# Alibaba Cloud MaxCompute

**Tools and Downloads** 

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# **Generic conventions**

### Table -1: Style conventions

Style	Description	Example
•	This warning information indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	<b>Danger:</b> Resetting will result in the loss of user configuration data.
A	This warning information 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 restore business.
	This indicates warning information, supplementary instructions, and other content that the user must understand.	<b>Note:</b> Take the necessary precautions to save exported data containing sensitive information.
	This indicates supplemental instructio ns, best practices, tips, and other content that is good to know for the user.	Note: You can use Ctrl + A to select all files.
>	Multi-level menu cascade.	Settings > Network > Set network type
Bold	It is used for buttons, menus, page names, and other UI elements.	Click <b>OK</b> .
Courier font	It is used for commands.	Run the cd /d C:/windows command to enter the Windows system folder.
Italics	It is used for parameters and variables.	bae log listinstanceid Instance_ID
[] or [a b]	It indicates that it is a optional value, and only one item can be selected.	ipconfig [-all/-t]
{} or {a b}	It indicates that it is a required value, and only one item can be selected.	<pre>swich {stand   slave}</pre>

# Contents

Legal disclaimer Generic conventions	
1 Client	
2 MaxCompute Studio	4
2.1 What is Studio	
2.2 Tools Installation and version history	9
2.2.1 Install IntelliJ IDEA	9
2.2.2 Installation procedure	14
2.2.3 View and upgrade the version	22
2.3 Manage data and resources	23
2.3.1 View tables and UDF	23
2.3.2 Import and export data	28
2.3.3 Visualization of operating the tables	33
2.4 Developing Java	37
2.4.1 Create MaxCompute Java Module	37
2.4.2 Develop and debug UDF	40
2.4.3 Develop MapReduce	45
2.4.4 Unstructured development	49
2.4.5 Package/Upload/Register	51
2.4.6 Develop Graph	55
2.5 Configure options	57
2.5.1 Configure MaxCompute Studio	58
3 Downloads	62

# 1 Client

This article describes how to use the basic functions of the MaxCompute using client command line tool. Before using the MaxCompute client, you must *install and configure the client*.



- Do not perform the analysis operation based on the output format of the client. The output format of the client is not ensured for forward compatibility. Clients of different versions are different in their command formats and behaviors.
- For more information about basic commands of the client, see *Basic commands*.
- Download MaxCompute console
- The client supports JDK 1.9 from the 0.28.0 version, and the previous version can only use JDK 1.8.
- The client supports MaxCompute 2.0 from the 0.27.0 version *New data type*.

After the client is installed and configured, you can use a command line to perform the following operations.

#### Get Help

To view the help information of the console, the command format is as follows:

odps @>./bin/odpscmd-h;

You can also input h; or help; (case-insensitive) in an interactive mode.

The console also provides the help [keyword]; command to get the command prompts related to the keyword. For example, input help table; to get command prompts related to the table operation as follows:

### Start parameters

When start the console, you can specify a series of parameters as follows:

Usage: odpscmd [option]...

```
where options include:
    --help (-h) for help
    --project= use project
    --endpoint= set endpoint
    -u-p user name and password
    -k will skip begining queries and start from specified position
    -r set retry times
    -f <"file_path;"> execute command in file
    -e <"command; [command;]..."> execute command, include sql command
    -C will display job counters
```

Take the -f parameter as an example, the operation is as follows:

**1.** Prepare the local script file script.txt. Suppose that the file is located in the disk D, and the content is shown as follows:

DROP TABLE IF EXISTS test\_table\_mj; CREATE TABLE test\_table\_mj (id string, name string); DROP TABLE test\_table\_mj;

**2.** Run the following command:

odpscmd\bin>odpscmd -f D:/script.txt;

#### Interactive mode

Run the console to directly enter the interactive mode:

```
[admin: ~]$odpscmd
Aliyun ODPS Command Line Tool
Version 1.0
@Copyright 2012 Alibaba Cloud Computing Co., Ltd. All rights reserved.
odps@ odps> INSERT OVERWRITE TABLE DUAL SELECT * FROM DUAL;
```

Enter the command at the cursor position (use a semicolon as a statement terminator), and press Enter to run.

#### Continuous running

- When using -e or -f option to run a command, if there are multiple statements, and you want to start running from a middle statement, you can specify the parameter -k, indicating to ignore the previous statements and to start running from the specified position. When the parameter <= 0 is specified, the execution starts from the first statement.</li>
- Each statement separated by a semicolon is considered as a valid statement. The statements which run successfully or fail to run are printed out at runtime.

For example,

suppose there are three SQL statements in the file /tmp/dual.sql:

```
drop table dual;
create table dual (dummy string);
insert overwrite table dual select count(*) from dual;
```

To ignore the first two statements, and start running from the third statement, the command format

is as follows:

odpscmd -k 3 -f dual.sql

### Get current logon user

To get current logon user, the command format is as follows:

whoami;

Use example:

```
odps@ hiveut>whoami;
Name: odpstest@aliyun.com
End_Point: http://service.odps.aliyun.com/api
Project: lijunsecuritytest
```

Use the preceding command to get the current logon user Alibaba Cloud account, endpoint configuration, and project name.

#### Exit

To exit the console, the command format is as follows:

odps@ > quit;

You can also use the following command to exit the console:

odps@ > q;

# 2 MaxCompute Studio

### 2.1 What is Studio

MaxCompute Studio is a big data integrated development environment (IDE) tool that is provided by the Alibaba Cloud MaxCompute platform and installed on the developer's client. It is a development plug-in based on the popular integrated development platform *IntelliJ IDEA*, helping users develop data conveniently. This article describes functional interfaces and common application scenarios of MaxCompute Studio.

### Basic user interface

MaxCompute Studio is a plug-in on the IntelliJ IDEA platform, which shares basic development interfaces with IntelliJ IDEA. For more information about the IntelliJ IDEA interfaces, see *the Interface operation guide*.

Based on the IntelliJ IDEA interfaces, MaxCompute Studio provides the following functional interfaces.

• **SQL Editor**: Provides features such as SQL syntax highlighting, code complementing, realtime error prompting, local compilation, and job submission.

Compiler View: Displays locally compiled prompts and error messages, and locates the code in the editor.

• **Project Explorer**: Connects to a MaxCompute project, and browses table structures, custom functions, and resource files in the project.

Table Details View: Displays details and sample data of tables, views, and other resources.

- Job Explorer: Browses and searches for historical jobs of MaxCompute.
  - Job Details View: Displays running details of a job, including the execution plan and details of each execution task.
  - Job Output View: Displays output information of a running job.
  - Job Result View: Displays the output result of the SELECT job.
- **MaxCompute Console**: Integrates the *MaxCompute client*, on which MaxCompute client commands can be input and executed.

#### **Connect to MaxCompute project**

Before using most features of MaxCompute Studio, you must *Create a project connection*. After the project connection is created, you can view related data structures and resource information in

the **Project Explorer**. MaxCompute Studio automatically creates a local metadata backup task for each project to increase the access frequency to MaxCompute metadata and reduce the latency.

Note:

- You must specify the target project connection to modify SQL scripts, submit jobs, view job information, open the MaxCompute console, and implement other functions using MaxCompute Studio. Therefore, creating a connection to the MaxCompute project is necessary.
- For more information about MaxCompute projects, see Project.
- For more information about project management using MaxCompute Studio, see *Project* space connection management.

### Manage data

You can use the **Project Explorer** of MaxCompute Studio to quickly browse table structures, custom functions, and resource files in the project. The tree control can be used to list data tables, columns, partition columns, virtual views, custom functions, function signatures, and resource files and types of all project connections. It also supports fast locating.

You can double-click a data table to open the **Table Details View** and view metadata, structure, and sample data of the data table. If you do not have the permission for a project, an error message is prompted.

MaxCompute Studio integrates *MaxCompute Tunnel* and supports local data upload and download. For more information, see *Import and export data*.

#### Write SQL scripts

You can easily compile a MaxCompute SQL script on MaxCompute Studio.

- 1. Open MaxCompute Studio and select File > New > Project or File > New > Module....
- 2. Create a MaxCompute Studio project or module.
- Select File > New > MaxCompute Script or right-click the menu and select New > MaxCompute Script , to create a maxcompute SQL script file.

### Note:

When a MaxCompute SQL script is created, MaxCompute Studio prompts you to select an associated MaxCompute project. You can also modify the associated project using the **project selector** on the right of the toolbar on the SQL editor. The editor automatically checks metadata (such as the table structure) and reports errors of an SQL statement based on the project associated with the SQL script. The editor also sends the SQL statement to the associated project for execution when it submits the SQL statement for running. For more information, see *Compile an SQL script*.

### SQL code intelligent prompt

After you enter the code, the SQL editor provided by MaxCompute Studio intelligently prompts the syntax errors, type matching errors, or warnings of SQL statements, and marks them on the code in real time. as shown in the following figure.



By using the code complementing function, MaxCompute Studio prompts you the name, table, field, function, type, and code keyword of a project based on the code context, and automatically complements the code based on your selections. as shown in the following figure.



### Compile and submit a job

Compile a job

Click the icon on the toolbar of the SQL editor to locally compile an SQL script. If syntax

or semantic errors occur, the editor reports it.

7 8	select clause in the front
9	<pre>select * from table_test;</pre>
10	
11	from clause in the front
12	<pre>from table_test table_alias select *;</pre>
13	
14	table name with project prefix
MaxCo	npute Compiler
×	🗧 🕕 Information: Parsing
	Information: Type checking
+ =	Information: Latency.compiler_parse_error : 44170
1.	Information: Build failed(2)
	Mulsers/vueming vm/ldeaProjects/MvUDE/Script/scripts
2 🔺	Error:(9, 15) table meta.table_test cannot be resolved
?	
•	Error:(12, 6) table meta.table_test cannot be resolved

Submit a job

Click the picon on the toolbar of the SQL editor to submit an SQL script to the queue of

the project specified by MaxCompute.

### View history jobs

Open Job Explorer to view recently executed jobs in the specified project.



List only displays jobs submitted by the user ID of the current connection.

MaxCompute Job Explorer ♣+ ↓+						
Project: s	Project: sql_optimizer 🔻 Days: 2 💌 🗊					
		Q (	40/47883)	Table 🔻		
Instanceld	Status	Owner	StartTime	EndTime		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	SUCCESS	ODPS	2017	2017		
20170	FAILED	ODPS	2017	2017		

Double-click a job to view the job details. as shown in the following figure.

图 Job ID: 201702170653179gu5qrzsk2 ×				
	Refresh			
	SQL_0_0_job_0			
	Task Name: sql_optimizer_201702170653179gu5qrzsk2_SQL_0_0_job_0			
M1	Task         I/O Records         Status         Progress         StartTime         EndTime           M1         1/1         100.0         2017-02         2017-02         2017-02			
TableScan_REL3692	M1 1/1 100.0 2017-02 2017-02			
Data Source: sql_optimizer.dual TS: alias: dual				
	M1 × Instance I/O Recor Status FinishedP StartTime EndTime IP & Path LogId			
ADHOC_SINK_3693	M1#0_0 1/1 TERMI 100.0 2017 2017 10.10 d01U			
FS: output: None				
2017-02-17 14:53:17 <b>14:5</b> 2017-02-17 14:53:35				
可视化 概要 (JSON) 概要 (文本) 结果 SQL				

If you have the Log view URL of a job, you can select **MaxCompute > Open Logview** from the menu to go to the details page of the job.

### Develop a MapReduce program and UDF program

MaxCompute Studio also allows you to develop MapReduce and Java UDF programs.

### **Connect to a MaxCompute client**

MaxCompute Studio is integrated with the *MaxCompute Client* of the latest version. Alternatively, you can specify the path of the locally installed MaxCompute client on the *Configuration page* of MaxCompute Studio.

On the **Project Explorer**, right-click a project and select **Open in Console** to open the **MaxCompute Console** window.



#### Next step

Now, you know the functional interfaces and common application scenarios of MaxCompute Studio. Continue to the next tutorial. In this tutorial, you will learn how to install MaxCompute Studio. For more information, see *Install Intellij IDEA*.

### 2.2 Tools Installation and version history

### 2.2.1 Install IntelliJ IDEA

This document describes how to install the basic platform IntelliJ IDEA of MaxCompute Studio.

### Context

Procedure

### Procedure

 Click *here* to download the IntelliJ IDEA of the version corresponding to your operating system (Windows, macOS, or Linux). The following assumes that the Windows operating system is used. Download IntelliJ IDEA 14.1.4 or a later version. (The Ultimate version, PyCharm version, and free Community version are supported.)

2. After the download is complete, double-click the installation program to enter the installation page, and click **Next**, as shown in the following figure.



3. Specify the installation directory, and click Next, as shown in the following figure.

🛂 IntelliJ IDEA Commu	nity Edition Setup		
<b>2</b>	Choose Install Location Choose the folder in which to install Intel Edition.	liJ IDEA Comm	unity
Setup will install IntelliJ IDEA Community Edition in the following folder. To install in a different folder, click Browse and select another folder. Click Next to continue.			
Destination Folder	ns\IntelliJ IDEA Community Edition 2017.1.5	Browse.	
Space required: 781.5ME Space available: 8.5GB	3		
	< Back Nex	dt >	Cancel

4. Select the 32-bit or 64-bit IntelliJ IDEA based on the version of the local operating system.

### You can query the local operating system version by following these steps:

- a) Open Windows Resource Manager, right-click **Computer** and select **Properties** from the shortcut menu. as shown in the following figure.
- b) In the displayed window, check the type of the operating system.
- 5. Select the corresponding system type and click **Next**, as shown in the following figure.

🛂 IntelliJ IDEA Commun	ity Edition Setup	
2	Installation Options Configure your Intellij IDEA Community Edition ins	stallation
Create associations	ut 64-bit launcher /y 🔲 .kt	
	< Back Next >	Cancel

6. Click Install to start installation, as shown in the following figure.

IntelliJ IDEA Cor	nmunity Edition Setup	
1	Choose Start Menu Folder	
	Choose a Start Menu folder for the Edition shortcuts.	Intellij IDEA Community
can also enter a na	enu folder in which you would like to create the me to create a new folder.	program's shortcuts. You
JetBrains		
7-Zip		
Accessories		=
Administrative Too	bls	-
Adobe		
Chone (59)		
Cisco Diserson Designer		
Diagram Designer doPDE 7		
eDiary		
Games		
Java		*
	< Back	Install Cancel

🛂 IntelliJ IDEA Community	Edition Setup				
<b>1</b>	Installing Please wait while Intellij IDEA Community Edi installed.	tion is being			
Extract: btn_toggle_off_foc	Extract: btn_toggle_off_focused_holo_dark.9.png 100%				
Show details					
	< Back Next >	Cancel			

7. After the installation is complete, click Finish.



### What's next

Now you know how to install IntelliJ IDEA. Continue to the next tutorial. In this tutorial, you will learn how to install the MaxCompute Studio plugin. For more information, see *Install the MaxCompute Studio plugin*.

### 2.2.2 Installation procedure

### **Environment requirements**

IntelliJ IDEA can be installed on *Windows*, *Mac*, *Linux*. For more information about the hardware and system environment requirements, click *here*. IntelliJ IDEA-based MaxCompute Studio can also be installed on clients running these operating systems.

MaxCompute Studio has the following requirements on the your environment:

- A client running Windows, macOS, or Linux.
- IntelliJ IDEA 14.1.4 or a later version is installed. (The Ultimate version, PyCharm version, and free *Community version* are supported.)
- JRE 1.8 is installed. (JRE 1.8 has been bound to the latest IntelliJ IDEA.)
- JDK 1.8 is installed. (Optional: JDK is required if you need to develop and debug Java UDF.)

### Note:

The client supports JDK 1.9 from the 0.28.0 version. The previous version only supports JDK 1.8.

### Installation method

MaxCompute Studio is a plugin of IntelliJ IDEA, which can be installed using either of the following two methods:

- Online installation using the plugin library (recommended)
- Installation using a local file

#### **Online installation (recommended)**

MaxCompute Studio The MaxCompute Studio plugin has been opened for all users on the Internet . You can install MaxCompute Studio using the official IntelliJ IDEA plugin library.

#### Procedure

- Open the plugin configuration page on IntelliJ IDEA. (If you are a Windows/Linux user, choose File > Settings > > Plugins. If you are a macOS user, choose IntelliJ IDEA > Preferences > Plugins ).
- 2. Click Browse repositories... and search for MaxCompute Studio.

- 3. On the MaxCompute Studio plugin page, click Install.
- **4.** After the installation is confirmed, restart IntelliJ IDEA to complete installation.

Q Search	Plugins		
Appearance & Behavior	Qr Show: All pluging	•	
Keymap	So	Android Support	
Editor	🗯 Android Support		se Repositories
Plugins	🔏 Ant Support		
Version Control	💉 ANTLR v4 grammar plugin		jory: All 👻
Build, Execution, Deployment	Bytecode Viewer	Sort by: nam	
Languages & Frameworks Tools	着 Copyright	MaxCompute Studio 4	
MaxCompute Studio	<sup>A</sup> Coverage	Une day	Install
Other Settings	CVS Integration		★★★★★ 4 downloads
	Eclipse Integration		Updated 16/10/10 v0.1.0
	▲ EditorConfig		MaxCompute Studio for IntelliJ products, providing development support for MaxCompute.
	Git Integration		Vendor
			Alibaba Inc. http://www.aliyun.com
	着 GitHub		Size
	i Gradle		40.2 M
	着 Groovy		
	hg4idea		
	I18n for Java		
	IntelliLang		
	🔏 Java Bytecode Decompiler		
	着 JavaFX		
	/¥ JUnit		
	/¥ Kotlin		
	💉 Lombok Plugin		
	Check or uncheck a plugin to enable or disable it.		
	Install JetBrains plugin Browse reposite	HTTP Proxy Settings Manage repositories	

### Local installation

MaxCompute Studio MaxCompute Studio can also be installed in a local environment.

### Procedure

- **1.** Go to the *MaxCompute Studio plugin page* to download the plugin package.
- 2. Run IntelliJ IDEA.
  - If you access IntelliJ IDEA for the first time, a welcome page is displayed. Click **Configure** and select **Plugins** from the shortcut menu, as shown in the following figure.



 If you have accessed IntelliJ IDEA before, choose File > Settings > Plugins to enter the same page, as shown in the following figure.



	Plugins
Appearance & Behavior	Q * Show: All plugins *
Keymap Editor Plugins Version Control Build, Execution, Deployment Languages & Frameworks Tools MaxCompute Studio	Sort by: name   Android Support   Ant Support   Bytecode Viewer   Copyright   Coverage   Coverage   CVS Integration   E clipse Integration   E ditorConfig   G if Integration   G if Integration   G if Integration   G if Integration   If andle   G if Integration   If a for Java   If a for Java   ItelliLang   If a bytecode Decompiler
	Check or uncheck a plugin to enable or disable it.         Install JetBrains plugin         Browse repositories    Install plugin from disk

3. On the Plugins page, click Install plugin from disk..., as shown in the following figure.

Plugins	×
Q• Show: All plugins •	
Sort by: name Android Support Ant Support Ant Support Sort Support Ant Support Ant Support Support Ant Support An	Android Support Version: 10.2.2.2 Supports the development of Open Handset Alliance Android applications with Intellij IDEA. tall plugin from disk
	OK Cancel Help

**4.** In the displayed window, click the gray icon before a directory for navigation, find the plugin file, select it, and click **OK**.

🖳 Choose Plugin File
JAR and ZIP archives are accepted
D:\software\odps-studio-intellij-2.0.0-yq.zip
> Git
> IDEA
> 🖿 Java
> 🖿 kb
> 🖿 logtail_installer
> odpscmd_public
> odpscmd_public01
> 🖿 SnagIt
> 🖿 SwitchOmega
> 🖿 windows-kb
apache-tomcat-7.0.77.zip
cs843.zip
httpd-2.2.32-x64-r1.zip
logtail_installer.zip
odps-studio-intellij-2.0.0-yq.zip
odpscmd_public.zip
Drag and drop a file into the space above to quickly locate it in the tree
OK Cancel

5. Return to the Plugins page and click **OK** to install the local plugin.

Plugins		x				
Q* Show: All plugins *						
Sort by: I	name 🔻	MaxCompute Studio				
Coverage		C Restart IntelliJ IDEA				
CVS Integration						
📲 Eclipse Integration		Version: 2.6.2.5				
📲 EditorConfig		Changes in Version 2.6.2.5:				
📑 Git Integration		<ul> <li>Change: Remove limitation on service mode job submission</li> <li>Bug fix: DDL submission issue on public projects</li> </ul>				
GitHub		Changes in Version 2.6.2.4:				
Gradle		Change: Update MaxCompute compiler version     Bug fix: Can't open help document in IDEA 2016.x				
Groovy		Changes in Version 2.6.2.3:				
turne de la constant		Enhancement: Data preview performance				
📲 I18n for Java		Bug fixes				
📲 IntelliLang		Changes in Version 2.6.2.2:				
📲 Java Bytecode Decompiler		<ul> <li>Bug fixes</li> </ul>				
📲 JavaFX		Changes in Version 2.6.2:				
C JUnit		Feature: Unstructured data handler template and examples     Feature: Overset live together is 200. Edited				
📲 Kotlin		<ul> <li>Feature: Support live template in SQL Editor</li> <li>Feature: Support decimal type in data import/export</li> </ul>				
📲 Maven Integration		<ul> <li>Feature: Support variable replacement in SQL script on submission</li> </ul>				
🚝 MaxCompute Studio		<ul> <li>Feature: Table partition list and partition data preview</li> <li>Feature: Running job progress visualization and replay</li> </ul>				
Check or uncheck a plugin to enable or disable it.						
Install JetBrains plugin Browse repositories	Install	plugin from <u>disk</u>				
		OK Cancel Help				

**6.** After the installation is complete, a dialog box is displayed, prompting you to restart IntelliJ IDEA. Click **Restart**.

🔛 Welcome to IntelliJ IDEA		23
Intelli LIDEA		
Restart IntelliJ IDEA to activate changes in plugins?		
Restart Postpone		
🗁 Open 🔸 Check out from Version Control 🗸		
Configure	e ਦ Get Help	P +

7. After IntelliJ IDEA is restarted, the page is displayed as shown in the following figure.

U Welcome to IntelliJ IDEA			_ <b>D</b> X	
	IntelliJ IDEA Version 2017.1.5			
	🔆 Create New Project			
	⊯ Import Project			
	늘 Open			
	🖊 Check out from Version Control 🗸			
		🏶 Configure 🗸	Get Help 👻	

### Next step

Now, you know how to install the MaxCompute Studio plugin. Continue to the next tutorial. In the tutorial, you will learn how to configure a MaxCompute project connection to manage data and resources. For more information, see *Create a MaxCompute project connection*.

### 2.2.3 View and upgrade the version

### View the MaxCompute Studio version

Perform the following steps to view the Studio version:

- **1.** Go to the **Settings/Preferences** page (by pressing Ctrl-Alt-S in Windows or  $_{\Re}$  in macOS).
- 2. Select Plugins on the left bar of the dialog box and search for MaxCompute Studio.
- 3. View the MaxCompute Studio version number and release information.

Alternatively, you can select **MaxCompute Studio** on the left bar of the **Settings** page to view the current version number.

#### Check new versions

By default, MaxCompute Studio automatically detects new versions. If a new version is available, MaxCompute Studio automatically notifies you.

After receiving an update prompt, you can select:

- **Install**: Click the Install link in the update prompt. The new version is automatically downloaded and installed. After the installation is complete, restart IntelliJ IDEA.
- **Configure**: Click the Configure link in the update prompt. You can configure whether to detect new versions automatically.

If the automatic update function is disabled, you can perform the following steps to check and install a new version of MaxCompute Studio.

- **1.** Go to the **Settings/Preferences** page (by pressing Ctrl-Alt-S in Windows or  $\mathfrak{K}$  in macOS).
- 2. Select MaxCompute Studio on the left bar of the dialog box.
- 3. On the MaxCompute Studio configuration page, click Check new versions.
- If a new available version is detected, Studio notifies you of the new version number. Click
   Install new version and restart IntelliJ IDEA to complete installation.

You can use the **Automatically checks for new version** check box to control the switch for automatic version update check.

#### Next step

Create a MaxCompute project connection

### 2.3 Manage data and resources

### 2.3.1 View tables and UDF

### View tables and functionsView tables and functions

In the **Project Explorer window**, you can view tables, functions, and resources with connections added. For tables and functions to be viewed in the Project Explorer window, the MaxCompute project connections must be added, for more information, see *Add MaxCompute project connections*.

### Browse tables and functions

To browse tables and functions in the project space, follow these steps.

1. Open the Project Explorer window and you can view the added Project node tree.



The toolbar is displayed at the top of the node tree, and includes:

- Add Project: Adds a connection to the MaxCompute project space.
- **Delete Project**: Deletes a connection from Project Explorer, which has no impact on the project space on the server end.
- **Update Metadata**: Updates metadata information from the project space on the server end and updates the locally buffered metadata.
- Expand Node: Expands all tree nodes.
- Fold Node: Folds all tree nodes.
- User Feedback: Submits user feedback.
- Online Documentation: Opens online documents.
- 2. Double-click the **Tables** node or click the drop-down arrow to expand the Tables node to list all tables in the project (including virtual views). The table name list serves the same purpose

as the show tables command. You must have the List Table permission in the project. The methods for the **Functions** and **Resources** nodes are similar to that of the Tables node.

- Odps\_studio\_dev
   Tables & Views
   alitrip\_dest\_relation
   array\_map\_test2
   haoping\_sdk\_log\_copy
   haoping\_test\_part
   hy\_test1
   key
   table test
   Functions
   Resources
- 3. MaxCompute Studio downloads project metadata on the server to the local device. When metadata on the server end is updated, for example, a new table is added, you must manually trigger a refresh to reload changed metadata to the local device. The refresh can be performed at the Project or Table level. The procedure is as follows:
  - a. Select a node.
  - b. Click the Refresh icon on the toolbar or right-click the node and select Refresh meta.



### View table details

You can view data table information in **Table Details View** of MaxCompute Studio.

1. In the node tree, expand a table node to view the column name and type.

▼ [P] odps_studio_dev
Tables & Views
alitrip_dest_relation
🔍 🇰 array_map_test2
id :STRING
arrays :ARRAY <string></string>
maps :MAP <string,string></string,string>
haoping_sdk_log_copy
haoping_test_part
hy_test1
key
table_test
Functions
Resources

 Double-click a table or right-click a table and choose Show Table Detail to view the table details. The table details include metadata, such as owner, size, and column, table structure information, and data preview.

J I Ž ÷	Table information		Table schem	Table schema				
neta_dev	key	value		name		type	comments	
_0101020223_stgcontrol_395	Name:	b_hour	hour		STRING			
tudiotest1 test1	Comments:		c		STRING			
Tables & Views	Owner:	1830820614534790	d		STRING			
	Created time:	2016-02-18 15:20:46	e		STRING			
b_hour	Meta Modified time:	2016-04-18 16:48:18	f		STRING			
hour :STRING	Data Modified time:	2016-08-05 10:18:33	9		STRING			
c :STRING	Size:	63048	h		STRING			
d :STRING	Physical size:	189144						
e :STRING	Partitions:	0						
f STRING	Partition columns							
g :STRING	Sharding:							
	Sharding columns:							
h :STRING								
b_second	Data preview							
🕨 🥅 big	hour	c		d	e	1	9	
big2	00		null	null	Inull	null	null	
CC CC	01		null	null	null	Inull	Inuli	
dual	02		mult	null	null	null	null	
haoping_aaa2	03		null	null	Inuli	Inuli	Inull	
haoping_test4	04		Inull	Inull	null	null	Inull	
	05		null	null	null	Inull	Inull	
haoping_test_part	06		Inull	Inull	Inull	inull.	Inull	
hy_test	07		null	null	null	null	null	
Iimiao_testabc	08		null	null	null	Inull	null	
mydual	10		null	null	null	null	noll	
skew	10		null	null	null	null null	null	
t t	11		null	null	null	Roll	- HUIT	
	12 13		null	null	null	null	null	
⊧ III t_view	13		null	RUIT	null	Roll	null	
t_yuyuan	14		null	null	null	null	null	
test1	15		null	Inull	null	Inull	Incite Incite	
test2	10			Inul	Inull	Inull	Tault Tault Inuit Inuit	
	17		null null	Inull	null	null		
unit_test_sdk								

3. Right-click **Tables & Views** and select **Open specific entity** to display the details of the specific table. Note that the complete table name must be specified. If you do not have the List permission on the project and only have the permission on a specific table, you can also view details of the table using this method. The methods for the Functions and Resources nodes are similar to that of the Tables node.

MaxCompute Project Explorer
• • ↓ • ₹ ₹ 0 (i)
▼ P odps_studio_dev
► Tabl Add project
🕨 🔄 Resc Refresh meta
<ul> <li>P wpp_de Open specific entity</li> <li>P cdo_meta</li> <li>P studiotest1_test1</li> </ul>
Open specific table
Name:
OK Cancel

Intellij IDEA supports searching by default. After a table is expanded, you can directly press keys on the keyboard to perform fuzzy match.

MaxCompute Studio also supports quick search for the table, you can use the shortcut key (Windows: Ctrl + Alt + Shift + N, macOS: ¬\_ + ℜ + O) to call the navigation bar, then enter the name of the table and press Enter.

Enter symbol name: Include non-project symbols (て第0)				
Q hy		8		
hy_partition_test odps_studio_dev				
whytest odps_studio_dev				
hy_view odps_studio_dev	云海社区 yq.aliy	un.com		

You can narrow the search by using the pre-keyword (table:, function:, or resource:). For example, to search for the function count, enter function:count.

5. To know the scripts in which the table is used, right-click the table and select Find usages.



### View function details

 Expand a function node under the UserDefined node of Functions to display the method signature of this function. Double-click a function node under the Functions node. Alternatively, double-click the source code resource of the function under the Resources node. In this case, codes of this function are displayed.



### Note:

The Java code is obtained by decompiling JAR, which is not the source code. To enable the Python UDF to parse the signature, install PyODPS (MaxCompute Python SDK) first. Install pip: sudo/usr/bin/python get-pip.py (Download get-pip.py from Google manually) and then PyODPS: sudo/usr/bin/python -m pip install PyODPS. Note that the Mac operating system has Python, which is stored in /usr/bin/python. Install PyODPS in this directory.

**2.** The classification under the BuiltIn node of **Functions** shows the built-in functions of the system, expand it to display signature and double-click it to display function document.

J MaxCompute Project Explorer 🕸 - I+	C JavaMethodFunction.java × 📴 PlusHello.class ×
ै + − J) Ξ ¥	Decompiled .class file, bytecode version: 50.0 (Java 6)
<ul> <li>P meta_dev</li> <li>P a_0101020223_stgcontrol_395</li> <li>P studiotest1_test1</li> <li>Tables &amp; Views</li> <li>Functions</li> <li>fx divideerror</li> <li>fx myudtf</li> </ul>	<pre>1 c// 2 // Source code recreated from a .class file by IntelliJ IDEA 3 // (powered by Fernflower decompiler) 4 c// 5 6 package myudf; 7 8 import com.aliyun.odps.udf.UDF; 9</pre>
▼ fx plushello	<pre>public class PlusHello extends UDF {     public PlusHello() { </pre>
fx plushello(STRING):STRING ▶ fx timestwo ▶ 😭 Resources	<pre>12</pre>

### 2.3.2 Import and export data

MaxCompute Studio can import local data files in CSV or TSV format to MaxCompute tables and export MaxCompute table data to local files. MaxCompute Studio completes data import and export by using Batch data Tunnel provided by the MaxCompute platform.

### **Usage instructions**

- The MaxCompute Tunnel service must be used for data import and export. Therefore, the MaxCompute project added in Studio must be configured with the Tunnel service.
- · Related permissions must be granted for table import and export.

### Import data

1. Open the **Project Explorer** window, right-click a table name or a field attribute in Data preview of Table details and select **Import Data Into Table**.



2. In the **Import Data** dialog box that appears, select the path of the imported data file, column separator, size limitation, and number of lines for an error tolerance, and click **OK**.



**3.** If **Import Data Success** is displayed, data import is successful and imported data can be viewed in the table.

### Export data

- 1. Two methods are provided for table data export.
  - Right-click a table name and select Export Data From Table.



Right-click a field attribute in **Data Preview** of Table details and select **Export Data From** Table.

Table information				
key	value	nam		comments
Name:	hy_test1	id	BIGINT	
Comments:		name	STRING	
Owner:	ALIYUN\$dxp_06894684@aliyun.c	om age	BIGINT	
Created time:	2016-12-29 11:50:22			
Meta Modified time:	2016-12-29 11:50:22			
Data Modified time:	2017-01-22 20:42:37			
Size:	1280			
Physical size:	3840			
Partitions:	0			
Partition columns				
Sharding:				
Sharding columns:				
ata preview id				
10	a Export d	ata from table	11	age
	a		1	
	Import d	ata into table	1	

2. In the Export Data dialog box that appears, select the path for saving the exported data file, column separator, size limitation, and number of lines for an error tolerance, and click OK.

+ - I) ₹ ₹ 0 0 ?	
▼ <sup>™</sup> P odps_studio_dev	
Tables & Views	
alitrip_dest_relation	
array_map_test2	
haoping_sdk_log_copy	
haoping_test_part	
▶ hy Add project	
Add project	
Territorial Refresh table meta	
Functi	
► fx ex2 Delete table from server	
► fx hac fx hac fx hac fx hac	
<ul> <li>fx hac</li> <li>fx hell Import data into table</li> </ul>	
fx par Export data from table fx parcely converted.	

3. If Export Data Success is displayed, data export is successful and exported data can be

viewed in the target file.

You can also right-click **Data Preview** of Table and choose **Export Grid Data** to export data.

≜hy_test1 ×						
Table information			Table schema			
key	Vi	alue	name	type	comments	
Name:	hy_test1		id	BIGINT		
Comments:			name	STRING		
Owner:	ALIYUN\$dxp_0689468	4@aliyun.com	age	BIGINT		
Created time:	2016-12-29 11:50:22					
Meta Modified time:	2016-12-29 11:50:22					
Data Modified time: Size:	2017-01-22 20:42:37					
Size:	1280					
Physical size:	3840					
Partitions:	0					
Partition columns						
Sharding:						
Sharding columns:						
Data preview						
id		n	ame		age	
1	a			11	3-	
1	a			1		
		Copy cell content				
		Export grid data				
		Export grid data				
		View cell text				



The **Data Preview** function in Data preview is used only to export data displayed in Data sample instead of all data in the table.

### New Type Import Export

Simply generate text in the agreed format and store it in CSV or TSV format, you can import to table through studio.

Conversion rules for each data type are described in detail below.

### **Basic Type**

**1.** Tinyint, smallint, Int, bigint is stored directly as an integer string, and the numeric value exceeds the type boundary is reported as wrong
- 2. Float, double to store fractional strings or floating-point forms, such as: 2.342 1x + 7
- **3.** Varchar is stored directly as a string, which is automatically truncated above the upper limit, and no errors will be reported
- 4. String is stored directly as a string
- 5. Decimal string that supports shaping or floating-point
- 6. Binary needs to encode binary data to base64 string
- **7.** Datetime date time requires that the format specified in import dialog is consistent and that the format mismatches will be reported incorrectly
- Timestamp timestamp needs to follow yyyy-[m] M-[d] d hh \: mm \: ss [. f...] Format is stored as a string
- 9. Boolean true or false string?

#### **Composite Type**

- **1.** Array needs to be stored as a JSON array. The array elements are converted to strings according to the rules agreed in this article, array elements support any type.
- 2. Map needs to be stored as a JSON object, and map key, value are converted to a string according to the rules agreed in this article, value supports any type of nesting.
- **3.** Struct needs to be stored as a JSON object, the struct field name is string, and the key converted to a JSON object, strect field values converted to JSON The value of the object, the value of the field that defines the rule transformation in this article.

#### Example

#### Array type

For Table structures as follows:

Column name	Column data types
c_1	ARRAY <tinyint></tinyint>
c_2	ARRAY <int></int>
c_3	ARRAY <float></float>
c_4	ARRAY <datetime></datetime>
c_6	ARRAY <timestamp></timestamp>
c_7	ARRAY <string></string>

You can import data in the CSV format shown below:

```
c_1,c_2,c_3,c_4,c_6,c_7
"[" "1" "," "2 "", "3" "]", "[" 1 "", "2", "3", "4"], "[" "1.2" "," 2.
0 ""] ", "[" "3-00:00:00", "3-5-00:00:00 "", "00:00:00", "[" At 00:00:
00. 123456789 "", "At 00:00:00. 123456789 "", "At 00:00:00. 123456789
""] "," ["AAA" "," Steamboat "", "4C" "]"
"[""1"",""2"",""3""]","[""1"",""2"",""3"",""4""]","[""1.2"",""2.0
""]","[""2017-11-11 00:00:00"",""2017-11-11 00:00:00"",""2017-11-11
00:00:00""]","[""2017-11-11 00:00:00.123456789"",""2017-11-11 00:00:00
.123456789"",""2017-11-11 00:00:00.123456789""]","[""aaa"",""bbb"",""
ccc""]"
"[""1"",""2"",""3""]","[""1"",""2"",""3"",""4""]","[""1.2"",""2.0
""]","[""2017-11-11 00:00:00"",""2017-11-11 00:00:00"",""2017-11-11
00:00:00""]","[""2017-11-11 00:00:00.123456789"",""2017-11-11 00:00:00
.123456789"",""2017-11-11 00:00:00.123456789""]","[""aaa"",""bbb"",""
CCC""]"
```



## Note:

The CSV format needs to escape double quotes, which are expressed by two double quotes, you can refer specifically to the CSV format specification.

#### Map Type

For Table structures as follows:

Column name	Column data types
c_1	MAP <tinyint,string></tinyint,string>
c_2	MAP <string,int></string,int>
c_3	MAP <float,string></float,string>
c_4	MAP <string,datetime></string,datetime>
c_5	MAP <string,string></string,string>
c_6	MAP <timestamp,string></timestamp,string>

You can import data in the CSV format shown below:

```
c_1,c_2,c_3,c_4,c_5,c_6
"{1:" "2345" "}", "{" 123 "": "2", "3": "4 ""}", "{2.0:" "223445"
", 1.2:" 1111 ""}", "{" "AAA" ":" "hub11 00:00:00 "", "4C" ":" China
 "11 00:00:00" "," Steamboat "": "00:00:00"} "," ckey "": "cvalue"}
"," {"" hub11 01:00:00. 123456789 "": "dddd" "," "hub11 00:00:00.
123456789 "": "AAA" "," 027 11 00:01:00. 123456789 "": "DDD ""}"
"{1:" "2345" "}", "{" 123 "": "2", "3": "4 ""}", "{2.0:" "223445"
", 1.2:" 1111 ""}", "{" "AAA" ":" "hub11 00:00:00 "", "4C" ":" China
 "11 00:00:00" "," Steamboat "": "00:00:00"} "," ckey "": "cvalue"}
 "," {"" hub11 01:00:00. 123456789 "": "dddd" "," "hub11 00:00:00.
123456789 "": "AAA" "," 027 11 00:01:00. 123456789 "": "DDD ""}"
```

```
"{1:""2345""}","{""123"":""2"",""3"":""4""}","{2.0:""223445"",1.2
:""1111""}","{""aaa"":""2017-11-11 00:00:00"",""ccc"":""2017-11-11
00:00:00"",""bbb"":""2017-11-11 00:00:00""}","{""ckey"":""cvalue
""}","{""2017-11-11 01:00:00.123456789"":""dddd"",""2017-11-11 00:00:
00.123456789"":""aaa"",""2017-11-11 00:01:00.123456789"":""dddd""}"
```

#### Struct Type

For Table structures as follows:

Column name	Column data types
	<ruct<x:int,y:varchar(256),z:struct<a :TINYINT,b:STRING&gt;&gt;</ruct<x:int,y:varchar(256),z:struct<a 

You can import data in the CSV format shown below:

```
c_struct
"{""x"":""1000"",""y"":""varchar_test"",""z"":{""a"":""123"",""b"":""
stringdemo""}}"
"{""x"":""1000"",""y"":""varchar_test"",""z"":{""a"":""123"",""b"":""
stringdemo""}}"
```

## 2.3.3 Visualization of operating the tables

The Project Explorer of MaxCompute Studio provides the visualized table structure editor used to create and modify tables.

#### Visualization of creating a table

#### Procedure

1. Right-click the project that you want to create the table, and select create a new table:



 In the dialog box that appears, enter a table name and column information. Click Generate CreateTable Statement generates the corresponding pant statement, click Execute to execute the build table.

• • •			Table Crea	ition Editor - [pro	ject : dataplus_p	private_test_4]		
							1	
Table	Name:		tablename					
Com	ment:		comments					
Lifec	ycle(days):		31					
Colum	1ns: 2							
Name		Тур	e	Length/Settings	isPartition	Comment	Operation	
ĺd		BIC	iint 🗸				×	
- Ad								
Gen	erate Crea	teTab	le Statement					
1 2	CREATE `id`		E IF NOT EXI	<b>ISTS</b> `dataplus_	private_test_4	`.`tablename` (	×	-
3	COMMEN	IT 'co	omments'					
4		CLE	31;					

When you set the table name, column name, type, and lifecycle, observe the related requirements of MaxCompute. For more information, see*Table Operations*.

 After the table is created, view the table metadata in table&view of the Project Explorer. If no metadata is displayed, refresh the list.

### Visualization of modifying a table

## Procedure

In table&view of the Project Explorer, right-click the expected table and select Open table
 Editor:

Project Explorer	*-⊩ 8	) C
+ – ᡗ Ξ 😤 🥝	D ?	
	<b> g</b> 521	
► <b>heren_nain_</b>	528	В
hqtest_0718		9
hqtest_1228	Add project	
▶ 🏢 ji■hbiaoshijiar	Find usages	
► 🏢 ji⊨gu1		
▶ IIII jiiiiu2	Open table editor	
▶ III jir ıyan_wc_ir	Refresh table meta	
▶ <b>∭ jin yan_v∎c_</b> o	Show table details	
▶ mkc=re_ft=c_t	N. edge	
kn_w_r_int_2	Generate select statement	
kncw_moint_t	Generate DDL statement	
knd _point_t	Truncete tehle dete	
knopoint_c	Truncate table data	
🕨 🏢 lah 💷 ropaga	Drop table from server	
🕨 🏢 l בפר א אפן א אפן א	Import data into table	
belpropagat		
Implementation	Export data from table	

 In the dialog box that appears, edit the table. You can modify the table comments, table lifecycle, column name, and column description, and add columns. Specific rules follow the MaxCompute table requirements and can be found in *Table Operations*.

		Table Editor - [dataplus_p	private_test_4.	hqtest_0718	]	
Table: hqtest_0	1718	Comment:		ifetime:		
Columns						
Name		Туре	Comment		Operation	
clol		STRING	cltest		×	
clo2		STRING	c2test		×	
clo3		STRING 🗸	c3test		×	
AlterTa	ble Statement	CreateTable Statement				
	ALTER TABLE hot ALTER TABLE hot ALTER TABLE hot	est_0718 set comment est_0718 set lifecyclo est_0718 CHANGE COLUMN est_0718 CHANGE COLUMN est_0718 ADD COLUMNS	a 1;   c1 clo1 STR   c2 clo2 STR	ING COMMENT	'c2test'	ľ
				Copy to Cli	pboard	Execute

**3.** After completing the modifications, click **Alter Table Statement** Generate a specific alter statement and click **Execute**to perform the table modify operation. After successful execution, view the table metadata.

### Visualization of deleting a table

In table&view of the Project Explorer, right-click the expected table and select **Drop table from server**:



Select **OK**in the bullet box to remove the table from the maxcompute service.

## 2.4 Developing Java

## 2.4.1 Create MaxCompute Java Module

MaxCompute Studio supports Java user-defined function (UDF) and MapReduce development. First, a MaxCompute Java module must be created.

## Create a module

Choose File > New > Module, set the module type to MaxCompute Java, and configure Java JDK. Click **Next**, enter a module name, and click **Finish**. MaxCompute Studio automatically creates a Maven module and introduces MaxCompute dependencies.

### Module structure

So far, a module for developing a MaxCompute Java program has been established, that is the mDev shown in the following figure. Its main directories include:

• src/main/java: Source code for Java program development.

- examples: Sample code, including unit test (UT) examples. You can see the examples to develop or compile UT.
- warehouse: Schema and data required for running locally.

Project 🔹	⊕ ‡	<b>☆</b> - ∦←				
🔻 <mark>\infty studioTest</mark> ~/ldeaProjects/studioTest						
idea						
mdev						
examples						
▼ <b>Com</b>						
aliyun						
▼ <b>D</b> odps						
examples						
mr						
<ul> <li>udf</li> <li>unstructured</li> </ul>						
<ul> <li>main</li> </ul>						
java						
resources						
▶ ► test						
target						
mdev.iml						
<i>m</i> pom.xml						
scripts						
warehouse						
example_project						
resources						
tables						
<pre>rs_out</pre>						
▼ ■ wc_in1						
í≣schema i∎ data						
► wc_in2						
<pre>wc_out</pre>						
studioTest.iml						
External Libraries						
		1				

## 2.4.2 Develop and debug UDF

Once the MaxCompute Java Module has been created, udfs can be developed.

#### Procedure

Expand the MaxCompute Java Module Directory that you created and navigate to src > main > java > new, and click MaxCompute Java as shown in the following figure.



2. Set Name and Kind, and click OK. as shown in the following figure.



- Name: Specifies the name of the MaxCompute Java Class. If you have not created a package, you can enter packagename.classname to automatically create a package.
- Kind: Specifies the type. Supported types include custom functions (UDF/UDAF/UDTF), MapReduce (Driver/Mapper/Reducer), and non-structural development (StorageHandler/ Extractor).

- Project ③ ÷ | ≱ · I\* MyFirstUDF.java ×
   package hq\_udf;
   package hq\_udf;
   java\_m
   main
   java
   main
   main
   main
   mesources
   f
   mesources
   f
   more sources
   f
   more source
   more source
   f
   more source
   f
   more source
   f
   more source
   more source
   f
   more source
   f
   more source
   f
   more source
   f
   more source
   more source
   f
   more source
   more sour
- 3. After the creation is successful, the Java program can be developed, modified, and tested.



Here's a code template that can be customized in Intellij. You can define it in **Preference** > **Editor** > **File** > **Code Templates**. Then look for the corresponding template in the **Code** tab.

For detailed development steps, see JAVA UDF development.

Normally, the development of JAVA UDF can be done in the following ways:

- Use MaxCompute Studio to complete the whole process of JAVA UDF development.
- Use *Develop and debug JAVA UDF using the Eclipse plug-in*, export the Jar package, then *Add resources* through commands or DataWorks, and *Register the function*.

For detailed development steps, see JAVA UDF Development.

#### Debug the UDF program

After the UDF program is developed, it can be tested using unit test (UT) or local running to check whether it meets expectations.

#### Unit Testing

There are various UT examples in the examples directory and you can refer to them to compile your UT.



#### Run locally

During local running of the UDF program, the running data source must be specified. The following two methods are provided to set the test data source:

- MaxCompute Studio uses the Tunnel Service to automatically download table data of a specific project to the warehouse directory.
- The mock project and table data are provided. You can see example\_project in warehouse to set it by yourself.

### Procedure

 Right-click UDF Class and select Run UDF class.main(). The Run Configuration dialog box is displayed. In normal cases, UDF/UDAF/UDTF data is used as columns in tables of a select sub-statement. The MaxCompute project, table, and column need to be configured. (The metadata is from the mock project under project explorer and warehouse.) Debugging for complex types is also supported, as shown in the following figure:

Run/Debug Configurations		X
+ 🗕 🖺 🔐 🛠 🛧 🖿 🐙	Name: PlusHello	Share Single instance only
<ul> <li>JUnit</li> <li>MaxCompute Java</li> </ul>	Main <u>c</u> lass:	myudf.PlusHello
VXUDAFExample	<u>V</u> M options:	2
V×hello ✓PlusHello	Program arguments:	
MaxCompute SQL	Working directory:	···· •
Sefaults	Environment variables:	
	Use classpath of module:	i java_module_learn
	JRE:	Default (1.8 - SDK of 'java_module_learn' module)
	Enable capturing form	i snapshots
	*MaxCompute project: or	dps_studio_dev 🔹 🕂
	*MaxCompute table: hy	_test1
	*Table columns: na	ie:c1,c2
	• Before launch: Build, Activ	ate tool window
	$+ - \nearrow + +$	
	<b>↓</b> <sup>11</sup> <sup>11</sup> Build	
	Show this page 🔽	Activate tool window
		OK Cancel Apply Help

2. Click OK.



- If the table data under the specified project is not downloaded into glashourse, You need to download the data first, default download 100 entries. If more data is required, use the Tunnel Command of the console or table downloading function of Studio.
- If the mock project is used or the table data is downloaded, directly run the program.
- The UDF local run framework uses data in specific columns in warehouse as the UDF input and run the UDF program locally. You can view log output and result display on the console.

#### Local warehouse directory

The local warehouse directory is used to store tables (including meta and data) or resources for local UDF or MR running. The following figure shows the warehouse directory.





## Note:

- The project name, tables, table name, table scheme, and sample data are under the warehouse directory in sequence.
- The schema file is configured with the project name, table name, and column name and type ( separated using a colon) in sequence. For a partition table, the partition column also needs to be configured. (For a non-partition table, refer to wc\_in1. For a partition table, refer to wc\_in2).
- The data file uses the standard CSV format to store table sample data.
  - Special characters include comma, double quotation marks, and line feed (\n or \r\n).
  - The column separator is comma and the line separator is \n or \r\n.

- If the column content includes special characters, double quotation marks (") must be added before and after the column content. For example, if the column content is 3,No, it is changed to "3, No".
- If the column content includes double quotation marks, each double quotation mark is converted to two double quotation marks. For example, if the column content is a"b"c, it is changed to "a""b""c".
- \N indicates that a column is null. If the column content (string type) is \N, it must be converted to """\N""".
- The file character code is UTF-8.

## 2.4.3 Develop MapReduce

After the MaxCompute Java module is created, MR can be developed.

### Develop the MR program

- Right-click the module source code directory src > main, select New, and select MaxCompute Java.
- 2. Create Driver, Mapper, and Reducer.

	Create new MaxCompute java class			
Name:		$\uparrow \downarrow$		
Kind:	🞯 Driver	\$		
	Cancel OK			

**3.** Set the input/output table and Mapper/Reducer class. The framework code is automatically filled in the template.

c	He	llo	Driver.java ×
			HelloDriver
1			<pre>package mymr.myudf;</pre>
2		+	import
11			
12			<pre>public class HelloDriver {</pre>
13 14 15		Ę	<pre>public static void main(String[] args) throws OdpsException {</pre>
16			<pre>JobConf job = new JobConf();</pre>
17 18 19 20			<pre>// TODO: specify map output types job.setMapOutputKeySchema(SchemaUtils.fromString(_?)); job.setMapOutputValueSchema(SchemaUtils.fromString(_?));</pre>
21 22 23 24 25			<pre>// TODO: specify input and output tables InputUtils.addTable(TableInfo.builder().tableName(_?).build(), job); OutputUtils.addTable(TableInfo.builder().tableName(_?).build(), job);</pre>
26 27 28 29 30			<pre>// TODO: specify a mapper job.setMapperClass(_?); // TODO: specify a reducer job.setReducerClass(_?);</pre>
30 31 32 33 34 35 36		É	<pre>RunningJob rj = JobClient.runJob(job); rj.waitForCompletion(); }</pre>

For details of developing MR, see *To write MapReduce*.

#### Debug the MR program

After the MR program is developed, test your code and check whether it meets the expectations. The following two methods are supported:

**Unit test (UT)**: There are WordCount UT examples in the examples directory. You can refer to them to compile your UT.

✓ ③ ≑   ☆ I <sup>+</sup>	💣 WordC	puntTest.java ×		
ox ∼/IdeaProjects/sandbox		WordCountTest()		
a	1	<pre>package com.aliyun.odps.examples.mr.test;</pre>		
x	2	,		
examples	3 +	import		
🖿 com.aliyun.odps.examples	19			
🔻 🛅 mr	20 🕨 21	<pre>public class WordCountTest extends MRUnitTest {     // 定义输入输出表的 schema</pre>		
🔻 🛅 test	22	private final static String INPUT SCHEMA = "a:string.	b:string":	
ổ ኈ WordCountTest	23	<pre>private final static String OUTPUT_SCHEMA = "k:st</pre>	· · · · · · · · · · · · · · · · · · ·	) #C
建 🖕 Resource	24			
建 🔓 WordCount	25 26		Paste	ЖV
▶ <b>D</b> udf	20	// 准备作业配置	Paste from History	}%V
STC	28	<pre>job = new JobConf();</pre>	Paste Simple 74	λжΛ
com	29		Column Selection Mode	}₩8
C h MrTest	30 31	<pre>job.setMapperClass(WordCount.TokenizerMapper.cl job.setCombinerClass(WordCount.SumCombiner.clas</pre>		
Dev.iml	32	job.setReducerClass(WordCount.SumReducer.class)	Refactor	
	33		Folding	•
pts	34 35	Job. set Maput put keyschella (Schella Utits, Hollist Hin	Analyze	
odps studio.haoyi	30	Job. setMapourpurva tueschema (schemaotrus. Tromstr	Analyze	
nello.py	37		Go To	►
nyudaf.py	38	<pre>OutputUtils.addTable(TableInfo.builder().tableN }</pre>	Generate	ЖN
qloptmizer.osql	39 A	}		
c.osql	41 5	<pre>@SuppressWarnings("deprecation")</pre>	Recompile 'WordCountTest.java'	ЖF9
.osql	42	ATast	Run 'WordCountTest'	^ 企R
.osql	43 🕨 🤤	<pre>public void testMap() throws IOException, ClassNo MapUIContext mapContext = new MapUIContext():</pre>	Debug 'WordCountTest'	^☆D
let	44 45		Run 'WordCountTest' with Coverage	
p	45	mapContext.setOutputSchema(OUTPUT_SCHEMA, job);	Run wordcountrest with coverage	
ehouse	47		Create 'WordCountTest'	

**Local MR running**: During local running, the running data source must be specified. The following two methods are provided to set the test data source:

- MaxCompute Studio uses the Tunnel Service to automatically download table data of a specific MaxCompute project to the warehouse directory. By default, 100 data records are downloaded. If more data is required for testing, use the Tunnel Command of the console or table downloading function of MaxCompute Studio.
- Provide the mock project (example\_project) and table data. You can see example\_project in warehouse to set it by yourself.
- Run the MR program. Right-click the Driver class and select Run. In the displayed Run Configuration dialog box, configure the MaxCompute project on which the MR program runs.

	Run/Debug C	onfigurations
+ - 🖺 📙 🛠 🔺 🖿 🔰	Name: WordCount	Single <u>i</u> nstance only
MaxCompute Java WordCount	Main class:	com.aliyun.odps.examples.mr.WordCount
V UDFExample V Resource	VM options:	
MaxCompute Python	Program arguments:	
<ul> <li>MaxCompute SQL</li> <li>Pefaults</li> </ul>	Working directory:	
-	Environment variables:	
	Use classpath of module:	Dev 🗘
	JRE:	Default (1.8 – SDK of 'jDev' module)
	<u>Enable capturing forr</u>	n snapshots
	*MaxCompute project: ex	ample_project 🗘 🕇
	<ul> <li>Before launch: Build, Activa</li> </ul>	ate tool window
	↓ <sup>01</sup> <sub>01</sub> Build	
	+ - / * *	
	Show this page 🗸	Activate tool window
?		Cancel Apply OK

2. Click OK. If table data of the specified MaxCompute project is not downloaded to warehouse, download data first. If a mock project is used or the MaxCompute project table data is downloaded, skip this step. Then, the MR local run framework reads specified table data in warehouse as the MR input and runs the MR program locally. You can view log output and result display on the console.

Run ¼ Wo	rdCount	-10
	<pre>/Library/Java/JavaVirtualMachines/jdkl.8.0_65.jdk/Contents/Home/bin/java [INFO]Form mapreduce job in local mode, Type: MR, Job ID: mr_20170221193325_750_3935 [INFO]Start to process input tables [INFO]Start to copy table: example_project.wc_in1&gt;/Users/liuyi/IdeaProject/sandbox/temp/mr_20170221193325_750_3935/input/example_project/wc_in1 [INFO]Finished copy table: example_project.wc_in2[p1=2, p2=1]-&gt;&gt;/Users/liuyi/IdeaProjects/sandbox/temp/mr_20170221193325_750_3935/input/example_project/wc_in2 [INFO]Finished process input tables [INFO]Start to process output tables [INFO]Start to process output tables [INFO]Finished process resources [INFO]Finished rom mapper, nakId: M_000001, Input: example_project.wc_in1 [INFO]Finished run mapper, TaskId: M_000001</pre>	

#### Run the MR program in the production environment

After local debugging is complete, release the MR program to the server and run it in the MaxCompute distributed environment.

- 1. Package the MR program to a JAR package and release it to the server. For more information
  - , see How to package and release MR.

2. Use the MaxCompute console integrated with MaxCompute Studio in seamless mode, that is, in the Project Explorer window, right-click Project and select Open in Console, and input the commands similar to the following *JAR command* in the console command line:

```
jar -libjars wordcount.jar -classpath D:\odps\clt\wordcount.jar com.
aliyun.odps.examples.mr.WordCount wc_in wc_out;
```

## 2.4.4 Unstructured development

An *unstructured data processing framework* is added for MaxCompute 2.0, supporting access to the OSS and Table Store using external tables. Studio provides some code templates for the framework, facilitating users' fast development.

### Compile StorageHandler/Extractor/Outputter

- 1. After the *MaxCompute Java Module* (Sample code is provided in the unstructured folder of the examples directory for your reference).
- Right-click the module source code directory src > > main, select new, and select MaxCompute Java.
- Specify Name and Kind. For example, set Name to myun.MyExtractor and Kind to Extractor. Click OK.

🛑 🔵 🔵 Create new MaxCompute java class					
Name:	myun.MyExtractor	↑↓			
Kind:	Extractor	\$			
?	Cancel OK				

- 4. The framework code has been automatically filled in the template. Compile your logic code.
- **5.** Compile Outputter and StorageHandler by following the preceding steps.

### **Unit Testing**

You can compile the unit test (UT) by following the examples in the examples directory to test your Extractor/Outputter.

Project ▼ ③ ÷	C ExtractorTest.java ×
StudioTest ~/IdeaProjects/studioTest	ExtractorTest ambulanceFullSchema
<ul> <li>idea</li> <li>idev</li> </ul>	3 <b>± import</b> 18
<ul> <li>examples</li> <li>com.aliyun.odps.examples</li> </ul>	19 G pulic class ExtractorTest { 20 private String ambulanceFullSchema =
► 🖿 mr	<pre>21 "vehicle:bigint;id:bigint;patient:bigint;calls:bigint;latitude:dc 22 private String speechDataFullSchema = "sentence_snr:double;id:string'</pre>
<ul> <li>Image: Image of the second seco</li></ul>	23 24 @Test
V Detest	<pre>25 G public void testTextExtractor() throws Exception { 26 //ex</pre>
C StractorTest	27 * Equivalent to the following SQL: 28 CREATE EXTERNAL TABLE ambulance_data_external
SpeechSentenceSnrExtractor.java SpeechStorageHandler	<ul> <li>(vehicle bigint, id bigint, patient bigint, calls bigint,</li> <li>Latitude double, Longitude double, time string, direction string)</li> </ul>
C TextExtractor	31 STORED BY 'com. <u>aliyun.odps</u> .udf.example.text.TextStorageHandler' 32 LOCATION 'oss:///data/ambulance_csv/'
C TextOutputer	<pre>33 USING 'jar_file_name.jar'; 34</pre>
© № TextStorageHandler © № TestUtil	<pre>35 SELECT * FROM ambulance_data_external; 36 */</pre>
🕨 🖿 data	37 Column[] externalTableSchema = UnstructuredUtils.parseSchemaString(

#### Package and upload

After StorageHandler/Extractor/Outputter is compiled, compress the completed Java program to a JAR package, and upload the package as a resource to the server, see *Package and release*.

#### **Create External Table**

box $\rangle$ is scripts $\rangle$	New	►	Java Class		
Project			🖶 Kotlin File/Class		
sandbox ~/Id	🔏 Cut	ЖX	🗐 File		
.idea	🖺 Сору	ЖС	ᡖ Scratch File 🗘 ំ#N		
jdev	Copy Path	☆₩C	Package		
out	Copy as Plain Text		FXML File		
scripts	Copy Reference	て企業C			
odps_st	🗇 Paste	жv	着 package-info.java		
🚶init			∉ MaxCompute Java		
abc.xml 😓	Find Usages	<b>℃</b> F7	MaxCompute Script		
🕾 meta_de	Find in Path	Ω℃₩F	HTML File		
ब्यु odps_stı	Replace in Path	Ω℃₩R			
🔤 osd.osql	Analyze	•	JavaFXApplication		
📄 ParseCo			着 Singleton		
🔤 tmp.osq	Refactor	•	😽 XSLT Stylesheet		
••••	· · · · · · · · · · · · · · · ·		· · · · · ·		

1. Right-click scripts and select new > MaxCompute Script.

- 2. Enter the SQL script name. Select the MaxCompute project in which the script is to be executed for Target Project and click **OK**.
- **3.** Select create external table live template in the editor to rapidly insert the script template for creating an external table.

c	
cet	create external table
ct	create table
ctl	create table like
cts	create table as select
CV	create view
^↓ and ^↑ will move caret d	own and up in the editor $\geq \geq$

Modify the external table name, column, type, StorageHanlder class path, configuration parameter, external path, and JAR name. Click Run MaxCompute SQL Script to create the external table.

4. Query the created external table, such as:

## 2.4.5 Package/Upload/Register

After a *user-defined function* or *MapReduce* is developed, you must package and release it to the MaxCompute system.

### Package a UDF or MapReduce

To release a UDF or MapReduce to the MaxCompute server for production use, you must complete **packaging** > **uploading** > **registration** in sequence. You can use the one-click release function to complete these procedures. MaxCompute Studio runs the mvn clean package command, uploads a JAR package, and registers the UDF in one stop. To use this function, right-click the UDF or MapReduce and select Deploy to server.... Make sure that the target class is in the **src** > **main** > **java** subdirectory and is successfully compiled on the Maven module. The dialog box shown in the following figure appears. Select the MaxCompute project to be deployed and enter a resource name and a function name. Click OK and wait until the operation in the background is complete.

Package a jar and submit resource				
*MaxCompute project: meta_dev 🗘 🕂				
*Resource name: jdev-1.0-SNAPSHOT.jar				
*Main class: myudf.TestHello				
*Function name:				
Force update if already exists				
? Cancel OK				

## Note:

If you require special packaging, you can modify relevant settings in the pom.xml file. After packaging, follow these steps to upload the JAR package and register the UDF.

## Upload the JAR package

After the JAR package is prepared, upload it to the MaxCompute server.

1. Select Add Resource from the MaxCompute menu.



 Select the MaxCompute project you want to upload the resource to, the JAR file path, and the resource name you want to register. Determine whether to force update when the resource or function already exists. Then click OK.

	Add Resource			
Add Resource	meta_dev			
*Resource file:	/out/artifacts/haoyitest/haoyitest.jar			
*Resource nam	e: haoyitest.jar			
Force update if already exists				
	Cancel			

 After uploading is successful, you can view the resource under the Resources node of the Project Explorer window.



### **Register the UDF**

After the JAR package is uploaded, register the UDF.

1. Select Create Function from the MaxCompute menu.

VCS	Window	MaxCompute	Help
deaPro	jects/studic	Dpen Log בווח בים Add Resou לא Create Fur	urce

2. Select the required resource JAR and JAR main class, and enter the function name. Click OK.

• •	Create Function
*MaxCompute pro	oject: meta_dev 🗘
*Function name:	plushello
*Using resources:	GetInstanceld.jar getprojectfromworkerpath.py getUserCommandUDF.py gunz64.py haoyitest.jar
*Main class: my	udf.PlusHello 📀
✓ Force update	if already exists
	Cancel OK

**3.** After the registration is successful, you can view the function under the Functions node of the Project Explorer window.



## Apply the UDF

· Apply the UDF in SQL to complete subsequent development.



## 2.4.6 Develop Graph

After the MaxCompute Java module is created, Graph can be developed.

#### Sample Code

There are some code examples of Graph in the examples directory, and you can refer to the example to get familiar with the structure of the Graph program.



#### **Develop a Graph Program**

1. Right-click the module source code directory src > > main, select new, and select

#### MaxCompute Java.

 Select the GraphLoader/Vertex type and enter the class name (package name is supported) in the Name text box. Click OK, and the frame code will be automatically filled in by the template, you can continue to modify.



### **Debug Graph Locally**

After the Graph program is developed, test your code and check whether it meets the expectatio ns. You can run the Graph code locally.

 Run the Graph program: Right-click the Driver class and select Run. In the displayed Run Configuration dialog box, configure the MaxCompute project on which the Graph program runs.



2. Click OK. If table data of the specified MaxCompute project is not downloaded to warehouse, download data first. If a mock project is used or the MaxCompute project table data is downloaded, skip this step. Then, the graph local run framework reads specified table data in warehouse as the Graph input and runs the Graph program locally. You can view log output and result display on the console. Each time you debug locally, a new temporary directory is created under the Intellij directory, as shown in the following figure:

Project		C PageRank.java ×	
<ul> <li>Count</li> <li>Input</li> <li>output</li> </ul>	1180322144903_634_1476 ers ← 作业运行的一些计数信息 ← 作业的输入数据 t ← 作业的输出数据	75 76 77 △ } 78 79 △ } 80 81 ♥ priv 82 Sy	<pre>i reception of the the theory of theory of the theory</pre>
	rce 🛶 作业使用的资源 Steps 🛶 每一轮迭代的消息持久相	86 🕨 🛛 🖯 publ	<pre>ic static void main(String[] args) throws IOException {</pre>
	nl 🛶 作业配置		<pre>i (args.length &lt; 2) printUsage();</pre>
<ul> <li>Im warehouse</li> <li>sandbox.iml</li> <li>Im External Librarie</li> </ul>		89 90 Gr 91 92 jo 93 io	aphJob job = <mark>new GraphJob();</mark> b.setGraphLoaderClass(PageRankVertexReader.class); b.setVertexClass(PaneRankVertex.class); ank → main0
Run 🔨 PageRank			
▲ 信息: Star 三月 22, 20 信息: gene 三月 22, 20 信息: Fini.	018 2:49:03 下午 com.aliyun.or rate schema file: /Users/liuy 018 2:49:03 下午 com.aliyun.or shed to write table scheme : 018 2:49:03 下午 com.aliyun.or er num :1 gs size: 2	dps.local.common.u /i/IdeaProjects/sar dps.local.common.u example_project.pa	<pre>rank_out&gt;/Users/luyyi/deaProjects/sandbox/temp/graph_20180322144903_634_1476/output/default tils.SchemaUtils generateSchemaFile ddox/temp/graph_20180322144903_634_1476/output/default/_schema tils.SchemaUtils generateSchemaFile agerank.out&gt;/Users/luyyi/IdeaProjects/sandbox/temp/graph_20180322144903_634_1476/output/default ster.Master init</pre>
Not	e:		

For a detailed introduction to warehouse, see Local Warehouse Directory section in *Develop UDF*.

#### Run the Graph Program in the Production Environment

After local debugging is complete, release the Graph program to the server and run it in the MaxCompute distributed environment.

- 1. Package the Graph program to a JAR package and release it to the server. *For more information, see How to package and release Graph.*
- 2. Use the MaxCompute console integrated with MaxCompute Studio in seamless mode, that is, in the Project Explorer Window, right-click Project and select Open in Console, and input the commands similar to the following *JAR command* in the console command line:

jar -libjars xxx.jar -classpath /Users/home/xxx.jar com.aliyun.odps. graph.examples.PageRank pagerank\_in pagerank\_out;

## 2.5 Configure options

## 2.5.1 Configure MaxCompute Studio

After the MaxCompute Studio plug-in is installed, you can find configuration items of MaxCompute Studio on the left bar of the Settings page of IntelliJ IDEA. For more information about how to open the IntelliJ IDEA configuration page, see *IntelliJ IDEA Documentation*.

#### MaxCompute Studio configuration option page

The MaxCompute Studio configuration option page provides the following configuration items:

#### 1. Path for storing the local metadata base

Specifies the path for locally storing metadata of a MaxCompute project. On MaxCompute Studio, the metadata is stored in the hidden directory .*odps.studio/meta* of the local user directory by default.

#### 2. Version update options

- You can use the **Automatically checks for new version** check box to control whether MaxCompute Studio automatically checks for new version updates.
- You can use the Check new versions button to manually check new versions. After you click this button, if a new version is available, the Install new version button is displayed. You can click this button to install the new version, and restart IntelliJ IDEA after the installation is complete.

#### SDK and Console configuration option page

The SDK and Console configuration option page provides the following configuration items:

#### 1. Path for installing a MaxCompute client

Specifies the path for local installation of MaxCompute client. MaxCompute Studio detects the version of the MaxCompute client installed in the path. If detection fails, an error message is prompted.

## Note:

MaxCompute Studio later than the 2.6.1 version provides the latest MaxCompute client. You do not need to specify the path. If you must use a MaxCompute client of a specific version, you can specify the path.

#### MaxCompute SQL configuration option page

The MaxCompute SQL configuration option page provides the following configuration items:

#### 1. Enable syntax coloring

Select Enable syntax coloring to enable the syntax highlighting feature.

2. Enable code completion

Select Enable code completion to enable the automatic code complementing feature.

3. Enable code formatting

Select Enable code formatting to enable the code formatting feature.

4. Compiler options

These are global default compiler options. The following options can be separately set for each file on the toolbar of the SQL compiler.

- Compiler Mode
  - Statement Mode: In this mode, the compiler compiles and submits a single statement of an SQL file as a unit.
  - Script Mode: In this mode, the compiler compiles and submits an entire SQL file as a unit. *NOTE: Script Mode enables the compiler and optimizer to optimize the execution plan and improve the overall execution efficiency. This mode is in the test phase now.*
- Type System
  - Legacy TypeSystem: Indicates the type system of original MaxCompute.
  - MaxCompute TypeSystem: Indicates the new type system introduced by MaxCompute 2 .0.
  - Hive Compatible TypeSystem: Indicates the type system in Hive compatibility mode introduced by MaxCompute 2.0.
- Compiler Version
  - Default Version: Indicates the default version of the compiler.
  - Flighting Version: Indicates the experimental version of the compiler, which includes new features of the compiler being tested.

#### Account configuration option page

You can add or manage accounts used to access MaxCompute on the Account configuration option page. For more information, see *User authentication*.

You must specify an account on MaxCompute Studio to access a MaxCompute project and run or submit jobs. MaxCompute Studio currently supports the following account type:

• Alibaba Cloud account (AccessKey)

#### Add an account

On the Account configuration option page, follow these steps:

- 1. Click + or press Ctrl-N.
- 2. Select the account type Aliyun Account by AccessKey.
- 3. In the displayed Add Account window, set the following items:
  - Account Name: Indicates the name of the account on MaxCompute Studio.
  - Using properties file: Read the AccessKey ID and AccessKey Secret from the configuration file.
    - Select the configuration file conf/odps\_config.ini after you process User authentication.
  - Using properties: Manually enter the AccessKey ID and AccessKey Secret.
    - Access Id: Enter the AccessKey ID of your Alibaba Cloud account.
    - Access Key: Enter the AccessKey Secret of your Alibaba Cloud account.

Add MaxCompute project Odps.ini files need to be			
Connection	downloaded in advance to initialize Setting configuration items such as AK/Endpoint.		
Properties File:	Ioad\MaxCompute Client \conf\odps_config.ini 🗁		
AK Account:	Using AK account to initialize AK, you can click on the right + to add.		
* Access Id:	LTATH RFTZIh9		
* Access Key:	oAPre 92Rr2jJEf		
* Project Name:	MySecondProject2		
* End Point:	http://service.odps.aliyun.com/api		
	~		
0	OK Cancel		

**4.** Click **OK** to complete addition. Then, the account will be displayed in the Account list on the Account configuration option page.

#### **Delete an account**

On the Account configuration option page, follow these steps: (This operation only deletes the account configuration on Studio configuration, which does not affect your account.)

- 1. Select the account to be deleted in the Account list.
- 2. Click -.
- 3. In the displayed dialog box, click OK.

### Modify the AccessKey of an account

On the Account configuration option page, follow these steps:

- 1. Select the account to be deleted in the Account list.
- 2. Click the pencil icon.
- **3.** In the displayed **Edit Account** window, modify the account information. The content is similar to that in the preceding section **Add Account**.

View the opening and connection of MaxCompute Region and the settings of Endpoint, see *Endpoints and Data Centers*.

# 3 Downloads

This document provides you with the download address of the relevant tools and plugins.

- SDK Downloads: Maven users can search odps-sdk from Maven library to get different versions of the Java SDK.
- MaxCompute console
- Eclipse plugin
- Intelij plugin, Studio