Data Lake Insight

SDK Reference

Issue 01

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1 Introduction to DLI SDKs

1.1 What Is DLI SDK

Introduction to DLI

Data Lake Insight (DLI) is a serverless data processing and analysis service fully compatible with Apache Spark, openLooKeng (Presto-based), and Flink ecosystems. It frees you from managing any server. DLI supports standard SQL and is compatible with Spark and Flink SQL. It also supports multiple access modes, and is compatible with mainstream data formats. DLI supports SQL statements and Spark applications for heterogeneous data sources, including CloudTable, RDS, DWS, CSS, OBS, custom databases on ECSs, and offline databases.

Introduction to DLI SDKs

Data Lake Insight Software Development Kit (DLI SDK) is the encapsulation of RESTful APIs provided by DLI to simplify user development. Users can directly call API functions provided by DLI SDK to use DLI.

NOTE

The DLI SDK calls APIs using HTTPS. The certificate for using the server is provided.

1.2 Content Navigation

This development guide describes how to install and configure an environment and call functions provided by DLI SDK for secondary development.

Chapter	Content
Overview	This topic describes the concepts of DLI and DLI SDKs.

Chapter		Content
Preparing the Environment	**Prerequisites**	This topic describes the configuration process of the running environment of the DLI SDKs.
	Configuring the Java Environment	
	Configuring the Python Environment	
Mapping Between DLI SDK and APIs	**Mapping Between DLI SDK and APIs**	This topic describes the DLI SDKs currently under development, along with its corresponding APIs.
Java SDK	**Java SDK**	This topic describes the DLI Java SDKs.
Pyhton SDK	**Python SDK**	This topic describes the DLI Python SDKs.

2 Preparing the Environment

2.1 Prerequisites

Registering with HUAWEI CLOUD

An account registered with HUAWEI CLOUD can access all services provided by HUAWEI CLOUD, including DLI.

1. Log in to the **HUAWEI CLOUD** homepage.
2. Click **Register** at the upper right corner of the page.
3. Complete the registration as instructed. For details, see **Registering a HUAWEI ID and Enabling HUAWEI CLOUD Services**.

   After the registration succeeds, the system automatically switches to your personal information page. You can refer to **Real-Name Authentication** for details.

If you have registered a HUAWEI CLOUD account and completed real-name authentication, skip this step.

Enabling DLI

1. Log in to the public cloud and choose **Products** from the top menu.
2. Click **Data Lake Insight** under **Enterprise Intelligence**.
3. Click **Access Console** to switch to the DLI management console.

Downloading SDK

1. Log in to the DLI management console.
2. On the **Overview** page, click **SDK Download** under **Helpful Links**.
3. On the displayed **DLI SDK DOWNLOAD** page, click the target link to obtain the desired SDK installation package.

   Currently, DLI provides the SDK installation packages of the Java and Python versions.

   - Java SDK

Obtain the **dli-sdk-java-*x.x.x*.zip** package and decompress it. The following table shows the directory structure of the package.

Table 2-1 Directory structure

Parameter	Description
jars	SDK and its dependent JAR packages.
maven-install	Script and JAR package that are installed in the local Maven repository.
dli-sdk-java.version	Java SDK version description.

If Maven is used, add the following Maven configuration items on which **huaweicloud-dli-sdk-java** depends:

```
<dependency>
  <groupId>com.huawei.dli</groupId>
  <artifactId>huaweicloud-dli-sdk-java</artifactId>
  <version>x.x.x</version>
</dependency>
```

DLI depends on the SDK (for example, OBS SDK). You can download it by configuring the Maven image source repository of HUAWEI CLOUD.

- Use the Huawei image source as the main repository:

  For details about how to configure the Huawei Maven image source, visit Huawei open source image site, select Huawei SDK, and click HuaweiCloud SDK.

  If you build a project with Maven, modify the **settings.xml** file by adding the following content:

  1) Add the following content to the **profiles** node:

```
<profile>
  <id>MyProfile</id>
  <repositories>
    <repository>
      <id>HuaweiCloudSDK</id>
      <url>https://repo.huaweicloud.com/repository/maven/huaweicloudsdk/</url>
      <releases>
        <enabled>true</enabled>
      </releases>
      <snapshots>
        <enabled>false</enabled>
      </snapshots>
    </repository>
  </repositories>
  <pluginRepositories>
    <pluginRepository>
      <id>HuaweiCloudSDK</id>
      <url>https://repo.huaweicloud.com/repository/maven/huaweicloudsdk/</url>
      <releases>
        <enabled>true</enabled>
      </releases>
      <snapshots>
        <enabled>false</enabled>
      </snapshots>
    </pluginRepository>
  </pluginRepositories>
</profile>
```


2) Add the following information to the **mirrors** node:

```
<mirror>
    <id>huaweicloud</id>
    <mirrorOf>*,!HuaweiCloudSDK</mirrorOf>
    <url>https://repo.huaweicloud.com/repository/maven/</url>
</mirror>
```

3) Add the **activeProfiles** tag to activate the configurations.

```
<activeProfiles>
  <activeProfile>MyProfile</activeProfile>
</activeProfiles>
```

- Use a non-Huawei image source as the main repository (for example, a user-defined image source) to use HuaweiCloud SDK:

  If you build a project with Maven, modify the **settings.xml** file as follows:

```
<settings xmlns="http://maven.apache.org/SETTINGS/1.0.0"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xsi:schemaLocation="http://maven.apache.org/SETTINGS/1.0.0 http://
maven.apache.org/xsd/settings-1.0.0.xsd">
    <servers>
     <server>
      <id>demo-releases</id>
      <username>deployment</username>
      <password><![CDATA[xxx]]></password>
    </server>
  </servers>
  <mirrors>
    <mirror>
      <id>demo-releases</id>
      <mirrorOf>*,!HuaweiCloudSDK</mirrorOf>
      <url>http://maven.demo.com:8082/demo/content/groups/public</url>
    </mirror>
  </mirrors>
  <profiles>
    <profile>
      <id>demo</id>
      <activation>
        <activeByDefault>true</activeByDefault>
        <jdk>1.8</jdk>
      </activation>
      <properties>
        <maven.compiler.source>1.8</maven.compiler.source>
        <maven.compiler.target>1.8</maven.compiler.target>
        <maven.compiler.compilerVersion>1.8</maven.compiler.compilerVersion>
      </properties>
      <repositories>
         <repository>
          <id>demo-releases</id>
          <url>http://demo-releases</url>
          <releases>
            <enabled>true</enabled>
          </releases>
          <snapshots>
            <enabled>true</enabled>
          </snapshots>
        </repository>
      </repositories>
      <pluginRepositories>
         <pluginRepository>
            <id>demo-releases</id>
            <url>http://demo-releases</url>
            <releases>
              <enabled>true</enabled>
            </releases>
            <snapshots>
              <enabled>true</enabled>
            </snapshots>
```



```
        </pluginRepository>
    </pluginRepositories>
  </profile>
  <profile>
    <id>huaweicloudrepo</id>
    <repositories>
      <repository>
        <id>HuaweiCloudSDK</id>
        <url>https://repo.huaweicloud.com/repository/maven/huaweicloudsdk/</url>
        <releases>
          <enabled>true</enabled>
        </releases>
        <snapshots>
          <enabled>false</enabled>
        </snapshots>
      </repository>
    </repositories>
    <pluginRepositories>
      <pluginRepository>
        <id>HuaweiCloudSDK</id>
        <url>https://repo.huaweicloud.com/repository/maven/huaweicloudsdk/</url>
        <releases>
          <enabled>true</enabled>
        </releases>
        <snapshots>
          <enabled>false</enabled>
        </snapshots>
      </pluginRepository>
    </pluginRepositories>
  </profile>
 </profiles>
 <activeProfiles>
  <activeProfile>demo</activeProfile>
  <activeProfile>huaweicloudrepo</activeProfile>
 </activeProfiles>
</settings>
```

- Python SDK

  Obtain the **dli-sdk-python-*x.x.x*.zip** package and decompress it. The following table shows the directory structure of the package.

  Table 2-2 Directory structure

Parameter	Description
dli	DLI Python SDK package.
examples	Example of using the SDK.
pyDLI	Connector for Python to connect to DLI SQL, which is implemented based on pyHive.
setup.py	SDK installation script.

2.2 Configuring the Java Environment

Scenario

Table 2-3 describes the environment required for secondary development.

Table 2-3 Development environment

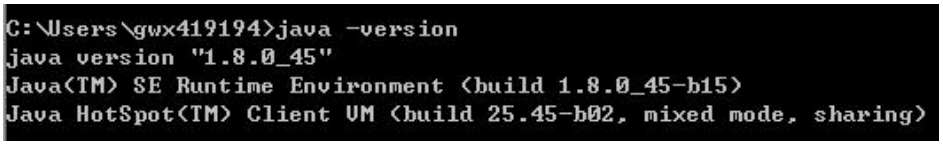
Item	Description
Installing the Operating System (OS)	Windows OS. Windows 7 or later is recommended.
Installing the JDK	Basic configurations of the development environment. JDK 1.7 or 1.8 is required. You are advised to use JDK 1.8 for better compatibility of later versions.
Eclipse installation and configuration	It is a tool used to develop DLI applications.

Procedure

Step 1 Download JDK of 1.8 or a later version from the **Oracle's official website**, install the JDK, and configure Java environment variables.

1. Install the JDK.
2. Set environment variables. Specifically, choose **Start** > **Control Panel**. Click **System** > **Advanced system settings**. In the displayed **System Properties** dialog box, click **Advanced** and then click **Environment Variables** to switch to the **Environment Variables** dialog box.
3. Create the system variable **JAVA_HOME** with **Value** set to the JDK installation path, for example, **D:\Java\jdk1.8.0_45**.
4. Edit the **Path** variable and add **%JAVA_HOME%\bin** to **Variable value**.
5. Create the **CLASSPATH** variable with **Variable value** set to **.;%JAVA_HOME%\lib;%JAVA_HOME%\lib\tools.jar**.
6. Check whether the configurations succeed. Specifically, at the Start menu, enter **cmd** and press **Enter** to bring up the command prompt window. Enter ***java -version*** and press **Enter**. If the version information is displayed, as shown in **Figure 2-1**, the JDK is successfully installed and environment variables are successfully configured.

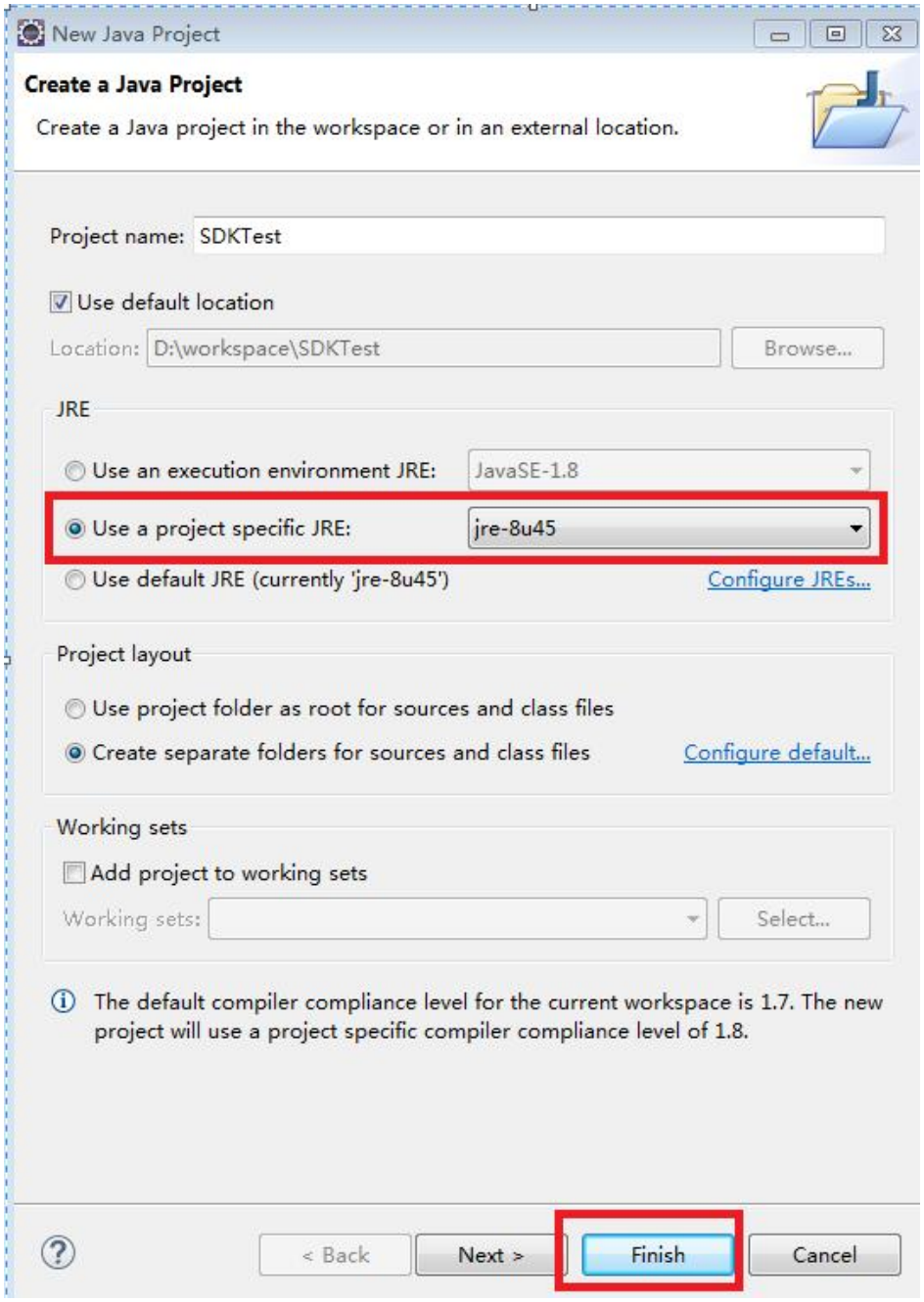
   Figure 2-1 Checking the configuration

Step 2 Download Eclipse IDE for Java Developers of the latest version from the **Eclipse's official website** and install it. Configure the JDK in Eclipse.

1. Create a project and select the correct JRE version. For details, see **Figure 2-2**.

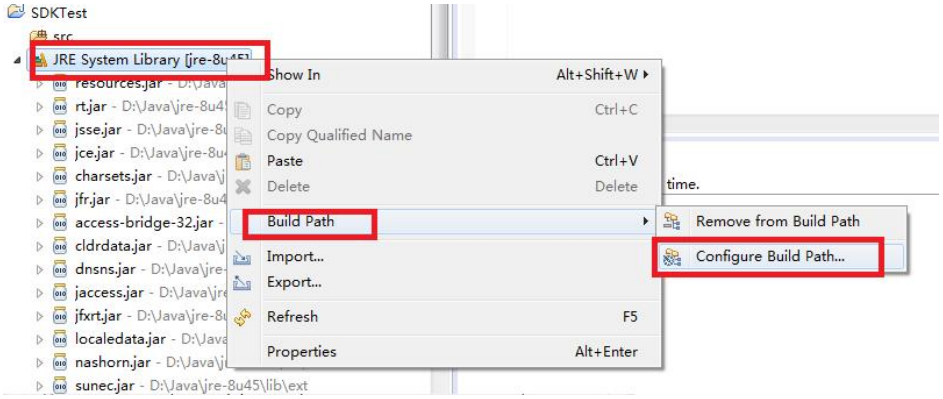
Figure 2-2 Creating a project



Step 3 Configure and import the SDK JAR package.

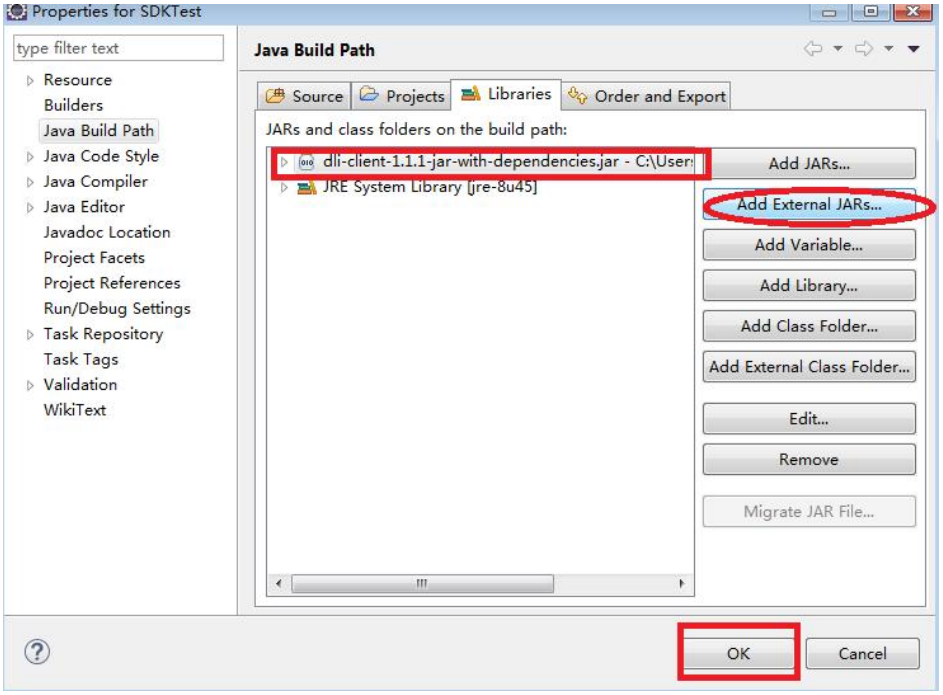
1. Right-click **JRE System Library** and choose **Build Path** > **Configure Build Path** from the shortcut menu. For details, see **Figure 2-3**.

Figure 2-3 Configuring the project path



2. Click **Add External JARs**, select the downloaded JAR package obtained in **Downloading SDK**, and click **OK**.

Figure 2-4 Selecting the SDK JAR package



----End

2.3 Configuring the Python Environment

Scenario

Table 2-4 describes the environment required for secondary development.

Table 2-4 Development environment

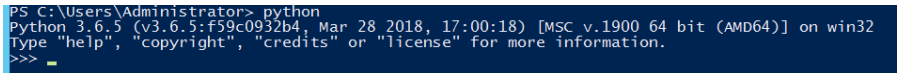
Item	Description
Operating system (OS)	Windows OS. Windows 7 or later is recommended.
Python installation	Python 2.7.10, 3.4.0, or later is recommended.
Python dependency installation	The DLI Python SDK dependencies include urllib3 1.15 or later, six 1.10 or later, certifi, and python-dateutil.

Procedure

Step 1 Download Python from **Python's official website** and install it.

1. Install Python according to the Python official guidelines.
2. Check whether the configurations succeed. Specifically, at the **Start** menu, enter **cmd** and press **Enter** to bring up the command prompt window. Enter **python** and press **Enter**. If the version information is displayed, as shown in **Figure 2-5**, Python is successfully installed and configured.

   Figure 2-5 Checking the configuration

Step 2 Install DLI Python SDK.

1. Select the JAR package of the **Downloading SDK** and decompress the installation package.

   Decompress **huaweicloud-dli-sdk-python-<version>.zip** to a local directory that can be adjusted.

2. Install the SDK.

   a. On a PC running the Windows OS, choose **Start** > **Run**, enter **cmd**, and press **Enter**.

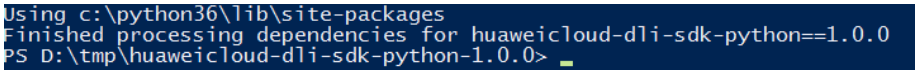
   b. In the command-line interface (CLI) window, access the **windows** directory in the directory where **huaweicloud-dli-sdk-python-<version>.zip** is decompressed. For example, **D:\tmp\huaweicloud-dli-sdk-python-1.0.0**.

   c. Run the following command to install DLI Python SDK (During the installation, the third-party dependencies are automatically downloaded):

   python setup.py install

   Figure 2-6 shows the installation result.

Figure 2-6 Installing Python SDK



----End

3 Mapping Between DLI SDKs and APIs

OBS Authorization SDKs

Table 3-1 Mapping between OBS authorization APIs and SDKs

Class	Method	Java Method	Python Method	API
Authorize	OBS authorization	authorizeBucket	-	POST /v1.0/{project_id}/dli/obs-authorize

Queue-related SDKs

Table 3-2 Mapping between queue-related APIs and SDKs

Class	Method	Java Method	Python Method	API
Queue	Creating a Queue	createQueue	-	POST /v1.0/{project_id}/queues
	Deleting a Queue	deleteQueue	-	DELETE /v1.0/{project_id}/queues/{queue_name}
	Obtaining the Default Queue	getDefaultQueue	-	-
	Querying All Queues	listAllQueues	list_queues	GET/v1.0/{project_id}/queues

Resource-related SDKs

Table 3-3 Mapping between resource-related APIs and SDKs

Class	Method	Java Method	Python Method	API
package Resources	Uploading a Resource Package	uploadResources	upload_resource	POST /v2.0/{project_id}/resources
	Deleting a Resource Package	-	-	DELETE /v2.0/{project_id}/resources/{resource_name}
	Querying All Resource Packages	listAllResources	list_resources	GET /v2.0/{project_id}/resources
	Querying a Specified Resource Package	-	-	GET /v2.0/{project_id}/resources/{resource_name}

SDKs Related to SQL Jobs

Table 3-4 Mapping between SQL job APIs and SDKs

Class	Method	Java Method	Python Method	API
Database	Creating a Database	createDatabase	create_database	POST /v1.0/{project_id}/databases
	Deleting a Database	deleteDatabase	delete_database	DELETE /v1.0/{project_id}/databases/{database_name}
	Querying All Databases	listAllDatabases	list_databases	GET /v1.0/{project_id}/databases
	Modifying a Database User	-	-	PUT /v1.0/{project_id}/databases/{database_name}/owner
Table	Creating a DLI Table	createDLITable	create_dli_table	POST /v1.0/{project_id}/databases/{database_name}/tables
	Creating an OBS Table	createObsTable	create_obs_table	POST /v1.0/{project_id}/databases/{database_name}/tables

Class	Method	Java Method	Python Method	API
	Deleting a Table	**deleteTable**	**delete_table**	DELETE /v1.0/{project_id}/databases/{database_name}/tables/{table_name}
	Querying All Tables	**listAllTables**	**list_tables**	GET /v1.0/{project_id}/databases/{database_name}/tables?keyword=tb&with-detail=true
	Describing Table Information	-	-	GET /v1.0/{project_id}/databases/{database_name}/tables/{table_name}
	Previewing a Table	-	-	GET /v1.0/{project_id}/databases/{database_name}/tables/{table_name}/preview
	Modifying a Table User	-	-	PUT /v1.0/{project_id}/databases/{database_name}/tables/{table_name}/owner
Job	Importing Data	**submit**	**import_table**	POST /v1.0/{project_id}/jobs/import-table
	Exporting Data	**submit**	**export_table**	POST /v1.0/{project_id}/jobs/export-table
	Submitting a Job	**submit**	**execute_sql**	POST /v1.0/{project_id}/jobs/submit-job
	Canceling a Job	**cancelJob**	-	DELETE /v1.0/{project_id}/jobs/{job_id}
	Querying All Jobs	**listAllJobs**	-	GET /v1.0/{project_id}/jobs?page-size=*{size}*&current-page=*{page_number}*&start=*{start_time}*&end=*{end_time}*&job-type={QUERY}&queue_name={test}&order={duration_desc}
	Querying Job Results	**queryJobResultInfo**	-	GET/v1.0/{project_id}/jobs/{job_id}?page-size=*{size}*&current-page=*{page_number}*

Class	Method	Java Method	Python Method	API
	Querying Job Status	-	-	GET/v1.0/{project_id}/jobs/{job_id}/status
	Querying Job Details	-	-	GET/v1.0/{project_id}/jobs/{job_id}/detail
	Querying Jobs of the SQL Type	**listSQLJobs**	-	-
	Checking the SQL Syntax	-	-	POST /v1.0/{project_id}/jobs/check-sql
	Exporting Search Results	-	-	POST /v1.0/{project_id}/jobs/{job_id}/export-result

SDKs Related to Flink Jobs

Table 3-5 Mapping between Java and Python SDKs and APIs

Class	Method	Java Method	Python Method	API
Job	Creating a Flink SQL job	**submitFlinkSqUob**	-	POST /v1.0/{project_id}/streaming/sql-jobs
	Creating a Custom Flink Job	**createFlinkJarJob**	-	POST /v1.0/{project_id}/streaming/flink-jobs
	Updating a Flink SQL Job	**updateFlinkSqUob**	-	PUT /v1.0/{project_id}/streaming/sql-jobs/{job_id}
	Updating a Custom Flink Job	**updateFlinkJarJob**	-	PUT /v1.0/{project_id}/streaming/flink-jobs/{job_id}
	Querying the List of Jobs	**getFlinkJobs**	-	GET /v1.0/{project_id}/streaming/jobs
	Querying Flink Job Details	**getFlinkJobDetail**	-	GET /v1.0/{project_id}/streaming/jobs/{job_id}

Class	Method	Java Method	Python Method	API
	Querying the Flink Job Execution Plan Diagram	**getFlinkJobExecuteGraph**	-	GET /v1.0/{project_id}/streaming/jobs/{job_id}/execute-graph
	Querying Flink Job Monitoring Information	**getFlinkJobsMetrics**	-	POST /v1.0/{project_id}/streaming/jobs/metrics
	Querying the APIG Address of a Flink Job	**getFlinkApigSinks**	-	GET /v1.0/{project_id}/streaming/jobs/{job_id}/apig-sinks
	Running a Flink Job	**runFlinkJob**	-	POST /v1.0/{project_id}/streaming/jobs/run
	Stopping a Flink Job	**stopFlinkJob**	-	POST /v1.0/{project_id}/streaming/jobs/stop
	Deleting Flink Jobs in Batches	**deleteFlinkJobInBatch**	-	POST /v1.0/{project_id}/streaming/jobs/delete

SDKs Related to Spark Jobs

Table 3-6 Mapping between Spark job APIs and SDKs

Class	Method	Java Method	Python Method	API
BatchJob	Submitting Batch Jobs	**asyncSubmit**	**submit_spark_batch_job**	POST /v2.0/{project_id}/batches
	Deleting Batch Jobs	**submit**	-	DELETE /v2.0/{project_id}/batches/{batch_id}
	Querying All Batch Jobs	**listAllBatchJobs**	-	GET /v2.0/{project_id}/batches
	Querying Batch Job Details	-	-	GET /v2.0/{project_id}/batches/{batch_id}

Class	Method	Java Method	Python Method	API
	Querying a Batch Job Status	-	-	GET /v2.0/{project_id}/batches/{batch_id}/state
	Querying Batch Job Logs	-	-	GET /v2.0/{project_id}/batches/{batch_id}/log

SDKs Related to Flink Job Templates

Table 3-7 Mapping between Java and Python SDKs and APIs

Class	Java Method	Python Method	API
Template	**createFlinkJobTemplate**	-	POST /v1.0/{project_id}/streaming/job-templates
	updateFlinkJobTemplate	-	PUT /v1.0/{project_id}/streaming/job-templates/{template_id}
	deleteFlinkJobTemplate	-	DELETE /v1.0/{project_id}/streaming/job-templates/{template_id}
	getFlinkJobTemplates	-	GET /v1.0/{project_id}/streaming/job-templates

4 Java SDK

4.1 Initializing the DLI Client

To use DLI SDK to access DLI, you need to initialize the DLI client. During DLI client initialization, you can perform authentication using the Access Key ID/Secret Access Key (AK/SK) or token. The sample code is as follows:

Sample code for AK/SK authentication

```
String ak = "ak";
String sk = "sk";
String regionName = "regionname";
String projectId = "project_id";
DLIInfo dliInfo = new DLIInfo(regionName, ak, sk, projectId);
DLIClient client = new DLIClient(AuthenticationMode.AKSK, dliInfo);
```

NOTE

You can perform the following operations to obtain the **Access Keys**, **project ID**, and **Region**:

1. Register with and log in to the management console.
2. Click the username in the upper right corner and select **My Credentials** from the drop-down list.
3. On the **My Credentials** page,
   - Click **Access Keys** to view the created access key.
   - Click **Projects** to view the **project ID** and **Region**.

Sample code for token-based authentication

```
String domainName = "domainname";
String userName = "username";
String password = "password";
String regionName = "regionname";
String projectId = "project_id";
DLIInfo dliInfo = new DLIInfo(regionName, domainName, userName, password, projectId);
DLIClient client = new DLIClient(AuthenticationMode.TOKEN, dliInfo);
```

NOTE

You can change the endpoint in **set** mode. Run the following statement: **dliInfo.setServerEndpoint(endpoint)**.

4.2 OBS Authorization

Example Code

You can use the API to grant operation rights on OBS buckets to DLI to save data and run logs of users' jobs. The example code is as follows:

```
private static void authorizeBucket(DLIClient client) throws DLIException {
        String bucketName ="obs_name";
        ObsBuckets obsBuckets = new ObsBuckets();
        obsBuckets.addObsBucketsItem(bucketName);
        GlobalResponse res = client.authorizeBucket(obsBuckets);
        System.out.println(res);
}
```

4.3 Queue-Related SDKs

Creating a Queue

You can use the API provided by DLI to create a queue. The example code is as follows:

```
 private static void createQueue(DLIClient client) throws DLIException {
   //Call the createQueue method of the DLIClient object to create a queue.
   String qName = "queueName";
   int cu = 16;
   ChargingMode mode = ChargingMode.CHARGING_MODE_CU;
   String description = "test for sdk";
   Queue queue = client.createQueue(qName, cu, mode, description);
   System.out.println("---------- createQueue success ---------");
 }
```

Deleting a Queue

You can use the API provided by DLI to delete the queue. The example code is as follows:

```
 private static void deleteQueue(DLIClient client) throws DLIException {
   //Call the getQueue(queueName) method of the DLIClient object to obtain queue queueName.
   String qName = "queueName";
   Queue queue = client.getQueue(qName);
   //Call the deleteQueue() method to delete queue queueName.
   queue.deleteQueue();
}
```

Obtaining the Default Queue

DLI provides an API for querying the default queue. You can use the default queue to submit jobs. The example code is as follows:

```
private static void getDefaultQueue(DLIClient client) throws DLIException{
  //Call the getDefaultQueue method of the DLIClient object to query the default queue.
     Queue queue = client.getDefaultQueue();
     System.out.println("defaultQueue is:"+ queue.getQueueName());
}
```

NOTE

All users can use the default queue. However, DLI limits the maximum number of times a user can use the default queue.

Querying All Queues

You can use the API provided by DLI to query the queue list and select the corresponding queue to execute the job. The example code is as follows:

```
private static void listAllQueues(DLIClient client) throws DLIException {
  System.out.println("list all queues...");

  //Call the listAllQueues method of the DLIClient object to query the queue list.
  List<Queue> queues = client.listAllQueues();
  for (Queue queue : queues) {
    System.out.println("Queue name:" + queue.getQueueName() + "  " + "cu:" + queue.getCuCount());
  }
}
```

4.4 Resource-Related SDKs

Uploading a Resource Package

You can use the interface provided by the DLI to upload resource packages. The code example is as follows:

```
private static void uploadResources(DLIClient client) throws DLIException {
  String kind = "jar";
  String[] paths = new String[1];
  paths[0] = "https://bucketname.obs.cn-north-1.myhuaweicloud.com/jarname.jar";
  String description = "test for sdk";
  //Call the uploadResources method of the DLIClient object to upload resources.
  List<PackageResource> packageResources = client.uploadResources(kind, paths, description);
  System.out.println("---------- uploadResources success ---------");
}
```

NOTE

The **paths** parameter consists of **{*bucketName*}.{*OBS domain name*}/{*jarPath*}/{*jarName*}**.

Querying All Resource Packages

You can use the API provided by DLI to query the list of uploaded resources. Sample code is as follows:

```
private static void listAllResources(DLIClient client) throws DLIException {
  System.out.println("list all resources...");
  //Call the listAllResources method of the DLIClient object to query the queue resource list.
  Resources resources = client.listAllResources();
  for (PackageResource packageResource : resources.getPackageResources()) {
    System.out.println("Package resource name:" + packageResource.getResourceName());
  }
  for (ModuleResource moduleResource : resources.getModuleResources()) {
    System.out.println("Module resource name:" + moduleResource.getModuleName());
  }
}
```

4.5 SDKs Related to SQL Jobs

4.5.1 Database-Related SDKs

Creating a Database

DLI provides an API for creating a database. You can use the API to create a database. The sample code is as follows:

```
private static Database createDatabase(DLIClient client) throws DLIException {
  //Call the createDatabase method of the DLIClient object to create a database.
  String dbName = "databasename";
  Database database = client.createDatabase(dbName);
  System.out.println("create database:" + database);
  return database;
}
```

NOTE

The **default** database is a built-in database. You are not allowed to create a database named **default**.

Deleting a Database

DLI provides an API for deleting a database. The example code is as follows:

```
  //Call the deleteDatabase interface of the Database object to delete a database.
  //Call the getDatabase(String databaseName) interface of the DLIClient object to obtain the Database object.
private static void deletedatabase(Database database) throws DLIException {
   String dbName = "databasename";
   database=client.getDatabase(dbName);
   database.deleteDatabase();
   System.out.println("delete db " + dbName);
}
```

NOTE

- A database that contains tables cannot be deleted. To delete a database that contains tables, delete the tables first.
- A deleted database cannot be restored. Therefore, exercise caution when deleting a database.

Querying All Databases

You can use the API provided by DLI to query the list of created databases. The example code is as follows:

```
private static void listDatabases(DLIClient client) throws DLIException {
  //Call the listAllDatabases method of the DLIClient object to query the database list.
  List<Database> databases = client.listAllDatabases();
  for (Database db : databases) {
    System.out.println("dbName:" + db.getDatabaseName() + " " + "tableCount:" + db.getTableCount());
  }
}
```

4.5.2 Table-Related SDKs

Creating a DLI Table

DLI provides an API for creating DLI tables. You can use it to create a table for storing DLI data. Sample code is as follows:


```
private static Table createDLITable(Database database) throws DLIException {
  //Construct a table column set and instantiate the Column object to construct columns.
  List<Column> columns = new ArrayList<Column>();
  Column c1 = new Column("c1", DataType.STRING, "desc for c1");
  Column c2 = new Column("c2", DataType.INT, "desc for c2");
  Column c3 = new Column("c3", DataType.DOUBLE, "desc for c3");
  Column c4 = new Column("c4", DataType.BIGINT, "desc for c4");
  Column c5 = new Column("c5", DataType.SHORT, "desc for c5");
  Column c6 = new Column("c6", DataType.LONG, "desc for c6");
  Column c7 = new Column("c7", DataType.SMALLINT, "desc for c7");
  Column c8 = new Column("c8", DataType.BOOLEAN, "desc for c8");
  Column c9 = new Column("c9", DataType.DATE, "desc for c9");
  Column c10 = new Column("c10", DataType.TIMESTAMP, "desc for c10");
  Column c11 = new Column("c11", DataType.DECIMAL, "desc for c11");
  columns.add(c1);
  columns.add(c2);
  columns.add(c3);
  columns.add(c4);
  columns.add(c5);
  columns.add(c6);
  columns.add(c7);
  columns.add(c8);
  columns.add(c9);
  columns.add(c10);
  columns.add(c11);

  List<String> sortColumns = new ArrayList<String>();
  sortColumns.add("c1");
  String DLITblName = "tablename";
  String desc = "desc for table";
  //Call the createDLITable method of the Database object to create a DLI table.
  Table table = database.createDLITable(DLITblName, desc, columns, sortColumns);
  System.out.println(table);
  return table;
}
```

NOTE

The default precision of **DataType.DECIMAL** is **(38,5)**. To set the precision of data of the decimal type, perform the following operation:

```
Column c11 = new Column("c11", new DecimalTypeInfo(25,5), "test for c11");
```

Creating an OBS Table

DLI provides an API for creating OBS tables. You can use it to create a table for storing OBS data. The example code is as follows:

```
private static Table createObsTable(Database database) throws DLIException {
  //Construct a table column set and instantiate the Column object to construct columns.
  List < Column > columns = new ArrayList < Column > ();
  Column c1 = new Column("c1", DataType.STRING, "desc for c1");
  Column c2 = new Column("c2", DataType.INT, "desc for c2");
  Column c3 = new Column("c3", DataType.DOUBLE, "desc for c3");
  Column c4 = new Column("c4", DataType.BIGINT, "desc for c4");
  Column c5 = new Column("c5", DataType.SHORT, "desc for c5");
  Column c6 = new Column("c6", DataType.LONG, "desc for c6");
  Column c7 = new Column("c7", DataType.SMALLINT, "desc for c7");
  Column c8 = new Column("c8", DataType.BOOLEAN, "desc for c8");
  Column c9 = new Column("c9", DataType.DATE, "desc for c9");
  Column c10 = new Column("c10", DataType.TIMESTAMP, "desc for c10");
  Column c11 = new Column("c11", DataType.DECIMAL, "desc for c11");
  columns.add(c1);
  columns.add(c2);
  columns.add(c3);
  columns.add(c4);
  columns.add(c5);
  columns.add(c6);
  columns.add(c7);
```



```
    columns.add(c8);
    columns.add(c9);
    columns.add(c10);
    columns.add(c11);
    CsvFormatInfo formatInfo = new CsvFormatInfo();
    formatInfo.setWithColumnHeader(true);
    formatInfo.setDelimiter(",");
    formatInfo.setQuoteChar("\"");
    formatInfo.setEscapeChar("\\");
    formatInfo.setDateFormat("yyyy/MM/dd");
    formatInfo.setTimestampFormat("yyyy-MM-dd HH:mm:ss");
    String obsTblName = "tablename";
    String desc = "desc for table";
    String dataPath = "OBS path";
    //Call the createObsTable method of the Database object to create an OBS table.
    Table table = database.createObsTable(obsTblName, desc, columns,StorageType.CSV , dataPath,
formatInfo);
    System.out.println(table);
    return table;
}
```

NOTE

The default precision of **DataType.DECIMAL** is **(38,5)**. To set the precision of data of the decimal type, perform the following operation:

```
Column c11 = new Column("c11", new DecimalTypeInfo(25,5), "test for c11");
```

Deleting a Table

DLI provides an API for deleting tables. You can use it to delete all the tables in a database. The example code is as follows:

```
private static void deleteTables(Database database) throws DLIException {
  //Call the listAllTables interface of the Database object to query all tables.
  List<Table> tables = database.listAllTables();
  for (Table table : tables) {
  //Traverse tables and call the deleteTable interface of the Table object to delete tables.
    table.deleteTable();
    System.out.println("delete table " + table.getTableName());
  }
}
```

NOTE

A deleted table cannot be restored. Therefore, exercise caution when deleting a table.

Querying All Tables

DLI provides an API for querying tables. You can use it to query all tables in a database. The example code is as follows:

```
private static void listTables(Database database) throws DLIException {
  //Call the listAllTables method of the Database object to query all tables in a database.
  List<Table> tables = database.listAllTables(true);
  for (Table table : tables) {
    System.out.println(table);
  }
}
```


Querying the Partition Information of a Table (Including the Creation and Modification Time of the Partition).

DLI provides an API for querying table partition information. You can use it to query the partition information (including the creation time and modification time) in the database table. The example code is as follows:

```
private static void showPartitionsInfo(DLIClient client) throws DLIException {
    String databaseName = "databasename";
    String tableName = "tablename";
    //Call the showPartitions method of the DLIClient object to query the partition information (including the partition creation and modification time) in the database table.
    PartitionResult partitionResult = client.showPartitions(databaseName, tableName);
    PartitionListInfo partitonInfos = partitionResult.getPartitions();
    //Obtain the creation and modification time of the partition.
    Long createTime = partitonInfos.getPartitionInfos().get(0).getCreateTime().longValue();
    Long lastAccessTime = partitonInfos.getPartitionInfos().get(0).getLastAccessTime().longValue();
    System.out.println("createTime:"+createTime+"\nlastAccessTime:"+lastAccessTime);
}
```

4.5.3 Job-related SDKs

Importing Data

DLI provides an API for importing data. You can use it to import data stored in OBS to a created DLI or OBS table. The example code is as follows:

```
//Instantiate the importJob object. The input parameters of the constructor include the queue, database name, table name (obtained by instantiating the Table object), and data path.
private static void importData(Queue queue, Table DLITable) throws DLIException {
    String dataPath = "OBS Path";
    queue = client.getQueue("queueName");
    CsvFormatInfo formatInfo = new CsvFormatInfo();
    formatInfo.setWithColumnHeader(true);
    formatInfo.setDelimiter(",");
    formatInfo.setQuoteChar("\"");
    formatInfo.setEscapeChar("\\");
    formatInfo.setDateFormat("yyyy/MM/dd");
    formatInfo.setTimestampFormat("yyyy-MM-dd HH:mm:ss");
    String dbName = DLITable.getDb().getDatabaseName();
    String tableName = DLITable.getTableName();
    ImportJob importJob = new ImportJob(queue, dbName, tableName, dataPath);
    importJob.setStorageType(StorageType.CSV);
    importJob.setCsvFormatInfo(formatInfo);
    System.out.println("start submit import table: " + DLITable.getTableName());
    //Call the submit interface of the ImportJob object to submit the data importing job.
    importJob.submit(); //Call the getStatus interface of the ImportJob object to query the status of the data importing job.
    JobStatus status = importJob.getStatus();
    System.out.println("Job id: " + importJob.getJobId() + ", Status : " + status.getName());
}
```


NOTE

- Before submitting the data importing job, you can set the format of the data to be imported. In the sample code, the setStorageType interface of the ImportJob object is called to set the data storage type to csv. The data format is set by calling the setCsvFormatInfo interface of the ImportJob object.
- Before submitting the data import job, you can set the partition of the data to be imported and whether to overwrite the data. You can call the **setPartitionSpec** API of the **ImportJob** object to set the partition information, for example, **importJob.setPartitionSpec(new PartitionSpec("part1=value1,part2=value2"))**. You can also create the partition using parameters when creating the **ImportJob** object. By default, data is appended to an import job. To overwrite the existing data, call the **setOverWrite** API of the **ImportJob** object, for example, **importJob.setOverWrite(Boolean.TRUE)**.
- If a folder and a file under an OBS bucket directory have the same name, data is preferentially loaded to the file, instead of the folder. It is recommended that the files and folders of the same level have different names when you create an OBS object.

Importing the Partition Data

DLI provides an API for importing data. You can use it to import data stored in OBS to a specified partition of the created DLI or OBS table. The example code is as follows:

```
//Instantiate the importJob object. The input parameters of the constructor include the queue, database name, table name (obtained by instantiating the Table object), and data path.
private static void importData(Queue queue, Table DLITable) throws DLIException {
    String dataPath = "OBS Path";
    queue = client.getQueue("queueName");
    CsvFormatInfo formatInfo = new CsvFormatInfo();
    formatInfo.setWithColumnHeader(true);
    formatInfo.setDelimiter(",");
    formatInfo.setQuoteChar("\"");
    formatInfo.setEscapeChar("\\");
    formatInfo.setDateFormat("yyyy/MM/dd");
    formatInfo.setTimestampFormat("yyyy-MM-dd HH:mm:ss");
    String dbName = DLITable.getDb().getDatabaseName();
    String tableName = DLITable.getTableName();
    PartitionSpec partitionSpec = new PartitionSpec("part1=value1,part2=value2");
    Boolean isOverWrite = true;
    ImportJob importJob = new ImportJob(queue, dbName, tableName, dataPath, partitionSpec, isOverWrite);
    importJob.setStorageType(StorageType.CSV);
    importJob.setCsvFormatInfo(formatInfo);
    System.out.println("start submit import table: " + DLITable.getTableName());
    //Call the submit interface of the ImportJob object to submit the data importing job.
    importJob.submit(); //Call the getStatus interface of the ImportJob object to query the status of the data importing job.
    JobStatus status = importJob.getStatus();
    System.out.println("Job id: " + importJob.getJobId() + ", Status : " + status.getName());
}
```

NOTE

- When the **ImportJob** object is created, the partition information **PartitionSpec** can also be directly transferred as the partition character string.
- If some columns are specified as partition columns during **partitionSpec** import but the imported data contains only the specified partition information, the unspecified partition columns after data import contain abnormal values such as null.
- In the example, **isOverWrite** indicates whether to overwrite data. The value **true** indicates that data is overwritten, and the value **false** indicates that data is appended. Currently, **overwrite** is not supported to overwrite the entire table. Only the specified partition can be overwritten. To append data to a specified partition, set **isOverWrite** to **false** when creating the import job.

Exporting Data

DLI provides an interface for exporting data. You can use it to export data from a DLI table to OBS. The example code is as follows:

```
//Instantiate the ExportJob object and transfer the queue, database name, table name (obtained by instantiating the Table object), and storage path of the exported data. The table type must be MANAGED.
private static void exportData(Queue queue, Table DLITable) throws DLIException {
    String dataPath = "OBS Path";
    queue = client.getQueue("queueName");
    String dbName = DLITable.getDb().getDatabaseName();
    String tableName = DLITable.getTableName();
    ExportJob exportJob = new ExportJob(queue, dbName, tableName, dataPath);
    exportJob.setStorageType(StorageType.CSV);
    exportJob.setCompressType(CompressType.GZIP);
    exportJob.setExportMode(ExportMode.ERRORIFEXISTS);
    System.out.println("start export DLI Table data...");
    //Call the submit interface of the ExportJob object to submit the data exporting job.
    exportJob.submit();
    //Call the getStatus interface of the ExportJob object to query the status of the data exporting job.
    JobStatus status = exportJob.getStatus();
    System.out.println("Job id: " + exportJob.getJobId() + ", Status : " + status.getName());
}
```

NOTE

- Before submitting the data exporting job, you can optionally set the data format, compression type, and export mode. In the preceding sample code, the setStorageType, setCompressType, and setExportMode interfaces of the ExportJob object are called to set the data format, compression type, and export mode, respectively. The setStorageType interface supports only the CSV format.
- If a folder and a file under an OBS bucket directory have the same name, data is preferentially loaded to the file, instead of the folder. It is recommended that the files and folders of the same level have different names when you create an OBS object.

Submitting a Job

DLI provides APIs for submitting and querying jobs. You can submit a job by calling the API. You can also call the API to query the job result. The example code is as follows:

```
//Instantiate the SQLJob object and construct input parameters for executing SQL, including the queue, database name, and SQL statements.
private static void runSqlJob(Queue queue, Table obsTable) throws DLIException {
    String sql = "select * from " + obsTable.getTableName();
    String queryResultPath = "OBS Path";
    SQLJob sqlJob = new SQLJob(queue, obsTable.getDb().getDatabaseName(), sql);
    System.out.println("start submit SQL job...");
    //Call the submit interface of the SQLJob object to submit the querying job.
    sqlJob.submit();
    //Call the getStatus interface of the SQLJob object to query the status of the querying job.
    JobStatus status = sqlJob.getStatus();
    System.out.println(status);
    System.out.println("start export Result...");
    //Call the exportResult interface of the SQLJob object to export the query result. queryResultPath refers to the path of the data to be exported.
    sqlJob.exportResult(queryResultPath, StorageType.CSV,
            CompressType.GZIP, ExportMode.ERRORIFEXISTS, null);
    System.out.println("Job id: " + sqlJob.getJobId() + ", Status : " + status.getName());
}
```


Canceling a Job

DLI provides an API for canceling jobs. You can use it to cancel all jobs in the **Launching** or **Running** state. The following sample code is used for canceling jobs in the **Launching** state:

```
private static void cancelSqlJob(DLIClient client) throws DLIException {

 List<JobResultInfo> jobResultInfos = client.listAllJobs(JobType.QUERY);
 for (JobResultInfo jobResultInfo : jobResultInfos) {
     //Cancel jobs in the LAUNCHING state.
     if (JobStatus.LAUNCHING.equals(jobResultInfo.getJobStatus())) {
         //Cancel the job of a specific job ID.
         client.cancelJob(jobResultInfo.getJobId());
     }
 }
}
```

Querying All Jobs

DLI provides an API for querying jobs. You can use it to query information about all jobs in the current project. The example code is as follows:

```
private static void listAllSqlJobs(DLIClient client) throws DLIException {
   //Return the collection of JobResultInfo lists.
    List < JobResultInfo > jobResultInfos = client.listAllJobs();
   //Traverse the JobResultInfo lists to view job information.
    for (JobResultInfo jobResultInfo: jobResultInfos) {
        //job id
        System.out.println(jobResultInfo.getJobId());
        //Job description
        System.out.println(jobResultInfo.getDetail());
        //job status
        System.out.println(jobResultInfo.getJobStatus());
        //job type
        System.out.println(jobResultInfo.getJobType());
    }
   //Filter the query result by job type.
    List < JobResultInfo > jobResultInfos1 = client.listAllJobs(JobType.DDL);
   //Filter the query result by job type and start time that is in the Unix timestamp format.
    List < JobResultInfo > jobResultInfos2 = client.listAllJobs(1502349803729L, 1502349821460L,
JobType.DDL);
   //Filter the query result by page.
    List < JobResultInfo > jobResultInfos3 = client.listAllJobs(100, 1, JobType.DDL);
   //Filter the query result by page, start time, and job type.
    List < JobResultInfo > jobResultInfos4 = client.listAllJobs(100, 1, 1502349803729L, 1502349821460L,
JobType.DDL);
}
```

NOTE

Parameters in the OVERWRITE method can be set to **null**, indicating that no filter conditions are specified. Ensure that all parameters are set to valid values. If the page parameter is set to **-1**, the query will fail.

Querying Job Results

DLI provides an API for querying job results. You can use it to query information about a job of the specific job ID. The example code is as follows:

```
private static void getJobResultInfo(DLIClient client) throws DLIException {
    String jobId = "4c4f7168-5bc4-45bd-8c8a-43dfc85055d0";
    JobResultInfo jobResultInfo = client.queryJobResultInfo(jobId);
   //View information about a job.
    System.out.println(jobResultInfo.getJobId());
    System.out.println(jobResultInfo.getDetail());
    System.out.println(jobResultInfo.getJobStatus());
```



```
    System.out.println(jobResultInfo.getJobType());
}
```

Querying Jobs of the SQL Type

DLI provides an API for querying SQL jobs. You can use it to query information about recently executed jobs submitted using SQL statements in the current project. The example code is as follows:

```
private static void getJobResultInfos(DLIClient client) throws DLIException {

 //Return the collection of JobResultInfo lists.
 List<JobResultInfo> jobResultInfos = client.listSQLJobs();
 //Traverse the list to view job information.
 for (JobResultInfo jobResultInfo : jobResultInfos) {
       //job id
       System.out.println(jobResultInfo.getJobId());
       //Job description
       System.out.println(jobResultInfo.getDetail());
       //job status
       System.out.println(jobResultInfo.getJobStatus());
       //job type
       System.out.println(jobResultInfo.getJobType());
  }
}
```

Exporting Query Results

DLI provides an API for exporting query results. You can use the API to export the query job result submitted in the editing box of the current project. The example code is as follows:

```
 //Instantiate the SQLJob object and construct input parameters for executing SQL, including the queue, database name, and SQL statements.
 private static void exportSqlResult(Queue queue, Table obsTable) throws DLIException {
   String sql = "select * from " + obsTable.getTableName();
   String queryResultPath = "OBS Path";
   SQLJob sqlJob = new SQLJob(queue, obsTable.getDb().getDatabaseName(), sql);
   System.out.println("start submit SQL job...");
   //Call the submit interface of the SQLJob object to submit the querying job.
    sqlJob.submit();
   //Call the getStatus interface of the SQLJob object to query the status of the querying job.
    JobStatus status = sqlJob.getStatus();
    System.out.println(status);
    System.out.println("start export Result...");
   //Call the exportResult interface of the SQLJob object to export the query result. exportPath indicates the path for exporting data. JSON indicates the export format. queueName indicates the queue for executing the export job. limitNum indicates the number of results of the export job. 0 indicates that all data is exported.
   sqlJob.exportResult(exportPath + "result", StorageType.JSON, CompressType.NONE,
       ExportMode.ERRORIFEXISTS, queueName, true, 5);
 }
```

4.6 SDKs Related to Flink Jobs

Creating a SQL Job

DLI provides an API for creating a Flink streaming SQL job. You can use it to create a Flink streaming SQL job and submit it to DLI. Sample code is as follows:

```
private static void createSQLJob(DLIClient client) throws DLIException {
   SubmitFlinkSqlJobRequest body = new SubmitFlinkSqlJobRequest();
   body.name("job-name");
   body.runMode(SubmitFlinkSqlJobRequest.RunModeEnum.SHARED_CLUSTER);
```



```
    body.checkpointEnabled(false);
    body.checkpointMode(1);
    body.jobType(SubmitFlinkSqlJobRequest.JobTypeEnum.JOB);
    JobStatusResponse result = client.submitFlinkSqlJob(body);
    System.out.println(result);
}
```

Customizing a Job

DLI provides an API for creating a user-defined Flink job. Currently, the job supports the JAR format and runs in dedicated queues. The example code is as follows:

```
private static void createFlinkJob(DLIClient client) throws DLIException {
    CreateFlinkJarJobRequest body = new CreateFlinkJarJobRequest();
    body.name("jar-job");
    body.cuNumber(2);
    body.managerCuNumber(1);
    body.parallelNumber(1);
    body.entrypoint("dli/WindowJoin.jar");
    JobStatusResponse result = client.createFlinkJarJob(body);
    System.out.println(result);
}
```

Updating a SQL Job

DLI provides an API for updating Flink streaming SQL jobs. You can use it to update a Flink streaming SQL job. Sample code is as follows:

```
private static void updateSQLJob(DLIClient client) throws DLIException {
    UpdateFlinkSqlJobRequest body = new UpdateFlinkSqlJobRequest();
    body.name("update-job");
    JobUpdateResponse result = client.updateFlinkSqlJob(body,203L);
    System.out.println(result);
}
```

Updating a Custom Job

DLI provides an API for updating user-defined Flink jobs. You can use it to update custom jobs, which currently support the JAR format and run in dedicated queues. The example code is as follows:

```
  private static void updateFlinkJob(DLIClient client) throws DLIException {
      UpdateFlinkJarJobRequest body = new UpdateFlinkJarJobRequest();
      body.name("update-job");
      JobUpdateResponse result = client.updateFlinkJarJob(body,202L);
      System.out.println(result);
  }
```

Querying the List of Jobs

DLI provides an API for querying the Flink job list. The following parameters are involved in this API: **name**, **status**, **show_detail**, **cursor**, **next**, **limit**, and **order**. In this example, the query results are displayed in descending order and information about the jobs whose IDs are less than the value of **cursor** is displayed. The example code is as follows:

```
private static void  QueryFlinkJobListResponse(DLIClient client) throws DLIException {
      QueryFlinkJobListResponse result = client.getFlinkJobs(null, "job_init", null, true, 0L, 10, null,
null,null,null,null);
      System.out.println(result);
  }
```


Querying Job Details

DLI provides an API for querying Flink job details. The example code is as follows:

```
private static void  getFlinkJobDetail(DLIClient client) throws DLIException {
Long jobId = 203L; //Job ID
    GetFlinkJobDetailResponse result = client.getFlinkJobDetail(jobId);
    System.out.println(result);
}
```

Querying the Job Execution Plan Diagram

DLI provides an API for querying the execution plan of a Flink job. The example code is as follows:

```
private static void  getFlinkJobExecuteGraph(DLIClient client) throws DLIException {
Long jobId = 203L; //Job ID
        FlinkJobExecutePlanResponse result = client.getFlinkJobExecuteGraph(jobId);
        System.out.println(result);
    }
```

Querying Job Monitoring Information

DLI provides an API for querying Flink job monitoring information. Monitoring information about multiple jobs can be queried at the same time. The example code is as follows:

```
public static void getMetrics(DLIClient client) throws DLIException{
    List < Long > job_ids = new ArrayList < > ();
    Long jobId = 6316L; //Job 1 ID
    Long jobId2 = 6945L; //Job 2 ID
    job_ids.add(jobId);
    job_ids.add(jobId2);
    GetFlinkJobsMetricsBody body = new GetFlinkJobsMetricsBody();
    body.jobIds(job_ids);
    QueryFlinkJobMetricsResponse result = client.getFlinkJobsMetrics(body);
    System.out.println(result);
}
```

Querying the APIG Address of a Job

DLI provides an API for querying the APIG access address of a Flink job. The example code is as follows:

```
 private static void  getFlinkApigSinks(DLIClient client) throws DLIException {
        Long jobId = 59L; //Job 1 ID
        FlinkJobApigSinksResponse result = client.getFlinkApigSinks(jobId);
        System.out.println(result);
    }
```

Running a Job

DLI provides APIs for running Flink jobs. The example code is as follows:

```
    public static void runFlinkJob(DLIClient client) throws DLIException{
      RunFlinkJobRequest body = new RunFlinkJobRequest();
        List<Long> jobIds = new ArrayList<>();
        Long jobId = 59L; //Job 1 ID
        Long jobId2 = 192L; //Job 2 ID
        jobIds.add(jobId);
        jobIds.add(jobid2);
        body.resumeSavepoint(false);
        body.jobIds(jobIds);
```



```
    List<GlobalBatchResponse> result = client.runFlinkJob(body);
    System.out.println(result);
  }
```

Stopping a Job

DLI provides an API for stopping Flink jobs. The example code is as follows:

```
  public static void stopFlinkJob(DLIClient client) throws DLIException{
    StopFlinkJobRequest body = new StopFlinkJobRequest();
    List<Long> jobIds = new ArrayList<>();
    Long jobId = 59L; //Job 1 ID
    Long jobId2 = 192L; //Job 2 ID
    jobIds.add(jobId);
    jobIds.add(jobid2);
    body.triggerSavepoint(false);
    body.jobIds(jobIds);
    List<GlobalBatchResponse> result = client.stopFlinkJob(body);
    System.out.println(result);
  }
```

Deleting Jobs in Batches

DLI provides an API for deleting Flink jobs in batches. You can use the API to batch delete Flink jobs in any status. The example code is as follows:

```
public static void deleteFlinkJob(DLIClient client) throws DLIException{
   DeleteJobInBatchRequest  body = new DeleteJobInBatchRequest ();
   List<Long> jobIds = new ArrayList<>();
   Long jobId = 202L; //Job 1 ID
   Long jobid2 = 203L; //Job 2 ID
   jobIds.add(jobId);
   jobIds.add(jobid2);
   body.jobIds(jobIds);
   List<GlobalBatchResponse>  result = client. deleteFlinkJobInBatch(body);
   System.out.println(result);
}
```

4.7 SDKs Related to Spark Jobs

Submitting Batch Jobs

DLI provides an API to perform batch jobs. Sample code is as follows:

```
private static void runBatchJob(Cluster cluster) throws DLIException {
   SparkJobInfo jobInfo = new SparkJobInfo();
   jobInfo.setClassName("your.class.name");
   jobInfo.setFile("xxx.jar");
   jobInfo.setCluster_name("queueName");
  //Call the asyncSubmit API of the BatchJob object to submit the batch job.
   BatchJob job = new BatchJob(cluster, jobInfo);
   job.asyncSubmit();
   while (true) {
      SparkJobStatus jobStatus = job.getStatus();
      if (SparkJobStatus.SUCCESS.equals(jobStatus)) {
         System.out.println("Job finished");
         return;
      }
      if (SparkJobStatus.DEAD.equals(jobStatus)) {
         throw new DLIException("The batch has already exited");
      }
      try {
         Thread.sleep(1000);
      } catch (InterruptedException e) {
```



```
            e.printStackTrace();
        }
    }
}
```

NOTE

- A cluster is a queue created by a user.
- The input parameter cannot be in JSON format.
- DLI provides the following two APIs related to batch jobs:
  - asyncSubmit: This API is asynchronous. After the API is submitted, the job result is directly returned.
  - submit: This API is synchronous. After the API is submitted, the result is returned only after job execution is complete.

Deleting Batch Jobs

DLI provides an API for deleting batch processing jobs. The example code is as follows:

```
private static void deleteBatchJob(DLIClient client) throws DLIException {
   //Submit the ID of the Spark batch processing job.
    String batchId = "0aae0dc5-f009-4b9b-a8c3-28fbee399fa6";
   //Call the delBatch interface of the Batch Job object to cancel the batch job.
    MessageInfo messageInfo = client.delBatchJob(batchId);
    System.out.println(messageInfo.getMsg());
}
```

Querying All Batch Jobs

DLI provides an API for querying batch processing jobs. You can use it to query all batch jobs of the current project. The example code is as follows:

```
private static void listAllBatchJobs(DLIClient client) throws DLIException {
  System.out.println("list all batch jobs...");
  //Call the listAllBatchJobs method of the DLIClient object to query the batch jobs.
  String queueName = "queueName";
  int from = 0;
  int size = 1000;
 //Paging, start page, size of each page
  List<SparkJobResultInfo> jobResults = client.listAllBatchJobs(queueName, from, size);
  for (SparkJobResultInfo jobResult : jobResults) {
    // job id
    System.out.println(jobResult.getId());
    // job app id
    System.out.println(jobResult.getAppId());
    //Job status
    System.out.println(jobResult.getState());
  }
}
```

4.8 SDKs Related to Flink Job Templates

Creating a Job Template

DLI provides an API for creating a Flink job template. The example code is as follows:

```
public static void createFlinkJobTemplate(DLIClient client) throws DLIException{
    CreateFlinkJobTemplateRequest body = new CreateFlinkJobTemplateRequest();
    body.name("template");
```



```
    FlinkJobTemplateCreateResponse  result = client.createFlinkJobTemplate(body);
    System.out.println(result);
}
```

Updating a Job Template

DLI provides an API for updating a Flink job template. The example code is as follows:

```
  public static void updateFlinkJobTemplate(DLIClient client) throws DLIException{
      Long templateId = 277L; //Template ID
      UpdateFlinkJobTemplateRequest body = new UpdateFlinkJobTemplateRequest();
      body.name("template-update");
      GlobalResponse result = client.updateFlinkJobTemplate(body,templateId);
      System.out.println(result);
  }
```

Deleting a Job Template

DLI provides an API for deleting a Flink job template. A template used by jobs can also be deleted. The example code is as follows:

```
public static void deleteFlinkJobTemplate(DLIClient client) throws DLIException{
    Long templateId = 277L; //Template ID
    FlinkJobTemplateDeleteResponse result = client.deleteFlinkJobTemplate(templateId);
    System.out.println(result);
}
```

Querying the List of Job Templates

DLI provides an API for querying Flink job templates. In this example, the query results are displayed in descending order and information about the job templates whose IDs are less than the value of **cursor** is displayed. The example code is as follows:

```
  public static void getFlinkJobTemplates(DLIClient client) throws DLIException{
      Long offset = 789L; // Long | Template offset.
      Integer limit = 56; // Integer | Maximum number of records that can be queried.
      String order = "asc"; // String | Query result display. The query results can be displayed in ascending or
descending order.
      FlinkJobTemplateListResponse result = client.getFlinkJobTemplates(offset,limit,order);
      System.out.println(result);
  }
```


5 Python SDK

5.1 Initializing the DLI Client

To use DLI Python SDK to access DLI, you need to initialize the DLI client. During DLI client initialization, you can perform authentication using the AK/SK or token. The sample code is as follows:

Example Code for AK/SK Authentication

```
def init_aksk_dli_client():
    auth_mode = 'aksk'
    region = 'cn-north-1'
    project_id = 'xxxx'
    ak = 'xxxx'
    sk = 'xxxx'
    dli_client = DliClient(auth_mode=auth_mode, region=region, project_id=project_id,ak=ak, sk=sk)
    return dli_client
```

NOTE

You can perform the following operations to obtain the **Access Keys**, **project ID**, and **Region**:

1. Register with and log in to the management console.
2. Click the username in the upper right corner and select **My Credentials** from the drop-down list.
3. On the **My Credentials** page:
   - Click **Access Keys** to view the created access key.
   - Click **Projects** to view the **project ID** and **Region**.

Example Code for Token-based Authentication

```
def init_token_dli_client():
    auth_mode = 'token'
    region = 'cn-north-1'
    project_id = 'xxxx'
    account = 'huaweicloud_account'
    user = 'xxxx'
    password = 'xxxx'
    dli_client = DliClient(auth_mode=auth_mode, region=region, project_id=project_id,account=account,
user=user, password=password)
    return dli_client
```


NOTE

You can change the endpoint in **set** mode. Run the following statement: **dliInfo.setServerEndpoint(endpoint)**.

5.2 Queue-Related SDKs

Querying All Queues

You can use the API provided by DLI to query the queue list and select the corresponding queue to execute the job. Sample code is as follows:

```
def list_all_queues(dli_client):
    try:
       queues = dli_client.list_queues()
    except DliException as e:
        print(e)
        return

    for queue in queues:
        print(queue.name)
```

5.3 Resource-Related SDKs

Uploading a Resource Package

You can use the APIs provided by DLI to upload resource packages. The example code is as follows:

```
def upload_resource(dli_client, kind, obs_jar_paths, group_name):
    try:
        dli_client.upload_resource(kind, obs_jar_paths, group_name)
    except DliException as e:
        print(e)
        return
```

NOTE

The **obs_jar_paths** is a collection.

Querying All Resource Packages

You can use the API provided by DLI to query the list of uploaded resources. The example code is as follows:

```
def list_resources(dli_client):
    try:
        resources = dli_client.list_resources()
    except DliException as e:
        print(e)
        return

    for resources_info in resources.package_resources:
        print('Package resource name:' + resources_info.resource_name)

    for group_resource in resources.group_resources:
        print('Group resource name:' + group_resource.group_name)
```


5.4 SDKs Related to SQL Jobs

5.4.1 Database-Related SDKs

Creating a Database

DLI provides an API for creating a database. You can use it to create a database. The sample code is as follows:

```
def create_db(dli_client):
    try:
        db = dli_client.create_database('db_for_test')
    except DliException as e:
        print(e)
        return

    print(db)
```

NOTE

The **default** database is a built-in database. You are not allowed to create a database named **default**.

Deleting a Database

DLI provides an API for deleting a database. The example code is as follows:

```
def delete_db(dli_client, db_name):
    try:
        dli_client.delete_database(db_name)
    except DliException as e:
        print(e)
        return
```

NOTE

- A database that contains tables cannot be deleted. To delete a database that contains tables, delete the tables first.
- A deleted database cannot be restored. Therefore, exercise caution when deleting a database.

Querying All Databases

DLI provides an API for querying the database list. The example code is as follows:

```
def list_all_dbs(dli_client):
    try:
        dbs = dli_client.list_databases()
    except DliException as e:
        print(e)
        return

    for db in dbs:
        print(db)
```


5.4.2 Table-Related SDKs

Creating a DLI Table

DLI provides an API for creating DLI tables. Sample code is as follows:

```
def create_dli_tbl(dli_client, db_name, tbl_name):
    cols = [
        Column('col_1', 'string'),
        Column('col_2', 'string'),
        Column('col_3', 'smallint'),
        Column('col_4', 'int'),
        Column('col_5', 'bigint'),
        Column('col_6', 'double'),
        Column('col_7', 'decimal(10,0)'),
        Column('col_8', 'boolean'),
        Column('col_9', 'date'),
        Column('col_10', 'timestamp')
    ]
    sort_cols = ['col_1']
    tbl_schema = TableSchema(tbl_name, cols, sort_cols)
    try:
        table = dli_client.create_dli_table(db_name, tbl_schema)
    except DliException as e:
        print(e)
        return

    print(table)
```

Creating an OBS Table

DLI provides an API for creating OBS tables. The example code is as follows:

```
def create_obs_tbl(dli_client, db_name, tbl_name):
    cols = [
        Column('col_1', 'string'),
        Column('col_2', 'string'),
        Column('col_3', 'smallint'),
        Column('col_4', 'int'),
        Column('col_5', 'bigint'),
        Column('col_6', 'double'),
        Column('col_7', 'decimal(10,0)'),
        Column('col_8', 'boolean'),
        Column('col_9', 'date'),
        Column('col_10', 'timestamp')
    ]
    tbl_schema = TableSchema(tbl_name, cols)
    try:
        table = dli_client.create_obs_table(db_name, tbl_schema,
                                            'obs://bucket/obj',
                                            'csv')
    except DliException as e:
        print(e)
        return

    print(table)
```

NOTE

You need to create an OBS path in advance and specify it when creating an OBS table.

Deleting a Table

DLI provides an API for deleting tables. The example code is as follows:


```
def delete_tbls(dli_client, db_name):
    try:
        tbls = dli_client.list_tables(db_name)
        for tbl in tbls:
            dli_client.delete_table(db_name, tbl.name)
    except DliException as e:
        print(e)
        return
```

NOTE

A deleted table cannot be restored. Therefore, exercise caution when deleting a table.

Querying All Tables

DLI provides an API for querying tables. The example code is as follows:

```
def list_all_tbls(dli_client, db_name):
    try:
        tbls = dli_client.list_tables(db_name, with_detail=True)
    except DliException as e:
        print(e)
        return

    for tbl in tbls:
        print(tbl.name)
```

5.4.3 Job-related SDKs

Importing Data

DLI provides an API for importing data. Sample code is as follows:

```
def import_data(dli_client, db_name, tbl_name, queue_name):
    options = {
        "with_column_header": True,
        "delimiter": ",",
        "quote_char": "\"",
        "escape_char": "\\",
        "date_format": "yyyy/MM/dd",
        "timestamp_format": "yyyy/MM/dd hh:mm:ss"
        }

    try:
        job_id, status = \
            dli_client.import_table(tbl_name, db_name,
                                    'obs://bucket/obj/data.csv',
                                    'csv',
                                    queue_name=queue_name,
                                    options=options)
    except DliException as e:
        print(e)
        return

    print(job_id)
    print(status)
```

NOTE

- Before submitting the importing job, you can specify the **data_type** parameter to set the type of the data to be imported. For example, set **data_type** to **csv**. Use the **options** parameter to set details about the CSV data format, such as the delimiter and escape character.
- If a folder and a file under an OBS bucket directory have the same name, data is preferentially loaded to the file, instead of the folder. It is recommended that the files and folders of the same level have different names when you create an OBS object.

Exporting Data

DLI provides an API for exporting data. The example code is as follows:

```
def export_data(dli_client, db_name, tbl_name, queue_name):
    try:
        job_id, status = dli_client.export_table(tbl_name, db_name,
                                                 'obs://bucket/obj',
                                                 queue_name=queue_name)
    except DliException as e:
        print(e)
        return

    print(job_id)
    print(status)
```

NOTE

- Before submitting the export job, you can set the data format, compression type, and export mode. The data can only be exported in the CSV format.
- If a folder and a file under an OBS bucket directory have the same name, data is preferentially loaded to the file, instead of the folder. It is recommended that the files and folders of the same level have different names when you create an OBS object.

Submitting a Job

DLI provides an API for querying jobs. The example code is as follows:

```
def run_sql(dli_client, db_name, queue_name):
    # execute SQL
    try:
        sql_job = dli_client.execute_sql('select * from tbl_dli_for_test', db_name)
        result_set = sql_job.get_result()
    except DliException as e:
        print(e)
        return

    if result_set.row_count == 0:
        return

    for row in result_set:
        print(row)

    # export the query result to obs
    try:
        status = sql_job.export_result('obs://bucket/obj',
                                       queue_name=queue_name)
    except DliException as e:
        print(e)
        return

    print(status)
```

Canceling a Job

DLI provides an API for canceling jobs. You can use it to cancel a submitted job. A job that has been completed or failed cannot be canceled. The example code is as follows:

```
def cancel_sql(dli_client, job_id):
    try:
        dli_client.cancel_sql(job_id)
    except DliException as e:
        print(e)
        return
```


Querying All Jobs

DLI provides an API for querying all jobs. You can use the API to query information about all jobs in the current project and obtain the query result. The example code is as follows:

```
def list_all_sql_jobs(dli_client):
    try:
        sql_jobs = dli_client.list_sql_jobs()
    except DliException as e:
        print(e)
        return
    for sql_job in sql_jobs:
        print(sql_job)
```

5.5 SDKs Related to Spark Jobs

Submitting Batch Jobs

DLI provides an API to perform batch jobs. The example code is as follows:

```
def submit_spark_batch_job(dli_client, batch_queue_name, batch_job_info):
    try:
        batch_job = dli_client.submit_spark_batch_job(batch_queue_name, batch_job_info)
    except DliException as e:
        print(e)
        return

    print(batch_job.job_id)
    while True:
        time.sleep(3)
        job_status = batch_job.get_job_status()
        print('Job status: {0}'.format(job_status))
        if job_status == 'dead' or job_status == 'success':
            break

    logs = batch_job.get_driver_log(500)
    for log_line in logs:
        print(log_line)
```

Canceling a Batch Processing Job

DLI provides an API for canceling batch processing jobs. If the job execution is complete or fails, you cannot cancel this job. The example code is as follows:

```
def del_spark_batch(dli_client, batch_id):
    try:
        resp = dli_client.del_spark_batch_job(batch_id)
        print(resp.msg)
    except DliException as e:
        print(e)
        return
```


6 Change History

Date	Description
2020-4-28	This issue is the tenth official release. Adjusted the document structure.
2019-8-30	This issue is the ninth official release. Adjusted the chapter directory and highlighted the code.
2019-8-16	This is the eighth official release. Changed Cluster to Queue.
2019-1-20	This is the seventh official release. The Python SDK supported complex data types.
2018-11-15	This issue is the sixth official release. The Java SDK supported complex data types.
2018-9-26	This issue is the fifth official release, which incorporates the following new sections: ● Creating or Deleting a Queue ● Querying the Queue List ● Uploading a Resource Package ● Querying the Resource List ● Executing Batch Jobs ● Querying All Batch Jobs
2018-7-26	This issue is the fourth official release, which incorporates the following changes: ● Added descriptions about Python SDK.
2018-04-23	This issue is the third official release and incorporates the following changes: ● Changed the service name from UQuery to DLI.

Date	Description
2018-02-24	This issue is the second official release, which incorporates the following changes: • Modified the address for downloading the SDK installation package in **Downloading SDK**.
2018-02-08	This issue is the first commercial release.

