




1. Second highest salary

- `SELECT MAX(salary)`
- `FROM employees`
- `WHERE salary < (SELECT MAX(salary) FROM employees);`
-  Uses subquery to exclude the top salary.


2. Department-wise avg salary (with >5 employees)

- SELECT department_id, AVG(salary) AS avg_salary
- FROM employees
- GROUP BY department_id
- HAVING COUNT(*) > 5;
-  `HAVING` filters aggregated groups.

3. Customers with >3 orders in last 30 days

- SELECT customer_id
- FROM orders
- WHERE order_date >= CURRENT_DATE - INTERVAL '30 days'
- GROUP BY customer_id
- HAVING COUNT(*) > 3;
-  Aggregation + date filter.

4. Find duplicates on multiple fields


- `SELECT col1, col2, COUNT(*)`
- `FROM my_table`
- `GROUP BY col1, col2`
- `HAVING COUNT(*) > 1;`
-  Helps detect data quality issues.

5. Transpose rows into columns using CASE


- SELECT
- user_id,
- MAX(CASE WHEN month = 'Jan' THEN spend
END) AS Jan,
- MAX(CASE WHEN month = 'Feb' THEN spend
END) AS Feb
- FROM user_spend
- GROUP BY user_id;




6. INNER JOIN vs EXISTS

- SELECT name
- FROM customers c
- WHERE EXISTS (
 - SELECT 1 FROM orders o WHERE
o.customer_id = c.id
-);
-  `EXISTS` stops at the first match. Good for correlated subqueries.

7. Products never sold

- SELECT p.*
- FROM products p
- LEFT JOIN order_items o ON p.id = o.product_id
- WHERE o.product_id IS NULL;
-  `LEFT JOIN` + NULL check = "no match" rows.

8. Highest order value per customer

- SELECT o.*
- FROM orders o
- WHERE amount = (
 - SELECT MAX(amount) FROM orders WHERE customer_id = o.customer_id)
-);
-  Correlated subquery per customer.


9. Compare today vs yesterday active users

- WITH daily_users AS (
 - SELECT activity_date, COUNT(DISTINCT user_id) AS user_count
 - FROM activity_log
 - WHERE activity_date IN (CURRENT_DATE, CURRENT_DATE - 1)
 - GROUP BY activity_date
 -)
- SELECT


10. Recursive CTE for hierarchy

- WITH RECURSIVE org_chart AS (
 - SELECT id, parent_id, 1 AS level
 - FROM employees
 - WHERE parent_id IS NULL
 - UNION ALL
 - SELECT e.id, e.parent_id, oc.level + 1
 - FROM employees e
 - JOIN org_chart oc ON e.parent_id = oc.id
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11. Rank products by sales within each category

- SELECT product_id, category,
- RANK() OVER (PARTITION BY category
ORDER BY total_sales DESC) AS rnk
- FROM product_sales;
-  `RANK()` gives position per category.

12. 7-day rolling avg website visits


- SELECT visit_date,
- AVG(visits) OVER (ORDER BY visit_date
ROWS BETWEEN 6 PRECEDING AND CURRENT
ROW) AS rolling_avg
- FROM web_traffic;
-  Smooth trends using sliding windows.

13. First and last transaction per user


- SELECT *
- FROM (
 - SELECT *,
 - ROW_NUMBER() OVER (PARTITION BY user_id ORDER BY tx_date ASC) AS rn_asc,
 - ROW_NUMBER() OVER (PARTITION BY user_id ORDER BY tx_date DESC) AS rn_desc
- FROM transactions
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14. Detect gaps in sequential dates

- SELECT date,
- LAG(date) OVER (ORDER BY date) AS
prev_date,
- date - LAG(date) OVER (ORDER BY date) AS
gap
- FROM events;
-  Easily identify missing dates or IDs.

15. Cumulative spend per customer per month

- SELECT customer_id, month,
- SUM(spend) OVER (PARTITION BY
customer_id ORDER BY month) AS cum_spend
- FROM monthly_spend;
-  Running totals within groups.