

Alibaba Cloud

MaxCompute

Prepare

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Document conventions

| Style | Description | Example |
|--|---|---|
|  Danger | A danger notice indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results. |  Danger: Resetting will result in the loss of user configuration data. |
|  Warning | A warning notice indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results. |  Warning: Restarting will cause business interruption. About 10 minutes are required to restart an instance. |
|  Notice | A caution notice indicates warning information, supplementary instructions, and other content that the user must understand. |  Notice: If the weight is set to 0, the server no longer receives new requests. |
|  Note | A note indicates supplemental instructions, best practices, tips, and other content. |  Note: You can use Ctrl + A to select all files. |
| > | Closing angle brackets are used to indicate a multi-level menu cascade. | Click Settings > Network > Set network type . |
| Bold | Bold formatting is used for buttons, menus, page names, and other UI elements. | Click OK . |
| Courier font | Courier font is used for commands | Run the <code>cd /d C:/window</code> command to enter the Windows system folder. |
| <i>Italic</i> | Italic formatting is used for parameters and variables. | <code>bae log list --instanceid</code> <i>Instance_ID</i> |
| [] or [a b] | This format is used for an optional value, where only one item can be selected. | <code>ipconfig [-all -t]</code> |
| { } or {a b} | This format is used for a required value, where only one item can be selected. | <code>switch {active stand}</code> |

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1. Overview

This topic describes the items that you need to prepare before you use MaxCompute. It also describes how to prepare these items.

Preparation items

Before you use MaxCompute, you must prepare the following items and perform the operations mentioned in [Procedure](#).

| Item | Description |
|-----------------------|--|
| Accounts | Plan the list of personnel who use MaxCompute to prepare Alibaba Cloud accounts or Resource Access Management (RAM) users. For more information about the differences between Alibaba Cloud accounts and RAM users, see Operation differences between Alibaba Cloud accounts and RAM users . |
| MaxCompute projects | Plan the region, billing method, and data type edition of the MaxCompute project that you want to create based on your business requirements. |
| Roles and permissions | Plan the roles and permissions of project members based on the principle of least privilege. For more information about the permissions, see Permissions . |
| Environment and tools | Select appropriate tools to meet your business requirements. For more information about the tools, see Tools . When you use a tool, you need to use an endpoint to access MaxCompute. You can select an endpoint based on the region and network type you selected when you activate MaxCompute. For more information about endpoints, see Endpoints . |

Procedure

The following table describes the preparation procedure.

| Step | Description |
|---|--|
| Step 1: Create an Alibaba Cloud account . | Create an Alibaba Cloud account and complete real-time verification. |
| Step 2: (Optional) Create a RAM user . | If you need to work with other users for business development, you must create a RAM user and assign the credentials of the RAM user to other users. |
| Step 3: Activate MaxCompute and DataWorks . | Activate MaxCompute and DataWorks. |
| Step 4: Create a MaxCompute project . | Create a MaxCompute project before you can use MaxCompute. |
| Step 5: (Optional) Add a workspace member and configure roles . | If you need to work with other users to use MaxCompute, you must add a RAM user to the related workspace. |

| Step | Description |
|--|---|
| Step 6: Prepare an environment and install required development tools. | Before you use MaxCompute, you must prepare the required tools and environment information to ensure that subsequent jobs can run normally. |

2. Create an Alibaba Cloud account

Before you use MaxCompute, you must have an Alibaba Cloud account. This topic describes how to create an Alibaba Cloud account and complete the account-related preparations.

Step 1: Create an Alibaba Cloud account

1. Log on to the [Alibaba Cloud official website](#).
2. In the upper-right corner of the Alibaba Cloud official website, click **Free Account**.
3. On the **Create Your Alibaba Cloud Account** page, create an account as prompted.

The Alibaba Cloud account that you created has full operational control over all the resources that belong to this account.

 **Notice** To secure your account and password, we recommend that you regularly update your password and do not share your account with others.

Step 2: Complete real-name verification for your Alibaba Cloud account

To make sure that you can normally use Alibaba Cloud services, you must complete **real-name verification**. Only an Alibaba Cloud account that passes real-name verification can purchase and use Alibaba Cloud services.

1. Go to the [Account Center](#) page.
2. In the left-side navigation pane, click **Real-name Registration** to complete real-name verification as prompted.

Step 3: Create an AccessKey pair

To make sure that subsequent jobs can run normally, you must create an AccessKey pair. The AccessKey pair is different from the account and password configured when you create an Alibaba Cloud account. The AccessKey pair is used for authentication between Alibaba Cloud services. An AccessKey pair consists of an AccessKey ID and an AccessKey secret.

1. Go to the [AccessKey Management](#) page.
2. On the **AccessKey Management** page, click **Create AccessKey**. The system automatically creates an AccessKey pair.
3. In the **Create AccessKey** dialog box, click the [Download CSV File](#) or [Copy](#) icon, save the created AccessKey pair, and then click **Close**.

You can also view the status of the created AccessKey pair on the **AccessKey Management** page, and disable or delete the AccessKey pair.

 Notice

- To ensure the security of the AccessKey pair, we recommend that you do not share this information with others. If your AccessKey pair is susceptible to data leakage, disable or update it immediately.
- The AccessKey pair is displayed only when you create the pair and unavailable for subsequent queries. We recommend that you record the AccessKey pair and keep it confidential for subsequent user.
- After you disable an AccessKey pair, the service that uses the AccessKey pair fails to run and an error is reported. Proceed with caution when you perform this operation. If the status of the AccessKey pair changes, check the status of the services that use the AccessKey pair in a timely manner.

What's next

- If you want to add other members to a MaxCompute project, you need to create [Resource Access Management \(RAM\)](#) users for security management. For more information about how to create a RAM user, see [Create a RAM user](#).
- If only you use MaxCompute, activate MaxCompute. For more information about how to activate MaxCompute, see [Activate MaxCompute and DataWorks](#).

 **Note** We recommend that you create a RAM user and use MaxCompute as the RAM user. This facilitates permission control as your business grows.

3. Create a RAM user

To ensure the security of project data, we recommend that you create a Resource Access Management (RAM) user and assign the credentials of the RAM user to other members who participate in a MaxCompute project. This helps strictly control the permissions of the personnel who participate in the MaxCompute project. This topic describes how to create a RAM user.

Prerequisites

An Alibaba Cloud account is created.

For more information about how to create an Alibaba Cloud account, see [Create an Alibaba Cloud account](#).

Usage notes

- RAM users belong to your Alibaba Cloud account. They do not own resources and are not separately charged.
- All the fees incurred by the RAM users must be paid by your Alibaba Cloud account.

Procedure

1. Step 1: Create a RAM user

Create a RAM user by using your Alibaba Cloud account. For more information, see [RAM](#).

2. Step 2: Create an AccessKey pair

Create an AccessKey pair for the RAM user by using your Alibaba Cloud account. This ensures that the jobs submitted by the RAM user run normally.

3. Step 3: (Optional) Grant permissions to RAM users

To allow the RAM user to create projects in [DataWorks](#), you must attach the `AliyunDataWorksFullAccess` policy to the RAM user by using your Alibaba Cloud account.

4. Step 4: Assign the credentials of the RAM user to other users

Assign the credentials of the created RAM user to other users.

Step 1: Create a RAM user

1. Log on to the [RAM console](#) by using your Alibaba Cloud account.
2. In the left-side navigation pane, choose **Identities > Users**.
3. On the **Users** page, click **Create User**.
4. In the **User Account Information** section of the **Create User** page, configure the **Logon Name** and **Display Name** parameters.

 **Note** You can click **Add User** to create multiple RAM users at a time.

5. In the **Access Mode** section, select **Console Access**.
 - **Console Access**: If you select this option, you must complete the logon security settings. These settings specify whether to use a system-generated or custom logon password, whether the password must be reset upon the next logon, and whether to enable multi-factor authentication (MFA).

- **API Call-based Access:** If you select this option, an AccessKey pair is automatically created for the RAM user. The RAM user can call API operations or use other development tools to access Alibaba Cloud resources.
6. Click **OK**.
 7. On the **Create User** page, click **Download CSV File** or find an existing RAM user and click **Copy** in the **Actions** column to save the logon username and password of the RAM user.

Step 2: Create an AccessKey pair

Note

- If you grant the RAM user the permission to manage an AccessKey pair, the RAM user can create an AccessKey pair in the RAM console. For more information about how to create an AccessKey pair, see [Configure security policies for RAM users](#).
- You can create a maximum of two AccessKey pairs for a RAM user.

1. In the left-side navigation pane, choose **Identities > Users**.
2. On the **Users** page, click the username of a specific RAM user.
3. In the **User AccessKeys** section, click **Create AccessKey Pair**.
4. In the **Create AccessKey Pair** dialog box, view the AccessKey ID and AccessKey secret.
You can click **Download CSV File** to download the AccessKey pair or click **Copy** to copy the AccessKey pair.
5. Click **Close**.

You can also view the status of the created AccessKey pair in the **User AccessKeys** section, and disable or delete the AccessKey pair.

Notice

- To ensure the security of the AccessKey pair, we recommend that you do not share this information with others. If your AccessKey pair is susceptible to data leakage, disable or update it immediately.
- The AccessKey pair is displayed only when you create the pair and unavailable for subsequent queries. We recommend that you record the AccessKey pair and keep it confidential for subsequent user.
- After you disable an AccessKey pair, the service that uses the AccessKey pair fails to run and an error is reported. Proceed with caution when you perform this operation. If the status of the AccessKey pair changes, check the status of the services that use the AccessKey pair in a timely manner.

Step 3: (Optional) Grant permissions to RAM users

1. In the left-side navigation pane, choose **Identities > Users**.
2. On the **Users** page, find the RAM user to which you want to grant permissions and click **Add Permissions** in the **Actions** column.
3. In the **Add Permissions** panel, grant permissions to the RAM user.

i. Select the authorization scope.

- **Alibaba Cloud Account** : The authorization takes effect on the current Alibaba Cloud account.
- **Specific Resource Group**: The authorization takes effect on a specific resource group.

 **Note** If you select Specific Resource Group for Authorized Scope, make sure that the required cloud service supports resource groups. For more information, see [Alibaba Cloud services that support resource groups](#).

ii. Specify the principal.

The principal is the RAM user to which permissions are to be granted. By default, the current RAM user is specified. You can also specify another RAM user.

iii. Select policies.

 **Note** You can attach a maximum of five policies to a RAM user at a time. If you need to attach more than five policies to a RAM user, perform the operation multiple times.

4. In the **Authorization Policy Name** column, click the **AliyunDataWorksFullAccess** policy to add this policy to the list of selected policies.

 **Note** If the RAM user needs to activate MaxCompute later, the Alibaba Cloud account must attach the **AliyunBSSOrderAccess** policy to the RAM user.

5. Click **OK**.

6. Click **Complete**.

Step 4: Assign the credentials of the RAM user to other users

To assign the credentials of the RAM user to other users, you must provide the following information of the RAM user to each user:

- RAM user logon link

Log on to the [RAM console](#). In the **Account Management** section in the upper-right corner of the **Overview** page, the URL under **RAM user logon** is the logon link of the RAM user.

- Domain name of the Alibaba Cloud account to which the RAM user belongs

Log on to the [RAM console](#). In the left-side navigation pane, click **Settings** under **Identities**. On the Settings page, click the **Advanced** tab. Then, you can view **Default Domain** and **Domain Alias**.

- The account and password of the RAM user, which are the logon username and password of the RAM user in [Step 1](#).
- The AccessKey pair of the RAM user, which is the AccessKey pair created in [Step 2](#).

What's next

After the RAM user is created, you can activate MaxCompute. For more information, see [Activate MaxCompute and DataWorks](#).

4. Activate MaxCompute and DataWorks

If you want to use MaxCompute and create a project in a visualized manner in DataWorks, you must activate MaxCompute and DataWorks. This topic describes how to activate MaxCompute and DataWorks.

Prerequisites

- An Alibaba Cloud account is created.

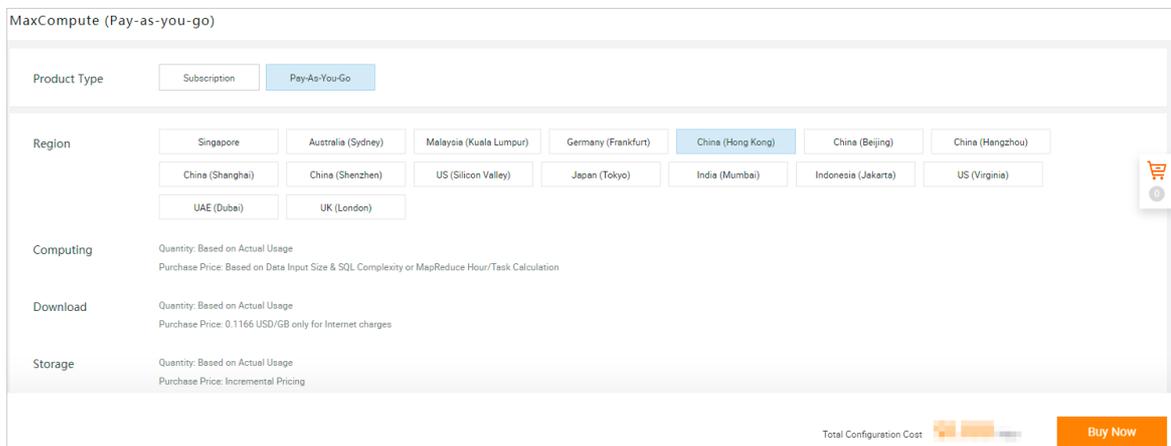
If you use MaxCompute for the first time, we recommend that you activate MaxCompute by using your Alibaba Cloud account. For more information about how to create an Alibaba Cloud account, see [Create an Alibaba Cloud account](#).

- A Resource Access Management (RAM) user is created.

If you need to activate MaxCompute as a RAM user, make sure that you have obtained the RAM user and granted the AliyunBSSOrderAccess permission to the RAM user. For more information about how to create or obtain RAM user information, see [Create a RAM user](#).

Procedure

1. Log on to the [Alibaba Cloud official website](#).
2. Go to the [product page of Alibaba Cloud MaxCompute](#) and click **Buy Now**.
3. On the buy page, select **Product Type** and **Region**, and click **Buy Now**. Product Type indicates the billing method of MaxCompute.



- You can select the subscription or pay-as-you-go billing method based on your business volume. For more information about the billing methods, see [Subscription标准版](#) and [Standard pay-as-you-goPay-as-you-go](#).
 - When you specify regions, you must consider the regions of other Alibaba Cloud services that work together with MaxCompute. For example, you must consider the region where your Elastic Compute Service (ECS) instance resides and the region where the data resides.
4. On the **Confirm Order** page, confirm that the settings are correct, read and select Terms of Service, and then click **Activate Now** to activate MaxCompute.

5. Create a MaxCompute project

A project is the basic unit that is used to perform user isolation and access control in MaxCompute. After you activate MaxCompute, you must create projects to use MaxCompute. This topic describes how to create a MaxCompute project in the MaxCompute or DataWorks console.

Prerequisites

- [DataWorks](#) and [MaxCompute](#) are activated by using your Alibaba Cloud account or the credentials of a RAM user. The two services are deployed in the same region.
- If you want to create a MaxCompute project as a RAM user, you must obtain the credentials of the RAM user and attach the `AliyunDataWorksFullAccess` policy to the RAM user.

For more information about how to create a RAM user or obtain information about a RAM user, see [Create a RAM user](#).

Context

RAM users have limited permissions. We recommend that you use an Alibaba Cloud account to create a MaxCompute project and grant RAM users permissions on the MaxCompute project. For more information about the permission differences between Alibaba Cloud accounts and RAM users, see [Users and roles](#). For more information about authorization, see [Permissions](#).

You can create a MaxCompute project by using one of the following methods:

- Method 1 (recommended): [Use the MaxCompute console to create a project](#)

The project management and query editing features of the MaxCompute console are implemented by DataWorks. Before you create a MaxCompute project, you must create a DataWorks workspace. DataWorks workspaces are distinguished from MaxCompute projects in the following ways:

- DataWorks workspaces: Log on to the [DataWorks console](#). In the left-side navigation pane, click **Workspaces**. On the Workspaces page, you can view the names of DataWorks workspaces.
 - MaxCompute projects: Log on to the [MaxCompute console](#). On the **Project management** tab, you can view the names of MaxCompute projects and the names of the DataWorks workspaces to which the MaxCompute projects correspond.
- Method 2: [Use the DataWorks console to create a project](#)

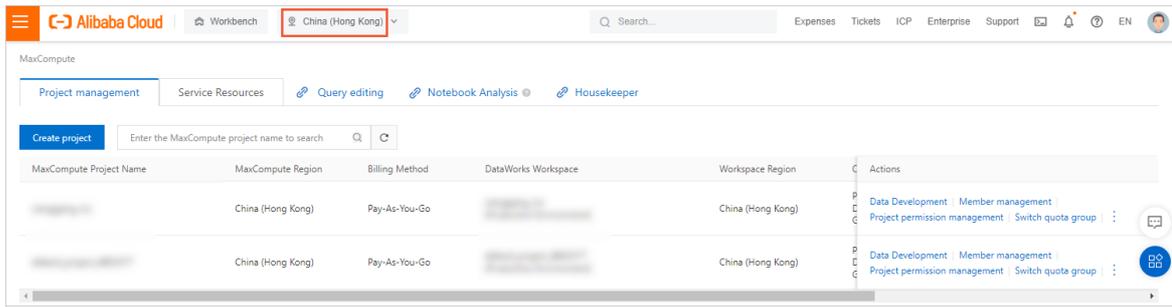
Usage notes

Before you create a MaxCompute project, take note of the following items:

- After you use an Alibaba Cloud account to create a MaxCompute project, you have the operation permissions on all the objects in the project. Only authorized users can access the project.
- For a MaxCompute project that is created by using the credentials of a RAM user, both the RAM user and the Alibaba Cloud account to which the RAM user belongs have the operation permissions on all the objects in the project. Other users can access the project only after the users are granted the related permissions.
- For a MaxCompute project that is created by using the credentials of a RAM user, MaxCompute assigns the RAM user the `Super_Administrator` role of the project by default. This facilitates project management. If a DataWorks workspace is in standard mode, the RAM user is assigned only the `Super_Administrator` role of a project in the development environment.

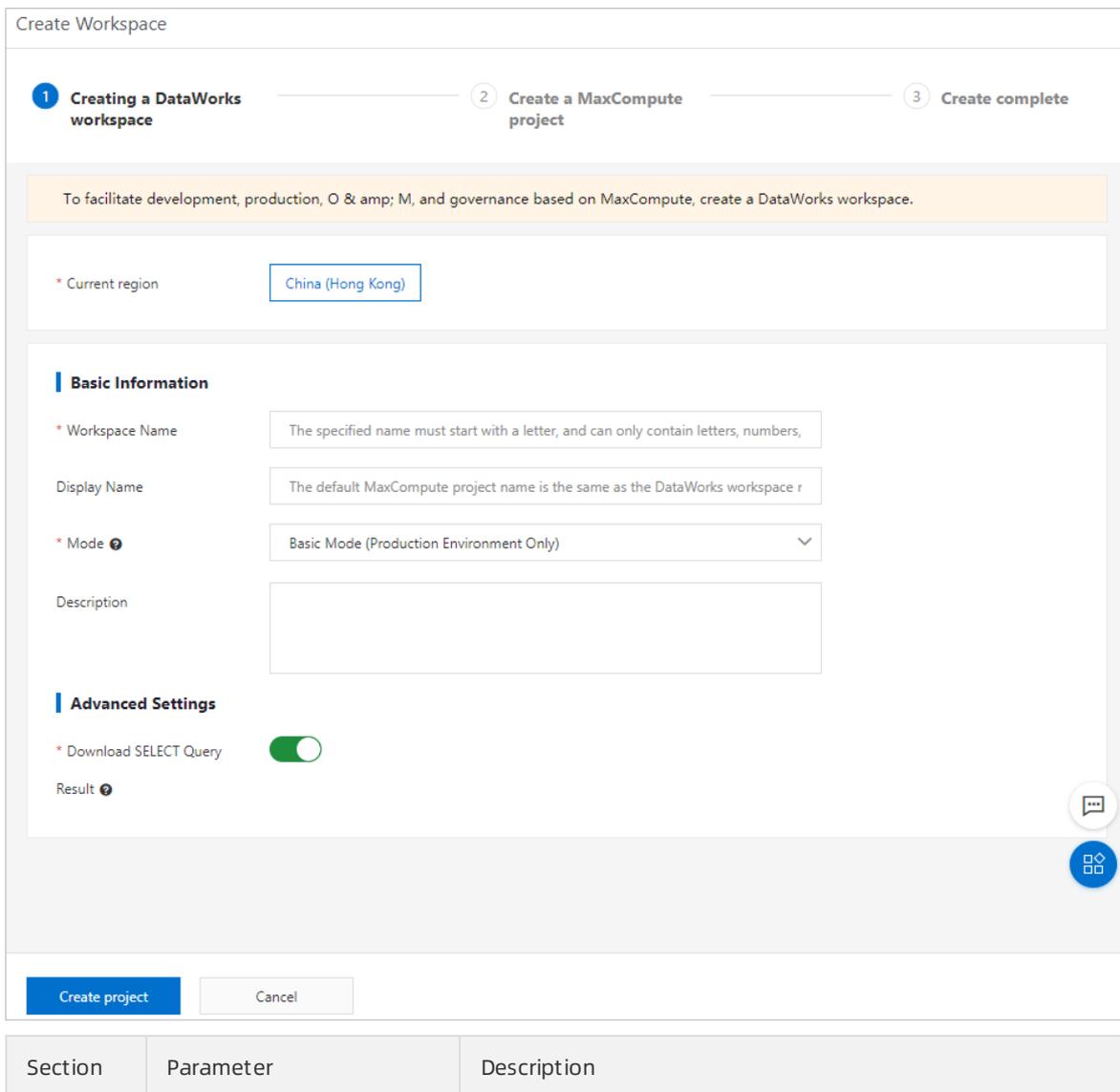
Use the MaxCompute console to create a project

1. Log on to the **MaxCompute console** and select a region in the top navigation bar.



2. On the **Project management** tab, click **Create project**.

3. In the **Creating a DataWorks workspace** step of the **Create Workspace** panel, configure the parameters, and click **Create project**.



| Section | Parameter | Description |
|---------|-----------------------|--|
| | Workspace Name | The custom name of the workspace. The name must meet the following requirements: <ul style="list-style-type: none">◦ It must be globally unique.◦ It must be 3 to 28 characters in length.◦ It can contain only letters, digits, and underscores (_) and must start with a letter. |
| | Display Name | The display name of the workspace. The name must be 1 to 23 characters in length, and can contain only letters, digits, and underscores (_). The name must start with a letter. |

| Section | Parameter | Description |
|---------------------------------|--------------------|--|
| <p>Basic Information</p> | <p>Mode</p> | <p>The workspace mode. Valid values:</p> <ul style="list-style-type: none"> ○ Basic Mode (Production Environment Only): One DataWorks workspace corresponds to only one MaxCompute project. A workspace in basic mode cannot isolate the development environment from the production environment. In such a workspace, you can perform basic data development but cannot strictly control the data development process or resource permissions. <p>You can use the member management feature that is provided by DataWorks to grant permissions to the members of a MaxCompute project.</p> <ul style="list-style-type: none"> ○ Standard Mode (Development and Production Environments): One DataWorks workspace corresponds to two MaxCompute projects. One project is in the production environment and the other is in the development environment. In this workspace, you can develop code in a standard manner and strictly control resource permissions. Unauthorized developers are prohibited from managing the resources of the project in the production environment. This ensures the data security of the project in the production environment. <ul style="list-style-type: none"> ■ For a project in the development environment, you can use the member management feature that is provided by DataWorks to grant permissions to the members of the project. ■ For a project in the production environment, only the project owner has full permissions on objects in the project by default. If a member of the project wants to read tables in the project, the member must request permissions on the tables in Security Center of DataWorks. For more information about how to request permissions, see Request permissions on tables. <p>If a member of a project in the production environment needs to have full permissions on objects in the project, you can go to the Customer User Roles tab of the DataWorks console, select the project from the MaxCompute Project selection drop-down list, and then assign the Admin role of the project to the member. For more information, see Configure MaxCompute.</p> <p>If you want to upgrade a workspace from the basic mode to the standard mode or understand the impact of the upgrade, see Upgrade the workspace mode.</p> <p>For more information about the differences between the two modes, see Basic mode and standard mode.</p> |

| Section | Parameter | Description |
|--------------------------|-------------------------------------|---|
| | Description | The description of the workspace. |
| Advanced Settings | Download SELECT Query Result | Specifies whether data query results can be downloaded from the DataStudio page in the DataWorks console. If you turn off Download SELECT Query Result , workspace members cannot download data query results. |

4. In the Create a MaxCompute project step of the **Create Workspace** panel, configure the parameters, and click **Confirm creation**.

Create Workspace

1 Creating a DataWorks workspace
2 **Create a MaxCompute project**
3 Create complete

* Current region: China (Hong Kong)

* Instance display name:

* Payment mode: The pay-as-you-go billing method Monthly packageBuy Now Developer versionBuy Now

* Quota group:

* MaxCompute data type:

* Whether to encrypt: No encryption Encryption

* Project name:

* Access identity:

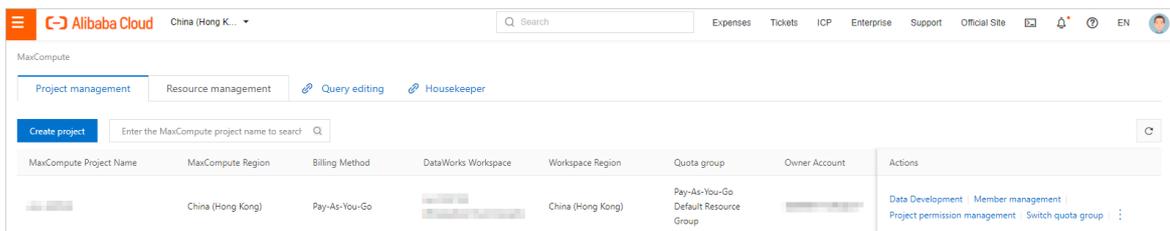
i If the account used to create the MaxCompute project is a RAM sub-account, the sub-account is added toMaxCompute Super_Administrator role(Only development environment projects in standard mode).

Confirm creation Cancel

| Parameter | Description |
|------------------------------|---|
| Instance display name | The name of the workspace. The name must be 3 to 28 characters in length, and can contain only letters, digits, and underscores (_). The name must start with a letter. |
| Payment mode | The billing method of MaxCompute, which must be the same as the method you selected when you activated MaxCompute. |

| Parameter | Description |
|-----------------------------|---|
| Quota group | The quota group. Quota groups are used to configure compute units (CUs) and disk quotas. For more information about quota groups, see Use MaxCompute Management . |
| MaxCompute data type | The data type edition of MaxCompute. Valid values: MaxCompute V2.0 Data Type Edition (Recommended) , MaxCompute V1.0 Data Type Edition (Suitable for Early MaxCompute Projects) , and Hive-Compatible Data Type Edition (Suitable for MaxCompute Projects Migrated from Hadoop) . You can select an appropriate data type edition based on your business requirements. For more information about the differences between the three data type editions, see Data type editions . |
| Whether to encrypt | Specifies whether to enable the data encryption feature for the MaxCompute project. For more information about data encryption, see Data encryption . |
| Key | The type of the key that is used in the MaxCompute project. Valid values: Dataworks Default Key and BYOK. If you select Dataworks Default Key, the key that MaxCompute automatically creates for the project in KMS is used in the project. |
| Algorithm | The encryption algorithm that is supported by the key. Valid values: AES256, AESCTR, and RC4. |
| Project name | The name of the MaxCompute project. If you create a DataWorks workspace in basic mode, the project name is automatically set to the name that you specified for the DataWorks workspace. If you create a DataWorks workspace in standard mode, the name of the project in the production environment is the same as the name of the DataWorks workspace by default, and the name of the project in the development environment is marked with <i>_dev</i> . |
| Access identity | The identity that you can use to access the MaxCompute project. For a project in the development environment, the value is fixed as Node Owner . For a project in the production environment, the valid values are Alibaba Cloud Account and RAM User . If you select Alibaba Cloud Account , an Alibaba Cloud account is used as the access identity. If you select RAM User , a RAM user is used as the access identity. |

After the MaxCompute project is created, you can view this project on the **Project management** tab.



Use the DataWorks console to create a project

For more information, see [Create a workspace](#).

What to do next

- If you need a RAM user for data development, you can add the RAM user as a member of your MaxCompute project and assign a role to the RAM user. For more information about how to add project members, see [Add a workspace member and configure roles](#).
- If you do not need to add project members, prepare the development environment for your MaxCompute project and install the required tools. For more information about how to prepare a development environment and install tools, see [Prepare an environment and install required development tools](#).
- If you need to delete an existing MaxCompute project, follow the instructions provided in [Delete a MaxCompute project](#) to perform this operation.

6. Add a workspace member and configure roles

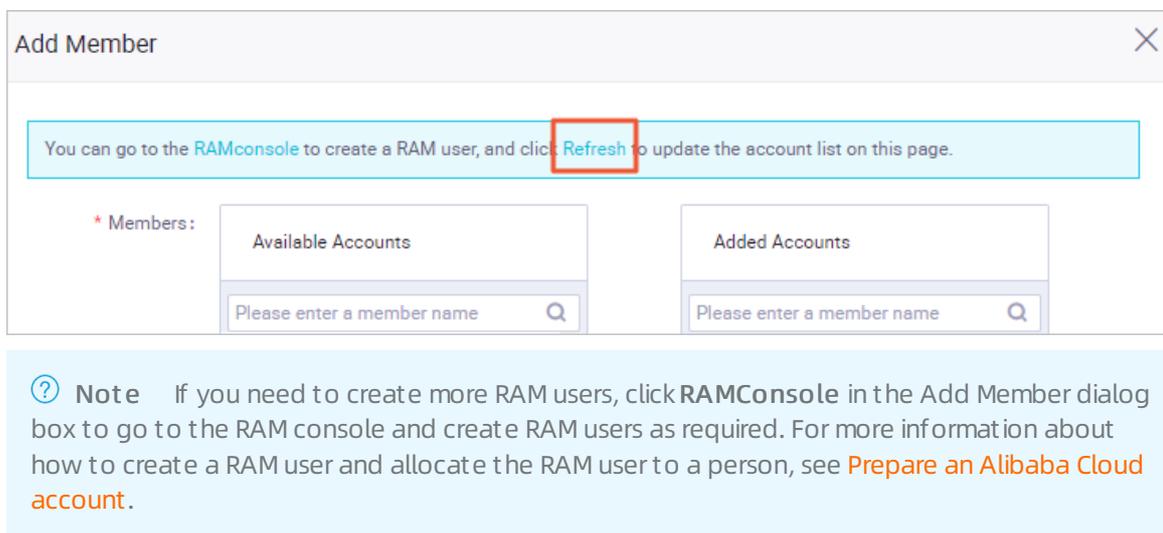
If you create a MaxCompute project by using your Alibaba Cloud account and require a Resource Access Management (RAM) user for data development, you can add the RAM user as a workspace member and assign roles to this user. This topic describes how to add a RAM user as a workspace member and assign roles to this user.

Prerequisites

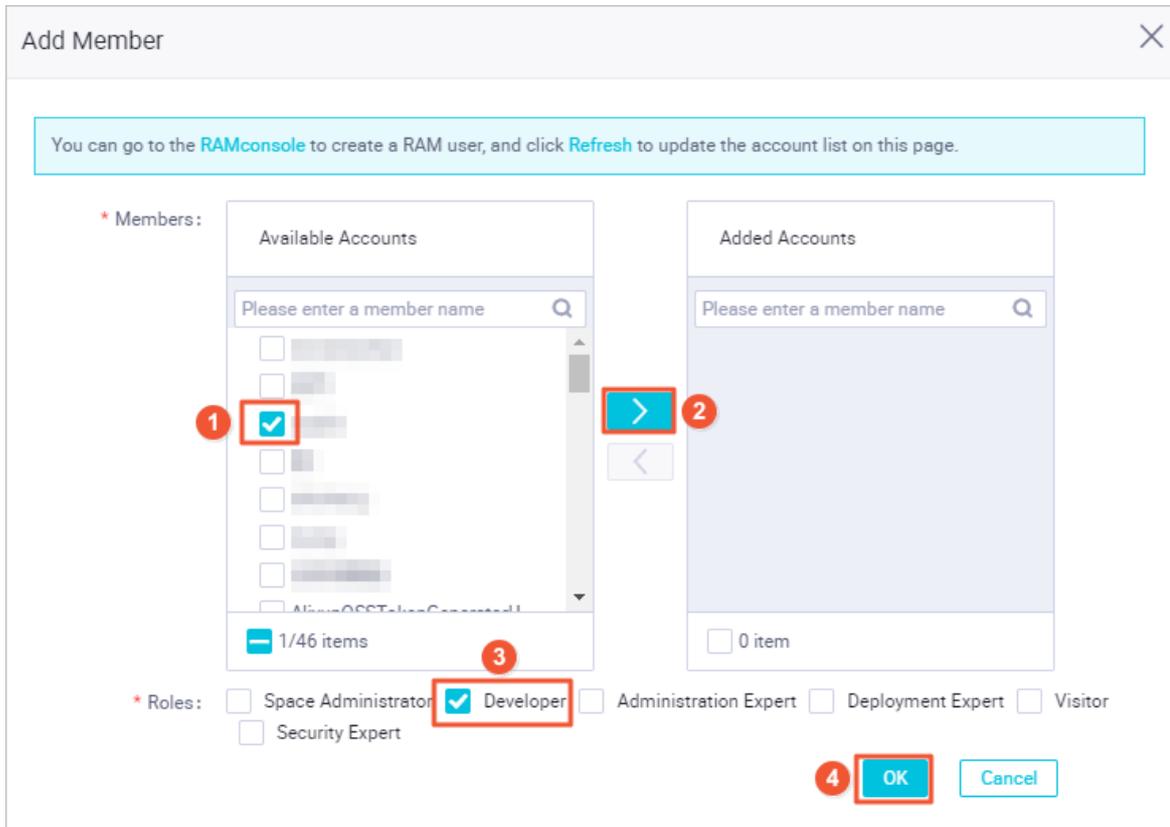
- A MaxCompute project is created by using an Alibaba Cloud account.
For more information about how to create a MaxCompute project, see [Create a MaxCompute project](#).
- A RAM user is created.
For more information about how to create a RAM user, see [Create a RAM user](#).

Procedure

1. Go to the **Workspace Management** page of the workspace to which you want to add members.
 - i. Log on to the [DataWorks console](#).
 - ii. In the left-side navigation pane, click **Workspaces**.
 - iii. On the Workspaces page, find the workspace to which you want to add members and click **Workspace Settings** in the Actions column.
 - iv. In the **Workspace Settings** panel, click **More**. The **Workspace Management** page appears.
You can also click Data Development in the Actions column of the workspace to which you want to add members. On the **DataStudio** page, click the  icon in the upper-right corner to go to the **Workspace Management** page.
2. In the left-side navigation pane, click **User Management**.
3. On the **User Management** page, click **Add Member** in the upper-right corner.
4. In the **Add Member** dialog box, click **Refresh**. All the RAM users created by your Alibaba Cloud account appear in the Available Accounts section.



5. Select RAM users in the **Available Accounts** section and click the > icon to move them to the **Added Accounts** section.
6. Select the roles to be assigned to the RAM users and click **Confirm**.



Notice You must move RAM users from the Available Accounts section to the Added Accounts section before you assign roles to them.

7. After you add a workspace member, you can view or modify information about existing members and their roles on the **User Management** page. On this page, you can also delete RAM users that do not assume the Project Owner role.

Roles include **Project Owner**, **Workspace Manager**, **Development**, **O&M**, **Deploy**, **Visitor**, and **Safety Manager**. By default, the creator of the workspace assumes the Workspace Manager role.

| Role | Description |
|--------------------------|--|
| Owner | The member with this role has full permissions on the workspace. |
| Workspace Manager | A member with this role has all permissions of the Development and O&M roles. A member with this role can also manage the workspace. For example, the member can add and remove workspace members and create custom resource groups. |
| Development | A member with this role can design and maintain nodes on the DataStudio page in the workspace. |
| O&M | A member with this role can manage the execution of all nodes in the workspace in Operation Center. |

| Role | Description |
|-----------------------|--|
| Deploy | A member with this role can review the code of each node and determine whether to commit the nodes to Operation Center only in a workspace in standard mode. |
| Visitor | A member with this role can only view workflows and code on the DataStudio page in the workspace. |
| Safety Manager | A member with this role can perform operations only in Data Security Guard. For more information, see Data Security Guard . |

What's next

Prepare the MaxCompute project development environment and install the required development tools. For more information, see [Prepare an environment and install required development tools](#).

7. Prepare an environment and install required development tools

Before you process data in a MaxCompute project, you must select development tools and prepare the required environment based on your business requirements. This topic describes how to prepare an environment and install the required development tools.

Prerequisites

A MaxCompute project is created. For more information about how to create a MaxCompute project, see [Create a MaxCompute project](#).

Context

The following table describes the development tools supported by MaxCompute.

| Development tool | Manual installation required | Scenario |
|---|------------------------------|---|
| Query editor (MaxCompute console) | No | • |
| MaxCompute client | Yes | The MaxCompute client is a command-line client. It is suitable for all scenarios, which helps you compile commands to process data. |
| DataWorks | No | DataWorks implements comprehensive features, such as data development, data integration, and data services in a visual manner based on MaxCompute projects. If you need to periodically schedule jobs, we recommend that you use DataWorks. |
| MaxCompute Studio | Yes | MaxCompute Studio is a development plug-in that is based on IntelliJ IDEA. MaxCompute Studio helps you develop data more easily and quickly. If you are familiar with IntelliJ IDEA, we recommend that you use MaxCompute Studio. |

Prepare an environment

The following table describes the environment requirements of the preceding development tools.

| Development tool | Environment requirement |
|---|--|
| Query editor (MaxCompute console) | We recommend that you use the latest version of Google Chrome. |
| MaxCompute client | You must install Java 8 or later. |
| DataWorks | We recommend that you use the latest version of Google Chrome. |

| Development tool | Environment requirement |
|--------------------------|---|
| <p>MaxCompute Studio</p> | <ul style="list-style-type: none"> • The client runs a Windows, macOS, or Linux operating system. • IntelliJ IDEA 2018.2.4 or later is installed on the client. The Ultimate, PyCharm, and free Community editions are supported. • Java Runtime Environment (JRE) 1.8 is installed. The latest version of IntelliJ IDEA is bundled with JRE 1.8. If you use IntelliJ IDEA of the latest version, you do not need to separately install JRE 1.8 • Java Development Kit (JDK) 1.8 is installed. JDK 1.8 is required only if you want to develop and debug user-defined functions (UDFs) in Java. <div style="border: 1px solid #add8e6; padding: 5px; margin-top: 10px;"> <p> Note MaxCompute Studio version 0.28.0 and later support JDK 1.9. The earlier versions of MaxCompute Studio support only JDK 1.8.</p> </div> |

Install and configure the MaxCompute client

 **Note** MaxCompute client V0.27.0 and later support the MaxCompute V2.0 data type edition. We recommend that you use the MaxCompute V2.0 data type edition. For more information about the data types that are supported by the MaxCompute V2.0 data type edition, see [MaxCompute V2.0 data type edition](#).

To install and configure the MaxCompute client, perform the following steps:

1. Download the [MaxCompute client installation package \(GitHub\)](#).

 **Note** If you cannot download the package after you click the preceding link, click [MaxCompute client installation package \(OSS\)](#) to download the package. For more information about how to solve the download failure, we recommend that you search for related solutions by using search engines.

2. Decompress the downloaded package to obtain the bin, conf, lib, and plugins folders.
3. Open the conf folder and configure the odps_config.ini file.

The following code shows the content in the odps_config.ini file.

```

project_name=
access_id=
access_key=
end_point=
log_view_host=
https_check=
# confirm threshold for query input size(unit: GB)
data_size_confirm=
# this url is for odpscmd update
update_url=
# download sql results by instance tunnel
use_instance_tunnel=
# the max records when download sql results by instance tunnel
instance_tunnel_max_record=
# IMPORTANT:
# If leaving tunnel_endpoint untouched, console will try to automatically get one from odps service, which might charge networking fees in some cases.
# Please refer to Endpoints
# tunnel_endpoint=
# use set.<key>=
# e.g. set.odps.sql.select.output.format=
    
```

In the `odps_config.ini` file, lines that start with a number sign (#) are comments. The following table describes the parameters in the `odps_config.ini` file.

| Parameter | Required | Description | Example |
|--------------|----------|---|--------------|
| project_name | Yes | <p>The name of the MaxCompute project that you want to access.</p> <p>If you create a workspace in standard mode, pay attention to the differences in the project names between the production environment and development environment when you configure the <code>project_name</code> parameter. The name of the project for the development environment ends with <code>_dev</code>. For more information, see Basic mode and standard mode.</p> <p>You can log on to the MaxCompute console and view the MaxCompute project names on the Project Management tab.</p> | doc_test_dev |

| Parameter | Required | Description | Example |
|------------|----------|--|--|
| access_id | Yes | <p>The AccessKey ID of your Alibaba Cloud account or a RAM user within the Alibaba Cloud account.</p> <p>You can obtain the AccessKey ID from the AccessKey Pair page.</p> | None |
| access_key | Yes | <p>The AccessKey secret that corresponds to the AccessKey ID.</p> <p>You can obtain the AccessKey secret from the AccessKey Pair page.</p> | None |
| end_point | Yes | <p>The endpoint of MaxCompute.</p> <p>You must configure this parameter based on the region and network connection method that you selected when you create the MaxCompute project. For more information about the endpoints that correspond to each region and network, see Endpoints.</p> <div style="border: 1px solid #ccc; background-color: #e6f2ff; padding: 5px; margin-top: 10px;"> <p> Notice If you specify an invalid endpoint, an error occurs when you access MaxCompute.</p> </div> | <p>http://service.cn-hangzhou.maxcompute.aliyun.com/api</p> |

| Parameter | Required | Description | Example |
|-------------------|----------|---|---|
| log_view_host | No | <p>The Logview Uniform Resource Locator (URL). You can view the detailed runtime information of a job by using this URL. This information helps you troubleshoot job errors. Set the value to <code>http://logview.odps.aliyun.com</code>.</p> <div style="border: 1px solid #add8e6; padding: 5px; background-color: #e0f0ff;"> <p> Note We recommend that you configure this parameter. If you do not configure this parameter, you cannot identify the cause of job errors.</p> </div> | <code>http://logview.odps.aliyun.com</code> |
| https_check | No | <p>Specifies whether to enable HTTPS access. If HTTPS access is enabled, requests to access MaxCompute projects are encrypted. Valid values:</p> <ul style="list-style-type: none"> ◦ True: HTTPS access is enabled. ◦ False: HTTP access is enabled. <p>Default value: False.</p> | True |
| data_size_confirm | No | <p>The maximum size of input data. Unit: GB. The value range is unlimited. We recommend that you set this parameter to 100.</p> | 100 |
| update_url | No | A reserved parameter. | None |

| Parameter | Required | Description | Example |
|----------------------------|----------|---|---|
| use_instance_tunnel | No | Specifies whether to use InstanceTunnel to download execution results of SQL statements. Valid values: <ul style="list-style-type: none"> True: InstanceTunnel is used to download execution results of SQL statements. False: InstanceTunnel is not used to download execution results of SQL statements. Default value: False. | True |
| instance_tunnel_max_record | No | The maximum number of SQL execution results that can be returned by the client. If the use_instance_tunnel parameter is set to True, you must configure this parameter. Maximum value: 10000. | 10000 |
| tunnel_endpoint | No | The public endpoint of MaxCompute Tunnel. If you do not configure this parameter, traffic is automatically routed to the Tunnel endpoint that corresponds to the network in which MaxCompute resides. If you configure this parameter, traffic is routed to the specified endpoint and automatic routing is not performed. For more information about the Tunnel endpoints that correspond to each region and network, see Endpoints . | http://dt.cn-hangzhou.maxcompute.aliyun.com |
| set.<key> | No | The properties of the MaxCompute project. For more information about the properties of MaxCompute projects, see Properties . | set.odps.sql.decimal.odps2=true |

Install and configure MaxCompute Studio

To install and configure MaxCompute Studio, perform the following steps:

1. [Install IntelliJ IDEA](#)

MaxCompute Studio is a plug-in that is integrated with IntelliJ IDEA. To install MaxCompute Studio,

you must install IntelliJ IDEA first.

2. **Install MaxCompute Studio**

Install the MaxCompute Studio plug-in on IntelliJ IDEA.

3. **Configure MaxCompute Studio**

Configure the configuration items of MaxCompute Studio.

4. **Connect to a MaxCompute project**

After you connect to a MaxCompute project by using MaxCompute Studio, you can view the information of the MaxCompute project on MaxCompute Studio.

What to do next

After you complete the preparations, use the development tool that you selected to use MaxCompute.

- If you use the query editor to process data, for more information about the query editor, see [Query editor](#).
- If you use the MaxCompute client to process data, for more information about the MaxCompute client, see [MaxCompute client](#).
- If you use DataWorks to process data, perform the operations by following the instructions provided in [Quick start of DataWorks](#).
- If you use MaxCompute Studio to process data, perform the operations by following the instructions provided in [MaxCompute Studio](#).

8. Endpoints

This topic describes the endpoints that are used in different regions and different network connection modes. This topic also describes the network connectivity and billing rules when MaxCompute communicates with other Alibaba Cloud services.

Background information

MaxCompute provides the MaxCompute service and Tunnel service.

- MaxCompute service: The connection address is an endpoint, which varies based on the region and network connection mode that you select. You can send all requests except data upload and download requests to MaxCompute. For example, you can send a request to create a table, delete a function, or run a computing job.

MaxCompute also supports external tables. After you create an external table, you can use MaxCompute to read data from Object Storage Service (OSS), Tablestore, Hologres, ApsaraDB for HBase, or ApsaraDB RDS. For more information, see [OSS external tables](#), [Access Tablestore data](#), and [Hologres external tables](#).

- Tunnel service: The connection address is a Tunnel endpoint, which varies based on the region and network connection mode that you select. The Tunnel service allows you to upload data to or download data from on-premises or cloud data sources.

For more information about the network connection modes, see [Network connection modes](#).

For more information about the MaxCompute endpoints and Tunnel endpoints that are used in different regions and network connection modes, see [Endpoints in different regions \(Internet\)](#), [Endpoints in different regions \(classic network\)](#), and [Endpoints in different regions \(VPC\)](#).

Scenarios

You must configure a MaxCompute endpoint or Tunnel endpoint in the following scenarios:

- Connect to MaxCompute by using a tool
 - Use the MaxCompute client (odpscmd) to connect to MaxCompute projects. In this case, you must configure the odps_config.ini file. For more information about how to install and configure the MaxCompute client, see [Install and configure the MaxCompute client](#).
 - Use MaxCompute Studio to connect to MaxCompute projects. For more information, see [Manage project connections](#).
 - Use DataWorks to connect to MaxCompute data sources. For more information about how to configure MaxCompute data sources in DataWorks, see [Add a MaxCompute data source](#).
- Connect to MaxCompute projects by configuring code
 - Use an SDK to connect to MaxCompute projects. For more information, see [SDK for Java](#) and [SDK for Python](#).
 - Use a Java Database Connectivity (JDBC) driver to connect to MaxCompute projects. For more information, see [JDBC](#).
 - Use the SQLTask class with the Tunnel service to export the execution results of SQL statements. For more information, see [Use SQLTask and Tunnel to export data](#).

Usage notes

Before you use the Tunnel service, take note of the following points:

- If you want to access the Tunnel service over the classic network or a virtual private cloud (VPC) of Alibaba Cloud, you must configure the endpoint of the classic network or the VPC. If you do not configure the endpoint of the classic network or the VPC, your traffic may be routed to the Internet, and you are charged for data downloads over the Internet.
- The billing rules for the Tunnel service vary based on the regions and network connection modes that you select. For more information about the billing rules, see [Billing rules](#).

Network connection modes

You can access the MaxCompute service and Tunnel service in the following network connection modes:

- Internet
- Classic network
- VPC

Before you use MaxCompute to read data from and write data to OSS or Tablestore, take note of the following points:

- If MaxCompute and Tablestore or OSS are deployed in the same region, all the preceding connection modes are supported. We recommend that you use the classic network or VPC for better performance.
- If MaxCompute and Tablestore or OSS are not deployed in the same region, we recommend that you use the Internet. If you use the classic network or VPC, connectivity issues may occur.

Billing rules

The following table describes the billing rules for the MaxCompute service and Tunnel service.

| Service type | Billing rule |
|--------------------|---|
| MaxCompute service | You are charged for data computing when you develop different types of jobs or run SQL jobs to read data from and write data to data sources by using external tables. The billing rules vary based on the billing method that you select when you create a MaxCompute project. For more information, see Computing pricing . |

| Service type | Billing rule |
|----------------|---|
| Tunnel service | <p>You are not charged when you use the Tunnel service to upload data.</p> <p>When you use the Tunnel service to download data from cloud data sources or on-premises data sources in a region, the following billing rules apply:</p> <ul style="list-style-type: none"> • If your Elastic Compute Service (ECS) instance and MaxCompute project are in the same region, you can download data over the classic network or a VPC free of charge. • If your ECS instance and MaxCompute project are not in the same region or if the two are in the same region but your ECS instance cannot access MaxCompute, you are charged when you download data across regions over the Internet. For more information about the billing rules, see Download pricing (pay-as-you-go). <div style="border: 1px solid #ccc; background-color: #e6f2ff; padding: 10px; margin-top: 10px;"> <p> Note The deployment and network connection mode of the Tunnel service may vary based on regions. Therefore, permanent connectivity for the Tunnel service cannot be guaranteed if you use the classic network or VPC for cross-region access.</p> </div> |

Endpoints in different regions (Internet)

 **Note** HTTP and HTTPS endpoints are supported. If you want to encrypt requests, use HTTPS endpoints.

| District | Region | MaxCompute available or not | Public endpoint | Public Tunnel endpoint |
|----------|-------------------|-----------------------------|---|---|
| China | China (Hangzhou) | Yes | http://service.cn-hangzhou.maxcompute.aliyun.com/api | http://dt.cn-hangzhou.maxcompute.aliyun.com |
| China | China (Shanghai) | Yes | http://service.cn-shanghai.maxcompute.aliyun.com/api | http://dt.cn-shanghai.maxcompute.aliyun.com |
| China | China (Beijing) | Yes | http://service.cn-beijing.maxcompute.aliyun.com/api | http://dt.cn-beijing.maxcompute.aliyun.com |
| China | China (Shenzhen) | Yes | http://service.cn-shenzhen.maxcompute.aliyun.com/api | http://dt.cn-shenzhen.maxcompute.aliyun.com |
| China | China (Hong Kong) | Yes | http://service.cn-hongkong.maxcompute.aliyun.com/api | http://dt.cn-hongkong.maxcompute.aliyun.com |

| District | Region | MaxCompute available or not | Public endpoint | Public Tunnel endpoint |
|---------------------|-------------------------|-----------------------------|---|--|
| Asia Pacific | Singapore (Singapore) | Yes | http://service.ap-southeast-1.maxcompute.aliyun.com/api | http://dt.ap-southeast-1.maxcompute.aliyun.com |
| Asia Pacific | Australia (Sydney) | Yes | http://service.ap-southeast-2.maxcompute.aliyun.com/api | http://dt.ap-southeast-2.maxcompute.aliyun.com |
| Asia Pacific | Malaysia (Kuala Lumpur) | Yes | http://service.ap-southeast-3.maxcompute.aliyun.com/api | http://dt.ap-southeast-3.maxcompute.aliyun.com |
| Asia Pacific | Indonesia (Jakarta) | Yes | http://service.ap-southeast-5.maxcompute.aliyun.com/api | http://dt.ap-southeast-5.maxcompute.aliyun.com |
| Asia Pacific | Japan (Tokyo) | Yes | http://service.ap-northeast-1.maxcompute.aliyun.com/api | http://dt.ap-northeast-1.maxcompute.aliyun.com |
| Europe & Americas | Germany (Frankfurt) | Yes | http://service.eu-central-1.maxcompute.aliyun.com/api | http://dt.eu-central-1.maxcompute.aliyun.com |
| Europe & Americas | US (Silicon Valley) | Yes | http://service.us-west-1.maxcompute.aliyun.com/api | http://dt.us-west-1.maxcompute.aliyun.com |
| Europe & Americas | US (Virginia) | Yes | http://service.us-east-1.maxcompute.aliyun.com/api | http://dt.us-east-1.maxcompute.aliyun.com |
| Europe & Americas | UK (London) | Yes | http://service.eu-west-1.maxcompute.aliyun.com/api | http://dt.eu-west-1.maxcompute.aliyun.com |
| Middle East & India | India (Mumbai) | Yes | http://service.ap-south-1.maxcompute.aliyun.com/api | http://dt.ap-south-1.maxcompute.aliyun.com |
| Middle East & India | UAE (Dubai) | Yes | http://service.me-east-1.maxcompute.aliyun.com/api | http://dt.me-east-1.maxcompute.aliyun.com |

Endpoints in different regions (classic network)

 **Note** HTTP and HTTPS endpoints are supported. If you want to encrypt requests, use HTTPS endpoints.

| District | Region | MaxCompute available or not | Classic network endpoint | Classic network Tunnel endpoint |
|-------------------|-------------------------|-----------------------------|---|---|
| China | China (Hangzhou) | Available | http://service.cn-hangzhou.maxcompute.aliyun-inc.com/api | http://dt.cn-hangzhou.maxcompute.aliyun-inc.com |
| China | China (Shanghai) | Yes | http://service.cn-shanghai.maxcompute.aliyun-inc.com/api | http://dt.cn-shanghai.maxcompute.aliyun-inc.com |
| China | China (Beijing) | Yes | http://service.cn-beijing.maxcompute.aliyun-inc.com/api | http://dt.cn-beijing.maxcompute.aliyun-inc.com |
| China | China (Shenzhen) | Yes | http://service.cn-shenzhen.maxcompute.aliyun-inc.com/api | http://dt.cn-shenzhen.maxcompute.aliyun-inc.com |
| China | China (Hong Kong) | Yes | http://service.cn-hongkong.maxcompute.aliyun-inc.com/api | http://dt.cn-hongkong.maxcompute.aliyun-inc.com |
| Asia Pacific | Singapore (Singapore) | Yes | http://service.ap-southeast-1.maxcompute.aliyun-inc.com/api | http://dt.ap-southeast-1.maxcompute.aliyun-inc.com |
| Asia Pacific | Australia (Sydney) | Yes | http://service.ap-southeast-2.maxcompute.aliyun-inc.com/api | http://dt.ap-southeast-2.maxcompute.aliyun-inc.com |
| Asia Pacific | Malaysia (Kuala Lumpur) | Yes | http://service.ap-southeast-3.maxcompute.aliyun-inc.com/api | http://dt.ap-southeast-3.maxcompute.aliyun-inc.com |
| Asia Pacific | Indonesia (Jakarta) | Yes | http://service.ap-southeast-5.maxcompute.aliyun-inc.com/api | http://dt.ap-southeast-5.maxcompute.aliyun-inc.com |
| Asia Pacific | Japan (Tokyo) | Yes | http://service.ap-northeast-1.maxcompute.aliyun-inc.com/api | http://dt.ap-northeast-1.maxcompute.aliyun-inc.com |
| Europe & Americas | Germany (Frankfurt) | Yes | http://service.eu-central-1.maxcompute.aliyun-inc.com/api | http://dt.eu-central-1.maxcompute.aliyun-inc.com |
| Europe & Americas | US (Silicon Valley) | Yes | http://service.us-west-1.maxcompute.aliyun-inc.com/api | http://dt.us-west-1.maxcompute.aliyun-inc.com |

| District | Region | MaxCompute available or not | Classic network endpoint | Classic network Tunnel endpoint |
|---------------------|----------------|-----------------------------|---|--|
| Europe & Americas | US (Virginia) | Yes | http://service.us-east-1.maxcompute.aliyun-inc.com/api | http://dt.us-east-1.maxcompute.aliyun-inc.com |
| Europe & Americas | UK (London) | Yes | http://service.uk-all.maxcompute.aliyun-inc.com/api | http://dt.uk-all.maxcompute.aliyun-inc.com |
| Middle East & India | India (Mumbai) | Yes | http://service.ap-south-1.maxcompute.aliyun-inc.com/api | http://dt.ap-south-1.maxcompute.aliyun-inc.com |
| Middle East & India | UAE (Dubai) | Yes | http://service.me-east-1.maxcompute.aliyun-inc.com/api | http://dt.me-east-1.maxcompute.aliyun-inc.com |

Endpoints in different regions (VPC)

 **Note** HTTP and HTTPS endpoints are supported. If you want to encrypt requests, use HTTPS endpoints.

| District | Region | MaxCompute available or not | VPC endpoint | VPC Tunnel endpoint |
|----------|----------------------|-----------------------------|--|---|
| China | China (Hangzhou) | Yes | http://service.cn-hangzhou.maxcompute.aliyun-inc.com/api | http://dt.cn-hangzhou.maxcompute.aliyun-inc.com |
| China | China East 2 Finance | Yes | http://service.cn-shanghai-finance-1.maxcompute.aliyun-inc.com/api | http://dt.cn-shanghai-finance-1.maxcompute.aliyun-inc.com |
| China | China (Beijing) | Yes | http://service.cn-beijing.maxcompute.aliyun-inc.com/api | http://dt.cn-beijing.maxcompute.aliyun-inc.com |
| China | China (Shenzhen) | Yes | http://service.cn-shenzhen.maxcompute.aliyun-inc.com/api | http://dt.cn-shenzhen.maxcompute.aliyun-inc.com |
| China | China (Hong Kong) | Yes | http://service.cn-hongkong.maxcompute.aliyun-inc.com/api | http://dt.cn-hongkong.maxcompute.aliyun-inc.com |

| District | Region | MaxCompute available or not | VPC endpoint | VPC Tunnel endpoint |
|---------------------|-------------------------|-----------------------------|---|---|
| Asia Pacific | Singapore (Singapore) | Yes | http://service.ap-southeast-1.maxcompute.aliyun-inc.com/api | http://dt.ap-southeast-1.maxcompute.aliyun-inc.com |
| Asia Pacific | Australia (Sydney) | Yes | http://service.ap-southeast-2.maxcompute.aliyun-inc.com/api | http://dt.ap-southeast-2.maxcompute.aliyun-inc.com |
| Asia Pacific | Malaysia (Kuala Lumpur) | Yes | http://service.ap-southeast-3.maxcompute.aliyun-inc.com/api | http://dt.ap-southeast-3.maxcompute.aliyun-inc.com |
| Asia Pacific | Indonesia (Jakarta) | Yes | http://service.ap-southeast-5.maxcompute.aliyun-inc.com/api | http://dt.ap-southeast-5.maxcompute.aliyun-inc.com |
| Asia Pacific | Japan (Tokyo) | Yes | http://service.ap-northeast-1.maxcompute.aliyun-inc.com/api | http://dt.ap-northeast-1.maxcompute.aliyun-inc.com |
| Europe & Americas | Germany (Frankfurt) | Yes | http://service.eu-central-1.maxcompute.aliyun-inc.com/api | http://dt.eu-central-1.maxcompute.aliyun-inc.com |
| Europe & Americas | US (Silicon Valley) | Yes | http://service.us-west-1.maxcompute.aliyun-inc.com/api | http://dt.us-west-1.maxcompute.aliyun-inc.com |
| Europe & Americas | US (Virginia) | Yes | http://service.us-east-1.maxcompute.aliyun-inc.com/api | http://dt.us-east-1.maxcompute.aliyun-inc.com |
| Europe & Americas | UK (London) | Yes | http://service.uk-all.maxcompute.aliyun-inc.com/api | http://dt.uk-all.maxcompute.aliyun-inc.com |
| Middle East & India | India (Mumbai) | Yes | http://service.ap-south-1.maxcompute.aliyun-inc.com/api | http://dt.ap-south-1.maxcompute.aliyun-inc.com |
| Middle East & India | UAE (Dubai) | Yes | http://service.me-east-1.maxcompute.aliyun-inc.com/api | http://dt.me-east-1.maxcompute.aliyun-inc.com |

9. Users and roles

This topic describes the users and roles involved in MaxCompute.

Background information

The following table describes the users and roles supported by MaxCompute.

| Category | Item | Description | Relationship between users and roles |
|----------|-----------------------|--|---|
| User | Alibaba Cloud account | An account that is created on the Alibaba Cloud official website. | <p>Users and roles are closely associated with permissions:</p> <ul style="list-style-type: none"> You can add a user to a MaxCompute project and authorize the user to perform specific operations on specific objects. For more information about user management, see User planning and management. For more information about authorization, see Permissions. You can quickly assign roles that are defined in MaxCompute to users based on their operation scope. For more information about how to assign a role to a user, see Assign a role to a user. You can also customize a role based on your business requirements and assign the role to users after you grant the role permissions. For more information about how to customize a role, see Role planning and management. <p>For more information about how to view the permissions of a user or role, see View permissions.</p> |
| | RAM user | A user that you can create by using an Alibaba Cloud account. Resource Access Management (RAM) users are used to assist Alibaba Cloud accounts in data processing. | |
| Role | Project Owner | <p>The owner of a project. After a user creates a MaxCompute project, the user becomes the owner of the project and has all permissions on the project.</p> <p>No one except the project owner has access to objects in this project unless authorized by the project owner.</p> | |
| | Super_Administrator | <p>A built-in management role of MaxCompute and the super administrator of a project. A user with the Super_Administrator role has operation permissions on all resources in the project and administrator permissions.</p> <p>Project owners or users with the Super_Administrator role can assign the Super_Administrator role to other users.</p> | |
| | Admin | <p>A built-in management role of MaxCompute. A user with the Admin role has operation permissions and some basic administrator permissions.</p> <p>A project owner can assign the Admin role to other users.</p> | |

| Category | Item | Description | Relationship between users and roles |
|----------|-------------|---|--------------------------------------|
| | Custom role | A non-built-in role of MaxCompute. This role needs to be customized. You can define roles based on the roles with the names that start with Role_ in DataWorks. | |

Note DataWorks also has roles. For more information about the roles in DataWorks and MaxCompute, see [Permission relationships between MaxCompute and DataWorks](#). If you want to add or authorize users in the DataWorks console, you can perform operations by following the instructions in [Add a workspace member and configure roles](#).

Operation differences between Alibaba Cloud accounts and RAM users

The following table describes the operations that Alibaba Cloud accounts and RAM users can perform by using different tools or on different platforms and also describes their required roles.

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|----------------|-----------------------------|----------------------------|-----------------------|-------------------------------|-----------|-----------------------------------|--|
| | Create and delete a project | DataWorks console | Supported | Project owner | Supported | DataWorks role: Workspace Manager | <ul style="list-style-type: none"> If you use an Alibaba Cloud account, enable an AccessKey pair. If you use a RAM user, attach the AliyunDataWorksFullAccess policy to the RAM user in the RAM console. |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|--------------------|-----------------------------|---|-----------------------|-------------------------------|---------------|---|---|
| Project management | Create and delete a project | <ul style="list-style-type: none"> MaxCompute client MaxCompute Studio Query editor | Not supported | N/A | Not supported | N/A | N/A |
| | Access data cross projects | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have cross-project access permissions DataWorks roles: Workspace Manager, Development, and O&M | Use your Alibaba Cloud account to complete authorization. |
| | Update a project | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Not supported | N/A | Not supported | N/A | N/A |
| | | | | | | | |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|----------------|---------------------------------|---|-----------------------|-------------------------------|---------------|--|---|
| | Configure IP address whitelists | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute role: Super_Administrator DataWorks role: not involved | If you use a RAM user, use your Alibaba Cloud account to assign the Super_Administrator role to the RAM user. |
| | Scan a full table | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Not supported | MaxCompute role: Super_Administrator DataWorks role: not involved | If you use a RAM user, use your Alibaba Cloud account to assign the Super_Administrator role to the RAM user. |
| | Protect project data | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Not supported | MaxCompute role: Super_Administrator DataWorks role: not involved | If you use a RAM user, use your Alibaba Cloud account to assign the Super_Administrator role to the RAM user. |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|------------------|--|---|-----------------------|-------------------------------|-----------|---|---|
| | Add, authorize, and manage project members | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute role: Super_Administrator DataWorks role: Workspace Manager | If you use a RAM user, use your Alibaba Cloud account to assign the Super_Administrator role to the RAM user. |
| Data Integration | Create and modify data sources | DataWorks console | Supported | Project owner | Supported | DataWorks role: Workspace Manager | N/A |
| | Create and modify synchronization tasks | DataWorks console | Supported | Project owner | Supported | DataWorks roles: Workspace Manager and Development | N/A |
| | Publish a synchronization task | DataWorks console | Supported | Project owner | Supported | DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|-----------------------|--|----------------------------|-----------------------|-------------------------------|---------------|--|--|
| MaxCompute Management | Modify a quota group | DataWorks console | Supported | Project owner | Supported | MaxCompute role: Super_Administrator DataWorks role: not involved | If you use a RAM user, use your Alibaba Cloud account to attach the AdministratorAccess or AliyunDataWorksFullAccess policy to the RAM user. |
| | View, perform O&M on, and monitor jobs | DataWorks console | Supported | Project owner | Supported | MaxCompute role: Super_Administrator DataWorks roles: Workspace Manager, Development, O&M, and Deploy | If you use a RAM user, use your Alibaba Cloud account to attach the AdministratorAccess or AliyunDataWorksFullAccess policy to the RAM user. |
| | Perform RAM authorization | DataWorks console | Not supported | N/A | Not supported | N/A | N/A |
| | View the code list and content | DataWorks console | Supported | Project owner | Supported | DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|------------------|--------------------------------------|---|-----------------------|-------------------------------|-----------|--|-------------|
| Code development | Create, delete, update, and run code | DataWorks console | Supported | Project owner | Supported | DataWorks roles: Workspace Manager and Development | N/A |
| | JAVA UDF | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to develop Java user-defined functions (UDFs) DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|------------------|----------------------------------|---|-----------------------|-------------------------------|-----------|---|-------------|
| | Python UDF | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to develop Python UDFs DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |
| Operation Center | View and manage scheduling tasks | DataWorks console | Supported | Project owner | Supported | DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |
| | Create a table | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to create tables DataWorks roles: Workspace Manager and Development | N/A |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|----------------|----------------|---|-----------------------|-------------------------------|-----------|---|-------------|
| | Update a table | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to update tables DataWorks roles: Workspace Manager and Development | N/A |
| | Delete a table | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to delete tables DataWorks roles: Workspace Manager and Development | N/A |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|----------------|--|---|-----------------------|-------------------------------|-----------|---|-------------|
| | Grant access to a single table by configuring an access control list (ACL) | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles DataWorks roles: Workspace Manager and Development | N/A |
| | Preview metadata | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to view metadata DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|----------------|--------------------------------|---|-----------------------|-------------------------------|-----------|--|---|
| | Preview a table cross projects | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to view tables cross projects DataWorks roles: Workspace Manager, Development, O&M, and Deploy | Use an Alibaba Cloud account to complete authorization. |
| | Query resources | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to view resources DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|---------------------|------------------------------------|---|-----------------------|-------------------------------|-----------|---|-------------|
| Resource management | Create and delete resources | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to create and delete resources DataWorks roles: Workspace Manager and Development | N/A |
| | Upload resources | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to upload resources DataWorks roles: Workspace Manager and Development | N/A |
| | View the workflow list and content | DataWorks console | Supported | Project owner | Supported | DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|----------------------|--------------------------------------|---|-----------------------|-------------------------------|-----------|--|-------------|
| Workflow development | Create, delete, and update workflows | DataWorks console | Supported | Project owner | Supported | DataWorks roles: Workspace Manager and Development | N/A |
| | Create, delete, and update folders | DataWorks console | Supported | Project owner | Supported | DataWorks roles: Workspace Manager and Development | N/A |
| Function development | View the function list and details | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to view functions DataWorks roles: Workspace Manager, Development, O&M, and Deploy | N/A |
| | | | | | | | |

| Operation type | Operation | Supported tool or platform | Alibaba Cloud account | Role of Alibaba Cloud account | RAM user | Role of RAM user | Requirement |
|----------------|---|---|-----------------------|-------------------------------|-----------|---|---|
| | Create and delete functions | <ul style="list-style-type: none"> DataWorks console MaxCompute client MaxCompute Studio Query editor | Supported | Project owner | Supported | <p>MaxCompute roles: MaxCompute built-in roles and custom roles that have permissions to create and delete functions.</p> <p>DataWorks roles: Workspace Manager and Development</p> | N/A |
| Sales | Purchase, recharge, renewal, upgrade, and downgrade | <ul style="list-style-type: none"> MaxCompute console and DataWorks console MaxCompute buy page | Supported | Project owner | Supported | N/A | If you use a RAM user, use your Alibaba Cloud account to attach the AliyunBSSFullAccess policy to the RAM user. |
| | View bills, billing details, and usage records | Billing Management of the Alibaba Cloud Management Console | Supported | Project owner | Supported | N/A | If you use a RAM user, use your Alibaba Cloud account to attach the AliyunBSSFullAccess policy to the RAM user. |

10.FAQ

This topic provides answers to some frequently asked questions about the preparations that are required for using MaxCompute.

| Category | FAQ |
|---|---|
| Activate MaxCompute | <ul style="list-style-type: none"> • What are the differences between DataWorks and MaxCompute? • How do I distinguish between a DataWorks workspace and a MaxCompute project? |
| Create a MaxCompute project | What do I do if the error ODPS-0410051 occurs when I create a MaxCompute project? |
| Create a RAM user | What do I do if a RAM user cannot be used to access a MaxCompute project? |
| Prepare an environment and install the required tools | <ul style="list-style-type: none"> • What do I do if the error ODPS-0410031 occurs when I use the MaxCompute client to access a MaxCompute project? • What are the platforms that MaxCompute Studio can integrate with? |

What are the differences between DataWorks and MaxCompute?

MaxCompute is a data warehouse that is used to store data or perform data development and computations.

DataWorks provides features, such as visualized development and node process management, for you to use in MaxCompute. DataWorks works with MaxCompute to provide an end-to-end data processing solution, including data development and data governance. For more information about DataWorks, see [What is DataWorks?](#).

How do I distinguish between a DataWorks workspace and a MaxCompute project?

You must create a DataWorks workspace before you create a MaxCompute project. For more information about how to create a MaxCompute project, see [Create a MaxCompute project](#). DataWorks workspaces are distinguished from MaxCompute projects in the following ways:

- DataWorks workspaces: Log on to the [DataWorks console](#). In the left-side navigation pane, click **Workspaces**. On the Workspaces page, you can view the names of the DataWorks workspaces.
- MaxCompute projects: Log on to the [MaxCompute console](#) and view the names of MaxCompute projects and the DataWorks workspaces to which the projects correspond on the **Project management** tab.

What do I do if the error ODPS-0410051 occurs when I create a MaxCompute project?

The error ODPS-0410051 occurs because the AccessKey pair is invalid. You can go to the [AccessKey Pair](#) page in the Resource Access Management (RAM) console to obtain a valid AccessKey pair or create an AccessKey pair.

What do I do if a RAM user cannot be used to access a MaxCompute project?

The RAM user is not authorized to access the MaxCompute project. You must grant the RAM user the required permissions by using the Alibaba Cloud account to which the RAM user belongs. For more information, see [Create a RAM user](#).

What do I do if the error ODPS-0410031 occurs when I use the MaxCompute client to access a MaxCompute project?

- Problem description

When the MaxCompute client is started, the following error message appears:

```
FAILED: ODPS-0410031:Authentication request expired - the expire time interval exceeds the max limitation: 900000, max_interval_date:900000,expire_date:2015-12-23T10:15:31.000Z,now_date:2015-12-23T02:16:00.000Z
```

- Cause

The local time of the device on which the MaxCompute client is installed is not the same as the time of the MaxCompute server. If the time difference exceeds 15 minutes, the connection request is considered timed out and rejected by the server.

- Solution

Adjust the local time of the device on which the MaxCompute client is installed. Then, restart the MaxCompute client.

What are the platforms that MaxCompute Studio can integrate with?

MaxCompute Studio is a big data integrated development environment (IDE) tool that is provided by Alibaba Cloud MaxCompute. MaxCompute Studio can be integrated with IntelliJ IDEA and PyCharm. For more information about how to configure MaxCompute Studio, see [Configure MaxCompute Studio](#).