



Informatica® PowerExchange for Google
BigQuery
10.2.2

User Guide

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Preface

The *Informatica PowerExchange for Google BigQuery User Guide* provides information about extracting data from and loading data to Google BigQuery. This guide is written for database administrators and developers who are responsible for developing mappings that extract data from and load data to Google BigQuery. This guide assumes you have knowledge of Google BigQuery and Informatica Data Services.

Informatica Resources

Informatica provides you with a range of product resources through the Informatica Network and other online portals. Use the resources to get the most from your Informatica products and solutions and to learn from other Informatica users and subject matter experts.

Informatica Network

The Informatica Network is the gateway to many resources, including the Informatica Knowledge Base and Informatica Global Customer Support. To enter the Informatica Network, visit <https://network.informatica.com>.

As an Informatica Network member, you have the following options:

- Search the Knowledge Base for product resources.
- View product availability information.
- Create and review your support cases.
- Find your local Informatica User Group Network and collaborate with your peers.

Informatica Knowledge Base

Use the Informatica Knowledge Base to find product resources such as how-to articles, best practices, video tutorials, and answers to frequently asked questions.

To search the Knowledge Base, visit <https://search.informatica.com>. If you have questions, comments, or ideas about the Knowledge Base, contact the Informatica Knowledge Base team at KB_Feedback@informatica.com.

Informatica Documentation

Use the Informatica Documentation Portal to explore an extensive library of documentation for current and recent product releases. To explore the Documentation Portal, visit <https://docs.informatica.com>.

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If you have questions, comments, or ideas about the product documentation, contact the Informatica Documentation team at infa_documentation@informatica.com.

Informatica Product Availability Matrices

Product Availability Matrices (PAMs) indicate the versions of the operating systems, databases, and types of data sources and targets that a product release supports. You can browse the Informatica PAMs at <https://network.informatica.com/community/informatica-network/product-availability-matrices>.

Informatica Velocity

Informatica Velocity is a collection of tips and best practices developed by Informatica Professional Services and based on real-world experiences from hundreds of data management projects. Informatica Velocity represents the collective knowledge of Informatica consultants who work with organizations around the world to plan, develop, deploy, and maintain successful data management solutions.

You can find Informatica Velocity resources at <http://velocity.informatica.com>. If you have questions, comments, or ideas about Informatica Velocity, contact Informatica Professional Services at ips@informatica.com.

Informatica Marketplace

The Informatica Marketplace is a forum where you can find solutions that extend and enhance your Informatica implementations. Leverage any of the hundreds of solutions from Informatica developers and partners on the Marketplace to improve your productivity and speed up time to implementation on your projects. You can find the Informatica Marketplace at <https://marketplace.informatica.com>.

Informatica Global Customer Support

You can contact a Global Support Center by telephone or through the Informatica Network.

To find your local Informatica Global Customer Support telephone number, visit the Informatica website at the following link:

<https://www.informatica.com/services-and-training/customer-success-services/contact-us.html>.

To find online support resources on the Informatica Network, visit <https://network.informatica.com> and select the eSupport option.

CHAPTER 1

Introduction to PowerExchange for Google BigQuery

This chapter includes the following topics:

- [PowerExchange for Google BigQuery Overview, 7](#)
- [Introduction to Google BigQuery, 7](#)

PowerExchange for Google BigQuery Overview

You can use PowerExchange for Google BigQuery to extract data from and load data to Google BigQuery.

You can use Google BigQuery objects as sources and targets in mappings. When you use Google BigQuery objects in mappings, you must configure properties specific to Google BigQuery. PowerExchange for Google BigQuery uses the Google APIs to integrate with Google BigQuery and Google Cloud Storage.

You can validate and run Google BigQuery mappings in the native environment or on the Spark engine in the Hadoop environment.

Example

Your organization is an open source log data collector, which collects log data from multiple sources and unifies them.

Logs help you understand how systems and applications perform. As the scale and complexity of the system increases, it is difficult to manage multiple logs from different sources.

To overcome this problem, you can use PowerExchange for Google BigQuery to write data to a Google BigQuery target and query terabytes of logs in seconds. You can then use the data to fix and improve the system performance in near real time.

Introduction to Google BigQuery

Google BigQuery is a fast, highly scalable, cost-effective and fully managed enterprise data warehouse that the Google Cloud Platform provides. You can store and analyze massive amounts of data using ANSI:2011 compliant SQL queries.

CHAPTER 2

PowerExchange for Google BigQuery Configuration

This chapter includes the following topics:

- [PowerExchange for Google BigQuery Configuration Overview, 8](#)
- [Prerequisites, 8](#)

PowerExchange for Google BigQuery Configuration Overview

The PowerExchange for Google BigQuery installs with Informatica Services. You can enable PowerExchange for Google BigQuery with a license key.

To configure PowerExchange for Google BigQuery, complete the prerequisites.

Prerequisites

To use PowerExchange for Google BigQuery, perform the following steps:

1. Install and configure Informatica Services.
2. Install and configure the Developer tool. You can install the Developer tool when you install Informatica clients.
3. Create and configure a Model Repository Service and a Data Integration Service in the Informatica domain.
4. Verify that you have write permissions on all the directories within the `<Informatica installation directory> directory`.
5. Ensure that the PowerExchange for Google BigQuery license is activated.
6. Ensure you have a Google service account to access Google BigQuery.
7. Ensure you have the `client_email`, `project_id`, and `private_key` values for the service account. You will need to enter these details when you create a Google BigQuery connection in Developer tool.
8. Ensure you have the project ID, dataset ID, source table name, and target table name when you create mappings in Developer Tool.

9. Verify that you have read and write access to the Google BigQuery dataset that contains the source table and target table.
10. If you use bulk mode, verify that you have write access to the Google Cloud Storage path where the Data Integration Service creates the staging file.
11. If you use staging mode, verify that you have read access to the Google Cloud Storage path where the Data Integration Service creates the staging file to store the data from the Google BigQuery source.

CHAPTER 3

Google BigQuery Connections

This chapter includes the following topics:

- [Google BigQuery Connections Overview, 10](#)
- [Connection Modes, 10](#)
- [Connection Mode Example, 11](#)
- [Rules and Guidelines for Google BigQuery Connection Modes, 13](#)
- [Google BigQuery Connection Properties, 14](#)
- [Creating a Google BigQuery Connection, 15](#)

Google BigQuery Connections Overview

Use a Google BigQuery connection to access a Google BigQuery database.

Use the Google BigQuery connection to import Google BigQuery metadata, create data objects, preview data, and run mappings. When you create a Google BigQuery connection, you define the connection attributes that the Developer tool uses to connect to the Google BigQuery dataset.

Use the Developer tool, Administrator tool, or infacmd to create a Google BigQuery connection.

Connection Modes

You can configure a Google BigQuery connection to use one of the following connection modes:

Simple mode

If you use simple mode, PowerExchange for Google BigQuery flattens each field within the Record data type field as a separate field in the Google BigQuery data object.

Hybrid mode

If you use hybrid mode, PowerExchange for Google BigQuery displays all the top-level fields in the Google BigQuery table including Record data type fields. PowerExchange for Google BigQuery displays the top-level Record data type field as a single field of the String data type in the Google BigQuery data object.

Complex mode

If you use complex mode, PowerExchange for Google BigQuery displays all the columns in the Google BigQuery table as a single field of the String data type in the Google BigQuery data object.

Connection Mode Example

PowerExchange for Google BigQuery reads and writes the Google BigQuery data based on the connection mode that you configure for the Google BigQuery connection.

You have a Customers table in Google BigQuery that contains primitive fields and the **Address** field of the Record data type. The Address field contains two primitive sub-fields, **City** and **State**, of the String data type.

The following image shows the schema of the Customers table in Google BigQuery:

ID	INTEGER	NULLABLE
Name	STRING	NULLABLE
Address	RECORD	NULLABLE
Address.City	STRING	NULLABLE
Address.State	STRING	NULLABLE
Mobile	STRING	REPEATED
Totalpayments	FLOAT	NULLABLE
age	INTEGER	REPEATED

The following table shows the Customers table data in Google BigQuery:

ID	Name	Address.City	Address.State	Mobile	Totalpayments
14	John	LOS ANGELES	CALIFORNIA	+1-9744884744	18433.90
				+1-8267389993	
29	Jane	BOSTON	MANHATTAN	+1-8789390309	28397.33
				+1-9876553784	
				+1-8456437848	

Simple Mode

If you use simple connection mode, PowerExchange for Google BigQuery flattens each field within the Record data type field as a separate field in the **Columns** tab of the Google BigQuery data object.

The following table shows two separate fields, Address_City and Address_State, for the respective sub-fields within the Address Record field in the Customers table:

ID	Name	Address_City	Address_State	Mobile	Totalpayments
14	John	LOS ANGELES	CALIFORNIA	+1-9744884744	18433.90
14	John	LOS ANGELES	CALIFORNIA	+1-8267389993	18433.90
29	Jane	BOSTON	MANHATTAN	+1-8789390309	28397.33
29	Jane	BOSTON	MANHATTAN	+1-9876553784	28397.33
29	Jane	BOSTON	MANHATTAN	+1-8456437848	28397.33

The following image shows the Address_State and Address_City fields in the **Columns** tab of the Google BigQuery data object:

Object Details:

General Columns Advanced									
	Name	Native Name	Type	Precision	Scale	Repeated	isRecord	Access Type	Description
1	ID	ID	INTEGER	19	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	
2	Name	Name	STRING	255	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	
3	Address_State	Address.State	STRING	255	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	
4	Address_City	Address.City	STRING	255	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	
5	Mobile	Mobile	STRING	255	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Read and Write	
6	TotalPayments	TotalPayments	FLOAT	16	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	
7	age	age	INTEGER	19	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Read and Write	

Hybrid Mode

If you use hybrid connection mode, PowerExchange for Google BigQuery displays all the top-level fields in the Google BigQuery table including Record data type fields. PowerExchange for Google BigQuery displays the top-level Record data type field as a single field of the String data type in the **Columns** tab of the Google BigQuery data object.

The following image shows the Address field in the **Columns** tab of the Google BigQuery data object:

Object Details:

General Columns Advanced									
	Name	Native Name	Type	Precision	Scale	Repeated	isRecord	Access Type	Description
1	ID	ID	INTEGER	19	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	
2	Name	Name	STRING	255	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	
3	Address	Address	STRING	65535	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Read and Write	
4	Mobile	Mobile	STRING	255	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Read and Write	
5	TotalPayments	TotalPayments	FLOAT	16	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	
6	age	age	STRING	255	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Read and Write	

Complex Mode

If you use complex connection mode, PowerExchange for Google BigQuery displays all the columns in the Google BigQuery table as a single field of the String data type in the **Columns** tab of the Google BigQuery data object.

The following image shows the STRING_DATA field in the **Columns** tab of the Google BigQuery data object:

Object Details:

General Columns Advanced									
	Name	Native Name	Type	Precision	Scale	Repeated	isRecord	Access Type	Description
1	STRING_DATA	STRING DATA	STRING	65535	0	<input type="checkbox"/>	<input type="checkbox"/>	Read and Write	

Rules and Guidelines for Google BigQuery Connection Modes

Simple Mode

Consider the following rules and guidelines when you configure a Google BigQuery connection to use simple connection mode:

- If the Google BigQuery data object contains repeated columns, you cannot configure filters for these columns in a data object read operation.
- If the Google BigQuery table contains more than one repeated column, you cannot preview data.
- If the Google BigQuery data object contains repeated columns, you cannot configure update and delete operations for these columns in a data object write operation.
- When you read data from a Google BigQuery source, you must not map more than one repeated column in a single mapping. You must create multiple mappings for each repeated column.

Hybrid Mode

Consider the following rules and guidelines when you configure a Google BigQuery connection to use hybrid connection mode:

- If the Google BigQuery data object contains columns of the Record data type and repeated columns, you cannot configure filters for these columns in a data object read operation.
- You cannot configure update and delete operations for columns of the Record data type and repeated columns.
- You must select JSON (Newline Delimited) format as the data format of the staging file under the data object write operation advanced properties.
- You cannot use CSV format as the data format of the staging file. The following CSV formatting options in the data object write operation advanced properties are not applicable:
 - Allow Quoted Newlines
 - Field Delimiter
 - Allow Jagged Rows

Complex Mode

Consider the following rules and guidelines when you configure a Google BigQuery connection to use complex connection mode:

- When you configure a Google BigQuery connection to use complex connection mode, you cannot configure filters in a data object read operation.

- You cannot configure update and delete operations.
- You must select JSON (Newline Delimited) format as the data format of the staging file under the data object write operation advanced properties.
- You cannot use CSV format as the data format of the staging file. The following CSV formatting options in the data object write operation advanced properties are not applicable:
 - Allow Quoted Newlines
 - Field Delimiter
 - Allow Jagged Rows

Google BigQuery Connection Properties

When you set up a Google BigQuery connection, you must configure the connection properties.

Note: The order of the connection properties might vary depending on the tool where you view them.

The following table describes the Google BigQuery connection properties:

Property	Description
Service Account ID	Specifies the client_email value present in the JSON file that you download after you create a service account in Google BigQuery.
Service Account Key	Specifies the private_key value present in the JSON file that you download after you create a service account in Google BigQuery.
Connection mode	<p>The mode that you want to use to read data from or write data to Google BigQuery.</p> <p>Select one of the following connection modes:</p> <ul style="list-style-type: none"> - Simple. Flattens each field within the Record data type field as a separate field in the mapping. - Hybrid. Displays all the top-level fields in the Google BigQuery table including Record data type fields. PowerExchange for Google BigQuery displays the top-level Record data type field as a single field of the String data type in the mapping. - Complex. Displays all the columns in the Google BigQuery table as a single field of the String data type in the mapping. <p>Default is Simple.</p>
Schema Definition File Path	<p>Specifies a directory on the client machine where the Data Integration Service must create a JSON file with the sample schema of the Google BigQuery table. The JSON file name is the same as the Google BigQuery table name.</p> <p>Alternatively, you can specify a storage path in Google Cloud Storage where the Data Integration Service must create a JSON file with the sample schema of the Google BigQuery table. You can download the JSON file from the specified storage path in Google Cloud Storage to a local machine.</p>

Property	Description
Project ID	Specifies the project_id value present in the JSON file that you download after you create a service account in Google BigQuery. If you have created multiple projects with the same service account, enter the ID of the project that contains the dataset that you want to connect to.
Storage Path	This property applies when you read or write large volumes of data. Path in Google Cloud Storage where the Data Integration Service creates a local stage file to store the data temporarily. You can either enter the bucket name or the bucket name and folder name. For example, enter <code>gs://<bucket_name></code> or <code>gs://<bucket_name>/<folder_name></code>

Creating a Google BigQuery Connection

Create a Google BigQuery connection before you create a Google BigQuery data object.

1. In the Developer tool, click **Window > Preferences**.
2. Select **Informatica > Connections**.
3. Expand the domain in the **Available Connections**.
4. Select the connection type **Enterprise Application > Google Big Query**, and click **Add**.
5. Enter a connection name and an optional description.
6. Select **Google Big Query** as the connection type.
7. Click **Next**.
8. Configure the connection properties.
9. Click **Test Connection** to verify the connection to Google BigQuery.
10. Click **Finish**.

CHAPTER 4

PowerExchange for Google BigQuery Data Objects

This chapter includes the following topics:

- [Google BigQuery Data Object Overview, 16](#)
- [Google BigQuery Data Object Properties, 17](#)
- [Read Modes, 17](#)
- [Write Modes, 17](#)
- [Pre SQL and Post SQL Commands, 18](#)
- [Google BigQuery Data Object Read Operation, 19](#)
- [Google BigQuery Data Object Write Operation, 22](#)
- [Creating an Google BigQuery Data Object, 26](#)
- [Creating a Google BigQuery Data Object Operation, 26](#)
- [Creating a Google BigQuery Target, 27](#)
- [Rules and Guidelines for PowerExchange for Google BigQuery Data Object Operations, 27](#)

Google BigQuery Data Object Overview

A Google BigQuery data object is a physical data object that uses Google BigQuery as a source or target. A Google BigQuery data object is a physical data object that represents data based on a Google BigQuery resource.

You can configure the data object read and write operation properties that determine how you can read data from Google BigQuery sources and load data to Google BigQuery targets.

Create a Google BigQuery data object from the Developer tool. You can configure the data object read and write operation properties that determine how the Data Integration Service reads data from Google BigQuery sources and loads data to Google BigQuery targets.

You can edit the advanced properties of the data object read or write operation and then add the operation to a mapping.

Google BigQuery Data Object Properties

Specify the data object properties when you create the data object.

The following table describes the properties that you configure for the Google BigQuery data objects:

Property	Description
Name	Name of the Google BigQuery data object.
Location	The project or folder in the Model Repository Service where you want to store the Google BigQuery data object.
Connection	Name of the Google BigQuery connection.

Read Modes

When you use PowerExchange for Google BigQuery, you can read data by using direct mode or staging mode. Before you choose a mode, see the Google documentation to understand the cost implications and trade-offs for each mode.

You can read data from a Google BigQuery source by using one of the following modes:

Direct Mode

Use direct mode when the volume of data that you want to read is small. In direct mode, PowerExchange for Google BigQuery directly reads data from a Google BigQuery source. You can configure the number of rows that you want PowerExchange for Google BigQuery to read in one request.

Staging Mode

Use staging mode when you want to read large volumes of data in a cost-efficient manner.

In staging mode, PowerExchange for Google BigQuery first exports the data from the Google BigQuery source into Google Cloud Storage. After the export is complete, PowerExchange for Google BigQuery downloads the data from Google Cloud Storage into a local stage file. You can configure the local stage file directory in the advanced source properties. PowerExchange for Google BigQuery then reads the data from the local stage file.

When you enable staging file compression, PowerExchange for Google BigQuery compresses the size of the staging file in Google Cloud Storage. PowerExchange for Google BigQuery then downloads the staging file and decompresses the staging file before it reads the file. To improve the performance and download data in parallel, you can configure the number of threads for downloading the staging file.

Write Modes

When you use PowerExchange for Google BigQuery, you can write data by using bulk mode or streaming mode. Before you choose a mode, see the Google documentation to understand the cost implications and trade-offs for each mode.

You can write data to a Google BigQuery target by using one of the following modes:

Bulk mode

Use bulk mode when you want to write large volumes of data in a cost-efficient manner.

In bulk mode, PowerExchange for Google BigQuery first writes the data to a staging file in Google Cloud Storage. When the staging file contains all the data, PowerExchange for Google BigQuery loads the data from the staging file to the Google BigQuery target.

When you enable staging file compression, PowerExchange for Google BigQuery compresses the size of the staging file before it writes data to Google Cloud Storage. PowerExchange for Google BigQuery writes the compressed file to Google Cloud Storage and then submits a load job to the Google BigQuery target.

Note: Enabling compression reduces the time that PowerExchange for Google BigQuery takes to write data to Google Cloud Storage. However, there will be a performance degradation when PowerExchange for Google BigQuery writes data from Google Cloud Storage to the Google BigQuery target.

PowerExchange for Google BigQuery deletes the staging file unless you configure the task or mapping to persist the staging file. You can choose to persist the staging file if you want to archive the data for future reference.

Streaming mode

Use streaming mode when you want the Google BigQuery target data to be immediately available for querying and real-time analysis. Evaluate Google's streaming quota policies and billing policies before you use streaming mode.

In streaming mode, PowerExchange for Google BigQuery directly writes data to the Google BigQuery target. PowerExchange for Google BigQuery appends the data into the Google BigQuery target.

You can configure the number of rows that you want PowerExchange for Google BigQuery to stream in one request. If you want to stream a larger number of rows than the maximum permissible limit prescribed by Google, you can write the data to multiple smaller target tables instead of one large target table. You can create a template table based on which Google BigQuery must create multiple tables. You can define a unique suffix for each table. Google BigQuery creates each table based on the template table and adds the suffix to uniquely identify each table.

Pre SQL and Post SQL Commands

You can specify **pre SQL** and **post SQL** data object read and write operation properties for Google BigQuery data objects. When you create a data object read or write operation in the Developer tool, you can specify SQL commands on the **Advanced** view.

You can perform the following operations by using pre SQL and post SQL commands:

- SELECT
- UPDATE
- DELETE

You can configure the options in Google BigQuery with a pre SQL or post SQL statement in the **pre SQL Configuration** or **post SQL Configuration** data object read and write operation properties for Google BigQuery data objects.

You must use the following format to specify a pre SQL configuration or a post SQL configuration:

```
<Option1:Value1,Option2:Value2,...OptionN:ValueN>
```

The following table shows the configuration options and supported values that you can specify in a pre SQL configuration or post SQL configuration:

Options	Supported Values
DestinationDataset	Dataset ID in Google BigQuery
DestinationTable	Table name in Google BigQuery
FlattenResults	True and False
UseLegacySQL	True and False
WriteDisposition	WRITE_TRUNCATE, WRITE_APPEND, and WRITE_EMPTY

Google BigQuery Data Object Read Operation

Create a mapping with a Google BigQuery data object read operation to read data from Google BigQuery.

Output Properties of the Data Object Read Operation

The output properties represent data that the Data Integration Service passes into the mapping pipeline. Select the output properties to configure advanced properties of the data object read operation.

The output properties of the data object read operation include general properties that apply to the data object operation. The output properties also include source, query, run-time, and advanced properties that apply to the Google BigQuery data object.

You can view and change the output properties of the data object read operation from the **General**, **Sources**, **Query**, **Run-time**, and **Advanced** tabs.

General Properties

The general properties display the name and description of the data object read operation.

Sources Properties

The sources properties list the Google BigQuery objects used in the data object read operation. You cannot join data from multiple sources of the Google BigQuery data object in a read operation.

Query Properties

Use the **Query** tab to select specific records from a Google BigQuery table.

The following table describes the query properties that you configure for a data object read operation:

Property	Description
Query	Filter value in a read operation. The filter specifies the where clause of select statement. Use a filter to reduce the number of rows that the Data Integration Service reads from the source. When you enter a source filter, the Developer tool adds a WHERE clause to the default query. You can use the Native or Platform expression to select specific records.

Run-time Properties

The run-time properties displays the name of the connection that the Data Integration Service uses to read data from the Google BigQuery table.

You can define the partition type as key range partitioning to read data from Google BigQuery data object that use simple or hybrid connection mode. When you configure key range partitioning, the Data Integration Service distributes rows of data based on a port or set of ports that you define as the partition key. You can define a range of values for each port. The Data Integration Service uses the key and ranges to send rows to the appropriate partition.

Advanced Properties

The Data Integration Service reads data from Google BigQuery based on the data object read operation.

The Developer tool displays advanced properties for the Google BigQuery data object operation in the Advanced view.

The following table describes the advanced properties for a Google BigQuery data object read operation:

Property	Description
Source Dataset ID	Optional. Overrides the Google BigQuery dataset name specified in the Google BigQuery data object read operation.
Source Table Name	Overrides the Google BigQuery table name specified in the Google BigQuery data object read operation.
Number of Rows to Read	Specifies the number of rows to read from the Google BigQuery source. Enter a number greater than 0.
Allow Large Results	Determines whether PowerExchange for Google BigQuery must produce arbitrarily large result tables to query large source tables. If you select this option, you must specify a destination table to store the query results.
Query Results Table Name	Required if you select the Allow Large Results option. Specifies the destination table name to store the query results. If the table is not present in the dataset, PowerExchange for Google BigQuery creates the destination table with the name that you specify.
Job Poll Interval in Seconds	The number of seconds after which PowerExchange for Google BigQuery polls the status of the read job operation. Enter a number greater than 0. Default is 10.

Property	Description
Read Mode	<p>Specifies the read mode to read data from the Google BigQuery source.</p> <p>You can select one the following read modes:</p> <ul style="list-style-type: none"> - Direct. In direct mode, PowerExchange for Google BigQuery reads data directly from the Google BigQuery source table. <p>Note: When you use hybrid and complex connection mode, you cannot use direct mode to read data from the Google BigQuery source.</p> <ul style="list-style-type: none"> - Staging. In staging mode, PowerExchange for Google BigQuery exports the data from the Google BigQuery source table into Google Cloud Storage. <p>After the download is complete, PowerExchange for Google BigQuery downloads the data from Google Cloud Storage into the local stage file that you specify into the local stage file and then reads data from the local stage file.</p> <p>Default is Direct mode.</p>
Number of Threads for Downloading Staging Files	<p>Specifies the number of files that PowerExchange for Google BigQuery downloads at a time to enable parallel download.</p> <p>Enter a number greater than 0.</p> <p>This property applies to staging mode.</p>
Data Format of the staging file	<p>Specifies the data format of the staging file. You can select one of the following data formats:</p> <ul style="list-style-type: none"> - JSON (Newline Delimited). Supports flat and record data with nested and repeated fields. - CSV. Supports flat data. <p>Note: If you use hybrid and complex connection mode, you cannot use CSV format as the data format of the staging file.</p>
Local Stage File Directory	<p>Specifies the directory on your local machine where PowerExchange for Google BigQuery stores Google BigQuery source data temporarily before it reads the data.</p> <p>This property applies to staging mode.</p>
Staging File Name	<p>Name of the staging file where data from the Google BigQuery source table is exported to Google Cloud Storage.</p> <p>This property applies to staging mode.</p>
Enable Staging File Compression	<p>Indicates whether to compress the size of the staging file in Google Cloud Storage before PowerExchange for Google BigQuery reads data from the staging file.</p> <p>You can enable staging file compression to reduce cost and transfer time.</p> <p>This property applies to staging mode.</p>
Persist Destination Table	<p>Indicates whether PowerExchange for Google BigQuery must persist the query results table after it reads data from the query results table.</p> <p>By default, PowerExchange for Google BigQuery deletes the query results table</p>
pre SQL	<p>SQL statement that you want to run before reading data from the source.</p> <p>For example, if you want to select records in the database before you read the records from the table, specify the following pre SQL statement:</p> <pre>SELECT * FROM [api-project-80697026669:EMPLOYEE.DEPARTMENT] LIMIT 1000;</pre>
pre SQL Configuration	<p>Specify a pre SQL configuration.</p> <p>For example,</p> <pre>DestinationTable:PRESQL_SRC, DestinationDataset:EMPLOYEE, FlattenResults:False, WriteDisposition:WRITE_TRUNCATE, UseLegacySql:False</pre>

Property	Description
post SQL	<p>SQL statement that you want to run after reading data from the source.</p> <p>For example, if you want to update records in a table after you read the records from a source table, specify the following post SQL statement:</p> <pre>UPDATE [api-project-80697026669.EMPLOYEE.PERSONS_TGT_DEL] SET phoneNumber.number=1000011, phoneNumber.areaCode=100 where fullname='John Doe' SET phoneNumber.number =1000011, phoneNumber.areaCode=100 where fullname='John Doe'</pre>
post SQL Configuration	<p>Specify a post SQL configuration.</p> <p>For example,</p> <pre>DestinationTable:POSTSQL_SRC, DestinationDataset:EMPLOYEE, FlattenResults:True, WriteDisposition:WRITE_TRUNCATE, UseLegacySql:False</pre>

Google BigQuery Data Object Write Operation

Create a mapping to write data to Google BigQuery. Use the Google BigQuery connection, and define the write operation properties to write data to Google BigQuery.

You can perform insert, update, delete, and upsert operations on a Google BigQuery target.

To perform a update, delete, or upsert operation, you must add an Update Strategy transformation to a mapping and flag the records in an update strategy expression.

Note: When you run a mapping on the Spark engine, you cannot add an Update Strategy transformation. Hence, you cannot perform update, delete, or upsert operations on a Google BigQuery target when you run a mapping on the Spark engine.

For more information about configuring an Update Strategy transformation, see "Update Strategy Transformation" in the *Informatica Developer Transformation Guide*.

Input Properties of the Data Object Write Operation

Input properties represent data that the Data Integration Service writes to a Google BigQuery table. Select the input properties to configure run-time properties of the data object write operation. You can also specify advanced data object write operation properties to write data to Google BigQuery table.

The input properties of the data object write operation include general properties that apply to the data object write operation. Input properties also include source, run-time, and advanced properties that apply to the data object write operation.

You can view and change the input properties of the data object write operation from the **General**, **Sources**, **Run-time**, and **Advanced** tabs.

General Properties

The general properties list the name and description of the data object write operation.

Target Properties

The target properties list the Google BigQuery table in the data object write operation.

Run-time Properties

The run-time properties displays the name of the connection that the Data Integration Service uses to write data to the Google BigQuery table.

You can also use the **Run-time** tab to configure partitioning. You can configure dynamic partitioning for Google BigQuery data object write operation.

Advanced Properties

Google BigQuery data object write operation properties include advanced properties that apply to the Google BigQuery data object.

The Developer tool displays advanced properties for the Google BigQuery data object operation in the **Advanced** tab.

You can configure the following advanced properties in the data object write operation:

Property	Description
UpdateMode	<p>Determines the mode that the Data Integration Service uses to update rows in the Google BigQuery target.</p> <p>You can select one of the following modes:</p> <ul style="list-style-type: none">- Update As Update. The Data Integration Service updates all rows flagged for update in the Update Strategy transformation if the entries exist.- Update Else Insert. The Data Integration Service first updates all rows flagged for update in the Update Strategy transformation if the entries exist in the target. If the entries do not exist, the Data Integration Service inserts the entries. <p>Default is Update As Update.</p>
Target Dataset ID	<p>Optional. Overrides the Google BigQuery dataset name specified in the Google BigQuery data object write operation.</p>
Target Table Name	<p>Optional. Overrides the Google BigQuery target table name specified in the Google BigQuery data object write operation.</p>
Create Disposition	<p>Specifies whether PowerExchange for Google BigQuery must create the target table if it does not exist.</p> <p>You can select one of the following values:</p> <ul style="list-style-type: none">- Create if needed. If the table does not exist, PowerExchange for Google BigQuery creates the table.- Create never. If the table does not exist, PowerExchange for Google BigQuery does not create the table.

Property	Description
Write Disposition	<p>Specifies how PowerExchange for Google BigQuery must write data in bulk mode if the target table already exists.</p> <p>You can select one of the following values:</p> <ul style="list-style-type: none"> - Write append. If the target table exists, PowerExchange for Google BigQuery appends the data to the existing data in the table. - Write truncate. If the target table exists, PowerExchange for Google BigQuery overwrites the existing data in the table. - Write empty. If the target table exists and contains data, PowerExchange for Google BigQuery displays an error and does not write the data to the target. <p>PowerExchange for Google BigQuery writes the data to the target only if the target table does not contain any data.</p> <p>Note: Write disposition is applicable for bulk mode. Write disposition is applicable only when you perform an insert operation on a Google BigQuery target.</p>
Write Mode	<p>Specifies the mode to write data to the Google BigQuery target.</p> <p>You can select one of the following modes:</p> <ul style="list-style-type: none"> - Bulk. In bulk mode, PowerExchange for Google BigQuery first writes the data to a staging file in Google Cloud Storage. <p>When the staging file contains all the data, PowerExchange for Google BigQuery loads the data from the staging file to the BigQuery target. Google BigQuery then deletes the staging file unless you configure the mapping to persist the staging file.</p> <ul style="list-style-type: none"> - Streaming. In streaming mode, PowerExchange for Google BigQuery directly writes data to the BigQuery target. PowerExchange for Google BigQuery writes the data into the target row by row. <p>Default is Bulk mode.</p>
Streaming Template Table Suffix	<p>Specifies the suffix that PowerExchange for Google BigQuery adds to the individual target tables that it creates based on the template target table.</p> <p>This property applies to streaming mode.</p>
Rows per Streaming Request	<p>Specifies the number of rows that PowerExchange for Google BigQuery streams to the BigQuery target for each request.</p> <p>Enter a number greater than 0. Default is 500 rows.</p> <p>The maximum row size that PowerExchange for Google BigQuery can stream to the BigQuery target for each request is 10 MB.</p> <p>This property applies to streaming mode.</p>
Staging File Name	<p>Name of the staging file that PowerExchange for Google BigQuery creates in the Google Cloud Storage before it loads the data to the Google BigQuery target.</p> <p>This property applies to bulk mode.</p>
Data Format of the staging file	<p>Specifies the data format of the staging file.</p> <p>You can select one of the following data formats:</p> <ul style="list-style-type: none"> - JSON (Newline Delimited). Supports flat and record data with nested and repeated fields. - CSV. Supports flat data. <p>Note: If you use hybrid and complex connection mode, you cannot use CSV format as the data format of the staging file.</p>
Persist Staging File After Loading	<p>Indicates whether PowerExchange for Google BigQuery must persist the staging file in the Google Cloud Storage after it writes the data to the Google BigQuery target. You can persist the staging file if you want to archive the data for future reference.</p> <p>By default, PowerExchange for Google BigQuery deletes the staging file in Google Cloud Storage.</p> <p>This property applies to bulk mode.</p>

Property	Description
Enable Staging File Compression	<p>Select this option to compress the size of the staging file before PowerExchange for Google BigQuery writes the data to the Google Cloud Storage and decompress the staging file before it loads the data to the Google BigQuery target.</p> <p>You can enable staging file compression to reduce cost and transfer time.</p>
Job Poll Interval in Seconds	<p>The number of seconds after which PowerExchange for Google BigQuery polls the status of the write job operation.</p> <p>Enter a number greater than 0. Default is 10.</p>
Number of Threads for Uploading Staging file	<p>The number of files that PowerExchange for Google BigQuery must upload to Google Cloud Storage in bulk mode.</p> <p>Enter a number greater than 0.</p>
Local Stage File Directory	<p>Specifies the directory on your local machine where PowerExchange for Google BigQuery stores the files temporarily before writing the data to the staging file in Google Cloud Storage.</p> <p>This property applies to bulk mode.</p> <p>Note: This property is not applicable if you run mappings with the Spark engine in the Hadoop environment.</p>
Allow Quoted Newlines	<p>Indicates whether PowerExchange for Google BigQuery must allow the quoted data sections with newline character in a .csv file.</p>
Field Delimiter	<p>Delimiter character for the fields in a .csv file.</p>
Allow Jagged Rows	<p>Indicates whether PowerExchange for Google BigQuery must accept the rows without trailing columns in a .csv file.</p>
Pre SQL	<p>SQL statement that you want to run before writing data to the target.</p> <p>For example, if you want to select records from the database before you write the records into the table, specify the following pre SQL statement:</p> <pre>SELECT * FROM `api-project-80697026669.EMPLOYEE.RegionNation` LIMIT 1000</pre>
Pre SQL Configuration	<p>Specify a pre SQL configuration.</p> <p>For example,</p> <pre>DestinationTable:PRESQL_TGT2, DestinationDataset:EMPLOYEE, FlattenResults:False, WriteDisposition:WRITE_TRUNCATE, UseLegacySql:False</pre>
Post SQL	<p>SQL statement that you want to run after writing the data into the target.</p> <p>For example, if you want to update records in a table after you write the records into the target table, specify the following post SQL statement:</p> <pre>UPDATE [api-project-80697026669.EMPLOYEE.PERSONS_TGT_DEL] SET phoneNumber.number =1000011, phoneNumber.areaCode=100 where fullname='John Doe'</pre>

Property	Description
Post SQL Configuration	Specify a post SQL configuration. For example, <code>DestinationTable:POSTSQL_SRC, DestinationDataset:EMPLOYEE, FlattenResults:True, UseLegacySQL:False</code>
Target Schema Strategy	Not applicable for PowerExchange for Google BigQuery. Leave the default value of RETAIN unchanged.

Creating an Google BigQuery Data Object

Create a Google BigQuery data object to add to a mapping.

1. Select a project or folder in the **Object Explorer** view.
2. Click **File > New > Data Object**.
3. Select **Bigquery Data Object** and click **Next**.
The **Bigquery Data Object** dialog box appears.
4. Enter a name for the data object.
5. Click **Browse** next to the **Location** option and select the target project or folder.
6. Click **Browse** next to the **Connection** option and select the Google BigQuery connection from which you want to import the Google BigQuery object.
7. To add a resource, click **Add** next to the **Selected Resources** option.
The **Add Resource** dialog box appears.
8. Select the checkbox next to the Google BigQuery object you want to add and click **OK**.
Note: While creating a data object, you must not select multiple Google BigQuery objects. After you create the Google BigQuery data object, click the **New (Insert)** button to add multiple objects.
9. Click **Finish**.
The data object appears under Physical Data Objects in the project or folder in the **Object Explorer** view.

Creating a Google BigQuery Data Object Operation

You can create the data object read, write, or lookup operation for Google BigQuery data objects. You can then add the Google BigQuery data object operation to a mapping.

1. Select the data object in the **Object Explorer** view.
2. Right-click and select **New > Data Object Operation**.
The **Data Object Operation** dialog box appears.
3. Enter a name for the data object operation.
4. Select the type of data object operation. You can choose to create a read or write operation.

5. Click **Add**.
The **Select Resources** dialog box appears.
6. Select the Google BigQuery data object for which you want to create the data object operation and click **OK**.
7. Click **Finish**.
The Developer tool creates the data object operation for the selected data object.

Creating a Google BigQuery Target

You can create a Google BigQuery target using the **Create Target** option. PowerExchange for Google BigQuery creates the data object write operation for the Google BigQuery data object.

1. Select a project or folder in the **Object Explorer** view.
2. Select a source or a transformation in the mapping.
3. Delete the FileName port from the **Ports** properties of the data object read operation and save.
Note: If you do not want to delete the FileName port, you must add a transformation and map the fields to the Source transformation. Then, right-click on the transformation and select **Create Target** option to create a Google BigQuery target.
4. Right-click on the Source transformation or the transformation and select **Create Target**.
The **Create Target** dialog box appears.
5. Select **Others** and then select **Google BigQuery** from the list in the **Data Object Type** section.
6. Select **Link ports by name** as the **Link Type**.
7. Click **OK**.
The **New Google BigQuery Data Object** dialog box appears.
8. Enter a name for the data object.
9. Click **Finish**.

The new target appears under the **Physical Data Objects** category in the project or folder in the **Object Explorer** view.

Note: You must specify a connection for the newly created Google BigQuery target in the **Connection** field to run a mapping.

Rules and Guidelines for PowerExchange for Google BigQuery Data Object Operations

Use the following rules and guidelines when you configure a PowerExchange for Google BigQuery data object read and write operation:

- You must define a primary key in the source table and target table for update and delete operations. If you do not define a primary key in the target table, the mapping fails to update records in or delete records from the target table.

- You cannot read hierarchical data from a Google BigQuery source, convert the hierarchical input to relational output, and write data to relational targets.
- You cannot perform more than one operation with a pre SQL or post SQL command.
- If you perform an UPDATE or DELETE operation with a pre SQL or post SQL command, you must specify the following parameter in the pre SQL configuration or post SQL configuration:

`UseLegacySQL:False`

CHAPTER 5

PowerExchange for Google BigQuery Mappings

This chapter includes the following topics:

- [PowerExchange for Google BigQuery Mappings Overview, 29](#)
- [Mapping Validation and Run-time Environments, 29](#)

PowerExchange for Google BigQuery Mappings Overview

After you create a Google BigQuery data object read or write operation, you can create a mapping to extract data from a Google BigQuery source or load data to a Google BigQuery target.

You can define properties in an operation to determine how the Data Integration Service must extract data from a Google BigQuery source or load data to a Google BigQuery target. You can extract data from one or more Google BigQuery sources, and load data to one or more Google BigQuery targets. When the Data Integration Service extracts data from the source or loads data to the target, it converts the data based on the data types associated with the source or the target.

Mapping Validation and Run-time Environments

You can validate and run mappings in the native environment or with the Spark engine in the Hadoop environment.

The Data Integration Service validates whether the mapping can run in the selected environment. You must validate the mapping for an environment before you run the mapping in that environment.

Native environment

You can configure the mappings to run in the native environment. When you run mappings in the native environment, the Data Integration Service processes the mapping and runs the mapping from the Developer tool.

Spark Engine

When you run mappings on the Spark engine, the Data Integration Service pushes the mapping to a Hadoop cluster and processes the mapping on a Spark engine. The Data Integration Service generates an execution plan to run mappings on the Spark engine.

You can view the plan in the Developer tool before you run the mapping and in the Administrator tool after you run the mapping.

For more information about the Hadoop environment and Spark engines, see the *Informatica Big Data Management™ User Guide*.

CHAPTER 6

Google BigQuery Run-Time Processing

This chapter includes the following topics:

- [Google BigQuery Run-Time Processing Overview, 31](#)
- [Filter Expression, 31](#)
- [Partitioning, 32](#)
- [Parameterization for Google BigQuery Sources, 33](#)
- [Parameterization for Google BigQuery Targets, 33](#)

Google BigQuery Run-Time Processing Overview

When you create a Google BigQuery data object read or write operation, you define properties that determine how the Data Integration Service reads data from or writes data to a Google BigQuery database.

You can configure lookup caching, partitioning, and parameterization in the run-time properties.

Filter Expression

To read specific data from a Google BigQuery table, you can configure a filter condition to query the Google BigQuery tables. You can use the Native or Platform expression to query specific columns in a Google BigQuery table.

Native Expression

You can specify a native expression that use AND, OR, or nested conditions. The expression that you enter becomes the WHERE clause in the query used to retrieve records from the source.

An Google BigQuery filter consists of one or more Boolean expressions. The Boolean expressions uses the following format:

```
<Tablename.columnname><Operator><Value>
```

If you use logical operators, add the operators as a prefix to the expression list. Default is blank.

To filter records from an Google BigQuery source, set the native expression in the data object read operation.

Note: When you configure a Native expression and select a column that you want to filter, you must delete the `<Tablename.>` value in the native expression.

Platform Expression

You can use the platform expression to select specific records from a Google BigQuery table based on the filter condition you specify.

The following table describes the properties you specify when you filter records from a Google BigQuery table when you use the platform expression filter:

Property	Description
Expression Type	The type of filter expression that you want to use to filter records.
Left Field	The Google BigQuery column on which you want to apply the filter condition. You cannot specify a platform expression for columns of the following data types: <ul style="list-style-type: none">- Date- Time- Date/Time- Timestamp
Operator	Simple operators you can use to filter records. You can select one of the following operators: =, !=, <, <=, >, and >=
Right Field	The value you specify to filter Google BigQuery columns.

Partitioning

When you read data from or write data to Google BigQuery, you can configure partitioning to optimize the mapping performance at run time. You can configure partitioning for Google BigQuery mappings that you run in the native or Spark engine. The partition type controls how the Data Integration Service distributes data among partitions at partition points. You can configure a partition key for a Google BigQuery data object that uses a simple or hybrid connection mode.

You can define the partition type as key range partitioning. To configure key range partitioning, open the Google BigQuery data object read operation, and select the **Key Range** partition type option on the **Run-time** tab.

When you configure key range partitioning, the Data Integration Service distributes rows of data based on a port or set of ports that you define as the partition key. You can define a range of values for each port. The Data Integration Service uses the key and ranges to send rows to the appropriate partition.

When you use a simple connection mode in a Google BigQuery connection, you can configure a partition key for fields of the following data types:

- Integer
- Float

When you use a hybrid connection mode in a Google BigQuery connection, you can configure a partition key for fields of the following data types:

- Integer
- Float
- Timestamp

Note: You cannot configure a partition key for Record data type columns and repeated columns.

You can configure dynamic partitioning for Google BigQuery data object write operation. To configure dynamic partitioning, open the Google BigQuery data object write operation, and select the **Dynamic** partition type option on the **Runtime** tab.

Parameterization for Google BigQuery Sources

You can parameterize the Google BigQuery connection and data object read operation properties to override the mapping properties at run time.

You can parameterize the following read operation properties for a Google BigQuery source:

- Source Dataset ID
- Source Table name
- Number of Rows to Read
- Query Results Table Name
- Job Poll Interval In Seconds
- Read Mode
- Number of Threads for Downloading Staging Files
- Data format of the staging file
- Local Stage File Directory
- Staging File Name
- pre SQL
- post SQL
- pre SQL Configuration
- post SQL Configuration

Parameterization for Google BigQuery Targets

You can parameterize the Google BigQuery connection and data object write operation properties to override the mapping properties at run time.

You can parameterize the following write operation properties for a Google BigQuery target:

- Target Dataset ID
- Target Table name
- Create Disposition

- Write Disposition
- Write Mode
- Streaming Template Table Suffix
- Rows per Streaming Request
- Staging File Name
- Number of Threads for Uploading Staging Files
- Data format of the staging file
- Job Poll Interval In Seconds
- Local Stage File Directory
- Staging File Name
- Field Delimiter
- pre SQL
- post SQL
- pre SQL Configuration
- post SQL Configuration

APPENDIX A

Google BigQuery Data Type Reference

This appendix includes the following topics:

- [Data Type Reference Overview, 35](#)
- [Google BigQuery and Transformation Data Types, 35](#)

Data Type Reference Overview

Developer Tool uses the following data types in Google BigQuery mappings:

- Google BigQuery native data types. Google BigQuery data types appear in Google BigQuery definitions in a mapping.
- Transformation data types. Set of data types that appear in the transformations. They are internal data types based on ANSI SQL-92 generic data types, which the Data Integration Service uses to move data across platforms. They appear in all transformations in a mapping.

When the Data Integration Service reads source data, it converts the native data types to the comparable transformation data types before transforming the data. When the Data Integration Service writes to a target, it converts the transformation data types to the comparable native data types.

Google BigQuery and Transformation Data Types

The following table lists the Google BigQuery data types that Developer Tool supports and the corresponding transformation data types:

Google BigQuery Data Type	Transformation Data Type	Range and Description for the Transformation Data Type
BOOLEAN	String	1 to 104,857,600 characters.
BYTE	Binary	1 to 104,857,600 bytes

Google BigQuery Data Type	Transformation Data Type	Range and Description for the Transformation Data Type
DATE	Date/Time	Jan 1, 0001 A.D. to Dec 31, 9999 A.D. (precision to the nanosecond)
DATETIME	Date/Time	Jan 1, 0001 A.D. to Dec 31, 9999 A.D. (precision to the nanosecond)
FLOAT	Double	Precision 15.
INTEGER	Bigint	-9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 Precision 19, scale 0
RECORD	String	1 to 104,857,600 characters Precision 65535, scale 0
STRING	String	1 to 104,857,600 characters. Precision 255, scale 0
TIME	Date/Time	Jan 1, 0001 A.D. to Dec 31, 9999 A.D. (precision to the nanosecond)
TIMESTAMP	Date/Time	Jan 1, 0001 A.D. to Dec 31, 9999 A.D. (precision to the nanosecond)

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