Hands-On Activity: Processing time with SQL

coursera.org/learn/process-data/quiz/9flb9/hands-on-activity-processing-time-with-sql/attempt

Congratulations! You passed!

Grade received 100%

To pass 100% or higher

Activity verview

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 amount of time queries take to run and how valuable tools like SQL can be to data analysts.

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.

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 computers. Data is measured 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)

Unit	Abbreviation	Equivalent to	Example (with approximate size)
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)

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 the world 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 amount of 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 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. Yet the 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 rows SQL has to process.

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

1. 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.

    1. **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. 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.

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

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1. The query below sorts and filters data from the dataset *bigquery-samples.wikipedia_benchmark.Wiki10B*, which is a sample from the Wikipedia public dataset that contains 10 billion rows. To access the dataset, all you need to do is run the query.

Copy and paste the following query into the Query editor then select **Run** to run it. The formatting improves readability, but it's okay if it changes when copied over—it won't affect how your code runs. If you choose to type out the query, make sure you use backticks around the table, rather than quotation marks.

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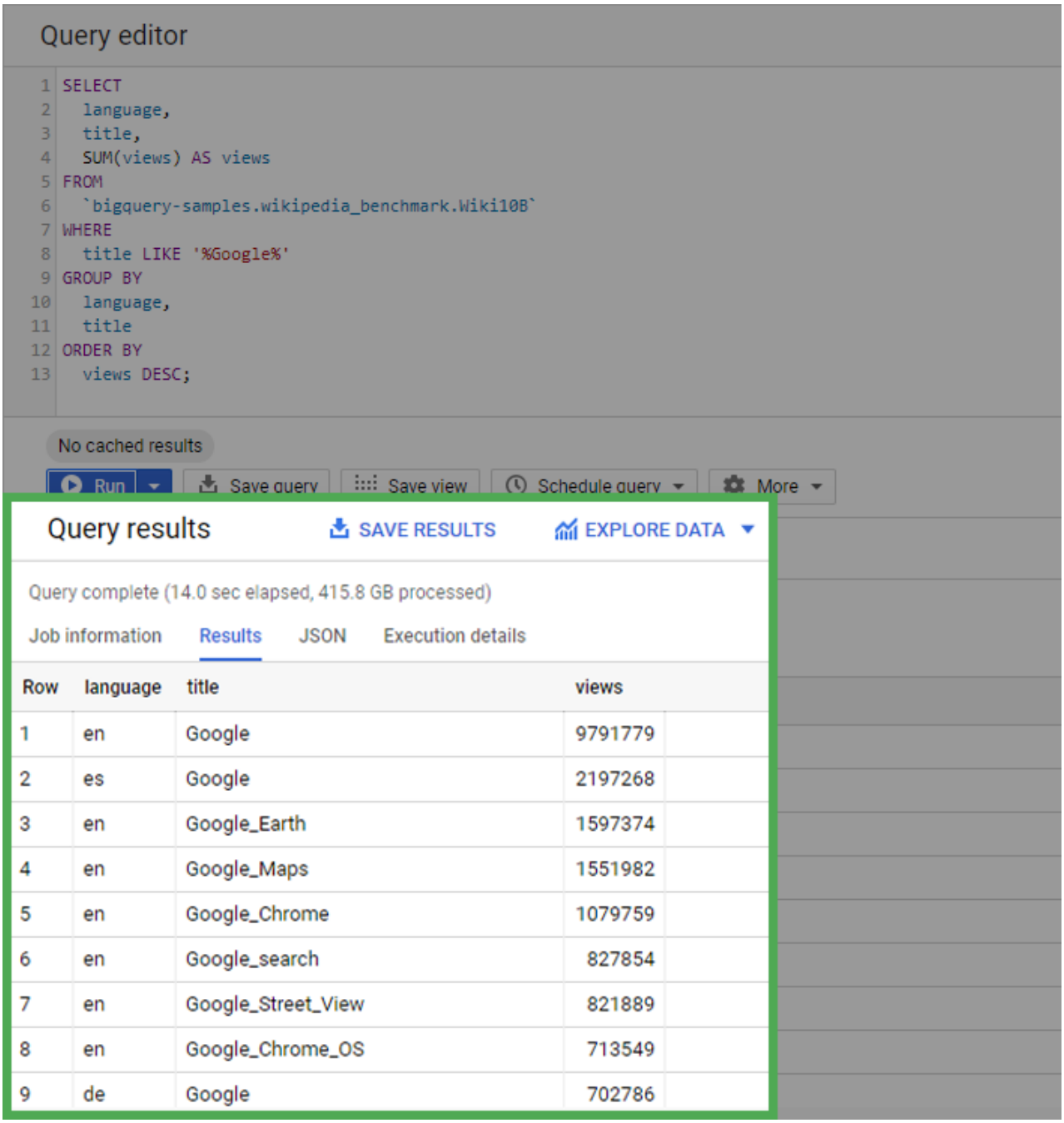
```
1
  views DESC;
  language,
  title
ORDER BY
WHERE
  title LIKE '%Google%'
GROUP BY
FROM
  `bigquery-samples.wikipedia_benchmark.Wiki10B`
  language,
  title,
  SUM(views) AS views
SELECT
```

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 periodically updated 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 is due to a 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 almost instant (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 query needs to be rerun.

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.

```
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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.

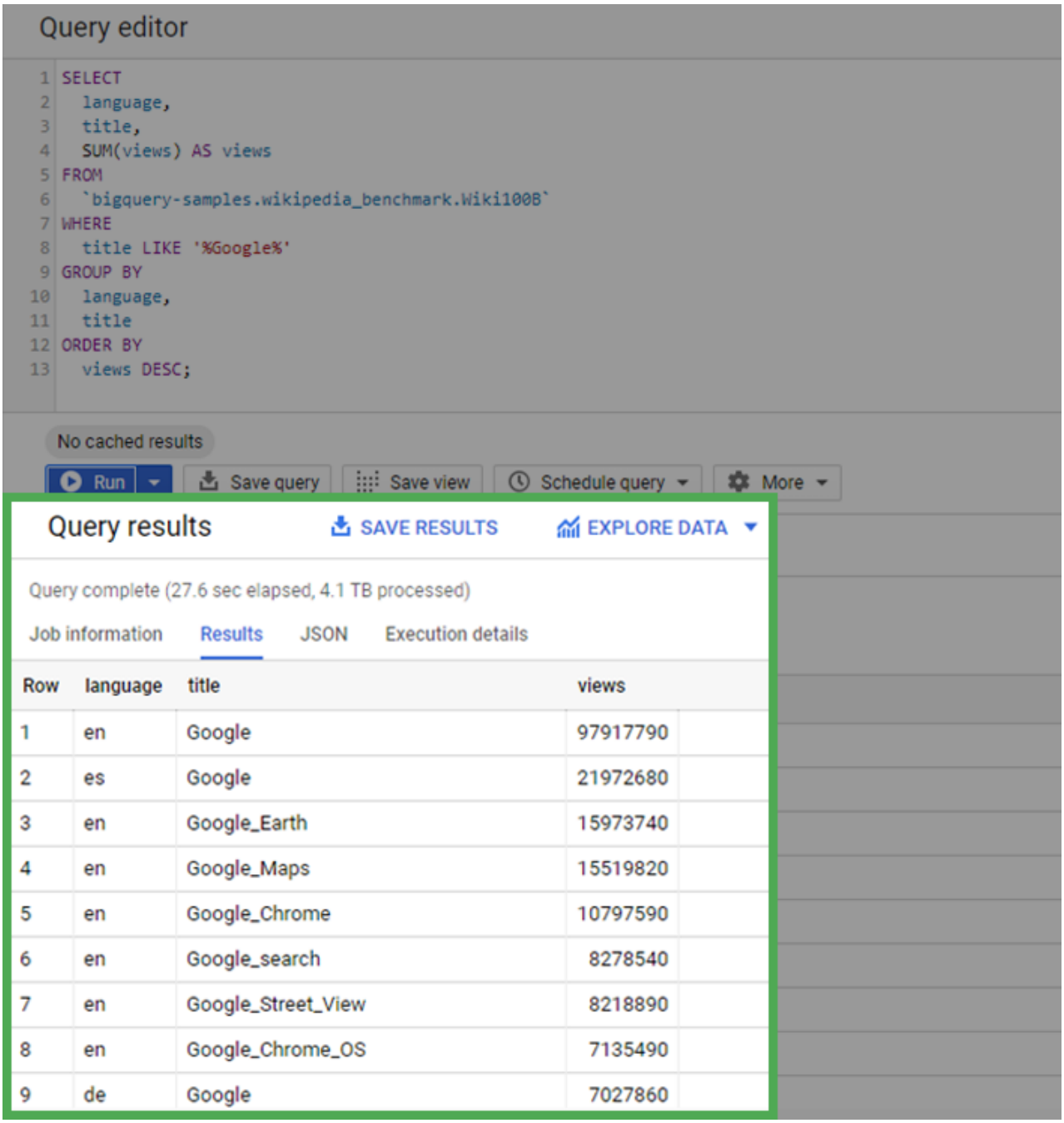

Image of the query results indicating that the query was completed in 27.6 seconds and processed 4.1 TB of data. The table returned by the query includes the rows language, title, and views.

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.

Question 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?

1 / 1 point

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.

Question 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?

1 / 1 point

- SQL's commands let me sift through the data quickly, targeting what I needed instead of manual inspection. This saved massive time. - Manually, this dataset could take a team weeks or months. Each piece of data would need individual sorting, making it slow and error-prone. - Fast querying empowers data analysts. They can uncover insights quicker, leading to better choices and efficiency.

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.