



Google Cloud Storage Adapter for SAP Integration Suite

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1 Introduction

1.1 Objective

This is the official guide for the Google Cloud Storage Adapter for SAP Integration Suite. This guide covers all relevant information for integration developers to start working with the Google Cloud Storage adapter. Read this guide carefully before using the Adapter.

1.2 Coding Samples

Any software coding and/or code lines/strings ("Code") included in this documentation are only examples and are not intended to be used in a productive system environment. The Code is only intended to better explain and visualize the syntax and phrasing rules of certain coding. The correctness and completeness of the Code given herein are not guaranteed.

1.3 Internet Hyperlinks

The documentation may contain hyperlinks to the Internet. These hyperlinks are intended to serve as a hint about where to find related information. The availability and the correctness of this related information or the ability of this information to serve a particular purpose are not warranted.

1.4 Overview

Most Integrations solutions require data storage for different data types as we exchange data between applications or systems. The Google Cloud Storage adapter is a Cloud Integration capability available on SAP Integration Suite that enables access to Google Storage. Leverage the full range of storage options in your integration scenarios using the Google Cloud Storage Adapter.

1.5 Features


Google Cloud Storage Adapter has the following features:

- Allows you to access and interact with different entities: **Buckets, Folders, and Objects.**
- Sender Adapter provides **Duplicate Check Expiration** option to avoid same object being read within a predefined expiration period and offers multiple **Post-Processing** options: **Delete Object after Processing, Keep Object after Processing, and Archive Object after Processing.**
- Archived objects can be named dynamically using Camel expressions or Camel File Expression language.
- Supports reading of encrypted objects with custom encryption and supports encrypted object creation.
- **Create** operation using Receiver Adapter supports existing File Handling scenarios: **Fail, Ignore, and Override.** It also allows multiple options for upload using **Upload Type** option: **Media, Multi-Part, and Resumable.**
- You can use **Max Results** and **Page Token** to customise your results while using **List** operation.
- Use **Query Parameters** and **Response Fields** to fetch desired results.
- Offers secure authentication via **Workload Identity Federation** and **OAuth2 Service Account** option (uses **Key Pair** authentication).

2 Installation and Configuration

This section describes the prerequisites and procedure to install the Google Cloud Storage adapter.


2.1 Prerequisites

 The Google Cloud Storage adapter is available as part of your Standard license for SAP Integration Suite. For more information, see [SAP Note](#).

Before you start working with the adapter, you must deploy it to your SAP Integration Suite tenant.

2.2 Procedure

You can deploy the adapter using the following methods:

 The below installation procedure is compatible with Apache Camel 2, Apache Camel 3, and Edge Integration Cell (EIC) platform.

2.2.1 Adapter Installation by Creating a New Integration Flow

The Google Cloud Storage adapter is available for selection in the Sender and Receiver adapter list and can be deployed in the **Design** tab directly as you use it in an Integration flow.




Purpose

To install an adapter for use in your Integration flow.

Procedure

Go to **Design** workspace and select the integration package where you want to create a new Integration flow.

1. Click **Edit** to make the package editable.
2. Go to the **Artifacts** tab. Click **Add** and select **Integration Flow**.

3. Enter the **Name** and **ID** for your flow. Additionally, select **Runtime Profile** from the drop-down and choose **Sender** and **Receiver** systems from the list . Finally, click **Add** to create the integration flow.
4. Go to the newly created integration flow and click **Edit** to make it editable.
 - i) For the Sender, in the integration flow add a **Connector**  between the **Sender box** and the **Start**.
 - ii) For the Receiver, in the integration flow, click **End** to add a **Connector**  between the **End** and the **Receiver Box**.
5. A drop-down with the available adapters appears. The **GoogleCloudStorage** adapter should show up in the list.
6. Select the **GoogleCloudStorage** adapter from the list. The adapter is now imported which *triggers* an adapter deployment.

Once the adapter is deployed, a success message is *displayed*.

After the above steps are done, the Google Cloud Storage Adapter is successfully deployed in your **Design** workspace of the SAP Integration Suite tenant.

2.2.2 Adapter Installation without Creating a New Integration Flow



The following procedure describes how the Google Cloud Storage adapter is migrated from the Discover workspace to the Design workspace of the SAP Integration tenant.

This method is useful for scenarios where integration flow packages are migrated from development to a higher environment such as Production. The Google Cloud Storage adapter can be imported into the Design workspace without creating an integration flow. Use the Transport Management Service (TMS) to import/transport the Google Cloud Storage adapter to a higher environment.

Alternatively, if the TMS is not available in the landscape, the adapter package can be imported into the **Design** workspace by copying it from the **Discover** workspace.

Purpose

To import the Google Cloud Storage adapter to **Design** workspace by copying the integration package from **Discover** workspace.

Procedure

1. Go to **Discover** workspace.
2. In the search box, search for **Google Cloud Storage Adapter for SAP Integration Suite** package.
3. Select the package and click **Copy**.
This copies the package from the Discover workspace to Design workspace.
4. Go to Design workspace and select the copied **Google Cloud Storage Adapter for SAP Integration Suite** package.
5. In the **Actions** tab of the selected package, click **Deploy**.

This completes the adapter deployment to **Design** workspace.

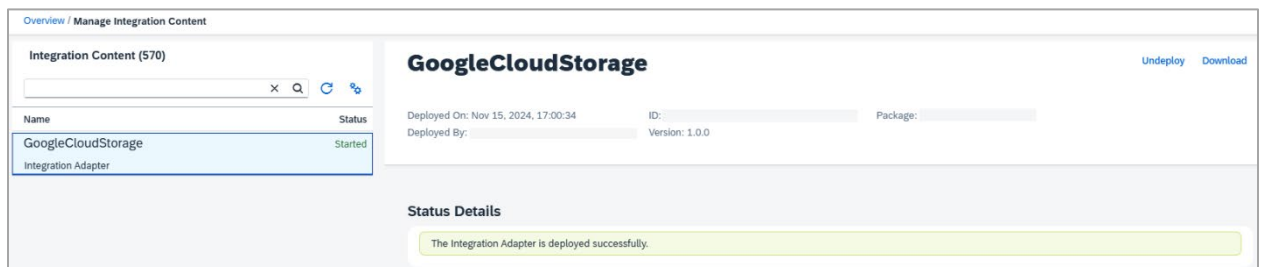
After the adapter deployment is complete, you can check the status in the **Monitor** section.

Purpose

To check the status of the deployed adapter.

Procedure

1. Under the **Monitor** tab, click **Integrations and APIs**. This opens the **Overview** page.
2. On the **Overview** page, go to **Manage Integration Content** section and click **All**. This opens **Integration Content** page with a list of all the deployed adapters.
3. Here, you can check and confirm the deployment status of your adapter.

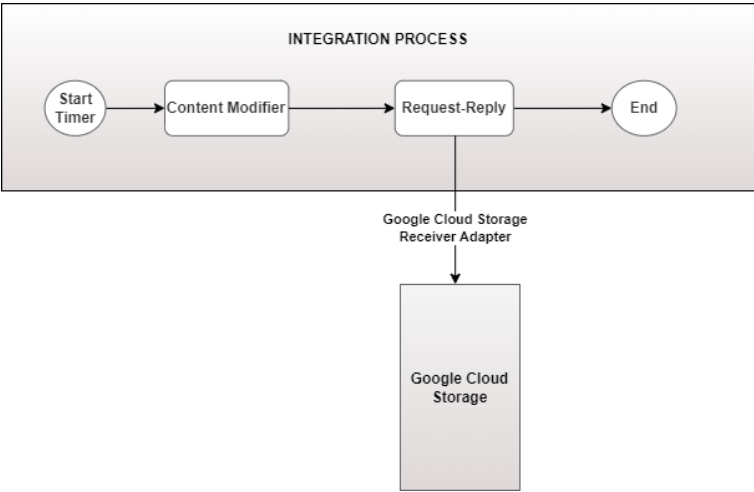


3 Getting Started: Google Cloud Storage Adapter

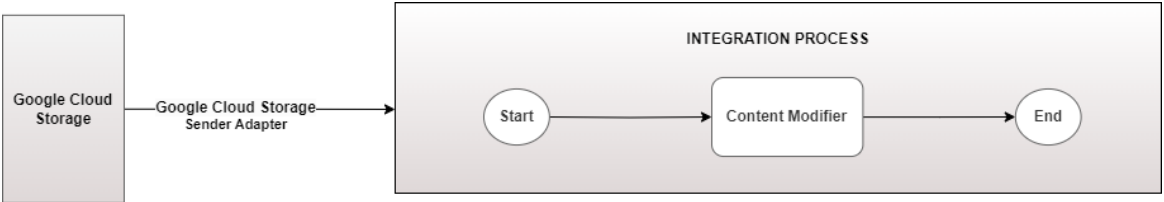
Before you start using the adapter, you can get to know underlying [Architecture](#) for the adapter and [Application Configuration](#) for Google Cloud Storage Adapter.

3.1 Architecture Overview

How the Google Cloud Storage Receiver Adapter Works: The Google Cloud Storage Receiver adapter (as the name suggests) is designed to function as a receiver adapter. In such a scenario where the adapter is used as a receiver adapter, SAP Integration Suite acts as the initiator of the calls.



How the Google Cloud Storage Sender Adapter Works: The Google Cloud Storage Sender adapter (as the name suggests) is designed to function as a sender adapter. In such a scenario where the adapter is used as a sender adapter, Google Cloud Storage acts as the initiator of the calls.



3.2 Application Configuration

- To get an overview of Google Cloud Storage, see [Google Cloud Storage Overview](#).
- To learn more about OAuth authentication, see [Using OAuth 2.0 for Web Server](#).
 - To set up OAuth authentication, see [OAuth for Service Accounts](#).

3.3 Authentication

The Google Cloud Storage adapter supports authentication using OAuth Service Account and Workload Identity Federation (WIF).

For more information about how to create service account, see [Create Keys](#).

3.3.1 Set up Workload Identity Federation

- To learn more about WIF authentication, see [Workload Identity Federation](#).
- To set up WIF authentication, see [WIF with Azure](#).
- You must create a security artifact of type OAuth2 Client Credentials. For more information, see [Creating Auth2 Client Credentials](#).

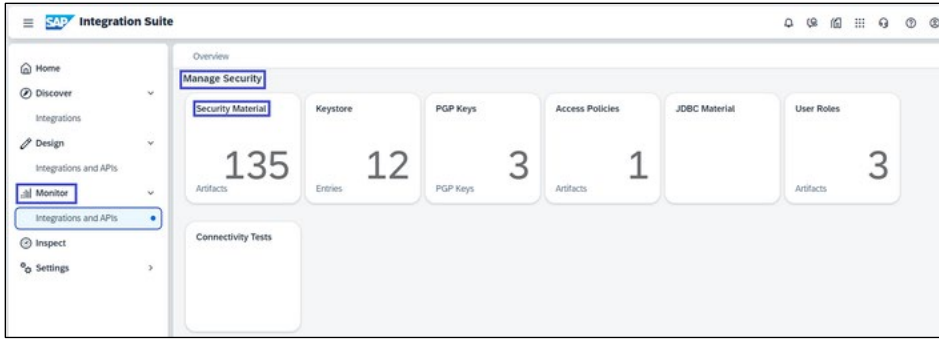
3.3.1.1 Creating OAuth2 Client Credentials

Purpose

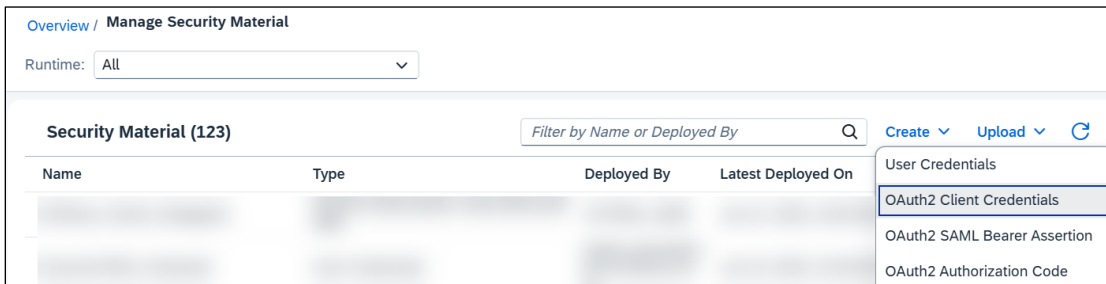
To create credentials in Security Material for **OAuth2 Client Credentials**.

Procedure

1. In SAP Integration Suite, navigate to **Monitor > Integrations and APIs**. This opens the **Overview** page.
2. On the **Overview** page, go to **Manage Security** section and click **Security Material**.




3. On Manage Security Material page, click Create to select **OAuth2 Client Credentials** from the dropdown.



4. In the Create **OAuth2 Client Credentials** popup, provide the below details.

| Parameter | Description |
|--------------------------|--|
| Name | Specify the name for the credentials. |
| Description | Specify the description for the credentials. |
| Token Service URL | Specify the URL of the OAuth2 authorization server that issues the access token. Example: <code>https://login.microsoftonline.com/<tenant ID>/oauth2/token</code> |
| Client ID | Specify the ID of the client to which you are connecting. |

| Parameter | Description |
|------------------------------|---|
| Client Secret | <p>Specify the Secret key of the client to which you are connecting.</p> <p>OAuth2 uses a multiple step authentication pattern: Client credentials (Client ID and Client Secret, as specified in the artifact) are used by the client application to initially request an access token. The access token is then used to authorize the client (for as long as the token is valid) to access the server's resources (for example, the resources that are used in the associated integration flow). In many OAuth2 scenarios, the access token is issued (or generated) by an authorization server.</p> |
| Client Authentication | <p>Select the Client Authentication which allows you to access an application using Client ID and Client Secret.</p> <p>By default, the Send as Body Parameter is selected, this option sends the Client ID and Client Secret as a JSON content to the authentication server in the request body.</p> <p>Example: Send as Body Parameter</p> |
| Scope | <p>Specify the OAuth2 scope information to be included in the request body.</p> <p>Example: <code>https://iam.googleapis.com/projects/<projectid>/locations/global/workloadIdentityPools/<wif-pool>/providers/<wif-provider>/default</code></p> |
| Content Type | <p>Select content type to indicate the media type.</p> <div data-bbox="435 1388 1305 1562" style="border: 1px solid #add8e6; padding: 10px; margin: 10px 0;"> <p> To use application permissions in the adapter, deploy an OAUTH2 Client Credential security artifact and ensure Content Type is set to 'application/x-www-form-urlencoded' :</p> </div> |
| Resource | <p>Specify the identifier of the application or service that shares the same client secret. The identifier varies depending on the service that you want to connect with.</p> |
| Audience | <p>Specify the identifier of the application or service that shares the same client secret. The identifier varies depending on the service that you want to connect with.</p> |

5. Click Deploy to complete the process.

When you refresh the Manage Security Material page, the new artifact is displayed (with Type **OAuth2 Client Credentials**) in the artifact table.

3.3.2 Creating Keys for OAuth2 Service Account

The Security artifact created below is used to connect to the Google Cloud Storage Application by configuring the **Connection tab** of the Adapter.

Login to Google Cloud Storage and generate a key. For more information, see [Create Keys](#). The **Key type** for private key can be either **JSON** or **P12**. Refer the following sections for each Key type usage.

3.3.2.1 Creating Keystore for JSON key

1. After downloading the newly created key, the content in the key needs to be extracted and aligned in a proper format. Follow the below steps:
 - i. Open the key as a text file (preferably notepad++) and delete content so that you only retain the private key content between and inclusive of `BEGIN PRIVATE KEY` and `END PRIVATE KEY`.
 - ii. Remove all occurrences of `\n` from your private key content.
 - iii.

Align the content as shown below:

```
-----BEGIN PRIVATE KEY-----  
  
*****  
*****  
  
-----END PRIVATE KEY-----
```

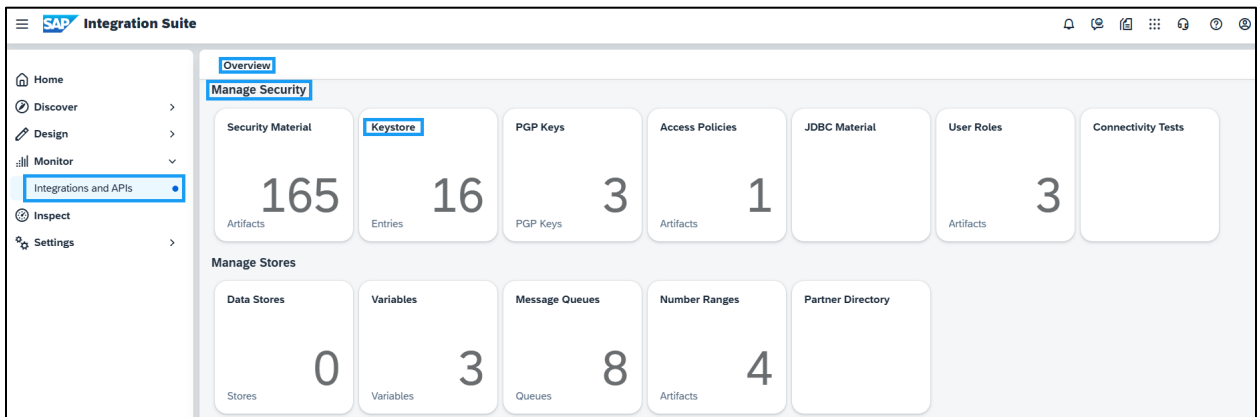
```

1 -----BEGIN PRIVATE KEY-----
2 MIIEvQIBADANBgkqhkiG9w0BAQEFAASCBKcwggSIAQIAggEAggUA
3 -----END PRIVATE KEY-----

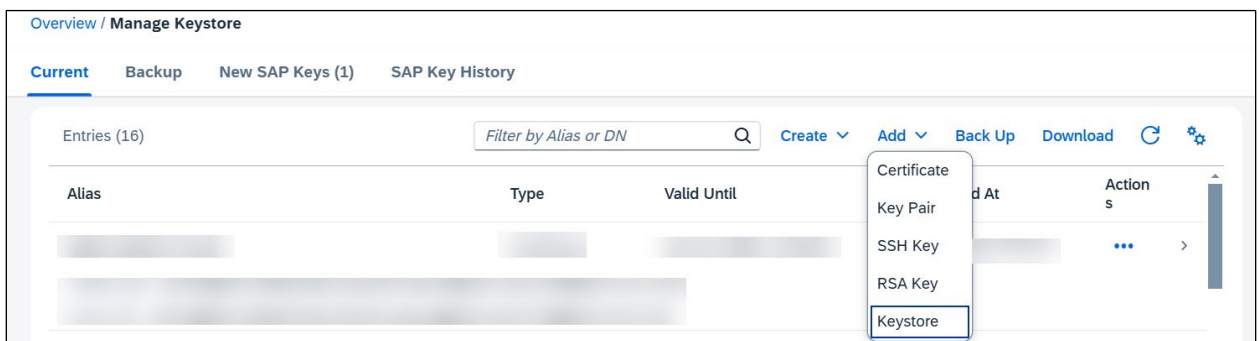
```

iv. Save as `gcs_rsa_key.p8`

2. Create a keystore file with `.jks` extension. For detailed information, see [Keystore Generation \(JKS file creation\)](#).
3. In SAP Integration Suite, navigate to **Monitor > Integrations and APIs**. This opens the **Overview** page.
4. On the **Overview** page, go to **Manage Security** section and click **Keystore**.



5. On **Manage Keystore** page, click **Add** to select **Keystore** from the dropdown.



6. In the **Add Keystore** popup, provide the below details.

Add Keystore

Keystore: *

Passphrase: *

Action: ▾

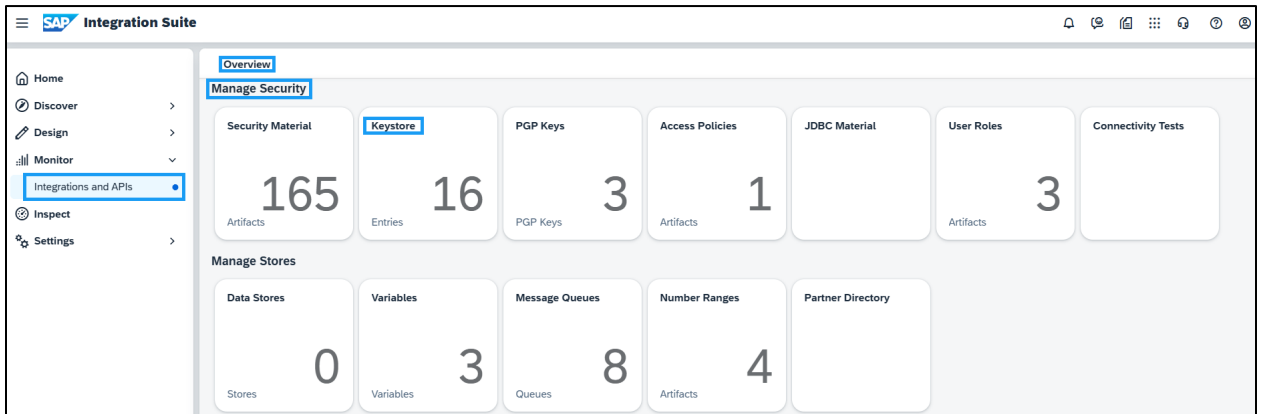
Overwrite existing entries

| Parameter | Description |
|-----------------------------------|---|
| Keystore | Choose a keystore for upload. Select the .jks file. For detailed information, see Keystore Generation (JKS file creation) . |
| Passphrase | Specify the password used while creating the .jks file. |
| Action | Specify the action to be performed as Add . |
| Overwrite Existing Entries | Enable or Disable depending on your need to overwrite existing entries. |

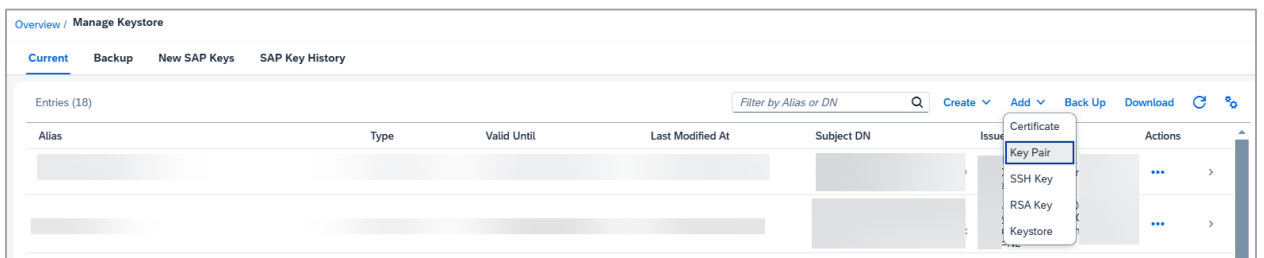
- Click **Deploy** to complete the process.

3.3.2.2 Creating Key-Pair for P12 key

1. In SAP Integration Suite, navigate to **Monitor > Integrations and APIs**. This opens the **Overview** page.
2. On the **Overview** page, go to **Manage Security** section and click **Keystore**.



3. On **Manage Keystore** page, click **Add** to select **Key Pair** from the dropdown.



4. In the **Key Pair** popup, provide the below details.

Add Key Pair

Alias: *

File: *

Password: *

| Parameter | Description |
|-----------------|---|
| Alias | Specify the alias for the key pair. |
| File | Select the P12 key for upload. |
| Password | Specify the password used while creating the .jks file. |

5. Click **Deploy** to complete the process.

4 Google Cloud Storage Adapter Configuration

This section describes the parameters to be configured for your Google Cloud Storage adapter. You need to configure the **Connection** and **Processing** tabs. A description and example usage for each field has been added.

4.1 Sender Adapter




4.1.1 Connection Tab



The **Connection** tab contains connection and authentication parameters for Google Cloud Storage adapter. Before you set the connection details, see [Create User Credentials](#).



The screenshot shows the configuration interface for the Google Cloud Storage adapter. The title bar reads "GoogleCloudStorage". Below the title bar are three tabs: "General", "Connection" (which is selected and underlined), and "Processing". The main content area is titled "CONNECTION DETAILS" and contains the following fields:

- Address: *
- Authentication Type: - OAuth2 Token URL: *
- Client Email: *
- Private Key Alias: *
- Scope: *
- Polling Interval (in ms):
- Proxy Type: - Reuse Connection:
- Connection Timeout (in ms):
- Response Timeout (in ms):

The **Connection** tab contains the following fields:

| Parameter | Description |
|---|---|
| Address | <p>Specify the hostname pointing to the Google Cloud Storage service.</p> <p>Default: https://storage.googleapis.com</p> <div style="border: 1px solid #0070c0; padding: 5px; margin-top: 10px;"> <p> When Proxy Type is set to On-Premise, you must use virtual host and port from cloud connector.</p> </div> |
| Authentication Type | <p>Select your preferred method for authentication:</p> <ul style="list-style-type: none"> • OAuth2 Service Account • Workload Identity Federation |
| <p> The below fields are applicable when Authentication Type is set to OAuth2 Service Account.</p> | |
| OAuth2 Token URL | <p>Specify the OAuth2 Token URL which identifies as the authorization server for producing a JWT token internally.</p> <p>Default: <code>https://www.googleapis.com/oauth2/v4/token</code></p> |
| Client Email | <p>Specify the Google Service Account Client email.</p> <p>Example: <code>limited-svc-account@192843.iam.gserviceaccount.com</code></p> |
| Private Key Alias | <p>Specify the Keystore alias for Google Service Account Private Key.</p> |
| Scope | <p>Specify the scope of the connection to Google Cloud Storage service.</p> <p>Default: <code>https://www.googleapis.com/auth/devstorage.full_control</code></p> |
| <p> The below fields are applicable when Authentication Type is set to Workload Identity Federation.</p> | |

| Parameter | Description |
|--|--|
| Microsoft Entra ID Credential Name | Specify the OAuth2 Client Credentials security artifact created for Microsoft Entra ID. |
| STS Token URL | Specify the Security Token Service URL. Example: <code>https://sts.googleapis.com/v1/token</code> |
| STS Audience | Specify the audience i.e. the full resource name of the identity provider. Example: <code>//iam.googleapis.com/projects/<project-number>/locations/global/workloadIdentityPools/<pool-id>/providers/<provider-id></code> |
| STS Scopes | Specify the OAuth 2.0 scopes to include on the resulting access token, formatted as a list of space-delimited, case-sensitive strings. Example: <code>https://www.googleapis.com/auth/cloud-platform</code> |
| STS Options | Specify the additional options to use in the STS token call. |
| Use Service Account Impersonation | Enable to use Service Account Impersonation. |
| <div style="border: 1px solid #0070c0; padding: 5px; background-color: #e6f2ff;">  The below fields are applicable when Use Service Account Impersonation is enabled. </div> | |
| Access Token URL | Specify the URL for generating access token with Service Account Impersonation. Example: <code>https://iamcredentials.googleapis.com/v1/projects/-/serviceAccounts/{ACCOUNT_EMAIL_OR_UNIQUEID}:generateAccessToken</code> <div style="border: 1px solid #0070c0; padding: 5px; margin-top: 10px;">  The - wildcard character is required; replacing it with a project ID is invalid. </div> |

| Parameter | Description |
|---|---|
| Service Account Impersonation Scopes | Specify the comma-separated scopes to be included in the resulting OAuth 2.0 access token. Example: https://www.googleapis.com/auth/pubsub , https://www.googleapis.com/auth/cloud-platform |
| Delegates | Specify the comma-separated sequence of service accounts in a delegation chain. Example: <code>projects/- /serviceAccounts/{ACCOUNT_EMAIL_OR_UNIQUEID}</code> |
| <div style="border: 1px solid #ccc; padding: 5px; background-color: #e6f2ff;">  The below fields are applicable are available for all authentication methods. </div> | |
| Polling Interval (in ms) | Specify the Polling Interval in milliseconds. |
| Proxy Type | Specify the proxy type: <ul style="list-style-type: none"> • Internet • On-Premise |
| Location ID (Only available when Proxy Type is set to On-Premise). | Specify the Location ID from Cloud Connector. <div style="border: 1px solid #ccc; padding: 5px; background-color: #e6f2ff;">  This is an optional field based on your configuration. </div> |
| Reuse Connection | Enable the reuse of connection objects from the internal connection pool which in turn improves the network turnaround time for multiple communications to a same end point. |
| Connection Timeout (in ms) | Specify the maximum waiting time (in milliseconds) for the connection to be established with Google Cloud Storage service. |

| Parameter | Description |
|---------------------------------|---|
| Response Timeout (in ms) | Specify the maximum waiting time (in milliseconds) for a response message to be received with Google Cloud Storage service. |




4.1.2 Processing Tab

The **Processing** tab contains the operational configurations for the Google Cloud Storage Sender adapter.


The screenshot shows the configuration interface for the Google Cloud Storage Sender adapter, specifically the Processing tab. The interface is organized into three main sections: PROCESSING DETAILS, ENCRYPTION DETAILS, and HEADER DETAILS. Each section contains several configuration fields and checkboxes.

- PROCESSING DETAILS:**
 - Bucket Name: *
 - Directory:
 - File Name: *
 - Include Subdirectories:
 - Query Parameters: delimiter=/
Max Results: 5
 - Duplicate Check Expiration (in ms): * 300000
 - Post-Processing: Delete Object after Processing (dropdown menu)
- ENCRYPTION DETAILS:**
 - Object Encrypted with Custom Key:
 - Encryption Key Alias: *
- HEADER DETAILS:**
 - Response Headers: *

| Parameter | Description |
|--------------------|---|
| Bucket Name | Specify the name of the bucket. |
| Directory | Specify the directory path. Example: folder1. When left empty, root folder "/" is used. |

| Parameter | Description |
|---|--|
| File Name | <p>Specify the file name or pattern matching the object name.</p> <p>Example: *.pdf</p> <p>Default: *</p> |
| Include Subdirectories | <p>Enable to search all subdirectories under the Directory.</p> |
| Query Parameters | <p>Specify the key value pairs (& separated) to be used as query parameters.</p> <p>Example: prefix=test&delimiter=/ <div style="border: 1px solid #add8e6; padding: 5px; margin-top: 10px;">  Don't use alt query parameter as it conflicts with the adapter's response. </div> </p> |
| Max Results | <p>Specify the maximum number of objects to be returned.</p> <div style="border: 1px solid #add8e6; padding: 5px; margin-top: 10px;">  The maximum value is 1000. If you want more results, use pagination using the Receiver Adapter. </div> |
| Duplicate Check Expiration (in ms) | <p>Specify the expiry time in milliseconds (minimum 300000 ms) while handling the Duplicate check.</p> <p>The default value is 300000.</p> |
| Post-Processing | <p>Select the action to be performed after processing the object:</p> <ul style="list-style-type: none"> • Archive Object after Processing • Delete Object after Processing • Keep Object after Processing <div style="border: 1px solid #add8e6; padding: 5px; margin-top: 10px;">  The post processing actions are executed only after the iFlow execution is completed. </div> |

| Parameter | Description |
|--|---|
| <p>Archive Wait Time (in ms) (Only available when Post-Processing is set to Archive Object after Processing.)</p> | <p>Specify the maximum time in milliseconds to archive the object.</p> |
| <p>Move to same Bucket (Only available when Post-Processing is set to Archive Object after Processing.)</p> | <p>Enable to move the object to the same bucket.</p> |
| <p>Destination Bucket Name (Only available when Move to same Bucket is disabled.)</p> | <p>Specify the destination bucket name.</p> |
| <p>Destination Folder (Only available when Post-Processing is set to Archive Object after Processing.)</p> | <p>Specify the destination folder. Example: <code>test_folder</code>.</p> |
| <p>Archive Object Name (Only available when Post-Processing is set to Archive Object after Processing.)</p> | <p>Specify the name for the archived object. When left empty existing object name is used. Camel expressions can be used to name the object dynamically. Example: <code>\${file:name.noext.single}.\${date:now:yyyy-MM-dd HH:mm:ss}.\${file:name.ext.single}</code></p> |

| Parameter | Description |
|--|---|
| Object Encrypted with Custom Key | Enable if object is encrypted with custom key. |
| Encryption Key Alias (Only available if Object Encrypted with Custom Key is enabled) | Specify the Alias for Encryption Key. |
| Encrypt Destination Object with Custom Key (Only available when Post-Processing is set to Archive Object after Processing .) | Enable to encrypt destination object with custom key. |
| Destination Encryption Key Type (Only available if Encrypt Destination Object with Custom Key is enabled) | Select the type of encryption key to be used for the object that will be archived: <ul style="list-style-type: none"> • Cloud KMS Key • Customer-Supplied Encryption Key <div style="border: 1px solid #add8e6; padding: 5px; margin-top: 10px;">  For Customer-Supplied Encryption key generation and usage, see Create Custom Encryption Key Alias. </div> |
| Destination Encryption Key Alias (Only available when Destination Encryption Key Type is set to Customer-Supplied Encryption Key) | Specify the alias for destination Encryption Key. |

| Parameter | Description |
|---|---|
| <p>Destination Cloud KMS Key Name</p> <p>(Only available when Destination Encryption Key Type is set to Cloud KMS Key)</p> | <p>Specify the resource name of the destination Cloud KMS key.</p> |
| <p>Response Headers</p> | <p>Enter a list of headers, separated by a pipe (), coming from the target system's response to be received in the message. Use an asterisk (*) to receive all the headers from the target system, which is also the default value. All Camel-specific headers and HTTP protocol headers except "date" are excluded by default even if you specify them.</p> |

4.2 Receiver Adapter

In this section, you will learn how to configure the Google Cloud Storage receiver adapter.


4.2.1 Connection Tab



The Connection tab contains connection and authentication parameters for Google Cloud Storage Receiver adapter. Before you set the connection details, see [Create User Credentials](#).



The screenshot shows the 'GoogleCloudStorage' configuration window with the 'Connection' tab selected. The 'CONNECTION DETAILS' section includes the following fields:



- Address: `https://storage.googleapis.com`
- Authentication Type: `Workload Identity Federation` (dropdown)
- Microsoft Entra ID Credential Name: `${header.entra_creds}`
- STS Token URL: `${header.token}`
- STS Audience: `${header.sts_audience}`
- STS Scopes: `${header.scopes}`
- STS Options: `${header.option}`
- Use Service Account Impersonation:
- Proxy Type: `Internet` (dropdown)
- Reuse Connection:
- Connection Timeout (in ms): `60000`
- Response Timeout (in ms): `60000`

The **Connection** tab contains the following fields:

| Parameter | Description |
|----------------------------|--|
| Address | <p>Specify the hostname pointing to the Google Cloud Storage service.</p> <p>Default: <code>https://storage.googleapis.com</code></p> <div style="border: 1px solid #0070c0; padding: 10px; margin-top: 10px;"><p> When Proxy Type is set to On-Premise, you must use virtual host and port from cloud connector.</p></div> |
| Authentication Type | <p>Select the method for authentication to Google Cloud Storage:</p> <ul style="list-style-type: none">• OAuth2 Service Account• Workload Identity Federation |

| Parameter | Description |
|---|---|
|  The below fields are applicable when Authentication Type is set to OAuth2 Service Account . | |
| OAuth2 Token URL | Specify the OAuth2 Token URL which identifies as the authorization server for producing a JWT token internally. Default: <code>https://www.googleapis.com/oauth2/v4/token</code> |
| Client Email | Specify the Google Service Account Client Email. Example: <code>limited-svc-account@192843.iam.gserviceaccount.com</code> |
| Private Key Alias | Specify the Keystore alias for Google Service Account Private Key. |
| Scope | Specify the scope of the connection to Google Cloud Storage service. Default: <code>https://storage.googleapis.com/auth/devstorage.full_control</code> |
|  The following fields are applicable when Authentication Type is set to Workload Identity Federation . | |
| Microsoft Entra ID Credential Name | Specify the OAuth2 Client Credentials security artifact created for Microsoft Entra ID. |
| STS Token URL | Specify the Security Token Service URL. Example: <code>https://sts.googleapis.com/v1/token</code> |
| STS Audience | Specify the audience i.e. the full resource name of the identity provider. Example: <code>//iam.googleapis.com/projects/<project-number>/locations/global/workloadIdentityPools/<pool-id>/providers/<provider-id></code> |

| Parameter | Description |
|---|---|
| STS Scopes | Specify the OAuth 2.0 scopes to include on the resulting access token, formatted as a list of space-delimited, case-sensitive strings. Example: <code>https://www.googleapis.com/auth/cloud-platform</code> |
| STS Options | Specify the additional options to use in the STS token call. |
| Use Service Account Impersonation | Enable to use Service Account Impersonation. |
|  The below fields are applicable when Use Service Account Impersonation is enabled. | |
| Access Token URL | Specify the URL for generating access token with Service Account Impersonation. Example: <code>https://iamcredentials.googleapis.com/v1/projects/-/serviceAccounts/{ACCOUNT_EMAIL_OR_UNIQUEID}:generateAccessToken</code>  The - wildcard character is required; replacing it with a project ID is invalid. |
| Service Account Impersonation Scopes | Specify the comma-separated scopes to be included in the resulting OAuth 2.0 access token. Example: <code>https://www.googleapis.com/auth/pubsub,https://www.googleapis.com/auth/cloud-platform</code> |
| Delegates | Specify the comma-separated sequence of service accounts in a delegation chain. Example: <code>projects/-/serviceAccounts/{ACCOUNT_EMAIL_OR_UNIQUEID}</code> |

| Parameter | Description |
|---|--|
|  The below fields are applicable are available for all authentication methods. | |
| Proxy Type | Specify the proxy type: <ul style="list-style-type: none"> • Internet • On-Premise |
| Location ID (Only available when Proxy Type is set to On-Premise). | Specify the Location ID from Cloud Connector. <div style="border: 1px solid #add8e6; padding: 5px; margin-top: 10px;">  This is an optional field based on your configuration. </div> |
| Reuse Connection | Enable the reuse of connection objects from the internal connection pool which in turn improves the network turnaround time for multiple communications to a same end point. |
| Connection Timeout (in ms) | Specify the maximum waiting time (in milliseconds) for the connection to be established with Google Cloud Storage service. |
| Response Timeout (in ms) | Specify the maximum waiting time (in milliseconds) for a response message to be received with Google Cloud Storage service. |

4.2.2 Processing Tab

This section lists the processing tab configurations for Google Cloud Storage Receiver adapter.

GoogleCloudStorage

General Connection **Processing**

PROCESSING DETAILS

Resource Type: Buckets ▾

Operation: List ▾

Project ID: * \${property,pid}

Max Results: 10

Page Token: \${property,pageTk}

Query Parameters: prefix=test

Response Fields: name

HEADER DETAILS

Request Headers:



Response Headers: *

| Parameter | Description |
|--|--|
| Resource Type | Select the resource type from the available dropdown: <ul style="list-style-type: none"> • Buckets • Folders • Objects |
| Operation | Select the operation to be performed. |
| Project ID | Specify the Project ID. |
| Bucket Name | Specify the bucket name. |
| Folder Name | Specify the folder name. |
| Create Parent Folders (Only available when Resource Type is set to Folders and Operation is set to Create .) | Enable to create non-existing parent folders. Example: If Folder Name is parent/child, enabling creates <code>parent</code> folder if not already present, and then creates <code>child</code> . |

| Parameter | Description |
|---|---|
| <p>Existing Folder Name</p> <p>(Only available when Resource Type is set to Folders and Operation is set to Rename.)</p> | <p>Specify the name of the source folder.</p> |
| <p>New Folder Name</p> <p>(Only available when Resource Type is set to Folders and Operation is set to Rename.)</p> | <p>Specify the name of the destination folder.</p> |
| <p>Directory</p> | <p>Specify the directory path. Example: <code>dir</code></p> <p>When left empty, root folder "/" will be used.</p> |
| <p>File Name</p> <p>(Only available when Resource Type is set to Objects and Operation is set to List.)</p> | <p>Specify the file name or pattern matching the object name.</p> <p>Example: <code>*.pdf</code></p> |
| <p>Include Subdirectories</p> <p>(Only available when Resource Type is set to Objects and Operation is set to List.)</p> | <p>Enable to search all subdirectories.</p> |
| <p>Object Name</p> | <p>Specify the object name.</p> |
| <p>Existing File Handling</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Create.)</p> | <p>Select action in case file to be created already exists:</p> <ul style="list-style-type: none"> • Fail throws an error and skips object creation if object exists. • Ignore skips object creation without throwing any error if object exists. • Override creates a new object or replaces the existing object with a new one. |

| Parameter | Description |
|---|--|
| <p>Upload Type</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Create.)</p> | <p>Select the type of upload request to be used for object creation:</p> <ul style="list-style-type: none"> • Media • Multi-Part • Resumable |
| <p>Content Type</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Create.)</p> | <p>Specify the content type of the object data.</p> <p>Example:</p> <ul style="list-style-type: none"> • <code>text/html</code> • <code>media-type</code> |
| <p>Object Metadata</p> | <p>Specify the metadata of the object.</p> <p>Example:</p> <pre>{ "metadata": { "file-type": "new", "source": "system-value", "createdDate": "20250101" } }</pre> |
| <p>Upload in Multiple Chunks</p> <p>(Only available when Upload Type is set to Resumable.)</p> | <p>Enable to create object in multiple chunks.</p> |
| <p>Chunk Size</p> <p>(Only available when Upload in Multiple Chunks is enabled.)</p> | <p>Specify the chunk size to be used for object creation. The chunk size should be a multiple of 256 KiB (256 x 1024 bytes).</p> |

| Parameter | Description |
|---|---|
| <p>Get Metadata only</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Get.)</p> | <p>Enable to get the metadata of the object.</p> |
| <p>Source Bucket Name</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Rewrite.)</p> | <p>Specify the source bucket name.</p> |
| <p>Source Directory Name</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Rewrite.)</p> | <p>Specify the source directory path. Example: "dir". When left empty, root folder "/" will be used.</p> |
| <p>Existing Object Name</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Rewrite.)</p> | <p>Specify the source object name.</p> |
| <p>Destination Bucket Name</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Rewrite.)</p> | <p>Specify the destination bucket name.</p> |
| <p>Destination Directory Name</p> | <p>Specify the destination directory path. Example: dir</p> <p>When left empty, root folder "/" will be used.</p> |
| <p>New Object Name</p> | <p>Specify the destination object name.</p> |
| <p>Rewrite Token</p> <p>(Only available when Resource Type is set to Objects and Operation is set to Rewrite.)</p> | <p>Specify the rewrite token if present.</p> |

| Parameter | Description |
|---|--|
| Object Encrypted with Custom Key | Enable if object is encrypted with custom key. |
| Encryption Key Type (Only available when Object Encrypted with Custom Key is enabled.) | Select the type of encryption to be used: <ul style="list-style-type: none"> • Cloud KMS Key • Customer-Supplied Encryption Key <div style="border: 1px solid #add8e6; padding: 5px; margin-top: 10px;">  For Customer-Supplied Encryption key generation and usage, see Create Custom Encryption Key Alias. </div> |
| Encryption Key Alias (Only available when Encryption Key Type is set to Customer-Supplied Encryption Key) | Specify the encryption key alias. |
| Cloud KMS Key Name (Only available when Encryption Key Type is set to Cloud KMS Key Name) | Specify the resource name of the Cloud KMS key. |
| Encrypt Destination Object with Custom Key | Enable if destination object is to be encrypted with custom key. |
| Destination Encryption Key Type (Only available when Resource Type is set to Objects and Operation is set to Rewrite .) | Select the type of encryption to be used: <ul style="list-style-type: none"> • Cloud KMS Key • Customer-Supplied Encryption Key <div style="border: 1px solid #add8e6; padding: 5px; margin-top: 10px;">  For Customer-Supplied Encryption key generation and usage, see Create Custom Encryption Key Alias. </div> |

| Parameter | Description |
|--|---|
| <p>Destination Encryption Key Alias</p> <p>(Only available when Destination Encryption Key Type is set to Customer-Supplied Encryption Key)</p> | <p>Specify the destination encryption key alias.</p> |
| <p>Destination Cloud KMS Key Name</p> <p>(Only available when Destination Encryption Key Type is set to Cloud KMS Key Name)</p> | <p>Specify the resource name of the destination Cloud KMS key.</p> |
| <p>Max Results</p> | <p>Specify the maximum number of items to be returned.</p> |
| <p>Page Token</p> | <p>Specify the next page token.</p> |
| <p>Query Parameters</p> | <p>Specify the key value pairs (& separated) to be used as query parameters.</p> <p>Example: <code>prefix=test&delimiter=</code></p> |
| <p>Response Fields</p> | <p>Specify the fields (comma separated) to be returned in the response.</p> <p>For information about syntax of response fields, see https://cloud.google.com/storage/docs/json_api#partial-response.</p> <p>Example:</p> <ul style="list-style-type: none"> • <code>name, generation, size</code> • <code>items/id</code> |

| Parameter | Description |
|-------------------------|--|
| Request Headers | Enter a list of custom headers, separated by a pipe (), to be sent to the target system. Use an asterisk (*) to send all custom headers to the target system. All Camel-specific headers and HTTP protocol headers except "date" are excluded by default even if you specify them. |
| Response Headers | Enter a list of headers, separated by a pipe (), coming from the target system's response to be received in the message. Use an asterisk (*) to receive all the headers from the target system, which is also the default value. All Camel-specific headers and HTTP protocol headers except "date" are excluded by default even if you specify them. |

5 Google Cloud Storage Adapter Operations

This section describes some of the CRUD (Create, Read, Update, Delete) operations supported by the Google Cloud Storage adapter.

5.1 Sender Adapter

While reading, the Sender adapter provides three **Post-Processing** options. Here, we will be demonstrating an example for **Archive Object after Processing**.

The screenshot shows the configuration interface for the Sender Adapter, specifically the 'Processing' tab. It is divided into two sections: 'PROCESSING DETAILS' and 'ENCRYPTION DETAILS'.

PROCESSING DETAILS:

- Bucket Name: *
- Directory: *
- File Name: *
- Include Subdirectories:
- Query Parameters: `delimiter=/'`
- Max Results: `5`
- Duplicate Check Expiration (in ms): * `300000`
- Post-Processing: `Archive Object after Processing` (dropdown)
- Archive Wait Time (in ms): * `300000`
- Move to same Bucket:
- Destination Folder: *
- Archive Object Name: `$(file.name.noext.single).$(date.now:yyyy-MM-dd HH:mm:ss).$(file.name.ext.single)`

ENCRYPTION DETAILS:

- Object Encrypted with Custom Key:
- Encryption Key Alias: * `E_KEY`
- Encrypt Destination Object with Custom Key:
- Destination Encryption Key Type: * `Customer-Supplied Encryption Key` (dropdown)
- Destination Encryption Key Alias: * `D_KEY`

| Parameter | Value |
|-------------------------------|--|
| Bucket Name | Set <code>parent_bkt</code> as the name of the bucket. |
| Directory | Set directory path as <code>test</code> |
| File Name | Set pattern as <code>*.json</code> |
| Include Subdirectories | Enable to search all subdirectories for objects. |
| Query Parameters | Set <code>prefix=pre</code> |
| Max Results | Set value to <code>10</code> |

| Parameter | Value |
|---|---|
| Duplicate Check Expiration (in ms) | Set value to 300000 |
| Post-Processing | Select action as Archive Object after Processing. |
| Archive Wait Time (in ms) | Set value as 300000. |
| Move to same Bucket | Enable |
| Archive Object Name | Set as <code>\${file:name.noext.single}.\${date:now:yyyy-MM-dd HH:mm:ss}.\${file:name.ext.single}</code> |
| Destination Folder | Specify the destination folder as <code>dest.</code> |
| Object Encrypted with Custom Key | Enable |
| Encryption Key Alias | Specify alias as <code>E_KEY</code> |
| Encrypt Destination Object with Custom Key | Enable |
| Destination Encryption Key Type | Select as Customer-Supplied Encryption Key |
| Destination Encryption Key Alias | Specify alias as <code>D_KEY</code> |

5.2 Receiver Adapter

5.2.1 Buckets: Create

Create allows you to create a bucket as part of the specified project.

The screenshot shows a configuration window with three tabs: 'General', 'Connection', and 'Processing'. The 'Processing' tab is active. Below the tabs is a section titled 'PROCESSING DETAILS'. It contains the following fields:

- Resource Type: A dropdown menu with 'Buckets' selected.
- Operation: A dropdown menu with 'Create' selected.
- Project ID: A text box containing the placeholder text '\${property.pid}'.
- Query Parameters: An empty text box.
- Response Fields: An empty text box.

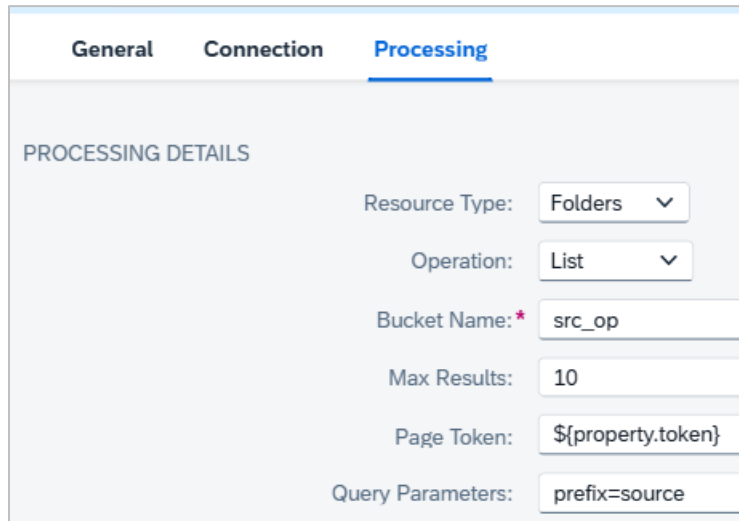
You must provide name of the bucket in the payload:

```
{
  "name": "partition_5",
  "hierarchicalNamespace": {
    "enabled": true
  },
  "labels": {
    "bucketType": "sales bucket"
  }
}
```

| Parameter | Values |
|---------------|--|
| Resource Type | Select Buckets |
| Operation | Select Create |
| Project ID | Specify bucket name as <code>\${property.pid}</code> |

5.2.2 Folders: List

List returns a list of folders which are available in the specified bucket. You can use **Query Parameters** and **Max Results** to customise your search results.



The screenshot shows a configuration interface with three tabs: 'General', 'Connection', and 'Processing'. The 'Processing' tab is active. Below the tabs is a section titled 'PROCESSING DETAILS' containing several configuration fields:

- Resource Type: Folders (dropdown menu)
- Operation: List (dropdown menu)
- Bucket Name: * src_op (text input)
- Max Results: 10 (text input)
- Page Token: \${property.token} (text input)
- Query Parameters: prefix=source (text input)

| Parameter | Values |
|------------------|---|
| Resource Type | Select Folders |
| Operation | Select List |
| Bucket Name | Specify bucket name as <code>src_op</code> |
| Max Results | Set as 10 |
| Page Token | Select value as <code>\${property.token}</code> |
| Query Parameters | Set as <code>prefix=source</code> |

5.2.3 Objects: Rewrite

Rewrite allows you to copy an object to a different location.

The screenshot shows the 'Processing' tab in the Google Cloud Storage interface. It contains the following configuration fields:

- Resource Type:** Objects
- Operation:** Rewrite
- Source Bucket Name:** src_op
- Source Directory Name:** src_dir
- Existing Object Name:** obj_first
- Destination Bucket Name:** tgt_op
- Destination Directory Name:** tgt_dir
- New Object Name:** obj_final
- Rewrite Token:** (empty)
- Object Encrypted with Custom Key:**
- Encryption Key Alias:** SRC_ENCRYPT
- Encrypt Destination Object with Custom Key:**
- Destination Encryption Key Type:** Customer-Supplied Encryption Key
- Destination Encryption Key Alias:** e2
- Query Parameters:** prefix=test
- Response Fields:** DEST_ENCRYPT

| Parameter | Value |
|-----------------------------------|-------------------------------|
| Resource Type | Select Objects |
| Operation | Select Rewrite |
| Source Bucket Name | Set as <code>src_op</code> |
| Source Directory Name | Set as <code>src_dir</code> |
| Existing Object Name | Set as <code>obj_first</code> |
| Destination Bucket Name | Set as <code>tgt_op</code> |
| Destination Directory Name | Set as <code>tgt_dir</code> |
| New Object Name | Set as <code>obj_final</code> |

| Parameter | Value |
|---|---|
| Object Encrypted with Custom Key | Enable |
| Encryption Key Alias | Set as SRC_ENCRYPT |
| Encrypt Destination Object with Custom Key | Enable |
| Destination Encryption Key Type | Select as Customer-Supplied Encryption Key |
| Destination Encryption Key Alias | Set as DEST_ENCRYPT |
| Query parameter | Set as prefix=test |
| Response Fields | Set as DEST_ENCRYPT |

6 References

6.1 Create Custom Encryption Key Alias

You will require a Customer-Supplied Encryption key for encrypting or decrypting data. For more information, see [Customer-supplied encryption keys](#).

Procedure

1. To create an encryption key, see [Generate your own encryption key](#) or you can run this command using OpenSSL: `openssl rand -base64 32`. This generates a 256-bit (32 bytes) AES Base64 encoded encryption key.
2. The encryption key created above needs to be saved as a **Secure Parameter** in **Security Material**. For more information, see [Deploying a Secure Parameter Artifact](#).

6.2 Keystore Generation (JKS File Creation)

1. Generate a certificate signing request by using the `gcs_rsa_key.p8` file and store it in a file called `gcs_server.csr`.

OpenSSL Command:

```
openssl req -new -key <source_path>/gcs_rsa_key.p8 -out  
<target_path>/gcs_server.csr
```

You are about to be asked to enter information that will be incorporated into your certificate request.

What you are about to enter is what is called a Distinguished Name or a DN.

There are quite a few fields but you can leave some blank

For some fields there will be a default value,

If you enter '.', the field will be left blank.

Country Name (2 letter code) [AU]:<enter_country_code>

State or Province Name (full name) [Some-State]:<enter_city_name>

Locality Name (eg, city) []:<enter_locality_name>

Organization Name (eg, company) [Internet Widgits Pty Ltd]:<enter_org_name>

Organizational Unit Name (eg, section) []:<enter_org_unit_name>

Common Name (e.g. server FQDN or YOUR name) []:<enter_common_name>

Email Address []:<enter_email_address>

Please enter the following 'extra' attributes to be sent with your certificate request

A challenge password []:<password>

An optional company name []:<company_name>

2. It is possible to sign the certificate using a self-signing mechanism or via CA.



Please refer to your organisation policy to choose a suitable signing mechanism for the certificate.

You can generate a self-signed digital certificate using our private key (`gcs_rsa_key.p8`) and certificate signing request (`gcs_server.csr`) file and store the certificate in a file called (`gcs_server.crt`).

This `gcs_server.crt` is uploaded when creating the jks file.

OpenSSL

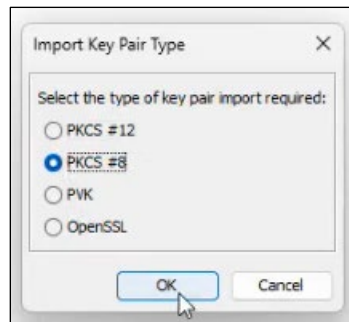
Command:

```
openssl x509 -req -sha256 -days 365 -in  
<source_path>/gcs_server.csr -signkey  
<source_path>/gcs_rsa_key.p8 -out <target/path>/gcs_server.crt
```

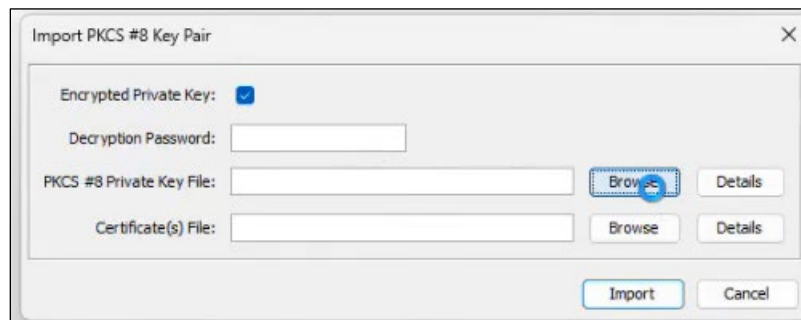
3. To create a JKS file using Keystore follow the below steps:
 - i. Go to Keystore and **Import key Pair**.

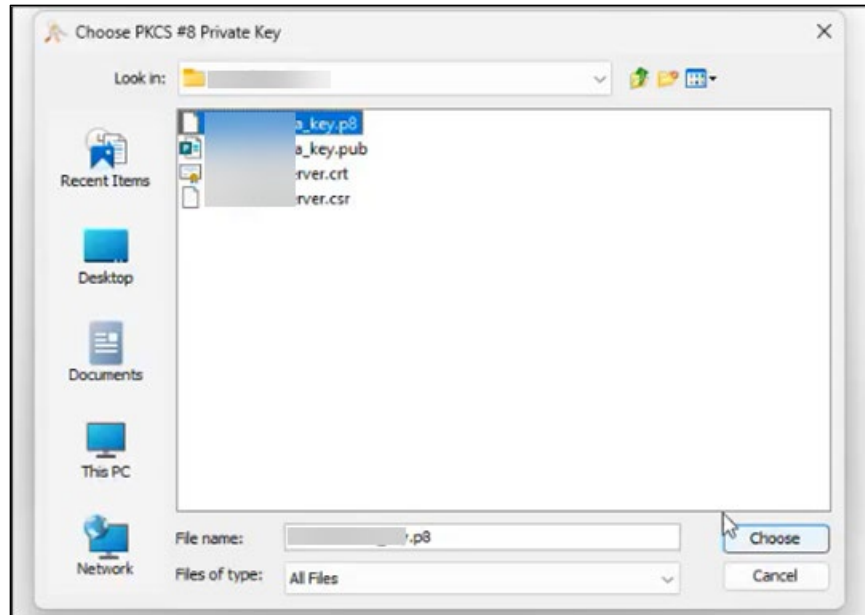


ii. Select the type of key pair as **PKCS #8**.

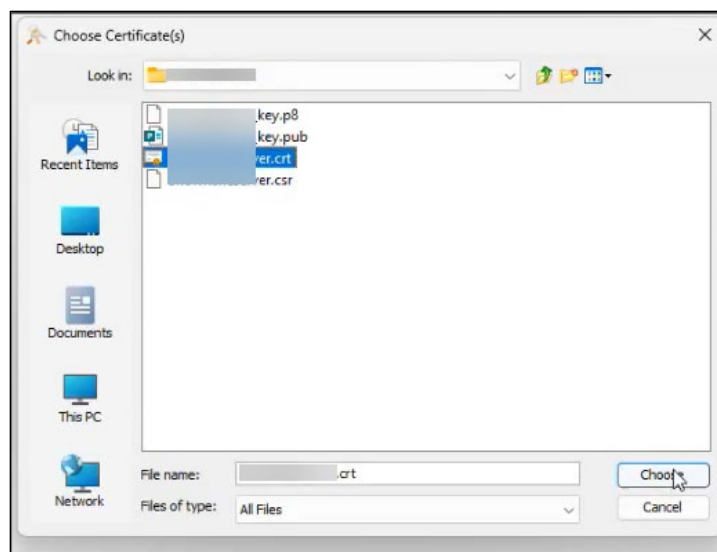
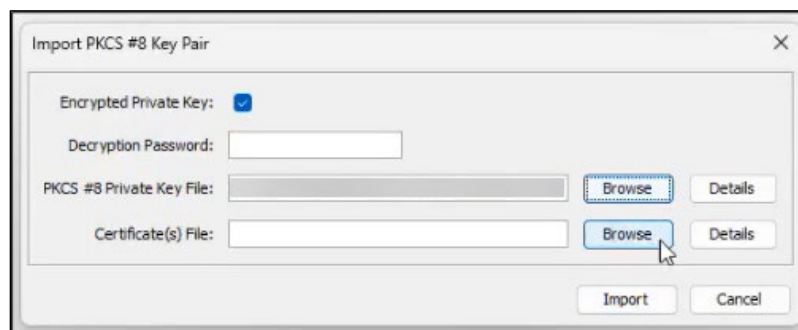


iii. Add the private key file by uploading the PKCS **Private Key** file.

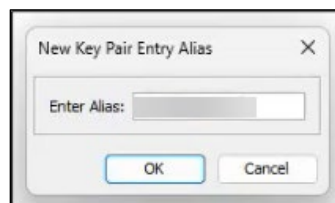
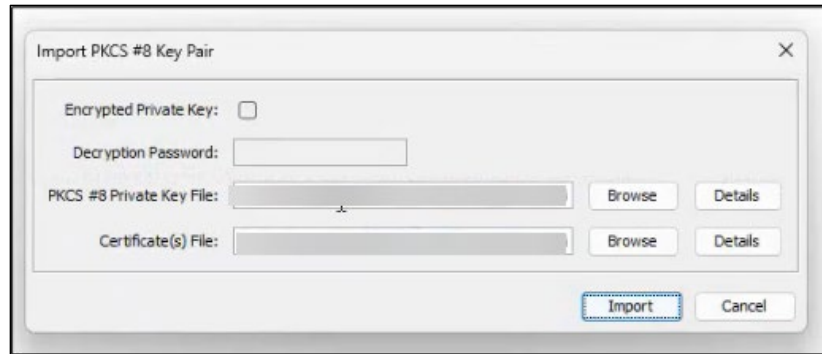




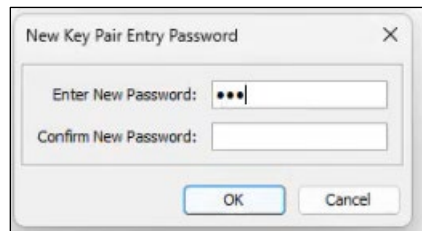
iv. Add the Google Cloud Storage **Certificate(s) File** created above.



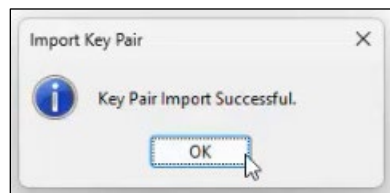
- v. Click **Import** and provide the **Alias**.



- vi. Provide a **New Key Pair Entry Password**.



- vii. You will get a message that indicates key pair import was successful.



viii. Provide the **KeyStore Password**.



ix. Finally, save the jks file.

