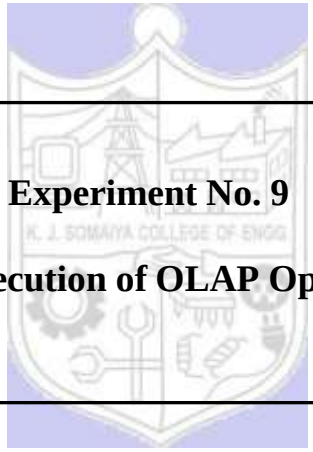

Experiment No. 9

Title: Execution of OLAP Operations

Batch: A2 **Roll No.:16010421059** **Experiment No.:9**

Aim: Execution of OLAP operations

Resources needed: MySQL, Postgres

Theory

OLAP:

In computing, online analytical processing, or OLAP is an approach to answering multi-dimensional analytical (MDA) queries. OLAP is part of the broader category of business intelligence, which also encompasses relational database report writing and data mining. Typical applications of OLAP include business reporting for sales, marketing, management reporting, business process management (BPM), budgeting and forecasting, financial reporting and similar areas, with new applications coming up, such as agriculture. The term OLAP was created as a slight modification of the traditional database term OLTP (Online Transaction Processing).

OLAP tools enable users to analyze multidimensional data interactively from multiple perspectives. OLAP consists of three basic analytical operations: consolidation (roll-up), drill-down, and slicing and dicing. Consolidation involves the aggregation of data that can be accumulated and computed in one or more dimensions. For example, all sales offices are rolled up to the sales department or sales division to anticipate sales trends. By contrast, the drill-down is a technique that allows users to navigate through the details. For instance, users can view the sales by individual products that make up a region's sales. Slicing and dicing is a feature whereby users can take out (slicing) a specific set of data of the OLAP cube and view (dicing) the slices from different viewpoints.

OLAP queries can be implemented by using analytical SQL functions

Oracle has extensions to ANSI SQL to allow to quickly computing aggregations and rollups.

These new statements include:

- rollup
- cube
- grouping

These simple SQL operators allow creating easy aggregations directly inside the SQL.

Creating tabular aggregates with ROLLUP:

ROLLUP enables an SQL statement to calculate multiple levels of subtotals across a specified group of dimensions. It also calculates a grand total. ROLLUP is a simple extension to the GROUP BY clause, so its syntax is extremely easy to use. Create cross-tabular reports with CUBE:

In multidimensional jargon, a "cube" is a cross-tabulated summary of detail rows. CUBE enables a SELECT statement to calculate subtotals for all possible combinations of a group of dimensions. It also calculates a grand total.

This is the set of information typically needed for all cross-tabular reports, so CUBE can calculate a cross-tabular report with a single select statement

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Activities:

1. Create a dataset in PostgreSQL and MySQL
2. Apply rollup and cube operations to the same

Result:

PostgresSQL

```
select*from car_sales_us;
```

price integer	brand character varying	model character varying	year integer	title_status character varying	mileage integer	state character varying	vin character varying
20000	Toyota	Camry	2009	Clean	42300	Washington	21a45ff
45000	Toyota	Corolla	2017	Clean	20000	Washington	1c45jf
35000	Mazda	MX6	2004	Clean	100000	Washington	98fg34v
55000	Ford	F150	2012	Clean	55670	California	85ddsc3
55000	Ford	F150	2012	Clean	55670	California	86ddsc3
35000	Mazda	MX6	2004	Clean	100000	Nevada	92fg34v
45000	Toyota	Corolla	2017	Clean	20000	Arizona	1a56jf
11000	Honda	Fit	2006	Clean	80000	Washington	4jccgf
35000	Mazda	MX6	2004	Clean	100000	Washington	97fg34w
45000	Ford	F150	2012	Clean	46020	Florida	22cfds45

```
SELECT state,brand,SUM (price)
FROM car_sales_us
GROUP BY
    ROLLUP (brand, state);
```

state character varying	brand character varying	sum bigint
California	Ford	110000
Florida	Ford	45000
[null]	Ford	155000
Washington	Honda	11000
[null]	Honda	11000
Nevada	Mazda	35000
Washington	Mazda	70000
[null]	Mazda	105000
Arizona	Toyota	45000
Washington	Toyota	65000
[null]	Toyota	110000
[null]	[null]	381000

```
SELECT state,brand,SUM (price)
FROM car_sales_us
GROUP BY
    cube (brand, state);
```

state character varying	brand character varying	sum bigint
California	Ford	110000
Florida	Ford	45000
[null]	Ford	155000
Washington	Honda	11000
[null]	Honda	11000
Nevada	Mazda	35000
Washington	Mazda	70000
[null]	Mazda	105000
Arizona	Toyota	45000
Washington	Toyota	65000
[null]	Toyota	110000
[null]	[null]	381000

MySQL

```
select*from Persons;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

PersonID	LastName	FirstName	Address	City
1	Desai	Swapnil	h530788234	Thane
2	Desai	Pranav	j67637rdbjba	Thane
3	Bhusari	Swapnil	chjhqjeeq	Airoli
4	Iyer	Rohan	jgguahuc	Mulund
5	Kelkar	Prakash	chjd577sk	Mulund

```
SELECT City,FirstName
FROM Persons
GROUP BY City WITH ROLLUP;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

City	FirstName
Airoli	Aditya
Mulund	Rohan
Thane	Swapnil
NULL	Swapnil

```
SELECT City,FirstName
FROM Persons
GROUP BY City WITH CUBE;
```

15 15:55:03 SELECT City,FirstName FROM Persons GROUP BY City WITH CUBE LIMIT 0, 1000 Error Code: 1235. This version of MySQL doesn't yet support 'CUBE' 0.000 sec

Questions:

1. **Elaborate on the operations applied and results generated to your dataset**
   I first created a database (car_sales_us) in **Postgres**, then i grouped the dataset by "state, brand, sum(price)". Then I created a table of (Brands,state,sum) using **ROLLUP** function.Then i calculated the subtotal for all possible combinations using **CUBE** function.

   Similarly, I created a database (persons) in **MySql**, then i grouped the dataset by "City, first name". Then I created a table using **ROLLUP** function.Then I calculated the subtotal for all possible combinations using **CUBE** function.

2. **Explain if Drill-down, Drill-across can be applied in relational database, Justify with a query implementation.**

   The drill-down operation converts less-detailed data into more-detailed data through one of two methods—moving down in the concept hierarchy or adding a new dimension to the cube. For example, if you view sales data for an organization's calendar or fiscal quarter, you can drill-down to see sales for each month, moving down in the concept hierarchy of the "time" dimension.

   The drill-down operation **(also called roll-down)** is the reverse operation of **roll-up**. Drill-down is like **zooming-in** on the data cube. It navigates from less detailed record to more detailed data. Drill-down can be performed by either **stepping down** a concept hierarchy for a dimension or adding additional dimensions.

   Figure shows a drill-down operation performed on the dimension time by stepping down a concept hierarchy which is defined as day, month, quarter, and year. Drill-down appears by descending the time hierarchy from the level of the quarter to a more detailed level of the month.

   Because a drill-down adds more details to the given data, it can also be performed by adding a new dimension to a cube. For example, a drill-down on the central cubes of the figure can occur by introducing an additional dimension, such as a customer group.

   Query Eg:

   ```
   SELECT … GROUP BY ROLLDOWN(columns);

   SELECT Time, Location, product ,sum(revenue) AS Profit FROM sales GROUP BY
   ROLLDOWN(Time, Location, product);
   ```

Outcomes:

CO4: Apply ETL processing and Online Analytical Processing on the warehouse data.

Conclusion: Understood the concept of OLAP and ran OLAP queries on datasets.

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of faculty in-charge with date

References:

- Paulraj Ponniah, "Data Warehousing: Fundamentals for IT Professionals", Wiley India