SUM to Add Values

by Sophia

WHAT'S COVERED

In this lesson, you will use the SUM function to add values within a column together, in three parts. Specifically, this lesson will cover:

1. The Value of the SUM Function

The SUM command allows you to calculate the sum (total) of numerical values within a column. This is particularly useful when aggregating data and obtaining cumulative values. For example, you can use SUM to calculate a dataset's total sales, revenue, or quantities.

Calculating the sum of values is essential for data analysis. It enables you to understand numerical data's overall magnitude, scale, or distribution. By aggregating values, you can gain insights into your dataset's patterns, trends, or anomalies. The SUM command is often used for financial calculations. It enables you to calculate total monetary values such as sales amounts, expenses, or profits. This is vital for financial reporting, budgeting, and decision making.

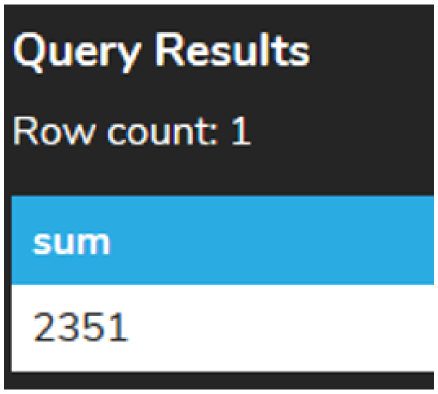
SUM is useful for calculating performance metrics or key performance indicators (KPIs). It enables you to aggregate performance-related data, such as scores, ratings, or durations, to measure and evaluate performance against predefined targets or benchmarks. SUM is also essential for budgeting and forecasting processes. It enables you to aggregate budgeted or forecasted values to calculate overall budgets, projected revenues, or expected expenses. This helps you monitor financial targets, assess performance, and make informed decisions.

2. Calculating the SUM

SUM is an aggregate function that returns the sum of all of the numeric values in a column. You can optionally apply a filter to the dataset with clauses such as WHERE, GROUP BY, or HAVING. Like the COUNT function, the SUM function ignores NULL values in a column.

```
SELECT SUM(total)
FROM invoice;
```

This would SUM the values in the total column that are not NULL, which would give the following result:



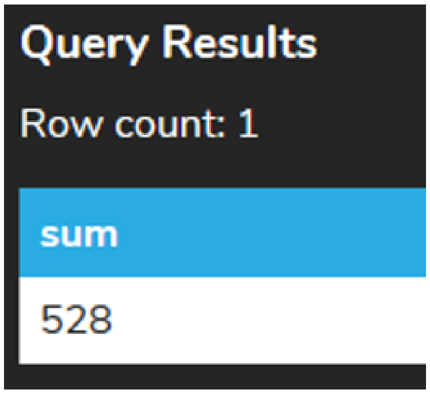
Query Results

Row count: 1

sum
2351

We may also want to SUM based on certain criteria by using the WHERE clause. For example, we could find the SUM of the total column for all invoices where the billing_country column's value is USA:

```
SELECT SUM(total)
FROM invoice
WHERE billing_country = 'USA';
```



Query Results

Row count: 1

sum
528

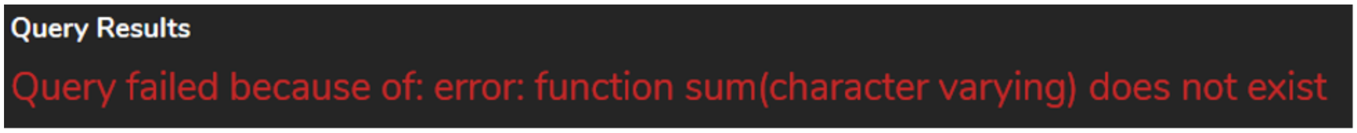
Anything that we can filter with the WHERE clause, we can then aggregate to find the SUM for.

---

3. Special Cases

If we tried to use the SUM function on a non-numeric column, it would result in an error:

```
SELECT SUM(billing_country)
FROM invoice;
```



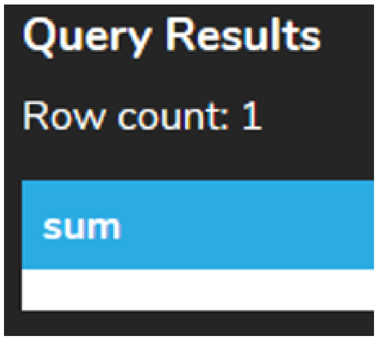
Query Results

Query failed because of: error: function sum(character varying) does not exist

If the query returns only NULL values, or if no rows are returned, the SUM returns NULL rather than 0. For example, if we're looking for the SUM of all of the invoices that have the invoice_id < 1 (which does not exist), as follows:

```
SELECT SUM(total)
FROM invoice
WHERE invoice_id < 1;
```

The result will look like this:



Query Results

Row count: 1

sum

3a. Using DISTINCT

The SQL **DISTINCT** keyword removes all duplicate records and retrieves only unique records.

For example, suppose you want a list of the customer IDs for all customers who have placed an order, but you don't want any duplicates on that list. You could run the following query on the invoice table to get one. Notice that this example uses ORDER BY to sort the list by the customer_id column.

```
SELECT DISTINCT customer_id
FROM invoice
ORDER BY customer_id;
```

DISTINCT can also be used in SUM functions to omit records containing duplicate values for a certain column. You might do this to eliminate redundant data.

Recall the example earlier in this lesson where we summed the values in the total column of the invoice table:

```
SELECT SUM(total)
FROM invoice;
```

Now suppose you wanted to omit records that have the same customer_id as another record that has already been included because you suspect those of being duplicates. You would modify the query like so:

```
SELECT SUM(DISTINCT customer_id)
total FROM customer;
```

TERM TO KNOW

DISTINCT
A keyword in PostgreSQL that enables you to limit query results to unique values from a specified column in a result set. It can be used on its own or with an aggregate function such as SUM.

3b. Using COALESCE

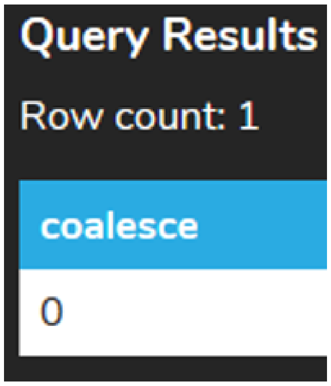
A NULL value can be assigned to any entry in any column in a SQL database, regardless of the data type. Obviously, some columns will be mandatory (non-nullable), but this is determined by the database designer, not the type itself.

The **COALESCE**() function returns the first non-null expression in a list. You can think of it as a set of contingencies—if the first item on the list is non-null, it is returned; otherwise, the second item on the list is checked and returned if non-null. It continues through its contingencies until it finds one that works, or until it runs out of contingencies.

The substitutions that the COALESCE() function perform are not permanent; the change persists only for the one SELECT statement in which it is used. This is a handy way of putting in temporary values to make the data easier to read or to use in another program.

In the invoice table, there should not be a value less than 1 for the invoice_id column. If we wanted to return a 0 instead of NULL in this case, we would use the COALESCE function. This function returns the second argument if the first argument is NULL. In the following example, if the total column is not null, its actual value is returned. But if it is null, a 0 is returned.

```
SELECT COALESCE(SUM(total),0)
FROM invoice
WHERE invoice_id < 1;
```


Query Results

Row count: 1

coalesce
0

A more complex COALESCE would be the following:

```
SELECT track,
  COALESCE(subcategory,'No Subcategory') AS subcategory,
  COALESCE(category,'No Category') AS category,
  COALESCE(family,'No Family') AS family
FROM artist
```

This would enable us to go and find out what rows are incomplete here so we could go back and validate the data for the TRACK information for each ARTIST.

TRY IT

Your turn! Open the SQL tool by clicking on the LAUNCH DATABASE button below. Then, enter in one of the examples above and see how it works. Next, try your own choices for which columns you want the query to provide.

TERM TO KNOW

COALESCE
This function in PostgreSQL returns the first non-null value from a list of expressions. It evaluates multiple arguments in order, returning the first non-null value encountered.

SUMMARY

In this lesson, you learned **the value of the SUM function** in analyzing data, and you learned how to use it to **calculate the SUM** (total) of a numeric column's values. You learned that applying the **DISTINCT**() function to a column eliminates duplicate values in the result set of a SELECT query. This function can be combined with a SUM() function to total values only where the record has a unique value in the specified column. This enables you to gain insights into unique elements within a dataset and ensure that the result sets contain only distinct values based on specified columns.

You also learned about **special cases** like the **COALESCE** function in PostgreSQL, which returns the first non-null value from a list of expressions. It evaluates multiple arguments in order, returning the first non-null value encountered. COALESCE is particularly useful when working with nullable columns or when you want to provide a default value if a specific value is null. By using COALESCE, you can simplify data handling and ensure that your queries return valid values even if some values are null.

TERMS TO KNOW

COALESCE

This function in PostgreSQL returns the first non-null value from a list of expressions. It evaluates multiple arguments in order, returning the first non-null value encountered.

DISTINCT

A keyword in PostgreSQL that enables you to limit query results to unique values from a specified column in a result set. It can be used on its own or with an aggregate function such as SUM.