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Experiment No. 2

Aim: Implementation of OLAP operations: Slice, Dice, Rollup, Drilldown and Pivot for the above problem statement (experiment 1).

Problem Statement:

This project designs a Data Warehouse for hospital visits using Star and Snowflake Schemas to analyze doctor consultations, patient visits, and revenue trends. The Fact Table stores visit details along with measures like count (number of visits) and charges (consultation fees). The Dimension Tables include Doctor, Patient, and Time data. The Star Schema provides a simple structure, while the Snowflake Schema normalizes dimensions for better integrity, enabling hospitals to analyze doctor performance, patient demographics, and financial trends efficiently.

Output:

1.) SLICE OPERATION:

```
SELECT f.doc_id, d.name AS doctor_name, d.specialization, f.pat_id,
f.time_id, f.count, f.charges
FROM fact f
JOIN doctor d ON f.doc_id = d.doc_id WHERE d.specialization =
'Cardiology';
```

DOC_ID	DOCTOR_NAME	SPECIALIZATION	PAT_ID	TIME_ID	COUNT	CHARGES
1	Dr. Smith	Cardiology	1	1	1	100
1	Dr. Smith	Cardiology	1	2	1	100
1	Dr. Smith	Cardiology	1	3	1	100
1	Dr. Smith	Cardiology	1	4	1	100
1	Dr. Smith	Cardiology	1	5	1	100
1	Dr. Smith	Cardiology	1	6	1	100
1	Dr. Smith	Cardiology	1	7	1	100
1	Dr. Smith	Cardiology	2	1	1	100
1	Dr. Smith	Cardiology	2	2	1	100
1	Dr. Smith	Cardiology	2	3	1	100

1	Dr. Smith	Cardiology	6	6	1	100
1	Dr. Smith	Cardiology	6	7	1	100
1	Dr. Smith	Cardiology	7	1	1	100
1	Dr. Smith	Cardiology	7	2	1	100
1	Dr. Smith	Cardiology	7	3	1	100
1	Dr. Smith	Cardiology	7	4	1	100
1	Dr. Smith	Cardiology	7	5	1	100
1	Dr. Smith	Cardiology	7	6	1	100
1	Dr. Smith	Cardiology	7	7	1	100

Download CSV

49 rows selected.

2.) DICE OPERATION:

```
SELECT f.doc_id, d.name AS doctor_name, d.specialization, p.name AS
patient_name, p.age, f.time_id, f.count, f.charges
FROM fact f
JOIN doctor d ON f.doc_id = d.doc_id
JOIN patient p ON f.pat_id = p.pat_id
WHERE d.specialization IN ('Neurology', 'Orthopedics')
AND p.age > 50;
```

DOC_ID	DOCTOR_NAME	SPECIALIZATION	PATIENT_NAME	AGE	TIME_ID	COUNT	CHARGES
2	Dr. Johnson	Neurology	William Davis	60	1	1	100
2	Dr. Johnson	Neurology	William Davis	60	2	1	100
2	Dr. Johnson	Neurology	William Davis	60	3	1	100
2	Dr. Johnson	Neurology	William Davis	60	4	1	100
2	Dr. Johnson	Neurology	William Davis	60	5	1	100
2	Dr. Johnson	Neurology	William Davis	60	6	1	100
2	Dr. Johnson	Neurology	William Davis	60	7	1	100
3	Dr. Brown	Orthopedics	William Davis	60	1	1	100
3	Dr. Brown	Orthopedics	William Davis	60	2	1	100
3	Dr. Brown	Orthopedics	William Davis	60	3	1	100
3	Dr. Brown	Orthopedics	William Davis	60	4	1	100
3	Dr. Brown	Orthopedics	William Davis	60	5	1	100
3	Dr. Brown	Orthopedics	William Davis	60	6	1	100
3	Dr. Brown	Orthopedics	William Davis	60	7	1	100

Download CSV

14 rows selected.

3.) ROLLUP OPERATION:

SELECT d.specialization, SUM(f.charges) AS total_charges
FROM fact f
JOIN doctor d ON f.doc_id = d.doc_id
GROUP BY ROLLUP(d.specialization);

SPECIALIZATION	TOTAL_CHARGES
Cardiology	4900
Dermatology	4900
General Medicine	4900
Neurology	4900
Orthopedics	4900
Pediatrics	4900
Psychiatry	4900
-	34300

Download CSV

8 rows selected.

4.) DRILLDOWN OPERATION:

SELECT d.specialization, d.name AS doctor_name, SUM(f.charges) AS total_charges
FROM fact f
JOIN doctor d ON f.doc_id = d.doc_id
GROUP BY d.specialization, d.name

SPECIALIZATION	DOCTOR_NAME	TOTAL_CHARGES
Cardiology	Dr. Smith	4900
Dermatology	Dr. Lee	4900
General Medicine	Dr. White	4900
Neurology	Dr. Johnson	4900
Orthopedics	Dr. Brown	4900
Pediatrics	Dr. Taylor	4900
Psychiatry	Dr. Davis	4900

Download CSV

7 rows selected.

5.) PIVOT OPERATION:

SELECT d.specialization,
    SUM(CASE WHEN f.count = 1 THEN f.charges ELSE
    0 END) AS "1 Visit", SUM(CASE WHEN f.count = 2
    THEN f.charges ELSE 0 END) AS "2 Visits",
    SUM(f.charges) AS "Total Charges"

```
FROM fact f
JOIN doctor d ON f.doc_id
= d.doc_id GROUP BY
d.specialization;
```

SPECIALIZATION	1 Visit	2 Visits	Total Charges
Pediatrics	4900	0	4900
Dermatology	4900	0	4900
General Medicine	4900	0	4900
Cardiology	4900	0	4900
Orthopedics	4900	0	4900
Neurology	4900	0	4900
Psychiatry	4900	0	4900

Download CSV

7 rows selected.

CONCLUSION:

OLAP operations facilitate effective analysis of hospital visits, doctor consultations, and revenue patterns. Slice and Dice allow targeted data filtering, Rollup and Drilldown offer summarized and in-depth insights, and Pivot improves data visualization. Together, these operations empower more informed decision-making and efficient hospital administration.

<u>Review Question:</u>

1. What is the difference between the Slice and Dice operations in OLAP?

- Slice: The Slice operation selects a single dimension from a multi-dimensional array, resulting in a sub-cube. Example: Selecting data for the year *2024* from a cube with dimensions Year, Region, and Product.

- Dice: The Dice operation selects two or more dimensions to form a smaller sub-cube by specifying ranges or values for these dimensions. Example: Selecting data for *Years 2023 and 2024*, *Regions North and South*, and *Product = Mobile Phones*.

2. How does the Roll-up operation help in summarizing large volumes of data?

The Roll-up operation aggregates data by climbing up a hierarchy or by dimension reduction. It helps in summarizing data by:

- Combining detailed data into higher-level summaries.

- Reducing data complexity for better analysis and visualization.

  Example: Rolling up daily sales data to monthly or yearly sales.

3. Give an example of a scenario where Pivoting the data provides a clearer insight than traditional tabular view?

Scenario: A sales manager analyzing quarterly sales across different regions and products.

- In a traditional table, the data may be displayed as rows of individual entries, making patterns harder to spot.

- With pivoting, the manager can turn rows into columns, such as displaying *Regions as rows* and *Quarters as columns* with *Sales figures as values*.

  This layout makes trends across regions and quarters much easier to compare at a glance.

Github link: https://github.com/OmMakwana249/DWM-Experiments