

# 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.

pgAdmin

FileObjectToolsHelp

Browser

production1

Casts

Catalogs

Event Triggers

Extensions

Foreign Data Wrappers

Languages

Publications

Schemas (1)

public

Collations

Domains

FTS Configurations

FTS Dictionaries

FTS Parsers

FTS Templates

Foreign Tables

Functions

Materialized Views

Procedures

Sequences

Tables (3)

DimCustomer

DimMonth

FactBilling

Trigger Functions

Types

Views

Subscriptions

Login/Group Roles

Tablespaces

DashboardPropertiesSQLStatisticsDependenciesDependentsproduction1/postgres@po

Query Editor

Query History

1

2

3

4

5

6

7

8

select year,category, sum(billedamount) as totalbilledamount

from "FactBilling"

left join "DimCustomer"

on "FactBilling".customerid = "DimCustomer".customerid

left join "DimMonth"

on "FactBilling".monthid="DimMonth".monthid

group by grouping sets(year,category);

Data Output

Explain

Messages

Notifications

	year integer	category character varying (10)	totalbilledamount bigint
1	2015	[null]	119808719
2	2011	[null]	119427469
3	2014	[null]	119239283
4	2010	[null]	119484658
5	2017	[null]	119526654
6	2019	[null]	120820495
7	2016	[null]	120433289
8	2012	[null]	120761543
9	2018	[null]	119595980

Successfully run. Total query run

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.

pgAdmin

FileObjectToolsHelp

Browser

postgres

Databases (2)

Product

Casts

Catalogs

Event Triggers

Extensions

Foreign Data Wrappers

Languages

Publications

Schemas (1)

public

Collations

Domains

FTS Configurations

FTS Dictionaries

FTS Parsers

FTS Templates

Foreign Tables

Functions

Materialized Views

Procedures

Sequences

Tables (3)

DimCustomer

DimMonth

FactBilling

Trigger Functions

Types

Views

Subscriptions

DashboardPropertiesSQLStatisticsDependenciesDependentsProduct/postgr...Dim

Query Editor

Query History

1

2

3

4

5

6

7

8

select year,category, sum(billedamount) as totalbilledamount

from "FactBilling"

left join "DimCustomer"

on "FactBilling".customerid = "DimCustomer".customerid

left join "DimMonth"

on "FactBilling".monthid="DimMonth".monthid

group by rollup(year,category)

order by year, category;

Data Output

Explain

Messages

Notifications

	year integer	category character varying (10)	totalbilledamount bigint
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

Successfully run. Total query runt

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.

pgAdmin

FileObjectToolsHelp

Browser

postgres

Databases (2)

Product

Cast

Catalogs

Event Triggers

Extensions

Foreign Data Wrappers

Languages

Publications

Schemas (1)

public

Collations

Domains

FTS Configurations

FTS Dictionaries

FTS Parsers

FTS Templates

Foreign Tables

Functions

Materialized Views

Procedures

Sequences

Tables (3)

DimCustomer

DimMonth

FactBilling

Trigger Functions

Types

Views

Subscriptions

DashboardPropertiesSQLStatisticsDependenciesDependentsProduct/postgr...Dim

Query Editor

Query History

1

2

3

4

5

6

7

8

select year,category, sum(billedamount) as totalbilledamount

from "FactBilling"

left join "DimCustomer"

on "FactBilling".customerid = "DimCustomer".customerid

left join "DimMonth"

on "FactBilling".monthid="DimMonth".monthid

group by cube(year,category)

order by year, category;

Data Output

Explain

Messages

Notifications

	year integer	category character varying (10)	totalbilledamount bigint
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

Successfully run. Total query runt

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);
```

Copied!

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);
```

Copied!

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;
```

Copied!

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;
```

Copied!

Practice exercises

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

▼ Click here for Hint

Make sure that this table contains the year and quartername.

▼ Click here for Solution

```
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);
```

Copied!

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

▼ Click here for Hint

Select columns year, quartername, sum(billedamount), and use a group by query and join the dimcustomer and dimmonth tables to factbilling table\_.

▼ Click here for Solution

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

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 rollup(year, quartername)
8. order by year, quartername;
```

Copied!

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

▼ Click here for Hint

Select columns year,quartername , sum of billedamount, and use a group by query and join the dimcustomer and dimmonth tables to factbilling table\_.

▼ Click here for Solution

```
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 cube(year,quartername);
```

Copied!

**Problem 4: Create an MQT named average\_billamount with columns year, quarter, category, country, average\_bill\_amount.**

▼ Click here for Hint

Select columns year, quarter, category, country, avg(billedamount), and use a group by query and join the dimcustomer and dimmonth tables to factbilling table\_.

▼ Click here for Solution

```
1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9

1. CREATE MATERIALIZED VIEW average_billamount (year,quarter,category,country, average_bill_amount) AS
2. (select year,quarter,category,country, avg(billedamount) as average_bill_amount
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 year,quarter,category,country
9. );
```

Copied!

```
1. 1

1. refresh MATERIALIZED VIEW average_billamount;
```

Copied!

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

## Author

Amrutha Rao

## 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

© IBM Corporation 2022. All rights reserved.