Activity Overview

In previous lessons, you learned how to work with data in spreadsheets. Now, you'll practice using SQL to work with data in databases. By the time you complete this activity, you'll be able to use SQL to write queries that retrieve data from databases. Further, you'll practice navigating large public datasets in BigQuery in order to become proficient in SQL queries—an essential skill for your future career as a data analyst.

Scenario

Review the following scenario. Then complete the step-by-step instructions.

In this activity, you'll query a public dataset that contains information about the trees in New York City in 2005. You'll also use the **`AVG`** function to determine the average diameter of all NYC trees in 2005. You'll then have the opportunity to write queries using the data for 1995 and 2015 to compare the average tree diameters.

Step 1: Set up your Data

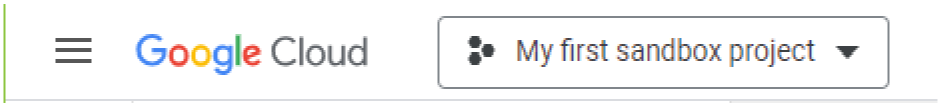
1. Log in to [BigQuery Sandbox](). On the BigQuery page, click the Go to BigQuery button.

If you have a [free-of-charge trial version of BigQuery](), you can use that instead.

Note: BigQuery Sandbox frequently updates its user interface. The latest changes may not be reflected in the screenshots presented in this activity, but the principles remain the same. Adapting to changes in software updates is an essential skill for data analysts, and it's helpful for you to practice troubleshooting. You can also reach out to your community of learners on the discussion forum for help.

2. If you haven't done so already, create a BigQuery project. (If you have a project, select it in the Explorer pane.)

a. In the BigQuery console, select the dropdown list to the right of the Google Cloud logo to open the Select a project dialog box.



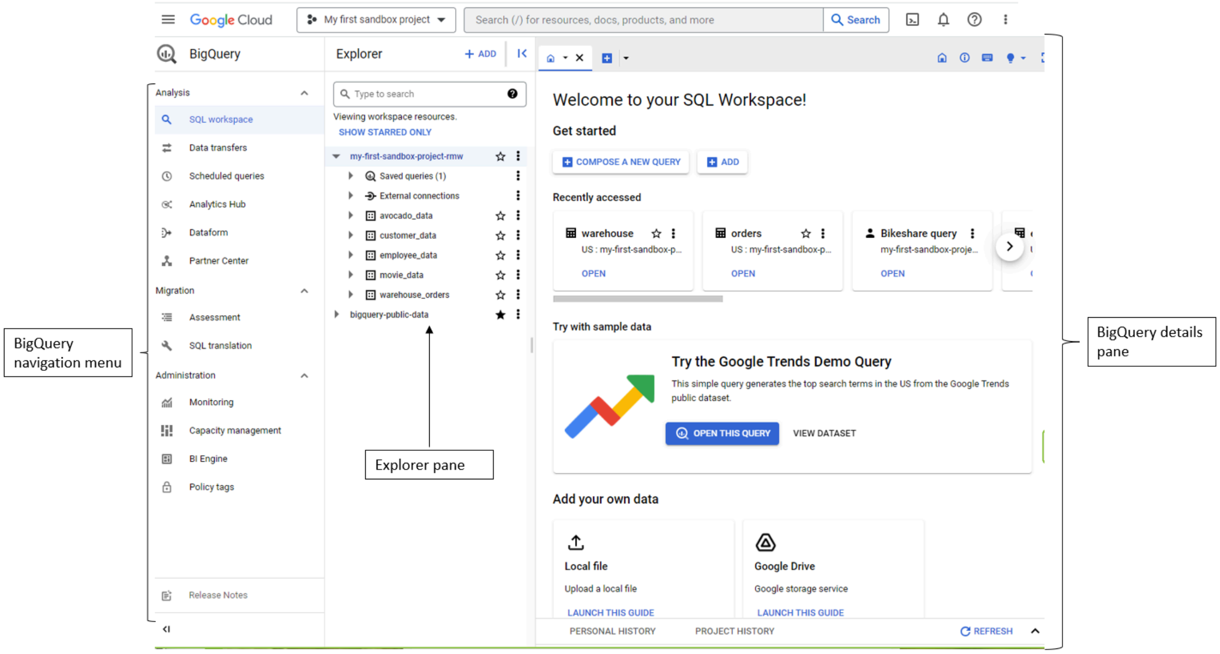
b. In the Select a project dialog box, select the CREATE PROJECT button.

c. Give your project a name that will help you identify it later. This can be a unique project ID or use an auto-generated one. You do not need to select an organization.

d. Select the CREATE button to create the project.

3. The three main sections of BigQuery are now onscreen: the BigQuery navigation menu; the Explorer pane, which you can use to search for public datasets and open projects; and the Details pane, which shows details of the database or dataset you've selected in the Explorer pane and displays windows for you to enter queries.

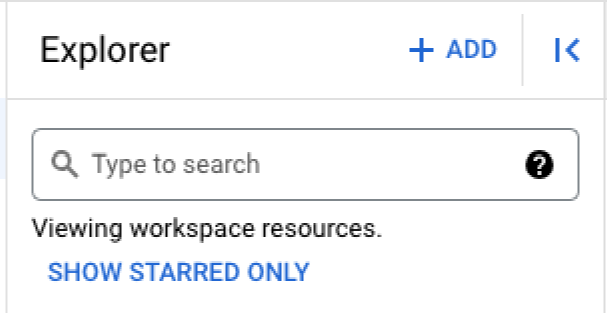
Notice that you can use the <| symbol in the BigQuery navigation menu section to collapse it. There is a similar symbol to collapse the Explorer pane.



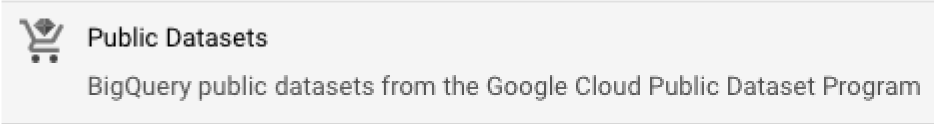
Step 2: Choose a dataset

Follow these steps to find and select the NYC Trees dataset for this activity:

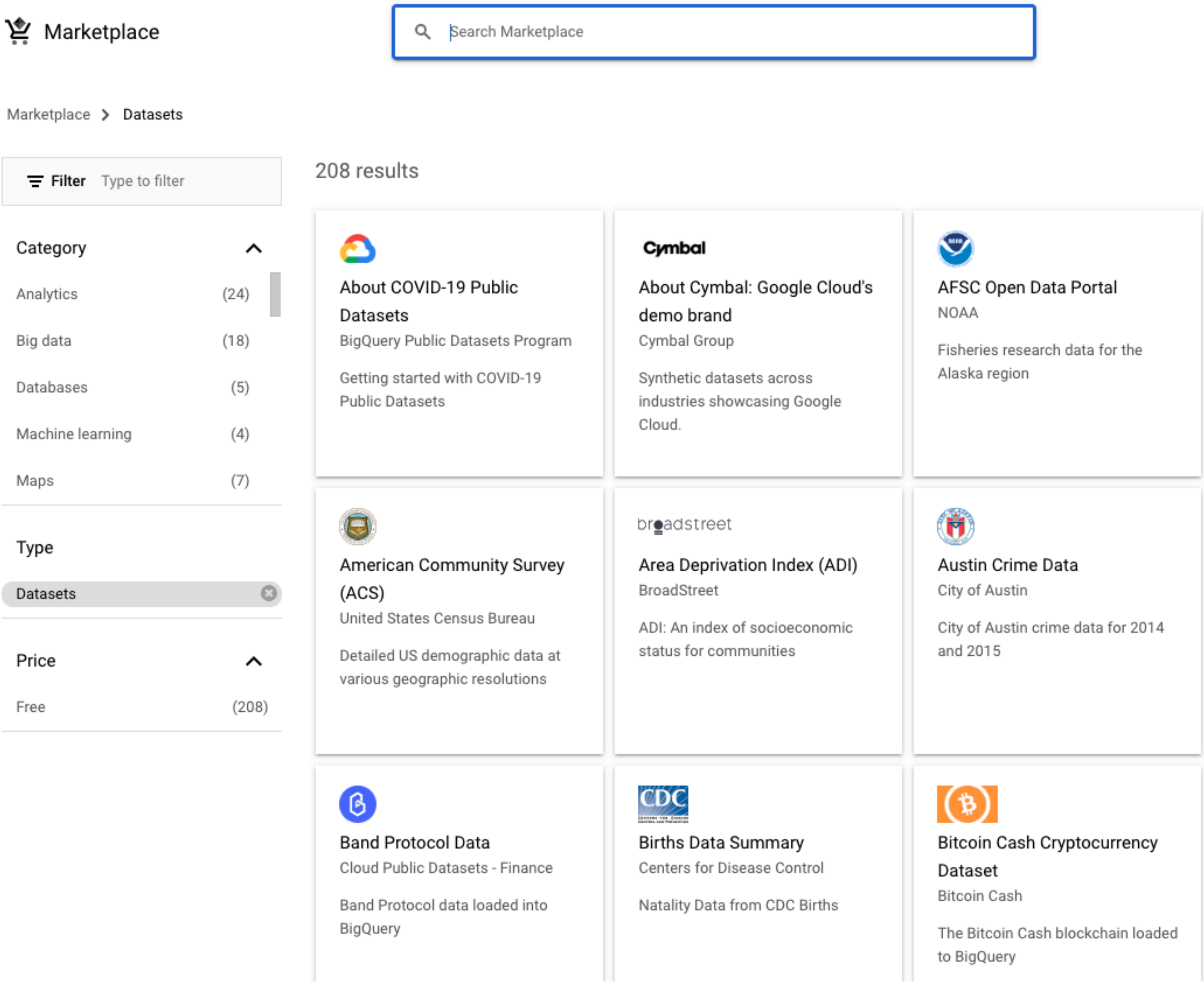
1. In the Explorer pane, select the + ADD button.



2. In the Add box that pops up, scroll down the Additional sources list. Select Public Datasets.


Public Datasets
BigQuery public datasets from the Google Cloud Public Dataset Program

3. A new box opens where you can search public datasets that are available through Google Cloud. In the Search Marketplace text box, search for New York City Trees.



208 results

Category	
Analytics	(24)
Big data	(18)
Databases	(5)
Machine learning	(4)
Maps	(7)

Type

Datasets

Price	
Free	(208)

About COVID-19 Public Datasets
BigQuery Public Datasets Program
Getting started with COVID-19 Public Datasets

About Cymbal: Google Cloud's demo brand
Cymbal Group
Synthetic datasets across industries showcasing Google Cloud.

AFSC Open Data Portal
NOAA
Fisheries research data for the Alaska region

American Community Survey (ACS)
United States Census Bureau
Detailed US demographic data at various geographic resolutions

Area Deprivation Index (ADI)
BroadStreet
ADI: An index of socioeconomic status for communities

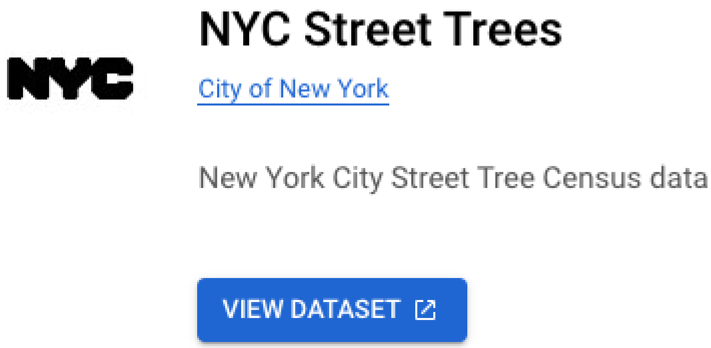
Austin Crime Data
City of Austin
City of Austin crime data for 2014 and 2015

Band Protocol Data
Cloud Public Datasets - Finance
Band Protocol data loaded into BigQuery

Births Data Summary
Centers for Disease Control
Natality Data from CDC Births

Bitcoin Cash Cryptocurrency Dataset
Bitcoin Cash
The Bitcoin Cash blockchain loaded to BigQuery

4. Select the search result NYC Street Trees, then select the View Dataset button.

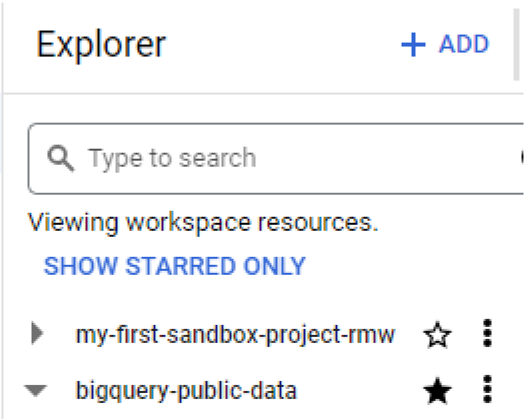

NYC Street Trees

City of New York

New York City Street Tree Census data

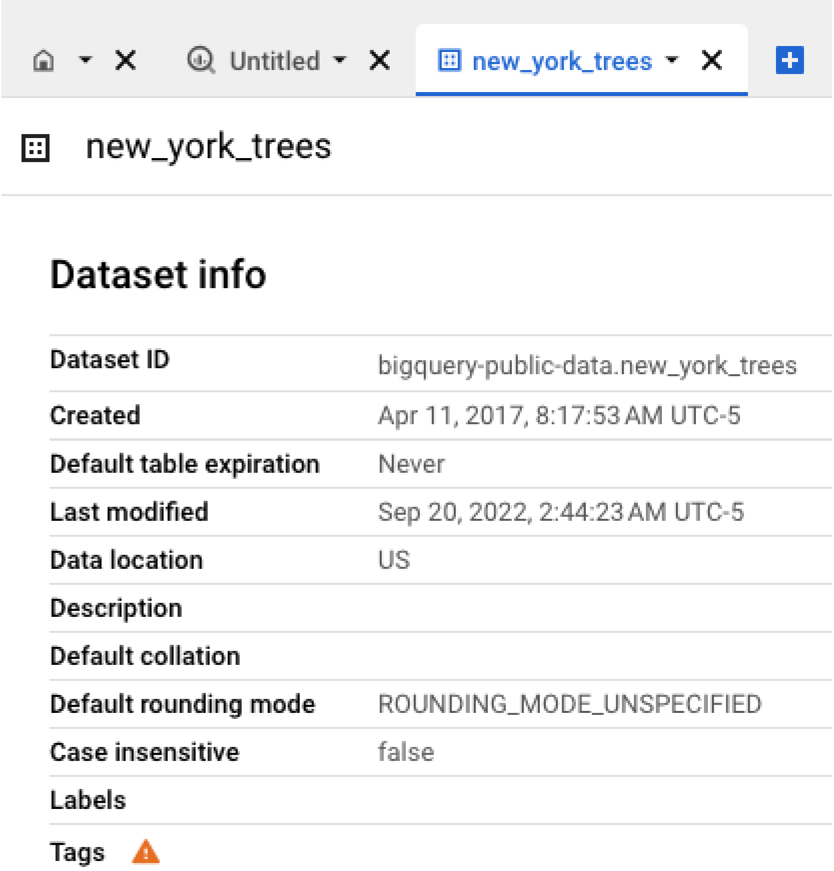
Heading is NYC Street Trees. Link to City of New York provided. Subheading is New York City Street Tree Census data. Select View dataset button to link to dataset.

5. Google Cloud opens a new browser tab displaying BigQuery with the `bigquery-public-data` collection open in the Explorer pane. To ensure the `bigquery-public-data` database remains in your project's Explorer pane, select the star next to the dataset.



Viewing workspace resources.

6. The BigQuery Details pane contains information about the `new_york_trees` dataset. This information includes the date the dataset was created, when it was last modified, and the Dataset ID.



Dataset info

Dataset ID	bigquery-public-data.new_york_trees
Created	Apr 11, 2017, 8:17:53 AM UTC-5
Default table expiration	Never
Last modified	Sep 20, 2022, 2:44:23 AM UTC-5
Data location	US
Description	
Default collation	
Default rounding mode	ROUNDING_MODE_UNSPECIFIED
Case insensitive	false
Labels	
Tags ⚠	

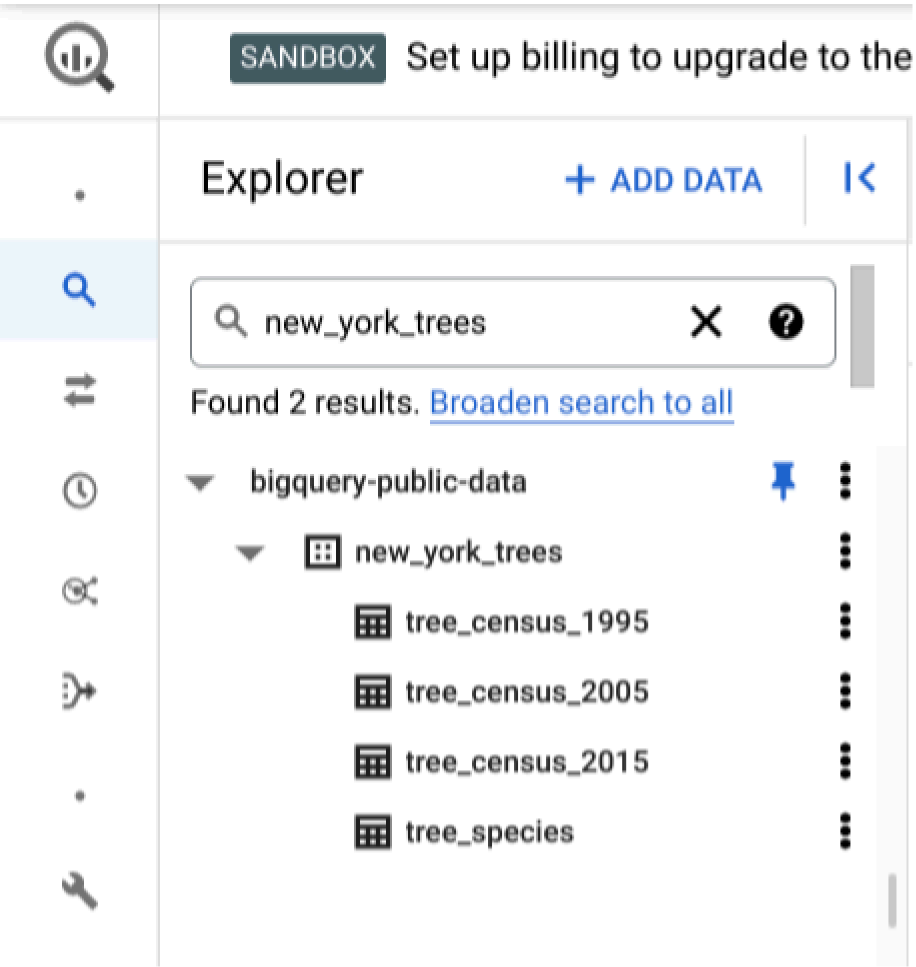
The Details pane displaying the new_york_trees data description including the dataset ID, when it was created, default table expiration, when it was last modified, the data location, description, the default collation, the default rounding mode, case insensitive, the labels, and the tags.

Step 3: Choose a table

1. In the Explorer pane, select the arrow next to the `new_york_trees` dataset to display the tables it contains.

Note: If the `new_york_trees` dataset is not in the Explorer pane, type `new_york_trees` into the Search text box in the Explorer pane. (This will work if you have pinned `bigquery-public-data` in the Explorer pane.) If search doesn't return the needed results, follow the steps above to search for the `new_york_trees` dataset.

2. Notice that the `new_york_trees` dataset contains three tree census tables from 1995, 2005, and 2015. It also contains a table that lists the tree species.



SANDBOX Set up billing to upgrade to the

new_york_trees

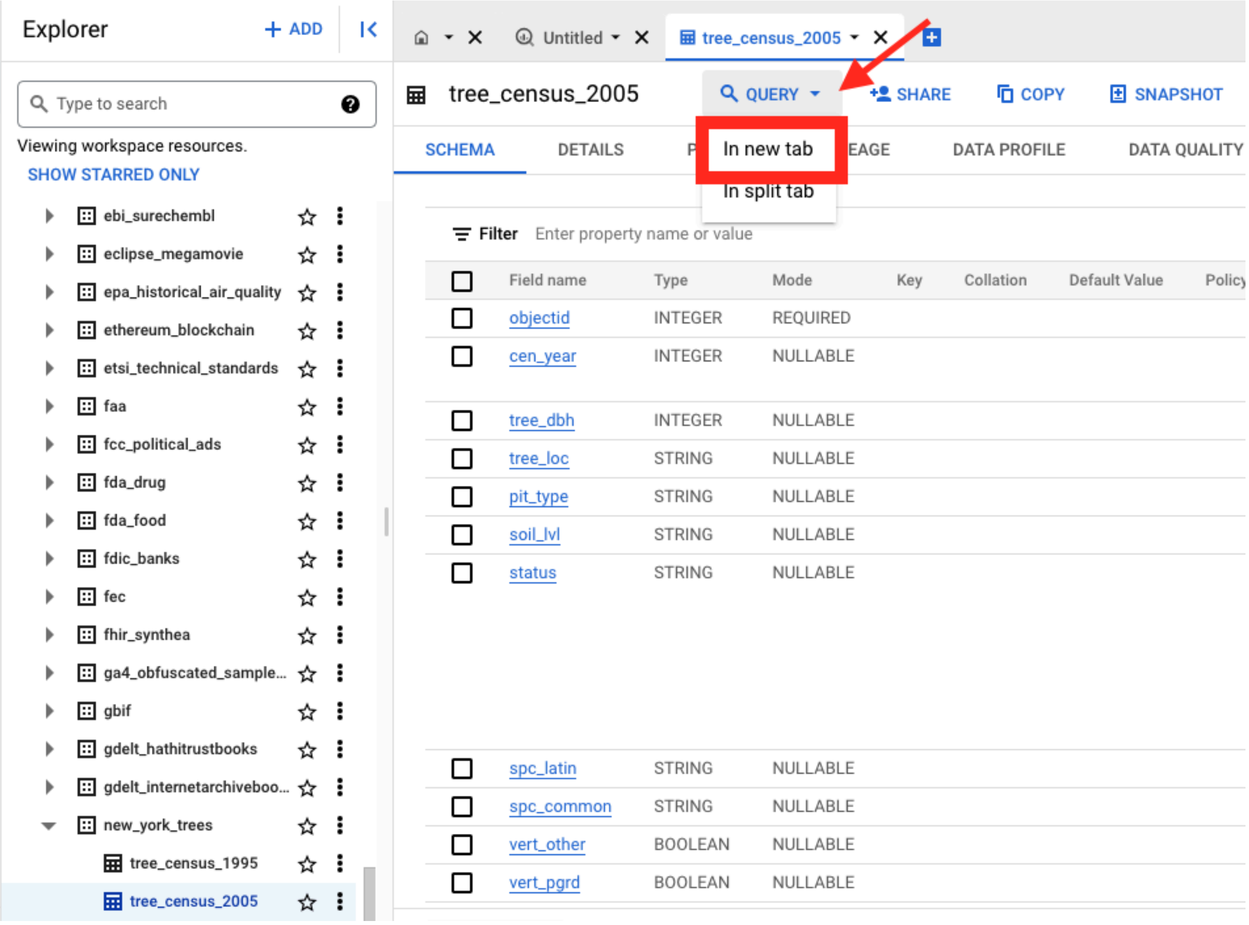
Found 2 results. Broaden search to all

In the Explorer pane, bigquery-public-data is open and the new_york_trees dataset is expanded to show the tables in the dataset are: tree_census_1995, tree_census_2005, tree_census_2015, and tree_species.

These are all tables contained in the dataset. Now, examine the data for all trees cataloged in New York City for three specific years.

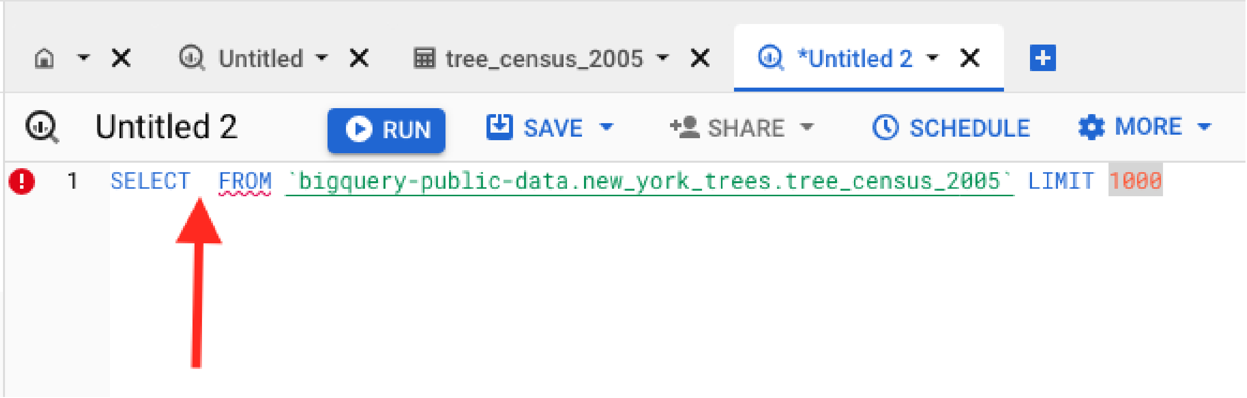
3. Select the `tree_census_2005` table. BigQuery displays the table's structure in the Details pane.

4. In the Details pane, select Query > In new tab to open a new query window.



□	Field name	Type	Mode	Key	Collation	Default Value	Policy
□	objectid	INTEGER	REQUIRED				
□	cen_year	INTEGER	NULLABLE				
□	tree_dbh	INTEGER	NULLABLE				
□	tree_loc	STRING	NULLABLE				
□	pit_type	STRING	NULLABLE				
□	soil_lvl	STRING	NULLABLE				
□	status	STRING	NULLABLE				
□	spc_latin	STRING	NULLABLE				
□	spc_common	STRING	NULLABLE				
□	vert_other	BOOLEAN	NULLABLE				
□	vert_pgrd	BOOLEAN	NULLABLE				

5. Notice that BigQuery populates the Query Window with a **SELECT** query. This query is incomplete because it doesn't contain anything in between **SELECT**and **FROM**.

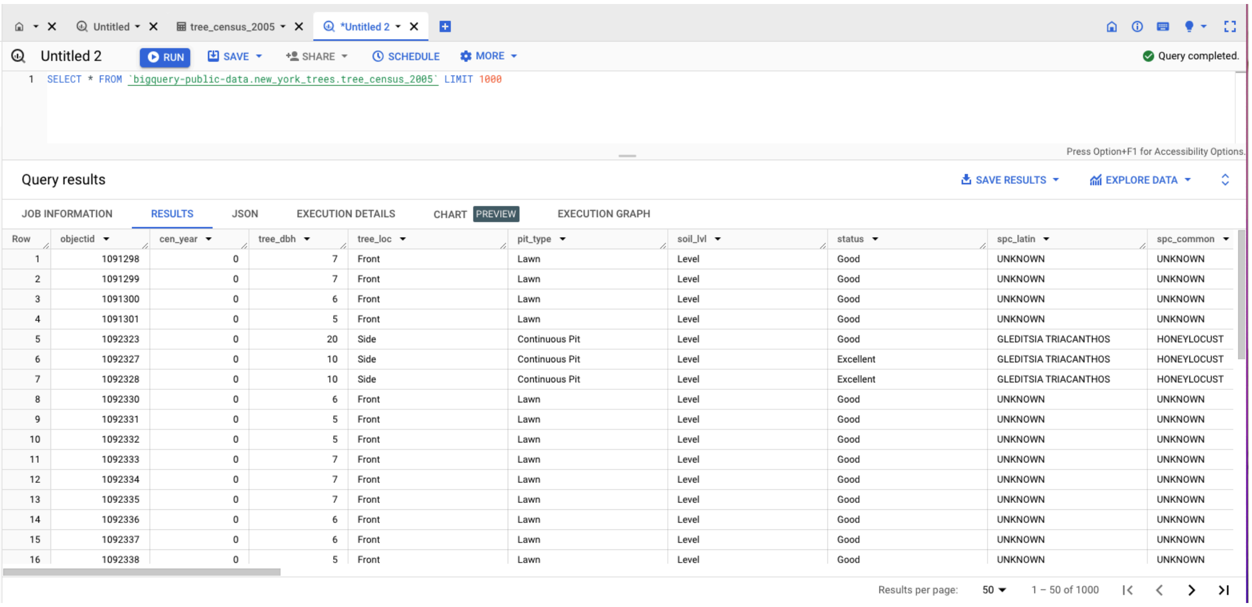


```
SELECT  FROM `bigquery-public-data.new_york_trees.tree_census_2005` LIMIT 1000
```

Step 4: Query the data

This **SELECT** statement in the Details pane is incomplete because the columns to display have not been specified. So, either list the columns separated by commas or use the asterisk to have BigQuery return all columns in the table.

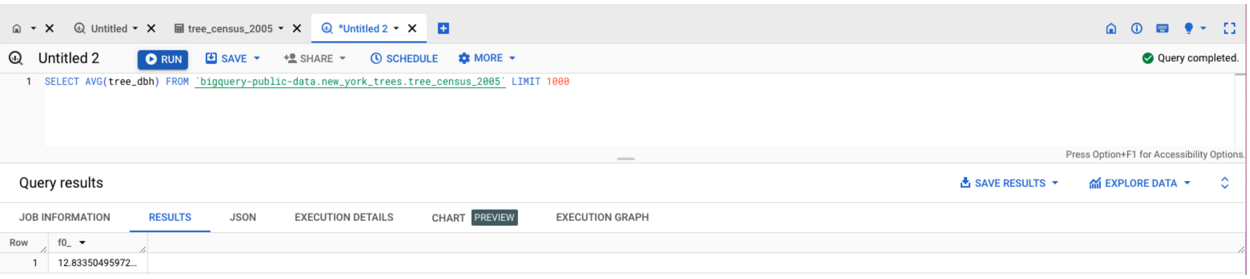
1. Type an asterisk * after the **SELECT** command in line one of the Query Editor. Your query should now read **SELECT * FROM** followed by your table location. This command tells BigQuery to return all of the columns in the **tree_census_2005** table.
2. In the Query Editor, select the Run button to run the query. The results will be displayed as a table in the Query Results pane below the Query Editor.



```
SELECT * FROM `bigquery-public-data.new_york_trees.tree_census_2005` LIMIT 1000
```

Row	objectid	cen_year	tree_dbh	tree_loc	pit_type	soil_lvl	status	spc_latin	spc_common
1	1091298	0	7	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
2	1091299	0	7	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
3	1091300	0	6	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
4	1091301	0	5	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
5	1092323	0	20	Side	Continuous Pit	Level	Good	GLEDITSIA TRIACANTHOS	HONEYLOCUST
6	1092327	0	10	Side	Continuous Pit	Level	Excellent	GLEDITSIA TRIACANTHOS	HONEYLOCUST
7	1092328	0	10	Side	Continuous Pit	Level	Excellent	GLEDITSIA TRIACANTHOS	HONEYLOCUST
8	1092330	0	6	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
9	1092331	0	5	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
10	1092332	0	5	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
11	1092333	0	7	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
12	1092334	0	7	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
13	1092335	0	7	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
14	1092336	0	6	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
15	1092337	0	6	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN
16	1092338	0	5	Front	Lawn	Level	Good	UNKNOWN	UNKNOWN

Results in the preview mode with columns with data populated including the row, object ID, cen_year, tree_dbh, tree_loc, pit_type, soil_lvl, status, spc_latin, and spc_common.
This query returns all columns for the first 1,000 rows from the table. BigQuery returns only the first 1,000 rows because the **SELECT** query includes a **LIMIT 1000** clause. This limits the rows returned to reduce the processing time required.
3. Next, write a query to find out the average diameter of all NYC trees in 2005. On line 1, replace the * after the **SELECT** command with **AVG(tree_dbh)**. Select the Run button to execute the query.



```
SELECT AVG(tree_dbh) FROM `bigquery-public-data.new_york_trees.tree_census_2005` LIMIT 1000
```

Row	f0_
1	12.83350495972...

This returns your answer, 12.833 (which means the average diameter of NYC trees in 2005 was 12.833 inches).

Step 5: Write your own queries

Now, come up with some questions and answer them with your own SQL queries. For example, query the 1995 and the 2015 tables to find the average diameter of trees. You can then compare the average diameter of the trees in all three datasets to determine whether the trees in NYC have grown on average. Note that the field name for tree diameter in the **tree_census_1995** table is diameter.

You are also free to choose another publicly available dataset in BigQuery and write your own queries for extra practice—there are many interesting choices!

Reflection

You want to compare tree sizes in 2005 to tree sizes in 2015. In the activity above, you calculated the average diameter of NYC trees in 2005. Based on the **`new_york_trees`** dataset, what is the average diameter of NYC trees in 2015?

- 12.334
- 11.439
- [✓ 11.279]
- 12.981

During this activity, you practiced writing SQL queries to return information from datasets. In the text box below, write a 2-3 sentence (40-60 words) response to each of the following questions:

- What do you think might happen if you wrote each component of a query correctly, but rearranged the order?
- How can you use SQL queries to grow as a data analyst?

Congratulations on completing this hands-on activity! A strong response would include how querying public datasets is a great way to practice SQL. Beyond that, consider the following: Data analysts use SQL to interact with databases and view data they need to analyze. This is important knowledge that will prepare you for future courses and many aspects of your career as a data analyst. In upcoming activities, you will learn and practice writing more advanced queries, which will help you master SQL, an essential tool in every data analyst’s toolkit.