GROUP BY and HAVING in MySQL

The `GROUP BY` clause is used to **group rows that have the same values** in specified columns. It is typically used with **aggregate functions** like `COUNT`, `SUM`, `AVG`, `MIN`, or `MAX`.

The `HAVING` clause is used to **filter groups** after aggregation — similar to how `WHERE` filters individual rows.

Example Table: `users`

Assume this is your `users` table:

id	name	gender	salary	referred_by_id
1	Aarav	Male	80000	NULL
2	Sneha	Female	75000	1
3	Raj	Male	72000	1
4	Fatima	Female	85000	2
5	Priya	Female	70000	NULL

GROUP BY Example: Average Salary by Gender

```
SELECT gender, AVG(salary) AS average_salary
FROM users
GROUP BY gender;
```

Explanation:

- This groups users by gender.
- Then calculates the average salary for each group.

GROUP BY with COUNT

Find how many users were referred by each user:

```
SELECT referred_by_id, COUNT(*) AS total_referred
FROM users
WHERE referred_by_id IS NOT NULL
GROUP BY referred_by_id;
```

Output:

referred_by_id	total_referred
1	2
2	1

HAVING Clause: Filtering Groups

Let's say we only want to show genders where the **average salary is greater than ₹75,000**.

```
SELECT gender, AVG(salary) AS avg_salary
FROM users
GROUP BY gender
HAVING AVG(salary) > 75000;
```

Why not `WHERE`?

- `WHERE` is used **before** grouping.
- `HAVING` is used **after** groups are formed — it's the only way to filter aggregated values.

Another Example: Groups with More Than 1 Referral

```
SELECT referred_by_id, COUNT(*) AS total_referred
FROM users
WHERE referred_by_id IS NOT NULL
GROUP BY referred_by_id
HAVING COUNT(*) > 1;
```

Summary

Clause	Purpose	Can use aggregates?
`WHERE`	Filters rows **before** grouping	No
`GROUP BY`	Groups rows based on column values	N/A
`HAVING`	Filters groups **after** aggregation	Yes

Use `GROUP BY` to organize data, and `HAVING` to filter those groups based on aggregate conditions.

ROLLUP

To get subtotals and grand totals, you can use `ROLLUP`:

```
SELECT gender, COUNT(*) AS total_users
FROM users
GROUP BY gender WITH ROLLUP;
```

Explanation:

- This will give you a count of users by gender, along with a grand total for all users.