Congratulations! You passed!

Grade received 100% To pass 100% or higher

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Hands-On Activity: Processing time with SQL

Total points 2

1. 1 / 1 point

Activity overview

In previous activities, you learned about and practiced SQL. In this activity, you'll work with SQL queries of different sizes.

By the time you complete this activity, you'll be familiar with the different sizes used to measure data storage. This will help you understand how data size affects the amount of time queries take to run and how valuable tools like SQL can be to data analysts.

Understand how data is measured

Data is measured by the number of **bits** it takes to represent it. All information in a computer can be represented as a binary number consisting solely of 0's and 1's. Each 0 or 1 in a number is a bit. A bit is the smallest unit of storage in computers. Since computers work in binary (Base 2), this means that all the important numbers that differentiate between different data sizes will be powers of 2.

A **byte** is a collection of 8 bits. Take a moment to examine the table below to get a feel for the difference between data measurements and their relative sizes to one another.

Unit	Equivalent to	Abbreviation	Real-World Example
Byte	8 bits	B	1 character in a string
Kilobyte	1024 bytes	KB	A page of text (~4 kilobytes)
Megabyte	1024 Kilobytes	MB	1 song in MP3 format (~2-3 megabytes)
Gigabyte	1024 Megabytes	GB	~300 songs in MP3 format
Terabyte	1024 Gigabytes	TB	~500 hours of HD video
Petabyte	1024 Terabytes	PB	10 billion Facebook photos
Exabyte	1024 Petabytes	EB	~500 million hours of HD video
Zettabyte	1024 Exabytes	ZB	All the data on the internet in 2019 (~4.5 ZB)

The amount of data in the world is exploding and growing at an incredible pace every year. This growth is largely the result of the over 4.6 billion people around the world connected to the Internet. Now that smartphones and other Internet-connected devices have become common, they generate a staggering amount of new data. Many experts believe that the size of all the data on the Internet will swell to 175 ZB by the end of 2025!

The size of the dataset you're working with usually determines which tool, spreadsheets or SQL, is best suited for the task. Spreadsheets often start to have performance issues as dataset sizes increase beyond a few megabytes. SQL databases are

much better at working with larger datasets that have billions of rows with sizes measured in gigabytes. The dataset's size still matters here--larger datasets will take longer for queries to complete, depending on the query's content and the number of rows SQL has to process to complete the query.

Query a large dataset

You'll now discover for yourself how these runtimes change with dataset size by running some queries on a huge dataset—Wikipedia!

1. Log in to BigQuery Sandbox. If you have a free trial version of BigQuery, you can use that instead. On the BigQuery page, click the **Go to BigQuery** button.

- **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 have never created a BigQuery project before, click **CREATE PROJECT** on the right side of the screen. If you have created a project before, you can use an existing one or create a new one by clicking the project dropdown in the blue header bar and selecting **NEW PROJECT**.

3. Name your project something that will help you identify it later. You can give it a unique project ID or use an auto-generated one. Don't worry about selecting an organization if you don't know what to put.

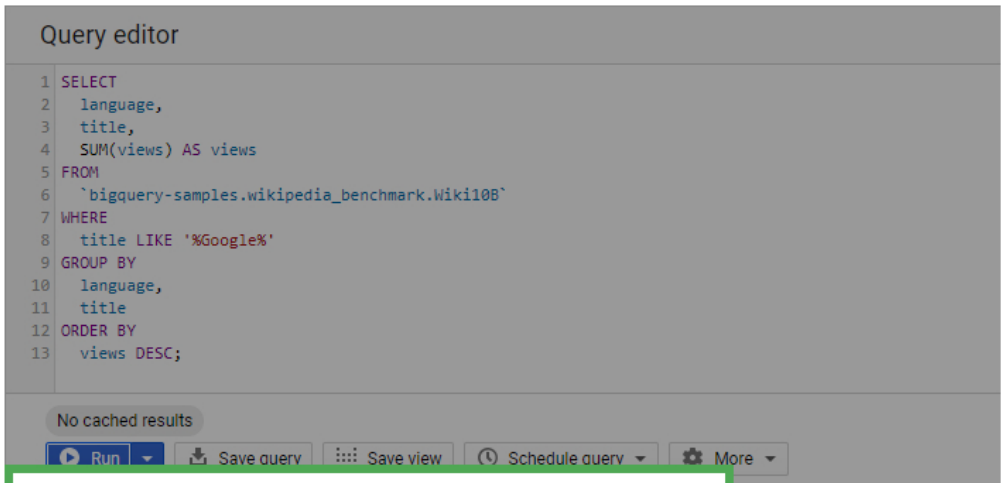
4. Now, you'll see the **Editor** interface. In the middle of the screen is a window where you can type code, and to the left is the **Explorer** menu where you can search for datasets.

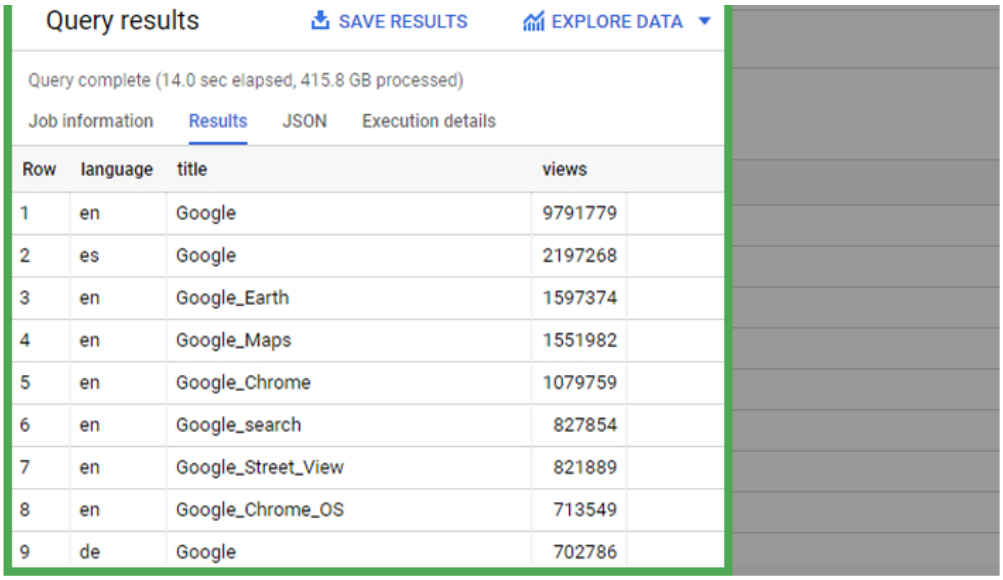
5. Copy and paste the following query into the editor and run it. The formatting is just cosmetic, so don't worry if it changes when copied over. The query should take 10-15 seconds to run:

```
    SUM(views) AS views
  FROM
    `bigquery-samples.wikipedia_benchmark.Wiki10B`
  WHERE
    title LIKE '%Google%'
  GROUP BY
    language,
    title
  ORDER BY
    views DESC;
```

Note: This query sorts and filters a dataset. You don't need to understand each detail yet. Coming up, you will learn what each part of this query means and how to use its functions in your own work.

After the query finishes, your screen should appear like this:





Query results SAVE RESULTS EXPLORE DATA

Query complete (14.0 sec elapsed, 415.8 GB processed)

Job information | Results | JSON | Execution details

Row	language	title	views
1	en	Google	9791779
2	es	Google	2197268
3	en	Google_Earth	1597374
4	en	Google_Maps	1551982
5	en	Google_Chrome	1079759
6	en	Google_search	827854
7	en	Google_Street_View	821889
8	en	Google_Chrome_OS	713549
9	de	Google	702786

This query returns a table that displays the total number of times each Wikipedia page with "Google" in the title has been viewed in each language. Note the information that BigQuery provides on the query you just ran. As you can infer from the dataset's title in the query, this dataset is a sample consisting of 10 billion rows from the Wikipedia public dataset.

You'll find that the query processes over 415 gigabytes of data when run—pretty impressive for 15 seconds! Note that if you run the query again, the runtime will be almost instant (as long as you haven't changed the default caching settings). This is because BigQuery caches the query results to avoid extra work if the query needs to be rerun.

Confirmation and reflection

In your last query, you processed 415.8 GB of data. How many rows were returned by the query?

- ○ 225,038
- ◉ 214,710
- ○ 305,710
- ○ 198,768

Correct
The last query you ran returns 214,710 rows of data. At the bottom of the data preview, you can see how many rows you returned. Going forward, you can apply this knowledge of data size measurements to better understand how much data you will work with and what tool is best suited to each data analysis project.

2. In this activity, you compared the amount of time it takes to process different sizes of queries in SQL. In the text box below, write 2-3 sentences (40-60 words) in response to each of the following questions: **1 / 1 point**

- How did working with SQL help you query a larger dataset?
- How long do you think it would take a team to query a dataset like this manually?
- How does the ability to query large datasets in reasonable amounts of time affect data analysts?

How did working with SQL help you query a larger dataset?
It is way faster compared to Excel.
How long do you think it would take a team to query a dataset like this manually?
I cannot imagine it.

How does the ability to query large datasets in reasonable amounts of time affect data analysts?
It will help by providing a way to analyze all these data really fast.

Correct

Congratulations on completing this hands-on activity! A good response would include how querying a dataset with billions of items isn't feasible without tools such as relational databases and SQL.

Performing large queries by hand would take years and years of manual work. The ability to query large datasets is an extremely helpful tool for data analysts. You can gain insights from massive amounts of data to discover trends and opportunities that wouldn't be possible to find without tools like SQL.