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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
ORDER BY d.specialization;

| 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 enable efficient analysis of hospital visits, doctor consultations, and revenue trends. Slice and Dice filter data, Rollup and Drilldown provide aggregated and detailed views, and Pivot enhances visualization. These operations support better decision-making and hospital management.

**Review Question:**

### 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*.

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### 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.

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### 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.

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