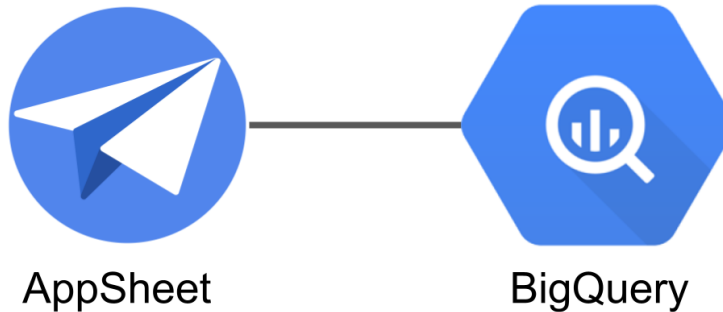


# Using the BigQuery Data Source



## Overview

The BigQuery data source is being released to all users as a Preview. The BigQuery data source allows app creators to access BigQuery datasets in READ-ONLY mode only. We do not support write/update/delete access because BigQuery is a [data warehouse](#) type of database, not an [online transaction processing](#) (OLTP) database that you would normally use to be the read/write data store for an application (like [Cloud SQL](#)). The intent of a data warehouse is to provide read-only datasets for reporting and data analytics. We do not plan to support write modes in AppSheet. We expect BigQuery datasets will be refreshed by the systems of record in a separate process outside of AppSheet (like a nightly ETL batch process, or a stream of data changes from the system of record using a tool like [Cloud Data Fusion](#)).

## Licensing

BigQuery is a [GCP](#) service that many enterprise customers use for data reporting. The volumes of data to process can be quite significant. Therefore, we are classifying this data source as an Advanced Data Connector, which will require a Business- or Enterprise-level plan. Here is a summary of the plans that will enable access to a BigQuery data source :

**New AppSheet plans that are required for BigQuery data source:**

- AppSheet Enterprise Standard
- AppSheet Enterprise Plus

**For reference: Older AppSheet plans that would have also enabled you to use the BigQuery data source:**

- AppSheet Business

- AppSheet Enterprise

## Limits

Because BigQuery has the potential to have massive amounts of data (potentially tens of millions of rows or more and up to 10,000 columns), we have put some product limits in place to ensure your apps will be able to load data and perform well. AppSheet will have the following limits in place for a BigQuery data source:

- **Read-only** - BigQuery is a data warehouse, and we do not plan to support write operations from AppSheet.
- **100,000 row hard limit** - BigQuery datasets larger than this will be truncated at the limit. This is the preview limit - it is still TBD what the limit will be for GA based on performance test results and user feedback.
- **Partitioned tables will not work** - This is a preview limitation we hope to remove by GA. Any BigQuery tables that have a "Partitioned Column" will give an error during configuration in AppSheet. Use a BigQuery View without the partitioned column to get around this.
- **GCP Access - Service Accounts** are the **only access method** we are providing. You will need to have access to create service accounts and keys in your GCP project, or you will need to request the creation from an IT Administrator who has this level of access. They can even create the data source as a [Team Data Source](#) and share it with you. The instructions below show how to set this up.

## How to set up your App to be successful within these limits

### 1. Use Security Filters

- a. Use AppSheet [expressions](#), which will be translated to BigQuery SQL and executed on the server before the data is downloaded to the app.

Examples:

- i. Filter by [USEREMAIL\(\)](#) to just get rows owned or viewable by the currently logged-in app user
- ii. Filter by *DateTime* values in the last week or month to get only the most recent data. Assuming a column in the dataset called *DateCreated*, you could use security filter expressions like:
  1. For the last week: `[DateCreated] >= TODAY() - 7`
  2. For the last month: `[DateCreated] >= TODAY() - 30`
- iii. Use a combination of [user settings](#) and security filters to allow your app user to limit the data.
  1. Using the user setting column named *Year*, and a column in the dataset called *StartTime*, this is a way to select just the 2018 or greater data from a dataset:
    - a. `[StartTime] >= DATETIME("1/1/" & USERSETTINGS("YEAR"))`

## 2. Use BigQuery Views

- a. You can create specific views for AppSheet in BigQuery that have potentially complex SQL queries to create a limited number of rows from the dataset. When setting-up the BigQuery data source as a table in your app, select from the list of views in your project as well as from the base datasets.

## 3. Create a new BigQuery Table

- a. BigQuery allows you to set up a copy of a table that can periodically be re-created based on a scheduled query.
- b. This is similar to a view, but is a physical table that contains the subset of data. This can also be used to reduce the number of columns in order to simplify the table structure.

# User Guide

## Pre-Requisites in GCP

In order to connect AppSheet to BigQuery, a Service Account must be created in GCP with the correct role to access BigQuery data. A Service Account is a special kind of account that is used to grant system to system level access, rather than access by individual users. AppSheet (a system) will use the service account user to access BigQuery (a system) which will establish the system-to-system communications. Additional user level access can be put in place in AppSheet through security filters on the datasource.

Accessing a **Public DataSet** will only require a **BigQuery Job User** role.

Accessing a **Private DataSet** will require a Custom Role in GCP. Please see the instructions in the **Accessing a Private DataSet** section in the instructions below. You can skip this section if you plan to just use a Public DataSet.

## Create a Service Account

1. Go to GCP console (<https://console.cloud.google.com>) / IAM & Admin / Service Accounts, click on "+ CREATE SERVICE ACCOUNT"

Google Cloud Platform DemoProject Search products and resources

IAM & Admin Service accounts + CREATE SERVICE ACCOUNT DELETE + MANAGE ACCESS

IAM  
Identity & Organization  
Policy Troubleshooter  
Policy Analyzer  
Organization Policies  
**Service Accounts**  
Labels  
Tags  
Settings  
Privacy & Security  
Identity-Aware Proxy  
Roles

Service accounts for project "DemoProject"

A service account represents a Google Cloud service identity, such as code running on Compute Engine VMs, App Engine apps, or systems running outside Google Cloud. Organization policies can be used to secure service accounts and block risky service account features, such as automatic IAM Grants, key creation/upload, or 1

Filter Enter property name or value

<input type="checkbox"/>	Email	Status	Name ↑	Description	Key ID	Key creation date	Actions
No rows to display							

- a. Create service account with the **BigQuery Job User** role  
Choose a Service Account Name and fill out the description, then click the "Create" button

Google Cloud Platform DemoProject Search products and resources

IAM & Admin Create service account

1 Service account details

Service account name  
BIGQUERY-READONLY  
Display name for this service account

Service account ...  
bigquery-readonly @demoproject-297500.iam.gserviceaccount.com X ↺

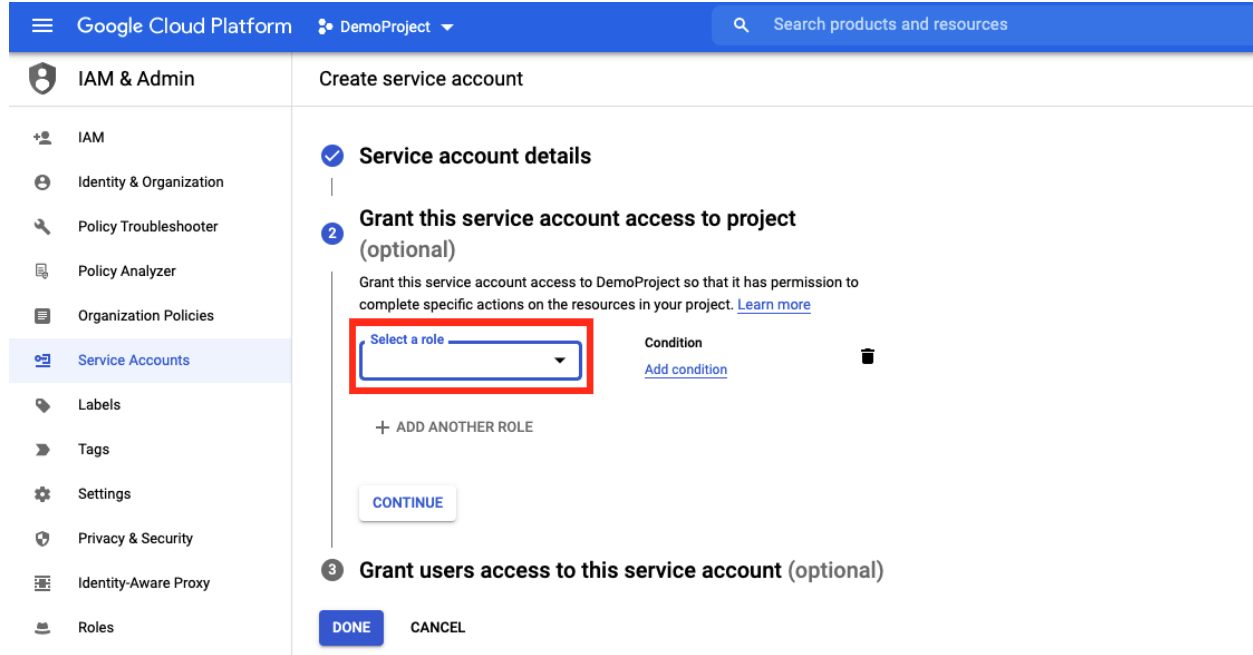
Service account description  
Service Account for AppSheet to access BigQuery for Read Only Access  
Describe what this service account will do

CREATE

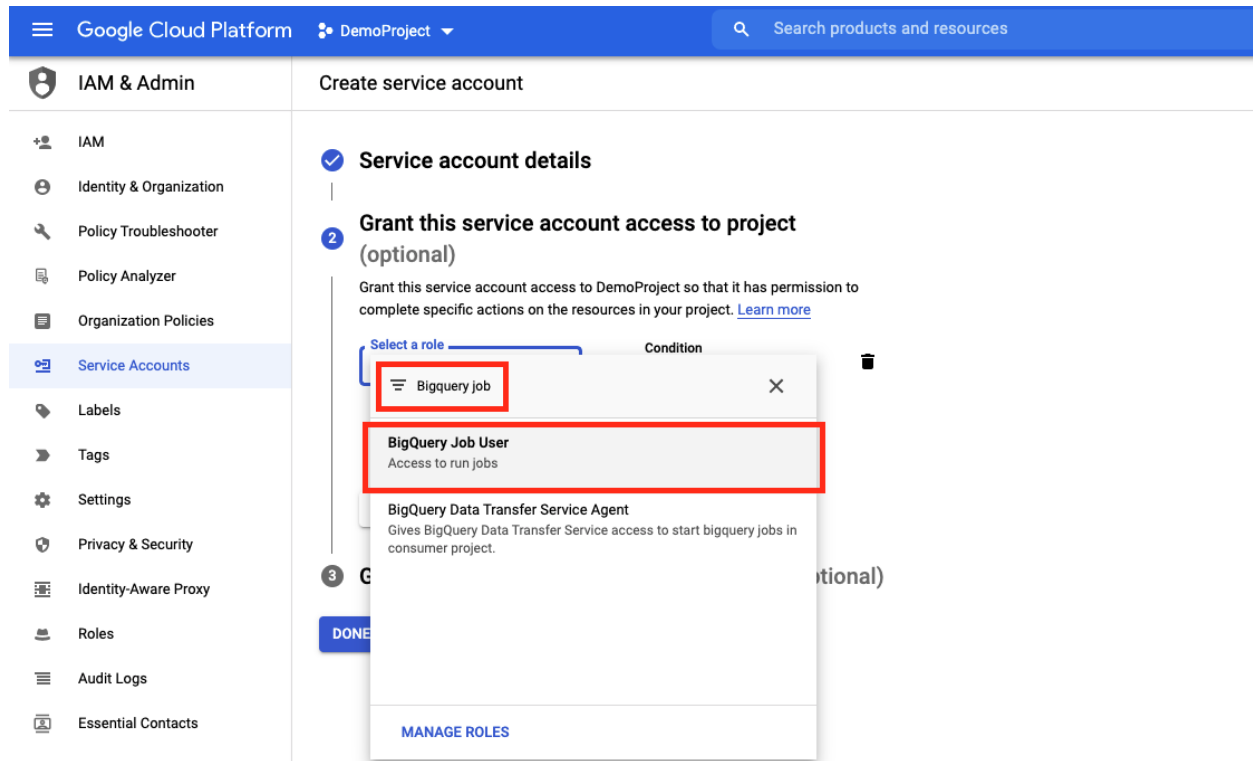
2 Grant this service account access to project (optional)

3 Grant users access to this service account (optional)

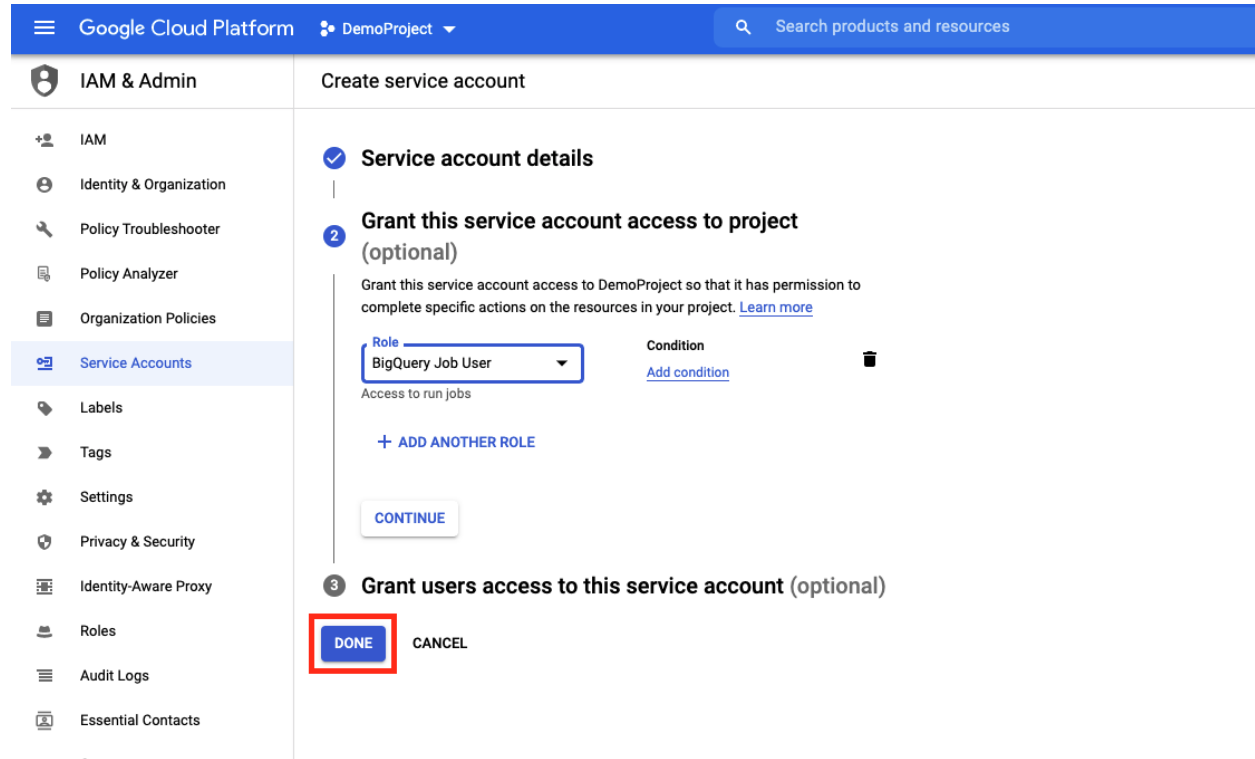
Grant the **Bigquery.Job.User** role



Type in “Bigquery Job” to the filter text box and a short list will appear below the filter text box. Select “BigQuery Job User”



Click on the “Done” button



- b. (*optional*) The role can also be set with the gcloud command line interface, if this is preferred (Change [PROJECTID] and [SERVICE\_ACCOUNT\_ID] to the values appropriate for your account :

```
gcloud projects add-iam-policy-binding [PROJECTID]
--member="serviceAccount:[SERVICE_ACCOUNT_ID]"
--role="roles/bigquery.jobUser"
```

## Create a **JSON key** of the Service Account

- c. Click on the Three Dots on the rightmost Actions column of the new Service Key you created, and select "Manage keys":

The screenshot shows the Google Cloud Platform IAM & Admin console. The left sidebar contains navigation options: IAM, Identity & Organization, Policy Troubleshooter, Policy Analyzer, Organization Policies, Service Accounts (selected), Labels, Tags, Settings, Privacy & Security, Identity-Aware Proxy, Roles, Audit Logs, Essential Contacts, and Groups. The main content area is titled 'Service accounts for project "DemoProject"'. It includes a table of service accounts with columns for Email, Status, Name, Description, Key ID, and Key creation date. One service account is listed: 'bigquery-readonly@demoproject-297500.iam.gserviceaccount.com' with a status of 'Active'. A dropdown menu is open for this service account, showing options: Manage details, Manage permissions, Manage keys (highlighted), View metrics, View logs, Disable, and Delete.

d. Click on the “Add Key” button and select “Create new key”

The screenshot shows the Google Cloud Platform IAM & Admin console, specifically the 'Keys' page for the 'BIGQUERY-READONLY' service account. The left sidebar is the same as in the previous screenshot. The main content area has tabs for DETAILS, PERMISSIONS, KEYS (selected), METRICS, and LOGS. Below the tabs, there is a section titled 'Keys' with instructions on how to add a new key pair or upload a public key certificate. Below the instructions, there is an 'ADD KEY' button with a dropdown arrow. The dropdown menu is open, showing three options: 'Create new key' (highlighted), 'Upload existing key', and 'Key creation date' / 'Key expiration date' (which are likely filters or headers for a table below).

e. Accept the default selection of “JSON” and Click on the “Create” button

The screenshot shows the Google Cloud Platform IAM & Admin console. The left sidebar lists various IAM & Admin services, with 'Service Accounts' selected. The main content area shows the 'Keys' page for a service account named 'BIGQUERY-READONLY'. The 'KEYS' tab is active, and an 'ADD KEY' button is visible. A modal dialog titled 'Create private key for "BIGQUERY-READONLY"' is open, displaying instructions and options for key creation. The 'JSON' option is selected and highlighted with a red box, and the 'CREATE' button is also highlighted with a red box.

Google Cloud Platform DemoProject Search products and resources

IAM & Admin BIGQUERY-READONLY

DETAILS PERMISSIONS KEYS METRICS LOGS

### Keys

Add a new key pair or upload a public key certificate from an existing key pair. Please note that public certificates need to be in RSA\_X509\_PEM format. [Learn more about upload key formats](#)

Block service account key creation using [organization policies](#).  
[Learn more about setting organization policies for service accounts](#)

ADD KEY

Type

No rows to display

#### Create private key for "BIGQUERY-READONLY"

Downloads a file that contains the private key. Store the file securely because this key can't be recovered if lost.

Key type

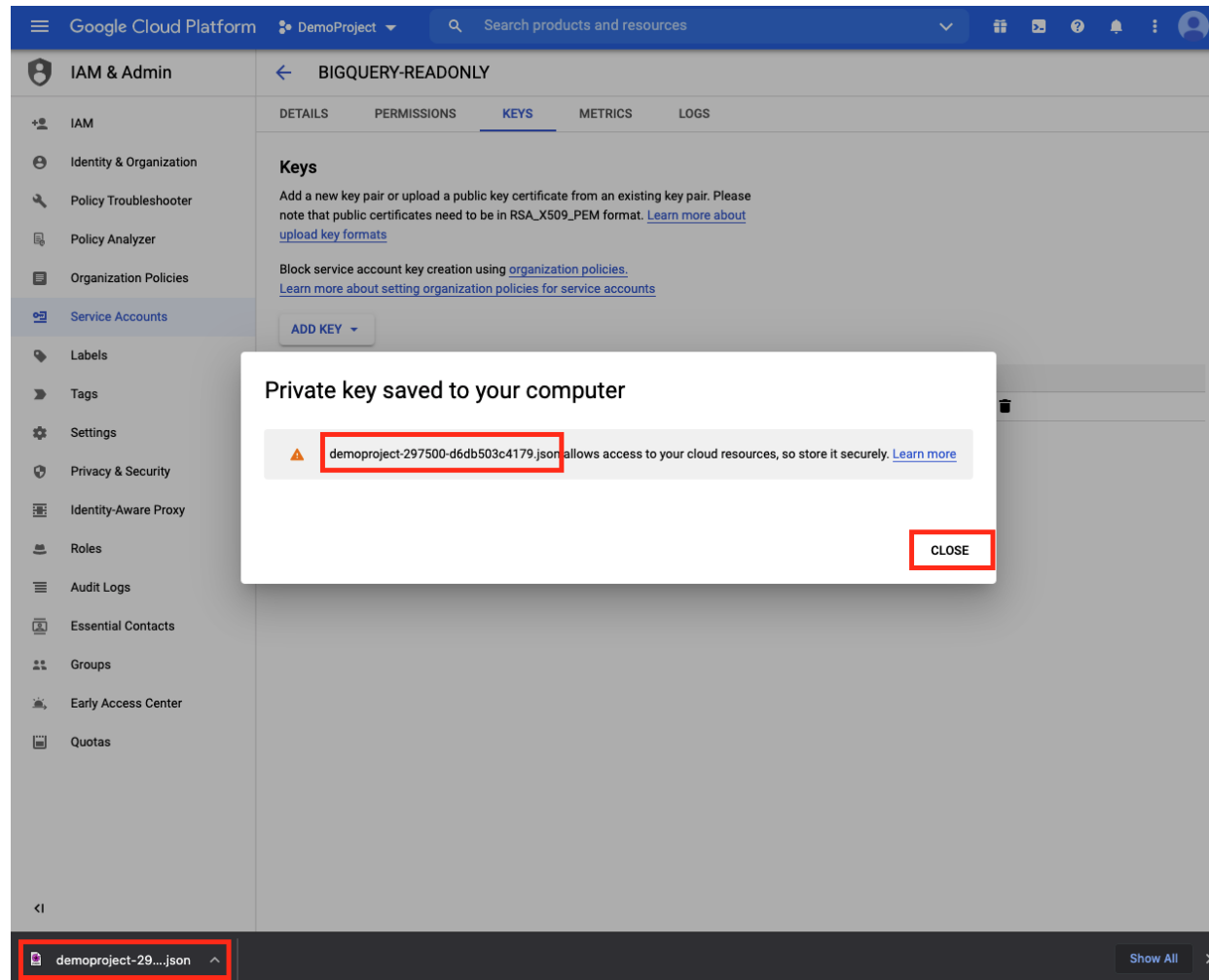
JSON  
Recommended

P12  
For backward compatibility with code using the P12 format

CANCEL CREATE

- f. Note the file name. You will find this in your browser's download folder. Click on the "Close" button. Depending on your browser type, you may see the downloaded file in the bottom bar of your browser window.





- g. Open the File so that you can cut/paste the contents in a few minutes


## Accessing a Private DataSet

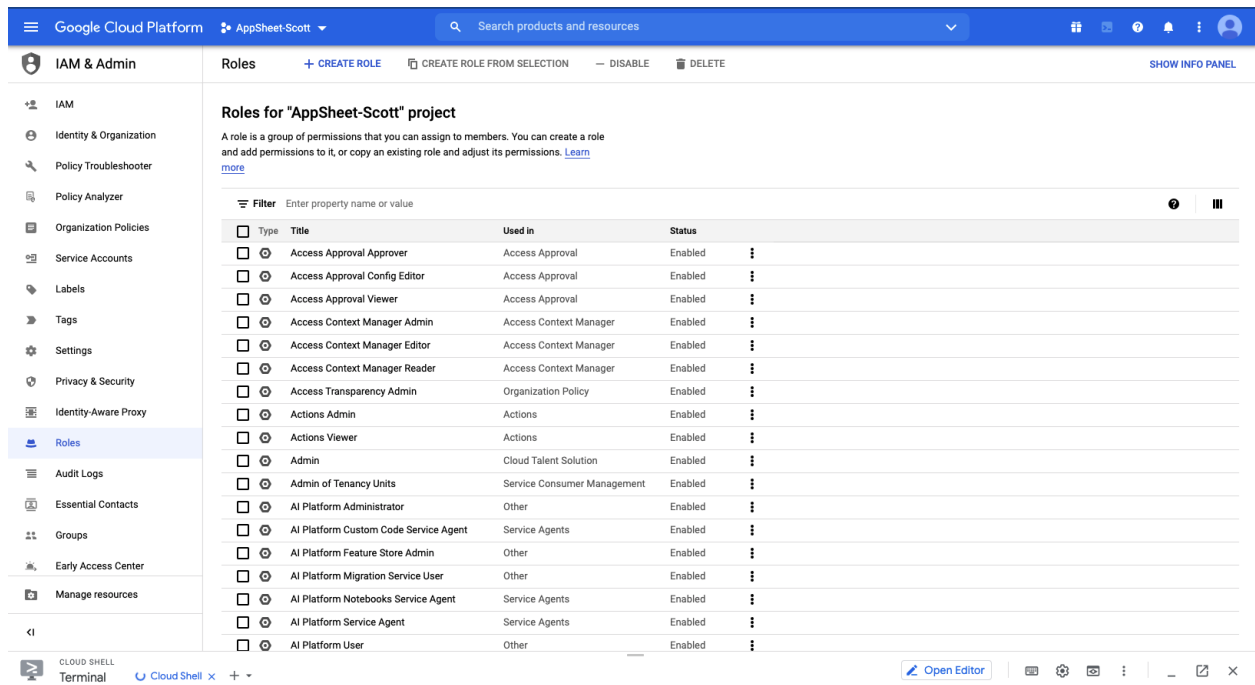
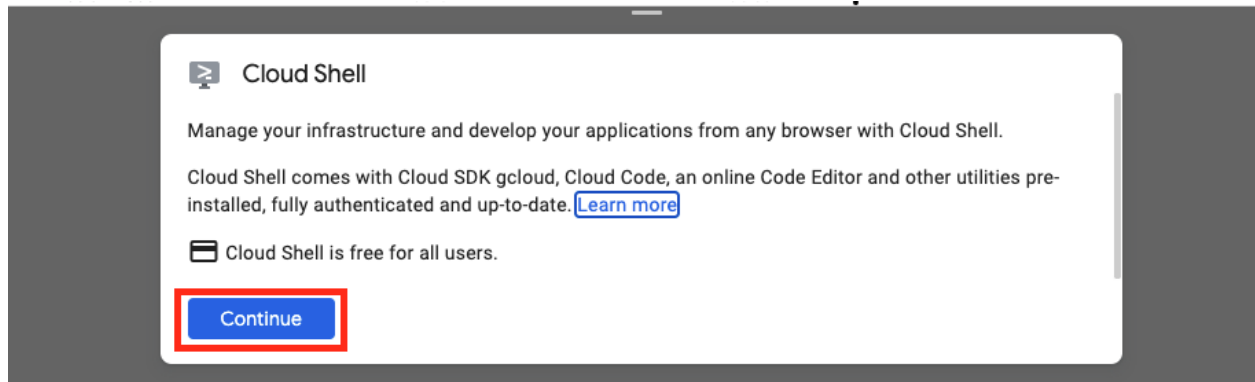
Every GCP account will have different security policies set up, according to the security needs of the customer account. The instructions in this section should work for most GCP projects with a highly restrictive set of policies. You may not need all of the permissions in the custom role in your specific GCP Project, so you can also try removing some of the permissions if you would like, then add them back in until it works for your project.

You need to create a Custom Role in GCP IAM in order to access a **Private DataSet**. Please **ignore** this section if you only need to access **Public DataSets**, and **skip** to the “**Add the BigQuery data source to an AppSheet App**” Section.

## Creating a Custom Role

GCP provides a shell feature in the GCP Cloud Console called **Cloud Shell**, which allows you to use a command line interface. This is the quickest way to create a custom role. Click on the

Cloud Shell icon  in the upper right of your GCP console window. Click on the Continue button when prompted, and then wait for the Terminal window to boot up in the bottom portion of your screen.



Establishing connection to your Google Cloud Shell...

Click on the "Open Editor" Icon in the Cloud Shell Navigation bar (or use vi if you prefer) :

Google Cloud Platform AppSheet-Scott Search products and resources

IAM & Admin Roles + CREATE ROLE CREATE ROLE FROM SELECTION -- DISABLE DELETE SHOW INFO PANEL

### Roles for "AppSheet-Scott" project

A role is a group of permissions that you can assign to members. You can create a role and add permissions to it, or copy an existing role and adjust its permissions. [Learn more](#)

Filter Enter property name or value

Type	Title ↑	Used in	Status
<input type="checkbox"/>	<input type="checkbox"/> Access Approval Approver	Access Approval	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Access Approval Config Editor	Access Approval	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Access Approval Viewer	Access Approval	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Access Context Manager Admin	Access Context Manager	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Access Context Manager Editor	Access Context Manager	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Access Context Manager Reader	Access Context Manager	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Access Transparency Admin	Organization Policy	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Actions Admin	Actions	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Actions Viewer	Actions	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Admin	Cloud Talent Solution	Enabled
<input type="checkbox"/>	<input type="checkbox"/> Admin of Tenancy Units	Service Consumer Management	Enabled
<input type="checkbox"/>	<input type="checkbox"/> AI Platform Administrator	Other	Enabled
<input type="checkbox"/>	<input type="checkbox"/> AI Platform Custom Code Service Agent	Service Agents	Enabled
<input type="checkbox"/>	<input type="checkbox"/> AI Platform Feature Store Admin	Other	Enabled
<input type="checkbox"/>	<input type="checkbox"/> AI Platform Migration Service User	Other	Enabled

Open Editor

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to appsheet-scott.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
shaaland@cloudshell:~ (appsheet-scott) $
```

Click on the ... icon and then the "New File" selection on the pop up menu:

CLOUD SHELL Editor

File Edit Selection View Go Run Terminal Help

EXPLORER: SHAALAND

- BigQuery.AppSheet.yaml
- README-cloudshell.txt

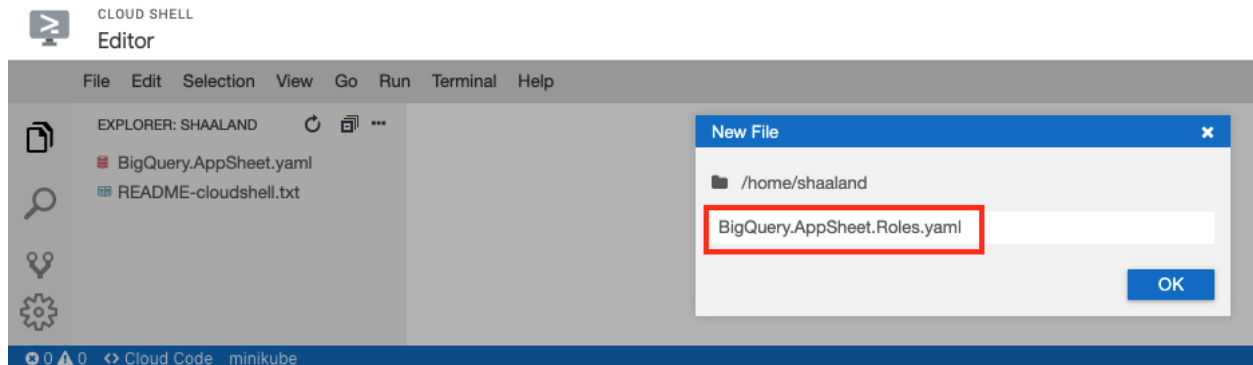
New File

New Folder

Add Folder to Workspace...

Cloud Code minikube

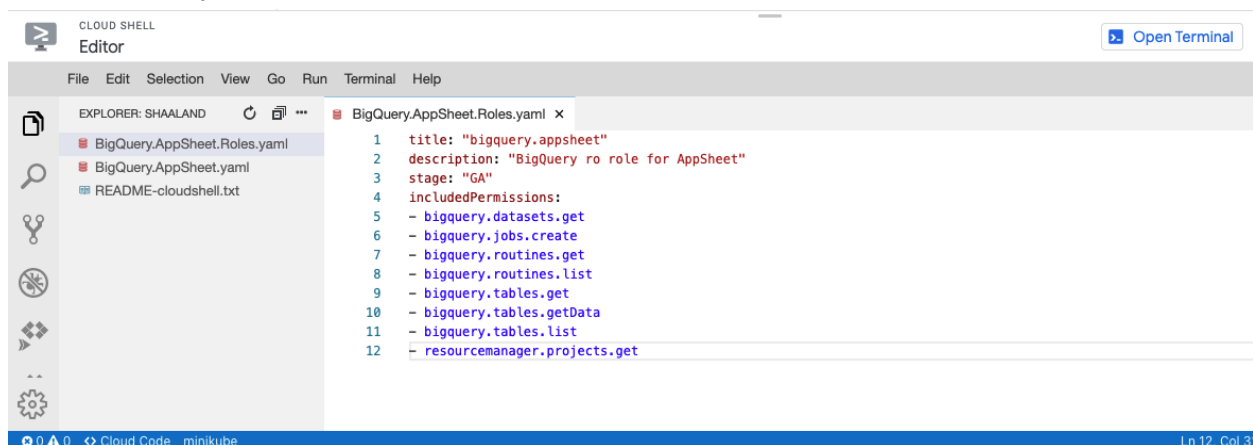
Enter a File name of your choice with a .yaml extension, like : BigQuery.AppSheet.Roles.yaml



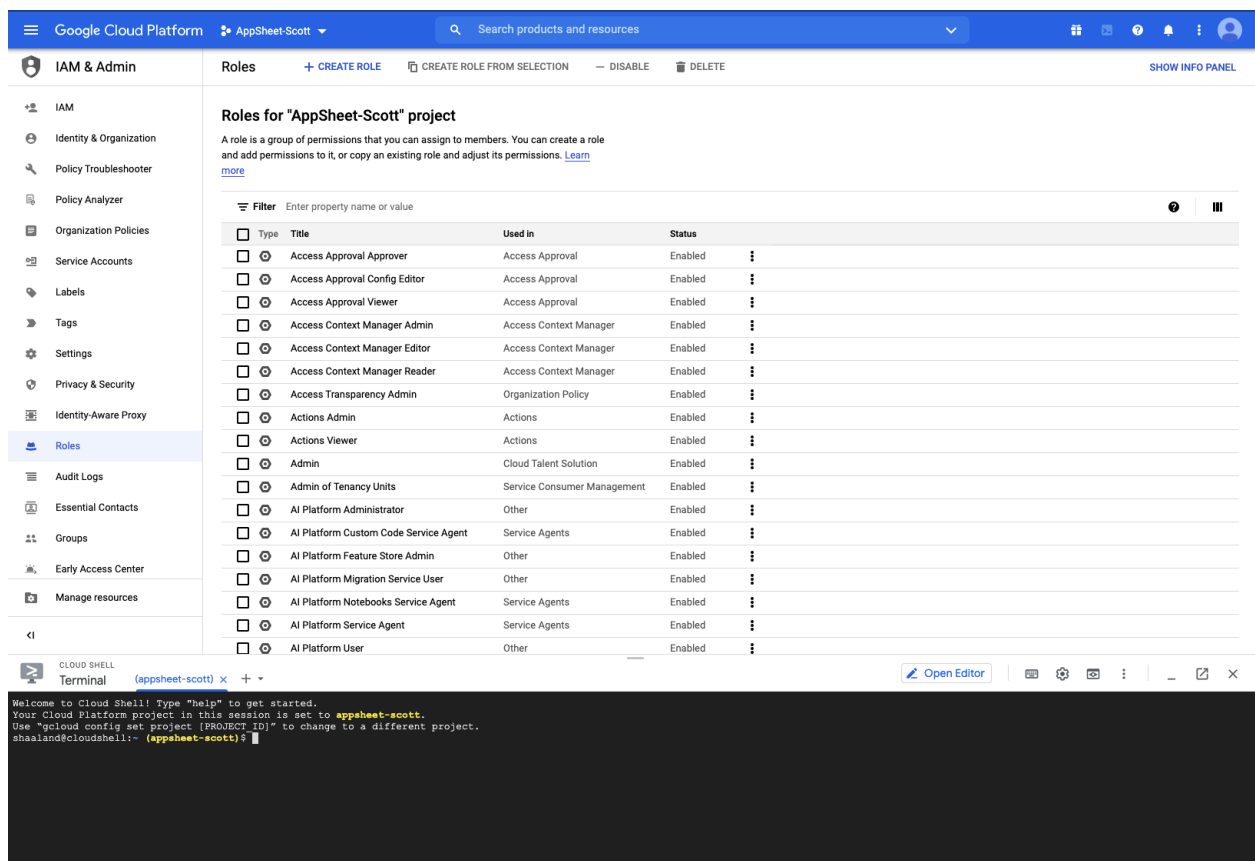
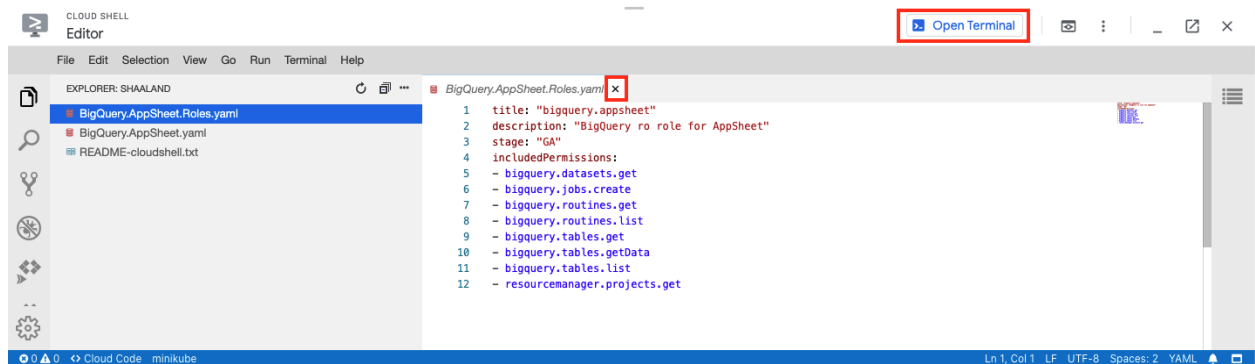
Cut and paste the following text into the file (modify the title and description values as needed for your use case):

```
title: "bigquery.appsheet"  
description: "BigQuery ro role for AppSheet"  
stage: "GA"  
includedPermissions:  
- bigquery.datasets.get  
- bigquery.jobs.create  
- bigquery.routines.get  
- bigquery.routines.list  
- bigquery.tables.get  
- bigquery.tables.getData  
- bigquery.tables.list  
- resourcemanager.projects.get
```

Remove any blank lines at the end by using backspace or delete on your keyboard. You should see 12 lines in your file, like this:



Click on the “x” in the file tab to close the file (it will automatically save). Then, click on the “Open Terminal” button to get back to the shell.



Cut and paste the following commands, one at a time. Replace the Red text with your own values. The backslash tells the shell that the command will continue on the next line :

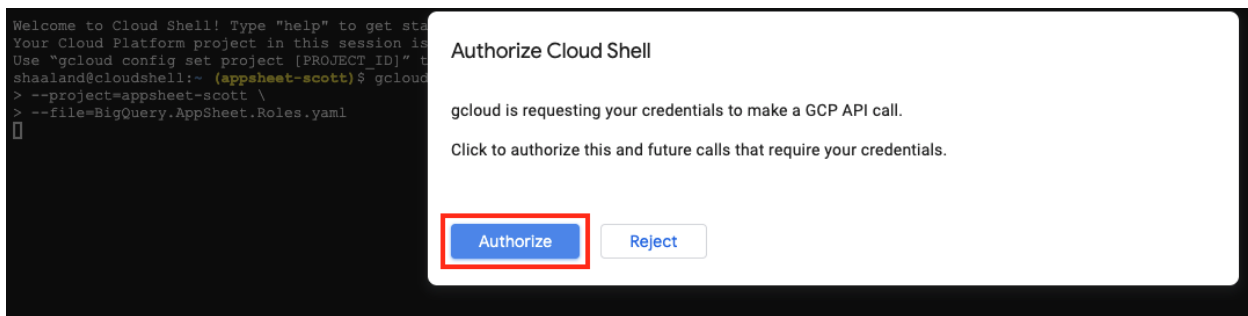
```
gcloud iam roles create <your new role name> \  
--project=<your-project-id> \  
--file=<your-YAML-File-Name.yaml>
```

Here is an example of how I filled out the Red text with my values :

```
gcloud iam roles create bigquery.appsheet3 \  
> --project=appsheet-scott \  
> --file=BigQuery.AppSheet.Roles.yaml
```

```
shaaland@cloudshell:~ (appsheet-scott)$ gcloud iam roles create bigquery.appsheet3 \  
> --project=appsheet-scott \  
> --file=BigQuery.AppSheet.Roles.yaml
```

You will now need to authorize the shell to call the API which will create the role. Click on Authorize:



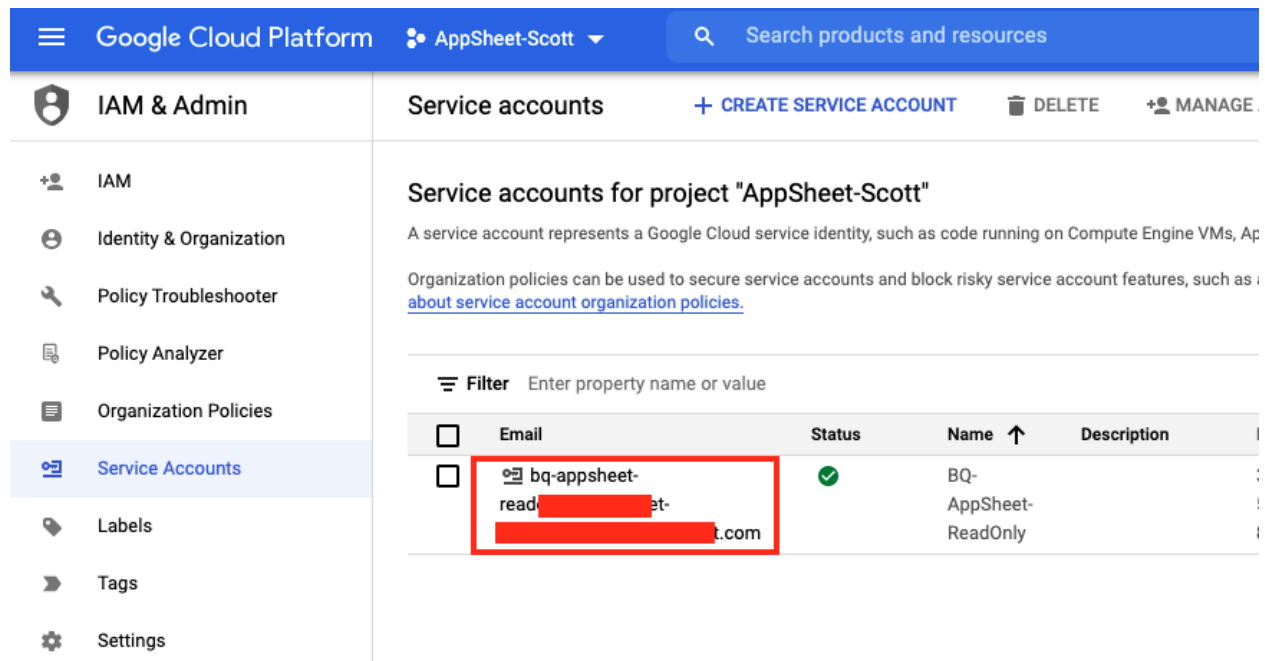
You should see the resulting text which tells you the role was successfully created:

```
shaaland@cloudshell:~ (appsheet-scott)$ gcloud iam roles create bigquery.appsheet3 \  
> --project=appsheet-scott \  
> --file=BigQuery.AppSheet.Roles.yaml  
Created role [bigquery.appsheet3].  
description: BigQuery ro role for AppSheet  
etag: BwXCKIiSfPI=  
includedPermissions:  
- bigquery.datasets.get  
- bigquery.jobs.create  
- bigquery.routines.get  
- bigquery.routines.list  
- bigquery.tables.get  
- bigquery.tables.getData  
- bigquery.tables.list  
- resourcemanager.projects.get  
name: projects/appsheet-scott/roles/bigquery.appsheet3  
stage: GA  
title: bigquery.appsheet  
shaaland@cloudshell:~ (appsheet-scott)$
```

Now, you need to share your **Private DataSet** with the role that you created so that all the permissions needed by the AppSheet BigQuery data source. The first thing you need is the user name that was assigned to your service account. Navigate to the Service Accounts

section of Google Cloud Console using the hamburger menu or go to this URL:  
<https://console.cloud.google.com/iam-admin/serviceaccounts>

Copy the email column from your BigQuery Service Account that we created earlier in this document, so that you can paste it in a few minutes. You may want to open another tab for the next step so that you can re-copy it into your mouse buffer if you lose it :

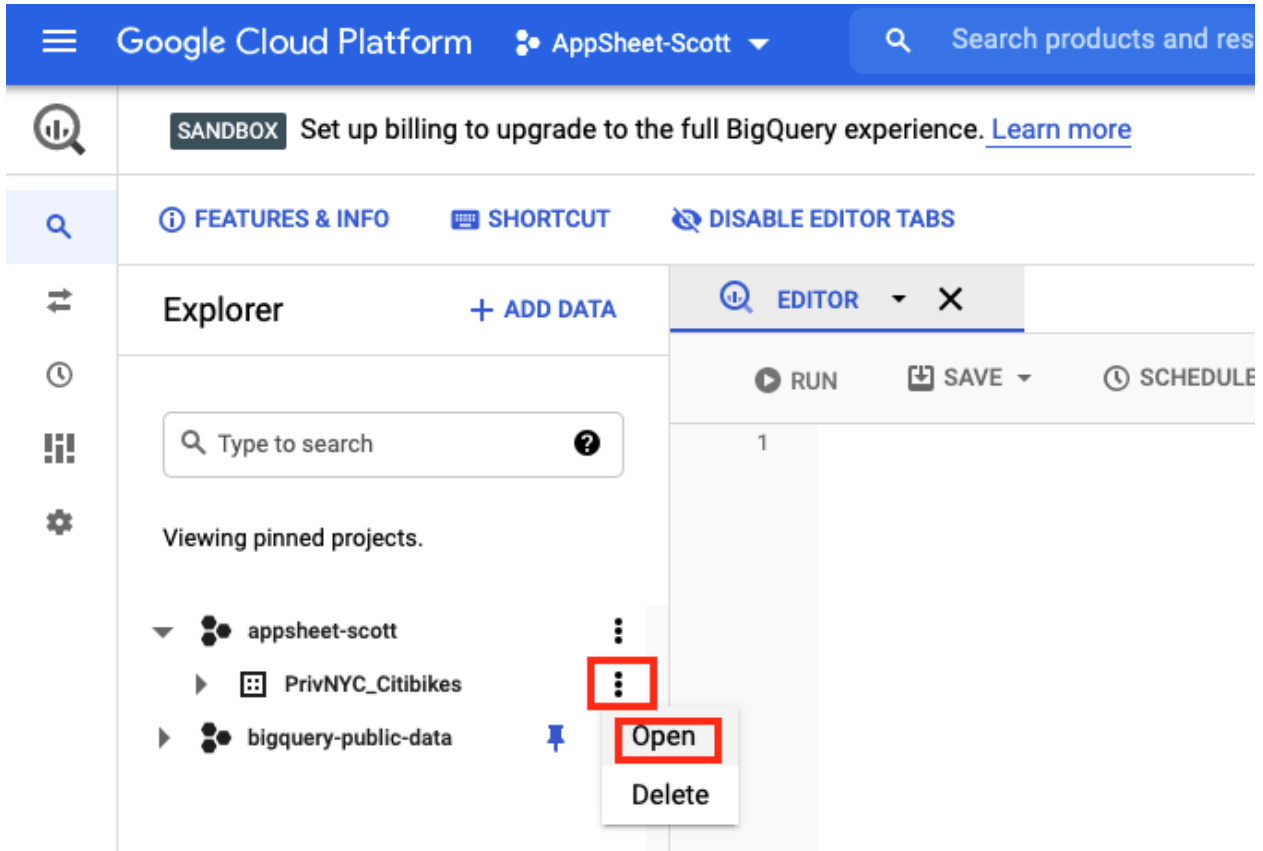


The screenshot shows the Google Cloud Platform IAM & Admin console for project "AppSheet-Scott". The left sidebar lists navigation options: IAM, Identity & Organization, Policy Troubleshooter, Policy Analyzer, Organization Policies, Service Accounts (highlighted), Labels, Tags, and Settings. The main content area is titled "Service accounts for project 'AppSheet-Scott'" and includes a table of service accounts. A filter bar is present above the table. The table has columns for Email, Status, Name, and Description. One service account is highlighted with a red box.

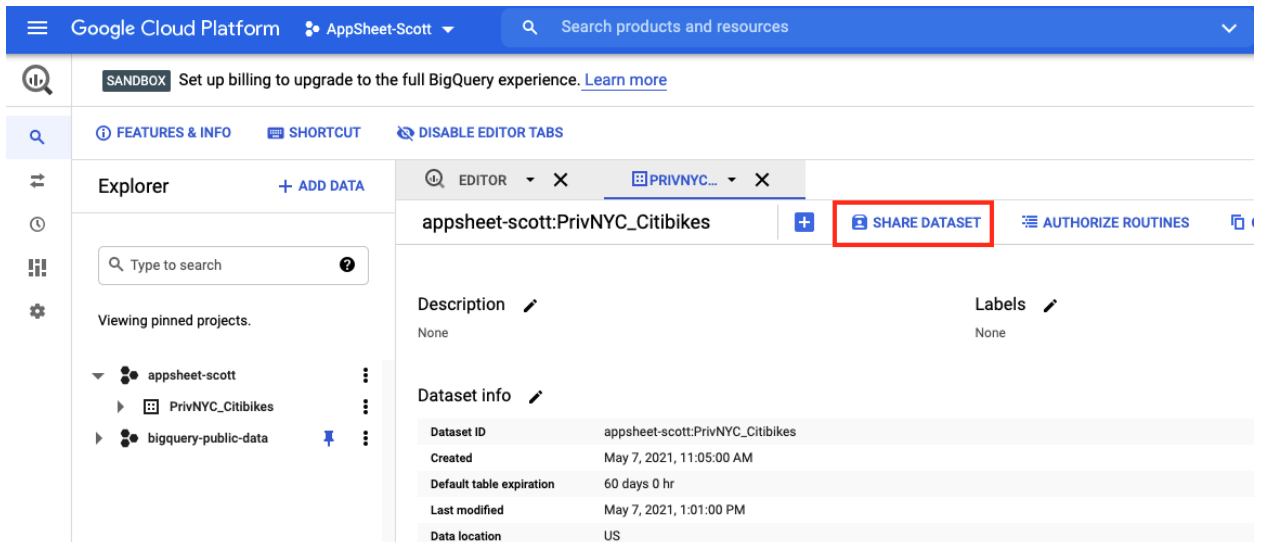
<input type="checkbox"/>	Email	Status	Name ↑	Description
<input type="checkbox"/>	bq-appsheet-read- [redacted]@ [redacted].com	✓	BQ-AppSheet-ReadOnly	

Open a new tab in your browser and go to the BigQuery service in Google Cloud Console. Use the hamburger menu in the upper left corner, or just navigate to this URL :  
<https://console.cloud.google.com/bigquery>

Find your private dataset and click on the triple dot menu on the right and then on "Open":



Click on “Share DataSet” in the BigQuery navigation bar:



Paste the Service Account email address into the Add Members text box.

Click on the “Select a role” drop down menu

Select the “Custom >” option

Select the new role you created like “bigquery.appsheet”



Click on the “Add” button.

**Dataset permissions**

To grant access to this dataset, add members and assign Identity and Access Management (IAM) roles to specify their level of access. Multiple roles allowed. You can no longer set ACLs in the console to manage access. To learn how IAM and ACLs are related, see the [documentation](#).

**DATASET PERMISSIONS** AUTHORIZED VIEWS

**Add members**

Search members

Filter by name

Owner (1 member)

Full access to all resources.

Note the new role now has a member, which is your service account. Click on the “Done” button:

## Dataset permissions

To grant access to this dataset, add members and assign Identity and Access Management (IAM) roles to specify their level of access. Multiple roles allowed.

You can no longer set ACLs in the console to manage access. To learn how IAM and ACLs are related, see the [documentation](#).

[DATASET PERMISSIONS](#) AUTHORIZED VIEWS

Add members ?

Select a role Add

Search members

Owner (1 member)

Full access to all resources.

BigQuery Data Editor (1 member)

Access to edit all the contents of datasets

BigQuery Data Owner (2 members)



Full access to datasets and all of their contents

BigQuery Data Viewer (1 member)

Access to view datasets and all of their contents

**bigquery.appsheet (1 member)**

BigQuery ro role for AppSheet

Type	Members	Inherited
	 bq-appsheet-readonly@ appsheet- scott.iam.gserviceaccount.co m	

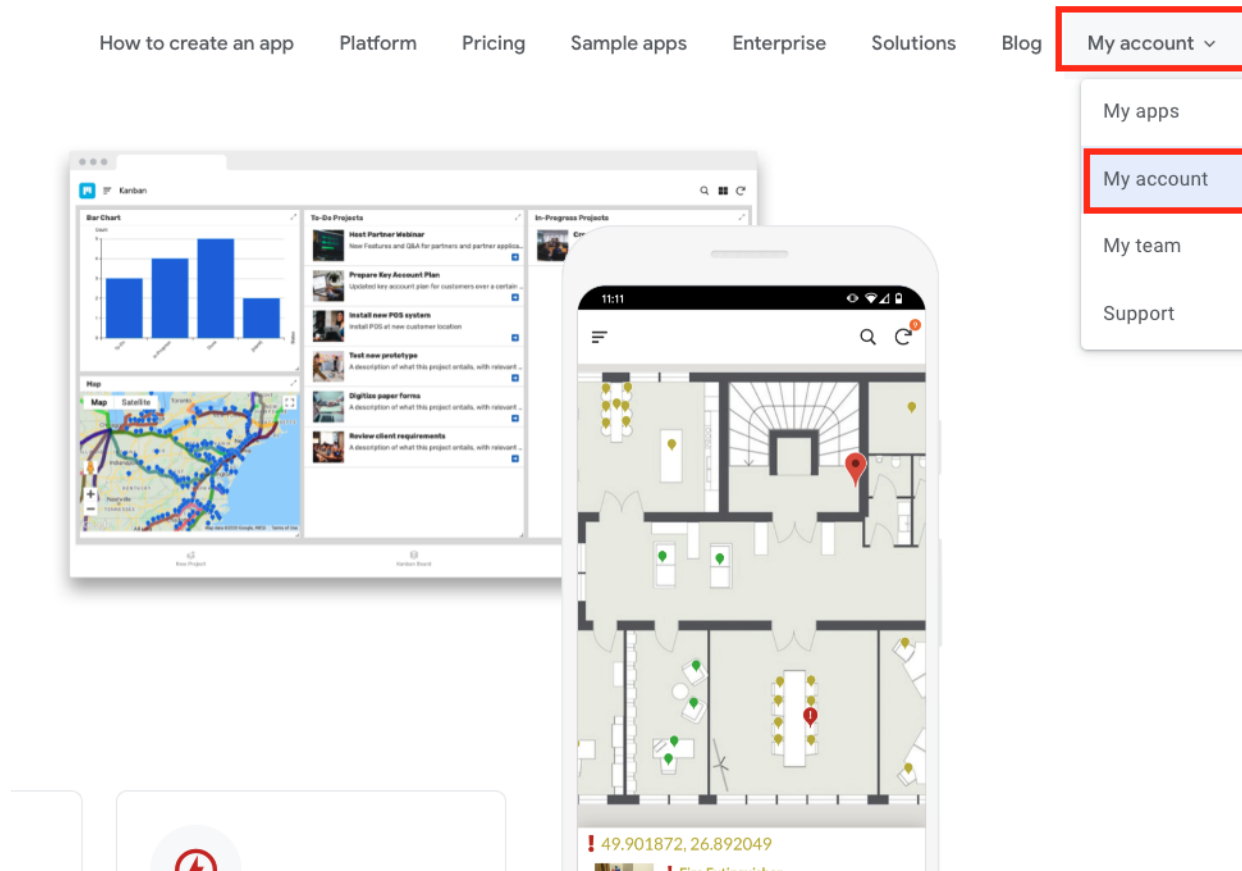
Done

Cancel

Now, you are ready to add the Data Source in AppSheet. If you were using a **Public DataSet**, then you can continue from here.

# Add the BigQuery data source to an AppSheet App

2. Go to appsheet.com and login
  - a. Go to My Account / My Account



- b. Click on the “+ New Data Source” button

# My Account

ID: 13 [REDACTED]

Plan: Business [Sign Out](#)

- Sources
- Integrations
- Policies
- Billing
- App Info
- Partner

Use this section to configure additional data sources for your account. This is a feature that allows multiple data sources (eg: from Google Drive and Dropbox) can be used together in the same app.

## Account Sources

These sources can be accessed by all apps in this account.

[+ New Data Source](#)

- c. Select “Cloud Database” and put your data source Name at the top that you’d like to use for your new data source (we used “BigQuery-NYC-Citibikes” as our name)::

### Add a new data source

BigQuery-NYC-Citibikes

Google

Microsoft

Dropbox

Smartsheet

Airtable

Apigee

Box

Cloud Database

- d. Choose the “BigQuery” option from the Dropdown list of available DB types (NOTE: If you don’t see BigQuery in the list, your account may not have this feature rolled out yet - please wait and try again tomorrow - Don’t worry, all of the

previous work you've done is still good! You can start from here.)

### Add database connection information

Type

- ✓ SQLServer
- MySQL
- DynamoDB
- Postgres
- MariaDB
- Oracle
- Redshift
- BigQuery

- e. Next, we will find the 3 input fields from back in our GCP Console and in the key file we downloaded above. We need the BigQuery DataSet ID, the Google Cloud Project ID, and the Service Account Key

### Add database connection information

Type

BigQuery

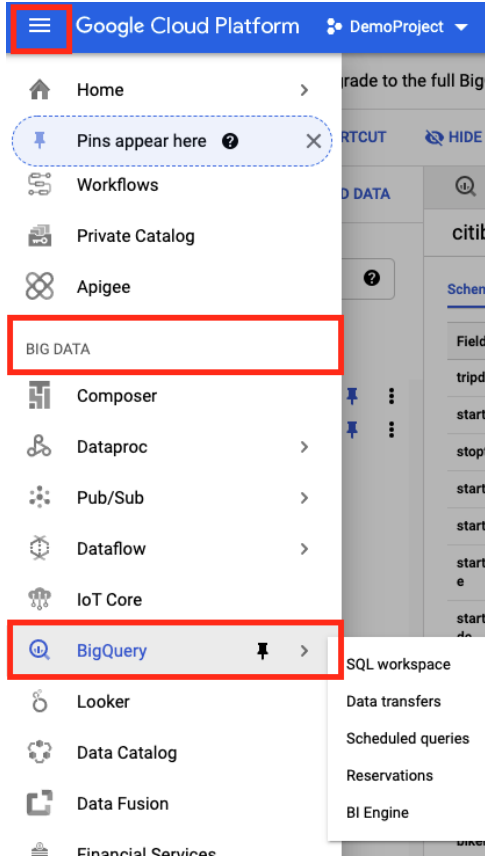
DataSet ID

Google Cloud Project ID

Service Account key



Test Authorize Access

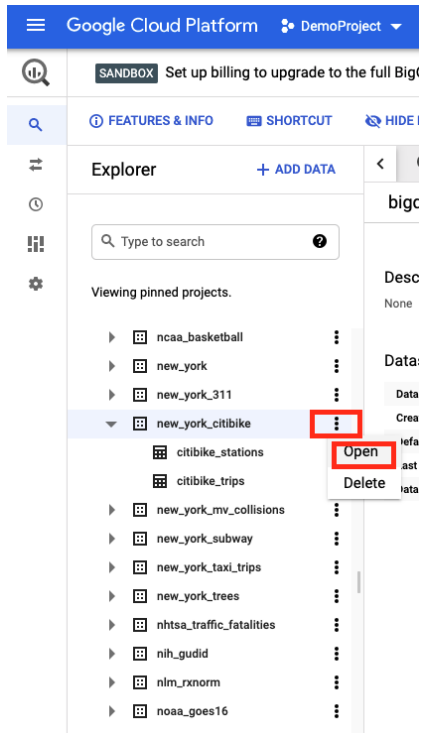
- f. DataSet ID - Go to the Google Cloud Console (<https://console.cloud.google.com>) and select "BigQuery" under the "Big Data" section. You may need to scroll down a fair bit on the main left hand hamburger menu to find it.



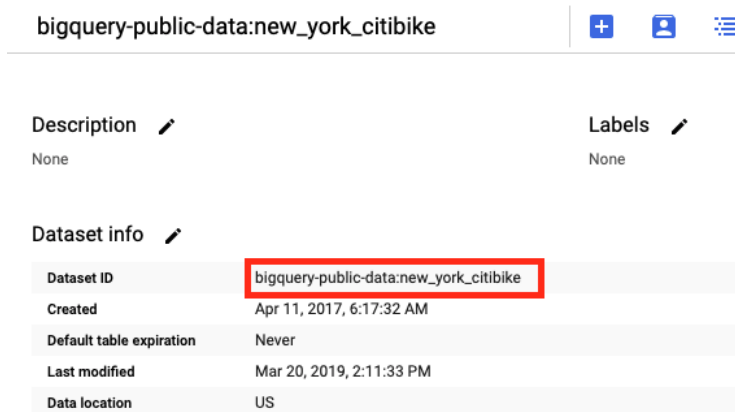
9.

- h. Find your BigQuery dataset that you'd like to use. We'll use a Public dataset called [bigquery-public-data:new\\_york\\_citibike](#) for demo/instructional purposes, but you should select the dataset that you would like to use in your app. If you don't see the dataset you want, click on the "+ ADD DATA" button and add it.
  - i. Open the dataset by clicking on the 3 vertical dots menu on the right of the dataset name. Make sure you are at the top level:

The dataset level , not on a Table level 



- ii. Copy the DataSet ID so that you can Paste it into AppSheet



- iii. Now, paste it into AppSheet's new data source window:

## Add database connection information

Type  
BigQuery

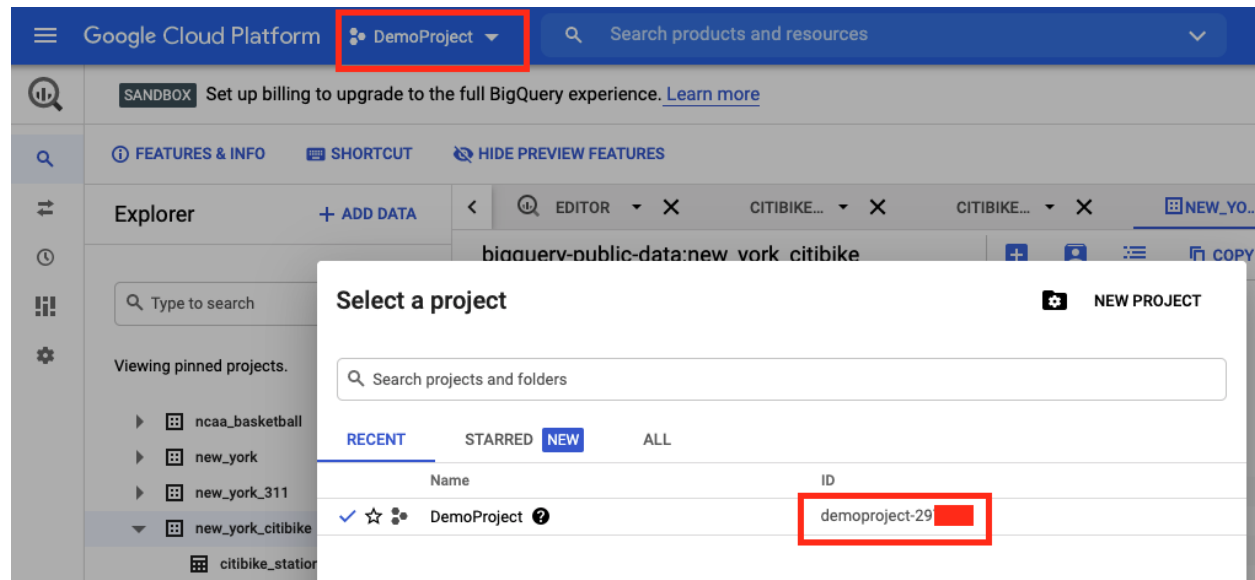
Paste DataSet ID Value here  
DataSet ID  
bigquery-public-data:new\_york\_citibike

Google Cloud Project ID

Service Account key

Test Authorize Access

- i. Google Cloud Project ID: Go back to the Google Cloud Console. Click on the Project Name at the top of the Browser, and then copy the Project ID from the pop-up so that you can paste it into AppSheet.



- j. Paste the Project Id into AppSheet



## Add database connection information

Type  
BigQuery

DataSet ID  
bigquery-public-data:new\_york\_citi

Paste the Project ID here  
Google Cloud Project ID  
demoproject-29

Service Account key

Test Authorize Access

- k. Service Account key : This is in the JSON file that was downloaded when we created the key on the Service Account in GCP Console (IAM & Admin). Find the file that was downloaded (will be in your browser's download directory) and open it with any text editor. Copy the entire contents of the file.

```
demoproject-297500-d6db503c4179.json — Downloads
1 {
2   "type": "service_account",
3   "project_id": "demoproject-29",
4   "private_key_id": "d6db503c417979dfe8b329b78de333eab77f834d",
5   "private_key": "-----BEGIN PRIVATE KEY-----\nMIIEvgIBADANBgkqhkiG9w0BAQ...",
6   "client_email": "bigquery-readonly@demoproject-29.com",
7   "client_id": "1069197622",
8   "auth_uri": "https://accounts.google.com/o/oauth2/auth",
9   "token_uri": "https://oauth2.googleapis.com/token",
10  "auth_provider_x509_cert_url": "https://www.googleapis.com/oauth2/v1/certs",
11  "client_x509_cert_url": "https://www.googleapis.com/robot/v1/metadata/x509/bigquery-readonly%40demoproject-29"
12 }
13
```

- l. Paste into AppSheet:

## Add database connection information

Type  
BigQuery

DataSet ID  
bigquery-public-data:new\_york\_citi

Google Cloud Project ID  
demoproject-297500

Paste Service Account Key from JSON file here  
Service Account key

.....

Test Authorize Access

m. Click on Test and then Authorize Access

## Add database connection information

Type  
BigQuery

DataSet ID  
bigquery-public-data:new\_york\_citi

Google Cloud Project ID  
demoproject-297500

Service Account key  
.....

Test Authorize Access

## Add a BigQuery Table to your App in AppSheet

n. On the Data Tab - Click on "+ New Table"

NYC-Citibikes

Tables Columns Slices User Settings

Not Deployed

Add new tables and modify table properties in this pane.

Table name 'NYC-Citibikes' uses special characters that are used in expressions and formulas. Consider renaming the table to remove these special characters.



Search tables

NYC-Citibikes  
source: NYC-Citibikes qualifier: Sheet1 datasource: google

- Info
- Data
- UX
- Behavior
- Automation
- Security
- Intelligence
- Users
- Manage
- Learning Center

o. Select big query nYC citibikes

Get data from...

Sheets on Google Drive Documents on Google Drive Sheets on Google Drive 2

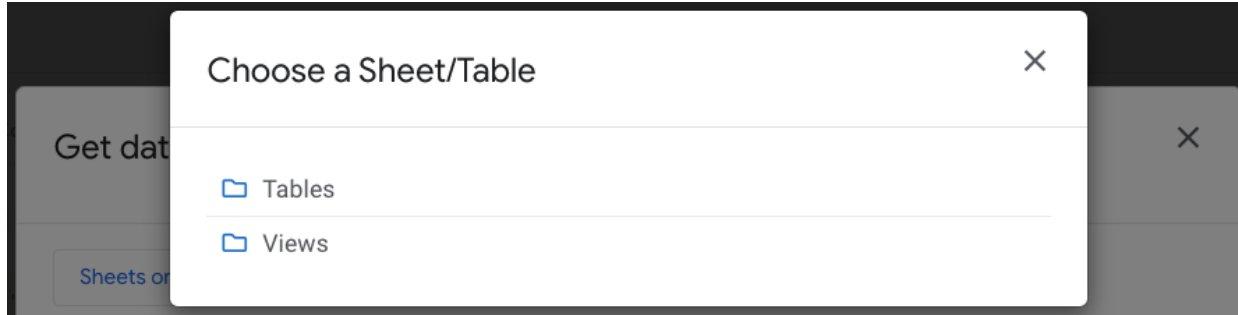
Documents on Google Drive 2 google calendar 1

big query nYC citibikes native

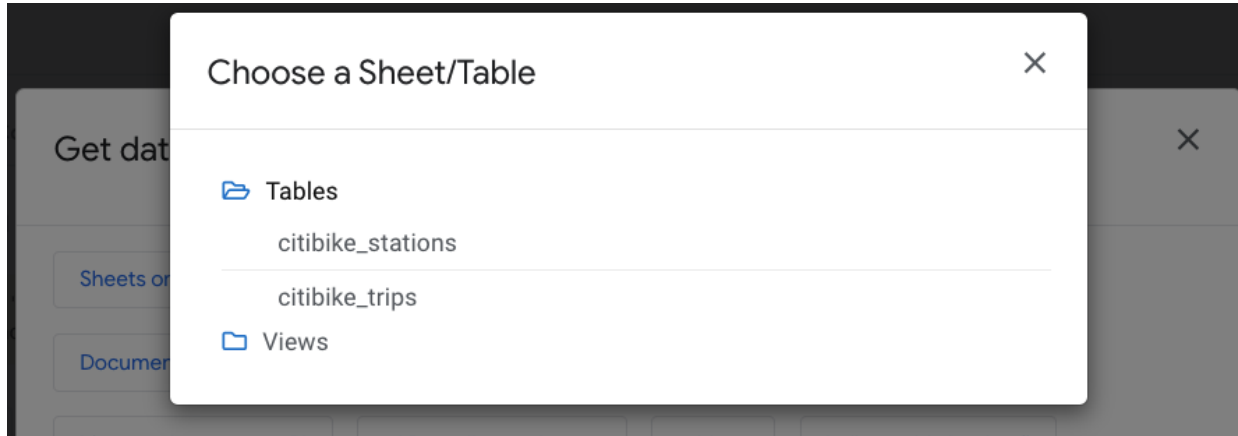
database 1 team 1102162 google calendar 1 team 931271 google calendar 2 team 931271

+

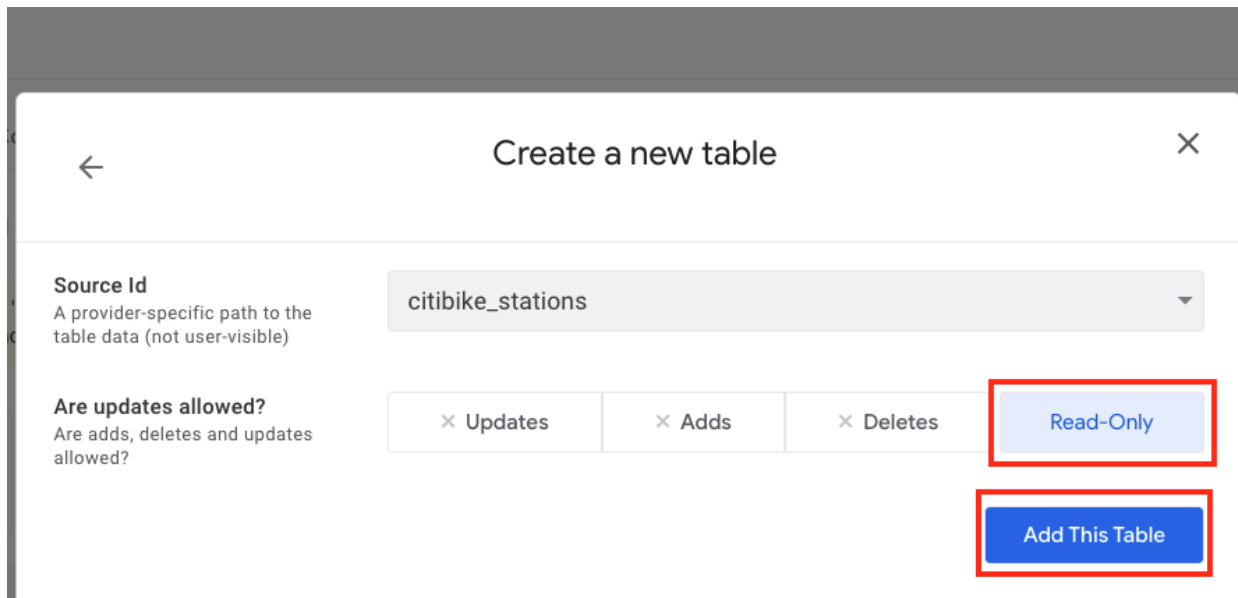
p. Select Tables or Views (we will use Tables)




- q. Select the table that you want for your App (we selected citibike\_stations):




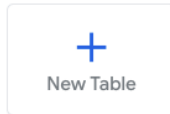
- r. Mark the table as “Read-Only” - this will improve your performance as the app will not try to recache as often. Click on the “Add This Table” button.








- s. Now, your app will have access to this data as if it were any other table.

Add new tables and modify table properties in this pane. 

 Table name 'NYC-Citibikes' uses special characters that are used in expressions and formulas. Consider renaming the table to remove these special characters. [More info](#)



 Search tables 

 <b>NYC-Citibikes</b> source: NYC-Citibikes qualifier: Sheet1 datasource: google	 <b>citibike_stations</b>  source: citibike_stations datasource: BigQuery-NYC-Citibikes
--	--

### Add database connection information

Type  
BigQuery

DataSet ID  
bigquery-public-data:stackoverflow

Google Cloud Project ID  
stoked-mode-310703

Service Account key  
.....

[Test](#) [Authorize Access](#)

Don't forget to add security filters to limit the number of rows that will be used with AppSheet.

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