Troubleshooting Common SQL Errors with BigQuery

Overview

BigQuery is Google's fully managed, NoOps, low cost analytics database. With BigQuery you can query terabytes and terabytes of data without having any infrastructure to manage or needing a database administrator. BigQuery uses SQL, and you can take advantage of the pay-as-you-go model. BigQuery allows you to focus on analyzing data to find meaningful insights.

A newly available ecommerce dataset that has millions of Google Analytics records for the Google Merchandise Store has been loaded into BigQuery. You have a copy of that dataset for this lab and will explore the available fields and row for insights.

This lab steps you through the logic of troubleshooting queries. It provides activities within the context of a real-world scenario. Throughout the lab, imagine you're working with a new data analyst on your team, and they've provided you with their queries below to answer some questions on your ecommerce dataset. Use the answers to fix their queries to get a meaningful result.

What you'll do

In this lab, learn how to perform the following tasks:

- Query the data-to-insights public dataset
- Use the BigQuery Query editor to troubleshoot common SQL errors
- Use the Query Validator
- Troubleshoot syntax and logical SQL errors

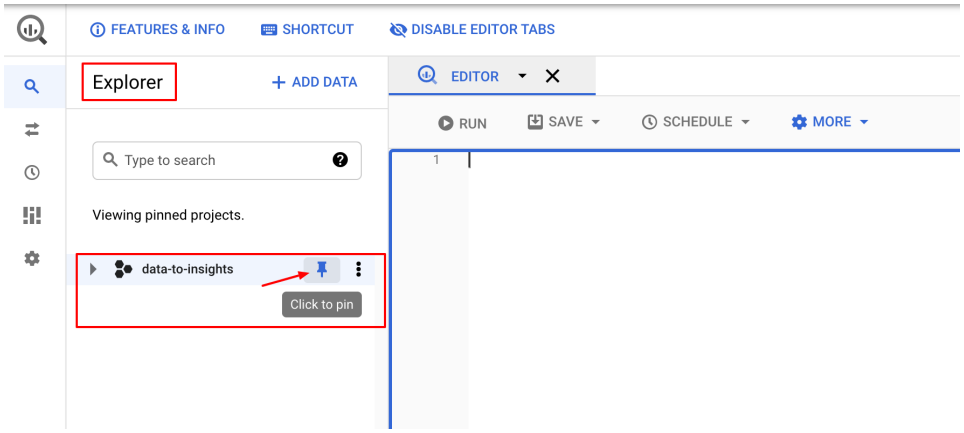
Open BigQuery and Pin a project to the Resource tree

1. Click **Navigation menu** > **BigQuery**.

The Welcome to BigQuery in the Cloud Console message box opens.

The Welcome to BigQuery in the Cloud Console message box provides a link to the quickstart guide and UI updates.

2. Click **Done**.
3. BigQuery public datasets are not displayed by default in the BigQuery web UI. To open the public datasets project, open https://console.cloud.google.com/bigquery?project=data-to-insights&page=ecommerce in a new browser window.
4. In the left pane, in the Explorer section, hover over data-to-insights and click on **Click to pin** icon.

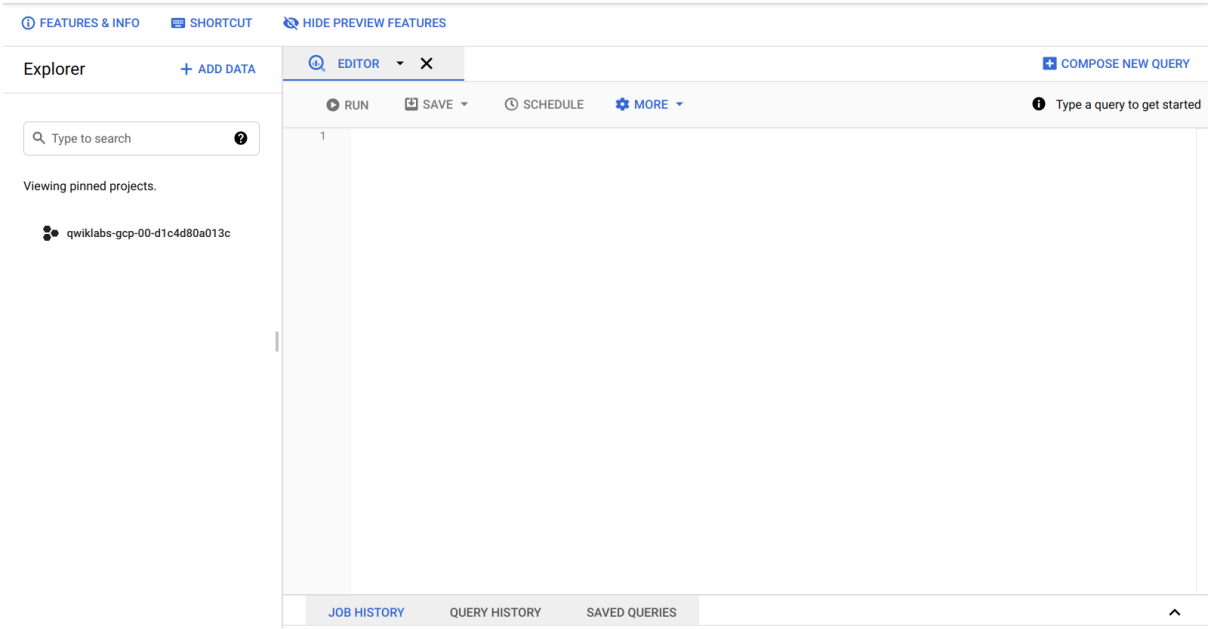


5. Close this browser window.
6. Return to and refresh the first BigQuery browser window to refresh the BigQuery web UI. The `data-to-insights` project is listed in the Explorer section.

BigQuery Code editor

For each activity in the following sections, this lab provides queries with common errors for you to troubleshoot. The lab directs you what to look at and suggests how to correct the syntax and return meaningful results.

To follow along with the troubleshooting and suggestions, copy and paste the query into the BigQuery Query editor. If there are errors, you see a red exclamation point at the line containing the error and in the query validator (bottom corner).



If you run the query with the errors, the query fails and the error is specified in the Job information.

When the query is error free, you see a green checkmark in the query validator. When you see the green checkmark, click Run to run the query to view what you get for results.

Find the total number of customers who went through checkout

Your goal in this section is to construct a query that gives you the number of unique visitors who successfully went through the checkout process for your website. The data is in the rev_transactions table which your data analyst team has provided. They have also given you example queries to help you get started in your analysis but you're not sure they're written correctly.

Troubleshoot queries that contain query validator, alias, and comma errors

Look at the below query and answer the following question:

```
#standardSQL
SELECT  FROM `data-to-inghts.ecommerce.rev_transactions` LIMIT 1000
```

What's wrong with the previous query to view 1000 items?

- *We are using legacy SQL*
- *There is a typo in the dataset name*
- *There is a typo in the table name*
- *We have not specified any columns in the SELECT*

What about this updated query?

```
#standardSQL
SELECT * FROM [data-to-insights:ecommerce.rev_transactions] LIMIT 1000
```

What's wrong with the new previous query to view 1000 items?

- *We are using legacy SQL*
- *There is a typo in the table name*
- *There is a typo in the dataset name*
- *We have not specified any columns in the SELECT*

What about this query that uses Standard SQL?

```
#standardSQL
SELECT FROM `data-to-insights.ecommerce.rev_transactions
```

What is wrong with the previous query?

- *We are still using legacy SQL*
- *We are missing an ORDER BY clause*
- *SELECT clause is returning all columns which leads to poor performance*
- *Still no columns defined in SELECT*

What about now? This query has a column.

```
#standardSQL
SELECT
fullVisitorId
FROM `data-to-insights.ecommerce.rev_transactions`
```

What is wrong with the previous query?

- The page title is missing from the columns in SELECT
- We are missing a LIMIT clause
- Without aggregations, limits, or sorting, this query is not insightful
- We are missing a column alias

What about now? The following query has a page title.

```
#standardSQL
SELECT fullVisitorId hits_page_pageTitle
FROM `data-to-insights.ecommerce.rev_transactions` LIMIT 1000
```

How many columns will the previous query return?

- the query will return an error
- columns will be returned since we are missing a comma
- columns named fullVisitorId and hits_page_pageTitle
- a column named hits_page_pageTitle

What about now? The missing comma has been corrected.

```
#standardSQL
SELECT
 fullVisitorId
```

```
 , hits_page_pageTitle
FROM `data-to-insights.ecommerce.rev_transactions` LIMIT 1000
```

Answer: This returns results, but are you sure visitors aren't counted twice? Also, returning only one row answers the question of how many unique visitors reached checkout. In the next section you find a way to aggregate your results.

Troubleshoot queries that contain logic errors, GROUP BY statements, and wildcard filters

Aggregate the following query to answer the question: How many unique visitors reached checkout?

```
#standardSQL
SELECT
  fullVisitorId
  , hits_page_pageTitle
FROM `data-to-insights.ecommerce.rev_transactions` LIMIT 1000
```

What about this? An aggregation function, `COUNT()`, was added.

```
#standardSQL

SELECT
COUNT(fullVisitorId) AS visitor_count
, hits_page_pageTitle
FROM `data-to-insights.ecommerce.rev_transactions`
```

What is wrong with the previous query?

- Nothing, it executes correctly
- It is missing a GROUP BY clause
- The COUNT() function does not de-deduplicate the same fullVisitorId
- A COUNT() function is used when SUM() should be used instead

In this next query, GROUP BY and DISTINCT statements were added.

```
#standardSQL
SELECT
COUNT(DISTINCT fullVisitorId) AS visitor_count
, hits_page_pageTitle
FROM `data-to-insights.ecommerce.rev_transactions`
GROUP BY hits_page_pageTitle
```

Row	visitor_count	hits_page_pageTitle
1	19981	Checkout Confirmation
2	1	6: Checkout Confirmation
3	1	2 Checkout Confirmation
4	1	11: Checkout Confirmation
5	1	2: Checkout Confirmation
6	1	Checkout Confirmation - https://shop.googlemerchandisestore.com/ordercompleted.html?vid=20160512512&orderDataId=33312
7	1	Checkout Confirmation - https://shop.googlemerchandisestore.com/ordercompleted.html?vid=20160512512&orderDataId=13522
8	1	Mugs & Cups | Drinkware | Google Merchandise Store

Table JSON

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Great! The results are good, but they look strange. Filter to just "Checkout Confirmation" in the results.

```
#standardSQL
SELECT
COUNT(DISTINCT fullVisitorId) AS visitor_count
, hits_page_pageTitle
FROM `data-to-insights.ecommerce.rev_transactions`
WHERE hits_page_pageTitle = "Checkout Confirmation"
GROUP BY hits_page_pageTitle
```

List the cities with the most transactions with your ecommerce site

Troubleshoot ordering, calculated fields, and filtering after aggregating errors

Complete the partially written query:

```
SELECT
geoNetwork_city,
totals_transactions,
COUNT( DISTINCT fullVisitorId) AS distinct_visitors
FROM
`data-to-insights.ecommerce.rev_transactions`
GROUP BY
```

Possible solution

```
#standardSQL
SELECT
geoNetwork_city,
SUM(totals_transactions) AS totals_transactions,
COUNT( DISTINCT fullVisitorId) AS distinct_visitors
FROM
`data-to-insights.ecommerce.rev_transactions`
GROUP BY geoNetwork_city
```

Update your previous query to order the top cities first.

Which city had the most distinct visitors? Ignore the value: 'not available in this demo dataset'

- San Jose
- Austin
- Los Angeles
- Mountain View

Possible solution

```
#standardSQL
SELECT
geoNetwork_city,
SUM(totals_transactions) AS totals_transactions,
COUNT( DISTINCT fullVisitorId) AS distinct_visitors
FROM
`data-to-insights.ecommerce.rev_transactions`
GROUP BY geoNetwork_city
ORDER BY distinct_visitors DESC
```

Update your query and create a new calculated field to return the average number of products per order by city.

Possible solution

```
#standardSQL
SELECT
geoNetwork_city,
SUM(totals_transactions) AS total_products_ordered,
COUNT( DISTINCT fullVisitorId) AS distinct_visitors,
SUM(totals_transactions) / COUNT( DISTINCT fullVisitorId) AS avg_products_ordered
FROM
`data-to-insights.ecommerce.rev_transactions`
GROUP BY geoNetwork_city
ORDER BY avg_products_ordered DESC
```

Results

Row	geoNetwork_city	total_products_ordered	distinct_visitors	avg_products_ordered
1	Jakarta	254	7	36.285714285714285
2	Maracaibo	409	21	19.476190476190474
3	Salem	252	16	15.75
4	Quito	15	1	15.0
5	North Attleborough	13	1	13.0
6	Fort Collins	11	1	11.0
7	Atwater	17	2	8.5
8	Ahmedabad	8	1	8.0

Table JSON

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Filter your aggregated results to only return cities with more than 20 avg_products_ordered.

What's wrong with the following query?

```
#standardSQL
SELECT
geoNetwork_city,
SUM(totals_transactions) AS total_products_ordered,
COUNT( DISTINCT fullVisitorId) AS distinct_visitors,
SUM(totals_transactions) / COUNT( DISTINCT fullVisitorId) AS avg_products_ordered
FROM
`data-to-insights.ecommerce.rev_transactions`
WHERE avg_products_ordered > 20
GROUP BY geoNetwork_city
ORDER BY avg_products_ordered DESC
```

What is wrong with the previous query?

- Nothing, it executes correctly
- You cannot filter on aliased fields within the `WHERE` clause
- You cannot divide non-similar aggregate functions
- You cannot filter aggregated fields in the `WHERE` clause (use `HAVING` instead).

Possible solution

```
#standardSQL
SELECT
geoNetwork_city,
SUM(totals_transactions) AS total_products_ordered,
```

```
COUNT( DISTINCT fullVisitorId) AS distinct_visitors,
SUM(totals_transactions) / COUNT( DISTINCT fullVisitorId) AS avg_products_ordered
FROM
`data-to-insights.ecommerce.rev_transactions`
GROUP BY geoNetwork_city
HAVING avg_products_ordered > 20
ORDER BY avg_products_ordered DESC
```

Find the total number of products in each product category

Find the top selling products by filtering with NULL values

What's wrong with the following query? How can you fix it?

```
#standardSQL
SELECT hits_product_v2ProductName, hits_product_v2ProductCategory
FROM `data-to-insights.ecommerce.rev_transactions`
GROUP BY 1,2
```

What is wrong with the previous query?

- Large GROUP BYs really hurt performance (consider filtering first and/or using aggregation functions)
- Nothing, it executes correctly
- No aggregate functions are used
- There is a typo in the column name

What is wrong with the following query?

```
#standardSQL
SELECT
COUNT(hits_product_v2ProductName) as number_of_products,
hits_product_v2ProductCategory
FROM `data-to-insights.ecommerce.rev_transactions`
WHERE hits_product_v2ProductName IS NOT NULL
GROUP BY hits_product_v2ProductCategory
ORDER BY number_of_products DESC
```

What is wrong with the previous query which lists products?

- The GROUP BY contains an incorrect column

- The WHERE clause should include NULL Product Names
- The COUNT() function is not the distinct number of products in each category
- Nothing, the query executes correctly

Update the previous query to only count distinct products in each product category.

Possible solution

```
#standardSQL
SELECT
COUNT(DISTINCT hits_product_v2ProductName) as number_of_products,
hits_product_v2ProductCategory
FROM `data-to-insights.ecommerce.rev_transactions`
WHERE hits_product_v2ProductName IS NOT NULL
GROUP BY hits_product_v2ProductCategory
ORDER BY number_of_products DESC
LIMIT 5
```

Which category has the most distinct number of products offered?

- Office
- (not set)
- ${productitem.product.origCatName}
- Electronics

Notes:

- (not set) could indicate the product has no category
- ${productitem.product.origCatName} is front-end code to render the category which may indicate the Google Analytics tracking script is firing before the page is fully-rendered