

How-to guides

Interacting with BigQuery

Introduction to interacting with BigQuery

An introduction to methods of interacting with BigQuery.

(/bigquery/docs/interacting-with-bigquery)

BigQuery sandbox

Get started with BigQuery without creating a billing account for your project.

(/bigquery/docs/sandbox)

Using the Cloud Console

BigQuery exposes a graphical interface in the Cloud Console that you can use to load and export data, run queries, and perform other user and management tasks in your browser.

(/bigquery/docs/bigquery-web-ui)

Using the bq command-line tool

The **bq** command-line tool is a python-based tool that accesses BigQuery from the command line.

(/bigquery/docs/bq-command-line-tool)

Running and managing jobs

Introduction to jobs

An introduction to BigQuery jobs.

(/bigquery/docs/jobs-overview)

Running jobs programmatically

Run BigQuery jobs programmatically using the API and client libraries.

(/bigquery/docs/running-jobs)

Managing jobs

Manage BigQuery jobs including listing jobs, canceling jobs, and rerunning jobs.

(/bigquery/docs/managing-jobs)

Working with datasets

Introduction to datasets

An introduction to BigQuery datasets.

(/bigquery/docs/datasets-intro)

Dataset locations

An overview of locations for storing BigQuery data.

(/bigquery/docs/dataset-locations)

Creating datasets

How to create datasets in BigQuery.

(/bigquery/docs/datasets)

Copying datasets

How to copy datasets, including copying datasets across regions.

(/bigquery/docs/copying-datasets)

Controlling access to datasets

How to control access to datasets in BigQuery.

(/bigquery/docs/dataset-access-controls)

Listing datasets

How to list datasets in BigQuery projects.

(/bigquery/docs/listing-datasets)

Getting information about datasets

How to get dataset information or metadata.

(/bigquery/docs/dataset-metadata)

Updating datasets

How to update dataset properties including updating descriptions, default expiration times, and access controls.

(/bigquery/docs/updating-datasets)

Managing datasets

Manage datasets including renaming datasets, deleting datasets, and copying datasets.

(/bigquery/docs/managing-datasets)

Availability and durability

Understand availability and durability of your datasets if a disaster occurs.

(/bigquery/docs/availability)

Working with table schemas

Specifying a schema

How to create and use table schemas.

(/bigquery/docs/schemas)

Specifying nested and repeated columns

How to specify nested and repeated columns in table schemas.

(/bigquery/docs/nested-repeated)

Auto-detecting schemas

Use schema auto-detection when you load data or query external data.

(/bigquery/docs/schema-detect)

Modifying table schemas

Modify table schema definitions including adding columns, renaming columns, deleting columns, and changing column names, data types, and modes.

(/bigquery/docs/managing-table-schemas)

Working with tables

Introduction to tables

An introduction to BigQuery tables.

(/bigquery/docs/tables-intro)

Creating and using tables

Create and use tables including listing tables, getting information about tables, and controlling access to table data.

(/bigquery/docs/tables)

Managing tables

Manage tables including updating table properties, renaming tables, deleting tables, and copying tables.

(/bigquery/docs/managing-tables)

Managing table data

An overview of working with table data including querying tables, browsing table data, modifying table data, exporting data, and appending or overwriting data.

(/bigquery/docs/managing-table-data)

Exporting table data

How to export table data to Cloud Storage.

(/bigquery/docs/exporting-data)

Updating table data using DML

Perform bulk modifications to table data using data manipulation language (DML) in standard SQL.

(/bigquery/docs/updating-data)

Working with partitioned tables

Introduction to partitioned tables

An introduction to partitioned tables in BigQuery.

(/bigquery/docs/partitioned-tables)

Creating partitioned tables

How to create partitioned tables, including time-unit column-partitioned tables, ingestion-time partitioned tables, and integer-range partitioned tables.

(/bigquery/docs/creating-partitioned-tables)

Managing partitioned tables

How to manage partitioned tables including updating properties, copying partitions, and deleting partitions.

(/bigquery/docs/managing-partitioned-tables)

Managing partitioned table data

How to manage partitioned table data including browsing data, modifying data, exporting data, and appending or overwriting data.

(/bigquery/docs/managing-partitioned-table-data)

Querying partitioned tables

How to query partitioned tables.

(/bigquery/docs/querying-partitioned-tables)

Updating partitioned table data using DML statements

How to use DML statements to insert, delete, or update data in partitioned tables.

(/bigquery/docs/using-dml-with-partitioned-tables)

Working with clustered tables

Introduction to clustered tables

An introduction to clustered tables in BigQuery.

(/bigquery/docs/clustered-tables)

Creating and using clustered tables

How to create and use clustered tables including listing and getting information about clustered tables.

(/bigquery/docs/creating-clustered-tables)

Querying clustered tables

How to query clustered tables.

(/bigquery/docs/querying-clustered-tables)

Working with views

Introduction to views

An introduction to BigQuery views.

(/bigquery/docs/views-intro)

Creating views

How to create views.

(/bigquery/docs/views)

Controlling access to views

How to control access to views.

(/bigquery/docs/view-access-controls)

Creating authorized views

How to create a view that allows you to share query results with users and groups without giving them access to the underlying tables.

(/bigquery/docs/authorized-views)

Listing views

How to list views.

(/bigquery/docs/listing-views)

Getting information about views

How to get information or metadata about views.

(/bigquery/docs/view-metadata)

Updating views

How to update view properties including descriptions, expiration times, and SQL queries.

(/bigquery/docs/updating-views)

Managing views

Manage views including copying views, renaming views, and deleting views.

(/bigquery/docs/managing-views)

Working with materialized views

Introduction to materialized views

An introduction to BigQuery materialized views.

(/bigquery/docs/materialized-views-intro)

Creating and using materialized views

Create and use materialized views.

(/bigquery/docs/materialized-views)

Best practices for materialized views

Best practices for materialized views.

(/bigquery/docs/materialized-views-best-practices)

Materialized views FAQ

Answers to frequently asked questions about materialized views.

(/bigquery/docs/materialized-views-faq)

Using Reservations for workload management

Introduction

An introduction to BigQuery Reservations.

(/bigquery/docs/reservations-intro)

Concepts

Concepts related to Reservations.

(/bigquery/docs/reservations-concepts)

Workload management

Using Reservations for workload management.

(/bigquery/docs/reservations-workload-management)

Monitoring

How to monitor your Reservation usage and billing.

(/bigquery/docs/reservations-monitoring)

Getting metadata using INFORMATION_SCHEMA

Introduction

An introduction to INFORMATION_SCHEMA.

(/bigquery/docs/information-schema-intro)

Getting dataset metadata

Using INFORMATION_SCHEMA to retrieve metadata about datasets.

(/bigquery/docs/information-schema-datasets)

Getting routine metadata

Using INFORMATION_SCHEMA to retrieve metadata about routines.

(/bigquery/docs/information-schema-routines)

Getting **table** metadata

Using INFORMATION_SCHEMA to retrieve metadata about tables.

(/bigquery/docs/information-schema-tables)

Getting **view** metadata

Using INFORMATION_SCHEMA to retrieve metadata about views.

(/bigquery/docs/information-schema-views)

Labeling **BigQuery** resources

Introduction to **labels**

An introduction to labeling resources in BigQuery.

(/bigquery/docs/labels-intro)

Adding **labels**

Add labels to group resources by purpose, environment, department, and so on.

(/bigquery/docs/adding-labels)

Viewing labels

Viewing labels on BigQuery resources.

(/bigquery/docs/viewing-labels)

Updating labels

Updating labels on BigQuery resources.

(/bigquery/docs/updating-labels)

Filtering resources using labels

Filtering resources using labels.

(/bigquery/docs/filtering-labels)

Deleting labels

Deleting labels on BigQuery resources.

(/bigquery/docs/deleting-labels)

Loading data into BigQuery

Introduction to loading data

Load your data into BigQuery from a variety of source formats, including CSV, JSON, Avro, Parquet, ORC and Datastore backups.

(/bigquery/docs/loading-data)

Loading data from Cloud Storage

Load data from Cloud Storage.

(/bigquery/docs/loading-data-cloud-storage)

Loading Avro data from Cloud Storage

How to load Avro data from Cloud Storage.

(/bigquery/docs/loading-data-cloud-storage-avro)

Loading Parquet data from Cloud Storage

How to load Parquet data from Cloud Storage.

(/bigquery/docs/loading-data-cloud-storage-parquet)

Loading ORC data from Cloud Storage

How to load ORC data from Cloud Storage.

(/bigquery/docs/loading-data-cloud-storage-orc)

Loading CSV data from Cloud Storage

How to load CSV data from Cloud Storage.

(/bigquery/docs/loading-data-cloud-storage-csv)

Loading JSON data from Cloud Storage

How to load newline delimited JSON data from Cloud Storage.

(/bigquery/docs/loading-data-cloud-storage-json)

Loading Datastore exports from Cloud Storage

How to load data from a Datastore export.

(/bigquery/docs/loading-data-cloud-datastore)

Loading Firestore exports from Cloud Storage

How to load data from a Firestore export.

(/bigquery/docs/loading-data-cloud-firestore)

Loading data from a local data source

How to load data from a local data source.

(/bigquery/docs/loading-data-local)

Streaming data into BigQuery

Stream your data into BigQuery using the BigQuery API.

(/bigquery/streaming-data-into-bigquery)

Querying BigQuery data

Introduction to querying data

An introduction to running queries in BigQuery.

(/bigquery/docs/query-overview)

Running interactive and batch queries

How to run interactive and batch queries.

(/bigquery/docs/running-queries)

Performing a query dry run

How to perform a dry run for a query job to estimate the amount of data processed.

(/bigquery/docs/running-queries)

Writing query results

Write and page through query results.

(/bigquery/docs/writing-results)

Using cached results

How to use cached query results.

(/bigquery/docs/cached-results)

Running parameterized queries

How to use parameterized queries.

(/bigquery/docs/parameterized-queries)

Querying data using a wildcard table

Query several tables concisely using a wildcard table.

(/bigquery/docs/querying-wildcard-tables)

Saving and sharing queries

Save and share queries.

(/bigquery/docs/saving-sharing-queries)

Scheduling queries

Schedule recurring queries in BigQuery.

(/bigquery/docs/scheduling-queries)

Using the query plan explanation

BigQuery provides diagnostic information about a completed query's execution plan.

(/bigquery/query-plan-explanation)

Using the BigQuery connector for Excel

BigQuery offers a connector that allows you to query BigQuery data to from Excel.

(/bigquery/docs/bigquery-connector-for-excel)

Querying external data sources

Introduction to external data sources

Query data directly from external data sources such as Cloud Storage, Cloud Bigtable, and Drive.

(/bigquery/external-data-sources)

Creating a table definition file

Create a table definition file for an external data source.

(/bigquery/external-table-definition)

Federated queries with Cloud SQL data

Query data in BigQuery and Cloud SQL with a federated query.

(/bigquery/docs/cloud-sql-federated-queries)

Querying Cloud Bigtable data

Use BigQuery to query data stored in Cloud Bigtable.

(/bigquery/external-data-bigtable)

Querying Cloud Storage data

Use BigQuery to query data stored in Cloud Storage.

(/bigquery/external-data-cloud-storage)

Querying Drive data

Use BigQuery to query data stored in Drive.

(/bigquery/external-data-drive)

Controlling BigQuery costs

Introduction to controlling BigQuery costs

An introduction to cost control measures for BigQuery.

(/bigquery/docs/controlling-costs)

Estimating storage and query costs

How to estimate storage and query costs before loading and querying data.

(/bigquery/docs/estimate-costs)

Custom cost controls

Manage costs by setting custom quotas on query processing.

(/bigquery/docs/custom-quotas)

Best practices for controlling costs

Best practices for controlling costs in BigQuery.

(/bigquery/docs/best-practices-costs)

Securing BigQuery resources

Predefined roles and permissions

Information on BigQuery's predefined IAM roles and permissions.

(/bigquery/docs/access-control)

Basic roles and permissions

Information on basic BigQuery roles and permissions that existed before IAM.

(/bigquery/docs/access-control-basic-roles)

Access control examples

Access control use cases in BigQuery.

(/bigquery/docs/access-control-examples)

Introduction to Column-level security (beta)

Learn about BigQuery Column-level security.

(/bigquery/docs/column-level-security-intro)

Restricting access with Column-level security (beta)

How to restrict access with BigQuery Column-level security.

(/bigquery/docs/column-level-security)

Encryption at rest

Learn how BigQuery encrypts your data at rest.

(/bigquery/docs/encryption-at-rest)

Using Cloud Data Loss Prevention to scan BigQuery data

Use Cloud Data Loss Prevention to identify and protect sensitive BigQuery data.

(/bigquery/docs/scan-with-dlp)

Protecting data with Cloud KMS keys

Use customer-managed encryption keys (CMEK) for BigQuery.

(/bigquery/docs/customer-managed-encryption)

Monitoring and logging

BigQuery monitoring using Cloud Monitoring

Monitor BigQuery resources using Cloud Monitoring.

(/bigquery/docs/monitoring)

Auditing policy tags

Audit activities related to policy tags.

(/bigquery/docs/auditing-policy-tags)

Audit logging reference

Log BigQuery usage using audit logs.

(/bigquery/docs/reference/auditlogs)

BigQuery API basics

Introduction to authentication

Perform authentication in various application scenarios.

(/bigquery/docs/authentication)

Getting started with authentication

Get started with application default credentials.

(/bigquery/docs/authentication/getting-started)

Authenticating with a service account key file

Manually create and obtain service account credentials.

(/bigquery/docs/authentication/service-account-file)

Authenticating with a user account for installed applications

Perform application authentication using user accounts.

(/bigquery/docs/authentication/end-user-installed)

Authorizing API requests

Authorize API requests with access tokens.

(/bigquery/docs/authorization)

Batch requests

Reduce the number of HTTP connections your client has to make by batching API calls.

(/bigquery/batch)

Paging through query results

Page through query results using the BigQuery API.

(/bigquery/docs/paging-results)

API performance tips

Techniques you can use to improve the performance of your application.

(/bigquery/docs/api-performance)

Best practices

Controlling costs

Best practices for controlling costs in BigQuery.

(/bigquery/docs/best-practices-costs)

Optimizing query performance

Best practices for optimizing query performance in BigQuery.

(/bigquery/docs/best-practices-performance-overview)

Optimizing storage

Best practices for optimizing BigQuery storage.

(/bigquery/docs/best-practices-storage)