



Apex Institute of Technology

Department of Computer Science & Engineering

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Branch: CSE AIML

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Semester: 4th

Subject Name: DBMS

1. Aim

To understand and implement SQL SELECT queries using various clauses such as WHERE, ORDER BY, GROUP BY, and HAVING to retrieve and manipulate data efficiently from relational database tables.

2. Objective of the Session

- To practice writing SQL SELECT statements.
- To apply filtering conditions using the WHERE clause.
- To sort query results using the ORDER BY clause.
- To group records using the GROUP BY clause.
- To filter grouped data using the HAVING clause.
- To analyze data using aggregate functions like COUNT(), SUM(), AVG(), MIN(), and MAX().

3. Practical / Experiment Steps

1. Display the department name and the average salary of employees for each department.
2. Consider only those employees whose salary is greater than 20,000.
3. Display only those departments where the average salary is greater than 30,000.
4. Arrange the final output in descending order of average salary.

4. Procedure of the Practical



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- (1) Start the system and log in to the computer.
- (2) Open PgAdmin (PostgreSQL).
- (3) Create or select the required database (e.g., lab_db).
- (4) Create the EMPLOYEE table using the given schema.
- (5) Insert sample data into the EMPLOYEE table.
- (6) Execute the queries step-by-step according to the practical steps.
- (7) Verify the output after each query execution.
- (8) Capture screenshots of execution and results for record.
- (9) Save the work and upload worksheet (Word + PDF) on GitHub.

5. I/O Analysis (Input / Output Analysis)

Input: SQL commands and queries executed in PgAdmin (table creation, insertion, and SELECT queries).

Output: Result tables displayed in PgAdmin showing department-wise average salary after applying WHERE, HAVING, and ORDER BY clauses.

SQL Implementation (PgAdmin / PostgreSQL)

A) Create Database (Optional):

```
CREATE DATABASE lab_db;
```

B) Create Table:

```
CREATE TABLE employee (
    emp_id      INT PRIMARY KEY,
    emp_name    VARCHAR(50),
    department   VARCHAR(50),
    salary       NUMERIC(10, 2),
    joining_date DATE
);
```



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C) Insert Sample Records:

```
INSERT INTO employee (emp_id, emp_name, department, salary, joining_date) VALUES  
(101, 'Arjun Malhotra', 'Data Science', 60000, '2022-01-10'),  
(102, 'Pooja Nair', 'Recruitment', 28000, '2021-03-15'),  
(103, 'Siddharth Iyer', 'Backend Dev', 42000, '2020-06-20'),  
(104, 'Meera Kulkarni', 'Accounts', 65000, '2019-09-05'),  
(105, 'Rohan Das', 'HR Operations', 24000, '2023-02-12'),  
(106, 'Kavya Menon', 'Auditing', 36000, '2020-11-25'),  
(107, 'Nitin Agarwal', 'Business Dev', 48000, '2021-07-30'),  
(108, 'Ishita Roy', 'Marketing', 26000, '2022-12-01'),  
(109, 'Aditya Kulkarni', 'Cloud Engg', 52000, '2022-04-18');
```

Step 1 Query:

```
SELECT department, AVG(salary) AS avg_salary  
FROM employee  
GROUP BY department;
```

Step 2 Query:

```
SELECT department, AVG(salary) AS avg_salary  
FROM employee  
WHERE salary > 20000  
GROUP BY department;
```

Step 3 Query:

```
SELECT department, AVG(salary) AS avg_salary  
FROM employee  
WHERE salary > 20000  
GROUP BY department  
HAVING AVG(salary) > 30000;
```



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Step 4 Query (Final Output):

```
SELECT department, AVG(salary) AS avg_salary
FROM employee
WHERE salary > 20000
GROUP BY department
HAVING AVG(salary) > 30000
ORDER BY avg_salary DESC;
```

6. Learning Outcome

- Understood the syntax and usage of SQL SELECT statements.
- Gained practical knowledge of WHERE clause for filtering rows.
- Learned grouping operations using GROUP BY clause.
- Applied HAVING clause to filter grouped results.
- Sorted query outputs using ORDER BY clause.
- Got hands-on experience in PostgreSQL execution using PgAdmin.

7. Screenshots

```
CREATE TABLE EMPLOYEE(
    emp_id int,
    emp_name varchar(20),
    department varchar(20),
    salary int,
    joining_date date
)

INSERT INTO employee (emp_id, emp_name, department, salary, joining_date) VALUES
(101, 'Arjun Malhotra', 'Data Science', 60000, '2022-01-10'),
(102, 'Pooja Nair', 'Recruitment', 28000, '2021-03-15'),
(103, 'Siddharth Iyer', 'Backend Dev', 42000, '2020-06-20'),
(104, 'Meera Kulkarni', 'Accounts', 65000, '2019-09-05'),
(105, 'Rohan Das', 'HR Operations', 24000, '2023-02-12'),
(106, 'Kavya Menon', 'Auditing', 36000, '2020-11-25'),
(107, 'Nitin Agarwal', 'Business Dev', 48000, '2021-07-30'),
(108, 'Ishita Roy', 'Marketing', 26000, '2022-12-01'),
(109, 'Aditya Kulkarni', 'Cloud Engg', 52000, '2022-04-18');

SELECT * FROM employee;
```



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Employee Data:

| | emp_id [PK] integer | emp_name character varying (50) | department character varying (50) | salary numeric (10,2) | joining_date date |
|---|------------------------|------------------------------------|--------------------------------------|--------------------------|----------------------|
| 1 | 101 | Arjun Malhotra | Data Science | 60000.00 | 2022-01-10 |
| 2 | 102 | Pooja Nair | Recruitment | 28000.00 | 2021-03-15 |
| 3 | 103 | Siddharth Iyer | Backend Dev | 42000.00 | 2020-06-20 |
| 4 | 104 | Meera Kulkarni | Accounts | 65000.00 | 2019-09-05 |
| 5 | 105 | Rohan Das | HR Operations | 24000.00 | 2023-02-12 |
| 6 | 106 | Kavya Menon | Auditing | 36000.00 | 2020-11-25 |
| 7 | 107 | Nitin Agarwal | Business Dev | 48000.00 | 2021-07-30 |
| 8 | 108 | Ishita Roy | Marketing | 26000.00 | 2022-12-01 |
| 9 | 109 | Aditya Kulkarni | Cloud Engg | 52000.00 | 2022-04-18 |

```
SELECT department, AVG(salary) AS avg_salary
FROM employee
GROUP BY department;
```

Avg Salary by Department:

| | department character varying (50) | avg_salary numeric |
|---|--------------------------------------|-----------------------|
| 1 | Cloud Engg | 52000.00000000000000 |
| 2 | Accounts | 65000.00000000000000 |
| 3 | Marketing | 26000.00000000000000 |
| 4 | HR Operations | 24000.00000000000000 |
| 5 | Recruitment | 28000.00000000000000 |
| 6 | Auditing | 36000.00000000000000 |
| 7 | Business Dev | 48000.00000000000000 |
| 8 | Data Science | 60000.00000000000000 |
| 9 | Backend Dev | 42000.00000000000000 |



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```
SELECT department, AVG(salary) AS avg_salary
FROM employee
WHERE salary > 20000
GROUP BY department
HAVING AVG(salary) > 30000;
```

Data Output Messages Notifications

≡+ SQL

| | department | avg_salary |
|---|--------------|------------------------|
| 1 | Cloud Engg | 52000.0000000000000000 |
| 2 | Accounts | 65000.0000000000000000 |
| 3 | Business Dev | 48000.0000000000000000 |
| 4 | Data Science | 60000.0000000000000000 |
| 5 | Backend Dev | 42000.0000000000000000 |
| 6 | Auditing | 36000.0000000000000000 |

```
SELECT department, AVG(salary) AS avg_salary
FROM employee
WHERE salary > 20000
GROUP BY department
HAVING AVG(salary) > 30000
ORDER BY avg_salary DESC;
```



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Data Output Messages Notifications

SQL

| | department character varying (50) | avg_salary numeric |
|---|--------------------------------------|------------------------|
| 1 | Accounts | 65000.0000000000000000 |
| 2 | Data Science | 60000.0000000000000000 |
| 3 | Cloud Engg | 52000.0000000000000000 |
| 4 | Business Dev | 48000.0000000000000000 |
| 5 | Backend Dev | 42000.0000000000000000 |
| 6 | Auditing | 36000.0000000000000000 |