Congratulations! You passed!
Grade received 100%To pass 100% or higher

Activity overview

In this activity, you'll explore how the amount of data processed by a SQL query affects how long it takes the query to run.

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

Step-By-Step Instructions

Follow the instructions to complete each step of the activity. Then answer the questions at the end of the activity before going to the next course item.

Step 1: Understand How Data Is Measured

All information in a computer is represented as a binary number consisting solely of 0's and 1's. Each 0 or 1 in a number is a bit, which is the smallest unit of storage in compute neasured by the number of bits it takes to represent it. This is then described in bytes, which are equal to 8 bits.
Take a moment to examine the table below to understand each data measurement and its size relative to the others..

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

Step 2: Relate to the Amount of Data in the World

Now that you've explored data measurements, think about the amount of data in the world. It's growing at an incredible pace largely due to the more than 5.3 billion people in th connected to the internet (as of November 2023). Smartphones and other internet-connected devices generate a staggering amount of new data. Many experts believe that the all the data on the internet will swell to 175 ZB by the end of 2025!

Dataset size is important

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 issu 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. Ye dataset's size still matters here: Even in SQL, it takes longer for queries to complete when they're run on longer datasets, depending on the query's content and the number of has to process.

Step 3: Prepare to Run Queries

On the Enable the BigQuery sandbox page, select Go to BigQuery. If you have a free 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 th 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 l the discussion forum for help.
The main section is the home screen from which you can access the Query Editor. You can navigate to different projects and data sets available to you using the Explorer menu

Select Compose a new query so that you can work through an example query.

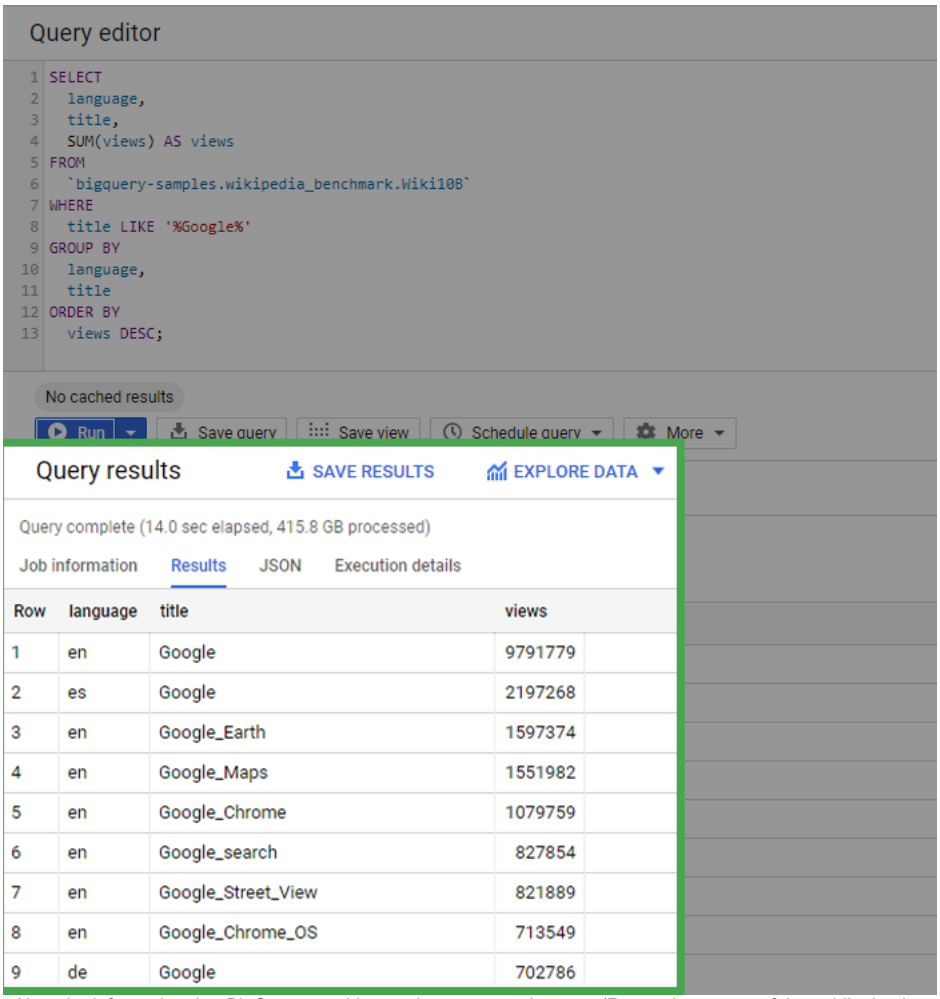
Step 4: Run a Large Query

1. Copy and paste the following query into the Query editor. Select Run to run it. The formatting improves readability, but it's okay if it changes when copied over—it won't affec code runs.
This query sorts and filters data from the dataset **`bigquery-samples.wikipedia_benchmark.Wiki10B`**, which is a sample from the Wikipedia public dataset that contains 1(ows.

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

Note: Later in this course and program, you will learn what each part of this query means and how to use its functions in your own work.

After the query finishes, you will get a table that displays the total number of times each Wikipedia page with "Google" in the title has been viewed in each language.



2. Note the information that BigQuery provides on the query you just ran. (Remember, many of the public databases on BigQuery are living records and, as such, are periodical with new data. Throughout this course (and others in this certificate program), if your results differ from those you encounter in videos or screenshots, there's a good chance it i data refresh.)

You'll find that the query processes more than 415 gigabytes of data when run—very impressive for 15 seconds! If you run the query on this dataset again, the runtime will be a nstant (as long as you haven't changed the default caching settings). This is because BigQuery caches (stores in the background) the query results to avoid extra work if the q o be rerun.

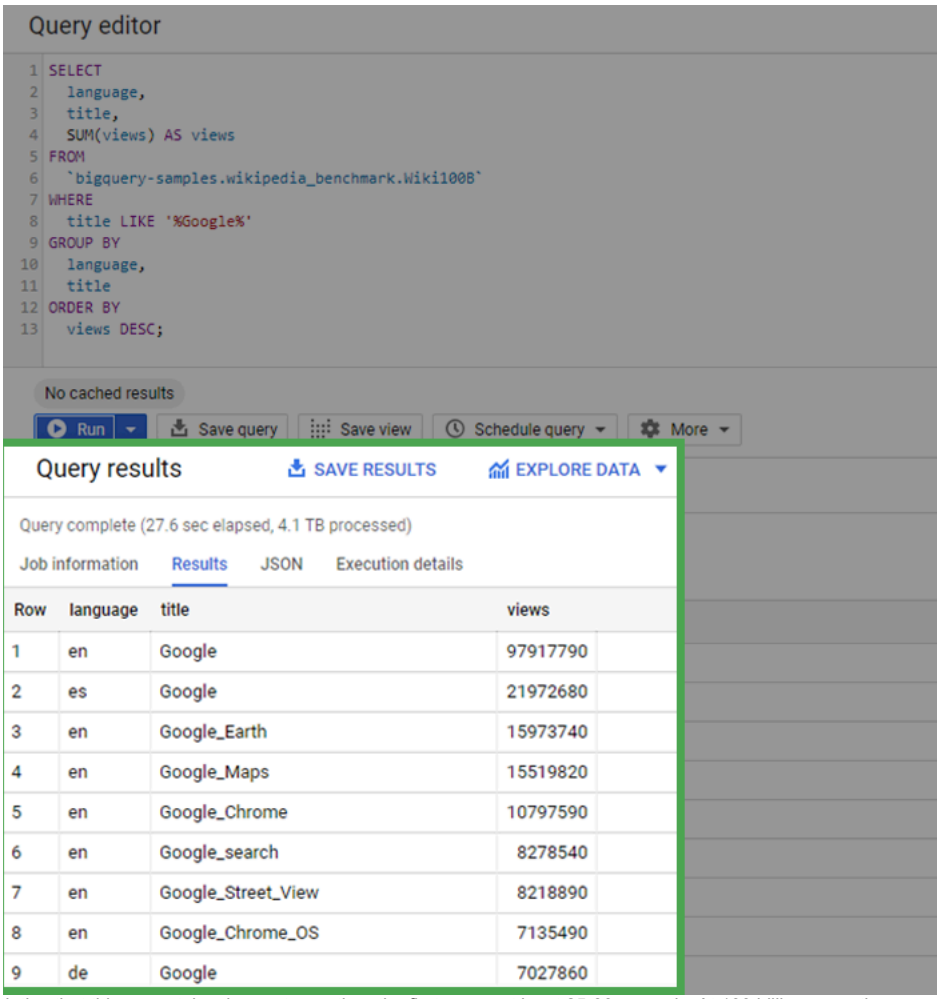
3. Run a larger query

Now, run the same query on a 100-billion-row version of the Wikipedia dataset. Copy and paste the following query into the editor and run it:

Note: This query will only run in the free trial account, not in the sandbox version of BigQuery. If you use a sandbox account, use the results presented below.

```
SELECT
  language,
  title,
  SUM(views) AS views
FROM
  `bigquery-samples.wikipedia_benchmark.Wiki100B`
WHERE
  title LIKE '%Google%'
GROUP BY
  language,
  title
ORDER BY
  views DESC;
```

After the query finishes, you will get a table that displays the total number of times each Wikipedia page with "Google" in the title has been viewed in each language.



Notice that this query takes longer to run than the first query, at least 25-30 seconds. At 100 billion rows, the query processed 4.1 terabytes of data!

1. Reflection

The first query you ran processed 415.8 GB of data. The data preview displays the number of rows the query returned. How many rows were returned by the query?

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

✓ Correct
The first query you ran returns 214,710 rows of data. 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:

- How did working with SQL help you query a larger dataset?
- How long do you think it would take a team to analyze 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?
SQL enabled efficient filtering, grouping, and sorting of a massive dataset with billions of rows. Instead of manually searching or processing the data, SQL executed complex calculations and aggregations automatically, allowing a vast dataset to be quickly summarized into meaningful insights.

How long do you think it would take a team to analyze a dataset like this manually?
Manually analyzing a dataset of this magnitude would take a team months, or even years, depending on its size and the complexity of the analysis required. Such a process would be prone to errors, as handling billions of rows manually is both time-consuming and error-prone.

How does the ability to query large datasets in reasonable amounts of time affect data analysts?
The ability to query large datasets quickly allows data analysts to focus on higher-level analysis and insights rather than data processing. This efficiency opens doors to more complex analyses, enables real-time decision-making, and enhances the ability to work with and gain insights from large-scale data, ultimately driving better business outcomes.

✓ Correct
Congratulations on completing this hands-on activity! An effective 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 manually would take years and years of 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.