



Apex Institute of Technology

Department of Computer Science & Engineering

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Branch: Computer Science & Engineering (AIML)

Section/Group: 24AIT-KRG-1/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

- (1) Start the system and log in to the computer.



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- (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
);
```

C) Insert Sample Records:



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```
INSERT INTO employee (emp_id, emp_name, department, salary, joining_date) VALUES
(201, 'Arjun Malhotra', 'IT', 52000, '2023-02-11'),
(202, 'Meera Nair', 'HR', 26000, '2020-08-19'),
(203, 'Siddharth Rao', 'IT', 34000, '2021-04-10'),
(204, 'Ritika Desai', 'Finance', 60000, '2018-12-05'),
(205, 'Harshit Bansal', 'HR', 17000, '2024-01-22'),
(206, 'Tanya Kapoor', 'Finance', 31000, '2022-05-09'),
(207, 'Gaurav Khanna', 'Sales', 42000, '2020-09-14'),
(208, 'Isha Mathur', 'Sales', 14000, '2023-03-01'),
(209, 'Manoj Patil', 'IT', 29000, '2022-10-18');
```

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;
```

Step 4 Query (Final Output):

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



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```
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

```
1 -- Create employee table
2 CREATE TABLE employee (
3     emp_id      INT PRIMARY KEY,
4     emp_name    VARCHAR(50),
5     department   VARCHAR(50),
6     salary       NUMERIC(10,2),
7     joining_date DATE
8 );
9
```

Data Output Messages Notifications

CREATE TABLE

Query returned successfully in 41 msec.



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```
10 -- Insert new employee data
11 INSERT INTO employee (emp_id, emp_name, department, salary, joining_date) VALUES
12 (201, 'Arjun Malhotra', 'IT', 52000, '2023-02-11'),
13 (202, 'Meera Nair', 'HR', 26000, '2020-08-19'),
14 (203, 'Siddharth Rao', 'IT', 34000, '2021-04-10'),
15 (204, 'Ritika Desai', 'Finance', 60000, '2018-12-05'),
16 (205, 'Harshit Bansal', 'HR', 17000, '2024-01-22'),
17 (206, 'Tanya Kapoor', 'Finance', 31000, '2022-05-09'),
18 (207, 'Gaurav Khanna', 'Sales', 42000, '2020-09-14'),
19 (208, 'Isha Mathur', 'Sales', 14000, '2023-03-01'),
20 (209, 'Manoj Patil', 'IT', 29000, '2022-10-18');
21
```

Data Output Messages Notifications

INSERT 0 9

Query returned successfully in 33 msec.

```
22 -- Query 1: Display all rows
23 SELECT * FROM employee;
24
```

Data Output Messages Notifications

Showing rows: 1 to 9 Page No: 1 of 1

	emp_id [PK] integer	emp_name character varying (50)	department character varying (50)	salary numeric (10,2)	joining_date date
1	201	Arjun Malhotra	IT	52000.00	2023-02-11
2	202	Meera Nair	HR	26000.00	2020-08-19
3	203	Siddharth Rao	IT	34000.00	2021-04-10
4	204	Ritika Desai	Finance	60000.00	2018-12-05
5	205	Harshit Bansal	HR	17000.00	2024-01-22
6	206	Tanya Kapoor	Finance	31000.00	2022-05-09
7	207	Gaurav Khanna	Sales	42000.00	2020-09-14
8	208	Isha Mathur	Sales	14000.00	2023-03-01
9	209	Manoj Patil	IT	29000.00	2022-10-18



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```
25 -- Query 2: Average salary by department
26 SELECT department, AVG(salary) AS avg_salary
27 FROM employee
28 GROUP BY department;
```

Data Output Messages Notifications

SQL

Showing rows: 1 to 4 Page No: 1 of 1 |

	department character varying (50)	avg_salary numeric
1	Finance	45500.0000000000000000
2	Sales	28000.0000000000000000
3	IT	38333.3333333333333333
4	HR	21500.0000000000000000

```
30 -- Query 3: Average salary (salary > 20000)
31 SELECT department, AVG(salary) AS avg_salary
32 FROM employee
33 WHERE salary > 20000
34 GROUP BY department;
```

```
35
36 -- Query 4: Average salary > 30000 after filter
37 SELECT department, AVG(salary) AS avg_salary
```

Data Output Messages Notifications

SQL

Showing rows: 1 to 4 Page No: 1 of 1 |

	department character varying (50)	avg_salary numeric
1	Finance	45500.0000000000000000
2	Sales	42000.0000000000000000
3	IT	38333.3333333333333333
4	HR	26000.0000000000000000



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```
36 -- Query 4: Average salary > 30000 after filter
37 SELECT department, AVG(salary) AS avg_salary
38 FROM employee
39 WHERE salary > 20000
40 GROUP BY department
41 HAVING AVG(salary) > 30000;
42
```

Data Output Messages Notifications

SQL

Showing rows: 1 to 3 | | Page No: 1 of 1 |

	department character varying (50)	avg_salary numeric
1	Finance	45500.0000000000000000
2	Sales	42000.0000000000000000
3	IT	38333.333333333333

```
43 -- Query 5: Same as above + order desc
44 SELECT department, AVG(salary) AS avg_salary
45 FROM employee
46 WHERE salary > 20000
47 GROUP BY department
48 HAVING AVG(salary) > 30000
49 ORDER BY avg_salary DESC;
50
```

Data Output Messages Notifications

SQL

Showing rows: 1 to 3 | | Page No: 1 of 1 |

	department character varying (50)	avg_salary numeric
1	Finance	45500.0000000000000000
2	Sales	42000.0000000000000000
3	IT	38333.333333333333