

Oracle® Cloud

Using the GraphQL Adapter with Oracle Integration 3



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Preface

This guide describes how to configure this adapter as a connection in an integration in Oracle Integration.



Note:

The use of this adapter may differ depending on the features you have, or whether your instance was provisioned using Standard or Enterprise edition. These differences are noted throughout this guide.

Topics:

- [Audience](#)
- [Documentation Accessibility](#)
- [Diversity and Inclusion](#)
- [Related Resources](#)
- [Conventions](#)

Audience

This guide is intended for developers who want to use this adapter in integrations in Oracle Integration.

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Oracle is fully committed to diversity and inclusion. Oracle respects and values having a diverse workforce that increases thought leadership and innovation. As part of our initiative to build a more inclusive culture that positively impacts our employees, customers, and partners, we are working to remove insensitive terms from our products and documentation.

We are also mindful of the necessity to maintain compatibility with our customers' existing technologies and the need to ensure continuity of service as Oracle's offerings and industry standards evolve. Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.

Related Resources

See these Oracle resources:

- Oracle Cloud at <http://cloud.oracle.com>
- *Using Integrations in Oracle Integration 3*
- *Using the Oracle Mapper with Oracle Integration 3*
- Oracle Integration documentation on the Oracle Help Center.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
<code>monospace</code>	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1

Understand the GraphQL Adapter

Review the following topics to learn about the GraphQL Adapter and how to use it as a connection in integrations in Oracle Integration. A typical workflow of adapter and integration tasks is also provided.

Topics:

- [GraphQL Adapter Capabilities](#)
- [GraphQL Adapter Restrictions](#)
- [What Application Version Is Supported?](#)
- [Workflow to Create and Add a GraphQL Adapter Connection to an Integration](#)

GraphQL Adapter Capabilities

The GraphQL Adapter enables you to integrate a cloud application that supports GraphQL with Oracle Integration. In addition, the GraphQL Adapter enables you to integrate on-premises applications, which support GraphQL APIs, with Oracle Integration using the connectivity agent. You can configure the GraphQL Adapter as an invoke connection in an integration in Oracle Integration.

The GraphQL Adapter provides the following capabilities:

- Supports connecting to private resources that are in your virtual cloud network (VCN) with a private endpoint. See *Connect to Private Resources* in *Provisioning and Administering Oracle Integration 3* and [Configure the Endpoint Access Type](#). This type of connection does not use the connectivity agent.
- Consumes any external GraphQL API.
- Supports getting complete introspection schema.
- Supports syntax validation and validation against introspection response.
- Provides an option for testing a query while configuring.
- Supports the extraction of requests and responses from user typed-in queries.
- Supports query, mutation, multi-query, and multi-mutation.
- Supports the connectivity agent.
- Supports fragments.
- Supports GraphQL APIs protected using API key-based authentication, a header-based security policy, and OAuth authorization code credentials.

The GraphQL Adapter is one of many predefined adapters included with Oracle Integration. See the *Adapters* page in the Oracle Help Center.

GraphQL Adapter Restrictions

Note the following GraphQL Adapter restrictions.

- The input variables are not currently validated.
- While validating the user's input query, the adapter displays errors sequentially, showing one at a time. After resolving an error, it moves on to display the next one in the sequence.
- Extensions in the response are not supported.
- Directives are not supported.



Note:

There are overall service limits for Oracle Integration. A service limit is the quota or allowance set on a resource. See [Service Limits](#).

What Application Version Is Supported?

For information about which application version is supported by this adapter, see the [Connectivity Certification Matrix](#).

Workflow to Create and Add a GraphQL Adapter Connection to an Integration

You follow a very simple workflow to create a connection with an adapter and include the connection in an integration in Oracle Integration.

This table lists the workflow steps for both adapter tasks and overall integration tasks, and provides links to instructions for each step.

Step	Description	More Information
1	Access Oracle Integration.	Go to <code>https://instance_URL/ic/home</code>
2	Create the adapter connections for the applications you want to integrate. The connections can be reused in multiple integrations and are typically created by the administrator.	Create a GraphQL Adapter Connection
3	Create the integration. When you do this, you add trigger (source) and invoke (target) connections to the integration.	Understand Integration Creation and Best Practices in <i>Using Integrations in Oracle Integration 3</i> and Add the GraphQL Adapter Connection to an Integration
4	Map data between the trigger connection data structure and the invoke connection data structure.	Map Data in <i>Using Integrations in Oracle Integration 3</i>

Step	Description	More Information
5	(Optional) Create lookups that map the different values used by those applications to identify the same type of object (such as gender codes or country codes).	Manage Lookups in <i>Using Integrations in Oracle Integration 3</i>
6	Activate the integration.	Activate an Integration in <i>Using Integrations in Oracle Integration 3</i>
7	Monitor the integration on the dashboard.	Monitor Integrations During Runtime in <i>Using Integrations in Oracle Integration 3</i>
8	Track payload fields in messages during runtime.	Assign Business Identifiers for Tracking Fields in Messages and Track Integration Instances in <i>Using Integrations in Oracle Integration 3</i>
9	Manage errors at the integration level, connection level, or specific integration instance level.	Manage Errors in <i>Using Integrations in Oracle Integration 3</i>

2

Create a GraphQL Adapter Connection

A connection is based on an adapter. You define connections to the specific cloud applications that you want to integrate.

Topics:

- [Prerequisites for Creating a Connection](#)
- [Create a Connection](#)
- [Upload a Certificate to Connect with External Services](#)

Prerequisites for Creating a Connection

You must satisfy the following prerequisites to create a connection with the GraphQL Adapter:

- Know the GraphQL endpoint URL.
- Understand the security policies and their specific requirements. See [Configure Connection Security](#).
- Understand OAuth security policies.

If you are using one of the OAuth security policies, you must have already registered your client application to complete the necessary fields on the Connections page.

Before a client application can request access to resources on a resource server, the client application must first register with the authorization server associated with the resource server. The registration is typically a one-time task. Once registered, the registration remains valid, unless the client application registration is revoked.

At the time of registration, the client application is assigned a client ID and client secret (password) by the authorization server. The client ID and secret are unique to the client application on that authorization server. If a client application registers with multiple authorization servers (for example, Facebook, Twitter, and Google), each authorization server issues its own unique client ID to the client application.

@ref: <http://tutorials.jenkov.com/oauth2/authorization.html>

Create a Connection

Before you can build an integration, you must create the connections to the applications with which you want to share data.

To create a connection in Oracle Integration:

1. In the navigation pane, click **Design**, then **Connections**.
2. Click **Create**.

 **Note:**

You can also create a connection in the integration canvas. See Define Inbound Triggers and Outbound Invokes.

3. In the Create connection panel, select the adapter to use for this connection. To find the adapter, scroll through the list, or enter a partial or full name in the **Search** field.
4. Enter the information that describes this connection.

Element	Description
Name	Enter a meaningful name to help others find your connection when they begin to create their own integrations.
Identifier	Automatically displays the name in capital letters that you entered in the Name field. If you modify the identifier name, don't include blank spaces (for example, SALES OPPORTUNITY).
Role	Select the role (direction) in which to use this connection (trigger, invoke, or both). Only the roles supported by the adapter are displayed for selection. When you select a role, only the connection properties and security policies appropriate to that role are displayed on the Connections page. If you select an adapter that supports both invoke and trigger, but select only one of those roles, you'll get an error when you try to drag the adapter into the section you didn't select. For example, assume you configure a connection for the Oracle Service Cloud (RightNow) Adapter as only an invoke . Dragging the adapter to a trigger section in the integration produces an error.
Keywords	Enter optional keywords (tags). You can search on the connection keywords on the Connections page.
Description	Enter an optional description of the connection.

Element	Description
Share with other projects	<p>Note: This field only appears if you are creating a connection in a project.</p> <p>Select to make this connection publicly available in other projects. Connection sharing eliminates the need to create and maintain separate connections in different projects.</p> <p>When you configure an adapter connection in a different project, the Use a shared connection field is displayed at the top of the Connections page. If the connection you are configuring matches the same type and role as the publicly available connection, you can select that connection to reference (inherit) its resources.</p> <p>See Add and Share a Connection Across a Project.</p>

5. Click **Create**.

Your connection is created. You're now ready to configure the connection properties, security policies, and (for some connections) access type.

Configure Connection Properties

Enter connection information so your application can process requests.

1. Go to the **Properties** section.
2. In the **GraphQL Endpoint** field, enter a GraphQL endpoint URL. See [Prerequisites for Creating a Connection](#).

Configure Connection Security

Configure security for your GraphQL Adapter connection.

1. Go to the **Security** section.
2. Select the security policy. See [Prerequisites for Creating a Connection](#).
3. If you select **API Key-Based Authentication**:
 - a. In the **API Key** field, enter the generated API key used to identify the client.
 - b. Optionally, in the **API Key Usage** field, enter the API key again.
4. If you select **Custom Security Policy**:
 - a. In the **Header Key** field, enter the header key.
 - b. In the **Header Value** field, enter the header value.
5. If you select **OAuth Authorization Code Credentials**:
 - a. In the **Client ID** field, enter the client identifier issued to the client during the registration process.
 - b. In the **Client secret** field, enter the client secret that you obtained.
 - c. In the **Authorization code URI** field, enter the URI to use for the access token.

- d. In the **Scope** field, enter the scope of the access request.
Scopes enable you to specify which type of access you need. Scopes are used to limit access for the OAuth token. They do not grant any additional permission beyond that which the user already possesses.
 - e. Optionally, configure OAuth flows with client authentication. This is similar to the Postman user interface feature for configuring client authentication.
 - **Send client credentials as basic auth header:** Pass the client ID and client secret in the header as basic authentication.
 - **Send client credentials in body:** Pass the client ID and client secret in the body as form fields.
6. If you select **No Security Policy**, no fields are displayed.
Select **No Security Policy** to create a connection without configuring any security policy.

Configure the Endpoint Access Type

Configure access to your endpoint. Depending on the capabilities of the adapter you are configuring, options may appear to configure access to the public internet, to a private endpoint, or to an on-premises service hosted behind a fire wall.

- [Select the Endpoint Access Type](#)
- [Ensure Private Endpoint Configuration is Successful](#)

Select the Endpoint Access Type

Select the option for accessing your endpoint.

Option	This Option Appears If Your Adapter Supports ...
Public gateway	Connections to endpoints using the public internet.
Private endpoint	Connections to endpoints using a private virtual cloud network (VCN). Note: To connect to private endpoints, you must complete prerequisite tasks in the Oracle Cloud Infrastructure Console. Failure to do so results in errors when testing the connection. See <i>Connect to Private Resources in Provisioning and Administering Oracle Integration 3</i> and <i>Troubleshoot Private Endpoints in Using Integrations in Oracle Integration 3</i> .

Option	This Option Appears If Your Adapter Supports ...
Connectivity agent	<p>Connections to on-premises endpoints through the connectivity agent.</p> <ol style="list-style-type: none"> 1. Click Associate agent group. The Associate agent group panel appears. 2. Select the agent group, and click Use. <p>To configure an agent group, you must download and install the on-premises connectivity agent. See Download and Run the Connectivity Agent Installer and About Creating Hybrid Integrations Using Oracle Integration in <i>Using Integrations in Oracle Integration 3</i>.</p>

Ensure Private Endpoint Configuration is Successful

- To connect to private endpoints, you must complete prerequisite tasks in the Oracle Cloud Infrastructure Console. Failure to do so results in errors when testing the connection. See Connect to Private Resources in *Provisioning and Administering Oracle Integration 3*.
- When configuring an adapter on the Connections page to connect to endpoints using a private network, specify the fully-qualified domain name (FQDN) and *not* the IP address. If you enter an IP address, validation fails when you click **Test**.
- IPsec tunneling and FastConnect are not supported for use with private endpoints.

Test the Connection

Test your connection to ensure that it's configured successfully.

1. In the page title bar, click **Test**. What happens next depends on whether your adapter connection uses a Web Services Description Language (WSDL) file. Only some adapter connections use WSDLs.

If Your Connection...	Then...
Doesn't use a WSDL	The test starts automatically and validates the inputs you provided for the connection.
Uses a WSDL	<p>A dialog prompts you to select the type of connection testing to perform:</p> <ul style="list-style-type: none"> • Validate and Test: Performs a full validation of the WSDL, including processing of the imported schemas and WSDLs. Complete validation can take several minutes depending on the number of imported schemas and WSDLs. No requests are sent to the operations exposed in the WSDL. • Test: Connects to the WSDL URL and performs a syntax check on the WSDL. No requests are sent to the operations exposed in the WSDL.


2. Wait for a message about the results of the connection test.
 - If the test was successful, then the connection is configured properly.

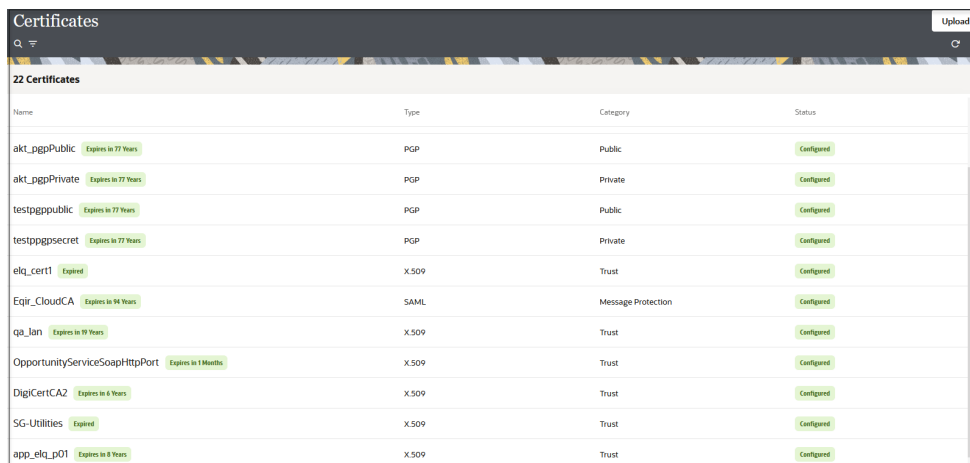
- If the test failed, then edit the configuration details you entered. Check for typos and verify URLs and credentials. Continue to test until the connection is successful.
3. When complete, click **Save**.

Upload a Certificate to Connect with External Services

Certificates allow Oracle Integration to connect with external services. If the external service/endpoint needs a specific certificate, request the certificate and then import it into Oracle Integration.

If you make an SSL connection in which the root certificate does not exist in Oracle Integration, an exception error is thrown. In that case, you must upload the appropriate certificate. A certificate enables Oracle Integration to connect with external services. If the external endpoint requires a specific certificate, request the certificate and then upload it into Oracle Integration.

1. Sign in to Oracle Integration.
2. In the navigation pane, click **Settings**, then **Certificates**.
All certificates currently uploaded to the trust store are displayed on the Certificates page.
3. Click **Filter**  to filter by name, certificate expiration date, status, type, category, and installation method (user-installed or system-installed). Certificates installed by the system cannot be deleted.



Name	Type	Category	Status
akt_ppgPublic Expires in 77 Years	PGP	Public	Configured
akt_ppgPrivate Expires in 77 Years	PGP	Private	Configured
testppgpublic Expires in 77 Years	PGP	Public	Configured
testppgsecret Expires in 77 Years	PGP	Private	Configured
elq_cert1 Expired	X.509	Trust	Configured
Eqir_CloudCA Expires in 94 Years	SAML	Message Protection	Configured
qa_lan Expires in 99 Years	X.509	Trust	Configured
OpportunityServiceSoapHttpPort Expires in 1 Month	X.509	Trust	Configured
DigiCertCA2 Expires in 4 Years	X.509	Trust	Configured
SG-Utilities Expired	X.509	Trust	Configured
app_elq_pp01 Expires in 8 Years	X.509	Trust	Configured

4. Click **Upload** at the top of the page.
The Upload certificate panel is displayed.
5. Enter an alias name and optional description.
6. In the **Type** field, select the certificate type. Each certificate type enables Oracle Integration to connect with external services.
 - [Digital Signature](#)
 - [X.509 \(SSL transport\)](#)
 - [SAML \(Authentication & Authorization\)](#)
 - [PGP \(Encryption & Decryption\)](#)

- [Signing key](#)

Digital Signature

The digital signature security type is typically used with adapters created with the Rapid Adapter Builder. See [Learn About the Rapid Adapter Builder in Oracle Integration in *Using the Rapid Adapter Builder with Oracle Integration 3*](#).

1. Click **Browse** to select the digital certificate. The certificate must be an X509Certificate. This certificate provides inbound RSA signature validation. See [Implement Digital Signature Validation \(RSA\) in *Using the Rapid Adapter Builder with Oracle Integration 3*](#).
2. Click **Upload**.

X.509 (SSL transport)

1. Select a certificate category.
 - a. **Trust**: Use this option to upload a trust certificate.
 - i. Click **Browse**, then select the trust file (for example, `.cer` or `.crt`) to upload.
 - b. **Identity**: Use this option to upload a certificate for two-way SSL communication.
 - i. Click **Browse**, then select the keystore file (`.jks`) to upload.
 - ii. Enter the comma-separated list of passwords corresponding to key aliases.

 **Note:**

When an identity certificate file (`.jks`) contains more than one private key, all the private keys must have the same password. If the private keys are protected with different passwords, the private keys cannot be extracted from the keystore.

- iii. Enter the password of the keystore being imported.
- c. Click **Upload**.

SAML (Authentication & Authorization)

1. Note that **Message Protection** is automatically selected as the only available certificate category and cannot be deselected. Use this option to upload a keystore certificate with SAML token support. Create, read, update, and delete (CRUD) operations are supported with this type of certificate.
2. Click **Browse**, then select the certificate file (`.cer` or `.crt`) to upload.
3. Click **Upload**.

PGP (Encryption & Decryption)

1. Select a certificate category. Pretty Good Privacy (PGP) provides cryptographic privacy and authentication for communication. PGP is used for signing, encrypting, and decrypting files. You can select the private key to use for encryption or decryption when configuring the stage file action.
 - a. **Private**: Uses a private key of the target location to decrypt the file.
 - i. Click **Browse**, then select the PGP file to upload.

- ii. Enter the PGP private key password.
- b. **Public**: Uses a public key of the target location to encrypt the file.
 - i. Click **Browse**, then select the PGP file to upload.
 - ii. In the **ASCII-Armor Encryption Format** field, select **Yes** or **No**.
 - **Yes** shows the format of the encrypted message in ASCII armor. ASCII armor is a binary-to-textual encoding converter. ASCII armor formats encrypted messaging in ASCII. This enables messages to be sent in a standard messaging format. This selection impacts the visibility of message content.
 - **No** causes the message to be sent in binary format.
 - iii. From the **Cipher Algorithm** list, select the algorithm to use. Symmetric-key algorithms for cryptography use the same cryptographic keys for both encryption of plain text and decryption of cipher text. The following supported cipher algorithms are FIPS-compliant:
 - AES128
 - AES192
 - AES256
 - TDES
- c. Click **Upload**.

Signing key

A signing key is a secret key used to establish trust between applications. Signing keys are used to sign ID tokens, access tokens, SAML assertions, and more. Using a private signing key, the token is digitally signed and the server verifies the authenticity of the token by using a public signing key. You must upload a signing key to use the OAuth Client Credentials using JWT Client Assertion and OAuth using JWT User Assertion security policies in REST Adapter invoke connections. Only PKCS1- and PKCS8-formatted files are supported.

1. Select **Public** or **Private**.
2. Click **Browse** to upload a key file.
If you selected **Private**, and the private key is encrypted, a field for entering the private signing key password is displayed after key upload is complete.
3. Enter the private signing key password. If the private signing key is not encrypted, you are not required to enter a password.
4. Click **Upload**.

3

Add the GraphQL Adapter Connection to an Integration

When you drag the GraphQL Adapter into the invoke area of an integration, the Adapter Endpoint Configuration Wizard is invoked. This wizard guides you through configuration of the GraphQL Adapter endpoint properties.

The following sections describe the wizard pages that guide you through configuration of the GraphQL Adapter as an invoke in an integration.

Topics:

- [Basic Info Page](#)
- [Operation Page](#)
- [Summary Page](#)

Basic Info Page

You can enter a name and description on the Basic Info page of each adapter in your integration.

Element	Description
What do you want to call your endpoint?	<p>Provide a meaningful name so that others can understand the responsibilities of this connection. You can include English alphabetic characters, numbers, underscores, and hyphens in the name. You can't include the following characters:</p> <ul style="list-style-type: none">• No blank spaces (for example, My Inbound Connection)• No special characters (for example, #;83& or righ(t)now4) except underscores and hyphens• No multibyte characters
What does this endpoint do?	<p>Enter an optional description of the connection's responsibilities. For example:</p> <pre>This connection receives an inbound request to synchronize account information with the cloud application.</pre>

Operation Page

Enter the details on the Operation page.

Element	Description
Enter your GraphQL query	<p>Enter the custom GraphQL query. Inline fragment example:</p> <pre>query (\$customerID:ID!){ node(id: \$customerID) { ... on Customer { id firstName lastName email } } }</pre> <p>Named fragment example:</p> <pre>query (\$customerId1:ID!, \$customerId2:ID!, \$first:Int!) { OperationOne: customer(id:\$customerId1){ ...CustomerFragment } OperationTwo: customer(id:\$customerId2){ ...CustomerFragment } } fragment CustomerFragment on Customer { id firstName lastName email addresses{ city } }</pre>
GraphQL Variables	<p>Define the variables for the GraphQL query.</p> <div data-bbox="878 1682 1378 1824" style="border: 1px solid #0070c0; background-color: #e6f2ff; padding: 10px;"><p> Note: Inline variables are not supported.</p></div>
Try Query	<p>Select to validate the query.</p>

**Note:**

Click **Continue** or outside the GraphQL query box to validate the GraphQL query.

Try Query Page

If you selected **Try Query** on the Operations page, the Try Query page appears with the following options.

Element	Description
GraphQL Variables	Enter the values for the input variables that you defined in the Operations page.
Test	Click Try Query to validate the query. The query is tested with the input variables that were entered. Testing the query enables you to check the response while configuring the adapter. You can change or edit your query based on the response.

**Note:**

Testing a mutation query can result in Create/Update/Delete of the actual record in the target application.

Summary Page

You can review the specified adapter configuration values on the Summary page.

Element	Description
Summary	Displays a summary of the configuration values you defined on previous pages of the wizard. The information that is displayed can vary by adapter. For some adapters, the selected business objects and operation name are displayed. For adapters for which a generated XSD file is provided, click the XSD link to view a read-only version of the file. To return to a previous page to update any values, click the appropriate tab in the left panel or click Go back . To cancel your configuration details, click Cancel .

4

Implement Common Patterns Using the GraphQL Adapter

You can use the GraphQL Adapter to implement the following common pattern.

Topics:

- [Insert Zuora Order Records into a Hasura Database Using the GraphQL Adapter](#)

Note:

Oracle Integration offers a number of prebuilt integrations, known as *recipes*, that provide you with a head start in building your integrations. You can start with a recipe, and then customize it to fit your needs and requirements. Depending upon the solution provided, a variety of adapters are configured in the prebuilt integrations.

See the Recipes and Accelerators page on the Oracle Help Center.

Insert Zuora Order Records into a Hasura Database Using the GraphQL Adapter

The GraphQL Adapter enables you to seamlessly transfer Zuora order records into the Hasura Database immediately upon their creation in Zuora. Similarly, you can insert other records from an application into the Hasura Database using the GraphQL Adapter.

This use case provides an overview of importing the Zuora order records into Oracle Integration and subsequently inserting those records into the Hasura Database using the GraphQL Adapter.


The following adapters and their operations are used in this use case:

- **Order processed event** (Zuora Adapter): Enables you to receive a notification for the configured event (that is, Order Processed Event) in Oracle Integration.
- **Mutation operation** (GraphQL Adapter): Inserts order records into the Hasura Database.

This implementation pattern provides an overview of the steps.

1. Create Zuora Adapter and GraphQL Adapter connections.
2. Create an application integration.
3. Drag a Zuora Adapter into the integration as a trigger connection.
4. Configure the Zuora endpoint as follows:
 - a. On the Basic Info page, provide an endpoint name.

- b. Select **Orders** as the business object, and then select **Order Processed Event** as the trigger event name.
 - c. Review your selections on the Summary page.
5. Drag a GraphQL Adapter into the integration canvas as an invoke connection.
 6. Configure the GraphQL Hasura endpoint as follows:
 - a. On the Basic Info page, provide an endpoint name.
 - b. On the Operations page, enter the GraphQL mutation query and GraphQL variables of the Hasura Database application.



View Operations

GraphQL invoke

Enter your GraphQL query

```

mutation Insert_Order($order_id_var: String, $order_number_var: String,
$order_description_var: String, $order_date_var: String, $order_status_var: String,
$account_id_var: String, $account_name_var: String, $order_category_var: String) {
  insert_order_one(object: {order_id: $order_id_var, order_number: $order_number_var,
order_description: $order_description_var, order_date: $order_date_var, order_status:
$order_status_var, account_id: $account_id_var, account_name: $account_name_var,
order_category: $order_category_var}) {
    order_id
  }
}

```

GraphQL Variables

```

"order_id_var": "5",
"order_number_var": "2",
"order_description_var": "28-09-2023",
"order_date_var": "28-10-2023",
"order_status_var": "sk1",
"account_id_var": "INR",
"account_name_var": "100",
"order_category_var": "New Sales"
}

```

- c. Review your selections on the Summary page.
7. In the mapper, perform the required mappings to insert the records into the Hasura Database through the GraphQL Adapter.
 8. When complete, activate the integration.

As a result, the integration is invoked when a new order record is created in Zuora and the same record details are imported/inserted into the Hasura Database through the GraphQL Adapter.

