

Hands-on Lab: Querying the Data Warehouse (Cubes, Rollups, Grouping Sets and Materialized Views)



Estimated time needed: 30 minutes

Objectives

In this lab you will learn how to create:

- Grouping sets
- Rollup
- Cube
- Materialized Query Tables (MQT)

Exercise 1 - Launch a PostgreSQL server instance on Cloud IDE and open up the pgAdmin Graphical User Interface.

This lab requires that you complete the previous lab Populate a Data Warehouse.

If you have not finished the Populate a Data Warehouse Lab yet, please finish it before you continue.

GROUPING SETS, CUBE, and ROLLUP allow us to easily create subtotals and grand totals in a variety of ways. All these operators are used along with the GROUP BY operator.

GROUPING SETS operator allows us to group data in a number of different ways in a single SELECT statement.

The **ROLLUP** operator is used to create subtotals and grand totals for a set of columns. The summarized totals are created based on the columns passed to the ROLLUP operator.

The **CUBE** operator produces subtotals and grand totals. In addition, it produces subtotals and grand totals for every permutation of the columns provided to the CUBE operator.

Exercise 2 - Write a query using grouping sets

After you launch a PostgreSQL server instance on Cloud IDE and open up the pgAdmin Graphical User Interface run the below query.

To create a grouping set for three columns labeled year, category, and sum of billedamount, run the sql statement below.

```
1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7

1. select year,category, sum(billedamount) as totalbilledamount
2. from "FactBilling"
3. left join "DimCustomer"
4. on "FactBilling".customerid = "DimCustomer".customerid
5. left join "DimMonth"
6. on "FactBilling".monthid="DimMonth".monthid
7. group by grouping sets(year,category);
```

Copied!

The partial output can be seen in the image below.

The screenshot shows the pgAdmin interface with the following components:

- Browser:** A tree view on the left showing the database structure. The 'production1' database is selected, and the 'public' schema is expanded, showing tables like 'FactBilling', 'DimCustomer', and 'DimMonth'.
- Query Editor:** The central pane contains a SQL query:

```
1 select year,category, sum(billedamount) as totalbilledamount
2 from "FactBilling"
3 left join "DimCustomer"
4 on "FactBilling".customerid = "DimCustomer".customerid
5 left join "DimMonth"
6 on "FactBilling".monthid="DimMonth".monthid
7 group by grouping sets(year,category);
8
```
- Data Output:** The bottom pane displays the query results in a table with 4 columns: 'year', 'category', 'totalbilledamount', and 'bigint'. The results show 13 rows of data.
- Messages:** A green message box at the bottom right states: 'Successfully run. Total query runtime: 947 msec. 13 rows affected.'

Exercise 3 - Write a query using rollup

To create a rollup using the three columns year, category and sum of billedamount, run the sql statement below.

```
1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8

1. select year,category, sum(billedamount) as totalbilledamount
2. from "FactBilling"
3. left join "DimCustomer"
4. on "FactBilling".customerid = "DimCustomer".customerid
5. left join "DimMonth"
6. on "FactBilling".monthid="DimMonth".monthid
7. group by rollup(year,category)
8. order by year, category;
```

Copied!

The partial output can be seen in the image below.

The screenshot shows the pgAdmin 4 web interface. On the left is the 'Browser' pane with a tree view of the database structure. The 'FactBilling' table is selected under 'public' > 'Tables (3)'. The main area is split into a 'Query Editor' and a 'Query History' pane. The 'Query Editor' contains the following SQL query:

```
1 select year,category, sum(billedamount) as totalbilledamount
2 from "FactBilling"
3 left join "DimCustomer"
4 on "FactBilling".customerid = "DimCustomer".customerid
5 left join "DimMonth"
6 on "FactBilling".monthid="DimMonth".monthid
7 group by rollup(year,category)
8 order by year, category;
```

Below the query editor is the 'Data Output' pane, which displays the results of the query in a table format. The table has three columns: 'year' (integer), 'category' (character varying (10)), and 'totalbilledamount' (bigint). The results are as follows:

year	category	totalbilledamount	
1	2009	Company	59048255
2	2009	Individual	61215072
3	2009	[null]	120263327
4	2010	Company	58725739
5	2010	Individual	60758919
6	2010	[null]	119484658
7	2011	Company	58559675
8	2011	Individual	60867794
9	2011	[null]	119427469

A green status bar at the bottom right of the 'Data Output' pane indicates: 'Successfully run. Total query runtime: 694 msec. 34 rows affected.'

Exercise 4 - Write a query using cube

To create a cube using the three columns labeled year, category, and sum of billedamount, run the sql statement below.

```
1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8

1. select year,category, sum(billedamount) as totalbilledamount
2. from "FactBilling"
3. left join "DimCustomer"
4. on "FactBilling".customerid = "DimCustomer".customerid
5. left join "DimMonth"
6. on "FactBilling".monthid="DimMonth".monthid
7. group by cube(year,category)
8. order by year, category;
```

Copied!

The partial output can be seen in the image below.

The screenshot shows the pgAdmin 4 web interface. On the left, the 'Browser' pane displays a tree view of the database structure. The 'public' schema is expanded, showing tables like 'FactBilling', 'DimCustomer', and 'DimMonth'. The 'FactBilling' table is selected. The main pane is divided into two sections: 'Query Editor' and 'Query History'. The 'Query Editor' contains a SQL query that joins 'FactBilling' with 'DimCustomer' and 'DimMonth' to calculate the total billed amount by year and category. The 'Query History' pane shows the executed query. Below the query editor, the 'Data Output' tab displays the results of the query in a table format. The table has four columns: 'year', 'category', and 'totalbilledamount'. The results show data for the years 2009 and 2010, with categories 'Company' and 'Individual'. A green status bar at the bottom indicates that the query was successfully run, with a total runtime of 751 msec and 36 rows affected.

```

1 select year,category, sum(billedamount) as totalbilledamount
2 from "FactBilling"
3 left join "DimCustomer"
4 on "FactBilling".customerid = "DimCustomer".customerid
5 left join "DimMonth"
6 on "FactBilling".monthid="DimMonth".monthid
7 group by cube(year,category)
8 order by year, category;

```

year	category	totalbilledamount
2009	Company	59048255
2009	Individual	61215072
2009	[null]	120263327
2010	Company	58725739
2010	Individual	60758919
2010	[null]	119484658
2011	Company	58559675
2011	Individual	60867794
2011	[null]	119427469

Successfully run. Total query runtime: 751 msec. 36 rows affected.

Exercise 5 - Create a Materialized Query Table(MQT)

In pgAdmin we can implement materialized views using Materialized Query Tables.

Step 1: Create the MQT.

Execute the sql statement below to create an MQT named countrystats.

```

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8

1. CREATE MATERIALIZED VIEW countrystats (country, year, totalbilledamount) AS
2. (select country, year, sum(billedamount)
3. from "FactBilling"
4. left join "DimCustomer"
5. on "FactBilling".customerid = "DimCustomer".customerid
6. left join "DimMonth"
7. on "FactBilling".monthid="DimMonth".monthid
8. group by country,year);

```

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The above command creates an MQT named countrystats that has 3 columns.

- Country
- Year
- totalbilledamount

The MQT is essentially the result of the below query, which gives you the year, quartername and the sum of billed amount grouped by year and quartername.

```

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7

1. select year, quartername, sum(billedamount) as totalbilledamount
2. from "FactBilling"
3. left join "DimCustomer"
4. on "FactBilling".customerid = "DimCustomer".customerid
5. left join "DimMonth"
6. on "FactBilling".monthid="DimMonth".monthid
7. group by grouping sets(year, quartername);

```

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Step 2: Populate/refresh data into the MQT.

Execute the sql statement below to populate the MQT countrystats.

```
1. 1
1. REFRESH MATERIALIZED VIEW countrystats;
```

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The command above populates the MQT with relevant data.

Step 3: Query the MQT.

Once an MQT is refreshed, you can query it.

Execute the sql statement below to query the MQT countrystats.

```
1. 1
1. select * from countrystats;
```

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Practice exercises

Problem 1: Create a grouping set for the columns year, quartername, sum(billedamount).

- ▶ [Click here for Hint](#)
- ▶ [Click here for Solution](#)

Problem 2: Create a rollup for the columns country, category, sum(billedamount).

- ▶ [Click here for Hint](#)
- ▶ [Click here for Solution](#)

Problem 3: Create a cube for the columns year, country, category, sum(billedamount).

- ▶ [Click here for Hint](#)
- ▶ [Click here for Solution](#)

Problem 4: Create an MQT named average_billamount with columns year, quarter, category, country, average_bill_amount.

- ▶ [Click here for Hint](#)
- ▶ [Click here for Solution](#)

Congratulations! You have successfully finished the Populating a Data Warehouse lab.

Author

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Change Log

Date (YYYY-MM-DD)	Version	Changed By	Change Description
2022-04-14	0.2	Amrutha Rao	converted initial version to pgAdmin workaround.
2021-09-29	0.1	Ramesh Sannareddy	Created initial version of the lab

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