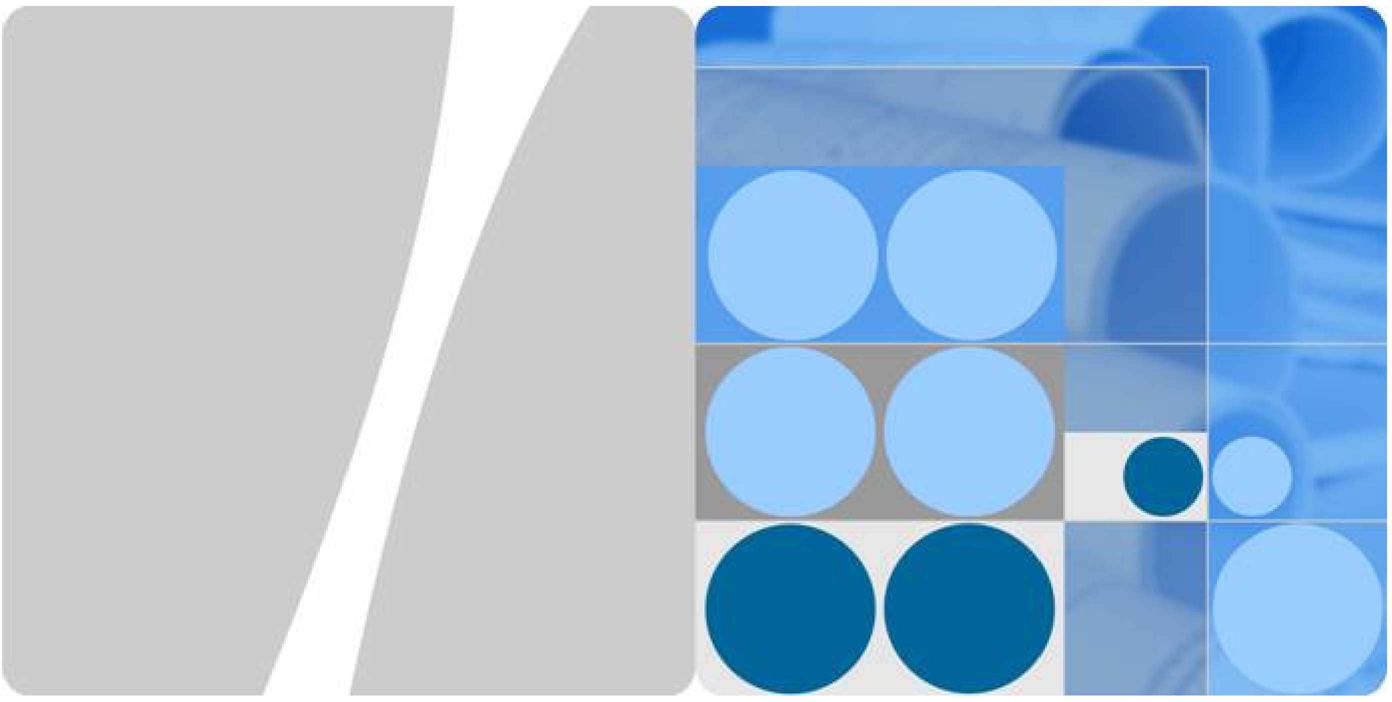


API Gateway

Developer Guide

Date **2022-08-16**

Contents

1 Overview

- Call APIs in different authentication modes. For details, see **Authentication Mode Selection** to **Calling APIs Through IAM Authentication**.
- Call APIs using a custom authorizer. For details, see **Creating a Function for Frontend Custom Authentication** to **Creating a Function for Backend Custom Authentication**.
- Create signatures to keep backend service access secure. For details, see **Creating Signatures for Backend Requests**.
- Import APIs from Swagger files, or export APIs from API Gateway. For details, see **Importing and Exporting APIs**.

2 Authentication Mode Selection

API Providers

The following authentication methods are available for calling APIs:

- **App authentication** (recommended)

  API callers will be authenticated using the AppKey and AppSecret issued by API Gateway.

  a. This authentication mode is provided for API Gateway tenants.

- **IAM authentication**

  Token and AK/SK authentication is supported.

  – Token authentication: Requests are authenticated using a token. This authentication mode is recommended because it requires no SDK signatures.

  – AK/SK authentication: Requests are signed using an AK and SK in the same way as in app authentication mode.

  This authentication mode is provided for API Gateway tenants.

- **Custom authentication**

  You can compile a function in FunctionGraph and use it for authentication. For details about API calling, see **Creating a Function for Frontend Custom Authentication**.

- **None**

  APIs with None authentication require no authentication of users accessing these APIs.

  a. It is intended for all public network users.

API Callers

1. If you obtain an API from an offline channel, contact the API provider to confirm the authentication mode, and then call the API according to the instructions in this document.

3 Calling APIs Through App Authentication

3.1 Preparation

Before calling APIs in App authentication mode, complete the following operations:

- Obtain the domain name, request URL, and request method of the API.

  View the settings by choosing **API Call** > **API Request** on the API details page.
- Publish the API in an environment before you can access it.

  To view the environment in which the API is published, choose **API Call** > **API Request** on the details page.
- Provide a valid AppKey and AppSecret to generate an authentication signature.

  Create an app on the **API Calling** > **Apps** page and bind it to the API. Then you can use the AppKey and AppSecret of the app to access the API. View the AppKey and AppSecret on the app details page.

  NOTE

  - AppKey: access key ID of the app. It is the unique ID associated with a secret access key. The AppKey and AppSecret are together used to obtain an encrypted signature for a request.
  - AppSecret: secret access key used together with an AppKey to sign requests. The AppKey and AppSecret can be together used to identify a request sender to prevent the request from being modified.
- When sending an API request, add the current time to the **X-Sdk-Date** header and the signature information to the **Authorization** header.

CAUTION

The local time on the client must be synchronized with the clock server to avoid a large error in the value of the **X-Sdk-Date** request header.

API Gateway checks the time format and compares the time with the time when API Gateway receives the request. If the time difference exceeds 15 minutes, API Gateway will reject the request.

3.2 App Authentication

1. Construct a standard request.

   Assemble the request content according to the rules of API Gateway (API Management), ensuring that the client signature is consistent with that in the backend request.
2. Create a to-be-signed string using the standard request and other related information.
3. Calculate a signature using the AK/SK and to-be-signed string.
4. Add the generated signature to an HTTP request as a header or query parameter.
5. After receiving the request, API Gateway performs 1 to 3 to calculate a signature.
6. The new signature is compared with the signature generated in 3. If they are consistent, the request is processed; otherwise, the request is rejected.

NOTE

The body of a signing request in app authentication mode cannot exceed 12 MB.

Step 1: Constructing a Standard Request

To access an API through app authentication, standardize the request content, and then sign the request. The client must follow the same request specifications as API Gateway so that each HTTP request can obtain the same signing result from the frontend and backend to complete identity authentication.

The pseudocode of standard HTTP requests is as follows:

```
CanonicalRequest =
    HTTPRequestMethod + '\n' +
    CanonicalURI + '\n' +
    CanonicalQueryString + '\n' +
    CanonicalHeaders + '\n' +
    SignedHeaders + '\n' +
    HexEncode(Hash(RequestPayload))
```

The following example shows how to construct a standard request.

Original request:

```
GET https://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com/app1?b=2&a=1 HTTP/1.1
Host: c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com
X-Sdk-Date: 20191111T093443Z
```

1. Specify an HTTP request method (**HTTPRequestMethod**) and end with a carriage return line feed (CRLF).

For example:

```
GET
```

2. Add a standard URI (**CanonicalURI**) and end with a CRLF.

   Description

   Path of the requested resource, which is the URI code of the absolute path.

   Format

   According to RFC 3986, each part of a standard URI except the redundant and relative paths must be URI-encoded. If a URI does not end with a slash (/), add a slash at its end.

   Example

   For the URI **/app1**, the standard URI code is as follows:

   ```
   GET
   /app1/
   ```

   NOTE

   During signature calculation, the URI must end with a slash (/). When a request is sent, the URI does not need to end with a slash (/).

3. Add a standard query string (**CanonicalQueryString**) and end with a CRLF.

   Description

   Query parameters. If no query parameters are configured, the query string is an empty string.

   Format

   Standard query strings must meet the following requirements:

   – Perform URI encoding on each parameter and value according to the following rules:

     ▪ Do not perform URI encoding on any non-reserved characters defined in RFC 3986, including A–Z, a–z, 0–9, hyphen (-), underscore (_), period (.), and tilde (~).

     ▪ Use **%XY** to perform percent encoding on all non-reserved characters. **X** and **Y** indicate hexadecimal characters (0–9 and A–F). For example, the space character must be encoded as **%20**, and an extended UTF-8 character must be encoded in the "%XY%ZA%BC" format.

   – Add "*URI-encoded parameter name* = *URI-encoded parameter value*" to each parameter. If no value is specified, use a null string instead. The equal sign (=) is required.

     For example, in the following string that contains two parameters, the value of parameter **parm2** is null.

     ```
     parm1=value1&parm2=
     ```

   – Sort the parameters in alphabetically ascending order. For example, a parameter starting with uppercase letter **F** precedes another parameter starting with lowercase letter **b**.

   – Construct standard query strings from the first parameter after sorting.

   Example

   The following example contains two optional parameters **a** and **b**.

```
GET
/app1/
a=1&b=2
```

4. Add standard headers (**CanonicalHeaders**) and end with a CRLF.

Description

List of standard request headers, including all HTTP message headers in the to-be-signed request. The **X-Sdk-Date** header must be included to verify the signing time, which is in the UTC time format *YYYYMMDDTHHMMSSZ* as specified in ISO 8601. When publishing an API in a non-RELEASE environment, you need to specify an environment name.

NOTICE

The local time on the client must be synchronized with the clock server to avoid a large error in the value of the **X-Sdk-Date** request header.

API Gateway checks the time format and compares the time with the time when API Gateway receives the request. If the time difference exceeds 15 minutes, API Gateway will reject the request.

Format

CanonicalHeaders consists of multiple message headers, for example, **CanonicalHeadersEntry0 + CanonicalHeadersEntry1 + ...**. Each message header (**CanonicalHeadersEntry**) is in the format of **Lowercase(HeaderName) + ':' + Trimall(HeaderValue) + '\n'**.

NOTE

- **Lowercase**: a function for converting all letters into lowercase letters.
- **Trimall**: a function for deleting the spaces before and after a value.
- The last message header carries a CALF. Therefore, an empty line appears because the **CanonicalHeaders** field also contains a CALF according to the specifications.
- The message header name must be unique. Otherwise, authentication fails.

Example

```
GET
/app1/
a=1&b=2
host:c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com
x-sdk-date:20191111T093443Z
```

NOTICE

Standard message headers must meet the following requirements:

- All letters in a header are converted to lowercase letters, and all spaces before and after the header are deleted.
- All headers are sorted in alphabetically ascending order.

For example, the original headers are as follows:

```
Host: c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com\n
Content-Type: application/json;charset=utf8\n
My-header1:    a   b   c  \n
X-Sdk-Date:20191111T093443Z\n
My-Header2:    "a   b   c"  \n
```

A standard header is as follows:

```
content-type:application/json;charset=utf8\n
host:c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com\n
my-header1:a   b   c\n
my-header2:"a   b   c"\n
x-sdk-date:20191111T093443Z\n
```

5. Add message headers (**SignedHeaders**) for request signing, and end with a CALF.

   Description

   List of message headers used for request signing. This step is to determine which headers are used for signing the request and which headers can be ignored during request verification. The **X-Sdk-date** header must be included.

   Format

   SignedHeaders = Lowercase(HeaderName0) + ';' + Lowercase(HeaderName1) + ";" + ...

   Letters in the message headers are converted to lowercase letters. All headers are sorted alphabetically and separated with commas.

   Lowercase is a function for converting all letters into lowercase letters.

   Example

   In the following example, two message headers **host** and **x-sdk-date** are used for signing the request.

```
GET
/app1/
a=1&b=2
host:c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com
x-sdk-date:20191111T093443Z

host;x-sdk-date
```

6. Use the hash function SHA-256 to create a hash value based on the body (**RequestPayload**) of the HTTP or HTTPS request.

   Description

   Request message body. The message body needs two layers of conversion (**HexEncode(Hash(*RequestPayload*))**). **Hash** is a function for generating message digest. Currently, SHA-256 is supported. **HexEncode**: the Base16 encoding function for returning a digest consisting of lowercase letters. For example, **HexEncode ("m")** returns **6d** instead of **6D**. Each byte you enter is expressed as two hexadecimal characters.

NOTE

If **RequestPayload** is null, the null value is used for calculating a hash value.

Example

This example uses GET as an example and leaves the request body empty. After hash processing, the request body (empty string) is as follows:

```
GET
/app1/
a=1&b=2
host:c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com
x-sdk-date:20191111T093443Z

host;x-sdk-date
e3b0c44298fc1c149afbf4c8996fb92427ae41e4649b934ca495991b7852b855
```

7. Perform hash processing on the standard request in the same way as that on the **RequestPayload**. After hash processing, the standard request is expressed with lowercase hexadecimal strings.

   Algorithm pseudocode:
   Lowercase(HexEncode(Hash.SHA256(CanonicalRequest)))

   Example of standard request after hash processing:

   ```
   af71c5a7ef45310b8dc05ab15f7da50189ffa81a95cc284379ebaa5eb61155c0
   ```

Step 2: Creating a To-Be-Signed String

After a standard HTTP request is constructed and the request hash value is obtained, create a to-be-signed string by combining them with the signature algorithm and signing time.

```
StringToSign =
   Algorithm + \n +
   RequestDateTime + \n +
   HashedCanonicalRequest
```

Parameters in the pseudocode are described as follows:

- **Algorithm**

  Signature algorithm. For SHA256, the value is **SDK-HMAC-SHA256**.
- **RequestDateTime**

  Request timestamp, which is the same as **X-Sdk-Date** in the request header. The format is *YYYYMMDDTHHMMSSZ*.
- **HashedCanonicalRequest**

  Standard request generated after hash processing.

In this example, the following to-be-signed string is obtained:

```
SDK-HMAC-SHA256
20191111T093443Z
af71c5a7ef45310b8dc05ab15f7da50189ffa81a95cc284379ebaa5eb61155c0
```

Step 3: Calculating the Signature

Use the AppSecret and created character string as the input of the encryption hash function, and convert the calculated binary signature into a hexadecimal expression.

The pseudocode is as follows:

```
signature = HexEncode(HMAC(APP secret, string to sign))
```

HMAC indicates hash calculation, and **HexEncode** indicates hexadecimal conversion. **Table 3-1** describes the parameters in the pseudocode.

Table 3-1 Parameter description

Parameter	Description
AppSecret	Signature key.
To-be-signed string	Character string to be signed.

If the AppSecret is **FWTh5tqu2Pb9ZGt8NI09XYZti2V1LTa8useKXMD8**, the calculated signature is as follows:

```
01cc37e53d821da93bb7239c5b6e1640b184a748f8c20e61987b491e00b15822
```

Step 4: Adding the Signature to the Request Header

Add the signature to the HTTP Authorization header. The Authorization header is used for identity authentication and not included in the signed headers.

The pseudocode is as follows:

```
Authorization header creation pseudocode:
Authorization: algorithm Access=APP key, SignedHeaders=SignedHeaders, Signature=signature
```

There is no comma before the algorithm and **Access**. **SignedHeaders** and **Signature** must be separated with commas.

The signed headers are as follows:

```
Authorization: SDK-HMAC-SHA256 Access=FM9RLCN************NAXISK, SignedHeaders=host;x-sdk-date,
Signature=01cc37e53d821da93bb7239c5b6e1640b184a748f8c20e61987b491e00b15822
```

The signed headers are added to the HTTP request for identity authentication. If the identity authentication is successful, the request is sent to the corresponding backend service for processing.

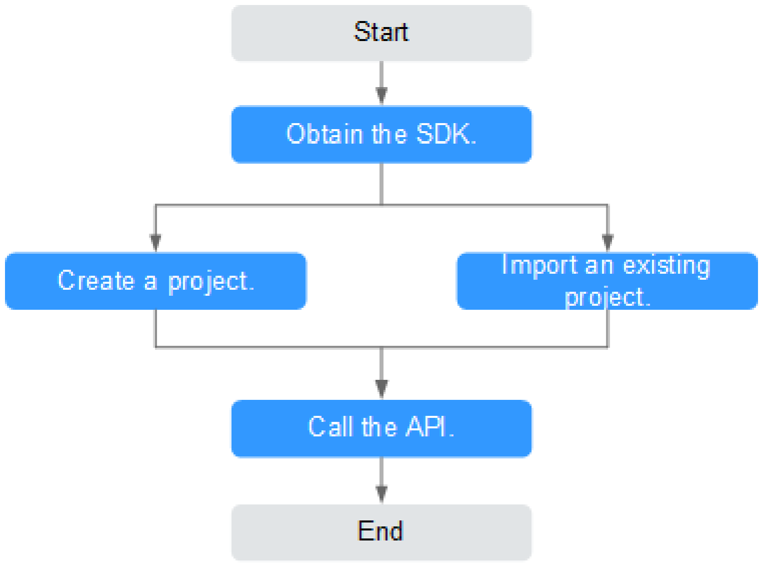
3.3 Java

Scenarios

To use Java to call an API through app authentication, obtain the Java SDK, create a project or import an existing project, and then call the API by referring to the API calling example.

This section uses Eclipse 4.5.2 as an example.

Figure 3-1 API calling process



Prerequisites

- You have obtained the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.
- You have installed Eclipse 3.6.0 or a later version. If not, download Eclipse from the **official Eclipse website** and install it.
- You have installed Java Development Kit (JDK) 1.8.111 or a later version. If not, download JDK from the **official Oracle website** and install it.

Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

Then obtain the **ApiGateway-java-sdk.zip** package. The following table shows the files decompressed from the package.

Name	Description
libs\	SDK dependencies
libs\java-sdk-core-*x.x.x*.jar	SDK package
src\com\apig\sdk\demo\Main.java	Sample code for signing requests
src\com\apig\sdk\demo\OkHttpDemo.java	
src\com\apig\sdk\demo\LargeFileUpload-Demo.java	
.classpath	Java project configuration files
.project	

Importing a Project

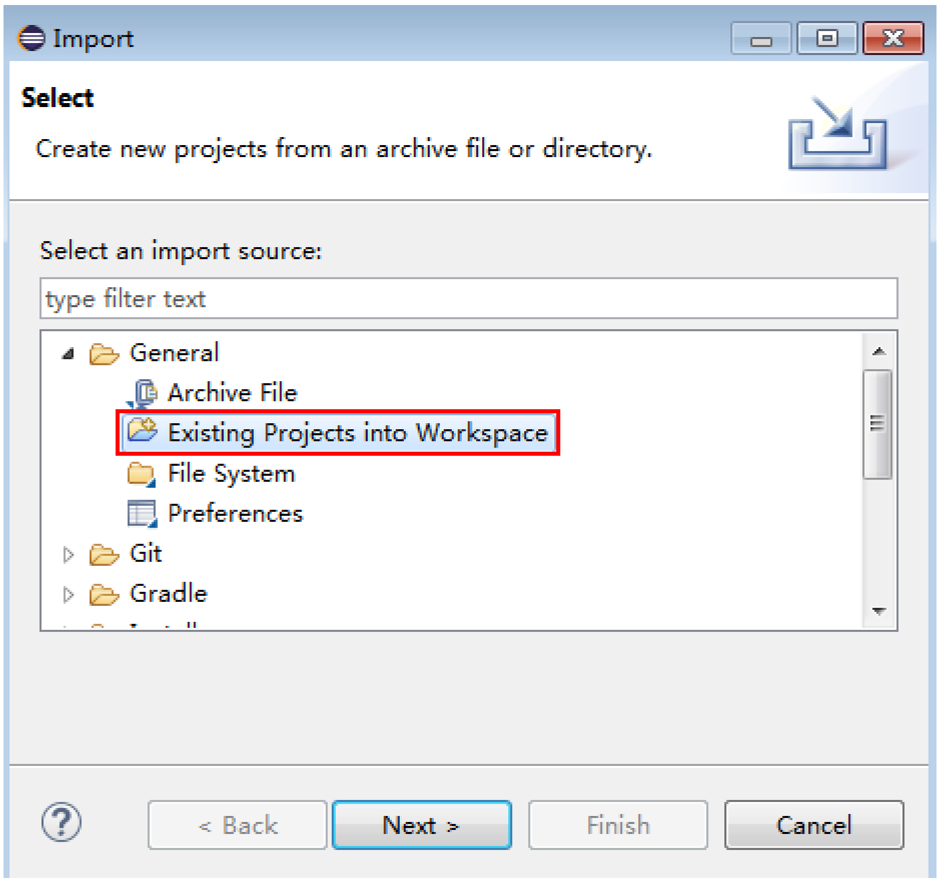
Step 1 Open Eclipse and choose **File** > **Import**.

The **Import** dialog box is displayed.

Step 2 Choose **General** > **Existing Projects into Workspace** and click **Next**.

The **Import Projects** dialog box is displayed.

Figure 3-2 Importing a project


Import

Select

Create new projects from an archive file or directory.

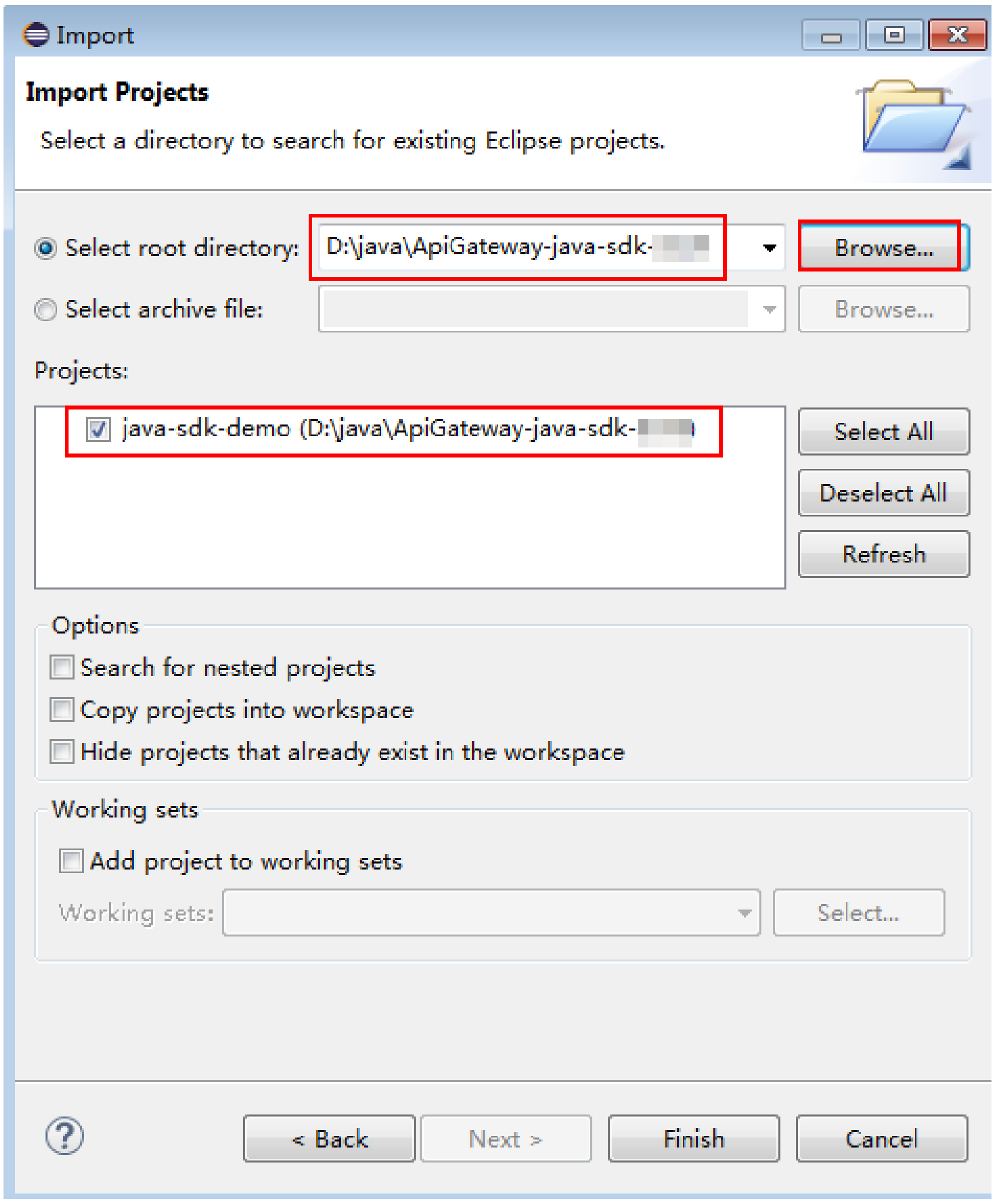
Select an import source:

type filter text

General
Archive File
Existing Projects into Workspace
File System
Preferences
Git
Gradle

Step 3 Click **Browse** and select the directory where the SDK is decompressed.

Figure 3-3 Selecting the demo project



Import

Import Projects

Select a directory to search for existing Eclipse projects.

(●) Select root directory: D:\java\ApiGateway-java-sdk- [Browse...]

( ) Select archive file: [Browse...]

Projects:

[✓] java-sdk-demo (D:\java\ApiGateway-java-sdk-

Options

[ ] Search for nested projects

[ ] Copy projects into workspace

[ ] Hide projects that already exist in the workspace

Working sets

[ ] Add project to working sets

Working sets:

Step 4 Click **Finish**.

Modify the parameters in sample code **Main.java** as required. For details about the sample code, see **API Calling Example**.

----End

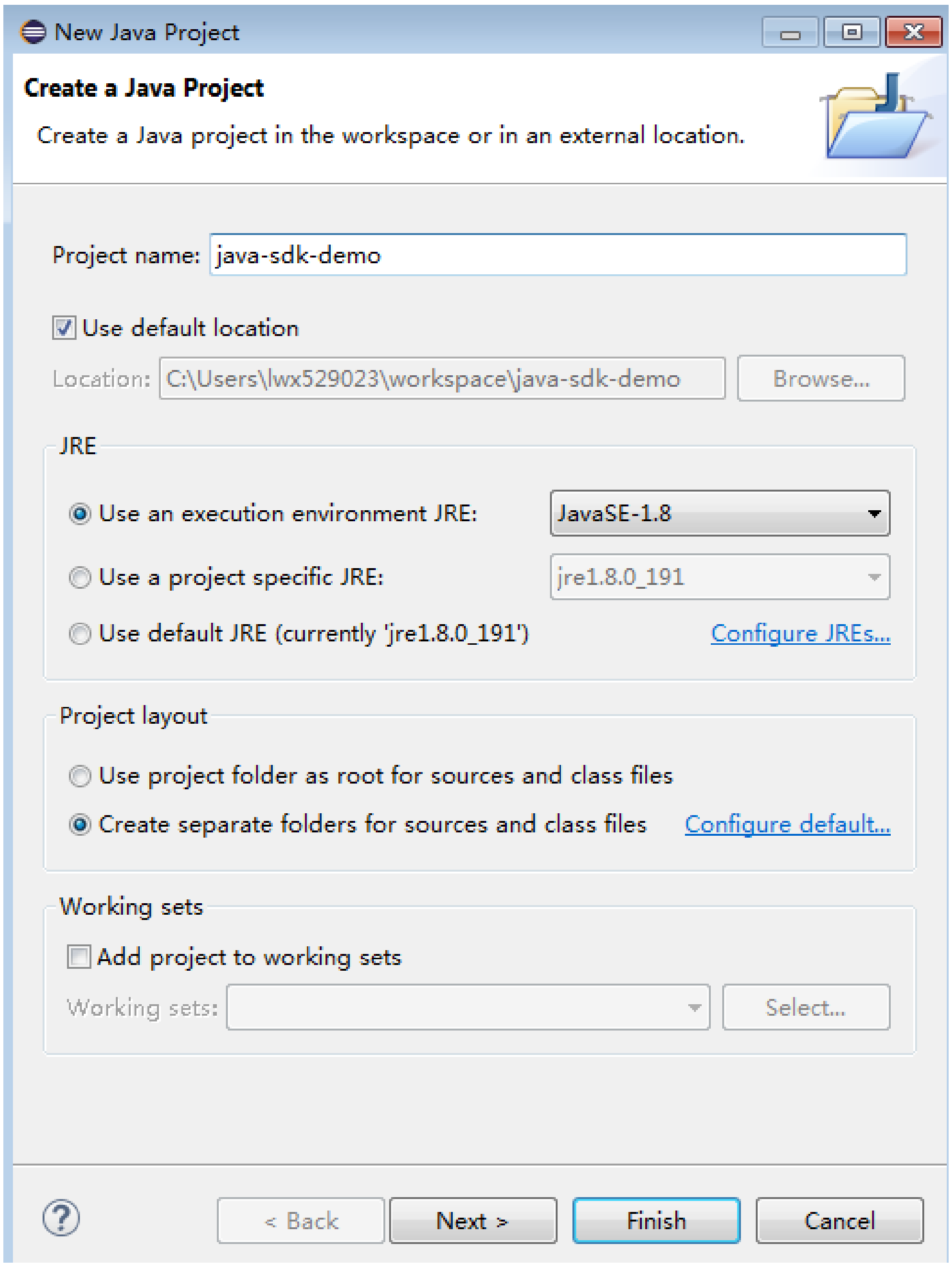
Creating a Project

Step 1 Open Eclipse and choose **File** > **New** > **Java Project**.

The **New Java Project** dialog box is displayed.

Step 2 Enter a project name, for example, **java-sdk-demo**, retain the default settings for other parameters, and click **Finish**.

Figure 3-4 Creating a project



New Java Project

Create a Java Project

Create a Java project in the workspace or in an external location.

Project name: java-sdk-demo

[✓] Use default location

Location: C:\Users\lwx529023\workspace\java-sdk-demo

JRE

[● Use an execution environment JRE:] JavaSE-1.8

Use a project specific JRE: jre1.8.0_191

Use default JRE (currently 'jre1.8.0_191')

Project layout

Use project folder as root for sources and class files

[● Create separate folders for sources and class files]

Working sets

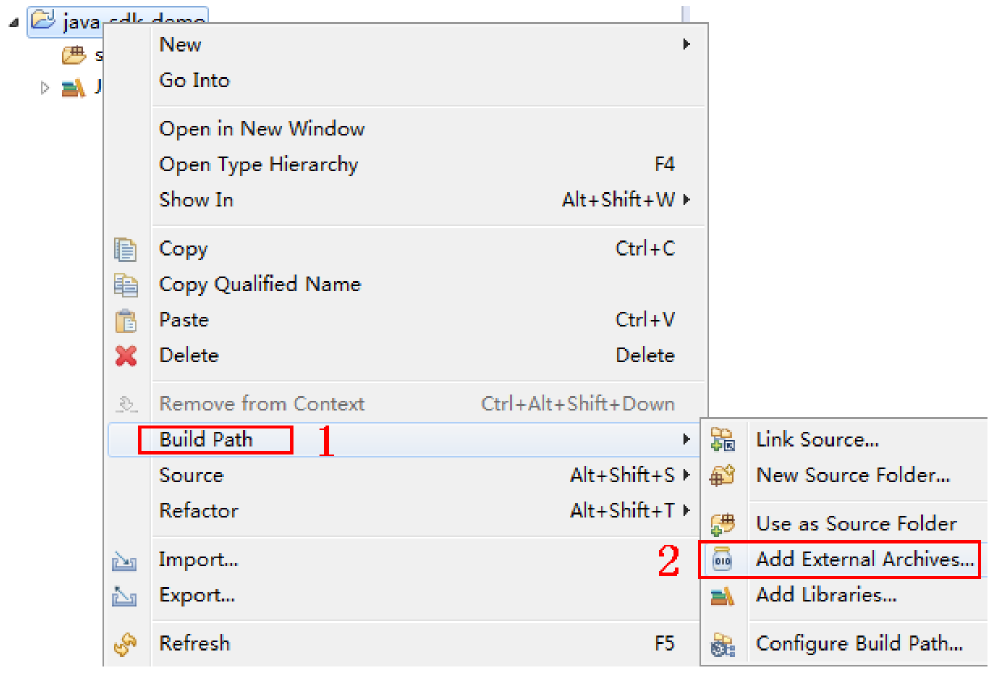
[ ] Add project to working sets

Working sets:

Step 3 Import the .jar files in the API Gateway Java SDK.

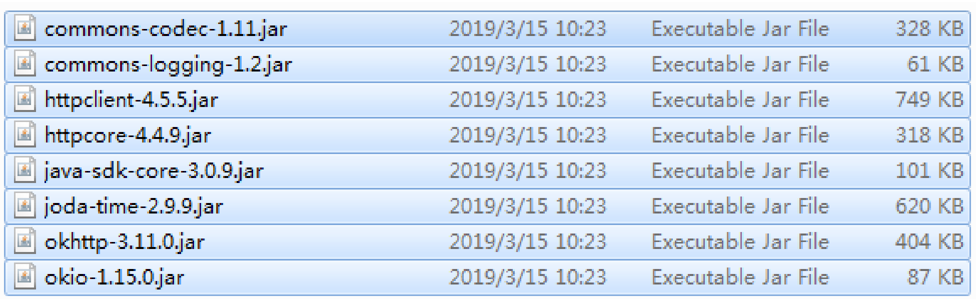
1. Choose **java-sdk-demo**, right-click, and choose **Build Path** > **Add External Archives** from the shortcut menu.

Figure 3-5 Importing the .jar files



2. Select all .jar files in the **\libs** directory.

Figure 3-6 Selecting all .jar files

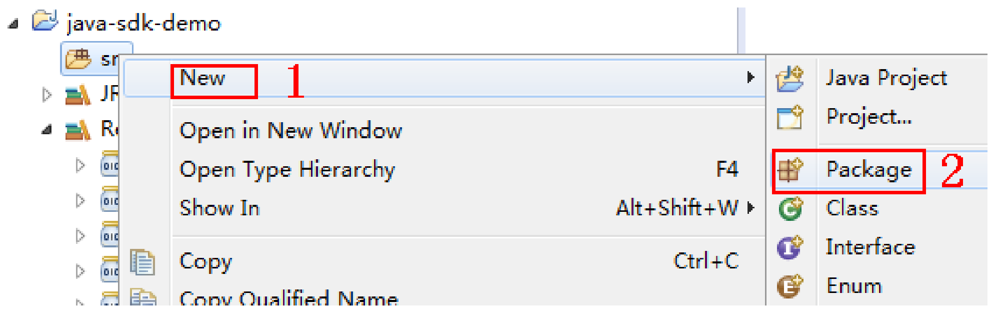


commons-codec-1.11.jar	2019/3/15 10:23	Executable Jar File	328 KB
commons-logging-1.2.jar	2019/3/15 10:23	Executable Jar File	61 KB
httpclient-4.5.5.jar	2019/3/15 10:23	Executable Jar File	749 KB
httpcore-4.4.9.jar	2019/3/15 10:23	Executable Jar File	318 KB
java-sdk-core-3.0.9.jar	2019/3/15 10:23	Executable Jar File	101 KB
joda-time-2.9.9.jar	2019/3/15 10:23	Executable Jar File	620 KB
okhttp-3.11.0.jar	2019/3/15 10:23	Executable Jar File	404 KB
okio-1.15.0.jar	2019/3/15 10:23	Executable Jar File	87 KB

Step 4 Create a package and **Main** file.

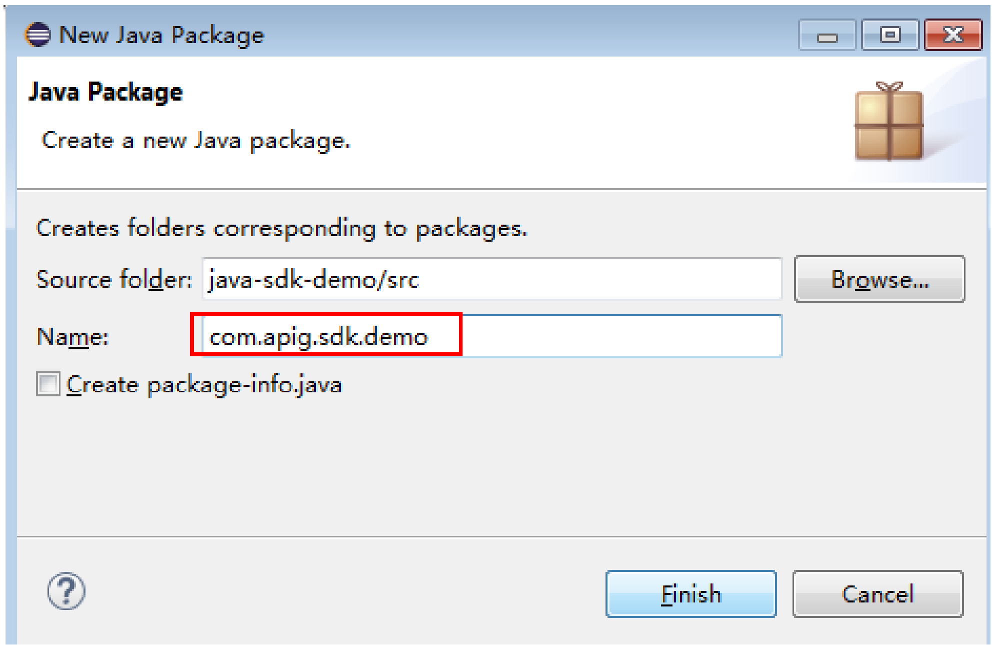
1. Choose **src**, right-click, and choose **New** > **Package** from the shortcut menu.

Figure 3-7 Creating a package



2. Enter **com.apig.sdk.demo** for **Name**.

Figure 3-8 Setting a package name


New Java Package

Java Package

Create a new Java package.

Creates folders corresponding to packages.

Source folder: java-sdk-demo/src

Name: com.apig.sdk.demo

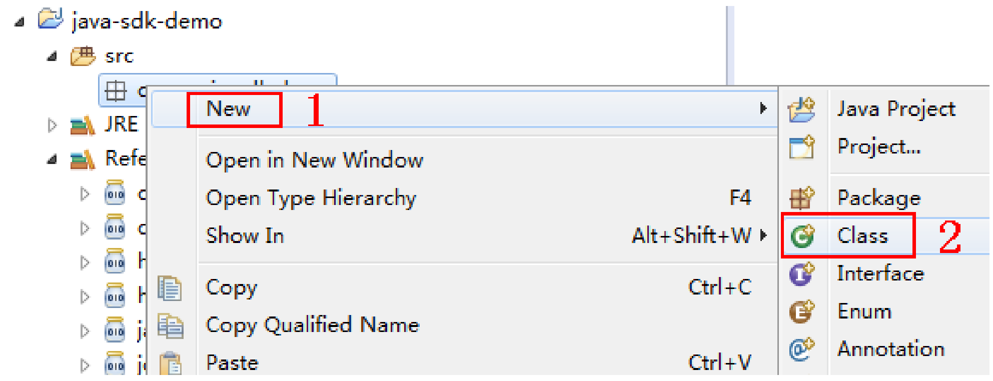
Create package-info.java

3. Click **Finish**.

   The package is created.

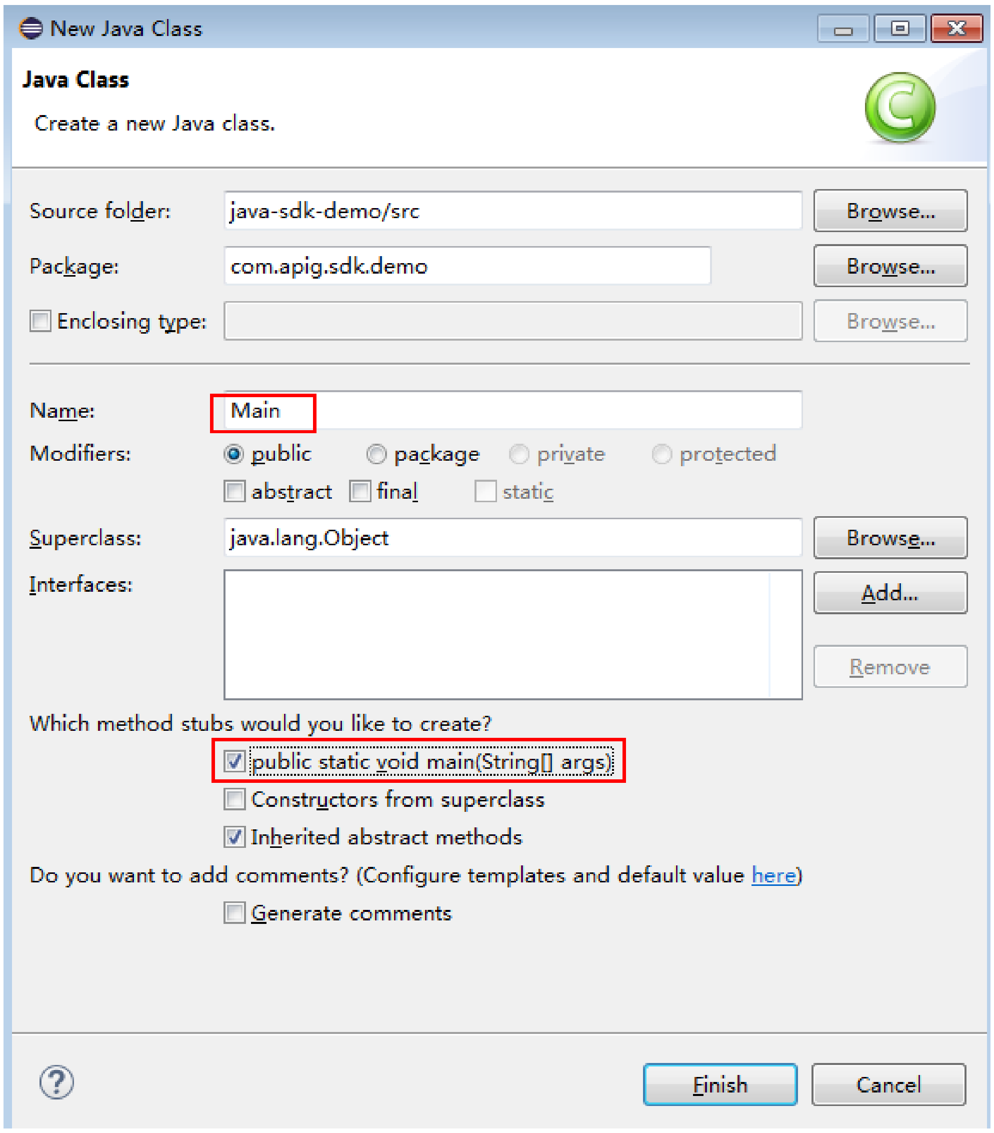
4. Choose **com.apig.sdk.demo**, right-click, and choose **New** > **Class** from the shortcut menu.

Figure 3-9 Creating a class



5. Enter **Main** for **Name** and select **public static void main(String[] args)**.

Figure 3-10 Configuring the class



New Java Class

Java Class

Create a new Java class.

Source folder: java-sdk-demo/src

Package: com.apig.sdk.demo

☐ Enclosing type:

Name: Main

Modifiers: ● public ○ package ○ private ○ protected

☐ abstract ☐ final ☐ static

Superclass: java.lang.Object

Interfaces:

Which method stubs would you like to create?

☑ public static void main(String[] args)

☐ Constructors from superclass

☑ Inherited abstract methods

Do you want to add comments? (Configure templates and default value here)

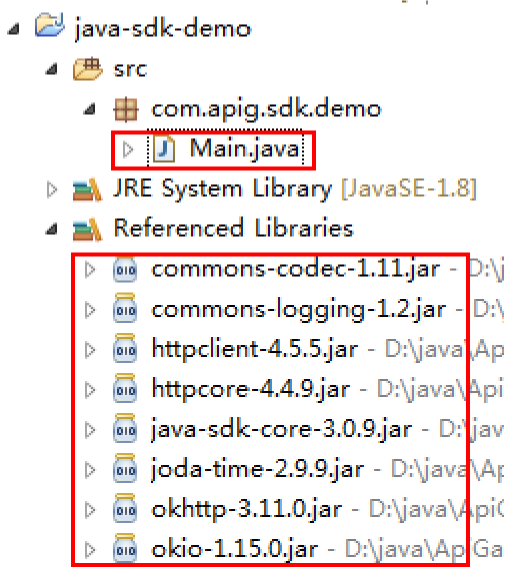
☐ Generate comments

6. Click **Finish**.

   The **Main** file is created.

Step 5 View the directory structure of the project.

Figure 3-11 Directory structure of the new project Main


java-sdk-demo
src
com.apig.sdk.demo
Main.java
JRE System Library [JavaSE-1.8]
Referenced Libraries
commons-codec-1.11.jar - D:\j
commons-logging-1.2.jar - D:\
httpclient-4.5.5.jar - D:\java\Ap
httpcore-4.4.9.jar - D:\java\Api
java-sdk-core-3.0.9.jar - D:\jav
joda-time-2.9.9.jar - D:\java\Ap
okhttp-3.11.0.jar - D:\java\ApiG
okio-1.15.0.jar - D:\java\ApiGa

Before using **Main.java**, enter the required code according to the API calling example provided in this section.

----End

API Calling Example

NOTE

- You need to create an API with the Mock backend on the console, and then publish the API. For details about how to create and publish an API, see the *User Guide*.
- The backend of this API is a fake HTTP service, which returns response code **200** and message body **Congratulations, sdk demo is running**.

Step 1 Add the following references to **Main.java**:

```
import java.io.IOException;
import javax.net.ssl.SSLContext;

import org.apache.http.Header;
import org.apache.http.HttpEntity;
import org.apache.http.HttpResponse;
import org.apache.http.client.methods.HttpRequestBase;
import org.apache.http.conn.ssl.AllowAllHostnameVerifier;
import org.apache.http.conn.ssl.SSLConnectionSocketFactory;
import org.apache.http.conn.ssl.SSLContexts;
import org.apache.http.conn.ssl.TrustSelfSignedStrategy;
import org.apache.http.impl.client.CloseableHttpClient;
import org.apache.http.impl.client.HttpClients;
import org.apache.http.util.EntityUtils;

import com.cloud.apigateway.sdk.utils.Client;
import com.cloud.apigateway.sdk.utils.Request;
```

Step 2 Construct a request by configuring the following parameters:

- **AppKey**: Obtain it by referring to **Preparation**. The sample code uses **4f5f626b-073f-402f-a1e0-e52171c6100c**.
- **AppSecret**: Obtain it by referring to **Preparation**. Set this parameter based on the site requirements. The example code uses ****** as an example.

- **Method**: Specify a request method. The sample code uses **POST**.
- **url**: Request URL of the API, excluding the QueryString and fragment parts. Use your own independent domain name. The sample code uses **http://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com/java-sdk**.
- **queryString**: Specify query parameters to be carried in the URL. Characters (0-9a-zA-Z./;[]\-=~#%^&_+:") are allowed. The sample code uses **name=value**.
- **header**: Specify request headers. The sample code uses **Content-Type:text/plain**. If you are going to publish the API in a non-RELEASE environment, specify an environment name. The sample code uses **x-stage:publish_env_name**.
- **body**: Specify the request body. The sample code uses **demo**.

The sample code is as follows:

```
        Request request = new Request();
        try
        {
            request.setKey("4f5f626b-073f-402f-a1e0-e52171c6100c"); //Obtain the value when creating an
app.
            request.setSecret("****"); //Obtained when an app is created.
            request.setMethod("POST");
            request.setUrl("http://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com/java-
sdk");
             //URL
            request.addQueryStringParam("name", "value");
            request.addHeader("Content-Type", "text/plain");
            //request.addHeader("x-stage", "publish_env_name"); //Specify an environment name before
publishing the API in a non-RELEASE environment.
            request.setBody("demo");
        } catch (Exception e)
        {
            e.printStackTrace();
            return;
        }
```

Step 3 Sign the request, access the API, and print the result.

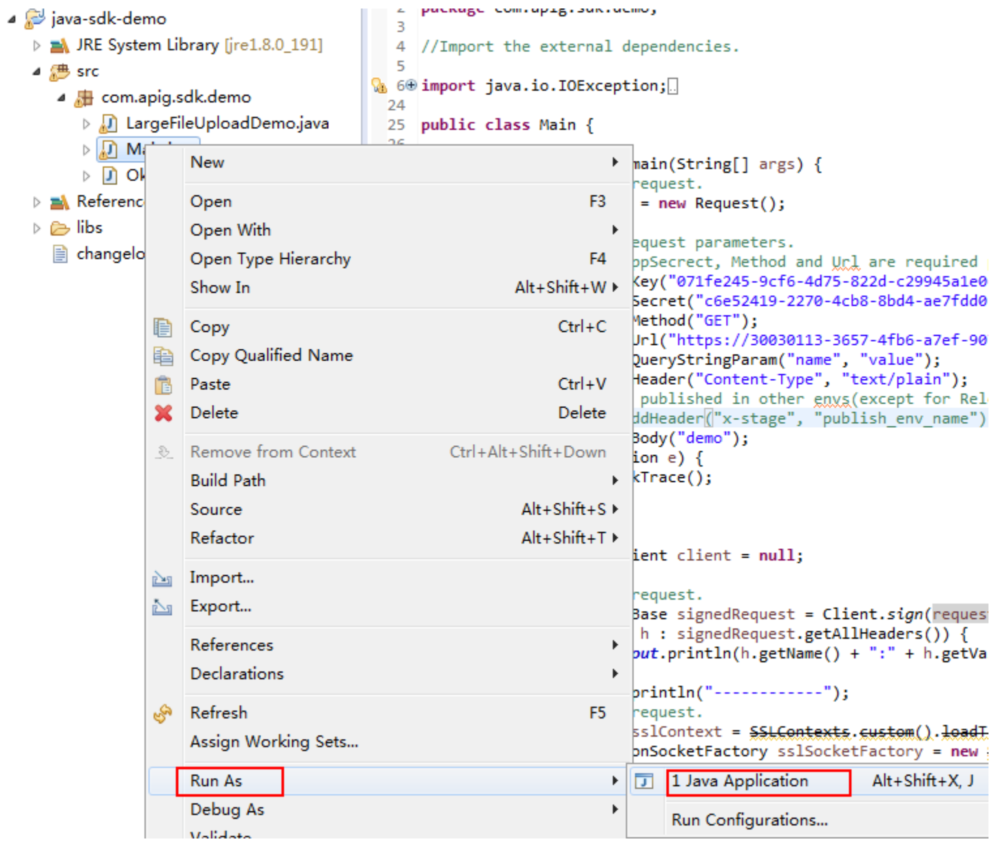
The sample code is as follows:

```
        CloseableHttpClient client = null;
        try
        {
            HttpRequestBase signedRequest = Client.sign(request);

            client = HttpClients.custom().build();
            HttpResponse response = client.execute(signedRequest);
            System.out.println(response.getStatusLine().toString());
            Header[] resHeaders = response.getAllHeaders();
            for (Header h : resHeaders)
            {
                System.out.println(h.getName() + ":" + h.getValue());
            }
            HttpEntity resEntity = response.getEntity();
            if (resEntity != null)
            {
                System.out.println(System.getProperty("line.separator") + EntityUtils.toString(resEntity, "UTF-8"));
            }

        } catch (Exception e)
        {
            e.printStackTrace();
        } finally
        {
```

```
        try
        {
            if (client != null)
            {
                client.close();
            }
        } catch (IOException e)
        {
            e.printStackTrace();
        }
    }
```

Step 4 Choose **Main.java**, right-click, and choose **Run As** > **Java Application** to run the project test code.

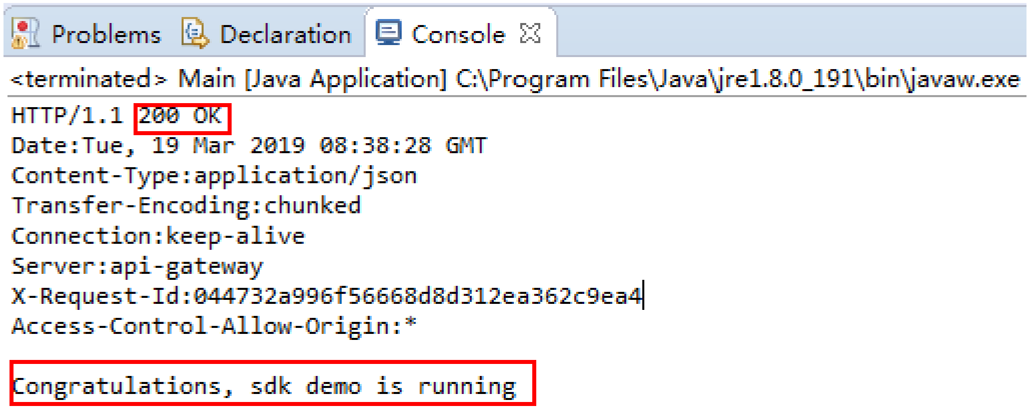
Figure 3-12 Running the project test code



```
//Import the external dependencies.

import java.io.IOException;

public class Main {

main(String[] args) {
request.
 = new Request();

equest parameters.
ppSecrect, Method and Url are required
Key("071fe245-9cf6-4d75-822d-c29945a1e0
Secret("c6e52419-2270-4cb8-8bd4-ae7fdd0
Method("GET");
Url("https://30030113-3657-4fb6-a7ef-90
QueryStringParam("name", "value");
Header("Content-Type", "text/plain");
 published in other envs(except for Rel
ddHeader("x-stage", "publish_env_name")
Body("demo");
ion e) {
kTrace();

ient client = null;

request.
Base signedRequest = Client.sign(reques
 h : signedRequest.getAllHeaders()) {
out.println(h.getName() + ":" + h.getVa

println("------------");
request.
sslContext = SSLContexts.custom().loadT
onSocketFactory sslSocketFactory = new
```

Step 5 On the **Console** tab page, view the running result.

Figure 3-13 Response displayed if the calling is successful



```
<terminated> Main [Java Application] C:\Program Files\Java\jre1.8.0_191\bin\javaw.exe
HTTP/1.1 200 OK
Date:Tue, 19 Mar 2019 08:38:28 GMT
Content-Type:application/json
Transfer-Encoding:chunked
Connection:keep-alive
Server:api-gateway
X-Request-Id:044732a996f56668d8d312ea362c9ea4
Access-Control-Allow-Origin:*

Congratulations, sdk demo is running
```

----End

3.4 Go

Scenarios

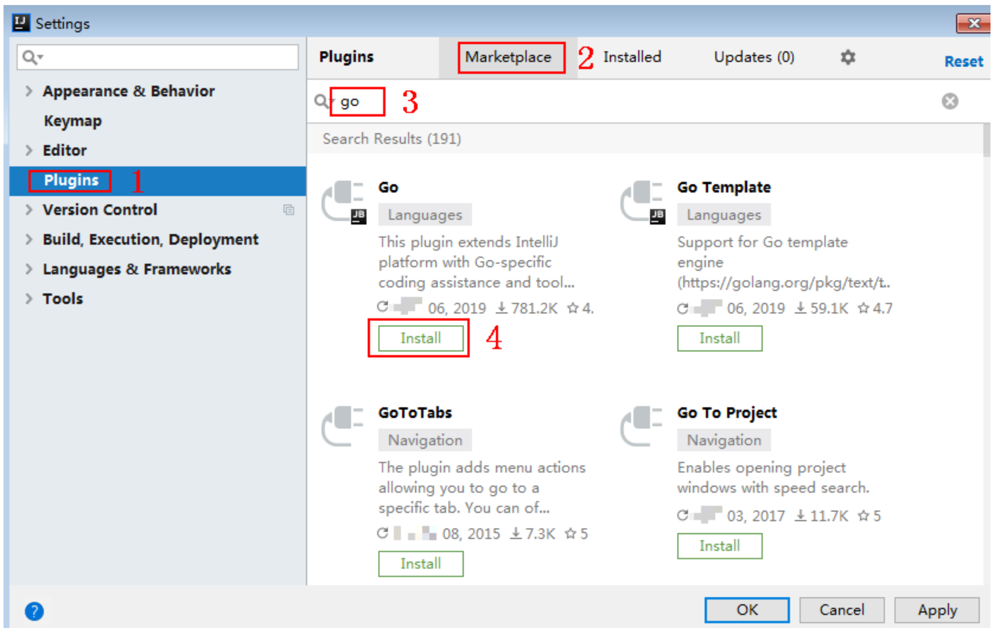
To use Go to call an API through App authentication, obtain the Go SDK, create a new project, and then call the API by referring to the API calling example.

This section uses IntelliJ IDEA 2018.3.5 as an example.

Prerequisites

- You have obtained the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.
- You have installed the Go programming language. If not, download the Go installation package from the **official Go website** and install it.
- You have installed IntelliJ IDEA. If not, download IntelliJ IDEA from the **official IntelliJ IDEA website** and install it.
- You have installed the Go plug-in on IntelliJ IDEA. If not, install the Go plug-in according to **Figure 3-14**.

Figure 3-14 Installing the Go plug-in



Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

The following table shows the files decompressed from the package.

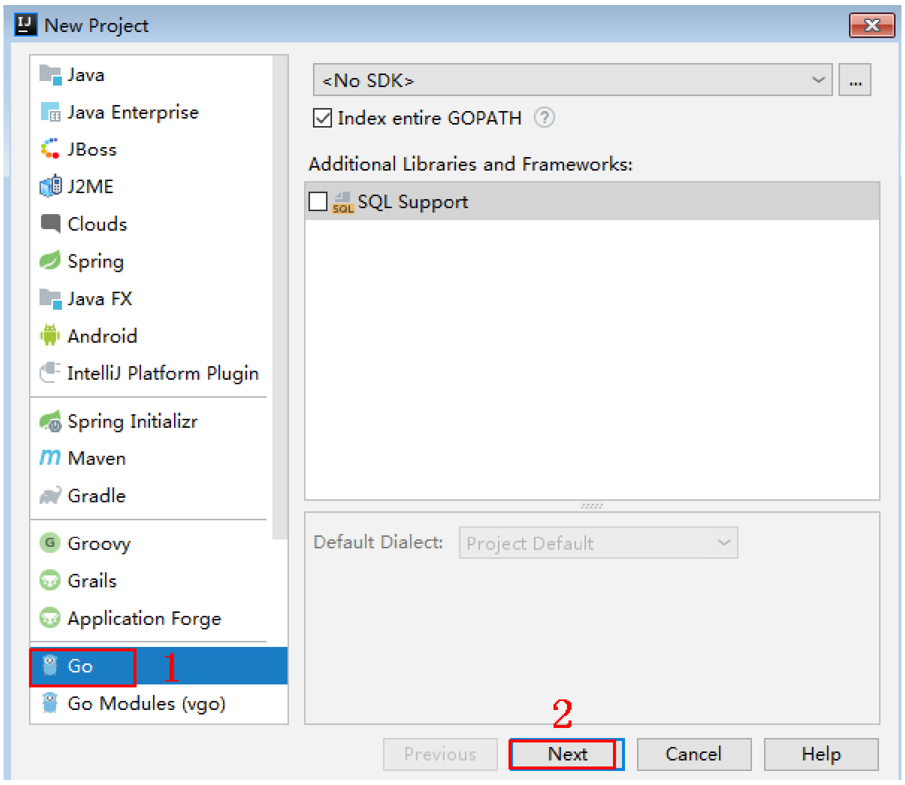
Name	Description
core\escape.go	SDK code
core\signer.go	
demo.go	Sample code

Creating a Project

Step 1 Start IntelliJ IDEA and choose **File** > **New** > **Project**.

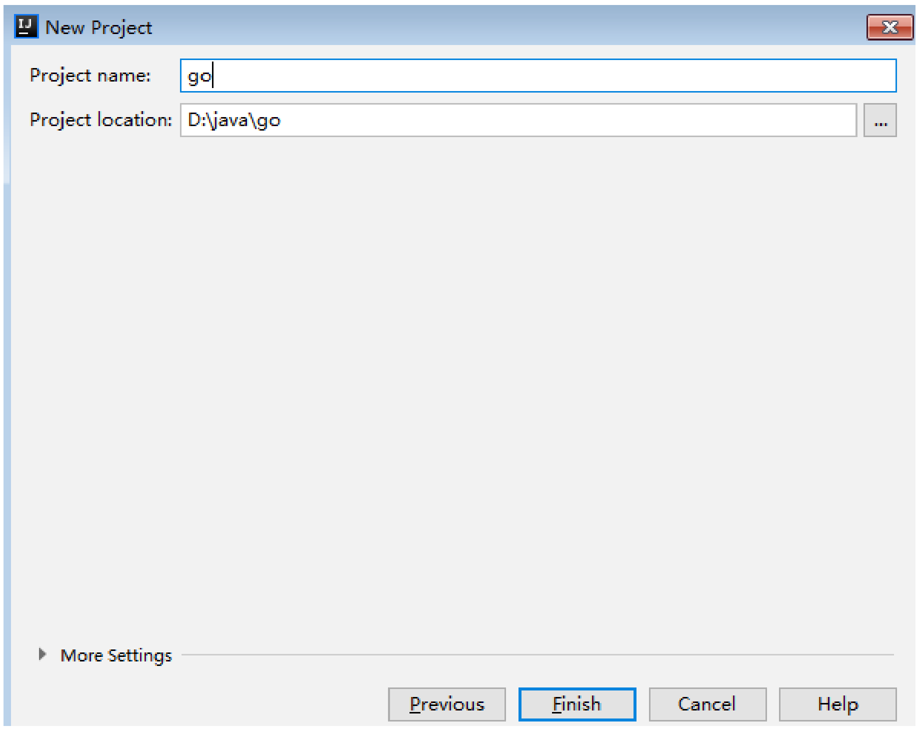
On the displayed **New Project** page, choose **Go** and click **Next**.

Figure 3-15 Go



Step 2 Click **...**, select the directory where the SDK is decompressed, and click **Finish**.

Figure 3-16 Selecting the SDK directory of Go after decompression

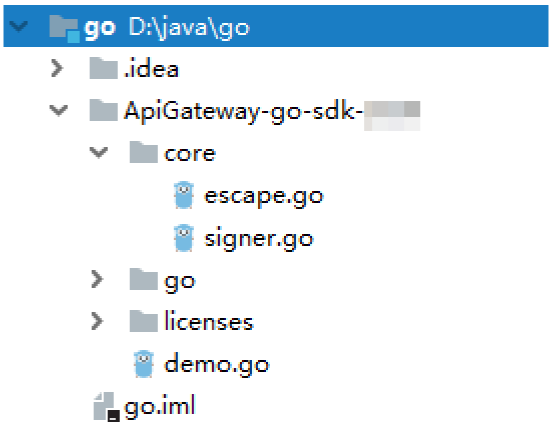


Project name: go

Project location: D:\java\go

Step 3 View the directory structure shown in the following figure.

Figure 3-17 Directory structure of the new project go



Modify the parameters in sample code **demo.go** as required. For details about the sample code, see **API Calling Example**.

----End

API Calling Example

Step 1 Import the Go SDK (signer.go) to the project.

```
import "apig-sdk/go/core"
```

Step 2 Generate a new signer and enter the AppKey and AppSecret.

```
s := core.Signer{
        Key: "4f5f626b-073f-402f-a1e0-e52171c6100c",
        Secret: "******",
}
```

Step 3 Generate a new request, and specify the domain name, method, request URL, query parameters, and body.

```
r, _ := http.NewRequest("POST", "http://c967a237-cd6c-470e-906f-
a8655461897e.apigw.exampleRegion.com/api?a=1&b=2",
                ioutil.NopCloser(bytes.NewBuffer([]byte("foo=bar"))))
```

Step 4 Add the x-stage header to the request to specify an environment name. Add other headers to be signed as necessary.

```
r.Header.Add("x-stage", "RELEASE")
```

Step 5 Execute the following function to add the X-Sdk-Date and Authorization headers for signing:

```
s.Sign(r)
```

Step 6 Access the API and view the access result.

```
resp, err := http.DefaultClient.Do(r)
body, err := ioutil.ReadAll(resp.Body)
```

----End

3.5 Python

Scenarios

To use Python to call an API through App authentication, obtain the Python SDK, create a new project, and then call the API by referring to the API calling example.

This section uses IntelliJ IDEA 2018.3.5 as an example.

Preparing the Environment

- You have obtained the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.
- You have installed Python 2.7.9 or 3.X. If not, download the Python installation package from the **official Python website** and install it.

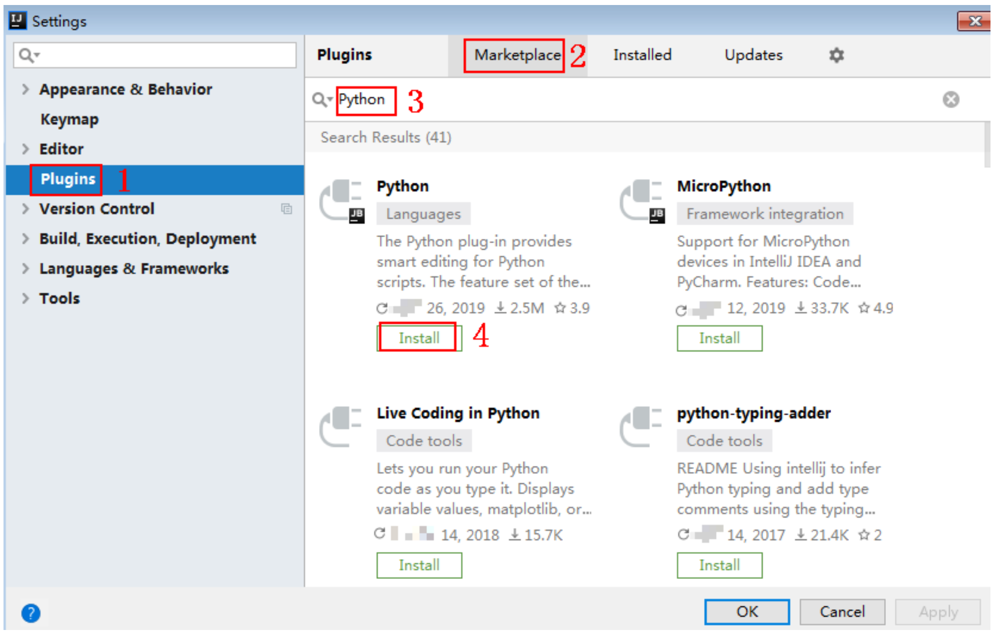
  After Python is installed, run the **pip** command to install the **requests** library in the CLI or Shell window.

  ```
  pip install requests
  ```

  NOTE

  If a certificate error occurs during the installation, download the **get-pip.py** file to upgrade the pip environment, and try again.
- You have installed IntelliJ IDEA. If not, download IntelliJ IDEA from the **official IntelliJ IDEA website** and install it.
- You have installed the Python plug-in on IntelliJ IDEA. If not, install the Python plug-in according to **Figure 3-18**.

Figure 3-18 Installing the Python plug-in


Settings
Appearance & Behavior
Keymap
Editor
Plugins
1
Version Control
Build, Execution, Deployment
Languages & Frameworks
Tools
Plugins
Marketplace
2
Installed
Updates
Python
3
Search Results (41)
Python
Languages
The Python plug-in provides smart editing for Python scripts. The feature set of the...
26, 2019 2.5M 3.9
Install
4
MicroPython
Framework integration
Support for MicroPython devices in IntelliJ IDEA and PyCharm. Features: Code...
12, 2019 33.7K 4.9
Install
Live Coding in Python
Code tools
Lets you run your Python code as you type it. Displays variable values, matplotlib, or...
14, 2018 15.7K
Install
python-typing-adder
Code tools
README Using intellij to infer Python typing and add type comments using the typing...
14, 2017 21.4K 2
Install
OK
Cancel
Apply

Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

The following table shows the files decompressed from the package.

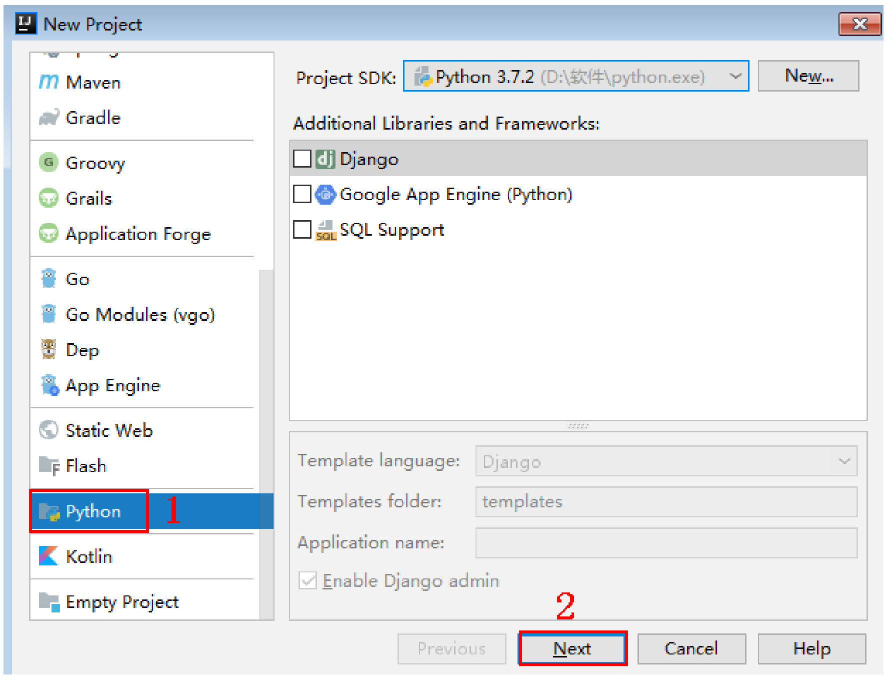
Name	Description
apig_sdk\__init__.py	SDK code
apig_sdk\signer.py	
main.py	Sample code
backend_signature.py	Sample code for backend signing
licenses\license-requests	Third-party license

Creating a Project

Step 1 Start IDEA and choose **File** > **New** > **Project**.

On the displayed **New Project** page, choose **Python** and click **Next**.

Figure 3-19 Python



Project SDK: Python 3.7.2 (D:\软件\python.exe)

Additional Libraries and Frameworks:

Template language: Django

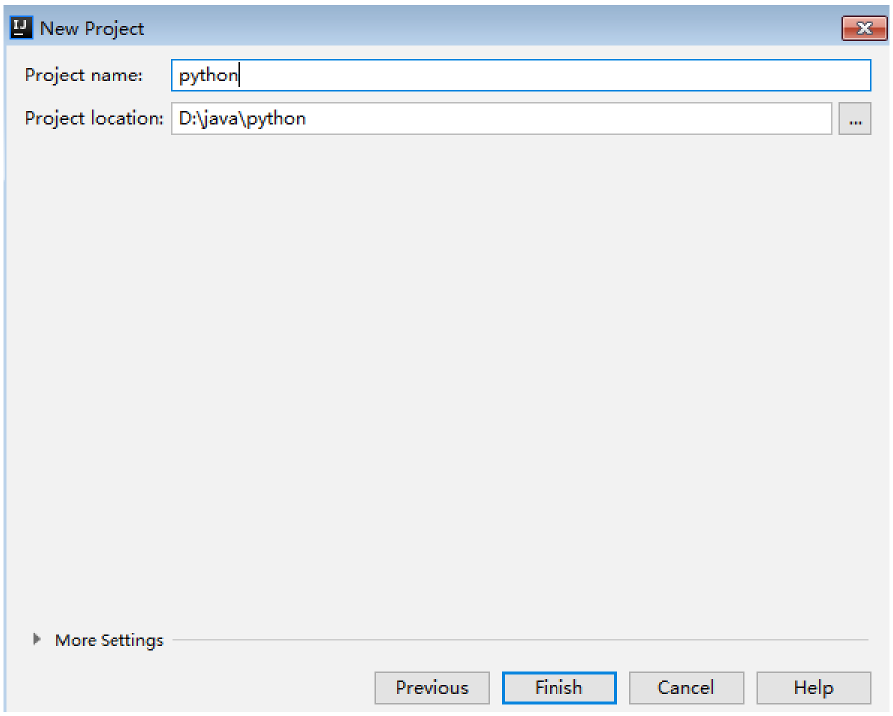
Templates folder: templates

Application name:

Enable Django admin

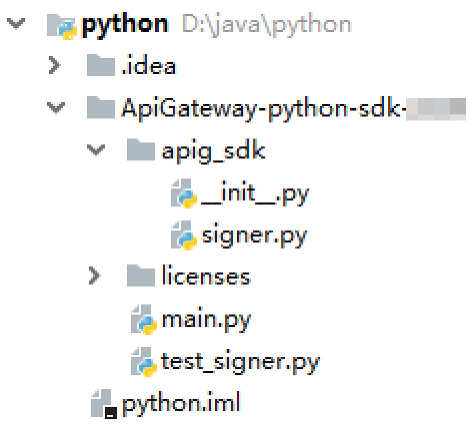
Step 2 Click **Next**. Click **...**, select the directory where the SDK is decompressed, and click **Finish**.

Figure 3-20 Selecting the SDK directory after decompression



Step 3 View the directory structure shown in the following figure.

Figure 3-21 Directory structure of the new project python



Modify the parameters in sample code **main.py** as required. For details about the sample code, see **API Calling Example**.

----End

API Calling Example

Step 1 Import **apig_sdk** to the project.

```
from apig_sdk import signer
import requests
```

Step 2 Generate a new signer and enter the AppKey and AppSecret.

```
sig = signer.Signer()
sig.Key = "4f5f626b-073f-402f-a1e0-e52171c6100c"
sig.Secret = "******"
```

Step 3 Generate a request, and specify the method, request URI, header, and request body.

```
r = signer.HttpRequest("POST",
                      "https://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com/app1?a=1",
                      {"x-stage": "RELEASE"},
                      "body")
```

Step 4 Execute the following function to add the X-Sdk-Date and Authorization headers for signing:

NOTE

X-Sdk-Date is a request header parameter required for signing requests.

```
sig.Sign(r)
```

Step 5 Access the API and view the access result.

```
resp = requests.request(r.method, r.scheme + "://" + r.host + r.uri, headers=r.headers, data=r.body)
print(resp.status_code, resp.reason)
print(resp.content)
```

----End

3.6 C#

Scenarios

To use C# to call an API through App authentication, obtain the C# SDK, open the project file in the SDK, and then call the API by referring to the API calling example.

Preparing the Environment

- You have obtained the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.
- You have installed Visual Studio. If not, download it from the **official Visual Studio website** and install it.

Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

The following table shows the files decompressed from the package.

Name	Description
apigateway-signature\Signer.cs	SDK code
apigateway-signature\HttpEncoder.cs	
sdk-request\Program.cs	Sample code for signing requests

Name	Description
backend-signature\	Sample project for backend signing
csharp.sln	Project file
licenses\license-referencesource	Third-party license

Opening a Project

Double-click **csharp.sln** in the SDK package to open the project. The project contains the following:

- **apigateway-signature**: Shared library that implements the signature algorithm. It can be used in the .Net Framework and .Net Core projects.
- **backend-signature**: Example of a backend service signature.
- **sdk-request**: Example of invoking the signature algorithm. Modify the parameters as required. For details about the sample code, see **API Calling Example**.

API Calling Example

Step 1 Import the C# SDK to your project.

```
using APIGATEWAY_SDK;
```

Step 2 Generate a new signer and enter the AppKey and AppSecret.

```
Signer signer = new Signer();
signer.Key = "4f5f626b-073f-402f-a1e0-e52171c6100c";
signer.Secret = "******";
```

Step 3 Generate an HttpRequest, and specify the method, request URL, and body.

```
HttpRequest r = new HttpRequest("POST",
                new Uri("https://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com/app1?
query=value"));
r.body = "{\"a\":1}";
```

Step 4 Add the x-stage header to the request to specify an environment name. Add other headers to be signed as necessary.

```
r.headers.Add("x-stage", "RELEASE");
```

Step 5 Execute the following function to generate **HttpWebRequest**, and add the X-Sdk-Date and Authorization headers for signing the request:

```
HttpWebRequest req = signer.Sign(r);
```

Step 6 Access the API and view the access result.

```
var writer = new StreamWriter(req.GetRequestStream());
writer.Write(r.body);
writer.Flush();
HttpWebResponse resp = (HttpWebResponse)req.GetResponse();
var reader = newStreamReader(resp.GetResponseStream());
Console.WriteLine(reader.ReadToEnd());
```

----End

3.7 JavaScript

Scenarios

To use JavaScript to call an API through App authentication, obtain the JavaScript SDK, create a project, and then call the API by referring to the API calling example.

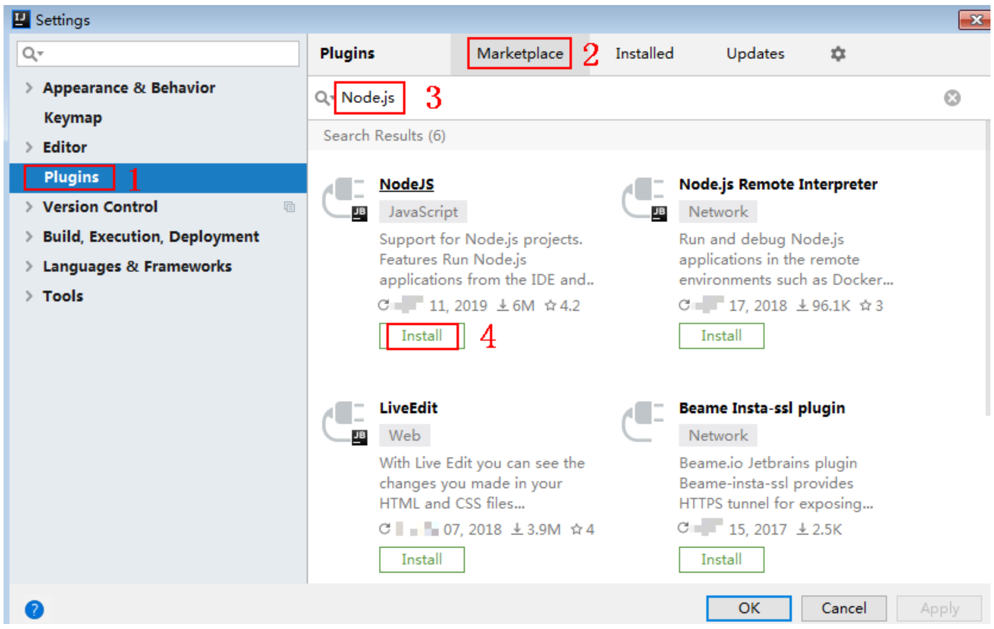
JavaScript SDKs can be run in **Node.js** and **browsers**.

This section describes the procedure of using IntelliJ IDEA 2018.3.5 to establish a Node.js environment. It also provides examples of calling APIs using a browser.

Preparing the Environment

- You have obtained the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.
- You have installed the Node.js programming language. If not, download the Node.js installation package from the **official Node.js website** and install it.
- You have installed IntelliJ IDEA. If not, download IntelliJ IDEA from the **official IntelliJ IDEA website** and install it.
- You have installed the Node.js plug-in on IntelliJ IDEA. If not, install the Python plug-in according to **Figure 3-22**.

Figure 3-22 Installing the Node.js plug-in


Settings
Appearance & Behavior
Keymap
Editor
Plugins
1
Version Control
Build, Execution, Deployment
Languages & Frameworks
Tools
Plugins
Marketplace
2
Installed
Updates
Node.js
3
Search Results (6)
NodeJS
JavaScript
Support for Node.js projects. Features Run Node.js applications from the IDE and..
11, 2019 6M 4.2
Install
4
Node.js Remote Interpreter
Network
Run and debug Node.js applications in the remote environments such as Docker...
17, 2018 96.1K 3
Install
LiveEdit
Web
With Live Edit you can see the changes you made in your HTML and CSS files...
07, 2018 3.9M 4
Install
Beame Insta-ssl plugin
Network
Beame.io Jetbrains plugin Beame-insta-ssl provides HTTPS tunnel for exposing...
15, 2017 2.5K
Install
OK
Cancel
Apply

Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

The following table shows the files decompressed from the package.

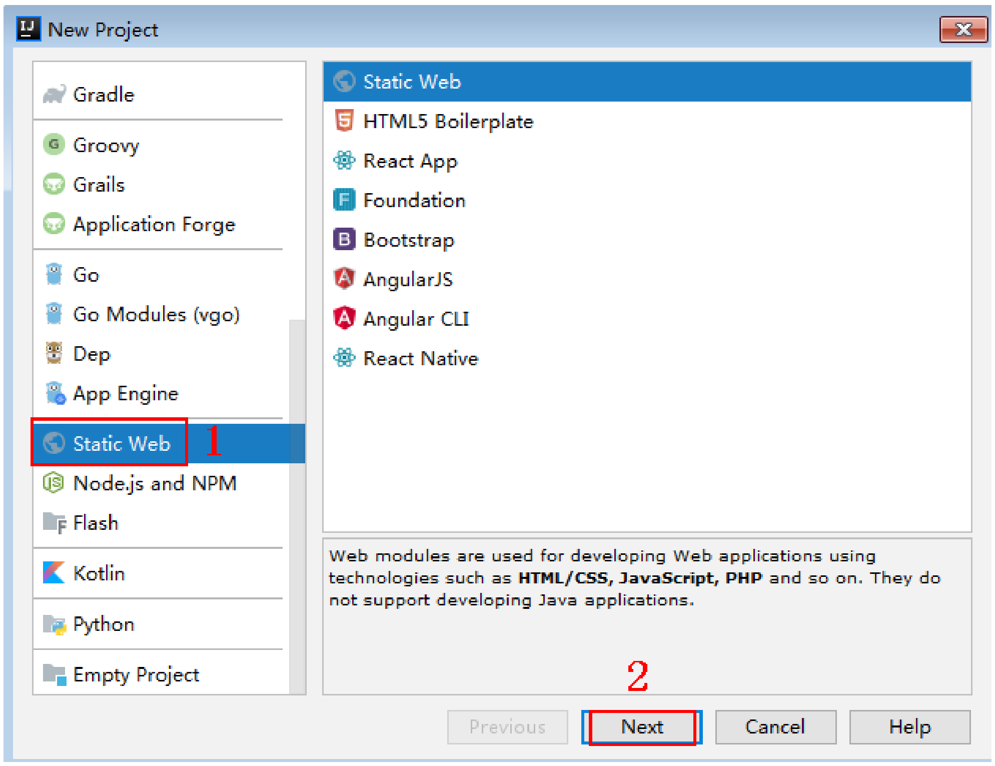
Name	Description
signer.js	SDK code
node_demo.js	Node.js sample code
demo.html	Browser sample code
demo_require.html	Browser sample code (loaded using **require**)
test.js	Test case
js\hmac-sha256.js	Dependencies
licenses\license-crypto-js	Third-party licenses
licenses\license-node	

Creating a Project

Step 1 Start IntelliJ IDEA and choose **File** > **New** > **Project**.

In the **New Project** dialog box, choose **Static Web** and click **Next**.

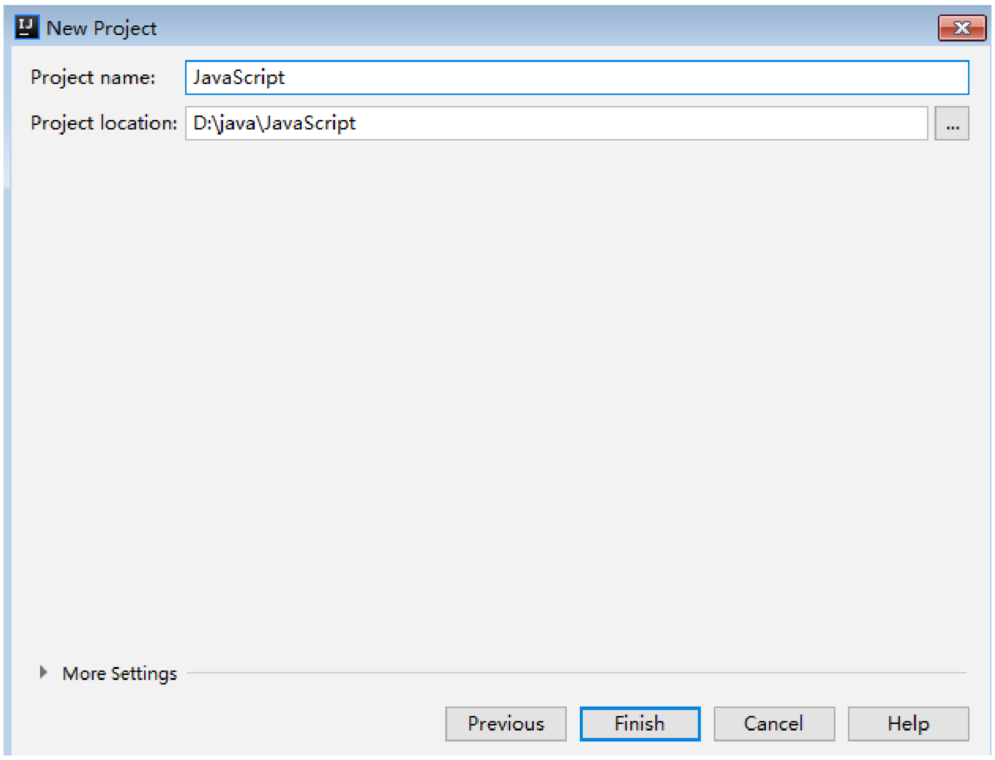
Figure 3-23 Static Web



Web modules are used for developing Web applications using technologies such as **HTML/CSS, JavaScript, PHP** and so on. They do not support developing Java applications.

Step 2 Click **...**, select the directory where the SDK is decompressed, and click **Finish**.

Figure 3-24 Selecting the SDK directory of JavaScript after decompression

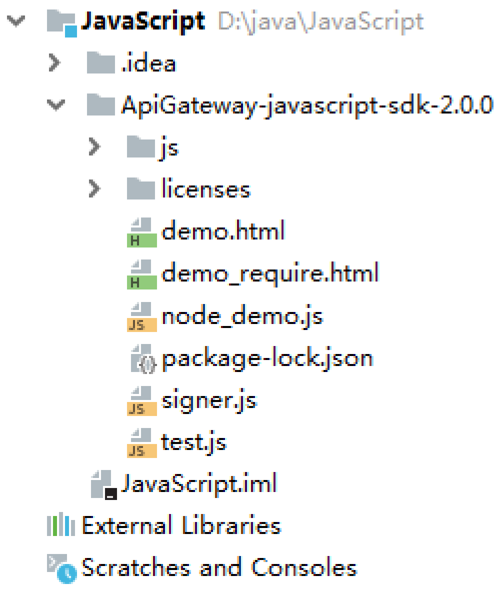

New Project

Project name: JavaScript

Project location: D:\java\JavaScript

Step 3 View the directory structure shown in the following figure.

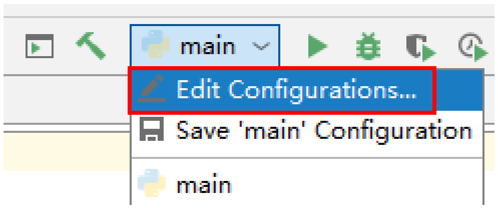
Figure 3-25 Directory structure of the new project JavaScript


```
JavaScript D:\java\JavaScript
  .idea
  ApiGateway-javascript-sdk-2.0.0
    js
    licenses
    demo.html
    demo_require.html
    node_demo.js
    package-lock.json
    signer.js
    test.js
  JavaScript.iml
External Libraries
Scratches and Consoles
```

- **node_demo.js**: Sample code in Node.js. Modify the parameters in the sample code as required. For details about the sample code, see **API Calling Example (Node.js)**.
- **demo.html**: Browser sample code. Modify the parameters in the sample code as required. For details about the sample code, see **API Calling Example (Browser)**.

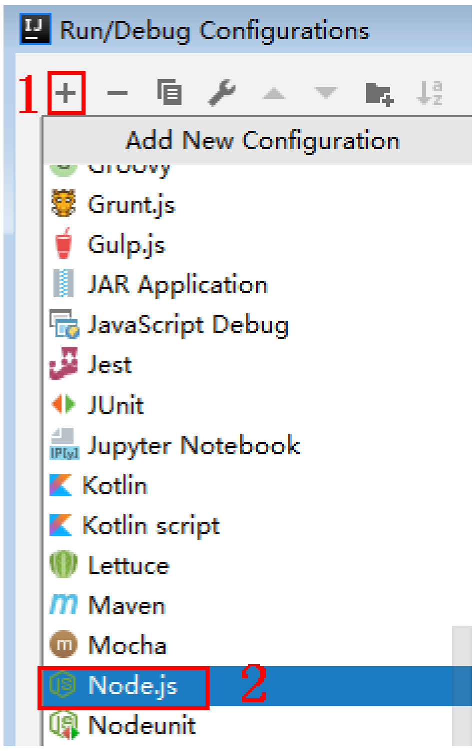
Step 4 Click **Edit Configurations**.

Figure 3-26 Click Edit Configurations



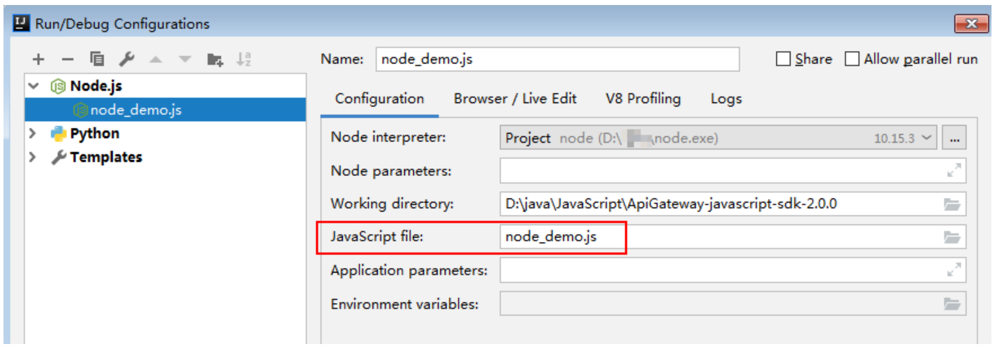
Step 5 Click **+** and select **Node.js**.

Figure 3-27 Selecting Node.js



Step 6 Set **JavaScript file** to **node_demo.js** and click **OK**.

Figure 3-28 Selecting node_demo.js


Run/Debug Configurations

Node.js
node_demo.js
Python
Templates

Name: node_demo.js ☐ Share ☐ Allow parallel run

Configuration | Browser / Live Edit | V8 Profiling | Logs

Node interpreter:	Project node (D:\ [redacted] node.exe) 10.15.3
Node parameters:	
Working directory:	D:\java\JavaScript\ApiGateway-javascript-sdk-2.0.0
JavaScript file:	node_demo.js
Application parameters:	
Environment variables:	

----End

API Calling Example (Node.js)

Step 1 Import **signer.js** to your project.

```
var signer = require('./signer')
var http = require('http')
```

Step 2 Generate a new signer and enter the AppKey and AppSecret.

```
var sig = new signer.Signer()
sig.Key = "4f5f626b-073f-402f-a1e0-e52171c6100c"
sig.Secret = "******"
```

Step 3 Generate a request, and specify the method, request URI, and request body.

```
var r = new signer.HttpRequest("POST", "c967a237-cd6c-470e-906f-
a8655461897e.apigw.exampleRegion.com/app1?a=1");
r.body = '{"a":1}'
```

Step 4 Add the x-stage header to the request to specify an environment name. Add other headers to be signed as necessary.

```
r.headers = { "x-stage":"RELEASE" }
```

Step 5 Execute the following function to generate HTTP(s) request parameters, and add the X-Sdk-Date and Authorization headers for signing the request:

```
var opts = sig.Sign(r)
```

Step 6 Access the API and view the access result. If you access the API using HTTPS, change **http.request** to **https.request**.

```
var req=http.request(opts, function(res){
        console.log(res.statusCode)
        res.on("data",    function(chunk){
        console.log(chunk.toString())
    })
})
req.on("error",function(err){
    console.log(err.message)
})
req.write(r.body)
req.end()
```

----End

API Calling Example (Browser)

Before calling an API with a browser, create an API that supports the OPTIONS method by following the instructions in "Enabling CORS" in the *User Guide*. When creating the API, enable CORS and add **Access-Control-Allow-*** fields in the response header.

Step 1 Import **signer.js** and dependencies to the HTML page.

```
<script src="js/hmac-sha256.js"></script>
<script src="js/moment.min.js"></script>
<script src="js/moment-timezone-with-data.min.js"></script>
<script src='signer.js'></script>
```

Step 2 Sign the request and access the API.

```
var sig = new signer.Signer()
sig.Key = "4f5f626b-073f-402f-a1e0-e52171c6100c"
sig.Secret = "******"
var r= new signer.HttpRequest()
r.host = "c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com"
r.method = "POST"
r.uri = "/app1"
r.body = '{"a":1}'
```

```
r.query = { "a":"1","b":"2" }
r.headers = { "Content-Type":"application/json" }
var opts = sig.Sign(r)
var scheme = "https"
$.ajax({
    type: opts.method,
    data: req.body,
    processData: false,
    url: scheme + "://" + opts.hostname + opts.path,
    headers: opts.headers,
    success: function (data) {
        $('#status').html('200')
        $('#recv').html(data)
    },
    error: function (resp) {
        if (resp.readyState === 4) {
            $('#status').html(resp.status)
            $('#recv').html(resp.responseText)
        } else {
            $('#status').html(resp.state())
        }
    },
    timeout: 1000
});
```

----End

3.8 PHP

Scenarios

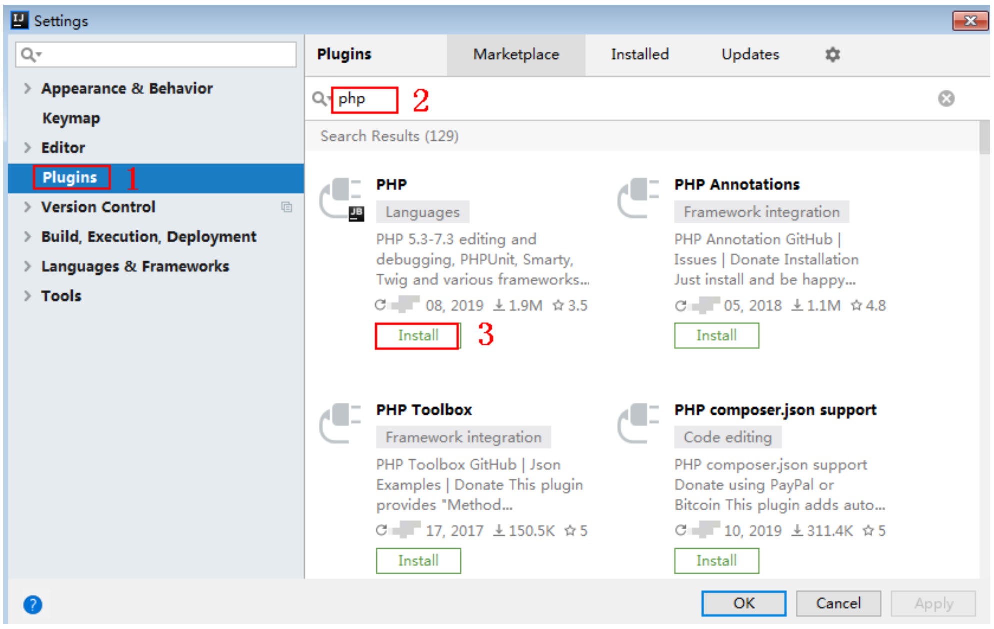
To use PHP to call an API through App authentication, obtain the PHP SDK, create a new project, and then call the API by referring to the API calling example.

This section uses IntelliJ IDEA 2018.3.5 as an example.

Preparing the Environment

- You have obtained the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.
- You have installed IntelliJ IDEA. If not, download IntelliJ IDEA from the **official IntelliJ IDEA website** and install it.
- You have installed the PHP programming language. If not, download the PHP installation package from the **official PHP website** and install it.
- Copy the **php.ini-production** file from the PHP installation directory to the **C:\windows\** directory, rename the file as **php.ini**, and then add the following lines to the file:
  ```
  extension_dir = "PHP installation directory/ext"
  extension=openssl
  extension=curl
  ```
- You have installed the PHP plug-in on IntelliJ IDEA. If not, install the PHP plug-in according to **Figure 3-29**.

Figure 3-29 Installing the PHP plug-in


Settings
Appearance & Behavior
Keymap
Editor
Plugins
1
Version Control
Build, Execution, Deployment
Languages & Frameworks
Tools
Plugins
Marketplace
Installed
Updates
php
2
Search Results (129)
PHP
Languages
PHP 5.3-7.3 editing and debugging, PHPUnit, Smarty, Twig and various frameworks...
08, 2019 1.9M 3.5
Install
3
PHP Annotations
Framework integration
PHP Annotation GitHub | Issues | Donate Installation Just install and be happy...
05, 2018 1.1M 4.8
Install
PHP Toolbox
Framework integration
PHP Toolbox GitHub | Json Examples | Donate This plugin provides "Method...
17, 2017 150.5K 5
Install
PHP composer.json support
Code editing
PHP composer.json support Donate using PayPal or Bitcoin This plugin adds auto...
10, 2019 311.4K 5
Install
OK
Cancel
Apply

Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

The following table shows the files decompressed from the package.

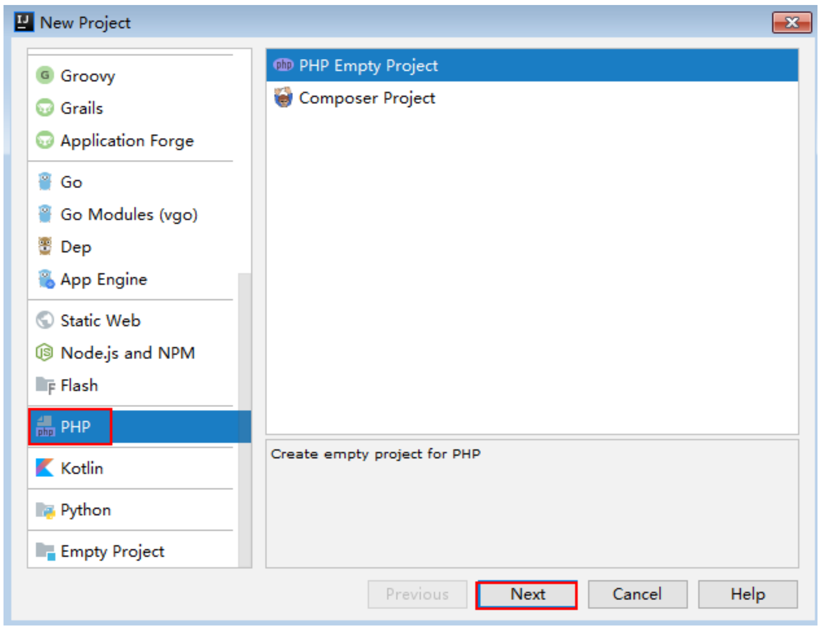
Name	Description
signer.php	SDK code
index.php	Sample code

Creating a Project

Step 1 Start IDEA and choose **File** > **New** > **Project**.

On the displayed **New Project** page, choose **PHP** and click **Next**.

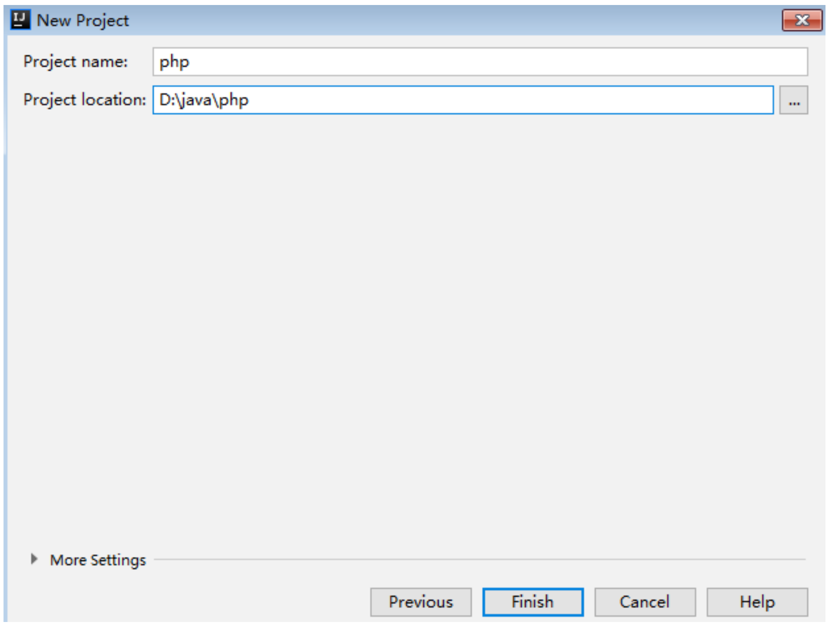
Figure 3-30 PHP



Create empty project for PHP

Step 2 Click **...**, select the directory where the SDK is decompressed, and click **Finish**.

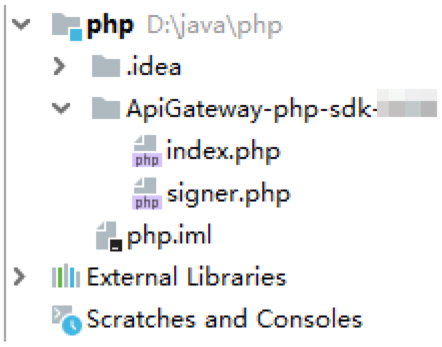
Figure 3-31 Selecting the SDK directory of PHP after decompression



Project name: php
Project location: D:\java\php

Step 3 View the directory structure shown in the following figure.

Figure 3-32 Directory structure of the new project php



Modify the parameters in sample code **signer.php** as required. For details about the sample code, see **API Calling Example**.

----End

API Calling Example

Step 1 Import the PHP SDK to your code.

```
require 'signer.php';
```

Step 2 Generate a new signer and enter the AppKey and AppSecret.

```
$signer = new Signer();
$signer->Key = '4f5f626b-073f-402f-a1e0-e52171c6100c';
$signer->Secret = "******";
```

Step 3 Generate a new request and specify the method, request URL, and body. (The body should contain the actual request content.)

```
$req = new Request('GET', "https://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com/
app1?a=1");
$req->body = '';
```

Step 4 Add the x-stage header to the request to specify an environment name. Add other headers to be signed as necessary.

```
$req->headers = array(
    'x-stage' => 'RELEASE',
);
```

Step 5 Execute the following function to generate a **$curl** context variable.

```
$curl = $signer->Sign($req);
```

Step 6 Access the API and view the access result.

```
$response = curl_exec($curl);
echo curl_getinfo($curl, CURLINFO_HTTP_CODE);
echo $response;
curl_close($curl);
```

----End

3.9 C++

Scenarios

To use C++ to call an API through App authentication, obtain the C++ SDK, and then call the API by referring to the API calling example.

Preparing the Environment

1. Obtain the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.
2. Install the OpenSSL library.
```
apt-get install libssl-dev
```
3. Install the curl library.
```
apt-get install libcurl4-openssl-dev
```

Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

The following table shows the files decompressed from the package.

Name	Description
hasher.cpp	SDK code
hasher.h	
header.h	
RequestParams.cpp	
RequestParams.h	
signer.cpp	
signer.h	
Makefile	**Makefile** file
main.cpp	Sample code

API Calling Example

Step 1 Add the following references to **main.cpp**:
```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <curl/curl.h>
#include "signer.h"
```

Step 2 Generate a new signer and enter the AppKey and AppSecret.
```
Signer signer("4f5f626b-073f-402f-a1e0-e52171c6100c", "******");
```

Step 3 Generate a new **RequestParams** request, and specify the method, domain name, request URI, query strings, and request body.
```
 RequestParams* request = new RequestParams("POST", "c967a237-cd6c-470e-906f-
a8655461897e.apigw.exampleRegion.com", "/app1",
        "Action=ListUsers&Version=2010-05-08", "demo");
```

Step 4 Add the x-stage header to the request to specify an environment name. Add other headers to be signed as necessary.

```
request->addHeader("x-stage", "RELEASE");
```

Step 5 Execute the following function to add the generated headers to the request variable.

```
signer.createSignature(request);
```

Step 6 Use the curl library to access the API and view the access result.

```
static size_t
WriteMemoryCallback(void *contents, size_t size, size_t nmemb, void *userp)
{
    size_t realsize = size * nmemb;
    struct MemoryStruct *mem = (struct MemoryStruct *)userp;

    mem->memory = (char*)realloc(mem->memory, mem->size + realsize + 1);
    if (mem->memory == NULL) {
        /* out of memory! */
        printf("not enough memory (realloc returned NULL)\n");
        return 0;
    }

    memcpy(&(mem->memory[mem->size]), contents, realsize);
    mem->size += realsize;
    mem->memory[mem->size] = 0;

    return realsize;
}

//send http request using curl library
int perform_request(RequestParams* request)
{
    CURL *curl;
    CURLcode res;
    struct MemoryStruct resp_header;
    resp_header.memory = (char*)malloc(1);
    resp_header.size = 0;
    struct MemoryStruct resp_body;
    resp_body.memory = (char*)malloc(1);
    resp_body.size = 0;

    curl_global_init(CURL_GLOBAL_ALL);
    curl = curl_easy_init();

    curl_easy_setopt(curl, CURLOPT_CUSTOMREQUEST, request->getMethod().c_str());
    std::string url = "http://" + request->getHost() + request->getUri() + "?" + request->getQueryParams();
    curl_easy_setopt(curl, CURLOPT_URL, url.c_str());
    struct curl_slist *chunk = NULL;
    std::set<Header>::iterator it;
    for (auto header : *request->getHeaders()) {
        std::string headerEntry = header.getKey() + ": " + header.getValue();
        printf("%s\n", headerEntry.c_str());
        chunk = curl_slist_append(chunk, headerEntry.c_str());
    }
    printf("-------------\n");
    curl_easy_setopt(curl, CURLOPT_HTTPHEADER, chunk);
    curl_easy_setopt(curl, CURLOPT_COPYPOSTFIELDS, request->getPayload().c_str());
    curl_easy_setopt(curl, CURLOPT_NOBODY, 0L);
    curl_easy_setopt(curl, CURLOPT_WRITEFUNCTION, WriteMemoryCallback);
    curl_easy_setopt(curl, CURLOPT_HEADERDATA, (void *)&resp_header);
    curl_easy_setopt(curl, CURLOPT_WRITEDATA, (void *)&resp_body);
    //curl_easy_setopt(curl, CURLOPT_VERBOSE, 1L);
    res = curl_easy_perform(curl);
    if (res != CURLE_OK) {
        fprintf(stderr, "curl_easy_perform() failed: %s\n", curl_easy_strerror(res));
    }
    else {
        long status;
        curl_easy_getinfo(curl, CURLINFO_HTTP_CODE, &status);
        printf("status %d\n", status);
        printf(resp_header.memory);
        printf(resp_body.memory);
    }
    free(resp_header.memory);
    free(resp_body.memory);
    curl_easy_cleanup(curl);

    curl_global_cleanup();

    return 0;
}
```

Step 7 Run the **make** command to obtain a **main** executable file, execute the file, and then view the execution result.

----End

3.10 C

Scenarios

To use C to call an API through App authentication, obtain the C SDK, and then call the API by referring to the API calling example.

Preparing the Environment

1. Obtain the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.
2. Install the OpenSSL library.
   ```
   apt-get install libssl-dev
   ```
3. Install the curl library.
   ```
   apt-get install libcurl4-openssl-dev
   ```

Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

The following table shows the files decompressed from the package.

Name	Description
signer_common.c	SDK code
signer_common.h	
signer.c	
signer.h	
Makefile	**Makefile** file
main.c	Sample code

API Calling Example

Step 1 Add the following references to **main.c**:

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <curl/curl.h>
#include "signer.h"
```

Step 2 Generate a sig_params_t variable, and enter the AppKey and AppSecret.

```
sig_params_t params;
sig_params_init(&params);
sig_str_t app_key = sig_str("4f5f626b-073f-402f-a1e0-e52171c6100c");
sig_str_t app_secret = sig_str("******");
params.key = app_key;
params.secret = app_secret;
```

Step 3 Specify the method, domain name, request URI, query strings, and request body.

```
sig_str_t host = sig_str("c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com");
sig_str_t method = sig_str("GET");
sig_str_t uri = sig_str("/app1");
sig_str_t query_str = sig_str("a=1&b=2");
sig_str_t payload = sig_str("");
params.host = host;
params.method = method;
params.uri = uri;
params.query_str = query_str;
params.payload = payload;
```

Step 4 Add the x-stage header to the request to specify an environment name. Add other headers to be signed as necessary.

```
sig_headers_add(&params.headers, "x-stage", "RELEASE");
```

Step 5 Execute the following function to add the generated headers to the request variable.

```
sig_sign(&params);
```

Step 6 Use the curl library to access the API and view the access result.

```
static size_t
WriteMemoryCallback(void *contents, size_t size, size_t nmemb, void *userp)
{
    size_t realsize = size * nmemb;
    struct MemoryStruct *mem = (struct MemoryStruct *)userp;

    mem->memory = (char*)realloc(mem->memory, mem->size + realsize + 1);
    if (mem->memory == NULL) {
        /* out of memory! */
        printf("not enough memory (realloc returned NULL)\n");
        return 0;
    }

    memcpy(&(mem->memory[mem->size]), contents, realsize);
    mem->size += realsize;
    mem->memory[mem->size] = 0;

    return realsize;
}

//send http request using curl library
int perform_request(RequestParams* request)
{
    CURL *curl;
    CURLcode res;
    struct MemoryStruct resp_header;
    resp_header.memory = malloc(1);
    resp_header.size = 0;
    struct MemoryStruct resp_body;
    resp_body.memory = malloc(1);
    resp_body.size = 0;

    curl_global_init(CURL_GLOBAL_ALL);
    curl = curl_easy_init();

    curl_easy_setopt(curl, CURLOPT_CUSTOMREQUEST, params.method.data);
    char url[1024];
    sig_snprintf(url, 1024, "http://%V%V?%V", &params.host, &params.uri, &params.query_str);
    curl_easy_setopt(curl, CURLOPT_URL, url);
    struct curl_slist *chunk = NULL;
    for (int i = 0; i < params.headers.len; i++) {
        char header[1024];
        sig_snprintf(header, 1024, "%V: %V", &params.headers.data[i].name, &params.headers.data[i].value);
        printf("%s\n", header);
        chunk = curl_slist_append(chunk, header);
    }
    printf("-------------\n");
    curl_easy_setopt(curl, CURLOPT_HTTPHEADER, chunk);
    curl_easy_setopt(curl, CURLOPT_POSTFIELDS, params.payload.data);
    curl_easy_setopt(curl, CURLOPT_NOBODY, 0L);
    curl_easy_setopt(curl, CURLOPT_WRITEFUNCTION, WriteMemoryCallback);
    curl_easy_setopt(curl, CURLOPT_HEADERDATA, (void *)&resp_header);
    curl_easy_setopt(curl, CURLOPT_WRITEDATA, (void *)&resp_body);
    //curl_easy_setopt(curl, CURLOPT_VERBOSE, 1L);
    res = curl_easy_perform(curl);
    if (res != CURLE_OK) {
        fprintf(stderr, "curl_easy_perform() failed: %s\n", curl_easy_strerror(res));
    }
    else {
        long status;
        curl_easy_getinfo(curl, CURLINFO_HTTP_CODE, &status);
        printf("status %d\n", status);
        printf(resp_header.memory);
        printf(resp_body.memory);
    }
    free(resp_header.memory);
    free(resp_body.memory);
    curl_easy_cleanup(curl);

    curl_global_cleanup();

    //free signature params
    sig_params_free(&params);
    return 0;
}
```

Step 7 Run the **make** command to obtain a **main** executable file, execute the file, and then view the execution result.

----End

3.11 Android

Scenarios

To use Android to call an API through App authentication, obtain the Android SDK, create a new project, and then call the API by referring to the API calling example.

Preparing the Environment

- You have obtained the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.

- You have installed Android Studio. If not, download Android Studio from the **official Android Studio website** and install it.

Obtaining the SDK

Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.

The following table shows the files decompressed from the package.

Name	Description
app\	Android project code
gradle\	Gradle files
build.gradle	Gradle configuration files
gradle.properties	
settings.gradle	
gradlew	Gradle Wrapper scripts
gradlew.bat	

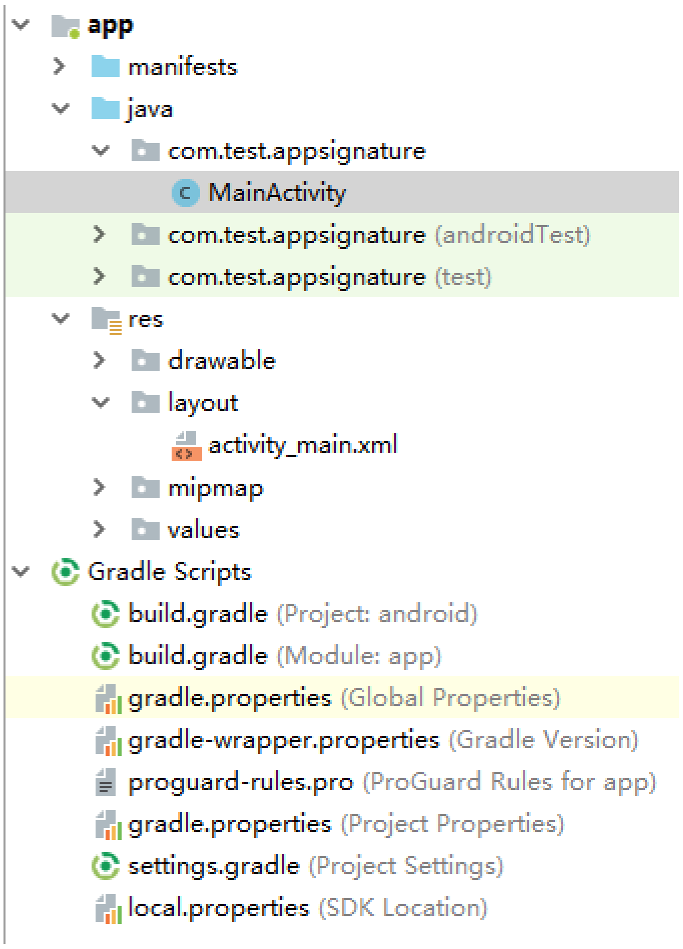
Opening a Project

Step 1 Start the Android Studio and choose **File** > **Open**.

Select the directory where the SDK is decompressed.

Step 2 View the directory structure of the project shown in the following figure.

Figure 3-33 Project directory structure



```
app
  manifests
  java
    com.test.appsignature
      MainActivity
    com.test.appsignature (androidTest)
    com.test.appsignature (test)
  res
    drawable
    layout
      activity_main.xml
    mipmap
    values
Gradle Scripts
  build.gradle (Project: android)
  build.gradle (Module: app)
  gradle.properties (Global Properties)
  gradle-wrapper.properties (Gradle Version)
  proguard-rules.pro (ProGuard Rules for app)
  gradle.properties (Project Properties)
  settings.gradle (Project Settings)
  local.properties (SDK Location)
```

----End

API Calling Example

Step 1 Add required JAR files to the **app/libs** directory of the Android project. The following JAR files must be included:

- java-sdk-core-x.x.x.jar
- joda-time-2.10.jar

Step 2 Add dependencies of the **okhttp** library to the **build.gradle** file.

Add **implementation 'com.squareup.okhttp3:okhttp:3.14.2'** in the **dependencies** field of the **build.gradle** file.

```
dependencies {
    ...
    ...
    implementation 'com.squareup.okhttp3:okhttp:3.14.3'
}
```

Step 3 Create a request, enter an AppKey and AppSecret, and specify the domain name, method, request URI, and body.

```
Request request = new Request();
try {
    request.setKey("4f5f626b-073f-402f-a1e0-e52171c6100c");
    request.setSecrect("******");
    request.setMethod("POST");
    request.setUrl("https://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com/app1");
    request.addQueryStringParam("name", "value");
    request.addHeader("Content-Type", "text/plain");
    request.setBody("demo");
} catch (Exception e) {
    e.printStackTrace();
    return;
}
```

Step 4 Sign the request to generate an **okhttp3.Request** object for API access.

```
okhttp3.Request signedRequest = Client.signOkhttp(request);
OkHttpClient client = new OkHttpClient.Builder().build();
Response response = client.newCall(signedRequest).execute();
```

----End

3.12 curl

Scenarios

To use the curl command to call an API through App authentication, download the JavaScript SDK to generate the curl command, and copy the command to the CLI to call the API.

Prerequisites

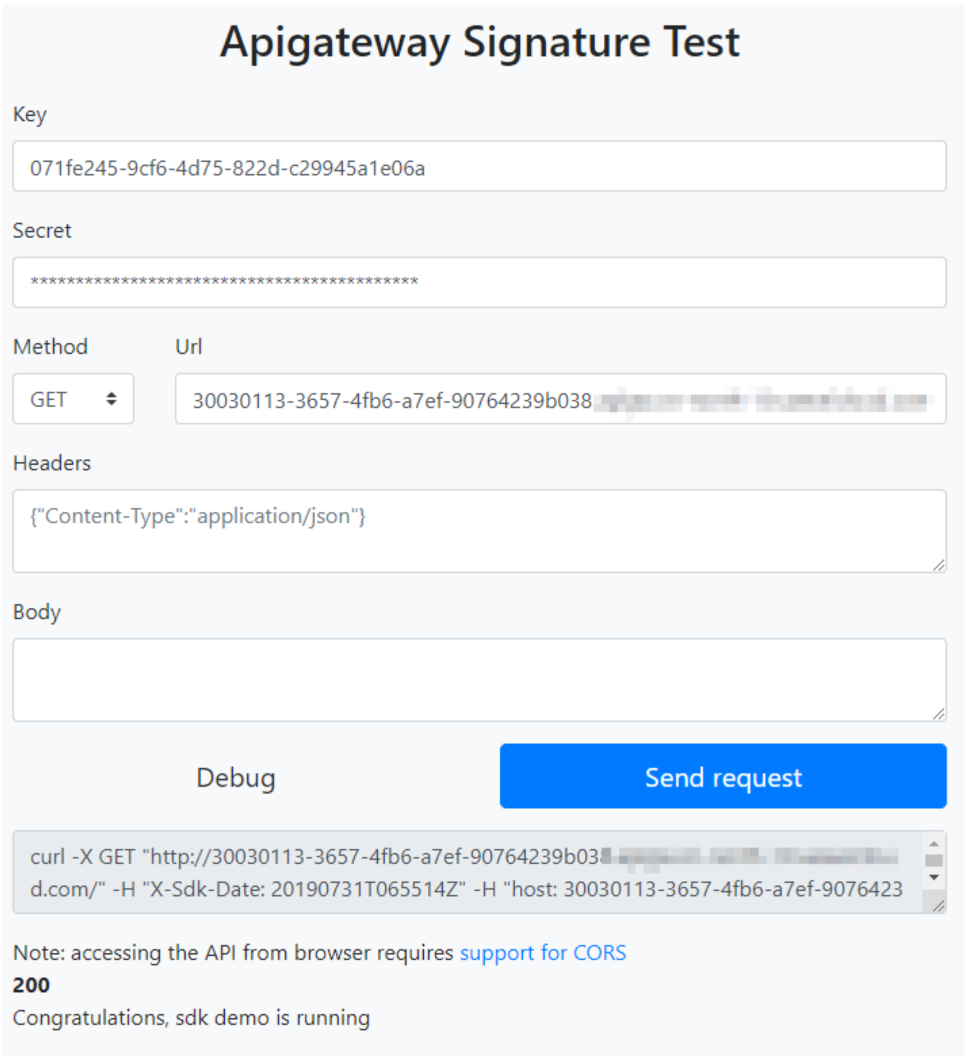
You have obtained the domain name, request URL, and request method of the API to be called, and the AppKey and AppSecret of the app for calling the API. For more information, see **Preparation**.

API Calling Example

Step 1 Use the JavaScript SDK to generate the curl command.

Log in to the API Gateway console, choose **API Calling** > **SDKs** in the navigation pane, and then download the SDK.

Open demo.html in a browser. The following figure shows the demo page.


Apigateway Signature Test

Key

071fe245-9cf6-4d75-822d-c29945a1e06a

Secret

****

Method: GET

Url: 30030113-3657-4fb6-a7ef-90764239b038[redacted]

Headers

{"Content-Type":"application/json"}

Body

```
curl -X GET "http://30030113-3657-4fb6-a7ef-90764239b03[redacted]
d.com/" -H "X-Sdk-Date: 20190731T065514Z" -H "host: 30030113-3657-4fb6-a7ef-9076423
```

Note: accessing the API from browser requires support for CORS

200

Congratulations, sdk demo is running

Step 2 Specify the key, secret, method, protocol, domain name, and URL. For example:

```
Key=4f5f626b-073f-402f-a1e0-e52171c6100c
Secret=******
Method=POST
Url=https://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com
```

Step 3 Specify query and header parameters in JSON format, and set the request body.

Step 4 Click **Send request** to generate a **curl** command. Copy the **curl** command to the CLI to access the API.

```
$ curl -X POST "https://c967a237-cd6c-470e-906f-a8655461897e.apigw.exampleRegion.com/" -H "X-Sdk-
Date: 20180530T115847Z" -H "Authorization: SDK-HMAC-SHA256 Access=071fe245-9cf6-4d75-822d-
c29945a1e06a, SignedHeaders=host;x-sdk-date, Signature=9e5314bd156d517******dd3e5765fdde4" -d ""
Congratulations, sdk demo is running
```

NOTE

The **curl** command generated using an SDK does not meet the format requirements of Windows. Please run the **curl** command in Git Bash.

----End

4 Calling APIs Through IAM Authentication

4.1 Token Authentication

Scenarios

To call APIs using a token, add the token to the **X-Auth-Token** header in API requests.

NOTE

You can use either of the following authentication methods to call APIs:

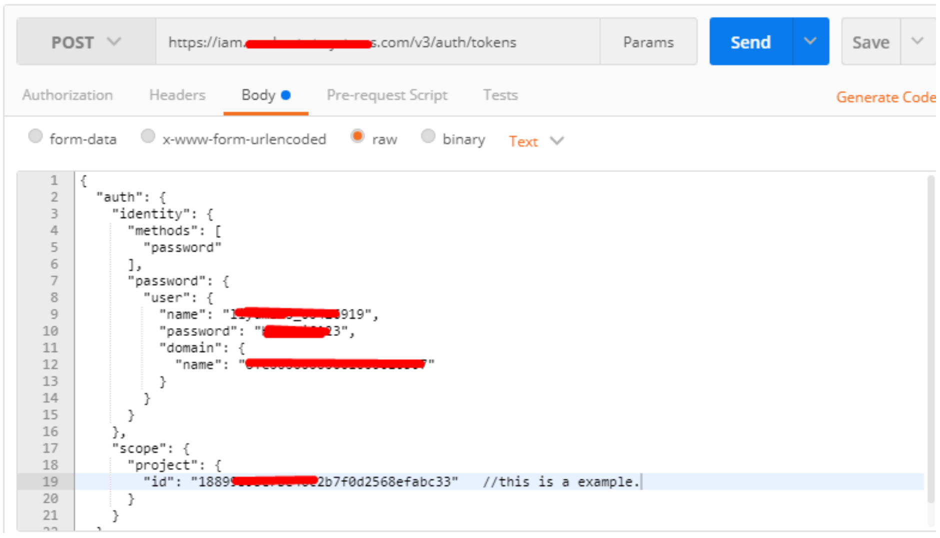
- Token authentication: Requests are authenticated using a token.
- AK/SK authentication: Requests are encrypted using an access key ID (AK) and a secret access key (SK).

Calling an API Through Token Authentication

1. Obtain a token. For details, see chapter "Obtaining a User Token" in the *Identity and Access Management API Reference*. After the request is processed, the value of **X-Subject-Token** in the message header is the token value.

   The following figures show how to obtain a token using an API testing tool.

Figure 4-1 Example request

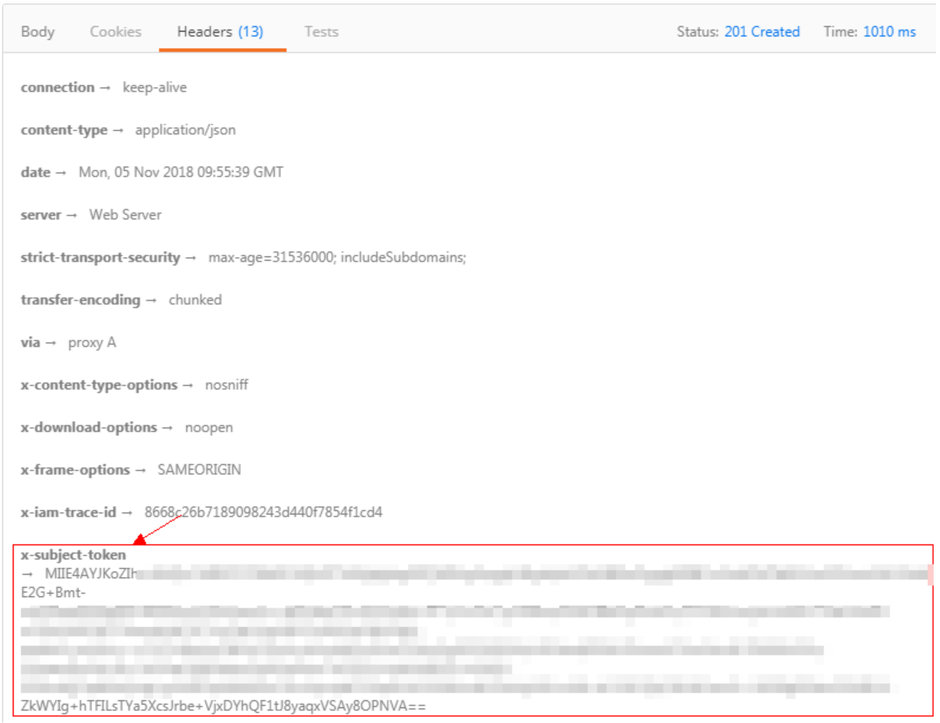


POST https://iam.[redacted]s.com/v3/auth/tokens

Body: raw

```
{
  "auth": {
    "identity": {
      "methods": [
        "password"
      ],
      "password": {
        "user": {
          "name": "[redacted]919",
          "password": "[redacted]23",
          "domain": {
            "name": "[redacted]"
          }
        }
      }
    },
    "scope": {
      "project": {
        "id": "18899[redacted]2b7f0d2568efabc33"    //this is a example.
      }
    }
```

Figure 4-2 Obtaining the X-Subject-Token response header



Status: 201 Created Time: 1010 ms

```
connection → keep-alive

content-type → application/json

date → Mon, 05 Nov 2018 09:55:39 GMT

server → Web Server

strict-transport-security → max-age=31536000; includeSubdomains;

transfer-encoding → chunked

via → proxy A

x-content-type-options → nosniff

x-download-options → noopen

x-frame-options → SAMEORIGIN

x-iam-trace-id → 8668c26b7189098243d440f7854f1cd4

x-subject-token
→ MIIE4AYJKoZIh[redacted]
E2G+Bmt-
[redacted]
ZkWYIg+hTFILsTYa5XcsJrbe+VjxDYhQF1tJ8yaqxVSAy8OPNVA==
```

2. Call a service API and add the **X-Auth-Token** request header to specify the token obtained in 1.

Example

This section describes the basic procedure for using an API.

1. Obtain the required information.

   Obtain the IAM endpoint from **Regions and Endpoints**.

2. On the management console, hover the mouse pointer over the username in the upper right corner, choose **My Credentials** from the drop-down list, and then view the project ID on the displayed page.

3. Call the token authentication API to obtain a token, and set an environment variable to pass the token. This token will be used for authentication of other APIs. For details, see chapter "Obtaining a User Token".

   a. Run the following commands to obtain a token:

```
curl -X POST https://{iam_endpoint}/v3/auth/tokens -H 'content-type: application/json' -d '{
    "auth": {
        "identity": {
            "methods": [
                "password"
            ],
            "password": {
                "user": {
                "name": "{user_name}",
                    "domain": {
                        "name": "{user_name}"
                    },
            "password": "{password}"
                }
            }
        },
        "scope": {
            "project": {
                "id": "{project_id}"
            }
        }
    }
}' -vk
```

   Modify the following parameters by referring to *Identity and Access Management API Reference*:

   - *{iam_endpoint}*: Replace this parameter with the IAM endpoint.
   - *{project_id}*: Replace this parameter with the project ID.
   - *{user_name}* and *{password}*: Replace these two parameters respectively with the username and password of the IAM server.

   The value of the **X-Subject-Token** response header is the token.

```
X-Subject-Token:MIIDkgYJKoZIhvcNAQcCoIIDgzCCAxxxxxx38CAQExDTALBglghkgBZQMEAgEwg
```

   b. Run the following command to set an environment variable for passing the token:

   export Token=*{X-Subject-Token}*

   X-Subject-Token is the token obtained in **3.a**. Example:

```
export Token=MIIDkgYJKoZIhvcNAQcCoIIDgzCCAxxxxxx38CAQExDTALBglghkgBZQMEAgEwg
```

4. Call an API. Configure required parameters, and obtain the domain name, request method, and URL by referring to **Preparation**.

```
curl -X Request_method Domain name+URL  -H "x-auth-token: $Token" -vk
```

4.2 AK/SK Authentication

This section describes how to use AK and SK to sign requests.

NOTE

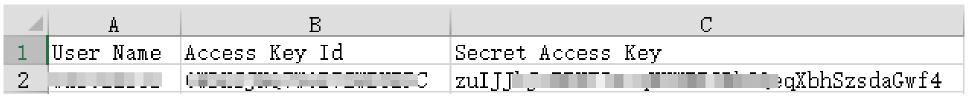
- AK: access key ID, which is a unique identifier used in conjunction with a secret access key to sign requests cryptographically.
- SK: secret access key used in conjunction with an AK to sign requests cryptographically. It identifies a request sender and prevents the request from being modified.

Generating an AK and SK Pair

If an AK/SK pair has already been generated, skip this step. Find the downloaded AK/SK file, which is usually named **credentials.csv**.

As shown in the following figure, the file contains the username, access key ID, and secret access key.

Figure 4-3 Content of the credential.csv file



	A	B	C
1	User Name	Access Key Id	Secret Access Key
2	[redacted]	[redacted]C	zuIJJ[redacted]eqXbhSzsdaGwf4

Perform the following procedure to generate an AK/SK pair:

1. Register an account and log in to the management console.
2. Hover the mouse pointer over the username and choose **My Credentials** from the drop-down list.
3. Click the **Access Keys** tab.
4. Click **Create Access Key**.
5. Enter the verification code or login password as prompted, and click **OK** to download the access key. Keep the access key secure.

Generating a Signature

Generate a signature in the same way as in App authentication mode. Replace AppKey with AK and replace AppSecret with SK to complete the signing and request processing. You can sign requests to access APIs by using **Java**, **Go**, **Python**, **C#**, **JavaScript**, **PHP**, **C++**, **C**, and **Android**.

NOTICE

The local time on the client must be synchronized with the clock server to avoid a large error in the value of the **X-Sdk-Date** request header.

API Gateway (API Management) checks the time format and compares the time with the time when API Gateway (API Management) receives the request. If the time difference exceeds 15 minutes, API Gateway will reject the request.

5 Creating a Function for Frontend Custom Authentication

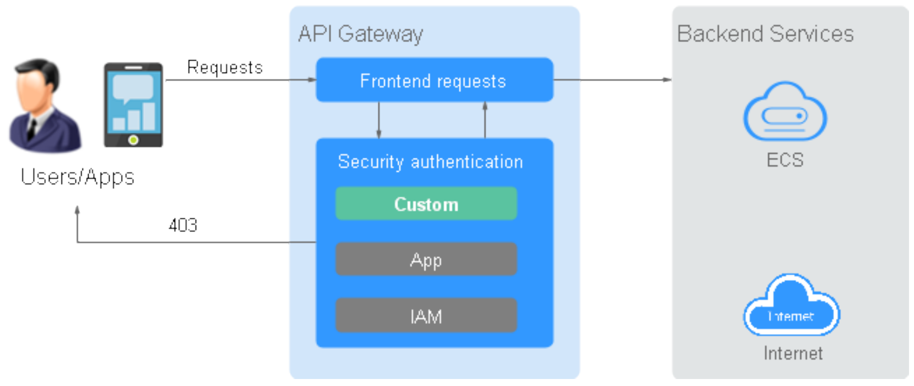
Scenarios

Custom authentication is supported for both frontend and backend requests. For frontend custom authentication, API Gateway uses a function to authenticate received API requests. For backend custom authentication, the backend service invokes another function to authenticate the API requests forwarded by API Gateway.

API requests can be authenticated using a custom authorizer. You need to create a FunctionGraph function for frontend custom authentication and define the required authentication information in the function. The function then serves as a custom authentication backend to authenticate requests for the API.

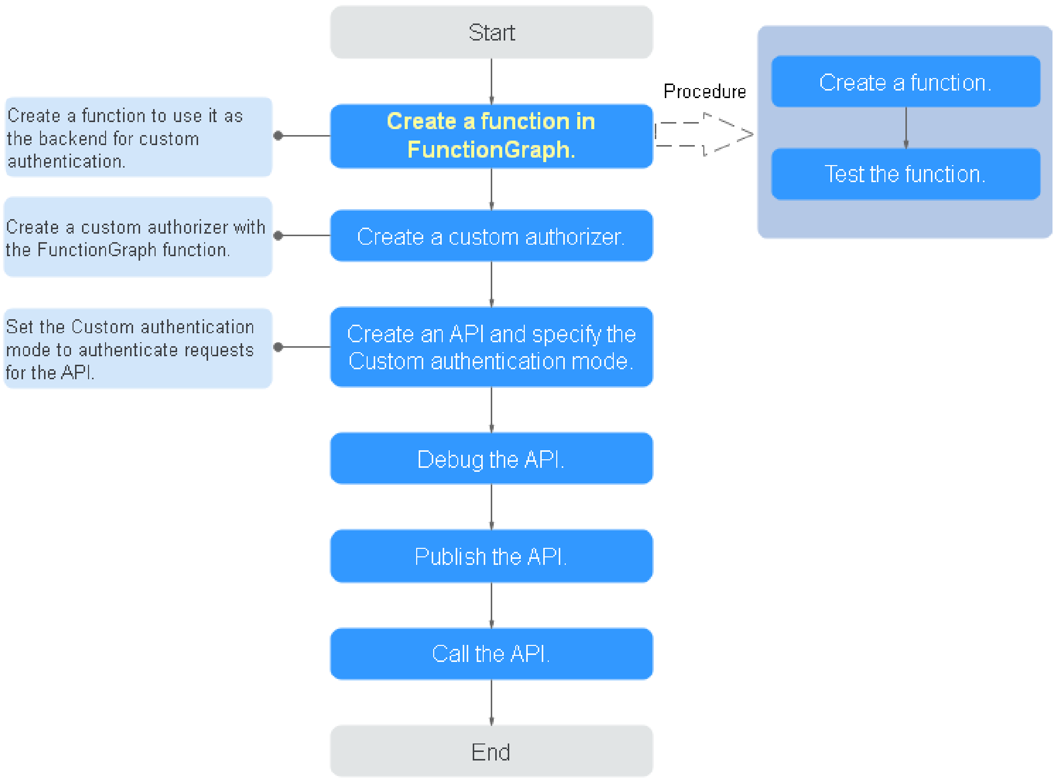
This section describes how to encapsulate a function into a "custom authorizer" and the important operations that need to be noted.

Figure 5-1 Schematic diagram of frontend custom authentication



The following figure shows the process of calling APIs using custom authentication.

Figure 5-2 Calling APIs by using custom authentication


Start
Create a function to use it as the backend for custom authentication.
Create a function in FunctionGraph.
Procedure
Create a function.
Test the function.
Create a custom authorizer with the FunctionGraph function.
Create a custom authorizer.
Set the Custom authentication mode to authenticate requests for the API.
Create an API and specify the Custom authentication mode.
Debug the API.
Publish the API.
Call the API.
End

NOTE

FunctionGraph is required for custom authorizers. If FunctionGraph is unavailable in the selected region, custom authorizers are not supported.

Procedure

Step 1 Create a function in FunctionGraph.

The function code must meet the following requirements (Python 2.7 is used as an example):

- The function code has defined three types of request parameters in the following formats:
  - Header parameters: event["headers"]["*Parameter name*"]
  - Query parameters: event["queryStringParameters"]["*Parameter name*"]
  - Custom user data: event["user_data"]
- The three types of request parameters obtained by the function are mapped to the custom authentication parameters defined in API Gateway.
  - Header parameter: Corresponds to the identity source specified in **Header** for custom authentication. The parameter value is transferred when the API that uses custom authentication is called.
  - Query parameter: Corresponds to the identity source specified in **Query** for custom authentication. The parameter value is transferred when the API that uses custom authentication is called.

  – Custom user data: Corresponds to the user data for custom authentication. The parameter value is specified when the custom authentication system is created.

- The response of the function cannot be greater than 1 MB and must be displayed in the following format:

```
{
    "statusCode":200,
    "body": "{\"status\": \"allow\", \"context\": {\"user\": \"abc\"}}"
}
```

  The **body** field is a character string, which is JSON-decoded as follows:

```
{
    "status": "allow/deny",
    "context": {
        "user": "abc"
    }
}
```

  The **status** field is mandatory and is used to identify the authentication result. The authentication result can only be **allow** or **deny**. **allow** indicates that the authentication is successful, and **deny** indicates that the authentication fails.

  The **context** field is optional and can only be key-value pairs. The key value cannot be a JSON object or an array.

  The **context** field contains custom user data. After successful authentication, the user data is mapped to the backend parameters. The parameter name in **context** is case-sensitive and must be the same as the system parameter name. The parameter name must start with a letter and can contain 1 to 32 characters, including letters, digits, hyphens (-), and underscores (_). After successful frontend authentication, the value **abc** of **user** in **context** is mapped to the **test** parameter in the **Header** location of backend requests.

Example header parameters:

```
# -*- coding:utf-8 -*-
import json
def handler(event, context):
    if event["headers"].get("test")=='abc':
        resp = {
            'statusCode': 200,
            'body': json.dumps({
                "status":"allow",
                "context":{
                    "user":"abcd"
                }
            })
        }
    else:
        resp = {
            'statusCode': 200,
            'body': json.dumps({
                "status":"deny",
            })
        }
    return json.dumps(resp)
```

Example query parameters:

```
# -*- coding:utf-8 -*-
import json
def handler(event, context):
    if event["queryStringParameters"].get("test")=='abc':
        resp = {
            'statusCode': 200,
            'body': json.dumps({
                "status":"allow",
                "context":{
                    "user":"abcd"
                }
            })
        }
    else:
        resp = {
            'statusCode': 200,
            'body': json.dumps({
                "status":"deny",
            })
        }
    return json.dumps(resp)
```

Example user data:

```
# -*- coding:utf-8 -*-
import json
def handler(event, context):
    if event.get("user_data")=='abc':
        resp = {
            'statusCode': 200,
            'body': json.dumps({
                "status":"allow",
                "context":{
                    "user":"abcd"
                }
            })
        }
    else:
        resp = {
            'statusCode': 200,
            'body': json.dumps({
                "status":"deny",
            })
        }
    return json.dumps(resp)
```

Step 2 Test the function. In the **Configure Test Event** dialog box, select **apig-event-template**, edit the test event, and click **Save**. Then click **Test**.

If the execution result is **Success**, the test is successful.

Next, you need to go to the API Gateway console to create a frontend custom authorizer.

----End

Follow-Up Operations

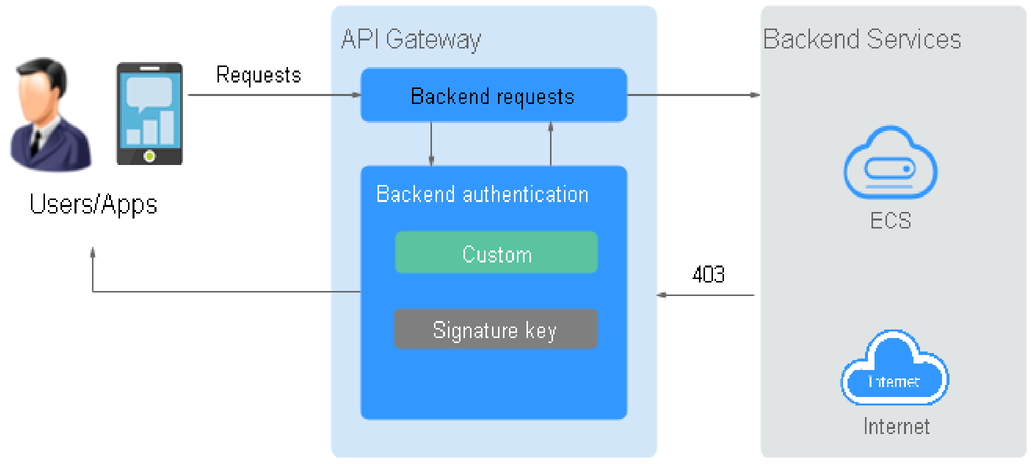
Create a custom authorizer for frontend authentication on the API Gateway console.

6 Creating a Function for Backend Custom Authentication

Scenarios

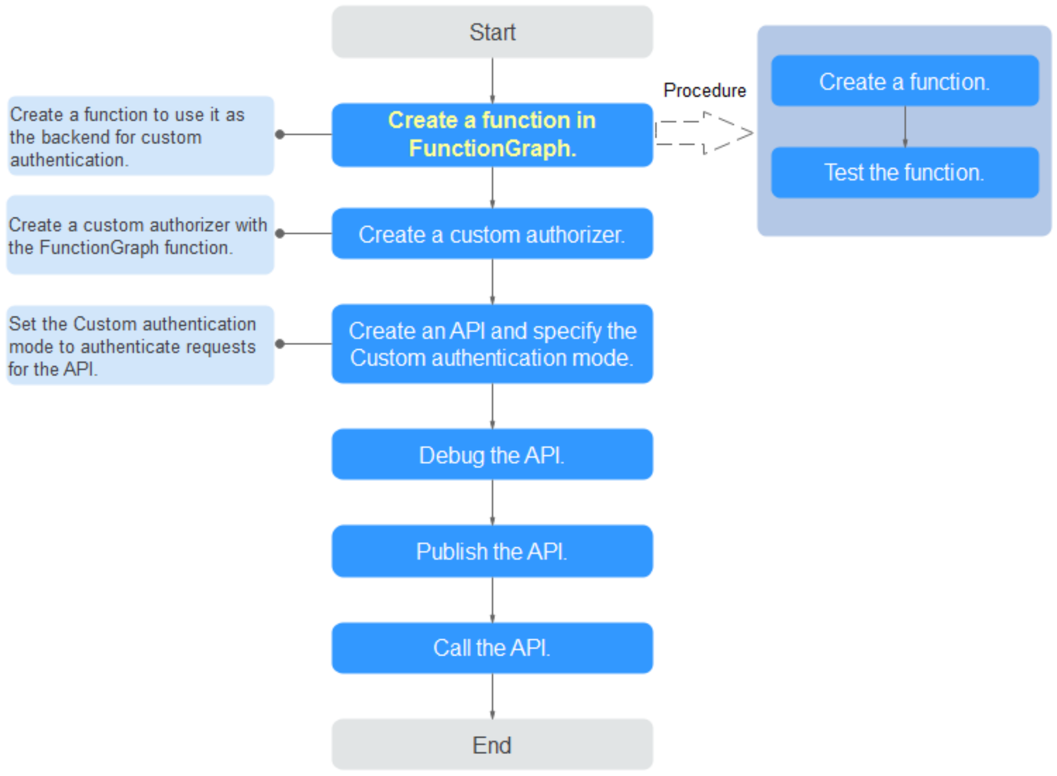
To protect backend services, you can use multiple external authentication systems by configuring one authentication mechanism. You need to create a FunctionGraph function for backend custom authentication and define the required authentication information in the function. The function then serves as a custom authentication backend to authenticate requests forwarded by API Gateway.

Figure 6-1 Schematic diagram of backend custom authentication



The following figure shows the process of calling APIs using custom authentication.

Figure 6-2 Calling APIs by using custom authentication


Start
Create a function to use it as the backend for custom authentication.
Create a function in FunctionGraph.
Procedure
Create a function.
Test the function.
Create a custom authorizer with the FunctionGraph function.
Create a custom authorizer.
Set the Custom authentication mode to authenticate requests for the API.
Create an API and specify the Custom authentication mode.
Debug the API.
Publish the API.
Call the API.
End

NOTE

FunctionGraph is required for custom authorizers. If FunctionGraph is unavailable in the selected region, custom authorizers are not supported.

Procedure

Step 1 Create a function in FunctionGraph.

The function code must meet the following requirements (Python 2.7 is used as an example):

- The custom user data contained in the function code must be in the following format: event["user_data"].
- The custom user data corresponds to the user data defined for the custom authorizer. You can define the user data in any format.
- The response of the function cannot be greater than 1 MB and must be displayed in the following format:

```
{
    "statusCode":200,
    "body": "{\"status\": \"allow\", \"context\": {\"user\": \"abc\"}}"
}
```

The **body** field is a character string, which is JSON-decoded as follows:

```
{
    "status": "allow/deny",
    "context": {
        "user": "abc"
    }
}
```

The **status** field is mandatory and is used to identify the authentication result. The authentication result can only be **allow** or **deny**. **allow** indicates that the authentication is successful, and **deny** indicates that the authentication fails.

The **context** field is optional and can only be key-value pairs. The key value cannot be a JSON object or an array.

The **context** field contains custom user data. After successful authentication, the user data is mapped to the backend parameters. The parameter name in **context** is case-sensitive and must be the same as the system parameter name. The parameter name in **context** must start with a letter and contain 1 to 32 characters, including uppercase letters, lowercase letters, digits, underscores (_), and hyphens (-).

After successful backend authentication, the value **abc** of **user** in **context** is mapped to the **test** parameter in the **Header** location of backend requests and passed to the backend service.

Example user data:

```
# -*- coding:utf-8 -*-
import json
import base64
def handler(event, context):
    exampleuserdata=base64.b64encode(event["user_data"])
    resp = {
        'statusCode': 200,
        'body': json.dumps({
            "status":"allow",
            "context":{
                "user":exampleuserdata
            }
        })
    }
    return json.dumps(resp)
```

Step 2 Test the function. In the **Configure Test Event** dialog box, select **blank-template**, and set the following test event:

```
{"user_data": "123"}
```

Click **Save**. Then click **Test**.

If the execution result is **Success**, the test is successful.

Next, you need to go to the API Gateway console to create a backend custom authorizer.

----End

Follow-Up Operations

Create a custom authorizer for backend authentication on the API Gateway console.

7 Creating Signatures for Backend Requests

7.1 Java

Scenarios

To use Java to sign backend requests, obtain the Java SDK, import the project, and verify the backend signature by referring to the example provided in this section.

This section uses IntelliJ IDEA 2018.3.5 as an example.

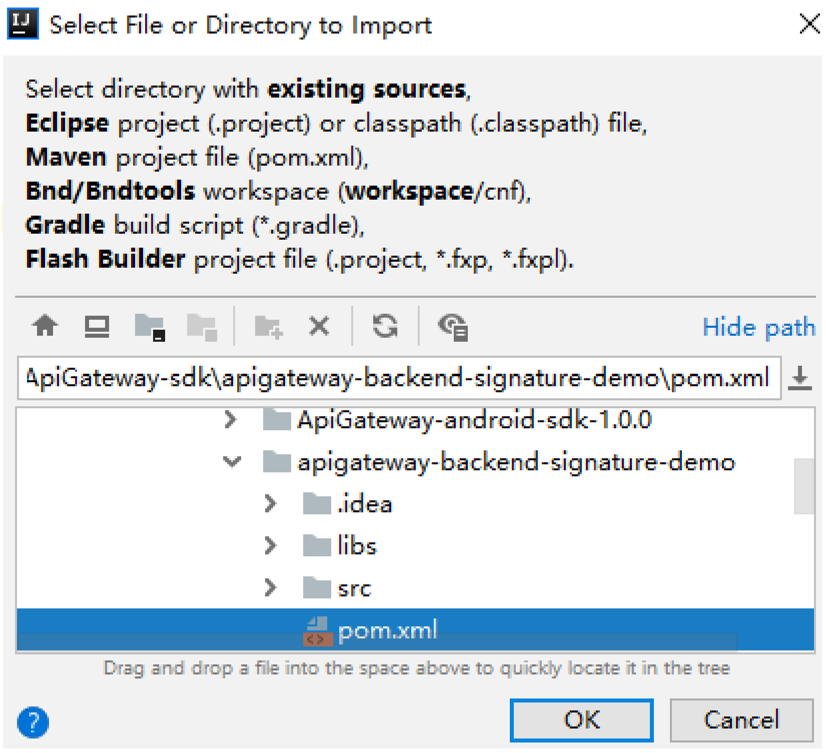
Prerequisites

- You have obtained the key and secret of the signature key to be used.
- You have created a signature key on the API Gateway console and bound it to the API to be called. For more information, see "Creating and Using a Signature Key" in the *User Guide*.
- Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.
- You have installed IntelliJ IDEA. If not, download IntelliJ IDEA from the **official IntelliJ IDEA website** and install it.
- You have installed Java Development Kit (JDK) 1.8.111 or a later version. If not, download JDK from the **official Oracle website** and install it.

Importing a Project

Step 1 Open IntelliJ IDEA, choose **File** > **New** > **Project from Existing Sources**, select the **apigateway-backend-signature-demo\pom.xml** file, and click **OK**.

Figure 7-1 Select File or Directory to Import


Select File or Directory to Import

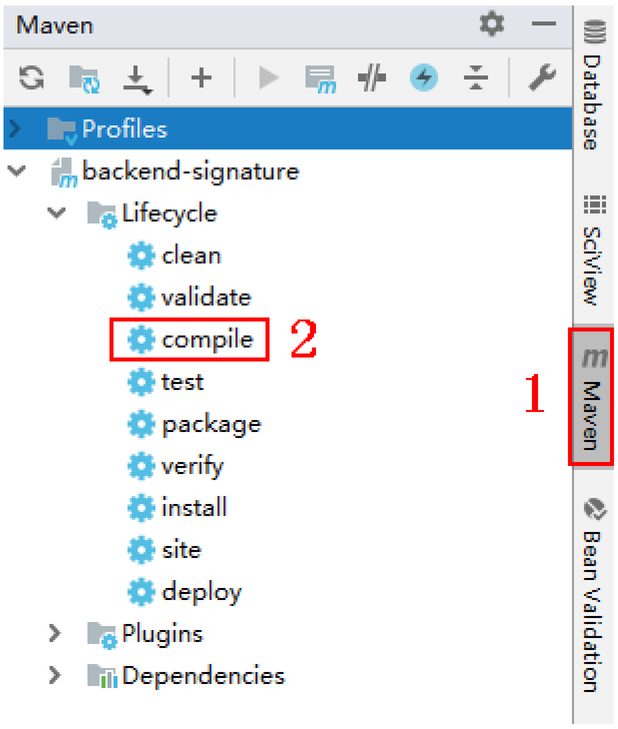
Select directory with **existing sources**,
Eclipse project (.project) or classpath (.classpath) file,
Maven project file (pom.xml),
Bnd/Bndtools workspace (**workspace**/cnf),
Gradle build script (*.gradle),
Flash Builder project file (.project, *.fxp, *.fxpl).

Hide path
ApiGateway-sdk\apigateway-backend-signature-demo\pom.xml
ApiGateway-android-sdk-1.0.0
apigateway-backend-signature-demo
.idea
libs
src
pom.xml
Drag and drop a file into the space above to quickly locate it in the tree
OK
Cancel

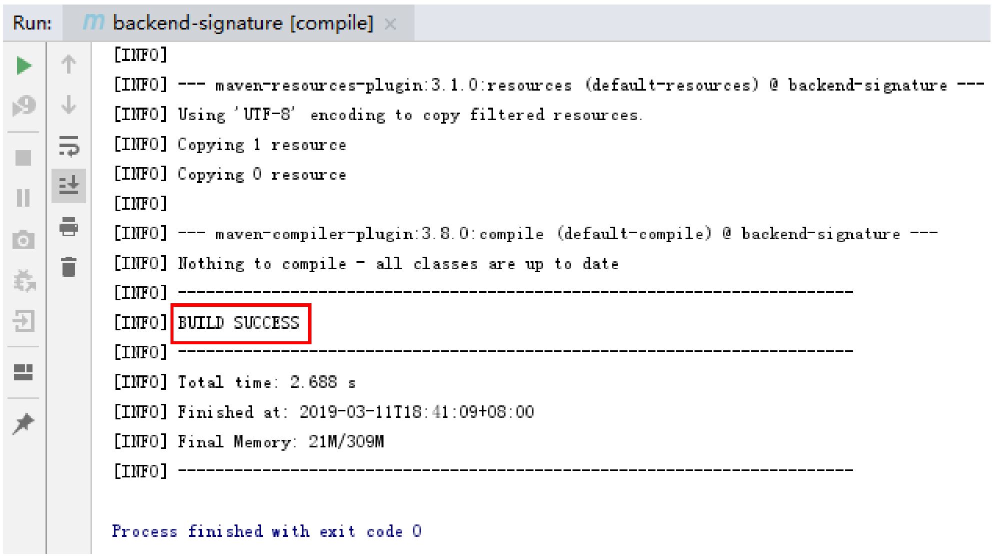
Step 2 Retain the default settings, click **Next** for the following four steps, and then click **Finish**.

Step 3 On the **Maven** tab page on the right, double-click **compile** to compile the file.

Figure 7-2 Compiling the project



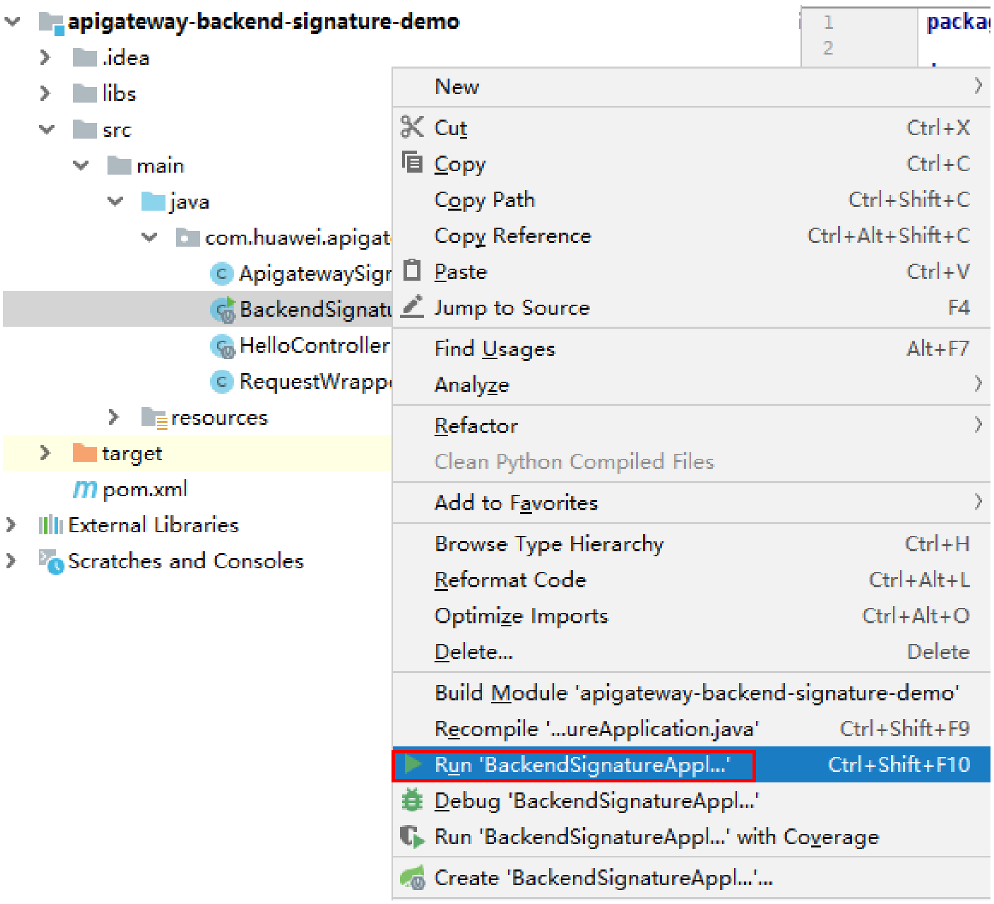
If the message "BUILD SUCCESS" is displayed, the compilation is successful.



```
[INFO]
[INFO] --- maven-resources-plugin:3.1.0:resources (default-resources) @ backend-signature ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] Copying 1 resource
[INFO] Copying 0 resource
[INFO]
[INFO] --- maven-compiler-plugin:3.8.0:compile (default-compile) @ backend-signature ---
[INFO] Nothing to compile - all classes are up to date
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 2.688 s
[INFO] Finished at: 2019-03-11T18:41:09+08:00
[INFO] Final Memory: 21M/309M
[INFO] ------------------------------------------------------------------------

Process finished with exit code 0
```

Step 4 Right-click **BackendSignatureApplication** and choose **Run**.

Figure 7-3 Running the BackendSignatureApplication service


apigateway-backend-signature-demo
.idea
libs
src
main
java
com.huawei.apigat
ApigatewaySigr
BackendSignatu
HelloController
RequestWrapp
resources
target
pom.xml
External Libraries
Scratches and Consoles
packa
New
Cut Ctrl+X
Copy Ctrl+C
Copy Path Ctrl+Shift+C
Copy Reference Ctrl+Alt+Shift+C
Paste Ctrl+V
Jump to Source F4
Find Usages Alt+F7
Analyze
Refactor
Clean Python Compiled Files
Add to Favorites
Browse Type Hierarchy Ctrl+H
Reformat Code Ctrl+Alt+L
Optimize Imports Ctrl+Alt+O
Delete... Delete
Build Module 'apigateway-backend-signature-demo'
Recompile '...ureApplication.java' Ctrl+Shift+F9
Run 'BackendSignatureAppl...' Ctrl+Shift+F10
Debug 'BackendSignatureAppl...'
Run 'BackendSignatureAppl...' with Coverage
Create 'BackendSignatureAppl...'...

Modify the parameters in sample code **ApigatewaySignatureFilter.java** as required. For details about the sample code, see **Backend Signature Verification Example**.

----End

Backend Signature Verification Example

This example demonstrates how to build a Spring boot–based server as the backend of an API and implement a filter to verify the signature of requests sent from API Gateway (API Management).

NOTE

Signature information is added to requests sent to access the backend of an API only after a signature key is bound to the API.

Step 1 Compile a controller that matches all request paths and methods and set the return body to **Hello World!**

```
// HelloController.java

@RestController
@EnableAutoConfiguration
public class HelloController {

    @RequestMapping("/*")
    private String index() {
        return "Hello World!";
    }
}
```

Step 2 Compile a filter that matches all request paths and methods, and put the signature key and secret in a **Map**.

```
// ApigatewaySignatureFilter.java

@Component
@WebFilter(filterName = "ApigatewaySignatureFilter", urlPatterns = "/*")
public class ApigatewaySignatureFilter implements Filter {
    private static Map<String, String> secrets = new HashMap<>();
    static {
        secrets.put("signature_key1", "signature_secret1");
        secrets.put("signature_key2", "signature_secret2");
    }

    @Override
    public void init(FilterConfig filterConfig) throws ServletException {
    }

    @Override
    public void doFilter(ServletRequest servletRequest, ServletResponse servletResponse, FilterChain chain) {
        //Signature verification code
        ...
    }
}
```

Step 3 To ensure that the body can be read in the filter and controller, wrap the request and send it to the filter and controller. The doFilter function is used for signature verification. For the implementation of wrapper classes, see RequestWrapper.java.

```
RequestWrapper request = new RequestWrapper((HttpServletRequest) servletRequest);
```

Step 4 Use a regular expression to parse the **Authorization** header to obtain **signingKey** and **signedHeaders**.

```
private static final Pattern authorizationPattern = Pattern.compile("SDK-HMAC-SHA256\\s+Access=([^,]+),\
\s?SignedHeaders=([^,]+),\\s?Signature=(\\w+)");

...

String authorization = request.getHeader("Authorization");
if (authorization == null || authorization.length() == 0) {
    response.sendError(HttpServletResponse.SC_UNAUTHORIZED, "Authorization not found.");
    return;
}

Matcher m = authorizationPattern.matcher(authorization);
if (!m.find()) {
    response.sendError(HttpServletResponse.SC_UNAUTHORIZED, "Authorization format incorrect.");
    return;
}
String signingKey = m.group(1);
String signingSecret = secrets.get(signingKey);
if (signingSecret == null) {
    response.sendError(HttpServletResponse.SC_UNAUTHORIZED, "Signing key not found.");
    return;
}
String[] signedHeaders = m.group(2).split(";");
```

For example, for **Authorization** header:

```
SDK-HMAC-SHA256 Access=signature_key1, SignedHeaders=host;x-sdk-date,
Signature=e11adf65a20d1b82c25419b5********8d0ba12fed1ceb13ed00
```

The parsing result is as follows:

```
signingKey=signature_key1
signedHeaders=host;x-sdk-date
```

Step 5 Find **signingSecret** based on **signingKey**. If **signingKey** does not exist, the authentication failed.

```
String signingSecret = secrets.get(signingKey);
if (signingSecret == null) {
    response.sendError(HttpServletResponse.SC_UNAUTHORIZED, "Signing key not found.");
    return;
}
```

Step 6 Create a request, and add the method, URL, query, and signedHeaders headers to the request. Determine whether the body needs to be set.

The body is read if there is no **x-sdk-content-sha256** header with value **UNSIGNED-PAYLOAD**.

```
Request apiRequest = new DefaultRequest();
apiRequest.setHttpMethod(HttpMethodName.valueOf(request.getMethod()));
String url = request.getRequestURL().toString();
String queryString = request.getQueryString();
try {
    apiRequest.setEndpoint((new URL(url)).toURI());
    Map<String, String> parametersmap = new HashMap<>();
    if (null != queryString && !"".equals(queryString)) {
        String[] parameterarray = queryString.split("&");
        for (String p : parameterarray) {
            String[] p_split = p.split("=", 2);
            String key = p_split[0];
            String value = "";
            if (p_split.length >= 2) {
                value = p_split[1];
            }
            parametersmap.put(URLDecoder.decode(key, "UTF-8"), URLDecoder.decode(value, "UTF-8"));
        }
        apiRequest.setParameters(parametersmap); //set query
    }
} catch (URISyntaxException e) {
    e.printStackTrace();
}

boolean needbody = true;
String dateHeader = null;
for (int i = 0; i < signedHeaders.length; i++) {
    String headerValue = request.getHeader(signedHeaders[i]);
    if (headerValue == null || headerValue.length() == 0) {
        ((HttpServletResponse) response).sendError(HttpServletResponse.SC_UNAUTHORIZED, "signed 
header" + signedHeaders[i] + " not found.");
    } else {
        apiRequest.addHeader(signedHeaders[i], headerValue);//set header
        if (signedHeaders[i].toLowerCase().equals("x-sdk-content-sha256") && 
headerValue.equals("UNSIGNED-PAYLOAD")) {
            needbody = false;
        }
        if (signedHeaders[i].toLowerCase().equals("x-sdk-date")) {
            dateHeader = headerValue;
        }
    }
}

if (needbody) {
        apiRequest.setContent(new ByteArrayInputStream(request.getBody()));    //set body
}
```

Step 7 Check whether the signature has expired. Obtain the time from the **X-Sdk-Date** header, and check whether the difference between this time and the server time is within 15 minutes. If **signedHeaders** does not contain **X-Sdk-Date**, the authentication failed.

```
private static final DateTimeFormatter timeFormatter = 
DateTimeFormat.forPattern("yyyyMMdd'T'HHmmss'Z'").withZoneUTC();

...

if (dateHeader == null) {
    response.sendError(HttpServletResponse.SC_UNAUTHORIZED, "Header x-sdk-date not found.");
    return;
}
long date = timeFormatter.parseMillis(dateHeader);
long duration = Math.abs(DateTime.now().getMillis() - date);
if (duration > 15 * 60 * 1000) {
    response.sendError(HttpServletResponse.SC_UNAUTHORIZED, "Signature expired.");
    return;
}
```

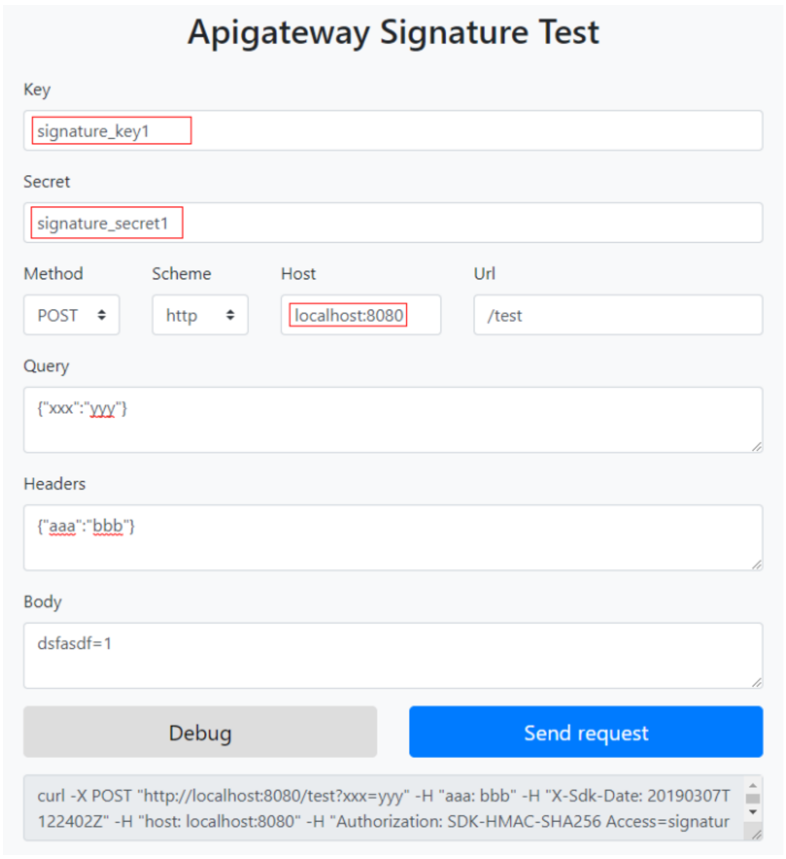
Step 8 Add the **Authorization** header to the request, and invoke the **verify** method to verify the request signature. If the verification is successful, the next filter is executed. Otherwise, the authentication failed.

```
DefaultSigner signer = (DefaultSigner) SignerFactory.getSigner();
boolean verify = signer.verify(apiRequest, new BasicCredentials(signingKey, signingSecret));
if (verify) {
    chain.doFilter(request, response);
} else {
    response.sendError(HttpServletResponse.SC_UNAUTHORIZED, "verify authroization failed.");
}
```

Step 9 Run the server to verify the code. The following example uses the **HTML signature tool** in the JavaScript SDK to generate a signature.

Set the parameters according to the following figure, and click **Send request**. Copy the generated curl command, execute it in the CLI, and check whether the server returns **Hello World!**

If an incorrect key or secret is used, the server returns **401**, which means authentication failure.



Key: signature_key1

Secret: signature_secret1

Method	Scheme	Host	Url
POST	http	localhost:8080	/test

Query: {"xxx":"yyy"}

Headers: {"aaa":"bbb"}

Body: dsfasdf=1

```
curl -X POST "http://localhost:8080/test?xxx=yyy" -H "aaa: bbb" -H "X-Sdk-Date: 20190307T
122402Z" -H "host: localhost:8080" -H "Authorization: SDK-HMAC-SHA256 Access=signatur
```

----End

7.2 Python

Scenarios

To use Python to sign backend requests, obtain the Python SDK, import the project, and verify the backend signature by referring to the example provided in this section.

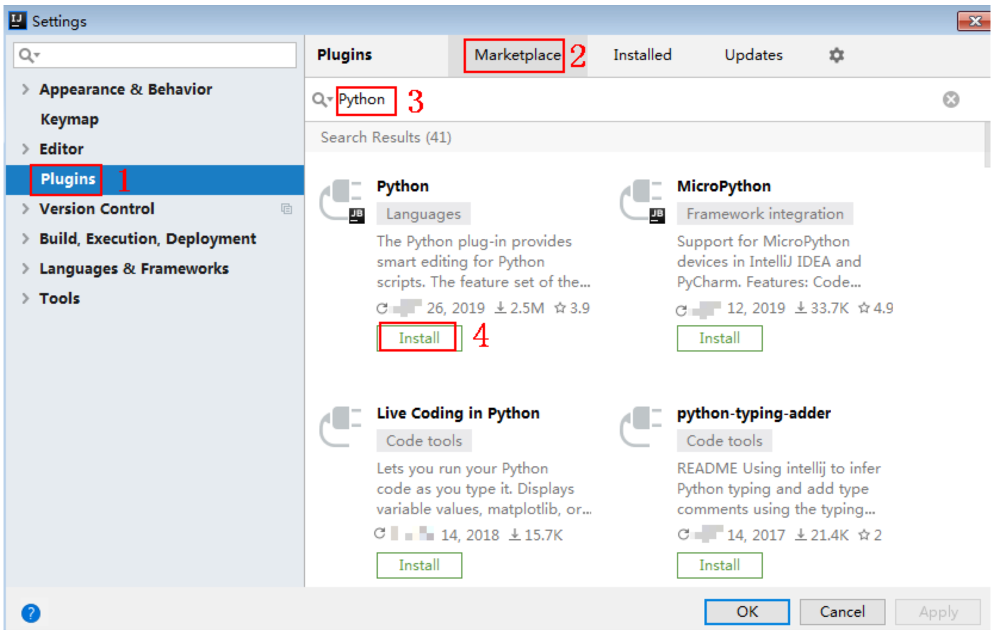
This section uses IntelliJ IDEA 2018.3.5 as an example.

Preparing the Environment

- You have obtained the key and secret of the signature key to be used.
- You have created a signature key on the API Gateway console and bound it to the API to be called. For more information, see "Creating and Using a Signature Key" in the *User Guide*.
- Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.
- You have installed Python 2.7 or 3.X. If not, download the Python installation package from the **official Python website** and install it.
- You have installed IntelliJ IDEA. If not, download IntelliJ IDEA from the **official IntelliJ IDEA website** and install it.

- You have installed the Python plug-in on IntelliJ IDEA. If not, install the Python plug-in according to **Figure 7-4**.

Figure 7-4 Installing the Python plug-in

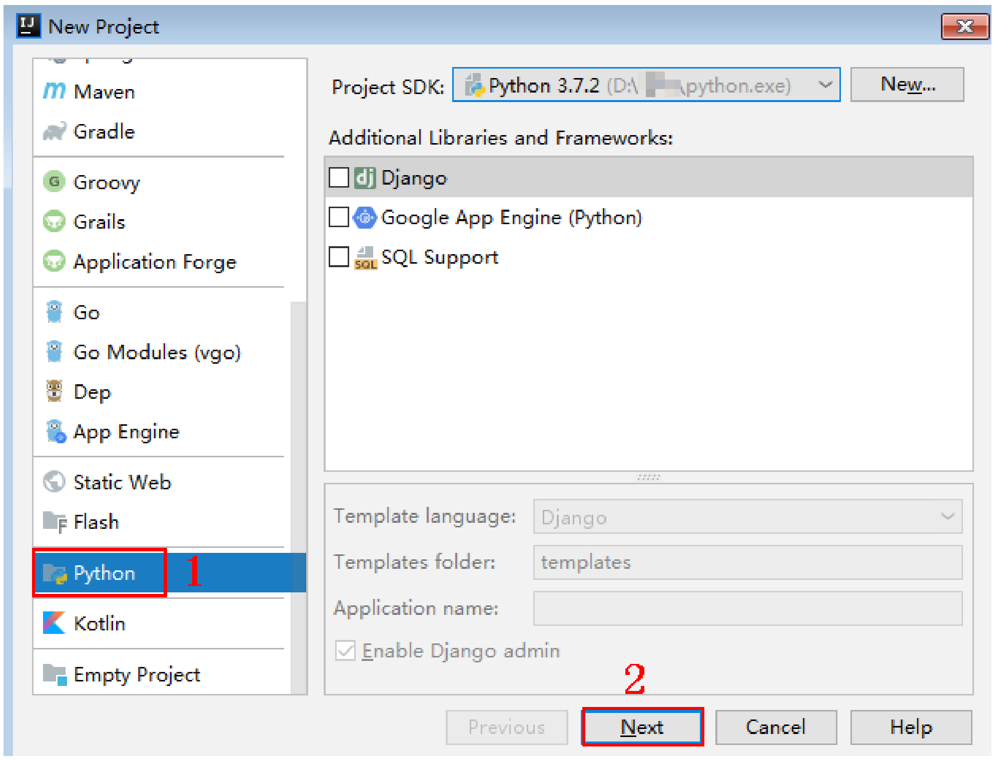

Settings
Appearance & Behavior
Keymap
Editor
Plugins
1
Version Control
Build, Execution, Deployment
Languages & Frameworks
Tools
Plugins
Marketplace
2
Installed
Updates
Python
3
Search Results (41)
Python
Languages
The Python plug-in provides smart editing for Python scripts. The feature set of the...
Install
4
MicroPython
Framework integration
Support for MicroPython devices in IntelliJ IDEA and PyCharm. Features: Code...
Install
Live Coding in Python
Code tools
Lets you run your Python code as you type it. Displays variable values, matplotlib, or...
Install
python-typing-adder
Code tools
README Using intellij to infer Python typing and add type comments using the typing...
Install
OK
Cancel
Apply

Importing a Project

Step 1 Start IntelliJ IDEA and choose **File** > **New** > **Project**.

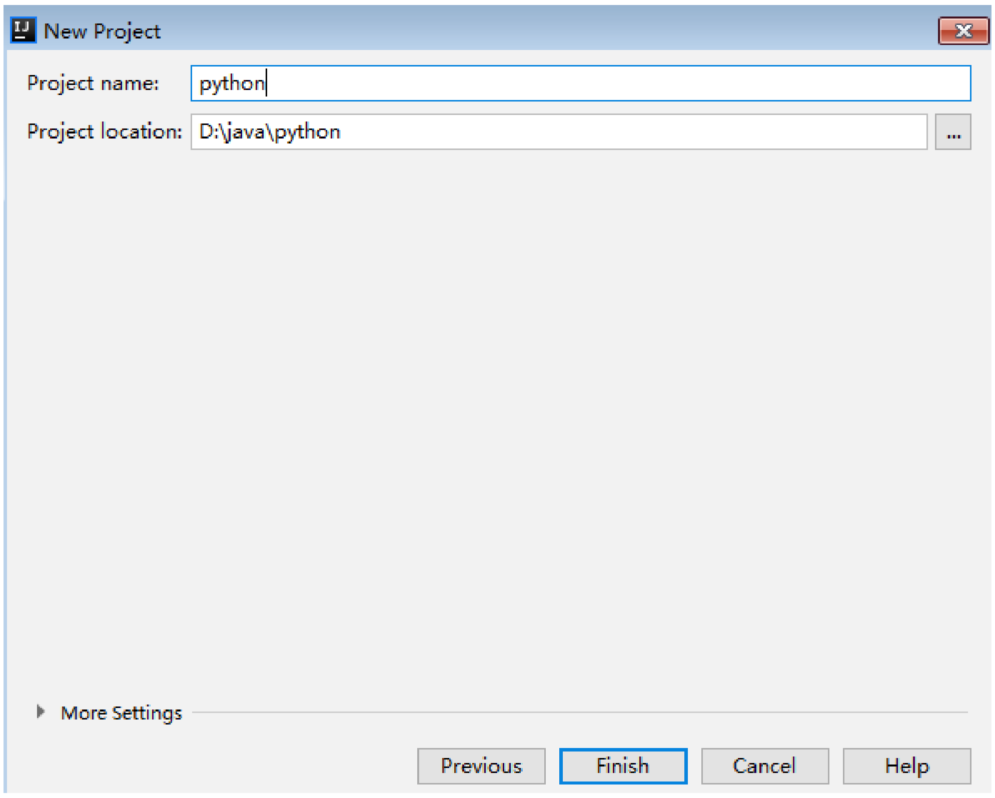
On the displayed **New Project** page, choose **Python** and click **Next**.

Figure 7-5 New Python



Step 2 Click **Next**. Click **...**, select the directory where the SDK is decompressed, and click **Finish**.

Figure 7-6 Selecting the SDK directory of Python after decompression



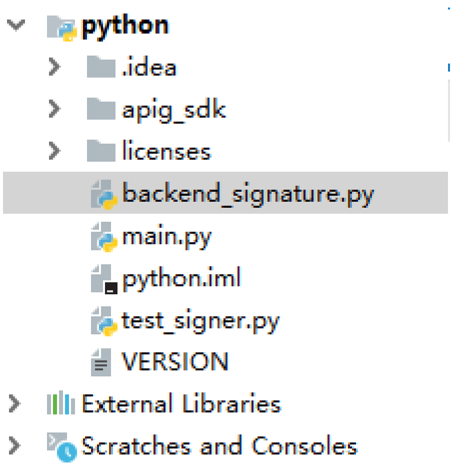
New Project

Project name: python

Project location: D:\java\python

Step 3 View the directory structure shown in the following figure.

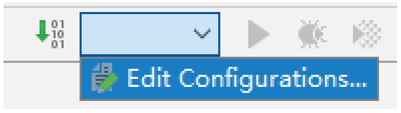
Figure 7-7 Directory structure



```
python
  .idea
  apig_sdk
  licenses
  backend_signature.py
  main.py
  python.iml
  test_signer.py
  VERSION
External Libraries
Scratches and Consoles
```

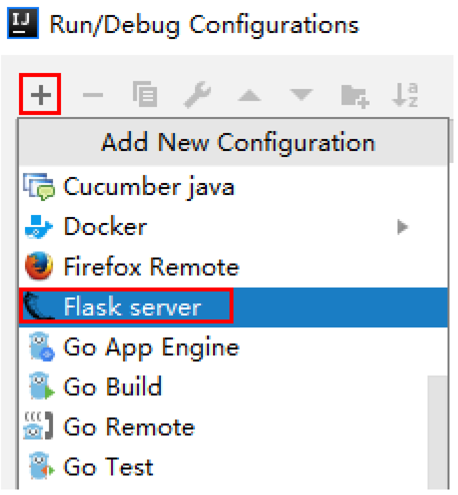
Step 4 Click **Edit Configurations**.

Figure 7-8 Edit Configurations

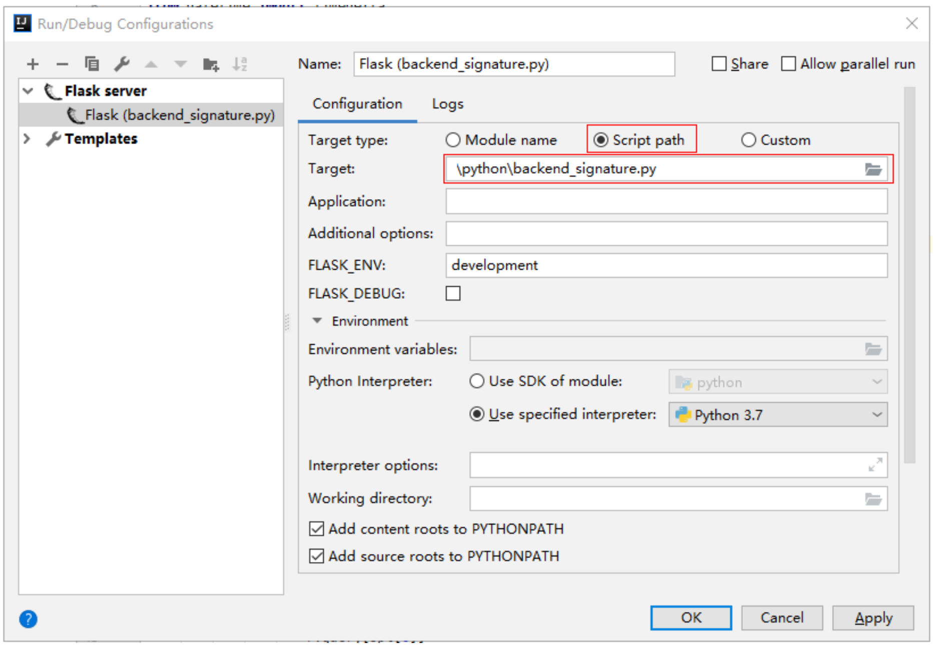


Step 5 Click **+** and choose **Flask server**.

Figure 7-9 Choosing Flask server



Step 6 Set **Target type** to **Script path**, select **backend_signature.py** from the **Target** drop-down list box, and click **OK**.



Name: Flask (backend_signature.py)

Target type: Module name [✓ Script path] Custom

Target: \python\backend_signature.py

Application:

Additional options:

FLASK_ENV: development

FLASK_DEBUG: ☐

Environment

Environment variables:

Python Interpreter: Use SDK of module: python [✓ Use specified interpreter: Python 3.7]

Interpreter options:

Working directory:

☑ Add content roots to PYTHONPATH

☑ Add source roots to PYTHONPATH

----End

Backend Signature Verification Example

This example demonstrates how to build a Flask-based server as the backend of an API and implement a wrapper to verify the signature of requests sent from API Gateway (API Management).

NOTE

Signature information is added to requests sent to access the backend of an API only after a signature key is bound to the API.

Step 1 Compile an interface that returns **Hello World!** Configure the GET, POST, PUT, and DELETE methods and the **requires_apigateway_signature** wrapper.

```
app = Flask(__name__)

@app.route("/<id>", methods=['GET', 'POST', 'PUT', 'DELETE'])
@requires_apigateway_signature()
def hello(id):
    return "Hello World!"
```

Step 2 Implement **requires_apigateway_signature** by putting the signature key and secret in a **dict**.

```
def requires_apigateway_signature():
    def wrapper(f):

        secrets = {
            "signature_key1": "signature_secret1",
            "signature_key2": "signature_secret2",
        }
        authorizationPattern = re.compile(
            r'SDK-HMAC-SHA256\s+Access=([^,]+),\s?SignedHeaders=([^,]+),\s?Signature=(\w+)')
        BasicDateFormat = "%Y%m%dT%H%M%SZ"

        @wraps(f)
        def wrapped(*args, **kwargs):
            //Signature verification code
            ...

            return f(*args, **kwargs)
        return wrapped
    return wrapper
```

Step 3 Use a regular expression to parse the **Authorization** header. The key and signedHeaders are obtained. The wrapped function is used for signature verification.

```
if "authorization" not in request.headers:
    return 'Authorization not found.', 401
authorization = request.headers['authorization']
m = authorizationPattern.match(authorization)
if m is None:
    return 'Authorization format incorrect.', 401
signingKey = m.group(1)
signedHeaders = m.group(2).split(";")
```

For example, for **Authorization** header:

```
SDK-HMAC-SHA256 Access=signature_key1, SignedHeaders=host;x-sdk-date,
Signature=e11adf65a20d1b82c25419b5********8d0ba12fed1ceb13ed00
```

The parsing result is as follows:

```
signingKey=signature_key1
signedHeaders=host;x-sdk-date
```

Step 4 Find **secret** based on **key**. If **key** does not exist, the authentication failed.

```
if signingKey not in secrets:
    return 'Signing key not found.', 401
signingSecret = secrets[signingKey]
```

Step 5 Create an HttpRequest, and add the method, URL, query, and signedHeaders headers to the request. Determine whether the body needs to be set.

The body is read if there is no **x-sdk-content-sha256** header with value **UNSIGNED-PAYLOAD**.

```
r = signer.HttpRequest()
r.method = request.method
```

```
r.uri = request.path
r.query = {}
for k in request.query_string.decode('utf-8').split('&'):
    spl = k.split("=", 1)
    if len(spl) < 2:
        r.query[spl[0]] = ""
    else:
        r.query[spl[0]] = spl[1]
r.headers = {}
needbody = True
dateHeader = None
for k in signedHeaders:
    if k not in request.headers:
        return 'Signed header ' + k + ' not found', 401
    v = request.headers[k]
    if k.lower() == 'x-sdk-content-sha256' and v == 'UNSIGNED-PAYLOAD':
        needbody = False
    if k.lower() == 'x-sdk-date':
        dateHeader = v
    r.headers[k] = v
if needbody:
    r.body = request.get_data()
```

Step 6 Check whether the signature has expired. Obtain the time from the **X-Sdk-Date** header, and check whether the difference between this time and the server time is within 15 minutes. If **signedHeaders** does not contain **X-Sdk-Date**, the authentication failed.

```
if dateHeader is None:
    return 'Header x-sdk-date not found.', 401
t = datetime.strptime(dateHeader, BasicDateFormat)
if abs(t - datetime.utcnow()) > timedelta(minutes=15):
    return 'Signature expired.', 401
```

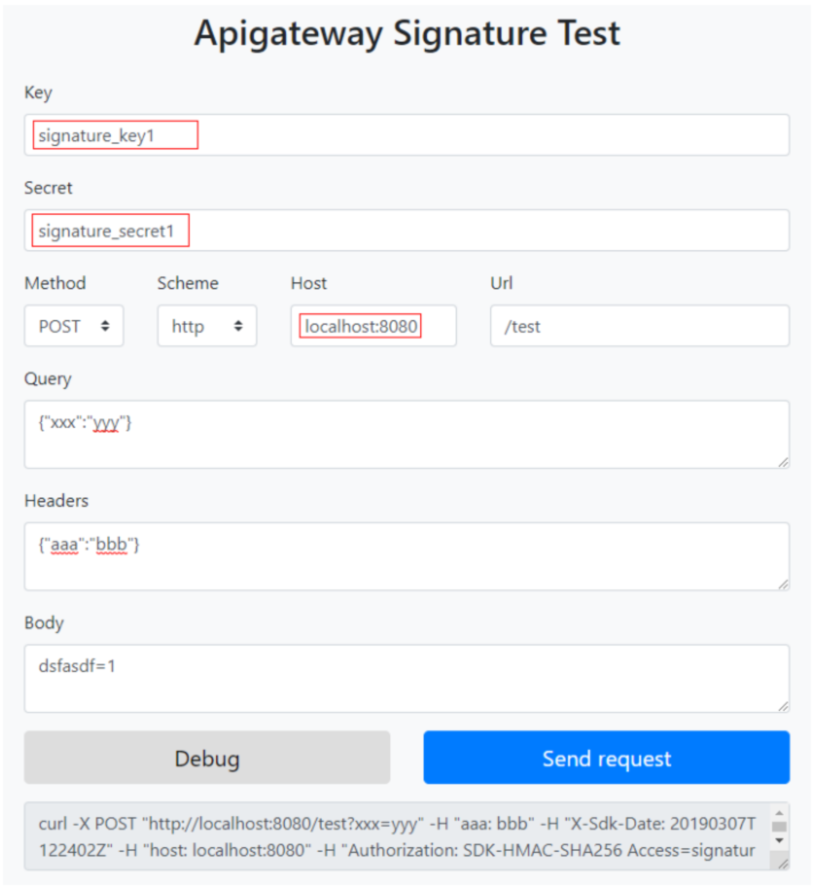
Step 7 Invoke the **verify** method to verify the signature of the request, and check whether the verification is successful.

```
sig = signer.Signer()
sig.Key = signingKey
sig.Secret = signingSecret
if not sig.Verify(r, m.group(3)):
    return 'Verify authroization failed.', 401
```

Step 8 Run the server to verify the code. The following example uses the **HTML signature tool** in the JavaScript SDK to generate a signature.

Set the parameters according to the following figure, and click **Send request**. Copy the generated curl command, execute it in the CLI, and check whether the server returns **200**.

If an incorrect key or secret is used, the server returns **401**, which means authentication failure.



Key: signature_key1
Secret: signature_secret1
Method: POST
Scheme: http
Host: localhost:8080
Url: /test
Query: {"xxx":"yyy"}
Headers: {"aaa":"bbb"}
Body: dsfasdf=1

```
curl -X POST "http://localhost:8080/test?xxx=yyy" -H "aaa: bbb" -H "X-Sdk-Date: 20190307T
122402Z" -H "host: localhost:8080" -H "Authorization: SDK-HMAC-SHA256 Access=signatur
```

----End

7.3 C#

Scenarios

To use C# to sign backend requests, obtain the C# SDK, import the project, and verify the backend signature by referring to the example provided in this section.

Preparing the Environment

- You have obtained the key and secret of the signature key to be used.
- You have created a signature key on the API Gateway console and bound it to the API to be called. For more information, see "Creating and Using a Signature Key" in the *User Guide*.
- Log in to the API Gateway console, and download the SDK on the **SDKs** page by referring to section "SDKs" in the *User Guide*.
- You have installed Visual Studio. If not, download it from the **Visual Studio official website** and install it.

Opening a Project

Double-click **csharp.sln** in the SDK package to open the project. The project contains the following:

- **apigateway-signature**: Shared library that implements the signature algorithm. It can be used in the .Net Framework and .Net Core projects.
- **backend-signature**: Example of a backend signature. Modify the parameters as required. For details about the sample code, see **Backend Signature Verification Example**.
- **sdk-request**: Example of invoking the signature algorithm.

Backend Signature Verification Example

This example demonstrates how to build an ASP.Net Core–based server as the backend of an API and implement an IAuthorizationFilter to verify the signature of requests sent from API Gateway (API Management).

NOTE

Signature information is added to requests sent to access the backend of an API only after a signature key is bound to the API.

Step 1 Write a controller that provides the GET, POST, PUT, and DELETE interfaces, and add the **ApigatewaySignatureFilter** attribute.

```
// ValuesController.cs

namespace backend_signature.Controllers
{
    [Route("api/[controller]")]
    [ApiController]
    [ApigatewaySignatureFilter]
    public class ValuesController : ControllerBase
    {
        // GET api/values
        [HttpGet]
        public ActionResult<IEnumerable<string>> Get()
        {
            return new string[] { "value1", "value2" };
        }

        // POST api/values
        [HttpPost]
        public void Post([FromBody] string value)
        {
        }

        // PUT api/values/5
        [HttpPut("{id}")]
        public void Put(int id, [FromBody] string value)
        {
        }

        // DELETE api/values/5
        [HttpDelete("{id}")]
        public void Delete(int id)
        {
        }
    }
}
```

Step 2 Implement **ApigatewaySignatureFilter** by putting the signature key and secret in a **Dictionary**.

```
// ApigatewaySignatureFilter.cs

namespace backend_signature.Filters
{
    public class ApigatewaySignatureFilter : Attribute, IAuthorizationFilter
    {
        private Dictionary<string, string> secrets = new Dictionary<string, string>
        {
            {"signature_key1", "signature_secret1" },
            {"signature_key2", "signature_secret2" },
        };

        public void OnAuthorization(AuthorizationFilterContext context) {
            //Signature verification code
            ...
        }
    }
}
```

Step 3 Use a regular expression to parse the **Authorization** header. The key and signedHeaders are obtained. The OnAuthorization function is used for signature verification.

```
private Regex authorizationPattern = new Regex("SDK-HMAC-SHA256\\s+Access=([^,]+),\\s?
SignedHeaders=([^,]+),\\s?Signature=(\\w+)");

...

string authorization = request.Headers["Authorization"];
if (authorization == null)
{
    context.Result = new UnauthorizedResult();
    return;
}
var matches = authorizationPattern.Matches(authorization);
if (matches.Count == 0)
{
    context.Result = new UnauthorizedResult();
    return;
}
var groups = matches[0].Groups;
string key = groups[1].Value;
string[] signedHeaders = groups[2].Value.Split(';');
```

For example, for **Authorization** header:

```
SDK-HMAC-SHA256 Access=signature_key1, SignedHeaders=host;x-sdk-date,
Signature=e11adf65a20d1b82c25419b5********8d0ba12fed1ceb13ed00
```

The parsing result is as follows:

```
signingKey=signature_key1
signedHeaders=host;x-sdk-date
```

Step 4 Find **secret** based on **key**. If **key** does not exist, the authentication failed.

```
if (!secrets.ContainsKey(key))
{
    context.Result = new UnauthorizedResult();
    return;
}
string secret = secrets[key];
```

Step 5 Create an HttpRequest, and add the method, URL, query, and signedHeaders headers to the request. Determine whether the body needs to be set.

The body is read if there is no **x-sdk-content-sha256** header with value **UNSIGNED-PAYLOAD**.

```
HttpRequest sdkRequest = new HttpRequest();
sdkRequest.method = request.Method;
sdkRequest.host = request.Host.Value;
sdkRequest.uri = request.Path;
Dictionary<string, string> query = new Dictionary<string, string>();
foreach (var pair in request.Query)
```

```
{
    query[pair.Key] = pair.Value;
}
sdkRequest.query = query;
WebHeaderCollection headers = new WebHeaderCollection();
string dateHeader = null;
bool needBody = true;
foreach (var h in signedHeaders)
{
    var value = request.Headers[h];
    headers[h] = value;
    if (h.ToLower() == "x-sdk-date")
    {
        dateHeader = value;
    }
    if (h.ToLower() == "x-sdk-content-sha256" && value == "UNSIGNED-PAYLOAD")
    {
        needBody = false;
    }
}
sdkRequest.headers = headers;
if (needBody)
{
    request.EnableRewind();
    using (MemoryStream ms = new MemoryStream())
    {
        request.Body.CopyTo(ms);
        sdkRequest.body = Encoding.UTF8.GetString(ms.ToArray());
    }
    request.Body.Position = 0;
}
```

Step 6 Check whether the signature has expired. Obtain the time from the **X-Sdk-Date** header, and check whether the difference between this time and the server time is within 15 minutes. If **signedHeaders** does not contain **X-Sdk-Date**, the authentication failed.

```
private const string BasicDateFormat = "yyyyMMddTHHmmssZ";

...

if(dateHeader == null)
{
    context.Result = new UnauthorizedResult();
    return;
}
DateTime t = DateTime.ParseExact(dateHeader, BasicDateFormat, CultureInfo.CurrentCulture);
if (Math.Abs((t - DateTime.Now).Minutes) > 15)
{
    context.Result = new UnauthorizedResult();
    return;
}
```

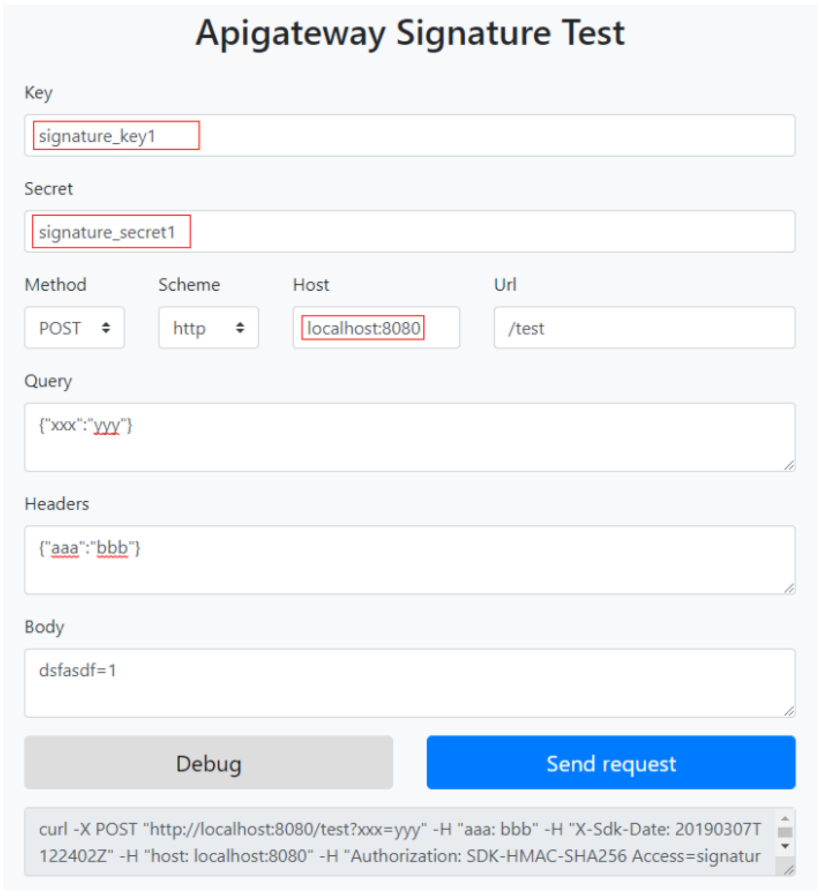
Step 7 Invoke the **verify** method to verify the signature of the request, and check whether the verification is successful.

```
Signer signer = new Signer();
signer.Key = key;
signer.Secret = secret;
if (!signer.Verify(sdkRequest, groups[3].Value))
{
    context.Result = new UnauthorizedResult();
}
```

Step 8 Run the server to verify the code. The following example uses the **HTML signature tool** in the JavaScript SDK to generate a signature.

Set the parameters according to the following figure, and click **Send request**. Copy the generated curl command, execute it in the CLI, and check whether the server returns **200**.

If an incorrect key or secret is used, the server returns **401**, which means authentication failure.


Apigateway Signature Test

Key	signature_key1
Secret	signature_secret1
Method	POST
Scheme	http
Host	localhost:8080
Url	/test
Query	{"xxx":"yyy"}
Headers	{"aaa":"bbb"}
Body	dsfasdf=1

```
curl -X POST "http://localhost:8080/test?xxx=yyy" -H "aaa: bbb" -H "X-Sdk-Date: 20190307T
122402Z" -H "host: localhost:8080" -H "Authorization: SDK-HMAC-SHA256 Access=signatur
```

----End

8 Importing and Exporting APIs

8.1 Restrictions and Compatibility

Note the following restrictions and compatibility issues when importing or exporting APIs on API Gateway:

- Only Swagger 2.0 is supported.
- The request parameter types in Swagger 2.0 differ from those on API Gateway. See the following table.

Table 8-1 Differences in request parameter types

Swagger Parameter Type	API Gateway Parameter Type	Supported Attribute
integer long float double	number	maximum minimum default enum required description
string	string	maxLength minLength default enum required description
Others	-	-

- API Gateway does not support the configuration of request parameters in the **formData** and **body** locations.

- The names of header parameters are not case-sensitive.
- API Gateway does not support the configuration of parameters **consumes** and **produces**.
- Imported and exported Swagger objects are mapped to API Gateway objects, as shown in the following table.

Swagger Object	API Gateway Object	Import	Export
info.title	API group name	Importing to a new API group: a new API group name Importing to an existing API group: not used An API group name consists of 3–64 characters, starting with a letter. Only letters, digits, and underscores (_) are allowed.	API group name
info.description	API group description	Importing to a new API group: description about the new group Importing to an existing API group: not used	API group description
info.version	Version	Not used	User-defined version The current time is used as the API group name if no name is specified.
host	-	Not used	The first user-defined domain name of an API group is preferentially used. The independent domain name of the API group is used if the API group is not bound with any user-defined domain names.

Swagger Object	API Gateway Object	Import	Export
basePath	-	Merged with the request path of each API	Not used
paths.path	API request path	Merged with **basePath** to use as an API request path	API request path
operation.operationId	API name	API name	API name
operation.description	API description	API description	API description
operation.parameters	API frontend request parameters	API request parameters	API request parameters
operation.schemes	API frontend request protocol	API request protocol	API request protocol
operation.responses	-	Not used	Default response
operation.security	API authentication mode	API authentication mode Used together with **x-apigateway-auth-type**	API authentication mode Used together with **x-apigateway-auth-type**

- API request paths differ between Swagger and API Gateway. See the following table.

Syntax	Swagger	API Gateway
/users/{userName}	Supported	Supported
/users/prefix-{userName} /users/{userName}-suffix /users/prefix-{userName} -suffix	Supported	Not supported for frontend request definition Supported for backend request definition

Syntax	Swagger	API Gateway
/users/{proxy+}	Not supported	Supported for frontend request definition Not supported for backend request definition

- API Gateway supports the following extended fields when importing APIs:
  - x-apigateway-auth-type
  - x-apigateway-request-type
  - x-apigateway-match-mode
  - x-apigateway-cors
  - x-apigateway-any-method
  - x-apigateway-backend
    - x-apigateway-backend.parameters
    - x-apigateway-backend.httpEndpoints
    - x-apigateway-backend.httpVpcEndpoints
    - x-apigateway-backend.functionEndpoints
    - x-apigateway-backend.mockEndpoints
  - x-apigateway-backend-policies
    - x-apigateway-backend-policies.conditions
  - x-apigateway-ratelimit
  - x-apigateway-ratelimits
    - x-apigateway-ratelimits.policy
    - x-apigateway-ratelimits.policy.special
  - x-apigateway-access-control
  - x-apigateway-access-controls
    - x-apigateway-access-controls.policy
- Backend policy restrictions are as follows:
  - Default backend type **HTTP**: The HTTP and HTTP-VPC backends are supported.
  - Default backend type **HTTP-VPC**: The HTTP and HTTP-VPC backends are supported.
  - Default backend type **function**: Only the function backend is supported.
  - Default backend type **mock**: Only the mock backend is supported.

8.2 Importing APIs

Before importing Swagger 2.0 APIs to API Gateway, you need to supplement extended definitions of the APIs. For more information, see **Extended Definition**.

Importing APIs to a New API Group

When you import APIs to a new API group name, the system creates an API group.

This function is suitable for importing new APIs to API Gateway.

Before importing APIs, ensure that the following requirements are met:

- Your API group and API quotas are sufficient.
- The **info.title** object of Swagger indicates an API group name.
- If two APIs have the same definition (such as the same name or request path), only the first API will be imported.
- If **Extended Definition Overwrite** is selected, the extended definition items (access control and request throttling policies) of an imported API will overwrite the existing extended definition items with the same name.
- Imported APIs must be manually published before they are available for access.

Importing APIs to an Existing API Group

When you import APIs to a specified API group, the system adds them to the API group while retaining the existing APIs.

This function is suitable for importing new or modified APIs to an existing API group.

Before importing APIs, ensure that the following requirements are met:

- Your API quota is sufficient.
- If the definition of an API you are importing is the same as that of an existing API, you can overwrite the existing API or retain it. If you leave the existing API alone, the new API will not be imported.
- If **Extended Definition Overwrite** is selected, the extended definition items (access control and request throttling policies) of an imported API will overwrite the existing extended definition items with the same name.
- Imported APIs must be manually published before they are available for access.

8.3 Exporting APIs

Export APIs from API Gateway by saving their definitions as Swagger files. You can export the basic, full, or extended definitions of APIs.

Exporting the Basic Definition of an API

The basic definition of an API is composed of the request and response definitions and does not include the backend definition. The request definition includes both standard and extended Swagger fields.

This function can generate a Swagger API definition file.

Exporting the Full Definition of an API

The full definition of an API is composed of the request, backend, and response definitions.

This function can be used to back up the full definition of an API as a Swagger file.

Exporting the Extended Definition of an API

The extended definition of an API is composed of the request, backend, and response definitions as well as the request throttling policy, access control policy, and other configurations of the API.

8.4 Extended Definition

The extended definition of an API includes the API's special configurations on API Gateway, such as authentication mode and backend parameters.

The extended definition fields of API Gateway are as follows:

1 x-apigateway-auth-type

Meaning: Swagger-based apiKey authentication format, which defines an authentication mode provided by API Gateway.

Scope of effect: **Security Scheme Object**

Example:

```
securityDefinitions:
  apig-auth-app:
    in: header
    name: Authorization
    type: apiKey
    x-apigateway-auth-type: AppSigv1
  apig-auth-iam:
    in: header
    name: unused
    type: apiKey
    x-apigateway-auth-type: IAM
```

Table 8-2 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-auth-type	Yes	String	Authentication mode used on API Gateway. **AppSigv1** and **IAM** are supported.
type	Yes	String	Authentication type. Only **apiKey** is supported.
name	Yes	String	Name of the parameter for authentication.
in	Yes	String	Only **header** is supported.
description	No	String	Description about the authentication.

2 x-apigateway-request-type

Meaning: API request type, which can be **public** or **private**.

Scope of effect: **Operation Object**

Example:

```
paths:
  '/path':
    get:
      x-apigateway-request-type: 'public'
```

Table 8-3 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-request-type	Yes	String	API visibility. The options include **public** and **private**. ● **public**: The API can be made available for sale. ● **private**: The API will not be available for sale.

3 x-apigateway-match-mode

Meaning: Request URL matching mode, which can be **NORMAL** or **SWA**.

Scope of effect: **Operation Object**

Example:

```
paths:
  '/path':
    get:
      x-apigateway-match-mode: 'SWA'
```

Table 8-4 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-match-mode	Yes	String	API matching mode. The options include **SWA** and **NORMAL**. ● **SWA**: prefix match. For example, both **/prefix/foo** and **/prefix/bar** match **/prefix**, but **/prefixpart** does not match. ● **NORMAL**: exact match.

4 x-apigateway-cors

Meaning: Specifies whether CORS is supported. The value is of the Boolean type.

Scope of effect: **Operation Object**

Example:

```
paths:
  '/path':
    get:
      x-apigateway-cors: true
```

Table 8-5 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-cors	Yes	boolean	Whether to support CORS. ● **true**: support ● **false**: not support

For the API request for enabling CORS, the headers listed in the following table will be added to the response.

Header	Value	Description
Access-Control-Max-Age	172800	Maximum time the response of a preflight request can be cached.

Header	Value	Description
Access-Control-Allow-Origin	*	Requests from any domain are allowed.
Access-Control-Allow-Headers	X-Sdk-Date, X-Sdk-Nonce, X-Proxy-Signed-Headers, X-Sdk-Content-Sha256, X-Forwarded-For, Authorization, Content-Type, Accept, Accept-Ranges, Cache-Control, and Range	Headers that can be used by a formal request.
Access-Control-Allow-Methods	GET, POST, PUT, DELETE, HEAD, OPTIONS, and PATCH	Methods that can be used by a formal request.

5 x-apigateway-any-method

Meaning: API request method used by default if no HTTP request method is specified.

Scope of effect: **Path Item Object**

Example:

```
paths:
  '/path':
    get:
      produces:
        - application/json
      responses:
        "200":
          description: "get response"
    x-apigateway-any-method:
      produces:
        - application/json
      responses:
        "200":
          description: "any response"
```

Table 8-6 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-any-method	No	String	Request method.

6 x-apigateway-backend

Meaning: API backend definition.

Scope of effect: **Operation Object**

Example:

```
paths:
  '/users/{userId}':
    get:
      produces:
        - "application/json"
      responses:
        default:
          description: "default response"
      x-apigateway-request-type: "public"
      x-apigateway-backend:
        type: "backend endpoint type"
```

Table 8-7 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-backend	Yes	String	Backend service definition.
type	Yes	String	Backend service type. The options include **HTTP**, **HTTP-VPC**, **FUNCTION**, and **MOCK**.
parameters	No	**x-apigateway-backend.parameters**	Backend parameters.
httpEndpoints	No	**x-apigateway-backend.httpEndpoints**	HTTP backend service definition.
httpVpcEndpoints	No	**x-apigateway-backend.httpVpcEndpoints**	HTTP VPC backend service definition.
functionEndpoints	No	**x-apigateway-backend.functionEndpoints**	Function backend service definition.
mockEndpoints	No	**x-apigateway-backend.mockEndpoints**	Mock backend service definition.

6.1 x-apigateway-backend.parameters

Meaning: API backend service definition.

Scope of effect: **x-apigateway-backend**

Example:

```
paths:
  '/users/{userId}':
    get:
      produces:
        - "application/json"
      parameters:
        - name: "X-Auth-Token"
                 description: "Authentication token"
          type: "string"
          in: "header"
          required: true
        - name: "userId"
                 description: "Username"
          type: "string"
          in: "path"
          required: true
      responses:
        default:
          description: "default response"
      x-apigateway-request-type: "public"
      x-apigateway-backend:
        type: "HTTP"
        parameters:
          - name: "userId"
            value: "userId"
            in: "query"
            origin: "REQUEST"
                   description: "Username"
          - name: "X-Invoke-User"
            value: "apigateway"
            in: "header"
            origin: "CONSTANT"
                   description: "Caller"
```

Table 8-8 Parameter description

Parameter	Mandatory	Type	Description
name	Yes	String	Parameter name, which consists of a maximum of 32 bytes, starting with a letter. Only letters, digits, periods (.), hyphens (-), and underscores (_) are allowed. The names of header parameters are not case-sensitive.
value	Yes	String	Parameter value, which is a parameter name if the parameter comes from a request.
in	Yes	String	Parameter location, which can be **header**, **query**, or **path**.

Parameter	Mandatory	Type	Description
origin	Yes	String	Parameter mapping source. The options include **REQUEST** and **CONSTANT**.
description	No	String	Parameter meaning.

6.2 x-apigateway-backend.httpEndpoints

Meaning: HTTP backend service definition.

Scope of effect: **x-apigateway-backend**

Example:

```
paths:
  '/users/{userId}':
    get:
      produces:
        - "application/json"
      parameters:
        - name: "X-Auth-Token"
                  description: "Authentication token"
          type: "string"
          in: "header"
          required: true
      responses:
        default:
          description: "default response"
      x-apigateway-request-type: "public"
      x-apigateway-backend:
        type: "HTTP"
        httpEndpoints:
          address: "example.com"
          scheme: "http"
          method: "GET"
          path: "/users"
          timeout: 30000
```

Table 8-9 Parameter description

Parameter	Mandatory	Type	Description
address	Yes	Array	Backend service address. The format is *<Domain name or IP address>:[Port number]*
scheme	Yes	String	Backend request protocol. HTTP and HTTPS are supported.
method	Yes	String	Backend request method. The options include **GET**, **POST**, **PUT**, **DELETE**, **HEAD**, **OPTIONS**, **PATCH**, and **ANY**.

Parameter	Mandatory	Type	Description
path	Yes	String	Backend request path, which can contain variables.
timeout	No	Number	Backend request timeout in milliseconds. The range is 1–60,000, and the default value is **5000**.

6.3 x-apigateway-backend.httpVpcEndpoints

Meaning: HTTP VPC backend service definition.

Scope of effect: **x-apigateway-backend**

Example:

```
paths:
  '/users/{userId}':
    get:
      produces:
        - "application/json"
      parameters:
        - name: "X-Auth-Token"
              description: "Authentication token"
          type: "string"
          in: "header"
          required: true
      responses:
        default:
          description: "default response"
      x-apigateway-request-type: "public"
      x-apigateway-backend:
        type: "HTTP-VPC"
        httpVpcEndpoints:
          name: "vpc-test-1"
          scheme: "http"
          method: "GET"
          path: "/users"
          timeout: 30000
```

Table 8-10 Parameter description

Parameter	Mandatory	Type	Description
name	Yes	Array	VPC channel name.
scheme	Yes	String	Backend request protocol. HTTP and HTTPS are supported.
method	Yes	String	Backend request method. The options include **GET**, **POST**, **PUT**, **DELETE**, **HEAD**, **OPTIONS**, **PATCH**, and **ANY**.

Parameter	Mandatory	Type	Description
path	Yes	String	Backend request path, which can contain variables.
timeout	No	Number	Backend request timeout in milliseconds. The range is 1–60,000, and the default value is **5000**.

6.4 x-apigateway-backend.functionEndpoints

Meaning: Function backend service definition.

Scope of effect: **x-apigateway-backend**

Example:

```
paths:
  '/users/{userId}':
    get:
      produces:
        - "application/json"
      parameters:
        - name: "X-Auth-Token"
              description: "Authentication token"
          type: "string"
          in: "header"
          required: true
      responses:
        default:
          description: "default response"
      x-apigateway-request-type: "public"
      x-apigateway-backend:
        type: "FUNCTION"
        functionEndpoints:
          version: "v1"
          function-urn: ""
          invocation-type: "synchronous"
          timeout: 30000
```

Table 8-11 Parameter description

Parameter	Mandatory	Type	Description
function-urn	Yes	String	Function URN.
version	Yes	String	Function version.
invocation-type	Yes	String	Function invocation type. The value can be **async** or **sync**.
timeout	No	Number	Function timeout in milliseconds. The range is 1–60,000, and the default value is **5000**.

6.5 x-apigateway-backend.mockEndpoints

Meaning: Mock backend service definition.

Scope of effect: **x-apigateway-backend**

Example:

```
paths:
  '/users/{userId}':
    get:
      produces:
        - "application/json"
      parameters:
        - name: "X-Auth-Token"
                  description: "Authentication token"
          type: "string"
          in: "header"
          required: true
      responses:
        default:
          description: "default response"
      x-apigateway-request-type: "public"
      x-apigateway-backend:
        type: "MOCK"
        mockEndpoints:
          result-content: "mocked"
```

Table 8-12 Parameter description

Parameter	Man dator y	Type	Description
result-content	Yes	String	Mock response.

7 x-apigateway-backend-policies

Meaning: API backend policy.

Scope of effect: **Operation Object**

Example:

```
paths:
  '/users/{userId}':
    get:
      produces:
        - "application/json"
      responses:
        default:
          description: "default response"
      x-apigateway-request-type: "public"
      x-apigateway-backend:
        type: "backend endpoint type"
      x-apigateway-backend-policies:
        - type: "backend endpoint type"
          name: "backend policy name"
          conditions:
            - type: "equal/enum/pattern",
              value: "string",
              origin: "source/request_parameter",
              parameter_name: "string"
```

Table 8-13 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-backend-policies	No	x-apigateway-backend-policies	Backend policies.
type	Yes	String	Backend service type. The options include **HTTP**, **HTTP-VPC**, **FUNCTION**, and **MOCK**.
name	Yes	String	Backend policy name.
parameters	No	**x-apigateway-backend.parameters**	Backend parameters.
httpEndpoints	No	**x-apigateway-backend.httpEndpoints**	HTTP service definition.
httpVpcEndpoints	No	**x-apigateway-backend.httpVpcEndpoints**	HTTP-VPC service definition.
functionEndpoints	No	**x-apigateway-backend.functionEndpoints**	Function service definition.
mockEndpoints	No	**x-apigateway-backend.mockEndpoints**	Mock service definition.
conditions	Yes	**x-apigateway-backend-policies.conditions**	Policy condition array.

7.1 x-apigateway-backend-policies.conditions

Meaning: API backend policy conditions.

Scope of effect: **x-apigateway-backend-policies**

Example:

```
paths:
  '/users/{userId}':
    get:
      produces:
        - "application/json"
      responses:
        default:
          description: "default response"
      x-apigateway-request-type: "public"
      x-apigateway-backend:
        type: "backend endpoint type"
      x-apigateway-backend-policies:
        - type: "backend endpoint type"
          name: "backend policy name"
          conditions:
            - type: "equal/enum/pattern",
              value: "string",
              origin: "source/request_parameter",
              parameter_name: "string"
```

Table 8-14 Parameter description

Parameter	Mandatory	Type	Description
type	Yes	String	Policy condition type. The options include **equal**, **enum**, and **pattern**.
value	Yes	String	Policy condition value.
origin	Yes	String	Policy condition source. The options include **source** and **request**.
parameter	No	String	Input parameter name if the **origin** parameter is set to **request**.

8 x-apigateway-ratelimit

Meaning: Request throttling policy.

Scope of effect: **Operation Object**

Example:

```
paths:
  '/path':
    get:
      x-apigateway-ratelimit: 'customRatelimitName'
```

Table 8-15 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-ratelimit	No	String	Request throttling policy.

9 x-apigateway-ratelimits

Meaning: Mapping between a request throttling policy name and limit values.

Scope of effect: **Swagger Object**

Example:

```
x-apigateway-ratelimits:
  customRatelimitName:
    api-limit: 200
    app-limit: 200
    user-limit: 200
    ip-limit: 200
    interval: 1
    unit: second/minute/hour
    shared: true
    special:
      - type: APP
        limit: 100
        instance: xxxxxxxxx
```

Table 8-16 Parameter description

Parameter	Mandatory	Type	Description
customRatelimitName	No	**x-apigateway-ratelimits.policy**	Name of a request throttling policy. To use a request throttling policy, set **x-apigateway-ratelimit** to the name of the policy.

9.1 x-apigateway-ratelimits.policy

Meaning: Definition of a request throttling policy.

Scope of effect: **x-apigateway-ratelimits**

Example:

```
x-apigateway-ratelimits:
  customRatelimitName:
    api-limit: 200
    app-limit: 200
    user-limit: 200
    ip-limit: 200
    interval: 1
    unit: MINUTE
    shared: false
    special:
      - type: USER
        limit: 100
        instance: xxxxxxx
```

Table 8-17 Parameter description

Parameter	Mandatory	Type	Description
api-limit	Yes	Number	Limit of API access.
user-limit	No	Number	Limit of API access for users.
app-limit	No	Number	Limit of API access for apps.
ip-limit	No	Number	Limit of API access for source IP addresses.
interval	Yes	Number	Throttling period.
unit	Yes	String	Throttling unit, which can be **SECOND**, **MINUTE**, **HOUR**, or **DAY**.
shared	No	Boolean	Whether to share the throttling limits among APIs.
special	No	**x-apigateway-ratelimits.policy.special** Array	Special request throttling policy.

9.2 x-apigateway-ratelimits.policy.special

Meaning: Definition of a special request throttling policy.

Scope of effect: **x-apigateway-ratelimits.policy**

Example:

```
x-apigateway-ratelimits:
  customRatelimitName:
    api-limit: 200
    app-limit: 200
    user-limit: 200
    ip-limit: 200
    interval: 1
    unit: MINUTE
    shared: false
    special:
      - type: USER
        limit: 100
        instance: xxxxxxxx
```

Table 8-18 Parameter description

Parameter	Mandatory	Type	Description
type	Yes	String	Special request throttling policy type, which can be **APP** or **USER**.
limit	Yes	Number	Access limit.
instance	Yes	String	Object ID of an excluded app or user.

10 x-apigateway-access-control

Meaning: Access control policy.

Scope of effect: **Operation Object**

Example:

```
paths:
  '/path':
    get:
      x-apigateway-access-control: 'customAccessControlName'
```

Table 8-19 Parameter description

Parameter	Mandatory	Type	Description
x-apigateway-access-control	No	String	Access control policy.

11 x-apigateway-access-controls

Meaning: Mapping between an access control policy name and limit settings.

Scope of effect: **Swagger Object**

Example:

```
x-apigateway-access-controls:
  customAccessControlName:
    acl-type: "DENY"
    entity-type: "IP"
    value: 127.0.0.1,192.168.0.1/16
```

Table 8-20 Parameter description

Parameter	Mandatory	Type	Description
customAccessControlName	No	x-apigateway-access-controls.policy	Name of an access control policy. To use a request throttling policy, set **x-apigateway-access-control** to the name of the policy.

11.1 x-apigateway-access-controls.policy

Meaning: Definition of an access control policy.

Scope of effect: **x-apigateway-access-controls**

Example:

```
x-apigateway-access-controls:
  customAccessControlName:
    acl-type: "DENY"
    entity-type: "IP"
    value: 127.0.0.1,192.168.0.1/16
```

Table 8-21 Parameter description

Parameter	Mandatory	Type	Description
acl-type	Yes	String	Access control effect. The options include **PERMIT** and **DENY**.
entity-type	Yes	String	Access control object. Only IP addresses are supported.
value	Yes	String	Access control values, which are separated with commas (,).

8.5 Examples of Importing APIs

Importing an HTTP Backend Service API

Import the request parameter definition of an HTTP backend service API that uses the GET method and is accessed through IAM authentication.

```
swagger: "2.0"
info:
  title: "importHttpEndpoint10"
  description: "import apis"
  version: "1.0"
host: "api.account.com"
```

```
paths:
  '/http/{userId}':
    get:
      operationId: "getUser3"
      description: "get user by userId"
      security:
      - apig-auth-iam: []
      schemes:
      - https
      parameters:
      - name: "test"
        description: "authorization token"
        type: "string"
        in: "header"
        required: true
      - name: "userId"
        description: "user id"
        type: "string"
        in: "path"
        required: true
      responses:
        "200":
          description: "user information"
      x-apigateway-request-type: "public"
      x-apigateway-cors: true
      x-apigateway-match-mode: "NORMAL"
      x-apigateway-backend:
        type: "HTTP"
        parameters:
        - name: "userId"
          value: "userId"
          in: "query"
          origin: "REQUEST"
          description: "user id"
        - name: "X-Invoke-User"
          value: "apigateway"
          in: "header"
          origin: "CONSTANT"
          description: "invoke user"
        httpEndpoints:
          address: "example.com"
          scheme: "http"
          method: "GET"
          path: "/users"
          timeout: 30000
securityDefinitions:
  apig-auth-app:
    in: header
    name: Authorization
    type: apiKey
    x-apigateway-auth-type: AppSigv1
  apig-auth-iam:
    in: header
    name: unused
    type: apiKey
    x-apigateway-auth-type: IAM
```

Importing an HTTP VPC Backend Service API

Import the request parameter definition of an HTTP VPC backend service API that uses the ANY method and is accessed through App authentication.

```
swagger: "2.0"
info:
  title: "importHttpVpcEndpoint"
  description: "import apis"
  version: "1.0"
host: "api.account.com"
```

```
paths:
  '/http-vpc':
    x-apigateway-any-method:
      operationId: "userOperation"
      description: "user operation resource"
      security:
      - apig-auth-app: []
      schemes:
      - https
      parameters:
      - name: "Authorization"
        description: "authorization signature"
        type: "string"
        in: "header"
        required: true
      responses:
        "default":
          description: "endpoint response"
      x-apigateway-request-type: "public"
      x-apigateway-cors: true
      x-apigateway-match-mode: "SWA"
      x-apigateway-backend:
        type: "HTTP-VPC"
        parameters:
        - name: "X-Invoke-User"
          value: "apigateway"
          in: "header"
          origin: "CONSTANT"
          description: "invoke user"
        httpVpcEndpoints:
          name: "userVpc"
          scheme: "http"
          method: "GET"
          path: "/users"
          timeout: 30000
securityDefinitions:
  apig-auth-app:
    in: header
    name: Authorization
    type: apiKey
    x-apigateway-auth-type: AppSigv1
  apig-auth-iam:
    in: header
    name: unused
    type: apiKey
    x-apigateway-auth-type: IAM
```

Importing a Function Backend Service API

Import the request parameter definition of a FunctionGraph backend service API that uses the GET method and is accessed through IAM authentication.

```
swagger: "2.0"
info:
  title: "importFunctionEndpoint"
  description: "import apis"
  version: "1.0"
host: "api.account.com"
paths:
  '/function/{name}':
    get:
      operationId: "invokeFunction"
      description: "invoke function by name"
      security:
      - apig-auth-iam: []
      schemes:
      - https
      parameters:
      - name: "test"
```

```
        description: "authorization token"
        type: "string"
        in: "header"
        required: true
      - name: "name"
        description: "function name"
        type: "string"
        in: "path"
        required: true
      responses:
        "200":
          description: "function result"
      x-apigateway-request-type: "public"
      x-apigateway-cors: true
      x-apigateway-match-mode: "NORMAL"
      x-apigateway-backend:
        type: "FUNCTION"
        parameters:
        - name: "functionName"
          value: "name"
          in: "query"
          origin: "REQUEST"
          description: "funtion name"
        - name: "X-Invoke-User"
          value: "apigateway"
          in: "header"
          origin: "CONSTANT"
          description: "invoke user"
        functionEndpoints:
          function-urn: "your function urn address"
          version: "your function version"
          invocation-type: "async"
          timeout: 30000
securityDefinitions:
  apig-auth-app:
    in: header
    name: Authorization
    type: apiKey
    x-apigateway-auth-type: AppSigv1
  apig-auth-iam:
    in: header
    name: unused
    type: apiKey
    x-apigateway-auth-type: IAM
```

Importing a Mock Backend Service API

Import the definition of a Mock backend service API that uses the GET method and is accessed without authentication.

```
swagger: "2.0"
info:
  title: "importMockEndpoint"
  description: "import apis"
  version: "1.0"
host: "api.account.com"
paths:
  '/mock':
    get:
      operationId: "mock"
      description: "mock test"
      schemes:
      - http
      responses:
        "200":
          description: "mock result"
      x-apigateway-request-type: "private"
      x-apigateway-cors: true
      x-apigateway-match-mode: "NORMAL"
      x-apigateway-backend:
        type: "MOCK"
        mockEndpoints:
          result-content: "{\"message\": \"mocked\"}"
securityDefinitions:
  apig-auth-app:
    in: header
    name: Authorization
    type: apiKey
    x-apigateway-auth-type: AppSigv1
  apig-auth-iam:
    in: header
    name: unused
    type: apiKey
    x-apigateway-auth-type: IAM
```

A Change History

Table A-1 Change history

Date	Description
2022-08-16	This issue is the first official release.