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Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: <https://www.huawei.com>

Email: support@huawei.com

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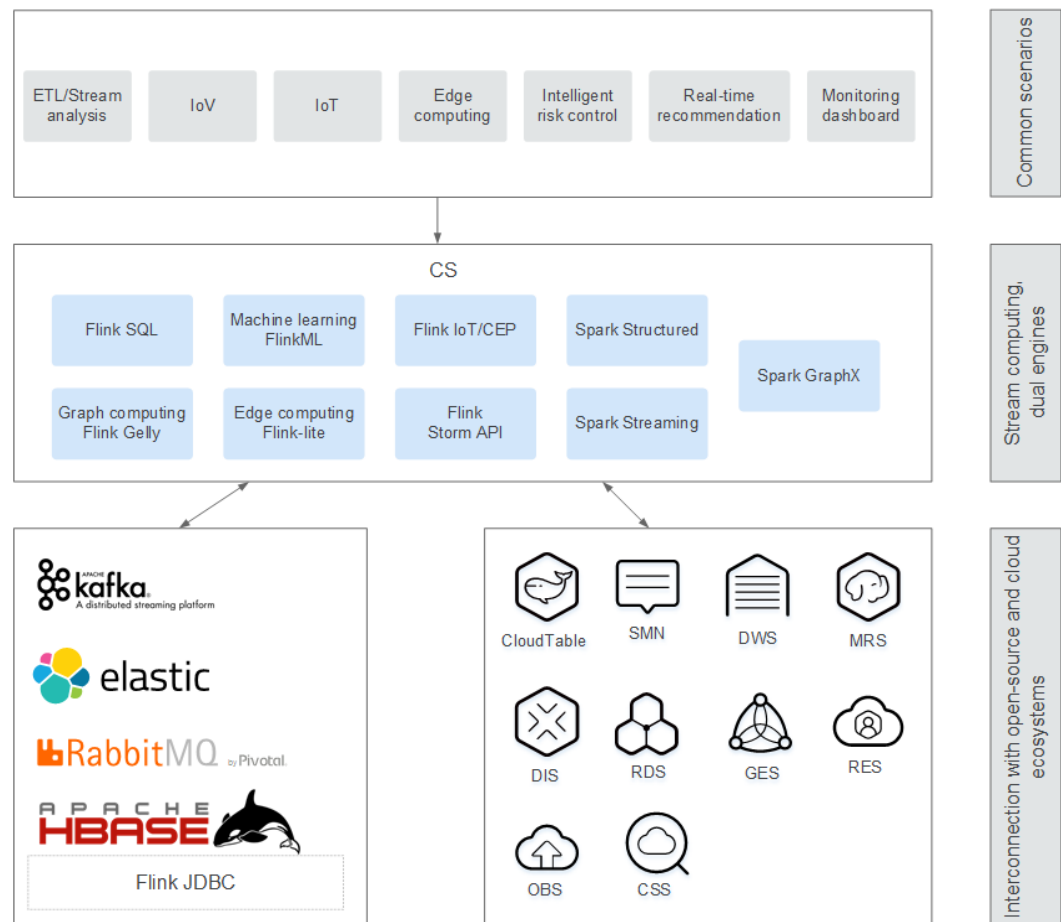
1 Introduction

1.1 What Is CS?

Cloud Stream Service (CS) is a real-time big data stream analysis service running on the public cloud. Computing clusters are fully managed by CS, allowing you to focus on StreamSQL services. CS is fully compatible with Apache Flink 1.5.3 and Apache Spark 2.2.1 APIs.

Recommended in the IT field, CS delivers distributed real-time stream computing with low latency (millisecond-level latency), high throughput, and high reliability. Powered on Flink, CS integrates enhanced features and security, and supports both stream processing and batch processing methods. It provides Stream SQL features required for data processing, and will add algorithms of machine learning and graph computing to Stream SQL in the future.

Figure 1-1 CS architecture



2 User Service Migration Guide

2.1 Mappings Between DLI and CS

Mapping of Main Concepts

Table 2-1 Mapping of main concepts

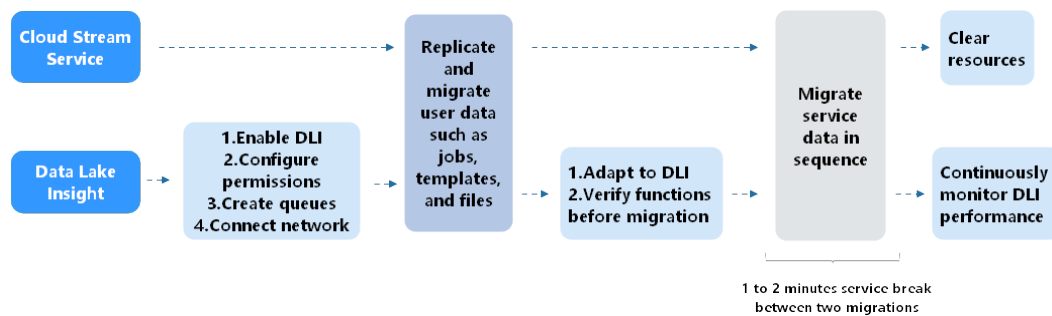
Concept in CS	Concept in DLI	Description
Cluster	Queue	Logical compute resources
SPU	CU	Compute unit. One SPU is one CU, which comprises of 1 vCPU and 4 GB memory.
VPC Peering Connection	Enhanced Datasource Connection	Enable network communication between VPCs.
-	Package Management	Upload the JAR packages of Spark jobs or Flink jobs to DLI before referencing them in jobs.
-	Datasource Authentication	Manage authentication information (such as certificates, usernames, and passwords) for connecting to other data sources. Once being created, the authentication information can be used for datasource jobs.

2.2 Overall Migration Solution

Migration Solution Description

The following figure shows the overall process for migrating CS data to DLI.

Figure 2-1 Process flow



To ensure smooth migration, set up a CS image environment in DLI and commission services before migration based on the preceding figure. After the environment is verified successfully, select a method to migrate CS services to DLI based on your service scenario and the existing reliability solution.

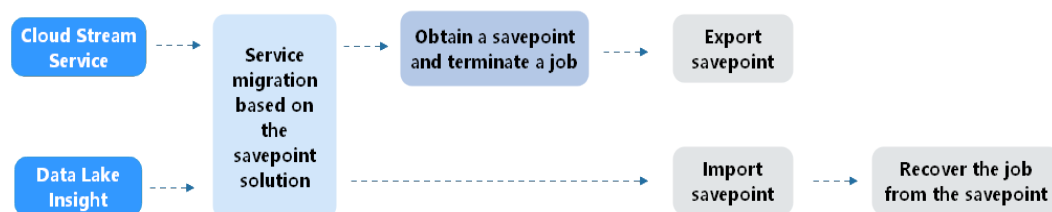
Procedure

1. Enable DLI and configure permissions in DLI based on the permission model in CS.
2. Sort out your resource requirements, create queues correspondingly, and connect the network.
3. Use the **Data Migration** function provided by CS to migrate your data.
4. Complete job commissioning and adaptation reconstruction in DLI.
5. Test and verify the job functions in DLI before the migration.
6. Select a proper method to migrate CS data based on service scenarios and reliability solutions.
7. Continuously monitor the service status in DLI.
8. Clear resources in CS.

Data Migration Solution Using the Flink Savepoint

For details about how to migrate data using the Flink savepoint, see the following figure.

Figure 2-2 Process flow



2.3 Preparations for Migration

2.3.1 Step 1: Grant Permissions

Before migrating user data from CS to DLI, log in to the DLI console using the master account to grant permissions.

Procedure

1. Enable DLI.

Log in to the management console. In the upper part of the page, search for **Data Lake Insight**. If you log in to the DLI console for the first time, the **Service Authorization** page is displayed. Click **Agree** to go to the **Overview** page of the DLI console.

2. Grant permissions to tenants.

If enterprise-level multi-tenant management is used, you need to grant DLI permissions to the member accounts. Same as CS, DLI uses Identity and Access Management (IAM) to implement fine-grained permissions management for your enterprise-level tenants.

Mapping Between System Policies and Roles

Table 2-2 Mapping between system policies and roles

CS Policy/ Role	DLI Policy/ Role	Description	Permission Type
CS FullAccess	DLI FullAccess	Full permissions for the service	System-defined policy
CS CommonOperations	-	Common user permissions for CS. Users who are granted with these permissions can create, delete, and modify jobs and templates.	System-defined policy
CS ReadOnlyAccess	DLI ReadOnlyAccess	Read-only permissions for the service	System-defined policy
CS Tenant Admin	Tenant Administrator /DLI Service Admin	Administrator permissions. Users who are granted with these permissions can perform all operations on service resources.	System-defined role
CS Tenant User	DLI Service User	Common user permissions for CS. Users who are granted with these permissions can create, delete, and modify jobs and templates.	System-defined role

Permissions Mapping

Table 2-3 Permissions mapping

CS	DLI	Description
cs:jobs:get	dli:jobs:get	Obtain job details.
cs:jobs:list	dli:jobs:list	Obtain the list of jobs in an account.
-	dli:jobs:list_all	Obtain the list of jobs in a project.
cs:jobs:create	dli:jobs:create	Create a job.
cs:jobs:update	dli:jobs:update	Modify a job.
cs:jobs:delete	dli:jobs:delete	Delete a job.
cs:jobs:start	dli:queue:submit_job	Start a job.
cs:jobs:stop	dli:queue:cancel_job	Stop a job.
cs:clusters:create	dli:queue:create_queue	Create a queue.
cs:clusters:delete	dli:queue:drop_queue	Delete a queue.

2.3.2 Step 2: Buy a Queue

A queue in DLI is equivalent to an exclusive cluster in CS. It is a logical resource required for job running. Before running a job, log in to the DLI console, choose **Queue Management** and click **Purchase Queue** to purchase a general-purpose queue.

Purchasing a yearly/monthly queue

Figure 2-3 Yearly/monthly queue

Purchase Queue [Back](#)

Billing Mode: **Yearly/Monthly** Pay-per-use

* Region: CN North-Ulanqab203
Resources in different regions are isolated. Select the region based on your requirements.

* Queue Name: Enter a queue name.

Queue Type: For SQL **For general purpose**

CPU Architecture: **x86** Kunpeng

* Queue Specifications Mode: **Default** Custom

Queue Specifications: **16 CUs** 64 CUs 256 CUs 512 CUs
Remaining CU quota: 368 (A CU includes one core and 4 GB memory.) [Increase quota](#)

* Enterprise Project: default

Description: 0/256

Required Duration: 1 2 3 4 5 6 7 8 9 months 1 year 2 years 3 years

Advanced Configuration: Default **Custom**

* CIDR: 172.16.0.0/1. Recommended CIDR: 10.0.0.0/8-26, 172.16.0.0/12-26, and 192.168.0.0/16-26

Purchasing a pay-per-use dedicated resource queue

Figure 2-4 Dedicated resource queue

Purchase Queue [Back](#)

Billing Mode: Yearly/Monthly **Pay-per-use**
Fee charged for used CUs = Number of CUs x Usage duration x Unit price. You are charged for used CUs on an hourly basis (rounded up to the nearest hour). The pay-per-use billing mode is adopted. You are advised to purchase the **CUH package** to enjoy preferential price.

* Region: CN North-Ulanqab203
Resources in different regions are isolated. Select the region based on your requirements.

* Queue Name: Enter a queue name.

Queue Type: For SQL **For general purpose**

Dedicated Resource Mode

CPU Architecture: **x86** Kunpeng

Queue Specifications: **16 CUs** 64 CUs 256 CUs 512 CUs
Remaining CU quota: 368 (A CU includes one core and 4 GB memory.) [Increase quota](#)

* Enterprise Project: default

Description: 0/256

Advanced Configuration: Default **Custom**

* CIDR: 172.16.0.0/1. Recommended CIDR: 10.0.0.0/8-26, 172.16.0.0/12-26, and 192.168.0.0/16-26

 NOTE

- To ensure adequate backend resources, you are advised to submit a service ticket to contact DLI technical support before purchasing a queue with more than 64 CUs.
- Select **For general purpose** for **Queue Type**. A SQL queue can only run DLI SQL jobs. A general-purpose queue can run Flink SQL jobs, custom Flink jobs, and Spark jobs.
- If a pay-per-use queue is idle, background resources are automatically released. Therefore, if you have services that require cross-network communication, purchase a yearly/monthly queue or pay-per-use dedicated resource queue (set the billing mode to **Pay-per-use** and select **Dedicated Resource Mode** under **Queue Type**.)
- The two VPCs in a VPC peering connection cannot have overlapping CIDR blocks. Therefore, you need to plan different CIDR blocks and configure **CIDR** on the **Purchase Queue** page (select **Custom** for **Advanced Configuration**.)
- Currently, DLI queues do not support automatic scaling. Before purchasing a queue, evaluate your resource usage. If you need scale-in or scale-out after a queue is created, choose **Queue Management > More > Modify Queue Specifications**.
- For details about queue management, see [Data Lake Insight User Guide](#).

2.3.3 Step 3: Connect the Network

A queue in DLI is equivalent to an exclusive cluster in CS. Therefore, the network connection solution in CS also can be used by DLI. **Datasource Connection** in DLI corresponds to **VPC Peering Connection** in CS. You can create an enhanced datasource connection to enable network communication between VPCs.

Figure 2-5 Creating a connection

Create Connection

* Connection Name

Bind Queue ▼

* VPC ▼

* Subnet ▼

Host Information

- **VPC** and **Subnet** indicate the VPC and subnet that need to establish a datasource connection with a DLI queue.
- **Host Information** indicates **IP-Domain Mapping** in CS. This is used to configure hosts mapping for a node.

For details about enhanced datasource connections, see [Data Lake Insight User Guide](#).

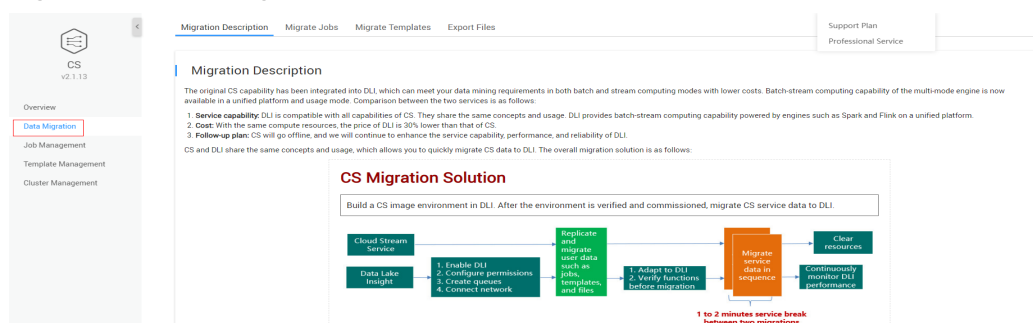
NOTE

- The CIDR block of the VPC for which an enhanced datasource connection is to be created cannot overlap with the CIDR block of the queue to be bound.
- An enhanced datasource connection cannot be bound to a queue across projects.

2.3.4 Step 4: Migrate User Data

On the **Data Migration** page of the CS console, migrate Flink jobs and custom templates in your account to the **Job Management** and **Package Management** pages of the DLI console, and export user files to a specified OBS bucket. Then log in to the DLI console, adjust your jobs (for example, select the newly purchased DLI queue when running a queue), and verify the functions.

Figure 2-6 Data migration



NOTE

- Before data migration, ensure that you have the permissions to create and modify jobs on the DLI console.
- Spark jobs cannot be automatically migrated. You can manually create and submit Spark jobs on the DLI console.

2.3.5 Step 5: Configure the Parameters

Before migrating CS data to DLI, configure the parameters according to change of CS APIs, SDKs, and Flink versions.

API

For services involving CS API calls, you are advised to use DLI APIs related to Flink job management (**streaming** is added to the original URL).

SDK

Services developed based on CS SDKs can be replaced with DLI SDKs. For details about how to use the DLI SDK, see [Data Lake Insight SDK Reference](#).

Component Version

After CS services are migrated to DLI, the Flink version will be upgraded from 1.5.3 to 1.7.2. Flink 1.7.2 APIs are mostly compatible with Flink 1.5.3 APIs. Ensure that you do a test and custom JAR jobs can work properly in DLI. The component

version change affects only the user-defined Flink JAR jobs. The SQL jobs do not need to be modified. For details about Flink version changes, see [Flink 1.7 Release Notes](#).

NOTE

In Flink 1.7.2, the legacy mode is removed and the CUs and parallelism parameters in the user-defined job configurations cannot control the number of resources occupied by jobs and the number of concurrent operators. Instead, they control the number of slots that can be started by each TaskManager, that is, the `taskmanager.numberOfTaskSlots` parameter. To customize a job, you need to configure the parallelism in the code. When Flink is running, it applies for resources based on the total number of concurrent operators and the number of slots started by each TaskManager. Flink SQL jobs are not affected.

Security Authentication for SQL Kafka

In CS, the SSL certificate of Kafka is uploaded through **Cluster Management**. DLI provides datasource authentication. You can choose **Datasource Connections > Datasource Authentication > Create** to create **Kafka_SSL** authentication information, including the certificate and password required for Kafka authentication. When using Kafka, replace parameters such as `ssl.truststore.location` and `ssl.truststore.password` with `kafka_certificate_name = datasource name` in the **with** configuration item.

SQL Character Escape

Escape characters in DLI do not need to be escaped again. For example, if the character ^ is used as the delimiter, it is expressed in CS as follows:

```
string_to_array($field, '\\\\^')
```

In DLI, it is simplified into:

```
string_to_array($field, '\\^')
```

Resource Package Management

DLI provides package management. Before creating a custom job, choose **Data Management > Package Management > Create** to upload the job JAR package, dependency package, and configuration files to DLI. Then, the job can be referenced.

If a resource package is updated, you can create a resource package with the same name on the **Package Management** page to overwrite the existing one.

NOTE

When you submit a job, DLI does not directly reference the resource file in the OBS path. Therefore, if the resource file is modified, you need to create a resource package with the same name on the **Package Management** page.

Configuration File

In CS, user-defined jobs can be uploaded to nodes and referenced via the absolute path `/opt/cs/user_files/fileName` in the code. In DLI, you can specify a resource package by setting the **Other Dependencies** parameter in a job and reference the resource package in the code by using `ClassName.class.getClassLoader().getResource("userData/fileName")`.

Custom Job Dependencies

Flink 1.7.2 and Hadoop 3.1.1 in DLI correspond to Flink 1.5.3 and Hadoop 2.8.3 in CS. However, the versions of the built-in dependency JAR packages are changed. Therefore, the version of the built-in JAR package for custom jobs in CS may conflict with that of the built-in JAR package in DLI. In this case, you need to exclude the existing JAR packages in DLI or set the package dependency scope to **provided** when packaging a custom job project.

For details about the built-in dependency packages in DLI, see [Data Lake Insight User Guide](#).

2.3.6 Step 6: Verify the Migration

Verify whether the service functions, execution flowchart, operator parallelism degree, and performance meet the expectations.

2.4 Service Migration

2.4.1 Risks and Countermeasures

During service migration, if a DLI job fails to be started or is running improperly, you only need to restart the job in CS to restore services.

2.4.2 Step 1: Migrate Service Data

You can design a migration solution based on your scenarios and the reliability mechanism for Flink jobs. CS and DLI both support a service migration solution based on [Flink savepoints](#). Flink jobs that comply with this solution can be migrated using savepoints.

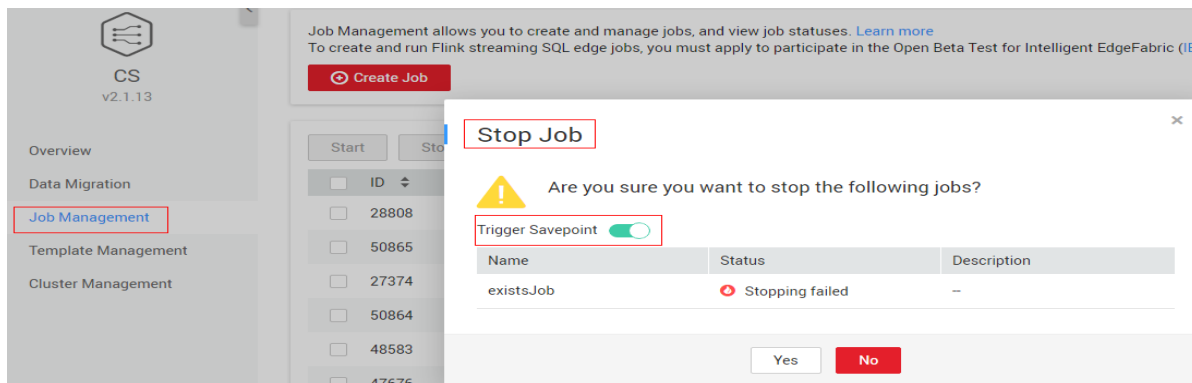
NOTE

Before service migration, verify that a DLI job is running properly.

Procedure

1. Stop a CS job and obtain the job savepoint.
On the **Job Management** page of the CS console, locate the target job and click **Stop** in the **Operation** column. On the displayed dialog box, enable **Trigger Savepoint** and click **Yes** to stop the job and obtain the current savepoint of the job.

Figure 2-7 Obtaining a savepoint



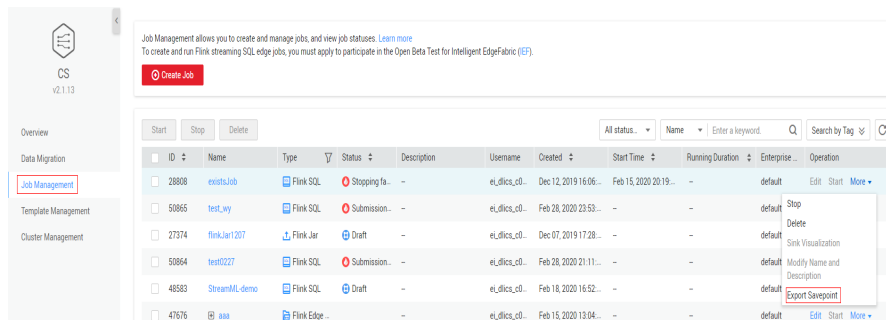
NOTE

When stopping a job, ensure that **Trigger Savepoint** is enabled. By default, savepoints are not triggered.

2. Export the job savepoint.

On the **Job Management** page of the CS console, locate the target job and choose **More > Export Savepoint** in the **Operation** column to export the job savepoint to the specified OBS path.

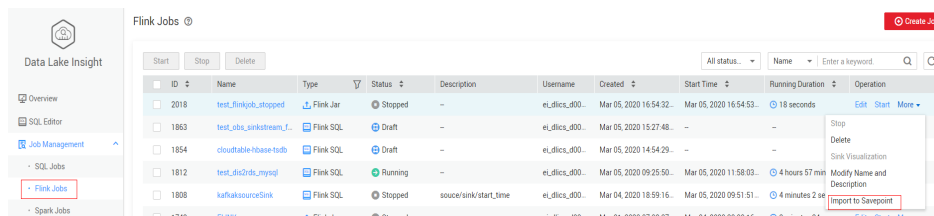
Figure 2-8 Export the savepoint



3. Import the savepoint to DLI.

On the **Job Management** page of the DLI console, locate the target job and choose **More > Import to Savepoint** in the **Operation** column to import the job savepoint exported in 2.

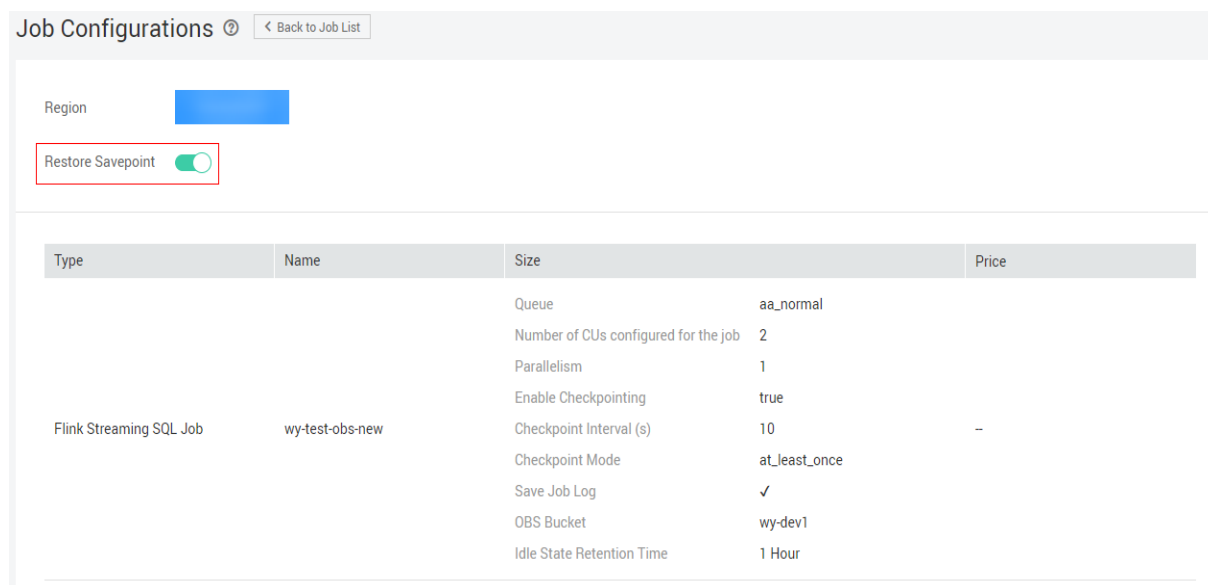
Figure 2-9 Importing the savepoint



4. Restore the job from the savepoint.

On the **Job Management** page of the DLI console, select the target job and click **Start**. On the **Start Job** page, select **Restore Savepoint** to restore the job from the savepoint. If the savepoint has been imported but this button is unavailable, refresh the job list.

Figure 2-10 Restoring the job from the savepoint



NOTE

When starting a job, ensure that **Restore Savepoint** is selected. By default, the job is not restored from the savepoint.

2.4.3 Step 2: Verify Functions

Verify that service functions work properly and keep a constant eye on service running.

2.4.4 Step 3: Clear CS Resources

If original CS services have been running properly for a period of time (for example, one week) in DLI, you can clear CS resources such as clusters and unsubscribe from CS.

3 Getting Started

This section describes how to use CS. The general procedure for using CS is as follows:

Step 1: Prepare Data Sources and Data Output Channels

Step 2: Create an OBS Bucket for Saving Outputs

Step 3: Apply for CS

Step 4: Create a Job and Submit It

Step 5: Send Data to DIS

Step 6: View Job Information and Job Execution Result

Step 7: View Related Documents

Step 8: Delete the Job

This document uses a Flink streaming SQL job as an example to help you understand how to use CS. For details about Flink streaming SQL edge jobs, user-defined Flink jobs, and user-defined Spark jobs, see **Job Management** in the [Cloud Stream Service User Guide](#).

In the example, vehicle data are recorded in real time and the data for Audi vehicles whose prices are lower than ¥300,000 are exported.

You need to create a job that has one source stream and one sink stream. The source stream is used to record vehicle information in real time. The sink stream is used to export information about the Audi vehicles whose prices are lower than ¥300,000.

Prerequisites

You have a public cloud account.

Step 1: Prepare Data Sources and Data Output Channels

CS supports other services as data sources and data output channels. For details, see [Preparing Data](#) in the *Cloud Stream Service User Guide*.

In this example, DIS serves as the data source and data output channel. You need to deploy DIS for **JobSample**.

For example, create the following DIS streams for **JobSample**. For details, see **Creating a DIS Stream** in the [Data Ingestion Service User Guide](#).

- DIS stream as the source stream
Stream Name: csinput
Stream Type: Common
Partitions: 1
Source Data Type: BLOB
Data Retention Period (days): 1
Data Dumping: Off
- DIS stream as the sink stream
Stream Name: csoutput
Stream Type: Common
Partitions: 1
Source Data Type: BLOB
Data Retention Period (days): 1
Data Dumping: Off

 **NOTE**

Retain the default values for **Stream Type**, **Source Data Type**, and **Data Retention Period (days)**.

Step 2: Create an OBS Bucket for Saving Outputs

In this example, you need to enable OBS for **JobSample** to provide CS with the functions of checkpoint, saving job logs, and debugging data.

For example, create the following OBS bucket for **JobSample**. For details, see **Creating a Bucket** in the [Object Storage Service Console Operation Guide](#).

Information about the created OBS bucket is as follows:

Region: CN North-Beijing1

Bucket Name: smoke-test

Storage Class: Standard

Bucket Policy: Private

 **NOTE**

Retain the default settings for other parameters.

Step 3: Apply for CS

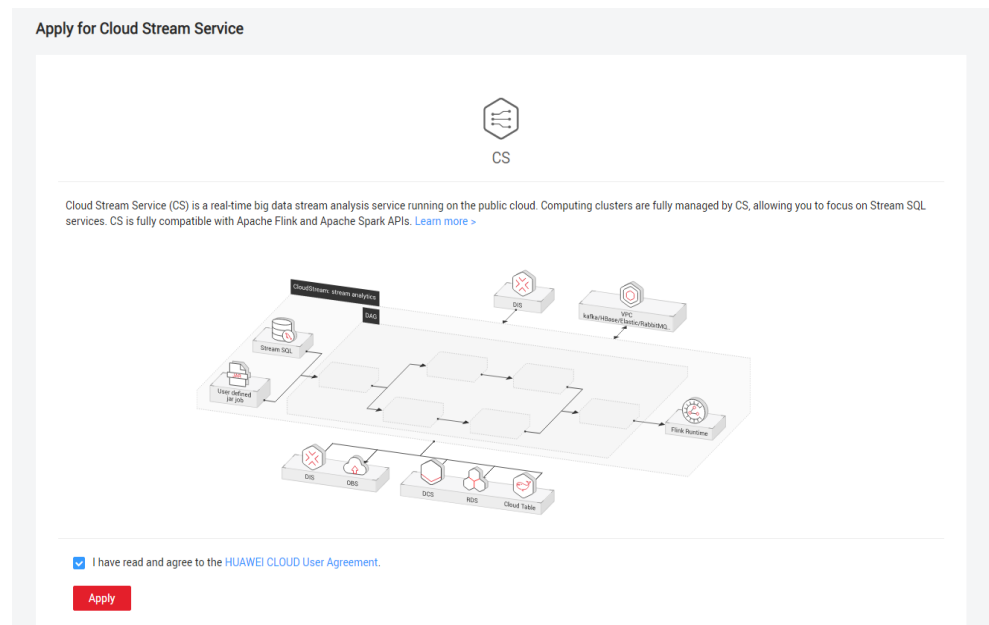
You can log in to the CS management console through a browser and apply for CS.

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

If you have not registered with the public cloud, click **Free Registration** to register an account with the public cloud as prompted.

Step 2 The **Apply for Cloud Stream Service** page is displayed.

Figure 3-1 Applying for CS

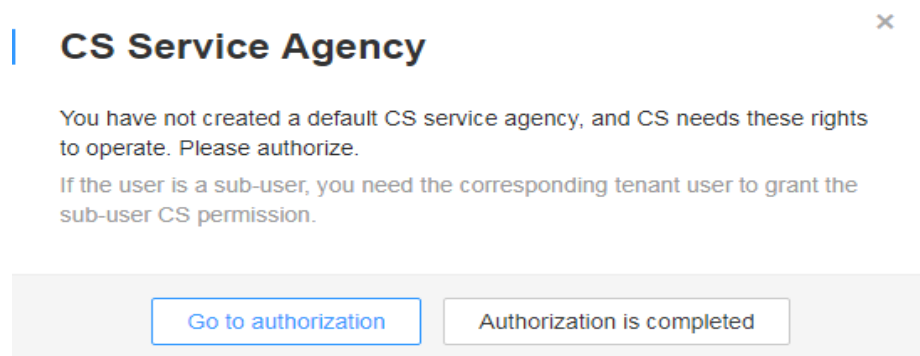


Step 3 Select **I have read and agree to the HUAWEI CLOUD User Agreement** and click **Apply**.

Step 4 After the application completes, the system will automatically redirect you to the **Overview** page.

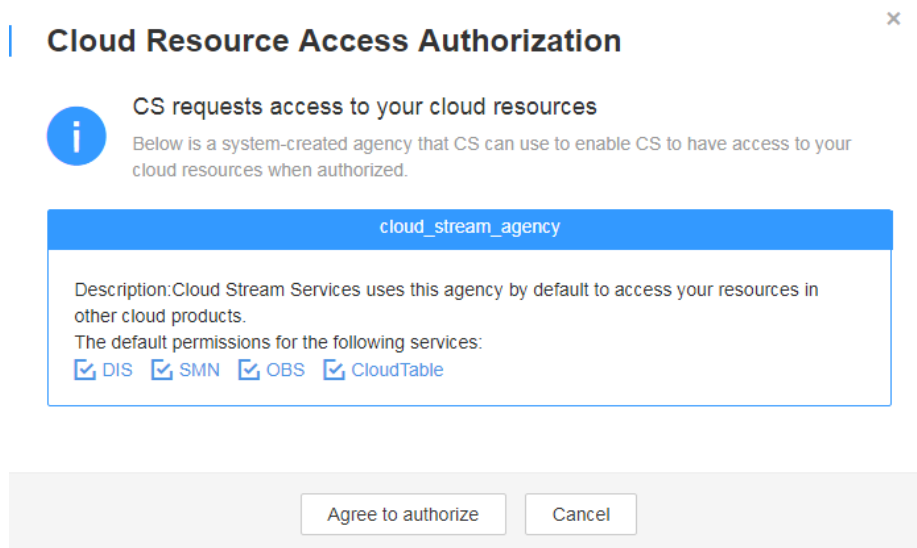
Step 5 In the **CS Service Agency** window that is automatically displayed, click **Go to authorization**.

Figure 3-2 Creating an agency



Step 6 On the **Cloud Resource Access Authorization** page that is displayed, click **Agree to authorize**.

Figure 3-3 Cloud resource access authorization



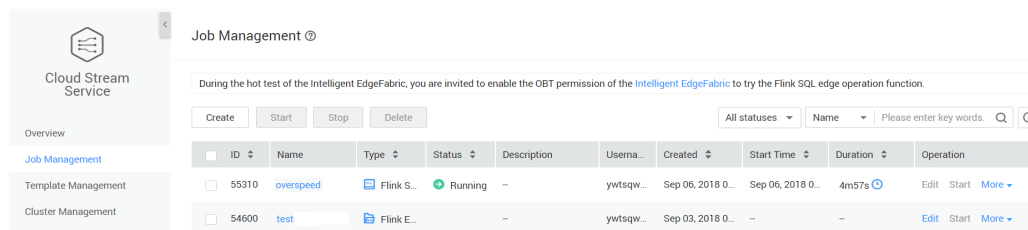
----End

Step 4: Create a Job and Submit It

To use CS, you need to create a job first, for example, **JobSample**.

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Job Management**.

Figure 3-4 Job Management



- Step 2** On the **Job Management** page, click **Create Job**. In the displayed **Create Job** dialog box, specify job details.

Figure 3-5 Creating a job

Step 3 Click **OK** to switch to the **Edit** page, as shown in the following figure. In the SQL statement editing area, SQL statements in the template selected in **Step 2** are displayed.

Figure 3-6 Editing a job

Step 4 Edit SQL statements as required.

This example uses the SQL statements from the template selected in **Step 2**. The SQL statement details are as follows:

```
/**
 * This example uses a general stream analysis template. DIS serves as both the source stream and sink
 * stream. You need to enable DIS and create source and sink streams.
 * >>>>>>>>> Ensure that you have created desired DIS streams with your account. <<<<<<<<<<<<
```

```

*
* >>>>Sample input<<<<<
* Stream name: car_infos(car_id,car_owner,car_brand,car_price):
* 1,lilei,bmw320i,28
* 2,hanmeimei,audia4,27
* >>>>Sample output<<<<<
* Stream name: audi_cheaper_than_30w(car_id,car_owner,car_brand,car_price):
* 2,hanmeimei,audia4,27
**/

/** Obtain data from DIS stream csinput and create a source stream.
*
* Reconfigure the following options according to actual conditions:
* channel: Indicates the name of the stream where data is located.
* partition_count: Indicates the number of partitions of the stream.
* encode: Indicates the data encoding format, which can be csv or json.
* field_delimiter: Indicates the separator used to separate every two attributes when the CSV encoding
format is adopted.
**/
CREATE SOURCE STREAM car_infos (
  car_id STRING,
  car_owner STRING,
  car_brand STRING,
  car_price INT
)
WITH (
  type = "dis",
  region = "cn-north-1",
  channel = "csinput",
  partition_count = "1",
  encode = "csv",
  field_delimiter = ","
);

/** Create a sink stream and export the data to DIS stream csoutput.
*
* Reconfigure the following options according to actual conditions:
* channel: Indicates the name of the stream where data is located.
* partition_key: Indicates the primary key used for data provisioning when there are multiple partitions in
the stream.
* encode: Indicates the result encoding format, which can be csv or json.
* field_delimiter: Indicates the separator used to separate every two attributes when the CSV encoding
format is adopted.
**/
CREATE SINK STREAM audi_cheaper_than_30w (
  car_id STRING,
  car_owner STRING,
  car_brand STRING,
  car_price INT
)
WITH (
  type = "dis",
  channel = "csoutput",
  region = "cn-north-1",
  partition_key = "car_owner",
  encode = "csv",
  field_delimiter = ","
);

/** Output information about the Audi vehicles whose prices are lower than ¥300,000. **/
INSERT INTO audi_cheaper_than_30w
SELECT *
FROM car_infos
WHERE car_brand like "audi%" and car_price < 30;

/*****Insert test data into source stream csinput*****/
CREATE SINK STREAM car_info_data (
  car_id STRING,
  car_owner STRING,

```

```
car_brand STRING,  
car_price INT  
)  
WITH (  
  type = "dis",  
  region = "cn-north-1",  
  channel = "csinput",  
  partition_key = "car_owner",  
  encode = "csv",  
  field_delimiter = ",\n"  
);  
  
INSERT INTO car_info_data  
SELECT "1", "lilei", "bmw320i", 28;  
INSERT INTO car_info_data  
SELECT "2", "hanmeimei", "audia4", 27;  
/***** Stop the process of inserting test data to the source stream. *****/
```

NOTE

The SQL statement consists of three parts:

- Creating the source stream: Ensure that fields defined for the stream are in the same format as the data source of the sink stream. Parameters in the **WITH** field defined for the stream must be the same as those of the source DIS stream.
- Creating a sink stream: Ensure that parameters in the **WITH** field defined for the stream are same as those of the sink DIS stream.
- Business logic: Compile SQL statements according to the scenario and insert the result data into the output stream.

Step 5 Click **Check Semantics**.

- You can only debug, submit, or start a job after semantic verification succeeds.
- If verification is successful, the message "The SQL semantic verification is complete. No error." will be displayed.
- If verification fails, a red "X" mark will be displayed in front of each SQL statement that produced an error. You can move the cursor to the "X" mark to view error details and change the SQL statement as prompted.

Step 6 On the **Running Parameters** page in the right pane of the **Edit** page, set the parameters as follows:

- Retain the default settings for **SPUs** and **Parallelism**.
- Select **Save Job Log** and set **OBS Bucket** to **smoke-test**. If the selected OBS bucket is not authorized, click **Authorize OBS**.
- Retain the default setting **Shared cluster** for **Cluster**. Alternatively, you can select a user-defined exclusive cluster. For details about how to create a user-defined exclusive cluster, see [Creating a Cluster](#) in the *Cloud Stream Service User Guide*.

Figure 3-7 Running parameters

Running Parameters	Debugging Parameters
* SPU	<input type="button" value="−"/> <input type="text" value="2"/> <input type="button" value="+"/>
Job Manager SPU: 1; Task Manager SPU: 1	
* Parallelism	<input type="button" value="−"/> <input type="text" value="1"/> <input type="button" value="+"/>
Enable Checkpoint	<input type="checkbox"/>
Save Job Log	<input checked="" type="checkbox"/>
* OBS Bucket	<input type="text" value="smoke-test"/>
OBS Authorized	
Alarm Generation upon Job Exception	<input type="checkbox"/>
Auto Restart upon Exception	<input type="checkbox"/>
Idle State Retention Time	<input type="button" value="−"/> <input type="text" value="1"/> <input type="button" value="+"/> <input type="text" value="Hour"/> <input type="button" value="▼"/>
Cluster	<input type="text" value="Shared cluster"/>
Insert the Jar package	<input type="text" value="No Jar file selected"/>

NOTE

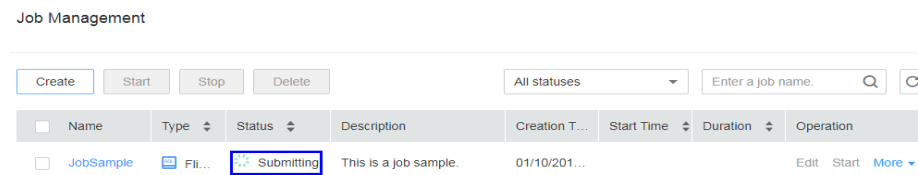
CS provides a debugging function to help you verify the business logic of jobs by using test data. For details, see [Debugging a Job](#) in the *Cloud Stream Service User Guide*.

Step 7 Click **Save**.

Step 8 Click **Submit**. On the displayed **Job Bill** page, click **OK** to submit and start the job.

After the job is submitted, the system automatically switches to the **Job Management** page, and the created job is displayed in the job list. You can view the **Status** column to query the job status. After a job is successfully submitted, the job status will change from **Submitting** to **Running**.

Figure 3-8 Job status



If the job status is **Submission failed** or **Running exception**, the job submission failed or the job did not execute successfully. In this case, click the job name **JobSample** in the job list and click **Running Logs** to query the job's run log. Rectify faults based on the log and resubmit the job.

----End

Step 5: Send Data to DIS

Use the obtained DIS stream as the data source. After the job is submitted, you can continuously upload data to DIS over the DIS stream to provide real-time stream data sources to CS jobs.

In this example, local data is uploaded to DIS through the csinput stream. For details, see **Sending Data to DIS** in the [Data Ingestion Service User Guide](#).

In the following example, each data record includes four fields: the license plate number, owner name, brand, and price of the vehicle.

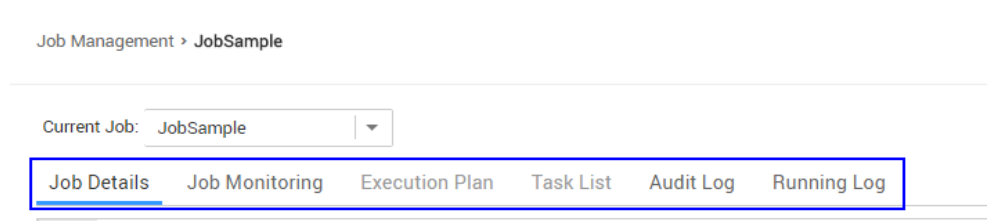
```
1,lilei,bmw320i,28
2,hanmeimei,audia4,27
```

Step 6: View Job Information and Job Execution Result

After a job is started, you can view the job status by performing the following steps:

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
- Step 2** In the job list, click job name **JobSample** to view job details.

Figure 3-9 Job monitoring



For details, see **Monitoring a Job** in the *Cloud Stream Service User Guide*.

To view the results of a job, log in to the DIS management console and view data on the DIS stream that serves as the sink stream. For details, see **Retrieving Data from DIS** in the [Data Ingestion Service User Guide](#).

----End

Step 7: View Related Documents

After performing the preceding steps, you can refer to the following to learn more about CS:

- **Cloud Stream Service User Guide:** This document explains concepts of a job, template, and cluster, as well as details about related operations.
- **Cloud Stream Service API Reference:** This document explains how to use CS APIs to perform job operations.
- **Cloud Stream Service Stream Ecosystem Development Guide:** This document discusses the cloud service and open-source ecosystems related to Cloud Stream Service and provides guidance on how to use stream ecosystems for development.
- **Cloud Stream Service SDK Reference:** This document describes how to install and configure the development environment, and how to perform secondary development by invoking API functions provided by CS SDK.
- **Cloud Stream Service SQL Syntax Reference:** This document details common SQL syntaxes used for CS.

Step 8: Delete the Job

You can delete unwanted example jobs to avoid resource waste or quota occupation.

NOTE

Deleted jobs cannot be restored. Exercise caution when deleting jobs.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 In the row where job **JobSample** is located on the **Job Management** page, choose **More > Delete**.

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

----End

4 Operation Guide

4.1 Prerequisites

This section describes how to log in to the CS management console and use CS.

Logging In to the Management Console

Register a public cloud account if you do not have one.

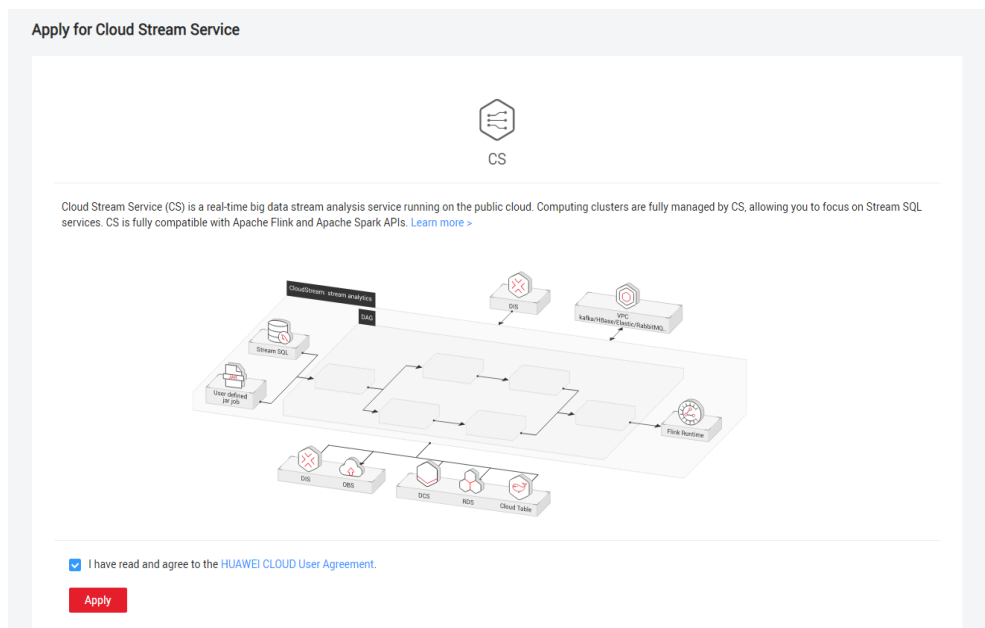
1. Log in to the [public cloud management console](#).
If you have not registered with the public cloud, click **Free Registration** to register an account with the public cloud as prompted.
2. From the menu on the top of the public cloud management console, choose **Service List**.
3. Click **Cloud Stream Service** under **EI Enterprise Intelligence**.

Enabling CS

If you are logging in to the CS management console for the first time, you need to apply for CS and then create an agency to manage permissions.

1. Log in to the [CS console](#).
If you have not registered with the public cloud, click **Free Registration** to register an account with the public cloud as prompted.
2. The **Apply for Cloud Stream Service** page is displayed.

Figure 4-1 Applying for CS



Step 1 Select **I have read and agree to the HUAWEI CLOUD User Agreement** and click **Apply**.

Step 2 After the application completes, the system will automatically redirect you to the **Overview** page.

The system automatically switches to the **CS Service Agency** so you can start assigning permissions. For details, see [Creating an Agency for Permission Management](#).

----End

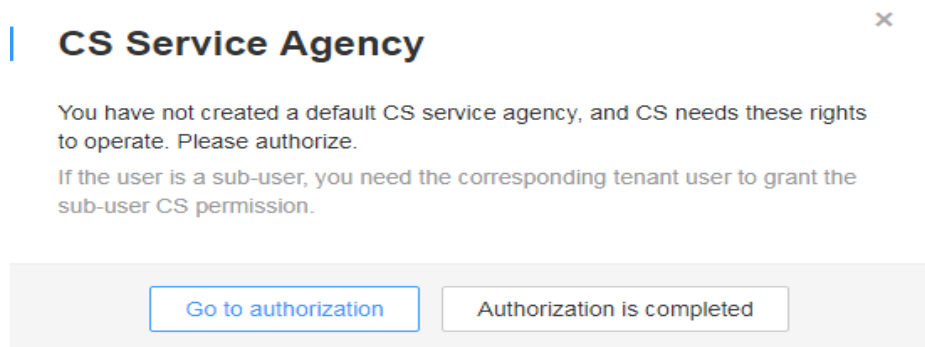
Creating an Agency for Permission Management

When applying for CS, create an agency for CS permission management so CS can use certain related services.

NOTE

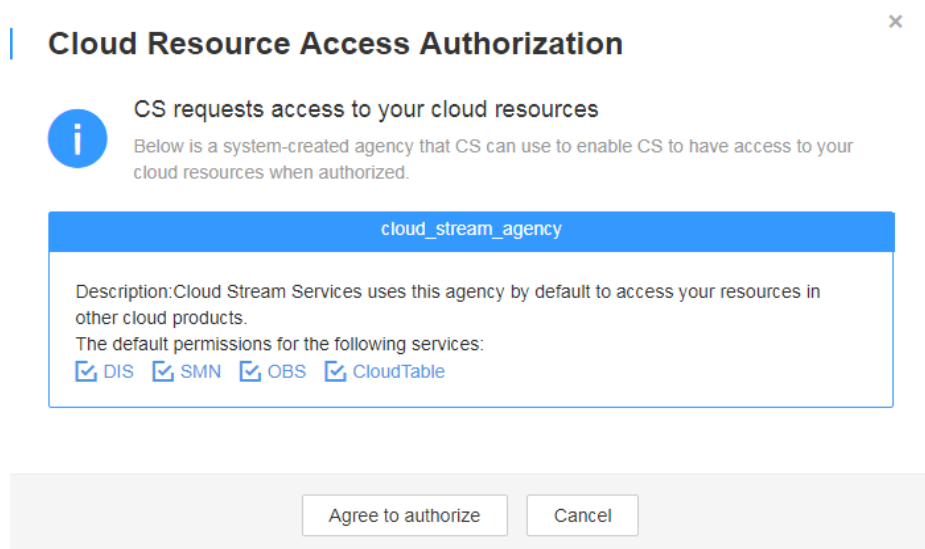
- To use CS, you need to create an agency first. Otherwise, related services, such as DIS, SMN, OBS, and CloudTable, will be unavailable.
 - Only the master account can create an agency. For details about the cloud account, see the [Identity and Access Management User Guide](#).
1. After logging in to the CS management console, if an agency has not been created, the **CS Service Agency** dialog box is displayed. If this happens, click **Go to authorization**.

Figure 4-2 Creating an agency



The **Cloud Resource Access Authorization** dialog box is displayed.

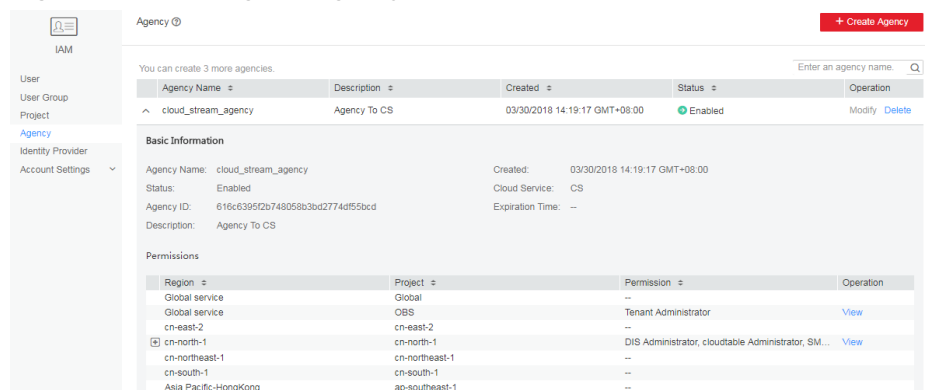
Figure 4-3 Requesting access to cloud resources



2. Click **Agree to authorize**. If the "**Successfully authorized, you have successfully created the CS Service Default Agency.**" message is displayed, the default agency has been created.

After the agency is created, you can view the agency details on the **Agency** page in the IAM console.

Figure 4-4 Viewing the agency



The following code illustrates permissions granted to CS:

```
{
  "Version": "1.0",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "OBS:Bucket:*",
        "OBS:Object:*"
      ]
    }
  ]
},
{
  "Version": "1.0",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "Cloudtable:Cloudtable:*"
      ]
    }
  ],
  "Depends": [
    {
      "catalog": "BASE",
      "display_name": "Tenant Guest"
    },
    {
      "catalog": "BASE",
      "display_name": "Server Administrator"
    }
  ]
},
{
  "Version": "1.0",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "DIS:DIS:*"
      ]
    }
  ],
  "Depends": [
    {
      "catalog": "BASE",
      "display_name": "Tenant Guest"
    },
    {
      "catalog": "BASE",
      "display_name": "Server Administrator"
    }
  ]
},
{
  "Version": "1.0",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "SMN:Topic:*",
        "SMN:Sms:*",
        "SMN:Email:*"
      ]
    }
  ]
},
{
```

```
"Version": "1.0",
"Statement": [
  {
    "Effect": "Allow",
    "Action": [
      "*"
    ]
  },
  {
    "Effect": "Deny",
    "Action": [
      "identity:*"
    ]
  }
]
```

4.2 Permissions Management

4.2.1 Creating a User and Granting CS Permissions

This section describes how to use [Identity and Access Management \(IAM\)](#) to implement fine-grained permissions control for your CS resources. With IAM, you can:

- Create IAM users for employees based on the organizational structure of your enterprise. Each IAM user has their own security credentials, providing access to CS resources.
- Grant only the permissions required for users to perform a specific task.
- Entrust a HUAWEI CLOUD account or cloud service to perform efficient O&M on your CS resources.

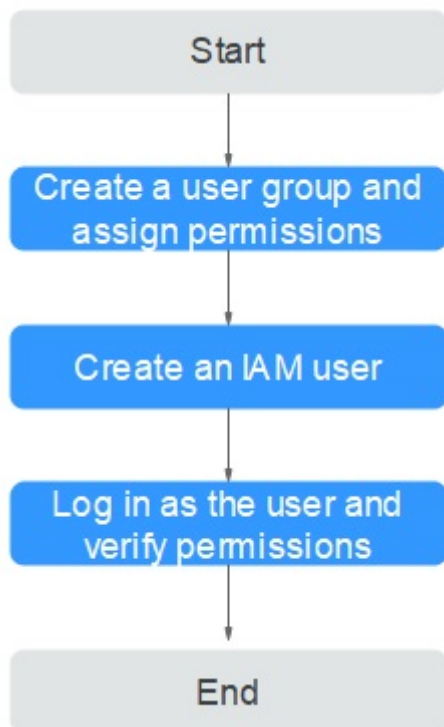
If your HUAWEI CLOUD account does not require individual IAM users, skip this chapter.

Prerequisites

- **CS ReadOnlyAccess** is a policy.
- Learn about the permissions (see [Permissions Management](#).) supported by CS and choose policies or roles according to your requirements.

Process Flow

This section describes how to use a group to grant permissions to a user. [Figure 4-5](#) shows the process for granting permissions.

Figure 4-5 Process for granting CS permissions

1. **Create a user group and assign permissions** to it.
Create a user group on the IAM console, and attach the **CS ReadOnlyAccess** policy to the group.
2. **Create an IAM user.**
Create a user on the IAM console and add the user to the group created in 1.
3. **Log in** and verify permissions.
Log in to the console by using the user created, and verify that the user has the granted permissions.
 - Choose **Service List > Cloud Stream Service**. Then click **Create Cluster** on the CS console. If a message appears indicating that you have insufficient permissions to perform the operation, the **CS ReadOnlyAccess** policy has already taken effect.
 - Choose any other service in **Service List**. If a message appears indicating that you have insufficient permissions to access the service, the **CS ReadOnlyAccess** permission has already taken effect.

4.2.2 CS Custom Policies

Custom policies can be created to supplement the system-defined policies of CS. For the actions that can be added to custom policies, see [Permissions Policies and Supported Actions](#).

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

- Visual editor: Select cloud services, actions, resources, and request conditions. This does not require knowledge of policy syntax.

- JSON: Edit JSON policies from scratch or based on an existing policy.

For details, see [Creating a Custom Policy](#). The following section contains examples of common CS custom policies.

Example Policies

- Example 1: Allowing users to query and stop a job

```
{
  "Version": "1.1",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "cs:jobs:get",
        "cs:jobs:stop"
      ]
    }
  ]
}
```

- Example 2: Denying exclusive cluster deletion

A deny policy must be used in conjunction with other policies to take effect. If the permissions assigned to a user contain both Allow and Deny actions, the Deny actions take precedence over the Allow actions.

The following method can be used if you need to assign permissions of the **CS FullAccess** policy to a user but also forbid the user from deleting exclusive clusters. Create a custom policy for denying exclusive cluster deletion, and assign both policies to the group the user belongs to. Then the user can perform all operations on CS except deleting exclusive clusters. The following is an example deny policy:

```
{
  "Version": "1.1",
  "Statement": [
    {
      "Effect": "Deny",
      "Action": [
        "cs:clusters:delete"
      ]
    }
  ]
}
```

4.3 Viewing the Overview Page

After you log in to the CS management console, the **Overview** page is displayed. Alternatively, you can click **Overview** in the left navigation pane to switch to this page.

Once you have jobs created, the **Overview** page will show you:

- Total Price
- Job Price
- Cluster Price
- Job Status
- Cluster Status

 NOTE

Details for these items are only displayed after jobs are created.

- Get Started with CS
Use a sample template **[Ecosystem]DIS-CS-DIS_SAMPLE_TEMPLATE** to create a Flink streaming SQL job with DIS streams serving as both the source and sink streams. Click **Get Started** to create CS jobs with a sample template.
- How CS Works?
This area illustrates how CS works. For details, see the [Cloud Stream Service Getting Started Guide](#).
- Typical Application Scenarios
 - DIS-CS-DIS
DIS streams serve as both the data source and output channel. You need to first enable DIS and prepare data sources and output channels. This scenario mainly involves real-time stream processing.
Sample template: **[Ecosystem]DIS-CS-DIS_SAMPLE_TEMPLATE**
 - DIS-CS-SMN
DIS serves as the data source and CS outputs the job result to a specific SMN topic. You need to first enable DIS to create a DIS stream as the data source, create an SMN topic, and add a mobile phone or email subscription. This scenario mainly involves real-time alarming.
Sample template: **[Ecosystem]DIS-CS-SMN_SAMPLE_TEMPLATE**
 - DIS-CS-CloudTable
DIS serves as the data source and CS outputs the job result to CloudTable. You need to first enable DIS to create a DIS stream as the data source and enable CloudTable. This scenario mainly involves real-time data importing into databases.
Sample template: **[Ecosystem]DIS-CS-CloudTable_SAMPLE_TEMPLATE**
 - Kafka-CS-Kafka
Kafka serves as both the data source and data output channel. You need to create a Kafka cluster first and establish a VPC peering connection between the Kafka cluster and the CS cluster. This scenario mainly involves access to CS from your owned Kafka clusters.
Sample template: **[Ecosystem]Kafka-CS-Kafka_SAMPLE_TEMPLATE**
 - IoT
IoT or edge devices upload data to DIS or other cloud storage services. CS reads data from DIS, analyzes data streams (including fault detection, data cleansing, statistical analysis, warning, and more), and makes the analysis result persistent or reports alarms in real time.
Sample templates: **[IoT]CAR-OVERSPEED-WARNING_SAMPLE_TEMPLATE**, **[IoT]YAW-WARNING_SAMPLE_TEMPLATE**, **[IoT]FENCE-WARNING_SAMPLE_TEMPLATE**, **[IoT]FAKE_LICENSED_CAR_DETECT_SAMPLE_TEMPLATE**, and **[IoT]WARNING-INHIBITION_SAMPLE_TEMPLATE**

For details about how to interconnect CS with other cloud services, see the [Cloud Stream Service Stream Ecosystem Development Guide](#).

For details about job template operations, see [Job Template](#).

4.4 Preparing Data

To use CS, you need a sink stream and source stream. To use another service as the source or sink stream, you need to apply for the service first.

CS supports the following data input and output channels:

- DIS as the data input and output channel

To use DIS as the data input and output channel for CS, enable DIS first.

For details about how to create a DIS stream, see [Creating a DIS Stream](#) in the [Data Ingestion Service User Guide](#).

After applying for a DIS stream, you can upload local data to DIS to provide data sources for CS in real time. For details, see [Sending Data to DIS](#) in the [Data Ingestion Service User Guide](#).

CS source data might look like this:

```
1,lilei,bmw320i,28  
2,hanmeimei,audia4,27
```

- OBS as the data source

To use OBS as the data source, enable OBS first. For details about how to enable OBS, see [Enabling OBS](#) in the [Object Storage Service Console Operation Guide](#).

After you enable OBS, upload local files to OBS using the Internet. For detailed operations, see [Uploading a File](#) in the [Object Storage Service Console Operation Guide](#).

- RDS as the output channel

To use RDS as the output channel, create an RDS instance. For details, see [Buying an RDS MySQL DB Instance](#) in the [Relational Database Service Getting Started Guide](#).

- SMN as the output channel

To use SMN as the output channel, create an SMN topic to obtain the URN resource ID and then add topic subscription. For details, see the [Simple Message Notification Getting Started Guide](#).

- Kafka as the data input and output channel

If Kafka serves as both the source and sink streams, create a VPC peering connection between CS and Kafka. For details, see [VPC Peering Connection](#).

If the Kafka server listens on the port using hostname, add the mapping between the hostname and IP address of the Kafka Broker node to the CS cluster. For details, see [Creating an IP-Domain Mapping](#).

- CloudTable as the data input and output channel

To use CloudTable as the data input and output channel, create a cluster in CloudTable and obtain the cluster ID. For details, see [Getting Started](#) in the [CloudTable Service User Guide](#).

- CSS as the output channel

To use CSS as the data output channel, create a cluster in CSS and obtain the cluster's private network address. For details, see [Getting Started](#) in the [Cloud Search Service User Guide](#).

- DCS as the output channel
To use DCS as the output channel, create a Redis cache instance in DCS and obtain the address used for CS to connect to the Redis instance. For details, see **Getting Started** in the [Distributed Cache Service User Guide](#).

4.5 Job Management

4.5.1 Introduction

A job refers to tasks ran by a compiled Java JAR file in a distributed system. A job contains three parts: source stream, Stream SQL data processing, and sink stream. On the **Job Management** page, you can create and manage jobs. Information about all created jobs is displayed in the job list on the **Job Management** page. If a large number of jobs are created, you can turn pages to view them.

Job Management

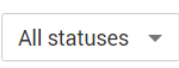
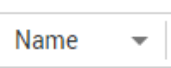




The job list displays all created jobs. By default, jobs are sorted in time sequence, and the latest job is displayed at the top. [Table 1](#) describes the parameters involved in the job list.

Table 4-1 Parameters involved in the job list

Parameter	Description
ID	Job ID, which is unique globally.
Name	Job name, which is unique globally.
Type	Type of the job. The following types are supported: <ul style="list-style-type: none">• Flink SQL• Flink JAR• Flink Edge SQL• Spark JAR

Parameter	Description
Status	<p>Available job statuses are as follows:</p> <ul style="list-style-type: none"> • Draft • Running • Idle • Completed • Stopped • Submitting • Submission failed • Running exception • Stopping • Stopping failed • Stopped due to arrears • Restoring (recharged jobs) • Creating the savepoint
Description	Description of a job.
Created	Time when the job is created.
Start Time	Start time of the job execution.
Running Duration	Running duration of the job.
Enterprise Project	Enterprise project to which the job belongs.
Operation	<ul style="list-style-type: none"> • Edit: You can click Edit to edit a job that has been created. • Start: You can click Start to start and run a job. • Stop: You can click More > Stop to stop a job in the Submitting or Running status. • Delete: You can click More > Delete to delete a job. <p>NOTE A deleted job cannot be restored. Therefore, exercise caution when deleting a job.</p> <ul style="list-style-type: none"> • Sink Visualization: Click More > Sink Visualization to display data of the digit type in the sink stream in a chart. • Modify Name and Description: Click More > Modify Name and Description to modify the job name and description.

Table 4-2 Buttons and drop-down list boxes

Button/Drop-down List Box	Description
	Select a certain job status from the drop-down list to display jobs in that status.
	Select a username, enterprise project, or job name from the drop-down list box to filter jobs.
	In the search box, enter the job name and click  to search for the job.
Search by Tag	Search for jobs by tag. For details, see Searching for Jobs by Tag .
	Click  to manually refresh the job list.

4.5.2 Creating a Flink Streaming SQL Job

This section describes how to create a Flink streaming SQL job. Flink SQL provides users a method for compiling jobs based on their logic requirements. SQL-based business logic expression facilitates service implementation. Currently, you can use the SQL editor or visual editor to edit Flink SQL statements for Flink streaming SQL jobs. This section describes how to use the SQL editor to edit a Flink streaming SQL job.

For details about the visual editor, see [Visual Editor](#).

Prerequisites

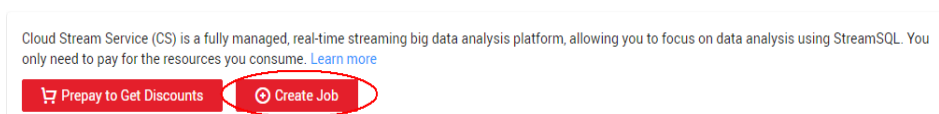
You have prepared the data input and data output channels. For details, see [Preparing Data](#).

Procedure

Step 1 You can create a Flink streaming SQL job on any of the following four pages: **Overview**, **Job Management**, **Edit**, and **Template Management**.

- **Overview**
 - a. In the navigation tree on the left pane of the CS management console, click **Overview** to switch to the **Overview** page.

Figure 4-6 Creating a job on the **Overview** page



- b. Click **Create Job** to switch to the **Create Job** dialog box.

- **Job Management**
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

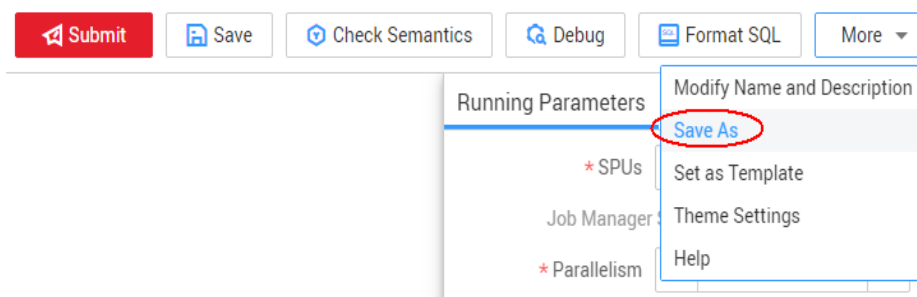
Figure 4-7 Creating a job on the **Job Management** page

On the Job Management page, you can create and manage jobs. Information about all created jobs is displayed in the job list on the Job Management page. [Learn more](#)
Intelligent EdgeFabric (IEF) is in the open beta test (OBT). You can apply for the OBT permission for IEF to try Flink streaming SQL edge jobs.



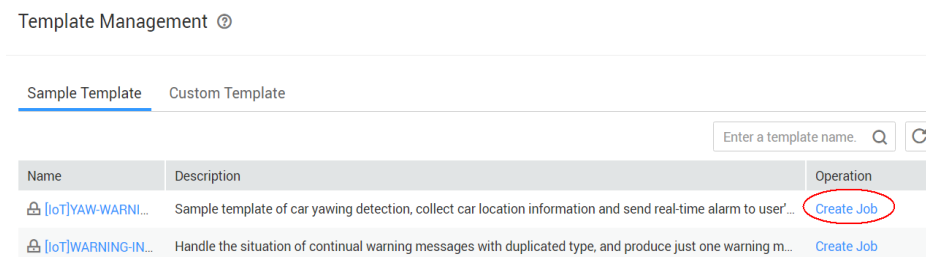
- b. On the **Job Management** page, click **Create Job** to switch to the **Create Job** dialog box.
- **Edit**
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
 - b. In the row where a created Flink streaming SQL job is located, click **Edit** under **Operation** to enter the **Edit** page.

Figure 4-8 Creating a Flink streaming SQL job on the **Edit** page



- c. Click **More > Save As**. The **Job Save as** dialog box is displayed.
- **Template Management**
 - a. In the navigation tree on the left pane of the CS management console, choose **Template Management** to switch to the **Template Management** page.
 - b. In the row where the desired template is located, click **Create Job** under **Operation**.

Figure 4-9 Creating a job on the **Template Management** page



Step 2 Specify job parameters.

Figure 4-10 Creating a Flink streaming SQL job

The screenshot shows a 'Create Job' dialog box with the following fields and values:

- Type:** Flink Streaming SQL Job
- Name:** JobSample
- Description:** (Empty text box, with a character count of 0/512)
- Editor:** SQL Editor
- Template:** [Ecosystem]DIS-CS-DIS_SAMPLE_TEMPLATE
- Enterprise Project:** -Select-
- Tags:** A section with a text box for 'Tag key' and a 'Tag value' button. Below it, it says 'You can add 10 more tags.'

At the bottom of the dialog, there are two buttons: 'OK' (in a red box) and 'Cancel'.

Table 4-3 Job parameters

Parameter	Description
Type	Set Type to Flink Streaming SQL Job . You will need to start jobs by compiling SQL statements.
Name	Name of a job. Enter 1 to 57 characters. Only letters, digits, hyphens (-), and underscores (_) are allowed. NOTE The job name must be globally unique.
Description	Description of a job. It can be up to 512 characters long.
Editor	SQL Editor and Visual Editor are both available. SQL Editor is used by default.
Template	This parameter is only used when Editor is set to SQL Editor . You can select a sample template or a custom job template. For details about templates, see Job Template .

Step 3 For **Enterprise Project**, select an enterprise project that you created on the Enterprise Management console.

For details about how to create an enterprise project on the Enterprise Management console, see **Creating an Enterprise Project** in the *Enterprise Management User Guide*.

The system also has a built-in enterprise project, **default**. If you do not select an enterprise project for the job, the default project is used instead.

During job creation, if the job is successfully bound to an enterprise project, the job has been created. If the binding fails, the system sends an alarm and the job fails to be created.

When you delete a job, the association between the job and its enterprise project is automatically deleted as well.

Step 4 (Optional) Add tags for the job. In this step, configure the parameters in the following table as required. The tags are optional. If you do not need tags, skip this step.

Table 4-4 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

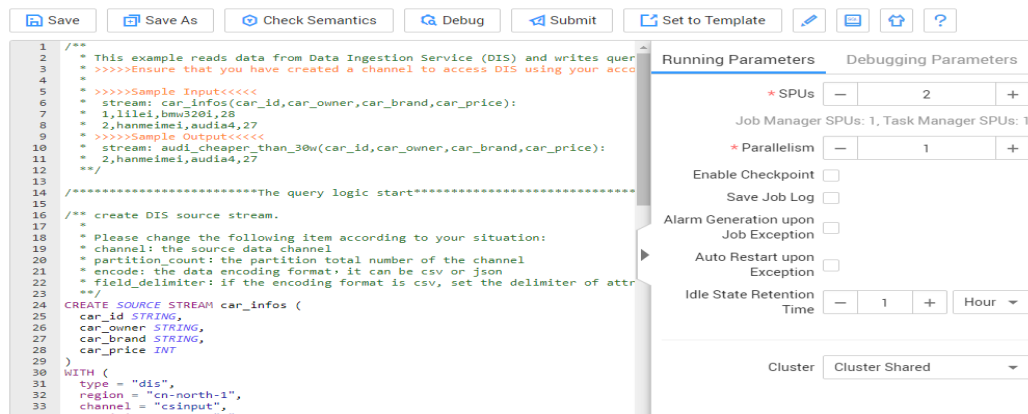
 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 5 Click **OK** to enter the **Edit** page.

Step 6 Edit a job.

Figure 4-11 Editing a job



In the SQL statement editing area, enter SQL statements to implement business logic. For details about how to compile SQL statements, see the [Cloud Stream Service SQL Syntax Reference](#).

Step 7 Click **Check Semantics**.

- You can only debug, submit, or start a job after semantic verification succeeds.
- If verification is successful, the message "The SQL semantic verification is complete. No error." will be displayed.
- If verification fails, a red "X" mark will be displayed in front of each SQL statement that produced an error. You can move the cursor to the "X" mark to view error details and change the SQL statement as prompted.

Step 8 Set job running parameters.

Figure 4-12 Setting Running Parameters

Running Parameters
Debugging Parameters

* SPUs

Job Manager SPUs: 1; Task Manager SPUs: 1

* Parallelism

Enable Checkpoint

Checkpoint Interval (s)

Checkpoint Mode

Save Job Log

* OBS Bucket

Authorize OBS

Alarm Generation upon Job Exception

Auto Restart upon Exception

Idle State Retention Time

Dirty Data Policy

* Dirty Data Dump Address

Cluster

JAR File to Be Inserted

Table 4-5 Running parameters

Parameter	Description
SPUs	Stream Processing Unit (SPU) is the pricing unit for CS. An SPU consists of 1 vCPU compute and 4 GB memory.
Parallelism	Number of tasks where CS jobs can simultaneously run NOTE The value of Parallelism must not exceed the value obtained through the following formula: 4 x (Number of SPU s - 1).


Parameter	Description
Enable Checkpoint	<p>Whether to enable job snapshots. If this function is enabled, jobs can be restored based on the checkpoints.</p> <p>The following two parameters are valid after Enable Checkpoint is selected:</p> <ul style="list-style-type: none"> • Checkpoint Interval (s) is the number of seconds between when new checkpoints are created. The parameter value ranges from 1 to 999999, and the default value is 10. • Checkpoint Mode can be set to either of the following values: <ul style="list-style-type: none"> - At least once: Events are processed at least once. - Exactly once: Events are processed only once.
Save Job Log	<p>Whether to save the job running logs to OBS</p> <p>NOTE If both Enable Checkpoint and Save Job Log are selected, you only need to authorize OBS once.</p>
OBS Bucket	<p>This parameter is valid only when Enable Checkpoint or Save Job Log is selected.</p> <p>Select an OBS bucket to store checkpoint and job logs.</p> <p>If the selected OBS bucket is not authorized, click Authorize OBS.</p>
Alarm Generation upon Job Exception	<p>Whether to report job exceptions, for example, abnormal job running or exceptions due to an insufficient balance, to users via SMS or email</p>
Auto Restart upon Exception	<p>Whether to enable automatic restart. If this function is enabled, CS automatically restarts any job that has become abnormal.</p>
Idle State Retention Time	<p>Defines for how long the state of a key is retained without being updated before it is removed in GroupBy or Window. The default value is 1 hour.</p>
Topic Name	<p>This parameter is only used when Alarm Generation upon Job Exception is selected.</p> <p>Select a user-defined SMN topic. For details about how to customize SMN topics, see Creating a Topic in the Simple Message Notification User Guide.</p>
Dirty Data Policy	<p>Select a policy for processing dirty data. Available options are as follows: Ignore, Trigger a job exception, and Save. The default value is Ignore.</p>

Parameter	Description
Cluster	<p>Retain the default setting Shared cluster. Alternatively, you can select a user-defined exclusive cluster. For details about how to create a user-defined exclusive cluster, see Creating a Cluster Billed on a Per-per-Use Basis.</p> <p>NOTE During job creation, a sub-user can only select a cluster that has been allocated to the user. For details about how to allocate a cluster to a sub-user, see Modifying a Sub-user.</p>
UDF JAR	<p>This parameter is valid only when you select an exclusive cluster for Cluster.</p> <p>In SQL, you can call a user-defined function that is inserted into a JAR file.</p> <p>For details about UDFs, see User-Defined Functions in the <i>Cloud Stream Service SQL Syntax Reference</i>.</p>

Step 9 Click **Save**.

Step 10 Click **Submit**. On the displayed **Job Configurations** page, click **OK** to submit and start the job.

After you click **OK** to submit a job, the system automatically switches to the **Job Management** page, and the created job is displayed in the job list. You can view the job status in the **Status** column. After a job is successfully submitted, the job status will change from **Submitting** to **Running**.

If the job status is **Submission failed** or **Running exception**, the job submission failed or the job did not execute successfully. In this case, you can move the cursor over the status icon in the **Status** column of the job list to view the error details. You can click  to copy these details. After handling the fault based on the provided information, resubmit the job.

 **NOTE**

Other buttons are as follows:

- **Debug**: indicates to perform job debugging. For details, see [Debugging a Job](#).
- **Format SQL**: indicates to format the SQL statement. After clicking **Format SQL**, you need to edit SQL statements again.
- **More > Modify Name and Description**: indicates to modify the job name and description.
- **More > Save As**: indicates to save the created job as a new job.
- **More > Set as Template**: indicates to set the created job as a job template.
- **More > Theme Settings**: indicates to set the theme related parameters, including **Font Size**, **Wrap**, and **Page Style**.
- **More > Help**: The help center provides SQL syntax reference for users.

----End

4.5.3 Creating a Flink Streaming SQL Edge Job

This section describes how to create a Flink streaming SQL edge job. The Flink streaming SQL edge job analyzes and processes data near where data is generated

when a large amount of data is generated on edge devices, which reduces the amount of data to be migrated to the cloud and improves real-time data processing.

Such a job is a combination of CS and IEF. Stream computing applications are deployed on edge nodes to realize real-time data processing at the edge, not on the cloud. CS then edits and delivers the stream processing job to edge nodes for execution. This helps you quickly and accurately analyze and process streaming data at the edge in real time.

Prerequisites

- IEF has been enabled.
- An ECS has been created. The recommended configuration is 4 vCPUs and 8 GB or higher memory. For details about how to create an ECS, see **Purchasing and Logging In to a Linux ECS** in the [Elastic Cloud Server Getting Started Guide](#).
- Edge nodes have been created and successfully managed. For details, see section "Edge Node" in the *Intelligent EdgeFabric User Guide*.
- The edge stream computing application **edge-cs** has been deployed. For details, see section "Application Deployment" in the *Intelligent EdgeFabric User Guide*.

NOTE

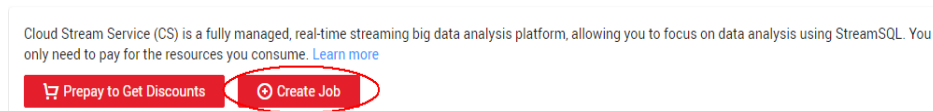
If you deploy an application using a system template, ensure that the container specification is not less than the default value. Otherwise, the instance deployment fails.

Creating a Flink Streaming SQL Edge Job

Step 1 You can create a Flink streaming SQL job on any of the three pages: **Overview**, **Job Management** and **Edit**.

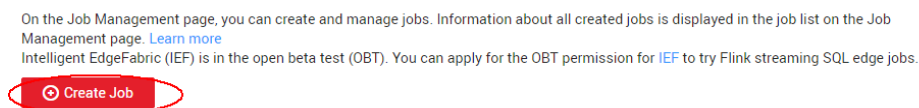
- **Overview**
 - a. In the navigation tree on the left pane of the CS management console, click **Overview** to switch to the **Overview** page.

Figure 4-13 Creating a job on the **Overview** page



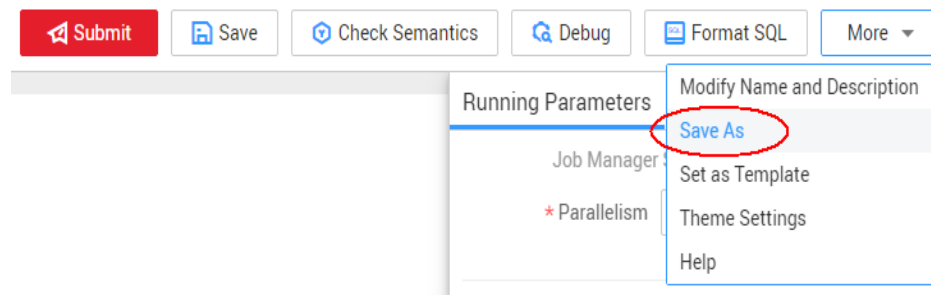
- b. Click **Create Job** to switch to the **Create Job** dialog box.
- **Job Management**
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Figure 4-14 Creating a job on the **Job Management** page



- b. Click **Create Job** to switch to the **Create Job** dialog box.
- **Edit**
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
 - b. In the row where a created Flink streaming SQL edge job is located, click **Edit** under **Operation** to enter the **Edit** page.

Figure 4-15 Creating a Flink streaming SQL edge job on the **Edit** page



- c. Click **More > Save As**. The **Save Job As** dialog box is displayed.

Step 2 Specify job parameters.

Figure 4-16 Creating a Flink streaming SQL edge job

Create Job
✕

Type ? Flink Streaming SQL Edge Job (In Open Beta Test)

* Name FlinkSQLEdge

Description 0/512

Template [Ecosystem]DIS-CS-DIS_SAMPLE_TEMPLATE

Enterprise Project ? --Select-- ↻

Tags It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. [View predefined tags](#)

Tag key

Tag value

You can add 10 more tags.

OK

Cancel

Table 4-6 Job parameters

Parameter	Description
Type	Set Type to Flink Streaming SQL Edge Job . You will need to start jobs by compiling SQL statements.
Name	Name of a job. Enter 1 to 57 characters. Only letters, digits, hyphens (-), and underscores (_) are allowed. NOTE The job name must be globally unique.
Description	Description of a job. It can be up to 512 characters long.
Template	You can select a sample template or a custom job template. For details about templates, see Job Template .

Step 3 For **Enterprise Project**, select an enterprise project that you created on the Enterprise Management console.

For details about how to create an enterprise project on the Enterprise Management console, see **Creating an Enterprise Project** in the *Enterprise Management User Guide*.

The system also has a built-in enterprise project, **default**. If you do not select an enterprise project for the job, the default project is used instead.

During job creation, if the job is successfully bound to an enterprise project, the job has been created. If the binding fails, the system sends an alarm and the job fails to be created.

When you delete a job, the association between the job and its enterprise project is automatically deleted as well.

Step 4 (Optional) Add tags for the job. In this step, configure the parameters in the following table as required. The tags are optional. If you do not need tags, skip this step.

Table 4-7 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 5 Click **OK** to enter the **Edit** page.

Step 6 Edit a job.

Edit the Flink streaming SQL edge job as required to process data generated on edge devices. Currently, **type** can be set to **edgehub**, and **encode** can be set to **json** or **csv**. For details about the SQL syntax, see the [Cloud Stream Service SQL Syntax Reference](#).

Example: Export the names and scores of students whose scores are greater than or equal to 80.

```
create source stream student_scores(name string, score int) with (
  type = "edgehub",
  topic = "abc",
  encode = "json",
  json_config = "score = student.score; name=student.name"
);
create sink stream excellent_students(name string, score int) with (
  type = "edgehub",
  topic = "abcd",
```

```

encode = "csv",
field_delimiter = ","
);
insert into excellent_students select name, score from student_scores where score >= 80;

```

Step 7 Click **Check Semantics**.

- You can only debug, submit, or start a job after semantic verification succeeds.
- If verification is successful, the message "The SQL semantic verification is complete. No error." will be displayed.
- If verification fails, a red "X" mark will be displayed in front of each SQL statement that produced an error. You can move the cursor to the "X" mark to view error details and change the SQL statement as prompted.

Step 8 Set job running parameters.

Figure 4-17 Setting running parameters of the Flink streaming SQL edge job

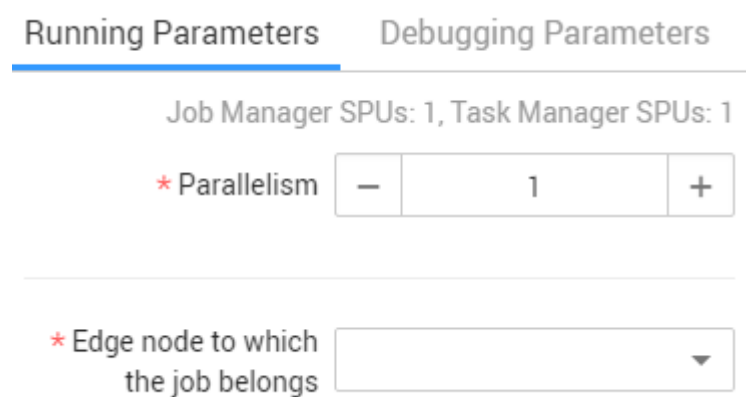


Table 4-8 Job running parameter description


Parameter	Description
Parallelism	Number of tasks where CS jobs can simultaneously run NOTE The value of Parallelism must not exceed four times of (Number of SPUs - 1).
Edge node to which the job belongs	Select the edge node that the job belongs to. <ul style="list-style-type: none"> • Your own edge computing devices serve as the edge nodes run edge applications, process your data, and work with cloud applications securely and conveniently. An edge application is a functional module that runs on an edge node. • CS jobs can be deployed on multiple edge nodes so that it can work with IEF.

Step 9 Click **Save**.

Step 10 Click **Submit**. On the displayed **Job Configurations** page, click **OK** to submit and start the job.

After you click **OK** to submit a job, the system automatically switches to the **Job Management** page, and the created job is displayed in the job list. You can view the job status in the **Status** column. After a job is successfully submitted, the job status will change from **Submitting** to **Running**.

If the job status is **Submission failed** or **Running exception**, the job submission failed or the job did not execute successfully. In this case, you can move the cursor over the status icon in the **Status** column of the job list to view the error details.

You can click  to copy these details. After handling the fault based on the provided information, resubmit the job.

NOTE

Other buttons are as follows:

- **Debug**: indicates to perform job debugging. For details, see [Debugging a Job](#).
- **Format SQL**: indicates to format the SQL statement. After clicking **Format SQL**, you need to edit SQL statements again.
- **More > Modify Name and Description**: indicates to modify the job name and description.
- **More > Save As**: indicates to save the created job as a new job.
- **More > Set as Template**: indicates to set the created job as a job template.
- **More > Theme Settings**: indicates to set the theme related parameters, including **Font Size**, **Wrap**, and **Page Style**.
- **More > Help**: The help center provides SQL syntax reference for users.

----End

Verifying Job Running

Step 1 On IEF, log in to any node that must interwork with edge nodes and install Mosquitto.

To download Mosquitto, visit <https://mosquitto.org/download/>.

Step 2 In the example, the following command is used to send data to edge nodes.

```
mosquitto_pub -h Edge node IP address -t abc -m '{"student":{"score":90,"name":"1bc2"}}';
```

In the command, **abc** refers to the topic name defined in the job.

Step 3 Open a new window and run related commands to monitor the output. Enter the following command to query the names and scores of students whose scores are greater than or equal to 80.

```
mosquitto_sub -h Edge node IP address -t abcd
```

In the command, **abcd** refers to the topic name defined in the job.

----End

4.5.4 Creating a User-Defined Flink Job

This section describes how to create a user-defined Flink job. You can perform secondary development based on Flink APIs, build your own JAR file, and submit the JAR file to CS clusters. CS is fully compatible with open-source community

APIs. To create a user-defined Flink job, you need to compile and build application JAR files. You must have a certain understanding of Flink secondary development and have high requirements related to stream computing complexity.

Prerequisites

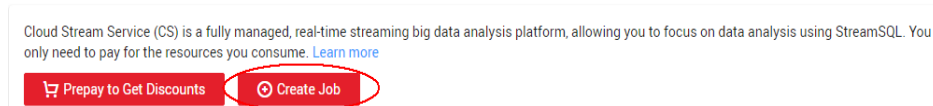
- You have complied the secondary development application code into a JAR file and stored the JAR file on your local PC or uploaded it to an OBS bucket.
- The Flink dependency packages have been integrated into the CS server and system hardening has been performed based on the open-source community version. You need to exclude related Flink dependencies when building an application JAR file. To achieve this, use Maven or SBT to set **scope** to **provided**.
- Ensure that an exclusive cluster has been created. For details about how to create an exclusive cluster, see [Creating a Cluster Billed on a Per-per-Use Basis](#).

Procedure

Step 1 You can create a user-defined Flink job on either of the following two pages: **Overview** and **Job Management**.

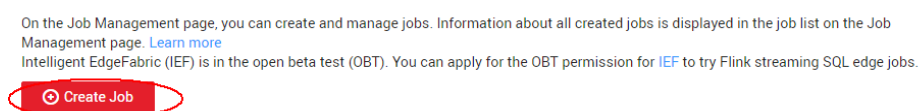
- **Overview**
 - a. In the navigation tree on the left pane of the CS management console, click **Overview** to switch to the **Overview** page.

Figure 4-18 Creating a job on the **Overview** page



- b. Click **Create Job** to switch to the **Create Job** dialog box.
- **Job Management**
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Figure 4-19 Creating a job on the **Job Management** page



- b. On the **Job Management** page, click **Create Job** to switch to the **Create Job** dialog box.

Step 2 Specify job parameters.

Figure 4-20 Creating a user-defined Flink job

Table 4-9 Parameters related to job creation

Parameter	Description
Type	Select Flink Streaming JAR Job .
Name	Name of a job. Enter 1 to 57 characters. Only letters, digits, hyphens (-), and underscores (_) are allowed. NOTE The job name must be globally unique.
Description	Description of a job. It can be up to 512 characters long.

Step 3 For **Enterprise Project**, select an enterprise project that you created on the Enterprise Management console.

For details about how to create an enterprise project on the Enterprise Management console, see **Creating an Enterprise Project** in the *Enterprise Management User Guide*.

The system also has a built-in enterprise project, **default**. If you do not select an enterprise project for the job, the default project is used instead.

During job creation, if the job is successfully bound to an enterprise project, the job has been created. If the binding fails, the system sends an alarm and the job fails to be created.

When you delete a job, the association between the job and its enterprise project is automatically deleted as well.

Step 4 (Optional) Add tags for the job. In this step, configure the parameters in the following table as required. The tags are optional. If you do not need tags, skip this step.

Table 4-10 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 5 Click **OK** to enter the **Edit** page.

Step 6 Upload the JAR file.

Figure 4-21 Uploading the JAR file

The screenshot shows a web interface for uploading a JAR file. It features several sections:

- Upload Mode:** Three radio buttons labeled 'Local upload', 'OBS', and 'Demo'. The 'Demo' button is selected and highlighted in blue.
- Select a demo file:** A text input field with the placeholder text 'Select a demo file'.
- Uploaded File:** A label with a red asterisk followed by the text 'WordCount.jar'.
- Main Class:** Two radio buttons labeled 'Default' and 'Manually assign'. The 'Default' button is selected and highlighted in blue.
- Class Arguments:** A text input field with the placeholder text 'Enter arguments that are space-separated. For example, Argument1 Argument2 Argument3 ...'. Below the field is a character count '0/10240'.
- Next:** A blue button labeled 'Next' at the bottom center.

Table 4-11 Parameter description

Name	Description
Upload Mode	<p>You can use either of the following methods to upload the JAR file:</p> <ul style="list-style-type: none"> Local upload: Upload the JAR file saved in your local PC to the CS server. <p>NOTE To upload a JAR file larger than 8 MB, upload the JAR file to OBS and then reference it from OBS.</p> OBS: Select a file from OBS as the data source and upload the file to the OBS bucket. CS then obtains data from OBS. <p>NOTE With this method, you need to create a bucket on the OBS management console and upload the customized JAR file to the bucket before the uploading.</p> Demo: You can select a demo file from the OBS public bucket as required.
Uploaded File	Name of the uploaded JAR file.
Main Class	<p>Name of the main class in the JAR file to be uploaded, for example, KafkaMessageStreaming. If you select Default for Main Class, the entry point is specified in the Manifest file in the JAR file. If you select Manually assign for Main Class, you need to specify Class Name. In the text box next to Class Arguments, enter the class arguments that are space-separated.</p> <p>NOTE If you specify a main class in a file, the value of this parameter must contain the file path. For example, packageName.KafkaMessageStreaming.</p>
Class Arguments	List of parameters related to the main class. Every two parameters are separated by a space.

Step 7 Click **Configure Parameters** on the left to configure job parameters.

Figure 4-22 Performing basic configurations of the user-defined Flink job

* SPU [You can use 400 more SPUs. Increase quota](#)

* Job Manager SPU

* Parallelism

Save Job Log

* OBS Bucket

Alarm Generation upon Job Exception

* Topic Name

Auto Restart upon Exception

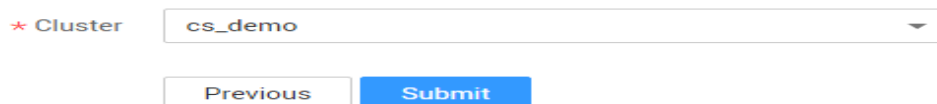
Table 4-12 Parameter description

Name	Description
SPUs	An SPU consists of 1 vCPU compute and 4 GB memory. The number of SPUs ranges from 2 to 400.
Job Manager SPU	Set the number of SPUs used for Job Manager. By default, one SPU is configured. You can select one to four SPUs for Job Manager.
Parallelism	Set the parallelism quantity for each operator of a job. NOTE <ul style="list-style-type: none"> The Parallelism value cannot be greater than four times of the number of SPUs used for Task Manager. It is recommended that you set this parameter to a value greater than the parallelism in the code. Otherwise, job submission may fail.

Name	Description
Save Job Log	Whether to save job logs To enable this function, you must select an authorized OBS bucket. If the selected OBS bucket is not authorized, click Authorize OBS . NOTE For details about operations related to OBS, see Getting Started in the Object Storage Service Console Operation Guide .
Alarm Generation upon Job Exception	Whether to report job exceptions, for example, abnormal job running or exceptions due to an insufficient balance, to users via SMS or email
Topic Name	This parameter is only used when Alarm Generation upon Job Exception is selected. Select a user-defined SMN topic. For details about how to customize SMN topics, see Creating a Topic in the Simple Message Notification User Guide .
Auto Restart upon Exception	Whether to enable automatic restart. If this function is enabled, CS automatically restarts any job that has become abnormal.

Step 8 From the left navigation tree, click **Select the Target Cluster**.

Figure 4-23 Selecting the cluster




NOTE

- User-defined jobs can only run on existing exclusive clusters. If there are no exclusive clusters, create one by referring to [Creating a Cluster Billed on a Per-per-Use Basis](#).
- If there are no exclusive clusters in the **Cluster** drop-down list, create one. Then, switch to the **User Quota Management** page under **Cluster Management** as the tenant account, bind the created cluster to the current user, and allocate the SPU quota. For details, see [Modifying a Sub-user](#).

Step 9 Click **Submit** in the upper right corner. On the displayed **Job Configurations** page, click **OK** to submit and start the job.

After the job is submitted, the system automatically switches to the **Job Management** page, and the created job is displayed in the job list. You can view the job status in the **Status** column. After a job is successfully submitted, the job status will change from **Submitting** to **Running**.

If the job status is **Submission failed** or **Running exception**, the job submission failed or the job did not execute successfully. In this case, you can move the cursor over the status icon in the **Status** column of the job list to view the error details.

You can click  to copy these details. After handling the fault based on the provided information, resubmit the job.

----End

4.5.5 Creating a User-Defined Spark Job

This section describes how to create a user-defined Spark job. You can perform secondary development based on Spark APIs, build your own JAR file, and submit the JAR file to CS clusters. CS is fully compatible with open-source community APIs. To create a user-defined Spark job, you need to compile and build application JAR files. You must have a certain understanding of Spark secondary development and have high requirements related to stream computing complexity.

Prerequisites

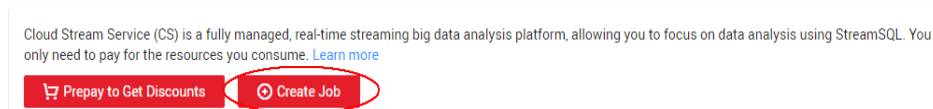
- You have compiled the secondary development application code into a JAR file and stored the JAR file on your local PC or uploaded it to an OBS bucket.
- The Spark dependency packages have been integrated into the CS server and system hardening has been performed based on the open-source community version. You need to exclude related Spark dependencies when building an application JAR file. To achieve this, use Maven or SBT to set **scope** to **provided**.

Procedure

Step 1 You can create a user-defined Spark job on either of the following two pages: **Overview** and **Job Management**.

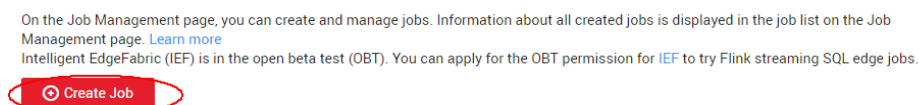
- **Overview**
 - a. In the navigation tree on the left pane of the CS management console, click **Overview** to switch to the **Overview** page.

Figure 4-24 Creating a job on the **Overview** page



- b. Click **Create Job** to switch to the **Create Job** dialog box.
- **Job Management**
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Figure 4-25 Creating a job on the **Job Management** page



- b. On the **Job Management** page, click **Create Job** to switch to the **Create Job** dialog box.

Step 2 Specify job parameters.

Figure 4-26 Creating a user-defined Spark job

Table 4-13 Parameters related to job creation

Parameter	Description
Type	Select Spark Streaming JAR Job .
Name	Name of a job. Enter 1 to 57 characters. Only letters, digits, hyphens (-), and underscores (_) are allowed. NOTE The job name must be globally unique.
Description	Description of a job. It can be up to 512 bytes long.

Step 3 For **Enterprise Project**, select an enterprise project that you created on the Enterprise Management console.

For details about how to create an enterprise project on the Enterprise Management console, see **Creating an Enterprise Project** in the *Enterprise Management User Guide*.

The system also has a built-in enterprise project, **default**. If you do not select an enterprise project for the job, the default project is used instead.

During job creation, if the job is successfully bound to an enterprise project, the job has been created. If the binding fails, the system sends an alarm and the job fails to be created.

When you delete a job, the association between the job and its enterprise project is automatically deleted as well.

Step 4 (Optional) Add tags for the job. In this step, configure the parameters in the following table as required. The tags are optional. If you do not need tags, skip this step.

Table 4-14 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 5 Click **OK** to enter the **Edit** page.

Step 6 Upload the JAR file.

Figure 4-27 Uploading the JAR file

Upload Mode Local upload OBS

Upload

* Uploaded File No File uploaded

Main Class Default Manually assign

Class Arguments 0/10240

Configuration File Default Use an external file

Next

Table 4-15 Parameter description

Name	Description
Upload Mode	<p>You can use either of the following methods to upload the JAR file:</p> <ul style="list-style-type: none"> Local upload: Upload the JAR file saved in your local PC to the CS server. <p>NOTE To upload a JAR file larger than 8 MB, upload the JAR file to OBS and then reference it from OBS.</p> OBS: Select a file from OBS as the data source and upload the file to the OBS bucket so that CS can obtain data from OBS. <p>NOTE With this method, you need to create a bucket on the OBS management console and upload the customized JAR file to the bucket before the uploading.</p>
Uploaded JAR File	Name of the uploaded JAR file.

Name	Description
Main Class	<p>Name of the main class in the JAR file to be uploaded, for example, KafkaMessageStreaming. If you select Default for Main Class, the entry point is specified in the Manifest file in the JAR file. If you select Manually assign for Main Class, you need to specify Class Name. In the text box next to Class Arguments, enter the class arguments that are space-separated.</p> <p>NOTE If you specify a main class in a file, the value of this parameter must contain the file path. For example, <i>packageName.KafkaMessageStreaming</i>.</p>
Arguments	List of parameters related to the main class. Every two parameters are separated by a space.
Configuration File	<ul style="list-style-type: none"> • You can select the spark-defaults.conf file or user-defined configuration files. The user-defined configuration files are transferred to the driver or executor through --files. • If the core-site.xml or hdfs-site.xml file exists, rename the files to prevent conflicts with corresponding files in the CS cluster. • To upload multiple configuration files, compress them into a ZIP package and then upload the package. <p>There are two methods to upload the configuration files:</p> <ul style="list-style-type: none"> • Local upload: Upload the file saved in your local PC to the CS server. • OBS: Select a file from OBS as the data source and upload the file to the OBS bucket. CS then obtains data from OBS.

Step 7 Click **Configure Parameters** on the left to configure job parameters.

Figure 4-28 Performing basic configurations of the user-defined Spark job

* SPUs - +
 You can use 400 more SPUs. [Increase quota](#)

* Driver SPUs - +

* Executors - +

* SPUs per Executor - +

Save Job Log

* OBS Bucket
Authorize OBS

Alarm Generation upon Job Exception

* Topic Name

Auto Restart upon Exception

Previous Next

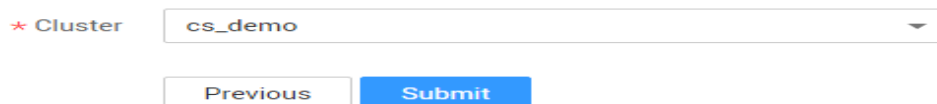
Table 4-16 Parameter description

Name	Description
SPUs	An SPU consists of 1 vCPU compute and 4 GB memory. This is the total number of SPU s configured for a user-defined Spark job, including the SPU s configured for the driver node and all executor nodes.
Driver SPU s	Number of SPU s used for each driver node. By default, one SPU is configured. You can select one to four SPU s .
Executors	Number of Executor nodes. The value ranges from 1 to 100 . The default value is 1 .
SPU s per Executor	Number of SPU s used for each Executor node. By default, one SPU is configured. You can select one to four SPU s for Job Manager.

Name	Description
Save Job Log	Whether to save job logs To enable this function, you must select an authorized OBS bucket. If the selected OBS bucket is not authorized, click Authorize OBS . NOTE For details about operations related to OBS, see Getting Started in the Object Storage Service Console Operation Guide .
Alarm Generation upon Job Exception	Whether to report job exceptions, for example, abnormal job running or exceptions due to an insufficient balance, to users via SMS or email
Topic Name	This parameter is only used when Alarm Generation upon Job Exception is selected. Select a user-defined SMN topic. For details about how to customize SMN topics, see Creating a Topic in the Simple Message Notification User Guide .
Auto Restart upon Exception	Whether to enable automatic restart. If this function is enabled, CS automatically restarts any job that has become abnormal.

Step 8 From the left navigation tree, click **Select the Target Cluster**.

Figure 4-29 Selecting the cluster




NOTE

- User-defined jobs can only run on existing exclusive clusters. If there are no exclusive clusters, create one by referring to [Creating a Cluster Billed on a Per-per-Use Basis](#).
- If there are no exclusive clusters in the **Cluster** drop-down list, create one. Then, switch to the **User Quota Management** page under **Cluster Management** as the tenant account, bind the created cluster to the current user, and allocate the SPU quota. For details, see [Modifying a Sub-user](#).

Step 9 Click **Submit** in the upper right corner. On the displayed **Job Configurations** page, click **OK** to submit and start the job.

After the job is submitted, the system automatically switches to the **Job Management** page, and the created job is displayed in the job list. You can view the job status in the **Status** column. After a job is successfully submitted, the job status will change from **Submitting** to **Running**.

If the job status is **Submission failed** or **Running exception**, the job submission failed or the job did not execute successfully. In this case, you can move the cursor over the status icon in the **Status** column of the job list to view the error details.

You can click  to copy these details. After handling the fault based on the provided information, resubmit the job.

----End

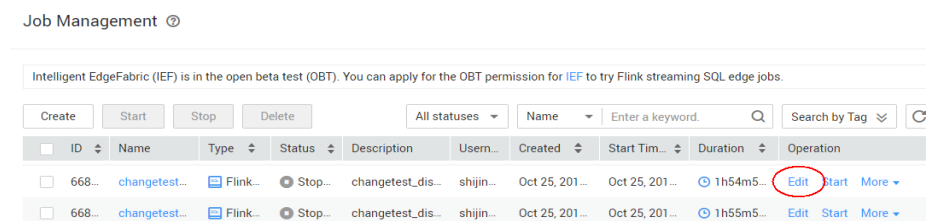
4.5.6 Debugging a Job

The debugging function checks the business logic of your compiled SQL statements before the jobs are executed. It helps prevent unnecessary fees generated when you run streaming Flink SQL jobs. This function can only be used for Flink streaming SQL jobs.

Procedure

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
- Step 2** On the **Job Management** page, locate the row where the target job resides and click **Edit** under **Operation** to switch to the **Edit** page.

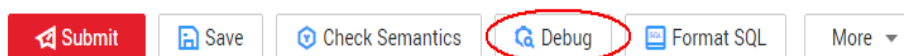
Figure 4-30 Job management



For a job that is currently being created, you can debug the job on the **Edit** page.

- Step 3** Click **Debug** to parse the compiled SQL statements. The **Debugging Parameters** page is displayed in the right pane of the **Edit** page.

Figure 4-31 Debugging a job



- Step 4** Set debugging parameters.
 - **Dump Bucket:** Select an OBS bucket to save debugging logs. If you select an unauthorized OBS bucket, click **Authorize OBS**.
 - **Data Input Mode:** The following two options are available:
 - **OBS (CSV):** You prepare OBS data first before using CS. For details, see [Preparing Data](#). OBS data is stored in CSV format, where multiple records are separated by line breaks and different fields in a single record are separated by commas (,).
 - **Manual typing:** You compile SQL statements to configure an input stream as the data source. If manual recording is used, you need to enter the value of each field in a single record.
 - Set **CAR_INFOS**.

- **OBS:** Select an OBS object as the input stream data.
- **Manual typing:** Specify attribute parameters as prompted. Only one record is allowed for each input stream. See [Figure 4-32](#).

Figure 4-32 Debugging parameters

The screenshot shows a configuration interface with two tabs: "Running Parameters" and "Debugging Parameters". The "Debugging Parameters" tab is active. It contains the following elements:

- A red asterisk icon followed by the text "Dump Bucket" and a text input field containing "smoke-test".
- The text "Data Input Mode" followed by a dropdown menu showing "Manual typing".
- A section titled "CAR_INFOS" with a downward arrow icon.
- Four input fields for car information:
 - CAR_ID: 1
 - CAR_OWNER: lilei
 - CAR_BRAND: bmw320i
 - CAR_PRICE: 28
- A large red button labeled "Start Debugging" at the bottom.

Step 5 Click **Start Debugging**. Once debugging is complete, the **Debugging Result** page appears.

- If the debugging result meets expectations, the job is running properly.
- If the debugging result does not meet expectations, there may be errors in the business logic. In this case, modify SQL statements and conduct debugging again.

Figure 4-33 Debugging result

Debugging Result			
CAR_ID	CAR_OWNER	CAR_BRAND	CAR_PRICE
1	lilei	bmw320i	28

----End

4.5.7 Visual Editor

CS provides a visual editor (also called visual SQL editor) for users who are not familiar with SQL development. The visual editor encapsulates upstream and downstream services (such as DIS and CloudTable) and internal logic operators (such as filter and window) that need to be interconnected with CS into drag-and-

drop components. It allows you to easily create a job topology by dragging required elements into the canvas and then connecting them. By clicking each element in the canvas, you can set related parameters. The visual editor consists of three areas:

- **Drag-and-Drop Elements** area: includes a variety of source elements, operator elements, and sink elements. Element types are to be added to satisfy your requirements in various scenarios.
 - Under **Source Element**, you can select an option as the source stream. Available options include **DIS**, **OBS**, and **CloudTable**.
 - Under **Operator Element**, you can select an operator. Available options include **Union**, **Filter**, **Window**, and **Select**.
 - Under **Sink Element**, you can select an option as the sink stream. Available options include **DIS**, **CloudTable**, **SMN**, and **RDS**.
- Canvas area
- Element parameter setting area

Procedure

The following procedure describes how to create a Flink streaming SQL job by using the visual editor in a DIS-CS (Window)-DIS scenario.

- Step 1** Log in to the CS management console.
- Step 2** In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
- Step 3** On the **Job Management** page, click **Create** to switch to the **Create Job** dialog box.
- Step 4** Specify job parameters as required.

Figure 4-34 Creating a job

Create Job [Close]

Type ⓘ Flink Streaming SQL Job

* Name JobSample

Description This is a sample job. 21/512

Editor SQL Editor

Template [Ecosystem]DIS-CS-DIS_SAMPLE_TEMPLATE

Tags It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. [View predefined tags](#)

Tag key Tag value

You can add 10 more tags.

OK Cancel

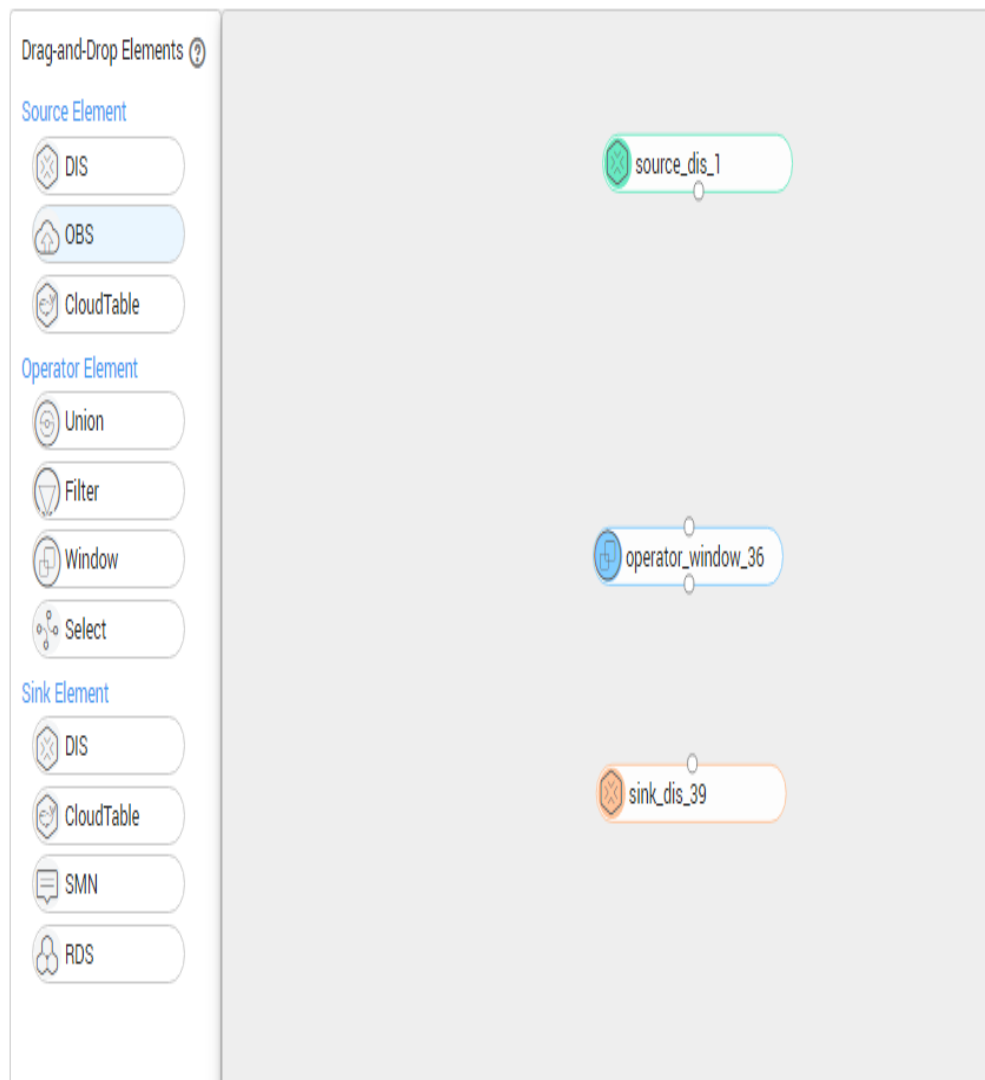
Table 4-17 Parameters related to job creation

Parameter	Description
Type	Select Flink Streaming SQL Job . NOTE The visual editor supports only Flink Streaming SQL Job .
Name	Name of a job, which has 1 to 57 characters and only contains letters, digits, hyphens (-), and underlines (_). NOTE The job name must be unique.
Description	Description of a job. It contains 0 to 512 characters.
Editor	Select Visual Editor . Options SQL Editor and Visual Editor are available.

Step 5 Click **OK** to enter the **Edit** page.

Step 6 Drag desired elements, such as DIS, Window, and DIS, to the canvas area.

Figure 4-35 Dragging elements to the canvas area



NOTE

You can double-click an element to delete it.

Step 7 Connect each element according to the business logic.

Starting from the egress port of an element, drag on the canvas to the ingress port of another element. You cannot directly connect the egress port of a source element to the ingress port of the sink element. In normal cases, the ingress port of the desired element turns green, rather than remain unchanged.

NOTE

You can double-click a connection to delete it.

Step 8 Configure the element parameters in the canvas area.

1. Click the source element, for example, **source_dis_1**. In the displayed area at the right side, configure parameters related to the element, including

parameters involved in **Data Stream Attribute Settings** and **Element Parameter Settings**.

Table 4-18 Parameters to be configured when DIS serves as the source element

Parameter	Description
Data Stream Attribute Settings	<p>Click Add Attribute, and specify Attribute Name and Attribute Type.</p> <p>Attribute Name starts with an English letter and only consists of English letters, digits, and underscores (_). A maximum of 20 characters are allowed.</p> <p>Supported attribute types include STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP.</p> <p>Click Insert Test Data to insert the test data of the attribute.</p> <p>Click Delete Test Data to delete the test data of the attribute.</p> <p>In the attribute list, click Delete in a row, where the attribute you want to delete resides, to delete the attribute.</p>
Element Parameter Settings	
Type	<p>Element type. Available options include the following:</p> <ul style="list-style-type: none"> - source-dis - source-obs - source-cloudtable
Region	Region where a user resides.
DIS Stream	<p>This parameter is valid only when DIS is selected under Source Element.</p> <p>Select a DIS stream.</p>
Partitions	<p>This parameter is valid only when DIS is selected under Source Element.</p> <p>Partitions are the base throughput unit of a DIS stream. Each partition supports a read speed of up to 2 MB/s and a write speed of up to 1000 records/s and 1 MB/s.</p>
Encoding	<p>This parameter is valid only when DIS is selected under Source Element.</p> <p>Data encoding mode, which can be CSV or JSON.</p>
Field Delimiter	<p>This parameter is valid only when DIS is selected under Source Element and Encode is set to CSV or when OBS is selected under Source Element.</p> <p>This parameter indicates the delimiter between attributes. The default value is a comma (,).</p>

Parameter	Description
JSON config	This parameter is valid only when DIS is selected under Source Element and Encoding is set to JSON . Configure the mapping between the JSON field and the stream definition field, for example, attr1=student.name;attr2=student.age;

Table 4-19 Parameters to be configured when OBS serves as the source element

Parameter	Description
Data Stream Attribute Settings	Click Add Attribute , and specify Attribute Name and Attribute Type . Attribute Name starts with an English letter and only consists of English letters, digits, and underscores (_). A maximum of 20 characters are allowed. Supported attribute types include STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP . Click Insert Test Data to insert the test data of the attribute. Click Delete Test Data to delete the test data of the attribute. In the attribute list, click Delete in a row, where the attribute you want to delete resides, to delete the attribute.
Element Parameter Settings	
Type	Element type. The options are as follows depending on various source elements: <ul style="list-style-type: none"> - source-dis - source-obs - source-cloudtable
Region	Region where a user resides.
OBS Bucket	This parameter is valid only when OBS is selected under Source Element . Select the OBS bucket where the selected source element is located.
Object Name	This parameter is valid only when OBS is selected under Source Element . Name of the object stored in the OBS bucket where source data is located.

Parameter	Description
Row Delimiter	This parameter is valid only when OBS is selected under Source Element . Delimiter between rows, such as: "\n".
Field Delimiter	This parameter indicates the delimiter between attributes. The default value is a comma (,).

Table 4-20 Parameters to be configured when CloudTable serves as the source element

Parameter	Description
Data Stream Attribute Settings	<p>Click Add Attribute, and specify Attribute Name and Attribute Type.</p> <p>Attribute Name starts with an English letter and only consists of English letters, digits, and underscores (_). A maximum of 20 characters are allowed.</p> <p>Supported attribute types include STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP.</p> <p>Click Insert Test Data to insert the test data of the attribute.</p> <p>Click Delete Test Data to delete the test data of the attribute.</p> <p>In the attribute list, click Delete in a row, where the attribute you want to delete resides, to delete the attribute.</p>
Element Parameter Settings	
Type	<p>Element type. Available options include the following:</p> <ul style="list-style-type: none"> - source-dis - source-obs - source-cloudtable
Region	Region where a user resides.
Table Name	<p>This parameter is valid only when CloudTable is selected under Source Element.</p> <p>Name of the data table to be read.</p>
Cluster ID	<p>This parameter is valid only when CloudTable is selected under Source Element.</p> <p>ID of the cluster to which the data table to be read belongs.</p>

Parameter	Description
Table Columns	<p>This parameter is valid only when CloudTable is selected under Source Element.</p> <p>This parameter value is in the format of rowKey,f1:c1,f1:c2,f2:c1. Ensure that the column quantity is the same as the number of attributes added in Data Stream Attribute Settings.</p>


2. Click an operator element, for example, **operator_window_1**. In the displayed area at the right side, configure parameters related to the element.

The Window operator can be used for the following two time types: **Event Time** and **Processing Time**. For each time type, the following three window types are supported: tumbling window (TUMBLE), sliding window (HOP), and session window (SESSION). You can perform calculation, such as summing up and averaging, on the data in the window.

Table 4-21 Window operator element parameter configuration

Parameter	Description
Source Attributes	Displays the data source, attribute name, and type that are specified in Source Element .
Window Aggregation Parameter Configuration	
Time Type	The Window operator supports the following two time types: Event Time and Processing Time.
Time Attribute	<p>If Time Type is set to Event Time, this parameter indicates the user-provided event time, which is the data with Type of timestamp in Source Attributes.</p> <p>If Time Type is set to Processing Time, this parameter indicates the local system time proctime when events are handled.</p>
WaterMark	<p>This parameter is valid only when Time Type is set to Event Time.</p> <p>If Time Type is set to Event Time, you must specify this parameter. This is because user data is usually disordered. If a watermark is not configured to properly delay user data, the data aggregation result may be greatly different from the expected.</p> <p>This parameter can be set to By time period or By number of events.</p>
Delay Period	Maximum delay time. The default value is 20 Seconds .
Send Period	<p>This parameter is valid only when WaterMark is set to By time period.</p> <p>Watermark sending interval. The default value is 10 Seconds.</p>

Parameter	Description
Event Number	This parameter is valid only when WaterMark is set to By number of events . Number of data packets, upon which the watermark is sent. The default value is 10 .
GroupBy	
Window Type	For each time type, the following three window types are supported: <ul style="list-style-type: none"> - Tumbling window - Sliding window - Session window
Window Period	The Window operator assigns each element to a window of a specified window size. The specified window size is the window period. The default window period is 1 day.
Group Attribute	This parameter is optional. Grouping can be performed by time window or attribute. This parameter indicates the attribute specified in Source Element . Multiple attributes can be selected.
Sliding Period	This parameter is valid only when Window Type is set to Hop Window . The sliding window has two parameters: size and slide . <ul style="list-style-type: none"> - The size parameter is indicated by Window Period and refers to the window size. - The slide parameter is indicated by Sliding Period and refers to each slide step. <p>If the slide value is smaller than the size value, sliding windows can be overlapping. In this case, elements are assigned to multiple windows.</p> <p>If the slide value is equal to the size value, the window can be considered as a tumbling window.</p> <p>If the slide value is greater than the size value, the window is considered a jump window. In this case, windows are not overlapping and there are no gaps between windows.</p>

Parameter	Description
Select Attribute	<p>Click Add Select Attribute, and specify Function Type and Type.</p> <p>Function Type can be set to Window, Aggregate, or No Function.</p> <p>Various window functions can be selected depending on your Window Type setting:</p> <ul style="list-style-type: none"> - If Window Type is set to Tumble Window, window functions TUMBLE_START and TUMBLE_END are available. - If Window Type is set to Hop Window, window functions HOP_START and HOP_END are available. - If Window Type is set to Session Window, window functions SESSION_START and SESSION_END are available. <p>The aggregate functions of following types are supported: Count, AVG, SUM, MAX, and MIN.</p> <p>Type can be set to the following: STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP.</p> <p>Click  to display the function parameter setting area and set parameters as required.</p> <p>Click Delete to delete the corresponding function type.</p>

The Select operator corresponds to the SQL statement Select used for selecting data from data streams. **Attribute Name** in **Source Attributes** must be the existing attribute name specified in the source element connected to the Select operator.

Table 4-22 Select operator element parameter configuration

Parameter	Description
Source Attributes	Displays the data source, attribute name, and type that are specified in Source Element .

Parameter	Description
Output Attributes	<p>Click Add Attribute, and specify Select Field and Type. The Select operator is used to select the sink stream. Each output attribute can be:</p> <ul style="list-style-type: none"> - Input attribute of the data source - Logical collection of data source attributes, such as addition or subtraction of attributes - Function calculation on the source attribute - Others <p>Type can be set to the following: STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP.</p> <p>Click Delete to delete the corresponding attribute.</p>

The Filter operator corresponds to the SQL statement WHERE used for filtering data from data streams. The filter rules support arithmetic operators, relational operators, and logical operators.

Table 4-23 Filter operator element parameter configuration

Parameter	Description
Source Attributes	Displays the data source, attribute name, and type that are specified in Source Element .
Filter Rules	<p>Click Add Rule to specify a filter rule. You can add multiple rules.</p> <p>Click Delete to delete the corresponding filter rule.</p>
Output Attributes	Displays the attribute name and type.

The Union operator is used to combine multiple streams. Ensure that the streams have the same attribute, including the attribute type and attribute sequence. Specifically, the attribute in the same row of each source element must have the same **Type** setting.

Table 4-24 Union operator element parameter configuration

Parameter	Description
Output Attributes	Displays the attribute name and type.

3. Click a sink element, for example, **sink_dis_1**. In the displayed area at the right side, configure parameters related to the element, including parameters

involved in **Data Stream Attribute Settings** and **Element Parameter Settings**.

Table 4-25 Parameters to be configured when DIS serves as the sink element

Parameter	Description
Data Stream Attribute Settings	<p>Click Add Attribute, and specify Attribute Name and Attribute Type.</p> <p>Attribute Name starts with an English letter and only consists of English letters, digits, and underscores (_). A maximum of 20 characters are allowed.</p> <p>Supported attribute types include STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP.</p> <p>In the attribute list, click Delete in a row, where the attribute you want to delete resides, to delete the attribute.</p>
Element Parameter Settings	
Type	<p>Sink element type. The options are as follows depending on various sink elements:</p> <ul style="list-style-type: none"> - sink-dis - sink-cloudtable - sink-smn - sink-rds
Region	Region where a user resides.
DIS Stream	<p>This parameter is valid only when DIS is selected under Sink Element.</p> <p>Select a DIS stream.</p>
Partition Key	<p>This parameter is valid only when DIS is selected under Sink Element.</p> <p>This parameter refers to the key used for data grouping when DIS serves as the sink stream.</p> <p>Key used for data grouping when there are multiple partitions in a DIS stream. Multiple keys are separated by using commas (,).</p>
Encoding	<p>This parameter is valid only when DIS is selected under Sink Element.</p> <p>Data encoding mode, which can be CSV or JSON.</p>
Field Delimiter	<p>This parameter is valid only when DIS is selected under Sink Element.</p> <p>This parameter indicates the delimiter between attributes. The default value is a comma (,).</p>

Table 4-26 Parameters to be configured when CloudTable serves as the sink element

Parameter	Description
Data Stream Attribute Settings	<p>Click Add Attribute, and specify Attribute Name and Attribute Type.</p> <p>Attribute Name starts with an English letter and only consists of English letters, digits, and underscores (_). A maximum of 20 characters are allowed.</p> <p>Supported attribute types include STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP.</p> <p>In the attribute list, click Delete in a row, where the attribute you want to delete resides, to delete the attribute.</p>
Element Parameter Settings	
Type	<p>Sink element type. The options are as follows depending on various sink elements:</p> <ul style="list-style-type: none"> - sink-dis - sink-cloudtable - sink-smn - sink-rds
Region	Region where a user resides.
Table Name	<p>This parameter is valid only when CloudTable is selected under Sink Element.</p> <p>Name of the data table to be read.</p>
Cluster ID	<p>This parameter is valid only when CloudTable is selected under Sink Element.</p> <p>ID of the cluster to which the data table to be read belongs.</p>
Table Columns	<p>This parameter is valid only when CloudTable is selected under Sink Element.</p> <p>The format is rowKey,f1:c1,f1:c2,f2:c1. The number of columns must be the same as the number of attributes specified in the source element.</p>
Abnormal Table	<p>This parameter is valid only when CloudTable is selected under Sink Element.</p> <p>Table for dumping abnormal data. This table is used to store data that cannot be written into HBase according to specified configuration. If this field is specified, abnormal data will be written into the specified table. If unspecified, abnormal data will be abandoned.</p>

Parameter	Description
Empty Table	This parameter is valid only when CloudTable is selected under Sink Element . Whether to create a table if the target table or column family where data is to be written does not exist. The default value is FALSE .
Data Records	This parameter is valid only when CloudTable is selected under Sink Element . Amount of data to be written in batches at a time. The value must be a positive integer. The upper limit is 100 . The default value is 10 .

Table 4-27 Parameters to be configured when SMN serves as the sink element

Parameter	Description
Data Stream Attribute Settings	Click Add Attribute , and specify Attribute Name and Attribute Type . Attribute Name starts with an English letter and only consists of English letters, digits, and underscores (_). A maximum of 20 characters are allowed. Supported attribute types include STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP. In the attribute list, click Delete in a row, where the attribute you want to delete resides, to delete the attribute.
Element Parameter Settings	
Type	Sink element type. The options are as follows depending on various sink elements: <ul style="list-style-type: none"> - sink-dis - sink-cloudtable - sink-smn - sink-rds
Region	Region where a user resides.
Topic URN	This parameter is valid only when SMN is selected under Sink Element . Topic URN.
Message Subject	This parameter is valid only when SMN is selected under Sink Element . Title of the message sent to SMN.

Parameter	Description
Column Name	This parameter is valid only when SMN is selected under Sink Element . Column name of the output stream whose content is the content of the message

Table 4-28 Parameters to be configured when RDS serves as the sink element

Parameter	Description
Data Stream Attribute Settings	Click Add Attribute , and specify Attribute Name and Attribute Type . Attribute Name starts with an English letter and only consists of English letters, digits, and underscores (_). A maximum of 20 characters are allowed. Supported attribute types include STRING, INT, BIGINT, BOOLEAN, DOUBLE, FLOAT, and TIMESTAMP. In the attribute list, click Delete in a row, where the attribute you want to delete resides, to delete the attribute.
Element Parameter Settings	
Type	Sink element type. The options are as follows depending on various sink elements: <ul style="list-style-type: none"> - sink-dis - sink-cloudtable - sink-smn - sink-rds
Region	Region where a user resides.
Username	This parameter is valid only when RDS is selected under Sink Element . Username root used for creating the RDS database instance.
Password	This parameter is valid only when RDS is selected under Sink Element . Password that is specified during RDS database instance creation.
DB URL	This parameter is valid only when RDS is selected under Sink Element . The parameter value is a combination of the private network IP address, port number, and DB name of the node where the DB is located. The format is as follows: <code>mysql://192.168.0.12:8635/dbName</code>

Parameter	Description
Table Name	This parameter is valid only when RDS is selected under Sink Element . Name of the table created in the node where the DB is located.

Step 9 (Optional) Click **SQL Editor** to convert the information in the visual editor into SQL statements.

Step 10 (Optional) Click **Save** to save the job parameter settings.

Step 11 If you need to run the job, click **Submit**.

----End

4.5.8 Data Visualization

Data visualization displays data in a sink stream in real time. The data of the digit type in the stream can be displayed in charts.

NOTE

Currently, data visualization supports only the Flink streaming SQL job whose sink stream type is **apig**. For details about how to connect CS to API Gateway (APIG), see [APIG Sink Stream](#) in the *Cloud Stream Service Stream Ecosystem Development Guide*.

Procedure

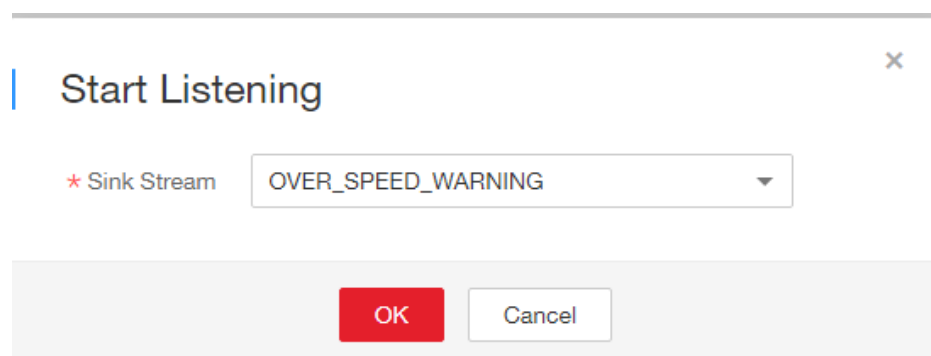
Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 In the job list, locate the row where a running job capable of sink visualization resides, and click **More > Sink Visualization**.

You can also click **Sink Visualization** in the upper right corner of the **Job Details** page.

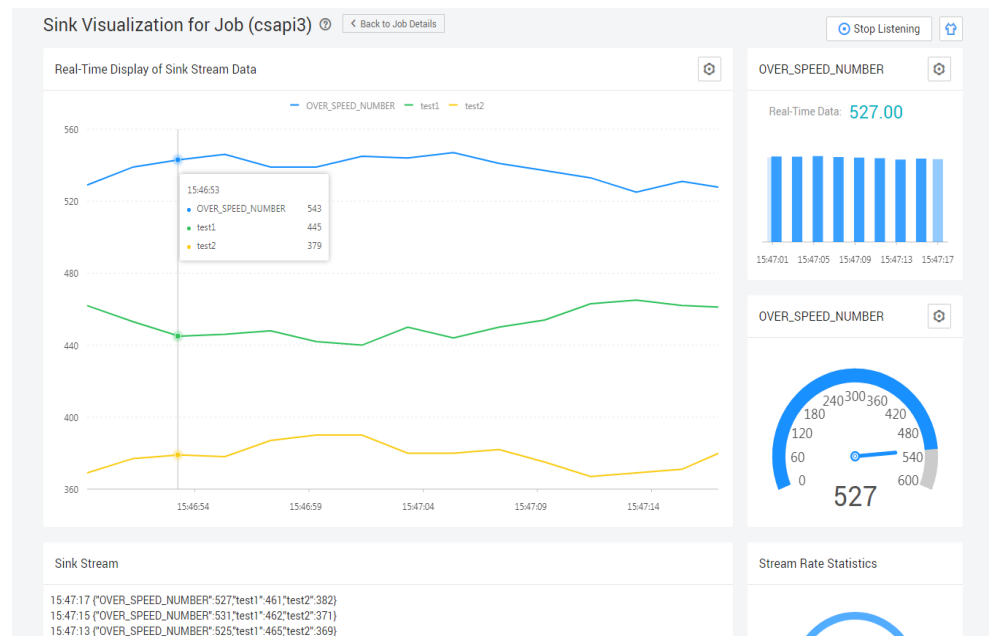
Step 3 In the displayed **Start Listening** dialog box, select the target sink stream as required.

Figure 4-36 Starting listening



Step 4 Click **OK**.

Figure 4-37 Real-time data display




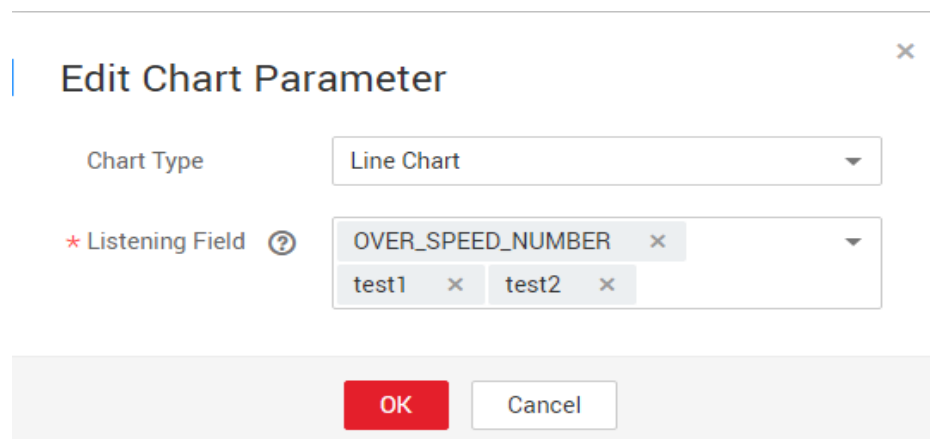
Step 5 (Optional) Click  in the upper right corner of the area for each chart, edit the chart type and the target listening field.

Figure 4-38 Editing chart parameters



- **Chart Type:** The following chart types are supported: line chart, bar chart, and dashboard.
- **Listening Field:** You can select the data of the digit type in the sink stream.

Step 6 (Optional) To stop listening, click **Stop Listening** in the upper right corner.

----End

4.5.9 Performing Operations on a Job

After a job is created, you can perform operations on the job as required.

- [Editing a Job](#)
- [Starting Jobs](#)
- [Job Configurations](#)
- [Stopping Jobs](#)
- [Deleting Jobs](#)

Editing a Job

You can edit a created job, for example, by modifying the SQL statement, job name, job description, or job configurations.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 In the row where the job you want to edit is located, click **Edit** in the **Operation** column to switch to the **Edit** page.

Step 3 Edit the job as required.

For details about the **Edit** page for Flink streaming SQL jobs, see [Creating a Flink Streaming SQL Job](#).

For details about the **Edit** page for Flink streaming SQL edge jobs, see [Creating a Flink Streaming SQL Edge Job](#).

For details about the **Edit** page for user-defined Flink jobs, see [Creating a User-Defined Flink Job](#).

For details about the **Edit** page for user-defined Spark jobs, see [Creating a User-Defined Spark Job](#).

----End

Starting Jobs

To start jobs that have been created or stopped, follow the following steps:

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 Use either of the following methods to start jobs:

- Starting a single job
Locate the row where the job you want to start resides and click **Start** in the **Operation** column. Alternatively, you can select the row where the job you want to start resides and click **OK** in the upper left of the job list.
- Batch starting jobs
Select the rows where the jobs you want to start reside and click **Start** in the upper left of the job list.

Step 3 On the **Job Configurations** page, click **OK**.

After a job is started, its status is displayed in the **Status** column on the **Job Management** page.

----End

Job Configurations

Upon submitting a job or starting a job, you need to confirm the job prices.

- Step 1** You will enter the **Job Configurations** page after submitting a job on the **Job Management** page or after starting a job on the **Job Management** page.
- Submit a job on the **Edit** page
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
 - b. In the row where the job you want to edit is located, click **Edit** in the **Operation** column to switch to the **Edit** page.
 - c. Edit SQL statements and configure parameters on the **Running Parameters** page.
 - d. Click **Submit** to switch to the **Job Configurations** page.
 - Start a job on the **Job Management** page
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
 - b. In the row where the job you want to start is located, click **Start** in the **Operation** column to switch to the **Job Configurations** page.

On the **Job Configurations** page, you can click **Pricing details** to view the product pricing details.

- Step 2** (Optional) Click **Price Calculator** in the lower right corner.
1. You can view the pricing details by clicking **Pricing details**.
 2. Find out how the price adds up on the **Price Calculator** page.

On the **Price Calculator** page, you can obtain the optimal product configuration through multiple tries.

- Step 3** (Optional) Click **Cancel** to cancel the operation of running a job.

- Step 4** Click **OK** to submit the job.

----End

Stopping Jobs

You can stop a job in the **Running** or **Submitting** state.

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

- Step 2** Stops jobs.

Perform either of the following methods to stop jobs:

- Stopping a job



Locate the row where the job you want to stop resides and click **More > Stop** in the **Operation** column.

Alternatively, you can select the row where the job you want to stop resides and click **Stop** in the upper left of the job list.

- Stopping jobs in batches
Locate the rows where the jobs you want to stop reside and click **Stop** in the upper left of the job list.

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

 **NOTE**

- Before stopping a job, you can create a savepoint to save the job status. When you start the job again, you can choose whether to restore the job from the savepoint.
-  indicates to create a savepoint.  indicates that no savepoint is created. By default, the savepoint function is disabled.
- The savepoint lifecycle describes a savepoint goes through from when it is created for a job that is to be stopped until it finally is deleted. The savepoint is automatically deleted after the job is restarted.

During the procedure of stopping jobs, the following **Status** settings may appear:

- **Stopping**: indicates that the job is being stopped.
- **Stopped**: indicates that the job is stopped successfully.
- **Stop failed**: indicates that the job failed to be stopped.

----End

Deleting Jobs

If you do not need to use a job, perform the following operations to delete it. A deleted job cannot be restored. Therefore, exercise caution when deleting a job.

Step 1 In the left navigation pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 Perform either of the following methods to delete jobs:

- Deleting a single job
Locate the row where the job you want to delete resides and click **More > Delete** in the **Operation** column.
Alternatively, you can select the row where the job you want to delete resides and click **Delete** in the upper left of the job list.
- Deleting jobs in batches
Select the rows where the jobs you want to delete reside and click **Delete** in the upper left of the job list.

Step 3 Click **OK**.

----End

4.5.10 Monitoring a Job

After a job is created, you can view the job details through the following operations:

- [Viewing Job Details](#)
- [Checking the Dashboard](#)

- [Viewing the Job Execution Plan](#)
- [Viewing the Task List of a Job](#)
- [Viewing Job Audit Logs](#)
- [Viewing Job Running Logs](#)
- [Viewing Job Tags](#)

Viewing Job Details

This section describes how to view job details. After you create and run a job, you can view job details, including SQL statements and parameter settings. For a user-defined job, you can only view its parameter settings.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 In the **Name** column, click the job name to switch to the **Job Details** page.

On the **Job Details** page, you can view SQL statements, total cost for the job, and **Parameter List**.

Table 4-29 Parameter description

Parameter	Description
Type	Job type, for example, Flink streaming SQL job.
ID	Job ID.
Status	Status of a job.
Running Mode	If you create a job in a shared cluster, this parameter is Shared . If you create a job in a user-defined cluster, this parameter is Exclusively .
Cluster	If you create a job in a shared cluster, this parameter is Cluster Shared . If you create a job in a user-defined cluster, the specific cluster name is displayed.
SPUs	Number of SPUs for a job.
Parallelism	Number of tasks where CS jobs can simultaneously run.
Enable Checkpoint	Select Enable Checkpoint to save the intermediate job running results to OBS, thereby preventing data loss in the event of exceptions.
Checkpoint Interval (s)	This parameter is valid only when Enable Checkpoint is set to true . Interval between storing intermediate job running results to OBS.

Parameter	Description
Checkpoint Mode	This parameter is valid only when Enable Checkpoint is set to true . Checkpoint mode. Values include: <ul style="list-style-type: none"> • AtLeastOnce: indicates that events are processed at least once. • ExactlyOnce: indicates that events are processed only once.
Save Job Log	Select Save Job Log to save job run logs to OBS so that you can locate faults by using run logs in the event of faults.
OBS Bucket	This parameter is valid when Enable Checkpoint is true or Save Job Log is true . Name of the OBS bucket where data is dumped.
Topic Name	SMN topic name. If an exception occurs during job running, CS notifies users of the exception over SMN.
Auto Restart upon Exception	If you enable this function, CS automatically restarts and restores abnormal jobs upon job exceptions.
Idle State Retention Time	Defines for how long the state of a key is retained without being updated before it is removed in GroupBy or Window.
Created	Time when a job is created.
Start Time	Start time of a job.
Enterprise Project	Name of the enterprise project to which a job belongs.
Total Billing Time	Total running duration of a job for charging.

----End

Checking the Dashboard

You can view details about job data input and output through the dashboard.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.


Step 2 In the **Name** column on the **Job Management** page, click the desired job name. On the displayed page, click **Job Monitoring**.

The following table describes monitoring metrics related to Spark jobs.

Table 4-30 Monitoring metrics related to Spark jobs

Metric	Description
InputSize (records/sec)	Provides the number of input records for a Spark job.
ProcessingTime (ms)	Provides the processing time distribution chart of all mini-batch tasks.
SchedulingDelay (ms)	Provides the scheduling delay distribution chart of all mini-batch tasks.
TotalDelay (ms)	Provides the total scheduling delay of all mini-batch tasks.

 **NOTE**




- Click  to refresh all the charts.
- Click a chart and scroll the mouse wheel to zoom in or out.
- You can only view monitoring information about running jobs.

The following table describes monitoring metrics related to Flink jobs.

Table 4-31 Monitoring metrics related to Flink jobs

Metric	Description
Data Input Rate	Provides the data input rate of a Flink job. Unit: Data records/s
Total Input Records	Provides the total number of input data records in a Flink job. Unit: Data records
Total Input Bytes	Provides the total input bytes of a Flink job. Unit: Byte
Data Output Rate	Provides the data output rate of a Flink job. Unit: Data records/s
Total Output Records	Provides the total number of output data records in a Flink job. Unit: Data records
Total Output Bytes	Provides the total output bytes of a Flink job. Unit: Byte
CPU Load (%)	Provides the CPU usage.
Memory Usage (%)	Provides the heap memory usage of a job.

 **NOTE**

- Click **Real-Time Refresh** to refresh the running jobs in real time. The charts are updated every 10 seconds.
- Click  . In the displayed **Add Chart** dialog box, specify the parameter as required.
- Click  in the upper right corner of a chart to zoom in the chart.
- Click  to delete a metric.

----End

Viewing the Job Execution Plan



You can view the execution plan to understand the operator stream information about the running job.

 **NOTE**

Execution plans of Spark jobs cannot be viewed.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 In the **Name** column on the **Job Management** page, click the desired job name. On the displayed page, click **Execution Plan**.

- Scroll the mouse wheel or click  |  to zoom in or out.
- The stream diagram displays the operator stream information about the running job in real time.

----End

Viewing the Task List of a Job

You can view details about each task running on a job, including the task start time, number of received and transmitted bytes, and running duration.

 **NOTE**

The task list of the Spark job cannot be viewed.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 In the **Name** column on the **Job Management** page, click the desired job name. On the displayed page, click **Task List**.

1. View the operator task list.

Table 4-32 Parameter description

Parameter	Description
Name	Name of an operator.
Duration	Running duration of an operator.
Parallelism	Number of parallel tasks in an operator.
Task	Operator tasks are categorized into the following: <ul style="list-style-type: none"> - The digit in red indicates the number of failed tasks. - The digit in light gray indicates the number of canceled tasks. - The digit in yellow indicates the number of tasks that are being canceled. - The digit in green indicates the number of finished tasks. - The digit in blue indicates the number of running tasks. - The digit in sky blue indicates the number of tasks that are being deployed. - The digit in dark gray indicates the number of tasks in a queue.
Status	Status of an operator task.
Back Pressure Status	Working load status of an operator. Available options are as follows: <ul style="list-style-type: none"> - OK: indicates that the operator is in normal working load. - LOW: indicates that the operator is in slightly high working load. - HIGH: indicates that the operator is in high working load.
Delay	Duration from the time when source data starts being processed to the time when data reaches the current operator. The unit is millisecond.
Sent Records	Records of an operator sending data.
Sent Bytes	Number of bytes sent by an operator.
Received Bytes	Number of bytes received by an operator.
Received Records	Records of an operator receiving data.
Start Time	Time when an operator starts running.
End Time	Time when an operator stops running.


2. Click  to view the task list.

Table 4-33 Parameter description

Parameter	Description
Start Time	Time when a task starts running.
End Time	Time when a task stops running.
Duration	Task running duration.
Received Bytes	Number of bytes received by a task.
Received Records	Records received by a task.
Sent Bytes	Number of bytes sent by a task.
Sent Records	Records sent by a task.
Attempts	Number of retry attempts after a task is suspended.
Host	Host IP address of the operator.

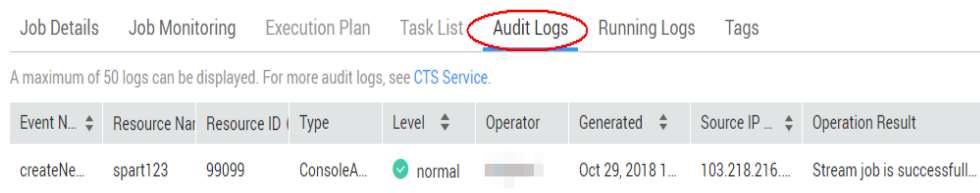
----End

Viewing Job Audit Logs

You can view the job operation records in audit logs, such as job creation, submission, running, and stop.

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
- Step 2** In the **Name** column on the **Job Management** page, click the desired job name to switch to the **Job Details** page.
- Step 3** Click **Audit Log** to view audit logs of the job.

Figure 4-39 Viewing job audit logs



A maximum of 50 logs can be displayed. For more audit logs, query them in CTS. For details about how to view audit logs in CTS, see section "Querying Real-Time Traces" in the *Cloud Trace Service Quick Start*.

 **NOTE**

If no information is displayed on the **Audit Log** page, you need to enable CTS.

1. Click **Enable** to switch to the **CTS Authorization** page.
2. Click **OK**.

You can also log in to the CTS management console to enable CTS. For details, see [Enabling CTS](#).

Table 4-34 Parameters related to audit logs

Parameter	Parameter description
Event Name	Name of an event.
Resource Name	Name of a running job.
Resource ID	ID of a running job.
Type	Job operation type.
Level	Event level. Available options include the following: <ul style="list-style-type: none"> • incident • warning • normal
Operator	Account used to run a job.
Generated	Time when an event occurs.
Source IP Address	IP address of the operator.
Operation Result	Operation result.

----End

Viewing Job Running Logs

You can view the run logs to locate the faults occurring during job running.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 In the **Name** column on the **Job Management** page, click the desired job name. On the displayed page, click **Running Logs**.

On the displayed page, you can view information of **Job Manager** and **Task Manager** for running jobs.

Information about Job Manager and Task Manager is updated every minute. By default, only the run logs generated within the last 1 minute are displayed. You can click **Log history** to view more logs.

If you select an OBS bucket for saving job logs during the job configuration, you can switch to the OBS bucket and download log files to view more historical logs.

If the job is not running, information on the **Task Manager** page cannot be viewed.

----End

Viewing Job Tags

You can view, add, modify, and delete job tags.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.

Step 2 In the row where the job whose tag you want to view is located, click the job name in the **Name** column to switch to the **Job Details** page.

Step 3 Click **Tags** to display the tag information about the current job.

For more information about job tags, see [Managing Job Tags](#).

----End

4.6 Job Template

The system provides templates related to SQL jobs. You can modify the SQL statements in an existing template to create your required job, which saves the time for compiling SQL statements. Alternatively, you can customize a job template as you need, facilitating future modification. You can create and manage templates on the **Job Template** page.

This section describes the following:

- [Template list](#)
- [Creating a Template](#)
- [Creating a Job Based on a Template](#)
- [Viewing Template Details](#)
- [Modifying a Template](#)
- [Deleting a Template](#)

Template list





All custom templates are displayed in the custom template list on the **Template Management** page. [Table 1](#) describes parameters involved in the custom template list.

Table 4-35 Parameters involved in the custom template list

Parameter	Description
Name	Name of a template, which has 1 to 64 characters and only contains letters, digits, hyphens (-), and underlines (_).
Description	Description of a template. It contains 0 to 512 characters.

Parameter	Description
Created	Time when a template is created.
Updated	Latest time when a template is modified.
Operation	<ul style="list-style-type: none"> You can click Edit to modify a template that has been created. You can click Create job to create a job directly by using the template. After a job is created, the system switches to the Edit page under Job Management. You can click Delete to delete a created template.

Table 4-36 Button description

Button	Description
Create Template	Click Create Template to create a custom template.
Delete	Click Delete to delete one or more custom templates.
	In the search box, enter the template name and click  to search for the template.
Search by Tag	Search for the custom templates based on the tag. For details, see Searching for Job Templates by Tag .
	Click  to manually refresh the template list.

Creating a Template

You can create a template using any of the following methods:

- Creating a template on the **Template Management** page
 - In the left navigation pane of the CS management console, click **Template Management, Custom Templates**.
 - Click **Create** to switch to the **Create Template** dialog box.
 - Specify **Name** and **Description**.

Figure 4-40 Creating a template

Create Template ×

* Name

Description

0/512

Tags It is recommended that you use TMS's predefined tag function to add the same tag to different cloud resources. [View predefined tags](#)

You can add 10 more tags.

Table 4-37 Parameters related to the template configuration

Parameter	Description
Name	Name of a template, which has 1 to 64 characters and only contains letters, digits, hyphens (-), and underlines (_). NOTE The template name must be unique.
Description	Description of a template. It contains 0 to 512 characters.

- d. (Optional) Add tags for the job template. In this step, configure the parameters in the following table as required. The tags are optional. If you do not need tags, skip this step.

Table 4-38 Tag parameters

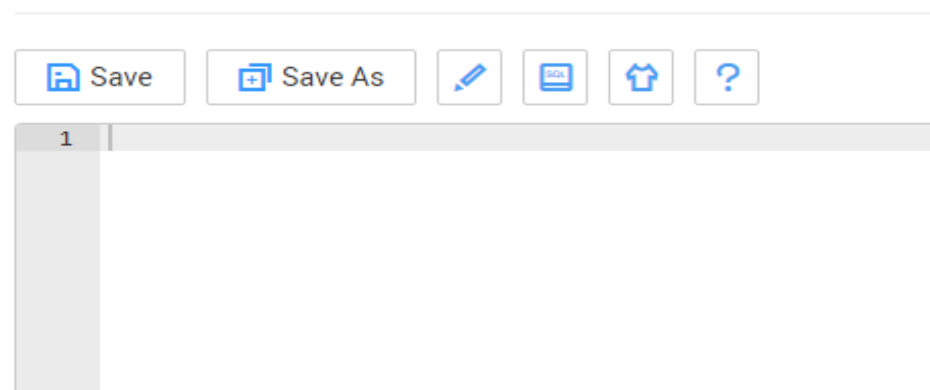
Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
 - Only one tag value can be added to a tag key.
 - The key name must be unique in the same resource.
- e. Click **OK** to enter the **Edit** page.

Figure 4-41 Editing a job template

Template Management > template-flinksql > **Edit**



- f. In the SQL statement editing area, enter SQL statements to implement business logic. For details about how to compile SQL statements, see the [Cloud Stream Service SQL Syntax Reference](#).
 - g. After the SQL statements are compiled, click **Save**.
After a template is created successfully, it will be displayed in the custom template list. You can click **Create Job** in the **Operation** column of the template you have created to create a job based on the template. For details about how to create a job, see [Creating a Flink Streaming SQL Job](#).
- Creating a template based on an existing job template
 - a. In the left navigation pane of the CS management console, click **Template Management, Custom Templates**.
 - b. In the row where the desired template is located in the custom template list, click **Edit** under **Operation** to enter the **Edit** page.
 - c. Click **Save As**.
 - d. In the **Template Save As** dialog box that is displayed, specify **Name** and **Description** and click **OK**.
 - Creating a template using a created job
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
 - b. On the **Job Management** page, click **Create** to switch to the **Create Job** dialog box.
 - c. Specify parameters as required.
 - d. Click **OK** to enter the **Edit** page.
 - e. After the SQL statement is compiled, click **More > Set as Template**.
 - f. In the **Set as Template** dialog box that is displayed, specify **Name** and **Description** and click **OK**.
 - Creating a template based on the existing job
 - a. In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
 - b. In the job list, locate the row where the job that you want to set as a template resides, and click **Edit** in the **Operation** column.
 - c. Click **More > Set as Template**.
 - d. In the **Set as Template** dialog box that is displayed, specify **Name** and **Description** and click **OK**.

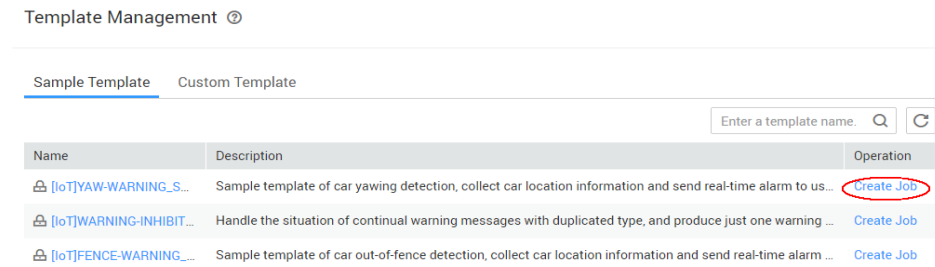
Creating a Job Based on a Template

You can create jobs based on sample templates or custom templates.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Template Management** to switch to the **Template Management** page.

Step 2 In the row where the desired template is located, click **Create Job** under **Operation**. For details, see [Creating a Flink Streaming SQL Job](#).

Figure 4-42 Creating a job based on a template



----End

Viewing Template Details

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Template Management** to switch to the **Template Management** page.
- Step 2** In the **Name** column of the sample template list or custom template list, click the name of the template you want to view.

The template description and SQL statements involved in the current template are displayed.
- Step 3** (Optional, only available for custom templates) Click **Audit Log** to view the operation logs of the current custom template.


For details about audit logs of a template, see [Viewing Job Template Audit Logs](#).
- Step 4** (Optional, only available for custom templates) Click **Tags** to view the tag key and tag value of the current template.

For details about template tags, see [Managing Job Template Tags](#).
- Step 5** (Optional, only available for custom templates) Click **Edit** in the upper right corner. You can edit the custom template on the **Edit** page.

----End

Modifying a Template

You can modify created custom templates as required. Sample templates cannot be modified.

- Step 1** In the left navigation pane of the CS management console, click **Template Management, Custom Templates**.
- Step 2** In the row where the template you want to modify is located in the custom template list, click **Edit** in the **Operation** column to enter the **Edit** page.
- Step 3** In the SQL statement editing area, modify the SQL statements as required.
- Step 4** (Optional) Click  to modify the template name and description.
- Step 5** Click **Save**.

 **NOTE**

You can access the **Edit** page through the **Template Details** page. The procedure is as follows:

1. In the custom template list, click the name of the template you want to modify to switch to the **Template Details** page.
2. Click **Edit** to enter the **Edit** page.

----End

Deleting a Template

You can delete a custom template as required. The sample template cannot be deleted. Deleted templates cannot be restored. Exercise caution when performing this operation.

Step 1 In the left navigation pane of the CS management console, click **Template Management, Custom Templates**.

Step 2 In the custom template list, select the templates you want to delete and click **Delete** in the upper left of the custom template list.

Alternatively, you can delete a template by performing the following operations: In the custom template list, locate the row where the template you want to delete resides, and click **Delete** in the **Operation** column.

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

----End

4.7 Cluster Management

CS can work with a shared cluster or with exclusive clusters. Exclusive clusters are physically isolated from shared clusters and exclusive clusters created by other tenants. Exclusive clusters are not affected by jobs running on other clusters. User-defined jobs can only run on exclusive clusters. To run a user-defined job, you must create an exclusive cluster.

This section describes the following:

- [Cluster List](#)
- [Creating a Cluster Billed on a Yearly/Monthly Basis](#)
- [Creating a Cluster Billed on a Per-per-Use Basis](#)
- [Viewing Cluster Details](#)
- [Creating an IP-Domain Mapping](#)
- [Uploading Files](#)
- [Modifying a Cluster](#)
- [Job Management](#)
- [Stopping a Cluster](#)
- [Restarting a Cluster](#)
- [Deleting a Cluster](#)

- [Renewing a Cluster](#)
- [Unsubscribing from a Cluster](#)

Cluster List

All clusters are listed in the cluster list on the **Cluster Management** page. [Table 1](#) describes parameters in the cluster list.

Table 4-39 Cluster list parameters

Parameter	Description
ID	ID of a cluster, which is automatically allocated during cluster creation
Name	Name of a cluster, which can be up to 100 characters long and can only contain letters, digits, hyphens (-), and underscores (_)
Status	Cluster status. The possible statuses are: <ul style="list-style-type: none"> • Requesting resources • Requesting resources failed • Requesting resources succeeded, cluster to be started • Starting • Running • Stopping • Stopping failed • Stopped • Restarting • Deleting • Deleted • Deletion failed • Stopping due to arrears • Stopping due to arrears failed • Stopped due to arrears • Restoring (recharged cluster) • Restoration of frozen cluster failed
Description	Description of a cluster. It can be up to 512 characters long.
SPU Usage (Used SPU/SPU Quota)	SPU usage of a cluster. For example, 2/12 , where 2 indicates the SPUs used by the cluster and 12 indicates the maximum SPUs allowed in the cluster.
Created	Time when a cluster is created
Enterprise Project	Enterprise project that a cluster belongs to

Parameter	Description
Billing Mode	Billing mode of a cluster, either Yearly/Monthly or Pay-per-use
Operation	<ul style="list-style-type: none"> • Click Job Management to perform operations on all of the jobs in a cluster. • The following operations are allowed on clusters that are billed on a pay-per-use basis: <ul style="list-style-type: none"> - Click More > Test Address Connectivity to test whether the connection between the current cluster and the specified address is normal. The address can be a domain name plus IP address or a specified port. - Click More > Modify Max. SPUs to change the SPU quota of the cluster. - Click More > Delete to delete the cluster that has been created. - Click More > Stop to stop the target cluster. - Click More > Restart to restart the target cluster. • The following operations are allowed on clusters that are billed on a yearly/monthly basis: <ul style="list-style-type: none"> - Click More > Renew to renew the subscription to the target cluster. - Click More > Unsubscribe to unsubscribe from the target cluster.

Creating a Cluster Billed on a Yearly/Monthly Basis

Step 1 In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.


Step 2 Click **Create Cluster** to switch to the **Create Cluster** page.

Step 3 Specify cluster parameters.

Figure 4-43 Creating a cluster

The screenshot shows the 'Create Cluster' interface. At the top, there is a 'Create Cluster' header with a help icon and a '< Back to Cluster List' link. Below this, the 'Billing Mode' is set to 'Yearly/Monthly' and 'Pay per Use' is also visible. The 'Region' is set to 'Beijing1'. The 'Name' field contains 'cluster_demo' and the 'Description' field is empty. The 'Tags' section has input fields for 'Tag key' and 'Tag value'. The 'Management Node Specs' section shows options for 2, 4, 8, 16, and 32 SPUs, with '2 SPUs' selected. Below this, there is a note: 'The tenant cluster consists of three management nodes. The management node contains 2 SPUs.' The 'SPUs' field has a spinner set to '10'. Below that, a note states: 'This parameter indicates the total number of SPUs required by the management nodes and jobs of a cluster.' The 'Required Duration' section has radio buttons for 1, 2, 3, 4, 5, 6, 7, 8, 9 months, 1 year (selected), 2 years, and 3 years. An 'Auto Renewal' checkbox is checked. At the bottom, there is an 'Advanced Configuration' section with a dropdown arrow.

Table 4-40 Cluster parameters

Parameter	Description
Billing Mode	Select Yearly/Monthly .
Region	Click  in the upper left corner of the management console to select the actual region for the cluster. Currently, regions CN South-Guangzhou and CN North-Beijing1 are supported.
Name	Name of a cluster, which can be up to 100 characters long and can only contain letters, digits, hyphens (-), and underscores (_) NOTE The cluster name must be globally unique.
Description	Description of a cluster. It can be up to 512 characters long.
Management Node Specs	Each tenant cluster consists of three management nodes. By default, each management node contains two SPUs (2 vCPUs and 8 GB memory). Available options include 2 SPUs, 4 SPUs, 8 SPUs, 16 SPUs, and 32 SPUs .

Parameter	Description
SPUs	Total number of SPUs required by the management nodes and jobs of a cluster. The maximum value of this parameter is 400 and its minimum value is calculated as follows: SPUs configured for a management node x 3 + 2.
Required Duration	Select the amount of time you want to use CS for. NOTE <ul style="list-style-type: none"> • After you specify Required Duration and SPUs, the system automatically calculates the fees you need to pay. • Under Configuration Price, you can click Pricing details to view the detailed price. • If you want to renew the cluster after the required duration expires, select Auto-renew. For a monthly subscription, the subscription is automatically renewed every month. For a yearly subscription, the subscription is automatically renewed every year.
Advanced Configuration	You can configure and adjust the VPC and subnet to which the cluster belongs based on the network plan. Currently, the following network segments are supported: 10.0.0.0/8-24, 172.16.0.0/12-24, and 192.168.0.0/16-24.

Step 4 For **Enterprise Project**, select the enterprise project that you created on the Enterprise Management console.

For details about how to create an enterprise project on the Enterprise Management console, see **Creating an Enterprise Project** in the *Enterprise Management User Guide*.

The system also has a built-in enterprise project, **default**. If you do not select an enterprise project for the cluster, the default project is used instead.

During cluster creation, if the cluster is successfully bound to an enterprise project, the cluster has been created. If the binding fails, the system sends an alarm and the cluster fails to be created.

When you delete a cluster, the association between the cluster and its enterprise project is automatically deleted as well.

Step 5 (Optional) Add tags for the cluster. In this step, configure the parameters in the following table as required. The tags are optional. If you do not need tags, skip this step.

Table 4-41 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 6 Click **OK**. On the displayed page, select any of the following payment methods: **Balance**, **Online Payment**, and **Request Online Contract and Pay**.

Step 7 Click **Pay** or **Create contract**.

Switch to the **Cluster Management** page, where you can see that **Status** of the created cluster is **Requesting resources**.

It takes about 1 to 3 minutes to create a cluster. If the value of **Status** changes to **Running**, the cluster has been created.

----End

Creating a Cluster Billed on a Per-per-Use Basis

Step 1 In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.


Step 2 Click **Create Cluster** to switch to the **Create Cluster** page.

Step 3 Specify cluster parameters.

Figure 4-44 Creating a cluster

The screenshot displays the 'Create Cluster' configuration interface. At the top, the 'Billing Mode' is set to 'Pay per Use'. The 'Region' is 'Beijing1'. The 'Name' field contains 'cluster_demo'. Below this is a 'Description' field with a character count of 0/512. The 'Tags' section includes a note about using predefined tags and input fields for 'Tag key' and 'Tag value'. The 'Enterprise Project' is set to '-Select-'. Under 'Management Node Specs', '2 SPU' is selected, with a note that the cluster consists of three management nodes. The 'Max. SPUs in a Cluster' is set to 100. A 'Cancel Configuration' section is expanded, showing 'VPC CIDR' as 172.16.0.0/23, 'Subnet CIDR' as 172.16.0.0/23, and 'Subnet Gateway' as 172.16.0.1.

Table 4-42 Cluster parameters

Parameter	Description
Billing Mode	Select Pay-per-use .
Region	Click  in the upper left corner of the management console to select the actual region for the cluster. Currently, regions CN South-Guangzhou and CN North-Beijing1 are supported.
Name	Name of a cluster, which contains 1 to 100 characters and can only contain letters, digits, hyphens (-), and underscores (_) NOTE The cluster name must be globally unique.
Description	Description of a cluster. It can be up to 512 characters long.

Parameter	Description
Management Node Specs	Each tenant cluster consists of three management nodes. By default, each management node contains two SPUs (2 vCPUs and 8 GB memory). The SPU specifications of a management node cannot be modified after being created. Available options include 2 SPUs, 4 SPUs, 8 SPUs, 16 SPUs, and 32 SPUs.
Max. SPUs in a Cluster	Maximum number of SPUs in a cluster (excluding the SPUs consumed by the management nodes). The value ranges from 1 to 800. The default value is 100.
Advanced Settings	You can configure and adjust the VPC and subnet that the cluster belongs to based on the network plan. Currently, the following network segments are supported: 10.0.0.0/8-24, 172.16.0.0/12-24, and 192.168.0.0/16-24.

Step 4 For **Enterprise Project**, select the enterprise project that you created on the Enterprise Management console.

For details about how to create an enterprise project on the Enterprise Management console, see **Creating an Enterprise Project** in the *Enterprise Management User Guide*.

The system also has a built-in enterprise project, **default**. If you do not select an enterprise project for the cluster, the default project is used instead.

During cluster creation, if the cluster is successfully bound to an enterprise project, the cluster has been created. If the binding fails, the system sends an alarm and the cluster fails to be created.

When you delete a cluster, the association between the cluster and its enterprise project is automatically deleted as well.

Step 5 (Optional) Add tags for the cluster. In this step, configure the parameters in the following table as required. The tags are optional. If you do not need tags, skip this step.

Table 4-43 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 6 Click **OK**. The system automatically switches to the **Cluster Management** page, on which you can see that **Status** of the created cluster is **Requesting resources**.

It takes about 1 to 3 minutes to create a cluster. If the value of **Status** changes to **Running**, the cluster has been created.

----End

Viewing Cluster Details

You can view the detailed information about created clusters.

Step 1 In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.

Step 2 In the row where the cluster you want to view is located, click the cluster name in the **Name** column to switch to the **Cluster Details** page.

On the page showing the cluster details, you can view detailed information about the current cluster.

 **NOTE**

- Click **Test Address Connectivity**. In the dialog box that is displayed, enter the address to be tested and click **OK** to test whether the connection between the current cluster and the specified address is normal. The address can be a domain name plus IP address or a specified port.
- Click **Modify Max. SPUs** to modify the SPU quota of the cluster that is billed on a pay-per-use basis.
- Click **More** for a cluster billed on pay-per-use basis to perform related operations, such as managing jobs in the cluster or stopping or restarting the cluster.
- For a cluster billed on yearly/monthly basis, click **More** to perform related operations, such as managing jobs in the cluster or renewing or unsubscribing from the cluster.

Step 3 Click **VPC Peering Connections** to display information about the VPC peering connections of the current cluster.

For details about the VPC peering connection, see [VPC Peering Connection](#).

Step 4 Click **IP-Domain Mapping** to display information about IP-domain mapping of the current cluster.

For details about how to create an IP-domain mapping, see [Creating an IP-Domain Mapping](#).

Step 5 Click **File Uploading** to display the files that have been uploaded to the cluster.

For details about how to upload files to a cluster, see [Uploading Files](#).

Step 6 Click **Audit Logs** to display operation logs of the current cluster.

For details about cluster audit logs, see [Viewing Cluster Audit Logs](#).

Step 7 Click **Tags** to display the tag information about the current cluster.

For details about the cluster tags, see [Managing Cluster Tags](#).

----End

Creating an IP-Domain Mapping

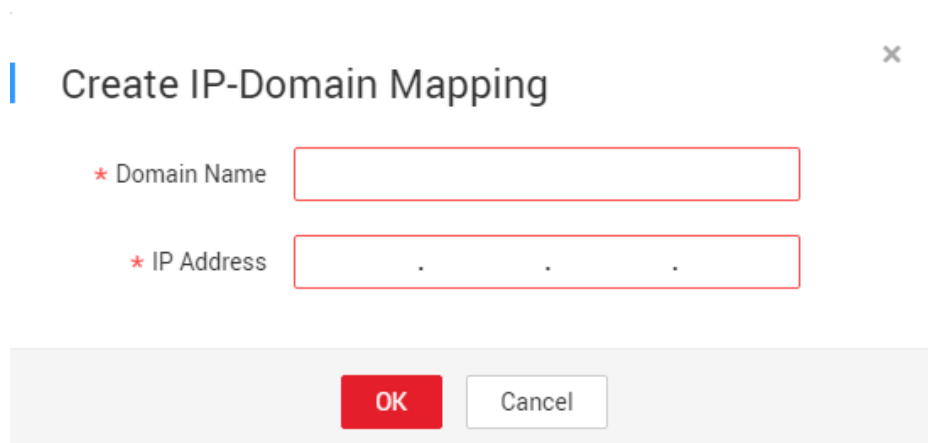
After creating a cluster, you can create an IP-domain mapping for the cluster to connect to other services.

Step 1 In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.

Step 2 In the row where the target cluster is located, click the cluster name in the **Name** column to switch to the **Cluster Details** page.

Step 3 Click **IP-Domain Mapping** to display information about IP-domain mapping of the current cluster.

Step 4 Click **Create IP-Domain Mapping**. In the displayed dialog box, specify **Domain Name** and **IP Address** and click **OK**.

Figure 4-45 Creating an IP-domain mapping

The screenshot shows a dialog box titled "Create IP-Domain Mapping". It has a close button (X) in the top right corner. There are two input fields: "Domain Name" and "IP Address", both marked with a red asterisk. Below the fields are "OK" and "Cancel" buttons.

After an IP-domain mapping is created, the current CS cluster can interconnect with the mapped IP address.

NOTE

- The domain name can contain only letters, digits, hyphens (-), and dots (.), and must start or end with a maximum of letters or digits. It contains a maximum of 67 characters.
- To edit an IP-domain mapping in the mapping list, locate the row where the IP-domain mapping is located and click **Edit** in the **Operation** column.
- To delete an IP-domain mapping in the mapping list, locate the row where the IP-domain mapping is located and click **Delete** in the **Operation** column.

Step 5 (Optional) Click **Add hosts File** to add IP-domain mapping for the cluster.

NOTE

Ensure that each line in the **hosts** file is in the "ip hostname" format. If an IP address corresponds to multiple domain names, the line can be in the "ip hostname1 hostname2" format.

----End

Uploading Files

You can use OBS to upload custom files (such as configuration files required by CS jobs) to the CS cluster.

Upload the desired files to the OBS bucket first. For details about how to upload files to the OBS bucket, see **Uploading a File** in the [Object Storage Service Console Operation Guide](#).

To upload a file to a cluster, perform the following operations:

- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** In the row where the cluster where you want to upload a file is located, click the cluster name in the **Name** column to switch to the **Cluster Details** page.
- Step 3** Click **File Uploading** to display the files that have been uploaded to the cluster.

Step 4 Click **Upload File**. In the displayed dialog box, select the target file and click **OK**.

The uploaded file is in the `/opt/cs/user_files` directory of the ECS that the cluster belongs to.

----End

Modifying a Cluster

You can modify the cluster name, description, and SPU quota of a cluster in **Running** status.

Step 1 In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.

Step 2 In the row where the cluster you want to modify is located, click the cluster name in the **Name** column to switch to the **Cluster Details** page.

Step 3 Click the editing icon next to **Name** to change the cluster name.

Step 4 Click the editing icon next to **Description** to modify the description of the cluster.

Step 5 Click **Modify Max. SPUs** for a cluster billed on pay-per-use basis to modify the SPU quota of the cluster.

NOTE

- If the used SPUs reach the cluster's SPU quota, increase the SPU quota. Otherwise, you cannot create jobs in the cluster.
- The maximum value of **Max. SPUs in a Cluster** is **800**. If you want to increase **Max. SPUs in a Cluster** to a value greater than 800, click **Service Tickets > Create Service Ticket** in the upper right corner of the management console to request SPU quota increase.

----End

Job Management

You can manage individual jobs within a cluster. On the **Job Management** page in **Cluster Management**, you can only view, start, stop, and delete jobs in a cluster, visualize streaming data in jobs, and modify job names and descriptions. For details, see [Performing Operations on a Job](#).

Step 1 In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.

Step 2 Locate the row where the target cluster is located, click **Manage Job** in the **Operation** column to switch to the **Job Management** page of the cluster.

NOTE

Only the jobs for which the cluster is selected during job creation are displayed.

----End

Stopping a Cluster

To stop a cluster, perform the following operations:

After a cluster is stopped, all jobs in the cluster are stopped. Exercise caution when performing this operation.

 **NOTE**

You can stop only the clusters that are billed on a pay-per-use basis.

- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** Locate the row where the cluster you want to delete is located, and click **More > Stop** in the **Operation** column to switch to the **Stop Cluster** page.
- Step 3** Click **OK**.

----End

Restarting a Cluster

To restart a stopped cluster, perform the following operations:

 **NOTE**

You can restart only the clusters that are billed on a pay-per-use basis.

- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** Locate the row where the cluster you want to restart is located, and click **More > Restart** in the **Operation** column.

It takes 1 to 3 minutes to restart the cluster.

----End

Deleting a Cluster

If you do not need to use a cluster, perform the following operations to delete it.

A deleted cluster cannot be restored and all jobs in the deleted cluster will be stopped. Exercise caution when performing this operation.

 **NOTE**

You can delete only the clusters that are billed on a pay-per-use basis. If you no longer use a cluster billed on a yearly/monthly basis, you can unsubscribe from it. For details, see [Unsubscribing from a Cluster](#).

- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** Locate the row where the cluster you want to delete is located, and click **Delete** in the **Operation** column to switch to the **Delete Cluster** dialog box.
- Step 3** Click **OK**.

----End

Renewing a Cluster

You can only renew clusters that are billed on a yearly/monthly basis.

- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** In the cluster list, locate the row where the target cluster is located and click **More > Renew** in the **Operation** column.
- Step 3** In the displayed dialog box, click **OK** to switch to the **Renew** page.
- Step 4** Select the renewal duration and click **Pay**.
- Step 5** On the displayed page, select any of the following payment methods: **Balance**, **Online Payment**, and **Request Online Contract and Pay**.
- Step 6** Click **Pay** or **Create contract**.

On the menu bar of the management console, you can choose **Billing > My Orders** to view the renewal order details.

----End

Unsubscribing from a Cluster

You can unsubscribe from only the clusters that are billed on a yearly/monthly basis. For details about unsubscription rules and handling fees, see [Unsubscription Rules](#).

After you unsubscribe from a cluster, resources and data will be deleted and cannot be retrieved. Therefore, ensure that the data has been backed up before the unsubscription.

- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** In the cluster list, locate the row where the target cluster resides and click **More > Unsubscribe** in the **Operation** column.
- Step 3** Click **OK** to switch to the **Unsubscribe** page.
- Step 4** Select the unsubscription reason and click **Confirm**.
- Step 5** In the displayed dialog box, click **OK**.

Switch to the **Cluster Management** page. **Status** of the cluster that is successfully unsubscribed from is **Stopped due to arrears**.

On the menu bar of the management console, you can choose **Billing > My Orders** to view the unsubscription order details.

----End

4.8 Quota Management

You can manage sub-users on the **User Quota Management** page, such as allocating SPU quotas for sub-users, binding sub-users to clusters, and unbinding sub-users from clusters.

This section is organized into the following parts:

- [Sub-user List](#)
- [Modifying a Sub-user](#)

Sub-user List

All sub-users of a tenant are displayed in the sub-user list on the **User Quota Management** page. [Table 4-44](#) describes parameters involved in the sub-user list.

Table 4-44 Parameters involved in the sub-user list

Parameter	Description
Username	Username of a sub-user.
User ID	ID of a sub-user, which is automatically allocated by the system during sub-user creation.
Used SPU	Number of SPUs used by a sub-user.
SPU Quota	Total number of SPUs that can be used for a user based on allocated clusters. The value ranges from 1 to 1000.
Cluster List	Cluster that is allocated for a sub-user. Users can create jobs in the allocated clusters.
Operation	You can click Save Configuration to save the configuration of the SPU quota and bound cluster for a sub-user.

Modifying a Sub-user

You can reallocate the SPU quota and cluster list for the sub-user as required.

Step 1 In the left navigation pane of the CS management console, click **Cluster Management**. On the displayed **Cluster Management** page, click **User Quota Management**.

Step 2 In the sub-user list, locate the row where the target sub-user resides, and reconfigure the value in the **SPU Quota** column.

The SPU quota of a sub-user ranges from 1 to 1000.

Step 3 In the **Cluster List** column, select the clusters that are allocated to the sub-user. One or more clusters are allowed.

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

----End

4.9 VPC Peering Connection

A VPC peering connection is a network connection between two VPCs. Users in two VPCs can use private IP addresses to communicate with each other as if the

two VPCs were on the same network. To enable two VPCs to communicate with each other, create a VPC peering connection between the two VPCs. You can create a VPC peering connection between the VPC where your created exclusive CS cluster is located and another VPC that is in the same region as the VPC. If you have established an ECS instance on the ECS server when using CS, you can click **VPC Peering** to connect the created CS clusters to the ECS instance.

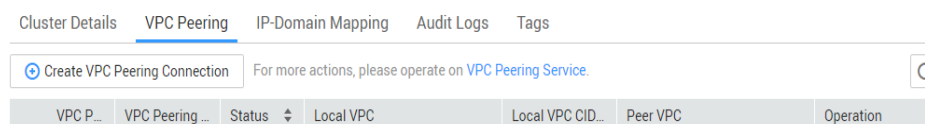
Prerequisites

- You have created an exclusive cluster.
- You have information about the peer VPC.

Establishing a VPC Peering Connection Between Two VPCs of an Account

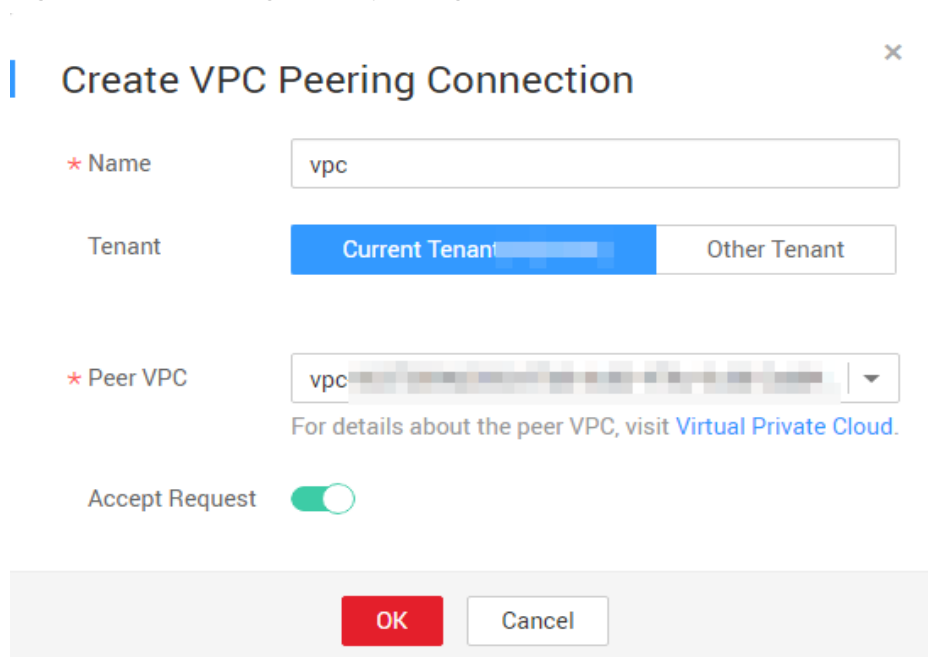
- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** In the row of the cluster you want to query, click the cluster name in the **Name** column to switch to the cluster details page. Click the **VPC Peering** tab.

Figure 4-46 VPC peering connection



- Step 3** Click **Create VPC Peering Connection**. In the displayed **Create VPC Peering Connection** dialog box, specify parameters as follows:

Figure 4-47 Creating a VPC peering connection for the current account



- **Name:** Enter a VPC peering connection name.

- **Tenant:** Select **Current Tenant**.
- **Peer VPC:** Select the target peer VPC from the drop-down list box.
- **Accept Request:** Choose whether to accept the request for the VPC peering connection. By default, the request is accepted.

Step 4 Click **OK**. The **VPC Peering** page is displayed.

Step 5 (Optional) If you chose to not accept the request for the VPC peering connection in **Step 3**, locate the row where the VPC peering connection you created is located and click **Accept Request** in the **Operation** column. If you chose to accept, skip this step.

Step 6 After the status of the VPC peering connection becomes **Accepted**, click **Add Route**. In the displayed dialog box, specify parameters in **Local Route** and **Peer Route**, and click **OK**.

Figure 4-48 Adding a route

Add Route

Local Route

* Destination 192.168.0.0 / 16

Next Hop ⓘ 96ef3a2b-b06e-45f2-8e0e-a43d6b68798e

[View Peer VPC](#)

Peer Route

* Destination 172.16.0.0 / 23

Next Hop ⓘ 96ef3a2b-b06e-45f2-8e0e-a43d6b68798e

[View Local VPC](#)

OK Cancel

 NOTE

- Parameters **Destination** in **Local Route** and **Peer Route** have been automatically set by the system. Generally, retain the default values. If there are custom requirements, modify them as required.
- You can click **View Peer VPC** or **View Local VPC** to view details about the peer or local VPC.
- After a VPC peering connection is created, you can run the job used for accessing ECSs in the peer VPC in the current cluster. However, ECS security groups may have different configurations and you may not be allowed to access ports on the peer end. In this case, configure the security group rule of the corresponding ECS and add rules on corresponding ports in inbound and outbound directions. For details about how to configure the security group rule for an ECS, see **Configuring a Security Group Rule** in the *Elastic Cloud Server User Guide*.
- CIDRs must not overlap at both ends of a VPC peering connection. During cluster creation, you can configure the VPC network segment where the cluster resides. Ensure that the configured network segment does not conflict with that of the peer end.

Step 7 (Optional) If the VPC peering connection is not required, click **Delete** in the **Operation** column.

After the VPC peering connection is deleted, communication between CS clusters and the peer end will be interrupted. Exercise caution when deleting a VPC peering connection.

----End

Establishing a VPC Peering Connection Between Two VPCs of Two Accounts

Before establishing a VPC peering connection with the VPC of another account, ensure that you have obtained the project ID and VPC ID of the peer VPC from the peer account.

The following example illustrates how to create a VPC peering connection between VPCs of two different accounts, *A* and *B*.

Step 1 Log in to the CS management console as account *A* and create a VPC peering connection with the VPC of account *B*.

1. In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
2. Locate the row where the target cluster is located and click the cluster name in the **Name** column to switch to the cluster details page. Click **VPC Peering Connections**.
3. Click **Create VPC Peering Connection**. In the displayed **Create VPC Peering Connection** dialog box, specify parameters as follows:

Figure 4-49 Creating a VPC peering connection for another account

- **Name:** Enter a VPC peering connection name.
- **Tenant:** Select **Other Tenant**.
- **Peer Project ID:** Enter the project ID of the peer VPC.
- **Peer VPC ID:** Enter the peer VPC ID.

4. Click **OK**. The **VPC Peering** page is displayed. The status of the new VPC peering connection is **Awaiting Acceptance**.

Step 2 Log in to the VPC management console as account *B* and configure the VPC peering connection.

1. In the left navigation pane of the VPC management console, click **VPC Peering** to switch to the **VPC Peering** page.
2. In the VPC peering connection list, locate the row where the VPC peering connection created in **Step 1** is located and click **Accept Request** in the **Operation** column.
After the request is accepted, the status of the VPC peering connection changes to **Accepted**.
3. In the VPC peering connection list, click the name of the VPC peering connection in the **VPC Peering Name/ID** column to display details about the VPC peering connection.
4. Save the **Local VPC CIDR Block** and **Peer VPC CIDR Block** settings of the VPC peering connection.
5. Click **Add Local Route**. In the displayed **Add Local Route** dialog box, specify **Destination** and click **OK**.

NOTE

The value of **Destination** is that of **Peer VPC CIDR Block** obtained in **Step 2.4**.

Step 3 Log in to the CS management console as account A.

1. Switch to the **VPC Peering Connections** tab page for the cluster where the new VPC peering connection was created, locate the row where the new VPC peering connection is located, and click the **Add Route** in the **Operation** column.
2. In the displayed **Add Route** dialog box, specify **Destination** and click **OK**.

 **NOTE**

The value of **Destination** is that of **Local VPC CIDR Block** obtained in [Step 2.4](#).

Step 4 (Optional) If the VPC peering connection is not required, click **Delete** in the **Operation** column.

After the VPC peering connection is deleted, communication between CS clusters and the peer end will be interrupted. Exercise caution when deleting a VPC peering connection.

----End

4.10 Audit Log

You can use CTS to record key operation events related to CS. The events can be used in various scenarios such as security analysis, compliance audit, resource tracing, and problem locating. This section is organized as follows:

- [Enabling CTS](#)
- [Disabling the Audit Log Function](#)
- [Key Operations](#)
- [Viewing Job Audit Logs](#)
- [Viewing Cluster Audit Logs](#)
- [Viewing Job Template Audit Logs](#)

Enabling CTS

A tracker will be automatically created after CTS is enabled. All traces recorded by CTS are associated with a tracker. Currently, only one tracker can be created for each account.

Step 1 On the CS management console, choose **Service List > Management & Deployment > Cloud Trace Service**. The CTS management console is displayed.

Step 2 In the navigation pane on the left, click **Tracker**.

Step 3 Click **Enable CTS**.

Step 4 On the **Enable CTS** page that is displayed, click **Enable**.

If you enable **Apply to All Regions**, the tracker is created in all regions of the current site to improve the completeness and accuracy of the current tenant's audit logs.

After CTS is enabled, the system automatically assigns a tracker. You can view details about the created tracker on the **Tracker** page.

----End

Disabling the Audit Log Function

If you want to disable the audit log function, disable the tracker in CTS.

- Step 1** On the CS management console, choose **Service List > Management & Deployment > Cloud Trace Service**. The CTS management console is displayed.
- Step 2** In the navigation pane on the left, click **Tracker**.
- Step 3** In the tracker list, click **Disable** in the **Operation** column.
- Step 4** In the displayed dialog box, click **OK** to disable the tracker.

After the tracker is disabled, the **Disable** button in the **Operation** column is switched to **Enable**. To enable the tracker again, click **Enable** and then click **OK**. The system will start recording operations again.

After the tracker is disabled, the system will stop recording operations, but you can still view existing operation records.

----End

Key Operations

[Table 4-45](#) describes the CS operations that can be recorded by CTS.

Table 4-45 CS operations that can be recorded by CTS

Operation	Resource Type	Event Name
Creating a job	job	createNewJob
Editing a job	job	editJob
Deleting a job	job	deleteJob
Starting a job	job	startJob
Stopping a job	job	stopJob
Deleting jobs in batches	job	deleteJobInBatch
Creating a template	template	createTemplate
Updating a template	template	updateTemplate
Deleting a template	template	deleteTemplate
Stopping jobs of an overdue account	job	stopArrearageJob
Restoring jobs of an overdue account	job	recoverArrearageJob

Operation	Resource Type	Event Name
Deleting jobs of an overdue account	job	deleteArrearageJob
Creating a cluster	cluster	createCluster
Deleting a cluster	cluster	deleteCluster
Adding nodes to a cluster	cluster	scalaUpCluster
Downsizing a cluster	cluster	scalaDownCluster
Expanding or downsizing a cluster	cluster	scalaCluster
Creating a tenant cluster	cluster	createReservedCluster
Updating a tenant cluster	cluster	updateReservedCluster
Deleting a tenant cluster	cluster	deleteReservedCluster
Updating the user quota	cluster	updateUserQuota

Viewing Job Audit Logs

You can view the job operation records in audit logs, such as job creation, submission, running, and stop.

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
- Step 2** In the **Name** column on the **Job Management** page, click the desired job name to switch to the **Job Details** page.
- Step 3** Click **Audit Log** to view audit logs of the job.

Figure 4-50 Viewing job audit logs

Event No.	Resource Name	Resource ID	Type	Level	Operator	Generated	Source IP	Operation Result
createNe...	spart123	99099	ConsoleA...	normal		Oct 29, 2018 1...	103.218.216...	Stream job is successfull...

A maximum of 50 logs can be displayed. For more audit logs, query them in CTS. For details about how to view audit logs in CTS, see section "Querying Real-Time Traces" in the *Cloud Trace Service Quick Start*.

 **NOTE**

If no information is displayed on the **Audit Log** page, you need to enable CTS.

1. Click **Enable** to switch to the **CTS Authorization** page.
2. Click **OK**.

You can also log in to the CTS management console to enable CTS. For details, see [Enabling CTS](#).

Table 4-46 Parameters related to audit logs

Parameter	Parameter description
Event Name	Name of an event.
Resource Name	Name of a running job.
Resource ID	ID of a running job.
Type	Job operation type.
Level	Event level. Available options include the following: <ul style="list-style-type: none"> • incident • warning • normal
Operator	Account used to run a job.
Generated	Time when an event occurs.
Source IP Address	IP address of the operator.
Operation Result	Operation result.

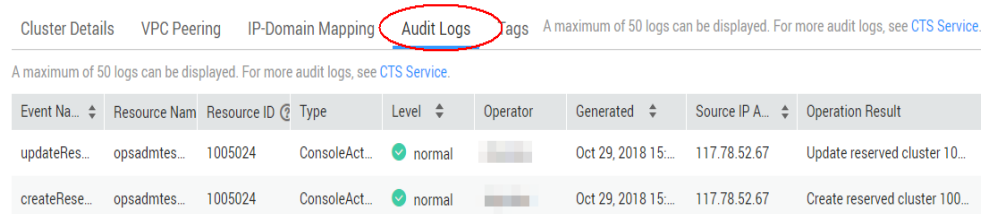
----End

Viewing Cluster Audit Logs

Cluster management allows you to view audit logs of a cluster.

- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** In the **Name** column on the **Cluster Management** page, click the desired cluster name to switch to the **Cluster Details** page.
- Step 3** Click **Audit Log** to view audit logs of the cluster.

Figure 4-51 Viewing cluster audit logs



A maximum of 50 logs can be displayed. For more audit logs, query them in CTS. For details about how to view audit logs in CTS, see section "Querying Real-Time Traces" in the *Cloud Trace Service Quick Start*.

 **NOTE**

- If no information is displayed on the **Audit Log** page, you need to enable CTS.
 1. Click **Enable** to switch to the **CTS Authorization** page.
 2. Click **OK**.

You can also log in to the CTS management console to enable CTS. For details, see [Enabling CTS](#).
- If ETS has been enabled for **Audit Log** under **Job Management**, you do not need to enable it for **Audit Log** under **Cluster Management**.

Table 4-47 Parameters related to audit logs

Parameter	Parameter description
Event Name	Name of an event.
Resource Name	Name of a running cluster.
Resource ID	ID of a running cluster.
Type	Cluster operation type.
Level	Event level. Available options include the following: <ul style="list-style-type: none"> • incident • warning • normal
Operator	Account used to run a cluster.
Generated	Time when an event occurs.
Source IP Address	IP address of the operator.
Operation Result	Operation result.

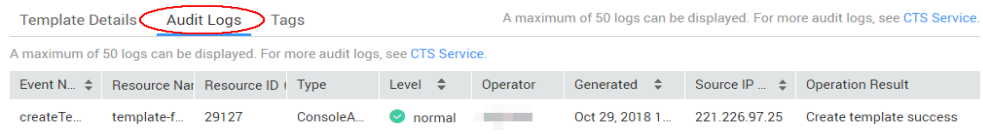
----End

Viewing Job Template Audit Logs

You can view audit logs of a custom job template by performing operations on the **Custom Template** page.

- Step 1** In the left navigation pane of the CS management console, click **Template Management, Custom Templates**.
- Step 2** In the **Name** column, click the name of a job template whose audit logs you want to view to switch to the **Template Details** page.
- Step 3** Click **Audit Log** to view audit logs of the template.

Figure 4-52 Viewing job template audit logs



A maximum of 50 logs can be displayed. For more audit logs, query them in CTS. For details about how to view audit logs in CTS, see section "Querying Real-Time Traces" in the *Cloud Trace Service Quick Start*.

NOTE

If no information is displayed on the **Audit Log** page, you need to enable CTS.

1. Click **Enable** to switch to the **CTS Authorization** page.
2. Click **OK**.

You can also log in to the CTS management console to enable CTS. For details, see [Enabling CTS](#).

Table 4-48 Parameters related to audit logs

Parameter	Parameter description
Event Name	Name of an event.
Resource Name	Template name.
Resource ID	ID of a template.
Type	Template operation type.
Level	Event level. Available options include the following: <ul style="list-style-type: none"> • incident • warning • normal
Operator	Account used to operate a template.
Generated	Time when an event occurs.
Source IP Address	IP address of the operator.
Operation Result	Operation result.

----End

4.11 Tag Management

A tag is a key-value pair customized by users and used to identify cloud resources. It helps users to classify and search for cloud resources. Tags are composed of key-value pairs.

CS allows you to add tags to jobs, job templates, and clusters. You can add identifiers to items such as the project name, service type, and background

information using tags. If you use tags in other cloud services, you are advised to create the same tag key-value pairs for cloud resources used by the same business to keep consistency.

CS supports the following two types of tags:

- Resource tags: indicate non-global tags created on CS.
- Predefined tags created on Tag Management Service (TMS). Predefined tags are global tags. For more information about predefined tags, see the [Tag Management Service User Guide](#).

This section is organized as follows:

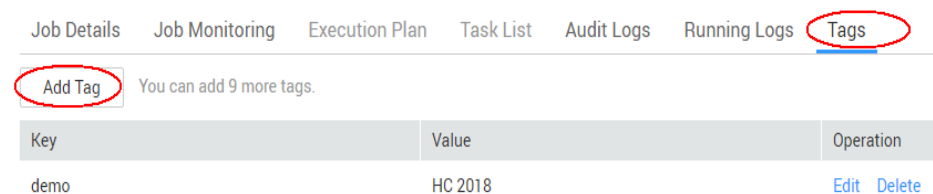
- [Managing Job Tags](#)
- [Managing Job Template Tags](#)
- [Managing Cluster Tags](#)
- [Searching for Jobs by Tag](#)
- [Searching for Job Templates by Tag](#)
- [Searching for Clusters by Tag](#)

Managing Job Tags

CS allows you to add, modify, or delete tags for jobs.

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
- Step 2** In the row where the target job resides, click the job name in the **Name** column to switch to the **Job Details** page.
- Step 3** Click **Tags** to display the tag information about the current job.

Figure 4-53 Managing job tags



- Step 4** Click **Add Tag** to switch to the **Add Tag** dialog box.
- Step 5** Configure the tag parameters in the **Add Tag** dialog box.

Figure 4-54 Adding tags

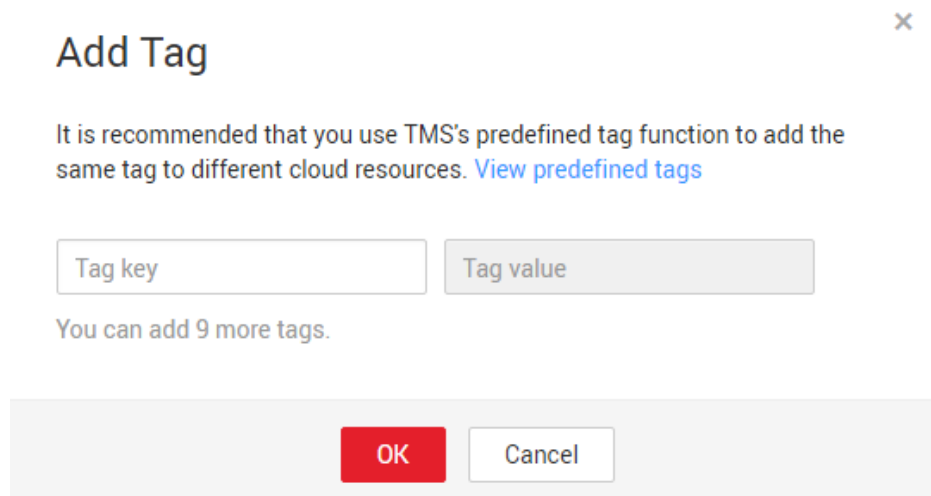


Table 4-49 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 6 Click **OK**.

Step 7 (Optional) In the tag list, locate the row where the tag whose value you want to edit resides, click **Edit** in the **Operation** column to edit the tag value.

Step 8 (Optional) In the tag list, locate the row where the tag you want to delete resides, click **Delete** in the **Operation** column to delete the tag.

----End

Managing Job Template Tags

CS allows you to add, modify, or delete tags for job templates.

Step 1 In the left navigation pane of the CS management console, click **Template Management, Custom Templates**.

Step 2 In the row where the target job resides, click the job template name in the **Name** column to switch to the **Template Details** page.

Step 3 Click **Tags** to display the tag information about the current job template.

Figure 4-55 Managing job template tags



Step 4 Click **Add Tag** to switch to the **Add Tag** dialog box.

Step 5 Configure the tag parameters in the **Add Tag** dialog box.

Figure 4-56 Adding tags

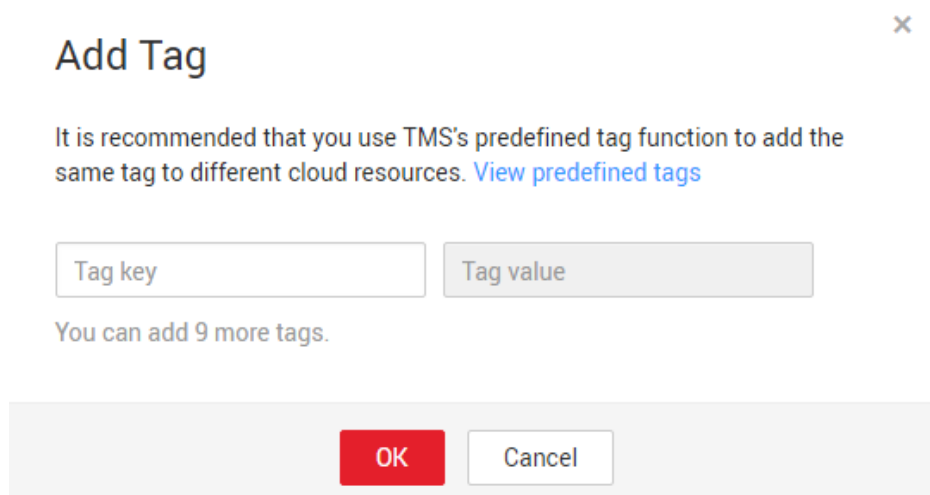


Table 4-50 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 6 Click **OK**.

Step 7 (Optional) In the tag list, locate the row where the tag whose value you want to edit resides, click **Edit** in the **Operation** column to edit the tag value.

Step 8 (Optional) In the tag list, locate the row where the tag you want to delete resides, click **Delete** in the **Operation** column to delete the tag.

----End

Managing Cluster Tags

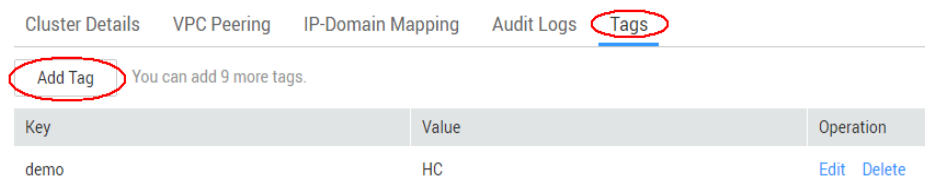
CS allows you to add, modify, or delete tags for clusters.

Step 1 In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.

Step 2 In the row where the cluster whose tags you want to manage is located, click the cluster name in the **Name** column to switch to the **Cluster Details** page.

Step 3 Click **Tab** to display the tag information about the current cluster.

Figure 4-57 Managing cluster tags



Step 4 Click **Add Tag** to switch to the **Add Tag** dialog box.

Step 5 Configure the tag parameters in the **Add Tag** dialog box.

Figure 4-58 Adding tags

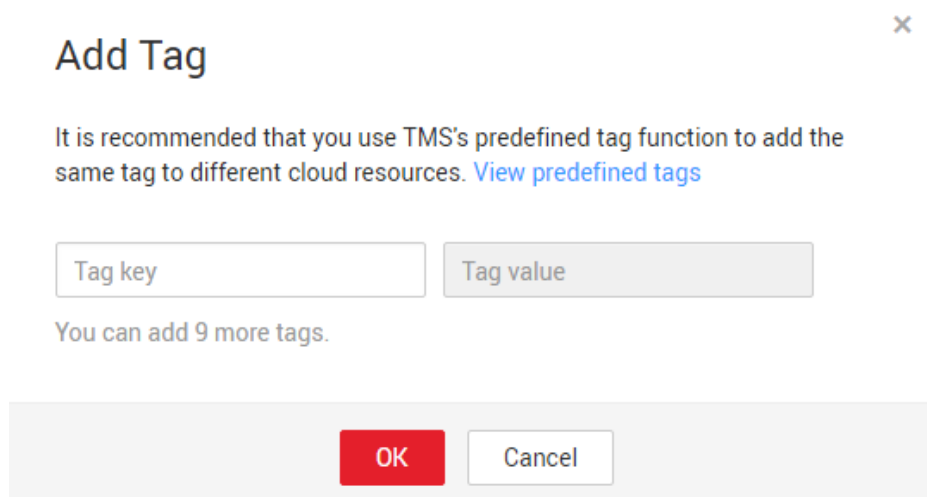


Table 4-51 Tag parameters

Parameter	Description
Tag key	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag key from the drop-down list. <p>NOTE To add a predefined tag, you need to create one on TMS and select it from the Tag key drop-down list. You can click View Predefined Tag to enter the Predefined Tag page of TMS. Then, click Create Tag to create a predefined tag. For details, see section Creating Predefined Tags in the <i>Tag Management Service User Guide</i>.</p> <ul style="list-style-type: none"> Enter a tag key in the text box. <p>NOTE A tag key contains a maximum of 36 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

Parameter	Description
Tag value	<p>You can perform the following operations:</p> <ul style="list-style-type: none"> Click the text box and select a predefined tag value from the drop-down list. Enter a tag value in the text box. <p>NOTE A tag value contains a maximum of 43 characters. The first and last characters cannot be spaces. The following characters are not allowed: =*,<>\\ /</p>

 **NOTE**

- A maximum of 10 tags can be added.
- Only one tag value can be added to a tag key.
- The key name must be unique in the same resource.

Step 6 Click **OK**.

Step 7 (Optional) In the tag list, locate the row where the tag whose value you want to edit resides, click **Edit** in the **Operation** column to edit the tag value.

Step 8 (Optional) In the tag list, locate the row where the tag you want to delete resides, click **Delete** in the **Operation** column to delete the tag.

----End

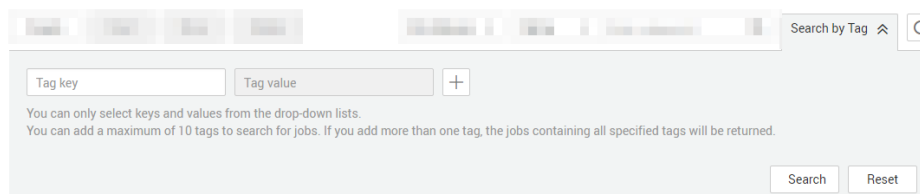
Searching for Jobs by Tag

If tags have been added to a job, you can search for the job by setting tag filtering conditions to quickly find it.

Step 1 In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.




Step 2 Click **Search by Tag** on the right of the current page to expand the tab page.

Figure 4-59 Searching for jobs by tag



Step 3 In the **Search by Tag** area, click the **Tag key** text box to select a tag key from the drop-down list and then click the **Tag value** text box to select the corresponding tag value.

You can only enter a tag key or value that exists in the drop-down list. If no tag key or value is available, create a tag for the job. For details, see [Managing Job Tags](#).

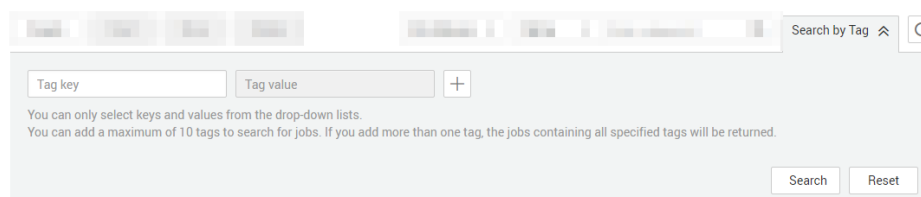
- Step 4** Click  to add the selected tag to the area under the text boxes.
- Select another tag in the text boxes and click  to generate a tag combination for job search. You can add a maximum of 10 tags to search for jobs. If you specify more than one tag, jobs containing all the specified tags will be displayed.
 - To delete an existing tag, click  next to the tag.
 - You can click **Reset** to clear all the added tags.
- Step 5** Click **Search**. The target job will be displayed in the job list.
- End

Searching for Job Templates by Tag

If tags have been added to a job template, you can search for the job template by setting tag filtering conditions to quickly find it.




- Step 1** In the left navigation pane of the CS management console, click **Template Management, Custom Templates**.
- Step 2** Click **Search by Tag** on the right of the current page to expand the tab page.

Figure 4-60 Searching for jobs by tag



- Step 3** In the **Search by Tag** area, click the **Tag key** text box to select a tag key from the drop-down list and then click the **Tag value** text box to select the corresponding tag value.

You can only enter a tag key or value that exists in the drop-down list. If no tag key or value is available, create a tag for the job template. For details, see [Managing Job Template Tags](#).

- Step 4** Click  to add the selected tag to the area under the text boxes.
- Select another tag in the text boxes and click  to generate a tag combination for job search. You can add a maximum of 10 tags to search for jobs. If you specify more than one tag, jobs containing all the specified tags will be displayed.
 - To delete an existing tag, click  next to the tag.
 - You can click **Reset** to clear all the added tags.
- Step 5** Click **Search**. The target job template will be displayed in the job template list.
- End

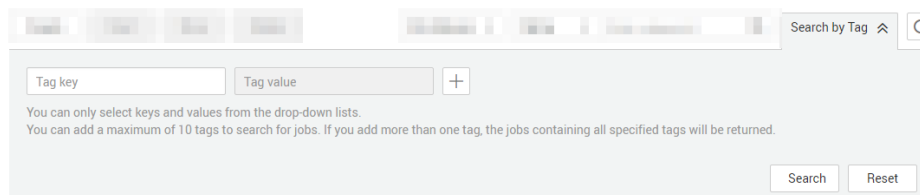
Searching for Clusters by Tag

If tags have been added to a cluster, you can search for the cluster by setting tag filtering conditions to quickly find it.

Step 1 In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.

Step 2 Click **Search by Tag** on the right of the current page to expand the tab page.

Figure 4-61 Searching for jobs by tag



Step 3 In the **Search by Tag** area, click the **Tag key** text box to select a tag key from the drop-down list and then click the **Tag value** text box to select the corresponding tag value.

You can only enter a tag key or value that exists in the drop-down list. If no label key or value is available, create a label for the cluster. For details, see [Managing Cluster Tags](#).

Step 4 Click to add the selected tag to the area under the text boxes.

- Select another tag in the text boxes and click to generate a tag combination for job search. You can add a maximum of 10 tags to search for jobs. If you specify more than one tag, jobs containing all the specified tags will be displayed.
- To delete an existing tag, click next to the tag.
- You can click **Reset** to clear all the added tags.

Step 5 Click **Search**. The target cluster will be displayed in the cluster list.

----End

4.12 Enterprise Project

An enterprise project is a way of managing cloud resources where cloud resources and members are centrally managed by project. Common management consoles are oriented to the control and configuration of individual cloud products. The Enterprise Management console, in contrast, is more focused on resource management. It is designed to help enterprises manage cloud-based resources, personnel, permissions, and finances, in a hierarchical manner. It makes it easier to manage companies, departments, and projects.

Users who have enabled the Enterprise Project Management service can use it to manage cloud service resources.

This section is organized as follows:

- [Binding an Enterprise Project for a Job](#)
- [Binding an Enterprise Project for a Cluster](#)
- [Viewing the Enterprise Project Associated with a Job](#)
- [Viewing the Enterprise Project Associated with a Cluster](#)
- [Searching for Jobs by Enterprise Project](#)
- [Searching for Clusters by Enterprise Project](#)
- [Migrating a Job or Cluster to or out of an Enterprise Project](#)
- [Enterprise Project-Level Authorization](#)

Binding an Enterprise Project for a Job

You can select an enterprise project during job creation and associate the job with that enterprise project.

- Step 1** Log in to the CS management console. On the **Overview** page or **Job Management** page, click **Create Job** to switch to the **Create Job** dialog box.
- Step 2** For **Enterprise Project**, select an enterprise project that you created on the Enterprise Management console.

For details about how to create an enterprise project on the Enterprise Management console, see **Creating an Enterprise Project** in the *Enterprise Management User Guide*.

The system also has a built-in enterprise project, **default**. If you do not select an enterprise project for the job, the default project is used instead.

During job creation, if the job is successfully bound to an enterprise project, the job has been created. If the binding fails, the system sends an alarm and the job fails to be created.

When you delete a job, the association between the job and its enterprise project is automatically deleted as well.

----End

Binding an Enterprise Project for a Cluster

You can select an enterprise project during cluster creation and associate the cluster with that enterprise project.

- Step 1** Log in to the CS management console. Switch to the **Cluster Management** page, and click **Create Cluster** to switch to the **Create Cluster** page.
- Step 2** For **Enterprise Project**, select the enterprise project that you created on the Enterprise Management console.

For details about how to create an enterprise project on the Enterprise Management console, see **Creating an Enterprise Project** in the *Enterprise Management User Guide*.

The system also has a built-in enterprise project, **default**. If you do not select an enterprise project for the cluster, the default project is used instead.

During cluster creation, if the cluster is successfully bound to an enterprise project, the cluster has been created. If the binding fails, the system sends an alarm and the cluster fails to be created.

When you delete a cluster, the association between the cluster and its enterprise project is automatically deleted as well.

----End

Viewing the Enterprise Project Associated with a Job

After a job is created, you can view the enterprise project associated with the job on the **Job Management** page or the **Job Details** page.

- Step 1** In the navigation tree on the left pane of the CS management console, choose **Job Management** to switch to the **Job Management** page.
- Step 2** In the job list, locate the row where the target job resides and view the enterprise project associated with the job in the **Enterprise Project** column.
- Step 3** In the row where the target job resides, click the job name in the **Name** column to switch to the **Job Details** page. You can view the enterprise project associated with the job.
- Step 4** Click the enterprise project name to view and edit it on the Enterprise Management console.

When querying the resource list of a specified project on the Enterprise Management console, you can also query the CS resources.

----End

Viewing the Enterprise Project Associated with a Cluster

After a cluster is created, you can view the enterprise project associated with the cluster on the **Cluster Management** page or the **Cluster Details** page.

- Step 1** In the navigation tree on the left pane of the CS management console, click **Cluster Management** to switch to the **Cluster Management** page.
- Step 2** In the cluster list, locate the row where the target cluster resides and view the enterprise project associated with the cluster in the **Enterprise Project** column.
- Step 3** In the row where the cluster you want to view is located, click the cluster name in the **Name** column to switch to the **Cluster Details** page. You can view the enterprise project associated with the cluster.
- Step 4** Click the enterprise project name to view and edit it on the Enterprise Management console.

When querying the resource list of a specified project on the Enterprise Management console, you can also query the CS resources.

----End

Searching for Jobs by Enterprise Project

You can search for all jobs associated with the project by enterprise project.

Step 1 Log in to the CS management console. Click **Job Management**. On the displayed page, select **Enterprise project** from the second drop-down list box in the upper right corner of the cluster list.

Step 2 Enter the name of the target enterprise project in the search text box to view all jobs associated with the enterprise project.

----End

Searching for Clusters by Enterprise Project

You can search for all clusters associated with the project by enterprise project.

Step 1 Log in to the CS management console. Click **Cluster Management**. On the displayed page, select **Enterprise project** from the second drop-down list box in the upper right corner of the cluster list.

Step 2 Enter the name of the target enterprise project in the search text box to view all clusters associated with the enterprise project.

----End

Migrating a Job or Cluster to or out of an Enterprise Project

Each CS job or cluster can only be associated with a single enterprise project. After a job or cluster is created, you can migrate it from its current enterprise project to another one on the Enterprise Management console, or migrate the job or cluster from another enterprise project to a specified enterprise project. After the migration, the job or cluster is associated with the new enterprise project. The association between the job or cluster and the original enterprise project is automatically released. For details, see **Enterprise Project Management > Managing Resources** in the *Enterprise Management User Guide*.

Enterprise Project-Level Authorization

If the permissions preset in the system do not meet your requirements, you can create custom policies and apply these policies to user groups for refined access control. As an independent managed object, the enterprise project can be bound to a user group, and the custom policy can be applied to the user group. This allows for more refined access control at the enterprise project level.

1. Log in to the IAM management console. On the **Policies** page, create a custom policy based on the preset policy template (such as CS Admin and CS Viewer).
2. Log in to the Enterprise Management console, add the user group to the project on the user group management page, bind the custom policy with the user group, and add users to the user group.

For details, see **Managing User Groups** in the *Enterprise Management User Guide*.

When creating a custom policy, you can add IAM actions corresponding to CS operations shown in **Table 4-52** to the action list of the policy statement so that the policy can obtain the CS operation permissions. For example, if **cs:jobs:create** is added to the action list of a custom policy statement, the policy has the permission to create jobs.

Table 4-52 Fine-grained permissions of CS

CS Operation	IAM Action
Obtaining details about a job	cs:jobs:get
Obtaining the job list	cs:jobs:list
Creating a job	cs:jobs:create
Updating a job	cs:jobs:update
Deleting a job	cs:jobs:delete
Starting a job	cs:jobs:start
Stopping a job	cs:jobs:stop
Obtaining details about a cluster	cs:clusters:get
Obtaining the cluster list	cs:clusters:list
Creating a cluster	cs:clusters:create
Updating a cluster	cs:clusters:update
Stopping a cluster	cs:clusters:stop
Restarting a cluster	cs:clusters:restart
Deleting a cluster	cs:clusters:delete
Querying quota information about a user	cs:clusterQuota:get
Querying quota information about all users	cs:clusterQuota:list
Changing the quota of a user	cs:clusterQuota:modify
Obtaining audit statistics	cs:auditLog:get
Obtaining template information	cs:template:get
Obtaining the template list	cs:template:list
Creating a template	cs:template:create
Updating a template	cs:template:update
Deleting a template	cs:template:delete