In the role management list, view information of database roles.

----End

3.9 PostgreSQL DB Instance Management (Development Tool)

3.9.1 Homepage

3.9.1.1 Overview

Logging In to a DB Instance

Step 1 Obtain the login permission and log in to the DAS console.

Step 2 In the login list of Development Tool, locate the DB instance you want to log in to and click **Log In** in the **Operation** column.

----End

Function Overview

Table 3-15 Functions

Function	Description
Top menu bar	• SQL Operations • Database Management • Import and Export • Account Management
Account information and logout	Displays the current account information and a logout button.
DB instance information	Displays the current database information, such as the DB engine logo, DB instance name, and DB engine version.

Function	Description
Database list	Displays the databases of the current DB instance, including user databases and system databases. Allows you to search for a database by name. Allows you to create databases.

3.9.1.2 Creating a Database

Procedure

Step 1 In the database list of the **Home** page, click **Create Database**.

Step 2 On the displayed page, enter a database name and select a character set.

📖 **NOTE**

You can execute the following SQL statement to query system table **pg_collation** and view character sets and their corresponding collations and collation types:

select pg_encoding_to_char(collencoding) as encoding,collname,collcollate,collctype from pg_collation ;

Step 3 Click **OK**. The database you create appears in the database list.

----End

3.9.1.3 Dropping a Database

Procedure

Step 1 In the database list, locate the database you want to delete and click **Delete** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.9.2 SQL Operations

3.9.2.1 SQL Window

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**.

Step 2 In the navigation pane, select a database, and then specify a table or view.

- **Execute SQL**: executes SQL statements.
- **Execute SQL Plan**: reports the execution of SQL statements to facilitate troubleshooting and optimize SQL processing performance.

- **SQL Favorites**: allows you to add, view, and manage frequently used SQL statements.
- **Format SQL**: improves the readability of SQL statements. Formatting SQL statements enables statements to be displayed in line break mode, but does not change their logic and semantics.

    The formatting takes effect for all the SQL statements in the SQL window. You cannot format only the selected statements.
- **SQL Input Prompt**: helps you to select your desired database, table, or field name as prompted to quickly enter statements in the SQL window.
- Overwrite/Append Mode:
    - **Append Mode:** Each time a SQL statement is executed, the new result set is appended to the previous one.
    - **Overwrite Mode**: Each time a SQL statement is executed, the new result set overwrites the previous one.
- **Full Screen**: shows SQL statements on a full screen.

Step 3 After SQL statements are executed, view SQL execution status on the **Executed SQL Statements**, **Messages**, and **Result Set** tab pages.

----End

3.9.2.2 Executing SQL Statements

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**. In the SQL window, select a database and a schema from the navigation pane.

Step 2 Enter SQL statements in the SQL window and click **Execute SQL**.

- You are advised to enable **SQL Input Prompt**. It helps you to select your desired database, table, or field name as prompted to quickly enter statements in the SQL window.
- To execute multiple SQL statements at a time, separate them using semicolons (;). In this case, click **Full Screen** to view the logics in SQL statements clearly.
    - To execute some of the SQL statements, select the statements before executing them.
    - To execute all the SQL statements, do not select any SQL statements or select all of them.

Step 3 View the executed SQL statements and the current execution status in the lower part of the page. On the **Messages** tab page, view the execution information, including SQL splitting, execution status, and elapsed time.

Step 4 On the **Result Sets** tab, view the execution details. You can perform the following operations on the result sets:

- **Copy Row**/**Copy Column**: copies a row or column for reuse.
- **Column Settings**: customizes the columns to display when there are a large number of columns in the query result.
- **Refresh**: refreshes the changed data.

- **Row Details**: displays the column field name, value, and type of the selected row.

----End

3.9.2.3 Executing the SQL Plan

Scenarios

This section describes how to analyze the execution efficiency of the current SQL statement.

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**. On the displayed page, select a database and a schema from the navigation pane.

Step 2 Enter SQL statements in the SQL window and click **Execute SQL Plan**.

- On the **Executed SQL Statements** tab page, view the historical SQL executions.

- On the **Messages** tab page, view the execution information, including SQL splitting, execution status, and elapsed time.

- On the **Execution Plan** tab page, view the execution status for each SQL statement.

----End

3.9.2.4 SQL Favorites

Scenarios

DAS allows you to add frequently used SQL statements and view and manage SQL statements.

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL Window**.

Step 2 In the SQL window, click **SQL Favorites**.

- **Add SQL Statement**: allows you to add your desired SQL statements. Specifically, specify the title and enter SQL statements as required, and then click **Save**.

- **Insert SQL Statement**: allows you to insert the SQL statements you have added. If there are no SQL statements stored, this option will not be displayed.

- **Manage SQL Statements**: allows you to manage frequently used SQL statements, including adding, editing, and deleting statements.

----End

3.9.2.5 SQL History

Procedure

Step 1 On the top menu bar, choose **SQL Operations** > **SQL History**.

Step 2 On the displayed page, search for execution information about the target SQL statement by time range, database name, or keyword.

- To access the **Database Management** page, click a database name.
- To copy and use a SQL statement, click it in the **SQL Statement** column.
- To execute a SQL statement, click **Open in SQL Window** in the **Operation** column.

   📖 **NOTE**

    After you enable **Save Executed SQL Statements**, executed SQL statements will be recorded in the DAS management host.

----End

3.9.3 Database Management

Function Overview

Table 3-16 Functions

Function	Description
Database information	Displays the name, IP address, character set, and SQL window of the current database.
Schema list	Allows you to manage data with different schemas in a database.
Object list	Consists of five types of objects, respectively tables, views, stored procedures, triggers, and sequences.
Metadata Collection	Allows DAS to automatically collects only the data such as database names, table names, and field names in an instance (user data in your tables is not included). **NOTE** If there are too many tables, the system will not collect the metadata and display the table list to mitigate the impact on database performance.
List details	Displays the operation area for each type of object.

📖 **NOTE**

> You can go to the **Database Management** page in either of the following ways:
> - Choose **Database Management** on the top menu bar.
> - In the database list of the **Home** page, locate the target database and click **Manage** in the **Operation** column.

Object List

You can manage tables, views, stored procedures, triggers, and sequences of PostgreSQL databases. Graphical windows for creating objects are not available. To create new objects, execute SQL statements in the SQL window.

- For details on how to manage tables, see **Table Management**.
- For details on how to manage views, see **View Management**.
- For details on how to manage stored procedures, see **Stored Procedure Management**.
- For details on how to manage triggers, see **Trigger Management**.
- For details on how to manage sequences, see **Sequence Management**.

3.9.3.1 Table Management

3.9.3.1.1 Opening a Table

Scenarios

Tables in PostgreSQL databases cannot be edited because the tables do not have primary keys.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Tables** on the left, locate the target table, and click **Open** in the **Operation** column.

Step 2 On the table details page, set the number of rows to display as required. You can also copy and reuse rows and columns.

Table 3-17 Functions

Item	Description
Where Condition	Filters records.
Copy Row	Copies data of the selected row. Specifically, double-click the target row and then click **Copy Row**.
Copy Column	Allows you to copy all data in a column by selecting this column from the **Copy Column** drop-down list.
Column Settings	Allows you to set the columns you want to display.

Item	Description
Refresh	Allows you to update table data manually.
Row Details	Shows the detailed information of a specified row.

----End

3.9.3.1.2 Viewing Table Details

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Tables**, locate the target table, and click **View** in the **Operation** column.

Step 3 In the displayed dialog box, view basic table information.

----End

3.9.3.2 View Management

3.9.3.2.1 Opening a View

Scenarios

Views in PostgreSQL databases cannot be edited because the views do not have primary keys.

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Views** on the left, locate the target view, and click **Open** in the **Operation** column.

Step 2 Check the view information on the details page or click **Where Condition**.

Table 3-18 Functions

Item	Description
Where Condition	Filters records.
Copy Row	Copies data of the selected row. Specifically, double-click the target row and then click **Copy Row**.
Copy Column	Allows you to copy all data in a column by selecting this column from the **Copy Column** drop-down list.
Column Settings	Allows you to set the columns you want to display.

Item	Description
Refresh	Allows you to update table data manually.
Row Details	Shows the detailed information of a specified row.

----End

3.9.3.2.2 Obtaining View Details

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Views** on the left, locate the target view, and click **View Details** in the **Operation** column.

Step 3 In the displayed dialog box, view the SQL statement used to create the view.

----End

3.9.3.3 Stored Procedure Management

3.9.3.3.1 Viewing Stored Procedure Details

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Stored Procedures**.

Step 2 In the right pane, click **View Details**.

----End

3.9.3.4 Trigger Management

3.9.3.4.1 Viewing Trigger Details

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Triggers**.

Step 2 In the right pane, click **View Details** to view the SQL statement used to create the trigger.

----End

3.9.3.5 Sequence Management

3.9.3.5.1 Viewing Sequence Details

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab, choose **Sequences**.

Step 2 In the right pane, click **View Details**.

----End

3.9.4 Import and Export

3.9.4.1 Data Import

Scenarios

Import data into a table for backup or migration. If you import a CSV or SQL file, the file must have the same data type as the target table.

Constraints

- Only one file that is no larger than 1 GB can be imported at a time.
- Binary fields such as BINARY, VARBINARY, TINYBLOB, BLOB, MEDIUMBLOB, and LONGBLOB are not supported.

Procedure

Step 1 On the top menu bar, choose **Import and Export** > **Import**.

Step 2 Import a file from your local PC or an OBS bucket.

- From your local PC

In the upper left corner, click **Create Task**. On the displayed page, select an import type, select **Upload file** for **File Source**, set the attachment storage, and upload the file. Then, set other parameters as required.

For security purposes, imported files are stored in OBS buckets.

📖 NOTE

- To keep your data secure, provide your own OBS bucket to store the attachments you upload. In this way, DAS automatically connects to your OBS bucket for in-memory reading.
- If you select **Delete the uploaded file upon an import success**, the file you upload will be automatically deleted from the OBS bucket after being imported to the destination database.

- From an OBS bucket

In the upper left corner, click **Create Task**. On the displayed page, select an import type, select **Choose from OBS** for **File Source**, and select a file from the bucket. Then, set other parameters as required.

📖 **NOTE**

The file uploaded from an OBS bucket will not be deleted upon an import success.

Step 3 After setting the import parameters, click **Create**. Confirm the information again before you click **OK** because original data may be overwritten after data import.

Step 4 View the import progress in the task list or check task details.

----End

3.9.4.2 Data Export

Scenarios

DAS allows you to export a large amount of data at a time to facilitate data query or to back up data for migration. This section describes how to export data.

Procedure

Step 1 On the top menu bar, choose **Import and Export** > **Export**.

Step 2 On the displayed page, click **Create Task** and choose **Export Database** or **Export SQL Result** as required. The following takes database export as an example.

Alternatively, click **Quick Export** and select the target database. On the displayed page, select a storage path and click **OK**.

Step 3 On the displayed page, set parameters as required in areas **Basic Information** and **Advanced Settings**. Then, select the tables to be exported on the right.

📖 **NOTE**

- In a SQL result export task, the executed SQL statements cannot exceed 5 MB.
- Databases are classified into user databases and system databases. System database cannot be exported. If system database data is required, deploy system database services in a created user database, so that you can export the system database data from the user database.
- DAS connects to your standby database to export data. This prevents the primary database from being affected by data export. However, if the standby database has a high replication delay, the exported data may not be the latest.

Step 4 After settings are complete, click **OK**.

Step 5 In the task list, view the task ID, type, status, and progress.

Step 6 Click **Details** in the **Operation** column to view task details.

----End

3.9.5 Account Management

3.9.5.1 Role Management

Procedure

Step 1 On the top menu bar, choose **Account Management** > **Role Management**.

Step 2 On the role management page, click **Create Role** in the upper left corner.

Step 3 On the **Basic Settings** tab page, enter a role name (mandatory) and specify other parameters as required. Ensure that all the settings are correct and click **Save**. In the displayed SQL preview window, confirm the settings again and click **OK** to create the role.

Step 4 (Optional) On the **Role Groups** tab page, select the check boxes in columns **Grant** and **With Grant Option** as needed. Then click **Save** and confirm the settings.

Step 5 (Optional) On the **Permissions** tab page, click **Add**, select the object type and corresponding column settings from the drop-down lists, and then click **Save** and confirm the settings.

Step 6 On the role management page, edit existing roles if needed. For how to edit a role, see **3** to **5**. Delete existing roles if needed. Deleted roles cannot be restored. Exercise caution when performing this operation.

----End

3.10 DDS DB Instance Management (Development Tool)

3.10.1 Homepage

3.10.1.1 Overview

Logging In to a DB Instance

Step 1 Obtain the login permission and log in to the DAS console.

Step 2 In the login list of Development Tool, choose **DDS DB instances** from the drop-down list, locate the DB instance you want to log in to, and click **Log In** in the **Operation** column.

----End

Function Overview

Table 3-19 Functions

Function	Description
Top menu bar	Provides entries to functional modules such as command operation, database management, and account management.
Account information and logout	Displays the current account information and a logout button.
DB instance information	Displays the current database information, such as the DB engine logo, DB instance name, and DB engine version.
Database list	Displays the databases of the current DB instance, including user databases and system databases. ● Allows you to search for a database by name. ● Allows you to create databases.

3.10.1.2 Creating a Database

Procedure

Step 1 In the database list of the **Home** page, click **Create Database**.

Step 2 On the displayed page, enter the database name and collection name (optional).

Step 3 Click **OK**. The database you create appears in the database list.

----End

3.10.1.3 Dropping a Database

Procedure

Step 1 In the database list, locate the database you want to delete and click **Drop** in the **Operation** column.

Step 2 In the displayed dialog box, click **Yes**.

----End

3.10.2 Command Operation

DAS manages database collections and views through SQL statements, facilitating user operations.

3.10.2.1 Command Window

Procedure

Step 1 On the top menu bar, choose **Command Operation** > **Command Window**.

Step 2 In the displayed text box, enter the commands you want to execute and click **Execute Command**.

Step 3 In the lower part of the page, view the execution results.

- On the **Executed Commands** tab page, view the details about the commands that have been executed.

- On the **Messages** tab page, view the execution results (successful or failed) and execution duration of current commands.

📖 **NOTE**

- Currently, the **db.collection.aggregate()** command is not supported. You can run the **db.runCommand** command instead. The following is an example about how to use syntax:

```
db.runCommand({
    aggregate: "collection",
    pipeline: [{
        "$match": {
            "time": {
                "$gte": 20.0
            }
        }
    },
    {
        "$sort": {
            "time": -1.0
        }
    }
    ]
});
```

- You can execute SQL commands in either of the following ways:

  – **Append Mode:** Each time a command is executed, the new result set is appended to the previous one.

  – **Overwrite Mode**: Each time a command is executed, the new result set overwrites the previous one.

----End

3.10.2.2 Command History

Prerequisites

- You have run SQL commands in the command window.
- You have enabled **Save Executed Commands** in the command window.

Procedure

Step 1 On the top menu bar, choose **Command Operation** > **Command History**.

Step 2 In the command execution list, view the execution records.

- You can search execution records by time range, database name, or command keyword.
- **Database name**: Click a database name to go to the database management page.
- **SQL Statement**: Click a statement to view or copy it.
- **Open in command window**: Click it to view the executed commands in a window for easy view and use.

----End

3.10.3 Database Management

Function Overview

Table 3-20 Functions

Function	Description
Sidebar	Offers two types of objects, collections and views.
Database information	Displays the name, IP address, and command window of the current database.
Object list	**Collections**: list the validation rule, including the validation level and action. **Views**: allow different validations by setting pipeline phases and collations.

📖 **NOTE**

You can go to the **Database Management** page in either of the following ways:

- Choose **Database Management** on the top menu bar.
- In the database list of the **Home** page, locate the target database and click **Manage** in the **Operation** column.

3.10.3.1 Collection Management

3.10.3.1.1 Creating a Collection

Prerequisites

You have logged in to a DDS DB instance and created a database.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the **Collections** tab page, click **New Collection**.

Step 3 On the displayed page, enter the collection name. Select **Capped collection**, **Auto index**, and **No padding** as required.

- **Capped collection**: Set the maximum number of bytes and the maximum number of documents. If the specified value is reached, an error is reported. The value specified must be greater than 0.

- **Auto index**: Automatically create an index on the **_id** field.

- **No padding**: A storage policy that does not reserve storage space for the growth of a record when inserting it.

Step 4 Enter the validation rule, and set **Validation Level** and **Validation Action**.

📖 NOTE

- Options for **Validation Level** include:
  - **strict**: a strict validation level.
  - **moderate**: a moderate validation level.
  - **off**: no validation level.

- Options for **Validation Action** include:
  - **error**
  - **warn**

Step 5 Ensure that all the settings are correct and click **OK**. The collection you create appears in the collection list, and you can perform operations on it.

----End

3.10.3.1.2 Opening a Collection

Prerequisites

You have logged in to a DDS DB instance, created a database, and created a collection in the database.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab page, choose **Collections**, locate the target collection, and click **Open Collection** in the **Operation** column.

Step 3 Set parameters **Query**, **Projection**, **Sort**, **Limit**, and **Skip** to query the documents in the current collection.

On the **JSON** tab page, view the filtered documents. To facilitate viewing, DAS allows you to view the documents in Table and Tree mode.

📖 NOTE

- **Query**: uses the query operator to specify the filter.
- **Projection**: specifies the fields that matched with the query filter in the document to return.
- **Sort**: defines the sorting order.
- **Limit**: specifies the maximum number of documents that can be returned.
- **Skip**: specifies the number of skipped documents.

Step 4 Click **Create Document**. On the displayed page, enter a valid JSON file and click **Save**.

----End

3.10.3.1.3 Altering Validator

Prerequisites

You have logged in to a DDS DB instance, created a database, and created a collection in the database.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Collections**, locate the target collection, and click **Alter Validator** in the **Operation** column.

Step 3 On the displayed **Alter Validator** page, confirm the validation rule, and set the validation level and action.

Step 4 Click **OK**.

----End

3.10.3.1.4 Renaming a Collection

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Collections**, locate the target collection, and click **Rename** in the **Operation** column.

Step 3 On the displayed page, set a new name for the collection and click **OK**.

----End

3.10.3.1.5 Clearing a Collection

NOTICE

Cleared collections cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Collections**, locate the target collection, and click **Clear** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.10.3.1.6 Dropping a Collection

> **NOTICE**
>
> Dropped collections cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Collections**, locate the target collection, and click **Drop** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.10.3.1.7 Creating an Index

Prerequisites

You have logged in to a DDS DB instance and created a database and a collection in the database.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 Choose **Collections** in the navigation pane. Under the collection list, click **New Index**.

Step 3 On the displayed page, enter an index name, add an index key, and click **Save**.

> **NOTE**
>
> If you do not select **Background** for **Advanced Settings**, the following dialog box is displayed.

----End

3.10.3.1.8 Editing an Index

Prerequisites

You have logged in to a DDS DB instance and created a database, a collection, and an index.

Procedure

Step 1 Choose **Collections** in the navigation pane. In the index list, locate the collection whose index you want to edit, and click ╪ before the index name.

Step 2 Locate the index that you want to edit and click **Edit** in the **Operation** column.

Step 3 Click **Save**.

----End

3.10.3.1.9 Deleting an Index

Prerequisites

You have logged in to a DDS DB instance and created a database, a collection, and an index.

Procedure

Step 1 Choose **Collections** in the navigation pane. In the index list, locate the collection whose index you want to edit, and click ╪ before the index name.

Step 2 Locate the index that you want to delete and click **Delete** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.10.3.2 View Management

3.10.3.2.1 Creating a View

Prerequisites

You have logged in to a DDS DB instance and created a database.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Views**, and click **Create View**.

Step 3 On the displayed page, enter the view name and collection name.

Step 4 On the **Aggregation Pipeline** tab, click **Add Pipeline Stage**. On the displayed page, select an operator, edit the expression, and click **Save**.

The aggregation pipeline you create appears in the list, and you can edit, delete, move up, or move down it.

Step 5 On the **Collation** tab, click **Custom Collation** and set collation rules as needed.

Step 6 After setting the view information, click **Save**.

----End

3.10.3.2.2 Opening a View

Prerequisites

You have logged in to a DDS DB instance, created a database, and created a view in the database.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Views**, locate the target view, and click **Open** in the **Operation** column.

Step 3 Set parameters **Query**, **Projection**, **Sort**, **Limit**, and **Skip** to query the documents in the current view.

On the **JSON** tab page, view the filtered documents.

> 📖 **NOTE**
>
> To facilitate viewing, DAS allows you to view documents in Table and Tree mode.

----End

3.10.3.2.3 Editing a View

Prerequisites

You have logged in to a DDS DB instance, created a database, and created a view in the database.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Views**, locate the target view, and click **Edit** in the **Operation** column.

Step 3 On the displayed page, change the collection name.

Step 4 Edit the aggregation pipeline and collation rule if need. For details, see **Creating a View**.

Step 5 After editing the view information, click **Save**.

----End

3.10.3.2.4 Dropping a View

Prerequisites

You have logged in to a DDS DB instance, created a database, and created a view in the database.

NOTICE

Dropped views cannot be recovered. Exercise caution when performing this operation.

Procedure

Step 1 On the top menu bar, choose **Database Management**.

Step 2 On the displayed **Objects** tab, choose **Views**, locate the target view, and click **Drop** in the **Operation** column.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.10.4 Account Management

3.10.4.1 User Management

Scenarios

You have logged in to a DDS DB instance.

Creating a User

Step 1 On the top menu bar, choose **Account Management** > **User Management**.

Step 2 Select the database for which a user is to be created and click **Create User**.

Step 3 On the displayed page, enter the username and password, and confirm the password.

Step 4 In the lower part of the page, click **Add Role**. On the displayed page, select roles for the database.

NOTE

If you assign a role from another database to this created user, the user has the operation permissions on that database.

Step 5 After setting required parameters, click **Save**. In the preview dialog box, click **OK**.

----End

Editing a User

The procedure for editing a user is the same as that for creating a user. For details, see **Creating a User**.

Deleting a User

Step 1 On the top menu bar, choose **Account Management** > **User Management**.

Step 2 In the user list, locate the user you want to delete and click **Delete**.

Step 3 In the displayed dialog box, click **Yes**.

----End

3.10.4.2 Role Management

Scenarios

You have logged in to a DDS DB instance.

Procedure

Step 1 On the top menu bar, choose **Account Management** > **Role Management**.

Step 2 Select the database for which the roles are to be created and click **Add Roles**.

Step 3 Enter the role name. On the **Permission** tab, click **Add Privileges**. On the displayed page, specify required parameters and click **Add**.

Step 4 On the **Role** tab page, click **Add Roles**. On the displayed page, select the roles you want to add and click **Add**.

Step 5 After setting the roles, click **Save**.

📖 NOTE

- If a role is created for the admin database, you can select other databases when adding privileges or roles, to grant the permissions of other databases to this role. Users with this role have the permissions to operate the selected database.

----End

3.11 Enterprise Change Approval

3.11.1 Introduction

3.11.1.1 What Is Enterprise Change Approval

Overview

Enterprise Change Approval is a database DevOps console designed for secure database access and operations as well as collaboration between system

administrators, DBAs, and users. By combining automatic change risk detection and permission approval processes, Enterprise Change Approval keeps data change secure and improves development efficiency. For enterprises, Enterprise Change Approval is a much better choice.

☐ NOTE

Enterprise Change Approval is only available to the accounts that are using it and will not be updated any longer.

Highlights

- DB instances are added by DBAs. Developers no longer have access to database usernames and passwords.

- Approval processes can be customized based on the enterprise business features and management needs. Operation permissions, such as data query and structure modification, can be granted at the minimum level of database.

- Each database has an owner role, which is designed for the business supervisor. User with this role can manage the access permissions to the database.

- All the operations, including user login, SQL query, and data modification, can be audited.

- The maximum number of rows returned in each SQL query can be customized for each database.

- During data modification, rows containing the modified data can be automatically backed up.

- The number of rows affected by the modification can be automatically verified to prevent developers from executing unexpected SQL statements.

- Data fields can be masked or tagged with sensitivity labels to protect the core data.

- With the customized approval process, DBAs can grant SQL modification permissions to developers and service owners so that DBAs can focus on valuable works and the development efficiency is improved.

3.11.1.2 User Roles

Roles

Enterprise Change Approval has the following user roles: system administrator, DBA, and common user. Each database has an owner role.

System Administrator

Usually the enterprise administrator. By default, the system administrator is the user who enables the account and is responsible for managing users of this enterprise, for example adding DBAs and developers to this enterprise.

DBA

Usually the enterprise database DBAs. DBAs are responsible for adding instances, customizing approval processes for instance or database operations, and approving modification tickets submitted by developers.

Common User

Usually the enterprise developers. Common users must apply for desired permissions before performing any operation on enterprise databases.

📖 NOTE

A database owner is a system role but also a common user. It is responsible for approving permission and data modification applications.

3.11.1.3 Scenarios

System Administrator

If you are the system administrator, perform the following operations after purchasing Enterprise Change Approval:

Step 1 On the **Home** page, choose **System Management** > **User Management** on the top menu bar.

Step 2 On the **User Management** page, click **Add User** to add DBAs.

Step 3 On the **User Management** page, add common users according to the preceding steps. For more information, see **User Management**.

----End

DBA

If you are a DBA, perform the following operations:

Step 1 Define an approval process. For details, see **Adding an Approval Process**.

Step 2 Add instances. For details, see **Instance Management**.

Step 3 Configure an OBS bucket. For details, see **Global Configuration Management**.

----End

Common User

Step 1 Apply for database permissions. For details, see **Creating a Ticket**.

Step 2 Execute SQL statements. For details, see **SQL Window**.

----End

3.11.2 Enabling Enterprise Change Approval

Enterprise Change Approval is not provided as a tenant-level resource and is not shared among IAM users of the same tenant if not configured.

Users can view only the enterprises they have joined. You can access a desired enterprise and choose **System Management** > **User Management** to manage users, such as synchronizing IAM users.

Procedure

Step 1 In the navigation pane on the left, choose **Enterprise Change Approval**.

📖 **NOTE**

- Currently, only MySQL and GaussDB(for MySQL) DB instances are supported.
- Enterprise quota can be upgraded only. Select a proper instance quantity.

Step 2 After the settings are complete, click **Create Now** in the lower part of the page.

Step 3 On the displayed page, confirm the settings.

- If you need to modify the settings, click **Previous** to modify parameters.
- If all the settings are correct, click **Submit** and pay for the order.

Step 4 After the payment is complete, view the enterprise information, such as the administrator, quota, joining time, and creation time, on the **Enterprise Change Approval** page.

Step 5 If you access an enterprise for the first time by clicking **Access**, a page will be displayed for you to set the enterprise name. Enter a name and click **OK**. You can also click ✎ to change the enterprise name.

Step 6 Click **Access**. On the displayed **Home** page, perform operations as required.

----End

3.11.3 Home Page

With database-level permissions management and approval processes, Enterprise Change Approval provides you with data protection, change approval, operation audit, and self-service development, helping you manage a large scale of databases with standardized management.

Process

Enterprise Change Approval keeps your data secure and reliable with approaches, like data access management, sensitive data protection, and permissions management.

Figure 3-2 Process

Home page

Function	Description
Top menu bar	Provides an entry to tickets, instances, databases, sensitive columns, SQL window, database management, data schemes, and system management.
Account information and logout	Displays the current account information and a logout button.
Basic information	Displays the enterprise name, current specification, added instances, and instance expiration date. It also includes upgrade and renew specification entries.
Operation guide and quick links	Displays the usage process of Enterprise Change Approval and offers quick links to database permission application and SQL window.
Ticket information	Displays tickets pending your approval, your tickets, and your approvals.
My favorites and recently used	Allows you to add databases to your favorites to facilitate usage.

3.11.4 Tickets

3.11.4.1 Creating a Ticket

Scenarios

Tickets are classified into five types: permission application, sensitive column deletion, SQL modification, data import, and data export.

📖 **NOTE**

- If you are a common user, apply for database permissions first.
- SQL modification mainly involves the execution of DML and DDL statements.

Procedure

Step 1 On the top menu bar, in the upper left corner, choose **Tickets**.

Step 2 In the upper right corner of the page, click **Create Ticket**. The following steps use **Request SQL Modification** as an example to describe how to create a ticket. The operations for creating other types of tickets are similar.

Step 3 On the displayed **Create Ticket** page, select **Request Permissions on Databases** and click **OK** to go to the database permission application page.

Step 4 On the displayed page, click **Add**. On the displayed page, filter databases by environment type and DB engine. Select your required database and click **OK**.

Step 5 Set parameters **Permissions** and **Duration**, and enter the application reason.

Step 6 Ensure that the settings are correct and click **Submit**. The system automatically processes the application according to the approval process set in advance.

----End

3.11.5 Instances/Databases/Sensitive Columns

3.11.5.1 Instances

Procedure

Step 1 On the top menu bar, choose **Instance/Databases/Sensitive Columns** > **Instances**.

Step 2 View instances in the instance list.

Step 3 Locate the target instance and click **View Database** in the **Operation** column.

----End

3.11.5.2 Databases

Database permission types are classified into database permission, database owner, and database DBA.

Request for Permissions

☐ NOTE

- The database permissions you apply for this time will overwrite the existing database permissions.
- The application cannot be submitted repeatedly for the database being approved. Submit a new application after the current application is approved.

Step 1 On the top menu bar, choose **Instance/Databases/Sensitive Columns** > **Databases**.

Step 2 In the database list, click **Request for Permissions**.

Step 3 Click **Add**. On the displayed page, select the databases you want to request permissions and click **OK**.

Step 4 Select a permission type (Database Permission, Database Owner, or Database DBA).

Step 5 Set **Permissions**, **Duration**, and **Application Reason**. Click **Submit**.

☐ NOTE

Query: data query, used for SQL window query and table data query.

Data modification: data writes used for data modifications.

Structure modification: structure modifications used for table structure modification.

O&M: O&M writes, such as grant, kill, and other operations.

High-risk operation: operations involving physical deletion, such as dropping databases or stables, truncating tables, and dropping tables.

Step 6 In the database list, click **Permissions Details** to view the details and click **Manage** to go to the database management page.

- Permissions details

  In the database list, click **Permissions Details**. In the dialog box, view **Current Database**, **Database DBA**, **Database Owner**, and **Users**.
- Database management. For details, see **Database Management**.
- SQL window. For details, see **SQL Window**.

----End

3.11.5.3 Sensitive Columns

Requesting Sensitive Column Permissions

Step 1 On the top menu bar, choose **Instances/Databases/Sensitive Columns** > **Sensitive Columns**.

Step 2 In the sensitive column list, click **Request for Permissions**.

Step 3 On the displayed page, click **Add**. In the dialog box, select sensitive columns to be added and click **OK**.

You can remove sensitive columns one by one or in a bath.

📖 **NOTE**

- The permissions you request this time will overwrite the existing permissions.
- The application cannot be submitted repeatedly for the sensitive column being approved. Submit a new application after the current application is approved.

Step 4 Select the permissions based on your service requirements.

Step 5 Select **1 month**, **3 months**, **6 months**, **1 year**, **2 years**, or **3 years**, or customize a duration.

Step 6 Enter your reason for requesting the sensitive column permission.

Step 7 Click **Submit** to enter the approval process.

Step 8 After submitting the application, choose **Tickets** on the top menu bar to view the ticket information and approval progress.

----End

3.11.6 SQL Window

Procedure

Step 1 On the top menu bar, choose **SQL Window**. On the displayed **Select Database** page, select an instance, and click **OK**.

Step 2 In the navigation pane, select a database, and then specify a table or view.

- **Execute SQL**: executes SQL statements.

- **Format SQL**: improves the readability of SQL statements. Formatting SQL statements enables statements to be displayed in line break mode, but does not change their logic and semantics.

  The formatting takes effect for all the SQL statements in the SQL window. You cannot format only the selected statements.

- **Execute SQL Plan**: reports the execution of SQL statements to facilitate troubleshooting and optimize SQL processing performance.

- **SQL Favorites**: allows you to add, view, and manage frequently used SQL statements.

- **SQL Input Prompt**: helps you to select your desired database, table, or field name as prompted to quickly enter statements in the SQL window.

- Overwrite/Append Mode:

  - **Append Mode:** Each time a SQL statement is executed, the new result set is appended to the previous one.

  - **Overwrite Mode**: Each time a SQL statement is executed, the new result set overwrites the previous one.

- **Full Screen**: shows SQL statements on a full screen.

Step 3 After SQL statements are executed, view SQL execution status on the **Executed SQL Statements**, **Messages**, and **Result Set** tab pages.

----End

3.11.7 Database Management

3.11.7.1 My Permissions

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Select Database** page, select a database and click **OK**.

Step 2 On the **My Permissions** tab page, you can view the permissions of the current user, database DBA, and database owner.

Step 3 Click **Apply for Permission** to change the permissions if needed.

----End

3.11.7.2 Objects

3.11.7.2.1 Table Management

Procedure

Step 1 On the top menu bar, click **Database Management**. In the **Select Database** dialog box, select a database and click **OK**.

Step 2 Click **+** in front of a table name to view the **Column**, **Indexes**, and **Foreign Keys** of the current table.

Click **Column** to view **Column Name**, **Type**, and **Index Type** of the current table. In **Operation** column, you can perform following operations:

- Click **Adjust security level** and configure **Is it a sensitive field**.
- Click **Adjust Log** to view when the column was modified and the user who has modified the column.
- Click **Permission Change Log** to view the authority type, dredge way, and dredge time.

Step 3 On objects details page, in **Operation** column, you can perform following operations:

- Click **Query** to go to the **SQL Window** page and perform **SQL query**.
- Click **Open** to go to the details page of the current table. You can view the name, type, and other information of the current table.
- Click **View**. A text box is displayed, showing **Basic Information** about the current table, including the database name, table name, and number of rows.
- In this text box, you can also click **SQL Statements for Creating Table** to view details about the SQL statements for creating this table.

----End

3.11.7.2.2 View Management

Procedure

Step 1 On the top menu bar, choose **Database Management**. In the **Select Database** dialog box, select a database and click **OK**. On the displayed **Objects** page, select **View**, locate the target view, and click **Open** in the **Operation** column.

Step 2 On the displayed page, you can check the view directly or click **Where Condition** to get the view information.

Table 3-21 Functions

Item	Description
Where Condition	Filters records.
Copy Row	Copies data of the selected row. Specifically, double-click the target row and then click **Copy Row**.
Copy Column	Allows you to copy all data in a column by selecting this column from the **Copy Column** drop-down list.
Column Settings	Allows you to set the columns you want to display.
Refresh	Allows you to update table data manually.
Row Details	Shows the detailed information of a specified row.

◻️ **NOTE**

View data can be only queried, but not be edited, because views do not have primary keys.

----End

3.11.7.2.3 Stored Procedure Management

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** page, select **Stored Procedures**, locate the target stored procedure, and click **View Details** in the **Operation** column.

----End

3.11.7.2.4 Event Management

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab page, select **Event**, locate the target event, and click **Event Detail** in the **Operation** column.

----End

3.11.7.2.5 Trigger Management

Procedure

Step 1 On the top navigation bar, choose **Database Management**. On the displayed **Objects** tab page, choose **Trigger** on the left, locate the target trigger, and click **Details** in the **Operation** column.

----End

3.11.7.2.6 Function Management

Procedure

Step 1 On the top menu bar, choose **Database Management**. On the displayed **Objects** tab page, choose **Function** on the left, locate the target function, and click **View Details** in the **Operation** column.

----End

3.11.7.3 SQL Window

See **SQL Window** for detailed SQL operations.

3.11.7.4 Metadata Collection

Procedure

Step 1 On the top menu bar, choose **SQL Window**. In the displayed **Select Database** dialog box, select a database and click **OK**.

Step 2 On the displayed page, click the **Metadata Collection** tab. You can select and operate a result set from the metadata collection result list.

----End

3.11.8 Data Schemes

3.11.8.1 SQL Modification

Scenarios

When you need to change the data or structure of a database, you can use **SQL Modification**.

Procedure

Step 1 On the top menu bar, choose **Data Schemes** > **SQL Modification**.

Step 2 In the **Basic Information** area, select the target database. You can select multiple databases.

Step 3 Enter the SQL statements or upload a SQL file.

Step 4 Enter the estimated number of rows that may be affected in this modification.

Step 5 In the **Task Control Items** area, select an execution mode. Set **Execute Transaction**, **Skip Error**, and **Back Up Data**.

☐ NOTE

- **Execution Mode**: Select an execution mode as required.
- **Execute Transaction**: This function is disabled by default. When disabled, SQL statements are executed one by one. If a SQL fails to execute, the execution will stop but will not roll back. When this function is enabled, if a SQL fails to execute, all the executed SQL statements will be rolled back (DML only, DDL not included).
- **Skip Error**: It is recommended that you enable this function. If an error occurs during execution, the system skips the SQL statement that fails to execute and continue to execute the next statement.
- **Back Up Data**:
  – This function is disabled by default. To ensure your data security, it is recommended that you enable this function before making SQL modifications. The number of rows to be backed up cannot exceed 100,000.
  – If this function is enabled, the SQL statement set or imported SQL file used during modification will be automatically backed up in case that you want to roll back the modification.

Step 6 Click **Submit** to go to the **Perform Prechecks** page.

Step 7 Check whether the precheck is passed.

If the precheck fails, view the failure cause. If you need to update the uploaded file, click **Modify Ticket** to return to the previous page. Alternatively, click **Modify SQL Statements**.

After the modification is complete, click **OK**. The system automatically performs the precheck again.

Step 8 After the precheck is passed, click **Submit for Approval**.

Step 9 The system performs the approval according to the approval process set for the database. After the approval is complete, click **View Task Execution Info** to view the approval progress.

Step 10 If you select **Manually execute after approval** for **Execution Mode**, click **Execute Modification**.

☐ NOTE

SQL statements that can be backed up include delete, update, insert_select, and replace_select.

Step 11 The SQL modification is complete after the backup.

----End

3.11.8.2 Data Import

Scenarios

When you need to import large amounts of local data to databases, you can use **Data Import**.

Procedure

Step 1 On the top menu bar, choose **Data Schemes** > **Data Import**.

Step 2 In the **Basic Information** area, select the target database. You can select multiple databases.

Step 3 Click **Upload file** or drag the file to the **+** area.

Step 4 Select **Auto Detect** or **UTF8** for **Charset**.

Step 5 In the **Background Information** area, in **Reason for modification** box, enter your reasons.

Step 6 In the **Task Control Items** area, select an execution mode.

Step 7 Click **Submit** and wait for the approval.

📖 **NOTE**

- To import a large amount of data, you must have at least one of the following permissions: data modification permission, structure modification permission, high-risk operation permission, or O&M permission.
- A maximum of 10 databases can be selected at a time.
- In one data import modification, the selected databases must have the same DB engine.
- Only one .sql or .zip file no larger than 10 GB can be uploaded.

----End

3.11.8.3 Data Export

Scenarios

DAS allows you to export a large amount of data at a time to facilitate data query or to back up data for migration. This section describes how to export data.

- Both databases and SQL result sets of the primary and standby DB instances can be exported.
- For single-node DB instances, databases and SQL result sets can be exported.

Procedure

Step 1 On the top menu bar, choose **Data Schemes** > **Data Export**.

Step 2 Enter your reason for export.

Step 3 Select the **Database** or **SQL Result** tab.

Step 4 If you select **Database**, proceed as follows:

Step 5 On the **Request Export** tab page, select the database to be exported. Set **Select Table** to **Specific tables** or **All tables**. If there are too many tables in the selected database, search for a table by name in the search box.

Step 6 (Optional) For **Other Object to Export**, select **Procedures**, **Events**, **Functions**, **Triggers**, and **Views** as needed.

Step 7 For **Export Content**, select **Data**, **Structure**, or **Data and structure** as needed

Step 8 For **File Format**, select **SQL** or **CSV**.

Step 9 For **Character Set**, select **UTF8**.

Step 10 (Optional) Under **Advanced Settings**, configure **File Options** as required.

Step 11 Select options for **Extended Options** as required.

Step 12 Select options for **Data Options** as required. Click **OK**.

📖 **NOTE**

- Before selecting a database, you need to apply for the required database permission.
- When selecting a table, you can select a column of the table and set the WHERE condition for further filtering.

----End

3.11.9 System Management

3.11.9.1 Instance Management

Prerequisites

You have the DBA or system administrator role.

Procedure

Step 1 On the top menu bar, choose **System Management** > **Instance Management** to go to the instance management page.

Step 2 Click **Add Instance** in the upper left corner.

Step 3 On the displayed page, set instance information.

Table 3-22 Basic information

Parameter	Description
Region	Select the region where all instances of your account are located.
Select Instance	List the instances that can be added by the current account.

Table 3-23 Instance properties

Parameter	Description
Environment Type	Select **Test** or **Production**.
Instance DBA	Select the DBA of the current instance.
Service Owner	Select the service owner of the current instance.
Remarks	Enter the instance description.

Table 3-24 Security control items

Parameter	Description
Query Timeout Duration (s)	Set it based on your service requirements.
Maximum Number of Rows Returned in a Query	Set it based on your service requirements.
Allow DML Execution in SQL Window	Data manipulation language (DML) is a SQL language used to operate data in the database. INSERT, DELETE, UPDATE, and SELECT are sample DML statements. Determine whether to enable **Allow DML Execution in SQL Console** based on your service requirements.
Allow DDL Execution in SQL Window	Data definition language (DDL) is a SQL language used to manage certain database objects, such as databases and tables. CREATE, ALTER, and DROP are sample DDL statements. Determine whether to enable **Allow DDL Execution in SQL Console** based on your service requirements.

Table 3-25 Approval process management

Parameter	Description
Enable Instance Approval Process Management	After enabled, permission applications related to this instance will be processed based on defined approval processes.
During Database Permission Application	Approval process for database permission application.
During Data Modification	Approval process for data modification. DML statements are mainly involved.
During Structure Modification	Approval process for structure modification. DDL statements are mainly involved.

Parameter	Description
During O&M	Approval process for O&M. DCL statements, including querying sessions, kill sessions, and create users, are mainly involved.
During Data Export	Approval process for data export.
During High-Risk Operation	Approval process for high-risk operations. High-risk operations mainly involve dropping databases, truncating tables, and dropping users.

☐ **NOTE**

Process approval management items of an instance are set to default settings when databases are synchronized. Approval process settings on the database are used.

Step 4 After settings are complete, click **OK**.

Step 5 On the **Instance Management** page, view information about existing instances, such as the environment type, instance name, and DB engine. You can also perform the following operations.

- **Edit**

  Click **Edit** in the **Operation** column. In the displayed dialog box, view the basic information about the current instance and edit the parameters listed in **Table 3-26**. After settings are complete, click **OK**.

Table 3-26 Editable instance information

Parameter	Description
Username	Database name.
Password	Password for logging in to the database.
Environment Type	Test environment or production environment
Instance DBA	Instance O&M personnel
Service Owner	Service operator of the instance

- **Synchronize Dictionary**

  Generally, metadata is automatically collected once a day. Click **Synchronize Dictionary** in the **Operation** column or in the upper left corner of the page to collect the data of databases, tables, and columns in the instance to DAS.

  Click the **Metadata Collection** tab under **Database Management**. On the displayed page, click **View Details** in the **Operation** column.

Step 6 On the **Instance Management** page, click **Configure** to edit the instance basic information.

Step 7 To disable or remove an instance, choose **More** > **Disable** or **More** > **Remove**.

----End

3.11.9.2 User Management

Adding a User

Step 1 On the top menu bar, choose **System Management** > **User Management**.

Step 2 On the **User Management** page, click **Add User** in the upper left corner.

Step 3 In the displayed dialog box, set user information as required.

Table 3-27 Adding users

Parameter	Description
Mode	Includes **Manually add**, **Synchronize IAM user**, and **Synchronize EPS user**. **Manually add**: Enter the user information. If multiple users need to be added, separate the user IDs with semicolons (;). **Synchronize IAM User**: Select IAM users to be synchronized from available users. **Synchronize EPS User**: Select an enterprise project and a user group, and then select EPS users from available users.
Role	Includes common user, DBA, and administrator.

Step 4 After settings are complete, click **OK**.

Step 5 Enable, disable, and remove the user if needed.

- Edit

  Edit the user information, such as the alias, role, employee ID, mobile number. User information can be edited only when the user status is normal.

- Enable/Disable

  Enable or disable an added user as required to manage permissions.

  The user who created the current enterprise cannot be disabled.

- Remove

  Remove users who are no longer required. After a user is removed, related user data cannot be restored. Exercise caution when performing this operation.

- View Permissions

  Click **View Permissions**. On the displayed page, view permissions owned by this user on each database by database permission, database DBA, or database owner. You can also release permissions if needed.

----End

3.11.9.3 Approval Process Management

Adding an Approval Process

Step 1 On the top menu bar, choose **System Management** > **Approval Process Management**.

Step 2 On the displayed page, click **Create** in the upper left corner.

Step 3 In the displayed dialog box, specify the name, approver, and remarks as required.

Step 4 Ensure the settings are correct and click **OK**.

----End

Managing an Approval Process

After creating an approval process, you can perform the following management operations on the **Approval Process Management** page:

- **Edit**

  Click **Edit** in the **Operation** column. In the displayed dialog box, edit parameters as required and click **OK**.

  📖 **NOTE**

  > After Enterprise Change Approval is enabled, a system-level process is automatically created and cannot be edited.

- **View Associated Instance**

  Click **View Associated Instance** in the **Operation** column. In the displayed dialog box, view details about the associated instance.

- **View Associated Database**

  Choose **More** > **View Associated Database** in the **Operation** column. In the displayed dialog box, view the details about the associated database.

- **Batch Delete/Delete**

  You can delete an approval process that is no longer required.

  By default, the system has two approval processes: Owner > DBA and Owner > DBA > Admin.

- The approver of each approval stage can be a role or a user. The role can be Admin (system administrator), DBA, or Owner. Take the approval process Owner > DBA > Admin as an example. The first approver is the service owner of the database, the second approver is the database DBA, and the third approver is the system administrator. If a user is both the owner and DBA of a database, after the first-stage application is approved, the second-stage application is also approved by default. Then, the system goes to the third stage for approval.

  📖 **NOTE**

  > - To delete the approval process of an associated instance or database, cancel the association.
  > - Deleted approval processes cannot be restored. Exercise caution when performing this operation.

3.11.9.4 Access Control

To secure database access, you can configure a whitelist to control IP addresses that access your database. This section describes how to configure such a whitelist in Enterprise Change Approval.

Adding IP Addresses to a Whitelist

Step 1 On the top menu bar, choose **System Management** > **Security Audit** > **Access Control**.

Step 2 On the **Access Control** page, click **New Whitelist**.

Step 3 On the displayed page, enter the IP addresses to be added and enter the description.

Step 4 Click **OK**.

----End

Editing a Whitelist

Step 1 In the list, view the IP addresses trusted by the current account.

Step 2 Locate the whitelist you want to edit and click **Edit** in the **Operation** column.

Step 3 On the displayed page, edit the whitelist. You can enter multiple IP addresses at a time, with each two separated using semicolons (;). You can also enter an IP address range, for example, **127.1.10.6;192.168.1.64/24**.

Step 4 Click **OK** to save the modification.

----End

Deleting a Whitelist

Step 1 In the list, view the IP addresses trusted by the current account. You can delete whitelists that are no longer needed.

Step 2 Locate the whitelist you want to delete and click **Delete** in the **Operation** column. In the displayed dialog box, click **Yes**.

⚠ **CAUTION**

Deleted whitelists cannot be recovered. Exercise caution when performing this operation.

----End

3.11.9.5 Operation Audit

Procedure

Step 1 On the top menu bar, choose **System Management** > **Security Audit** > **Operation Audit**.

Step 2 On the displayed page, search for audit tasks by name, functional module, and operation time.

Table 3-28 Functional module parameters

Name	Description
Instance Management	Management records of RDS, ECS, DDM, and GaussDB instances, including the detailed operations like adding, updating, disabling, and removing instances, and creating databases.
User Management	Management records of EPS and IAM users, including detailed operations like adding, disabling, and deleting users.
Permission Application	Database and sensitive column permission application records.
Access Control	Management record of access whitelists, including detailed operations like adding, deleting, and editing access sources.
SQL Window	Records of SQL statement execution in the SQL window.
Ticket Management	Ticket creation and approval records.
SQL Modification	SQL modification records.
Data Export	Data export records.
Data Import	Data import records.
Other	Other operation records, including user logins and OBS bucket modifications.

☐ **NOTE**

You can filter and view different log records based on each functional module.

Step 3 In the audit list, locate the task you want to view and click **View Details** in the **Operation** column.

----End

3.11.9.6 Global Configuration Management

Scenarios

Global configuration management is used to save files.

During data modification, if the backup is enabled, backup files will be saved to the OBS bucket configured here.

If the OBS bucket is not configured, certain functions such as data backup in data modification cannot be used.

Configuring an OBS Bucket

Step 1 On the top menu bar, choose **System Management** > **Global Configuration Management**.

Step 2 On the displayed page, select **OBS Bucket**. The system displays the current OBS bucket where you can store files.

Step 3 Click **Set OBS Bucket** to configure the current bucket.

Step 4 Click **Save**.

----End

Configuring Process Approval

    📖 **NOTE**

- Approval process of sensitive columns is configured globally. After configured, the approval process takes effect for sensitive columns in all databases.
- When a user applies for the view permission of sensitive columns, the approver can be set here.

Step 1 On the top menu bar, choose **System Management** > **Global Configuration Management**.

General approval process configurations include the following parameters:

- Max. Number of DBAs per Instance/DB
- Max. Number of Owners per Instance/DB
- Allow Admin Be Set as Owner
- Do Not Allow Approval by Submitter When There Are Multiple Approvers
- Combine High-risk Approval Process with Owner > DBA > Admin Process

Step 2 In the navigation pane on the left, choose **Approval Process Configuration**. In the right pane, click **Set Approval Process**.

Step 3 Click **Create Approval Process** to create a process.

You can also select an existing approval process from the process list.

Step 4 On the displayed page, click **Create**.

Step 5 In the displayed dialog box, specify the name, approver, and remarks as required.

Step 6 Click **OK** to save the process information.

Step 7 View the details of the created process in the process list and manage it as required.

----End

SQL Modification

> **NOTE**
>
> - For the purposes of data security, you are advised to enable **Back Up SQL Modification** before modifying SQL statements.
> - Backup data is stored in OBS, which incurs fees.

Step 1 On the top menu bar, choose **System Management** > **Global Configuration Management**.

Step 2 In the navigation pane on the left, choose **SQL Modification**. In the right pane, enable **Back Up SQL Modification**.

----End

3.12 Intelligent O&M

DAS Intelligent O&M provides an all-round intelligent monitoring, diagnosis, and tuning for databases, facilitating user operations.

3.12.1 MySQL DB Instances

3.12.1.1 Function Overview

Procedure

Step 1 On the DAS console, choose **Intelligent O&M** to go to the instance overview page of Intelligent O&M.

Step 2 Click **Details** of an instance to go to the Intelligent O&M details page.

----End

3.12.1.2 Performance

3.12.1.2.1 Real-Time Performance

Procedure

Step 1 Log in to the DAS console using your username and password.

Step 2 On the **Overview** page, click **Go to Intelligent O&M**.

Step 3 Locate your desired instance and click **Details** to go to the Intelligent O&M overview page.

Step 4 On the **Real-Time Performance** tab page, view the server uptime, connection information, and buffer pool.

Step 5 Click **Start**/**Pause** or change the time interval (1 to 10 seconds) to adjust the performance monitoring. You can also click **Set Metric** to specify required metrics based on service requirements.

----End

3.12.1.3 Sessions

3.12.1.3.1 Real-Time Sessions

Procedure

Step 1 Log in to the DAS console using your username and password.

Step 2 On the **Overview** page, click **Go to Intelligent O&M**.

Step 3 Locate your desired instance and click **Details** to go to the Intelligent O&M overview page.

Step 4 Choose **Sessions** > **Real-Time Sessions** to view the real-time session statistics collected by user, host, and database.

Step 5 On the **All Sessions** page, select the abnormal session you want to end and click **Kill** for the databases to recover.

On the **Slow Sessions** tab page, specify **Slow Session Threshold** and click the refreshing button or enable **Auto Refresh** to search for the SQL statements whose execution time exceeds the threshold. Select the sessions you want to end and click **Kill** for the databases to recover.

----End

3.12.1.3.2 Emergency Channel

Scenarios

- Emergency Channel
  - If the maximum number of sessions for an instance has been reached and the instance cannot be logged in to, you can view and kill unnecessary sessions through the emergency channel.
  - Emergency channel is available to only RDS MySQL databases currently, but not to self-built databases on ECSs and instances in the creating, frozen, or abnormal state.
  - Use this function in urgent conditions. All your kill operations will be logged.
  - If your instance can be logged in on the DAS console, log in to the instance and perform desired operations through **Real-Time Sessions**.
  - Sessions of sensitive users, like rdsadmin, rdsbackup, rdsmetric, and rdsRepl cannot be killed.
- History Logs

  On the **History Logs** tab page, you can view all your sessions killed through the emergency channel.

Prerequisites

The DB engine must be MySQL. The MySQL 5.6 version must be 5.6.43.3 or later, and MySQL 5.7 version must be 5.7.25.3 or later.

Procedure

Step 1 Log in to the DAS console using your username and password.

Step 2 On the **Overview** page, click **Go to Intelligent O&M**.

Step 3 Locate your desired instance and click **Details** to go to the Intelligent O&M overview page.

Step 4 On the **Emergency Channel** tab page, select the sessions you want to kill. By default, the sessions are sorted in descending order by session duration.

Step 5 Click **Kill**. In the displayed dialog box, click **Yes**.

Step 6 On the **History Logs** tab page, view your sessions killed through the emergency channel.

----End

3.12.1.4 Locks and Transactions

3.12.1.4.1 InnoDB Lock Query

Overview

With this feature, the system displays the lock waits generated before the DML operations on the database in real time. With these waits, you can quickly locate the session waits and blocks that happened when multiple sessions update the same piece of data at the same time, and can quickly terminate the source session that holds locks to restore blocked operations.

📖 **NOTE**

This feature does not support DDL locks, also called metadata locks (MDLs). You view and analyze them on the **Metadata Locks** page.

Procedure

Step 1 Log in to the DAS console using your username and password.

Step 2 On the **Overview** page, click **Go to Intelligent O&M**.

Step 3 Locate your desired instance and click **Details** to go to the Intelligent O&M overview page.

Step 4 Choose **Locks and Transactions** > **InnoDB Locks** to check whether there are lock waits.

----End

3.12.1.4.2 Metadata Locks

Overview

- Metadata locks (MDLs) are used to ensure consistency between DDL and DML operations. Usually, DDL operations require MDL write locks. Once an MDL lock occurs, it can have a significant impact on your database because all subsequent operations (SELECT, DML, and DDL operations) on the target table will be blocked, causing a backlog of connections.

- The system displays database MDL locks in real time. With these locks, you can quickly locate MDL problems and terminate the sessions holding MDL locks, so that blocked operations can be restored.

  📖 **NOTE**

  - This feature does not support DML locks. You can view and analyze them on the **InnoDB Locks** page.
  - Currently, this feature is available only for MySQL 5.6 and 5.7.
  - A maximum of 1,000 records can be displayed.

Procedure

Step 1 Log in to the DAS console using your username and password.

Step 2 On the **Overview** page, click **Go to Intelligent O&M**.

Step 3 Locate the required instance and click **Details** to go to the Intelligent O&M overview page.

Step 4 Choose **Locks and Transactions** > **Metadata Locks**.

Step 5 Select a lock status and type, and enter a database name, table name, and session ID as needed. Then, click **Query**.

Step 6 In the query result, check whether there are sessions that hold MDL locks. If yes, select the sessions as required and click **Kill Session**.

----End

3.12.2 RDS for PostgreSQL Instances

3.12.2.1 Function Overview

Procedure

Step 1 On the **Overview** page, click **Go to Intelligent O&M**.

Step 2 Select an instance and click **Details** to go to the Intelligent O&M details page.

----End

3.12.2.2 SQL

3.12.2.2.1 SQL Explorer

Use Constraints

SQL Explorer cannot record all data. As for RDS for PostgreSQL, it has the following constraints:

SQL Explorer is limited by the memory buffer, so some data may not be recorded when a buffer overrun occurs, for example, when the QPS is over 1000 or the usage of resources such as CPUs or memory becomes too high.

Any SQL statement that exceeds 4096 bytes by default will be discarded.

SQL Explorer is available to only RDS for PostgreSQL instances of the following versions:

- Major version: 14; minor version: 14.4 or later
- Major version: 13; minor version: 13.6 or later (if the minor version is 13.2 or later but earlier than 13.6, SQL statements executed using psql can be collected, but those executed by other drivers like JDBC may not.)
- Major version: 12; minor version: 12.10 or later (if the minor version is 12.6 or later but earlier than 12.10, SQL statements executed using psql can be collected, but those executed by other drivers like JDBC may not.)
- Major version: 11; minor version: 11.15 or later (if the minor version is 11.11 or later but earlier than 11.15, SQL statements executed using psql can be collected, but those executed by other drivers like JDBC may not.)
- Major version: 10; minor version: 10.20 or later (if the minor version is 10.16 or later but earlier than 10.20, SQL statements executed using psql can be collected, but those executed by other drivers like JDBC may not.)
- Major version: 9.6; minor version: 9.6.24 or later (if the minor version is 9.6.21 or later but earlier than 9.6.24, SQL statements executed using psql can be collected, but those executed by other drivers like JDBC may not.)
- Major version: 9.5; minor version: 9.6.25 or later (For some instances with the minor version of 9.5.25, SQL statements executed using psql can be collected, but those executed by other drivers like JDBC may not.)

Procedure

Step 1 Log in to the DAS console.

Step 2 On the **Overview** page, click **Go to Intelligent O&M**.

Step 3 Select the required instance and click **Details**.

Step 4 Choose **SQL** > **SQL Explorer** to view SQL Explorer details of the instance.

Step 5 Toggle on **Enable DAS SQL Explorer** to obtain information about all SQL statements executed on the current instance.

📖 **NOTE**

You can click **Export** in the upper right corner of the SQL template list to obtain information about all SQL templates in the list. This feature is available to only paid instances.

Step 6 Click the **TOP SQL** tab and select **Last 1 hour**, **Last 3 hours**, or **Last 6 hours** to view the top SQL statements executed. You can also customize a time range with the duration no longer than one day.

📖 **NOTE**

> Execution Duration Distribution displays the distribution of the time required to execute all SQL templates in a specific period of time. There are four execution duration ranges. The system calculates execution times of the SQL statements in each execution time range. If you select **Last 1 hour**, the execution duration distribution is updated every 10 seconds. If you select **Last 6 hours**, the distribution is updated every 1 minute. If you select a time range longer than 6 hours, the distribution is updated every 5 minutes. The execution duration ranges of SQL templates are as follows:
>
> - < 100 ms
> - 100 ms—500 ms
> - 500 ms—1s
> - > 1s

Step 7 Select **By instance** or **By node**. If you select **By node**, you can view execution duration distribution of the primary node. You can change node to view the duration distribution of other nodes. The primary node is selected by default.

Step 8 View execution duration details of top SQL templates with the following methods, such as average execution duration, total duration, average lock wait duration, and average scanned rows.

- Hover your mouse at any point in time on the graph to view top SQL templates at that time.
- Specify a time range using your mouse on the graph, and you will see top SQL templates used during that time range.

Step 9 In the SQL template list, locate a SQL template and click **Details** to view total executions, average rows scanned, average execution duration, and the like.

----End

4 FAQs

4.1 Connection Management (Development Tool)

4.1.1 Permission Issues

1. Error message: You do not have the required permission. The policy does not allow action das:connections:xxx.

   Error cause: Your account does not have the DAS FullAccess permission.

   Solution: Add the DAS FullAccess permission based on the document about how to create a user and grant permissions.

2. Error message: You do not have the permission to perform this operation. Contact your administrator to request the required permission.

   Error cause: Your account does not have the DAS FullAccess permission.

   Solution: Add the DAS FullAccess permission based on the document about how to create a user and grant permissions.

3. Error message: Your current account only has the read-only permission and cannot perform this operation. To ensure that you can use DAS smoothly, add the DAS Administrator permission.

   Error cause: Your account does not have the DAS FullAccess permission.

   Solution: Add the DAS FullAccess permission based on the document about how to create a user and grant permissions.

4.1.2 MySQL

4.1.2.1 RDS Instances

1. Error message: **Access denied for user 'user_name'@'100.xxx.xx.xx' (using password: YES)**

   a. Error cause: The username or password of the RDS instance is incorrect.

      Solution: Check whether the username and password are correct. If you are not sure, log in to the RDS console to reset the password.

> **NOTICE**
>
> Changing the password may affect services.

If the username and password are correct, log in to the database using a client or CLI tool and run **select * from mysql.user where user = 'user_name'** to view the account. Make sure that the DAS CIDR block is within the CIDR block of the user. **user_name @ %** and **user_name @100.%** are two different users whose passwords and permissions are independent. Enter the password of **user user_name @100.%**.

b. Error cause: The IP address of the DAS server is not in the whitelist of the login user.

Solution: Log in to the database using the client or CLI tool, and create a user account that can be used to access the database through DAS.

```
create user 'user_name'@'100.%' identified by 'password';
grant select on *.* to 'user_name'@'100.%';
```

> **NOTE**
>
> - The IP address of the DAS server is in the 100.xxx.xx.xx network segment. Add the IP address to the whitelist of the login user.
> - Grant permissions to user **user_name@100.%** based on service requirements.

c. Error cause: The SSL function is not enabled on the server.

Solution: Run the following statement to check whether the user is an SSL user. If yes, enable SSL on the RDS DB instance details page. The user is an SSL user if the **ssl_type** field has a value.

```
select user, host, ssl_type from mysql.user where user = 'user_name';
```

2. Error message: **Trying to connect with ssl, but ssl not enabled in the server**

Error cause: The SSL function is not enabled on the server.

Solution: Run the following SQL statement to check whether the user is an SSL user. If yes, enable SSL on the RDS instance details page. The user is an SSL user if the **ssl_type** field has a value.

```
select user, host, ssl_type from mysql.user where user = 'user_name';
```

3. Error message: **Client does not support authentication protocol requested by server. plugin type was = 'sha256_password'**

Error cause: DAS does not allow you to connect to the database whose password is encrypted with SHA-256.

Solution: Execute the following SQL statements to change the password encryption method to mysql_native_password.

```
alter user 'user_name'@'%' identified with mysql_native_password by 'password';
```

4. Error message: **Communications link failure The last packet sent successfully to the server was 0 milliseconds ago.** The driver has not received any packets from the server

Error cause: The network between the DAS server and the instance is disconnected.

Solution: Contact technical support.

4.1.3 DDS

1. Error message: Command failed with error 18 (AuthenticationFailed): 'Authentication failed.' on server xxx.xxx.xx.xx:xxxx. The full response is { 'ok' :

0.0, 'errmsg' : "Authentication failed.", "code" : 18, "codeName" : "AuthenticationFailed" }

    a. Error cause: The username or password of the DDS DB instance is incorrect.

        Solution: Check whether the username or password is correct. If you are not sure, view the username or reset the password on the DDS console.

> **NOTICE**
>
> Changing the password may affect services.

    b. Error cause: The entered username does not have the permission to access the database.

        Solution: Check whether the username has the permission to access the database. If you are not sure, connect to the admin database as user **rwuser**. Then check whether the entered username has the required permission.

4.1.4 Reference

### 4.1.4.1 Modifying ECS Security Group Rules

Step 1 On the ECS details page, click the **Security Groups** tab and view security group rules. To enable DAS to access the self-built DB instances on ECSs, you need to add an inbound rule with the port set to 3306 (example) and source to 100.0.0.0/8.

Figure 4-1 Security group rules

Step 2 Click **Manage Rule** on the left. On the **Inbound Rules** tab page, click **Add Inbound Rule**. .

Figure 4-2 Adding an inbound rule

> **NOTE**
>
> Recommended configuration: Select **TCP** for **Protocol & Port**, enter the port number of the self-built database, and set the source to 100.0.0.0/8 or 0.0.0.0/0.

Step 3 On the **Outbound Rules** tab page, click **Add Outbound Rule**.

Figure 4-3 Adding an outbound rule

> **NOTE**
>
> Recommended configuration: Select **TCP** for **Protocol & Port**, enter the port number of the self-built database, and set the source to 100.0.0.0/8 or 0.0.0.0/0.

----End

4.1.4.2 Modifying Firewall Rules

Step 1 In the ECS list, locate the required ECS and click **Remote Login**.

Step 2 Enter the username and password. After the login is successful, run the following command to check the iptables configuration:

iptables -S

```
-A INPUT -p tcp -m tcp --dport 49537 -j ACCEPT
```

 NOTE

- The port next to **--dport** indicates the port that can be accessed.
- Perform the following operations to ensure that the port can be accessed:
  - Add an iptables rule to allow access to the port.
  - Run the following command to disable the firewall:
    systemctl stop iptables

----End

4.2 Usage

4.2.1 What Can I Do If Garbled Characters Are Displayed in the Exported Database Result Set?

CSV files exported from DAS are encoded in UTF-8, whereas Excel files are encoded in ANSI. Encoding inconsistency resulted in garbled characters.

You are advised to open the CSV file using a text editor and save the file in ANSI encoding.

4.2.2 What Are the Precautions for Connecting DAS to a Third-Party Client?

After operations are performed on a third-party client, refresh the DAS console to view the generated data.

4.2.3 What Are the Username and Password for DAS?

The username and password for adding a login are those used for creating the DB instance.

4.2.4 What Should I Do If Table Obtaining Times Out?

The possible cause is that the instance load is heavy. As a result, the table data collection on DAS times out. You are advised to kill a thread and perform the operation again.

A Change History

Released On	Description
2022-09-30	This issue is the fourth official release. Added descriptions about top SQL templates to section "SQL Explorer".
2022-08-30	This issue is the third official release. Updated account management of RDS for SQL Server instances.
2021-5-25	Added description of new accounts in **Database Account Security**.
2021-02-28	This issue is the first official release.