



Apex Institute of Technology

Department of Computer Science & Engineering

Student Name: Aditya Verma

UID:24BAI70937

Branch: CSE AIML

Section/Group:24AIT-KRG1/G2

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



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Query Query History

```
1 CREATE TABLE employee (
2     emp_id      INT PRIMARY KEY,
3     emp_name    VARCHAR(50),
4     department   VARCHAR(50),
5     salary       NUMERIC(10,2),
6     joining_date DATE
7 );
8
9 INSERT INTO employee (emp_id, emp_name, department, salary, joining_date) VALUES
10 (101, 'Arjun Malhotra', 'Data Science', 60000, '2022-01-10'),
11 (102, 'Pooja Nair', 'Recruitment', 28000, '2021-03-15'),
12 (103, 'Siddharth Iyer', 'Backend Dev', 42000, '2020-06-20'),
13 (104, 'Meera Kulkarni', 'Accounts', 65000, '2019-09-05'),
14 (105, 'Rohan Das', 'HR Operations', 24000, '2023-02-12'),
15 (106, 'Kavya Menon', 'Auditing', 36000, '2020-11-25'),
16 (107, 'Nitin Agarwal', 'Business Dev', 48000, '2021-07-30'),
17 (108, 'Ishita Roy', 'Marketing', 26000, '2022-12-01'),
18 (109, 'Aditya Kulkarni', 'Cloud Engg', 52000, '2022-04-18');
19
20 SELECT * FROM employee;
21
```

Data Output Messages Notifications

SQL

	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



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```
21  
22     SELECT department, AVG(salary) AS avg_salary  
23     FROM employee  
24     GROUP BY department;  
25  
26 |
```

Data Output Messages Notifications

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	department	avg_salary
1	Cloud Engg	52000.0000000000000000
2	Accounts	65000.0000000000000000
3	Marketing	26000.0000000000000000
4	HR Operations	24000.0000000000000000
5	Recruitment	28000.0000000000000000
6	Auditing	36000.0000000000000000
7	Business Dev	48000.0000000000000000
8	Data Science	60000.0000000000000000
9	Backend Dev	42000.0000000000000000



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```
W 32  SELECT department,AVG(salary) AS avg_salary  
W 33  FROM employee  
W 34  WHERE salary > 20000  
W 35  GROUP BY department  
W 36  HAVING AVG(salary) > 30000;  
W 37
```

Data Output Messages Notifications

	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



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```
37
38  SELECT department,AVG(salary) AS avg_salary
39  FROM employee
40  WHERE salary > 20000
41  GROUP BY department
42  HAVING AVG(salary) > 30000
43  ORDER BY avg_salary DESC;
44
```

Data Output Messages Notifications

A screenshot of a SQL database interface showing a table of average salaries by department. The table has three columns: department (character varying (50)), avg_salary (numeric), and a lock icon. The data shows six rows of results.

	department	avg_salary
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