

Branch: MCA (Data Science)	Semester: 2 nd
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Experiment No.: 2

- 1. Aim:** To implement and analyze SQL SELECT queries using filtering, sorting, grouping, and aggregation concepts in PostgreSQL for efficient data retrieval and analytical reporting.
- 2. S/W Requirement:** Oracle Database Express Edition and PGAdmin
- 3. Objectives:** Implementation of SELECT Queries with Filtering, Grouping and Sorting in PostgreSQL
 - To retrieve specific data using filtering conditions
 - To sort query results using single and multiple attributes
 - To perform aggregation using grouping techniques
 - To apply conditions on aggregated data
 - To understand real-world analytical queries commonly asked in placement interviews
- 4. Task to be done:**

Step 1: Database and Table Preparation

- Start the PostgreSQL server.
- Open the PostgreSQL client tool.
- Create a database for the experiment.
- Prepare a sample table representing customer orders containing details such as customer name, product, quantity, price, and order date.
- Insert sufficient sample records to allow meaningful analysis.
- Purpose: To create a realistic dataset for performing analytical queries.

Step 2: Filtering Data Using Conditions

- Execute data retrieval operations to display only those records that satisfy specific conditions, such as higher-priced orders.
- Observe how filtering limits the number of rows returned.

Observation: Filtering reduces unnecessary data processing and improves query efficiency.

Step 3: Sorting Query Results

- Retrieve selected columns from the table and arrange the output based on numerical values such as price.
- Perform sorting using both ascending and descending order.
- Apply sorting on more than one attribute to understand priority-based ordering.

Observation: Sorting is essential for reports, rankings, and ordered displays.

Step 4: Grouping Data for Aggregation

- Group records based on a common attribute such as product.
- Calculate aggregate values like total sales for each group.
- Analyze how multiple rows are combined into summarized results.

Observation: Grouping transforms transactional data into analytical insights.

Step 5: Applying Conditions on Aggregated Data

- Apply conditions on grouped results to retrieve only those groups that satisfy specific aggregate criteria.
- Compare the difference between row-level filtering and group-level filtering.

Observation: Conditions applied after grouping allow refined analytical reporting.

Step 6: Conceptual Understanding of Filtering vs Aggregation Conditions

- Analyze scenarios where conditions are incorrectly applied before grouping.
- Correctly apply conditions after grouping to avoid logical errors.

Observation: Understanding execution order prevents common SQL mistakes frequently tested in interviews.

4. Dataset:

	customer_name character varying (50) 🔒	product character varying (50) 🔒	price numeric (10,2) 🔒
1	Karan	Mobile	20000.00
2	Sneha	Mobile	22000.00
3	Ankit	Tablet	28000.00
4	Rahul	Tablet	30000.00
5	Riya	Laptop	54000.00
6	Amit	Laptop	55000.00
7	Pooja	Laptop	58000.00

5. Code:

```
CREATE TABLE customer_orders (  
    order_id SERIAL PRIMARY KEY,  
    customer_name VARCHAR(50),  
    product VARCHAR(50),  
    quantity INT,  
    price NUMERIC(10,2),  
    order_date DATE  
);  
  
INSERT INTO customer_orders  
  
(customer_name, product, quantity, price, order_date)
```



VALUES

('Amit', 'Laptop', 1, 55000, '2024-01-10'),
('Riya', 'Laptop', 2, 54000, '2024-01-12'),
('Karan', 'Mobile', 3, 20000, '2024-01-15'),
('Sneha', 'Mobile', 1, 22000, '2024-01-16'),
('Rahul', 'Tablet', 2, 30000, '2024-01-18'),
('Pooja', 'Laptop', 1, 58000, '2024-01-20'),
('Ankit', 'Tablet', 3, 28000, '2024-01-22');

SELECT *

FROM customer_orders

WHERE price > 30000;

SELECT customer_name, product, price

FROM customer_orders

ORDER BY price ASC;

SELECT customer_name, product, price

FROM customer_orders

ORDER BY price DESC;

SELECT product, price, quantity

FROM customer_orders

ORDER BY product ASC, price DESC;

```
SELECT product,
SUM(quantity * price) AS total_sales
FROM customer_orders
GROUP BY product;

SELECT product,
SUM(quantity * price) AS total_sales
FROM customer_orders
GROUP BY product
HAVING SUM(quantity * price) > 100000;
```

- **Output:**

	order_id [PK] integer	customer_name character varying (50)	product character varying (50)	quantity integer	price numeric (10,2)	order_date date
1	1	Amit	Laptop	1	55000.00	2024-01-10
2	2	Riya	Laptop	2	54000.00	2024-01-12
3	3	Karan	Mobile	3	20000.00	2024-01-15
4	4	Sneha	Mobile	1	22000.00	2024-01-16
5	5	Rahul	Tablet	2	30000.00	2024-01-18
6	6	Pooja	Laptop	1	58000.00	2024-01-20
7	7	Ankit	Tablet	3	28000.00	2024-01-22

	order_id [PK] integer	customer_name character varying (50)	product character varying (50)	quantity integer	price numeric (10,2)	order_date date
1	1	Amit	Laptop	1	55000.00	2024-01-10
2	2	Riya	Laptop	2	54000.00	2024-01-12
3	6	Pooja	Laptop	1	58000.00	2024-01-20

	product character varying (50)	total_sales numeric
1	Mobile	82000.00
2	Tablet	144000.00
3	Laptop	221000.00

	product character varying (50) 🔒	total_sales numeric 🔒
1	Tablet	144000.00
2	Laptop	221000.00

	customer_name character varying (50) 🔒	product character varying (50) 🔒	price numeric (10,2) 🔒
1	Pooja	Laptop	58000.00
2	Amit	Laptop	55000.00
3	Riya	Laptop	54000.00
4	Rahul	Tablet	30000.00
5	Ankit	Tablet	28000.00
6	Sneha	Mobile	22000.00
7	Karan	Mobile	20000.00

- **Learning Outcomes:**

- Students understand how data can be filtered to retrieve only relevant records from a database.
- Students learn how sorting improves readability and usefulness of query results in reports.
- Students gain the ability to group data for analytical purposes.
- Students clearly differentiate between row-level conditions and group-level conditions.
- Students develop confidence in writing analytical SQL queries used in real-world scenarios.
- Students are better prepared to answer SQL-based placement and interview questions related to filtering, grouping, and aggregation.