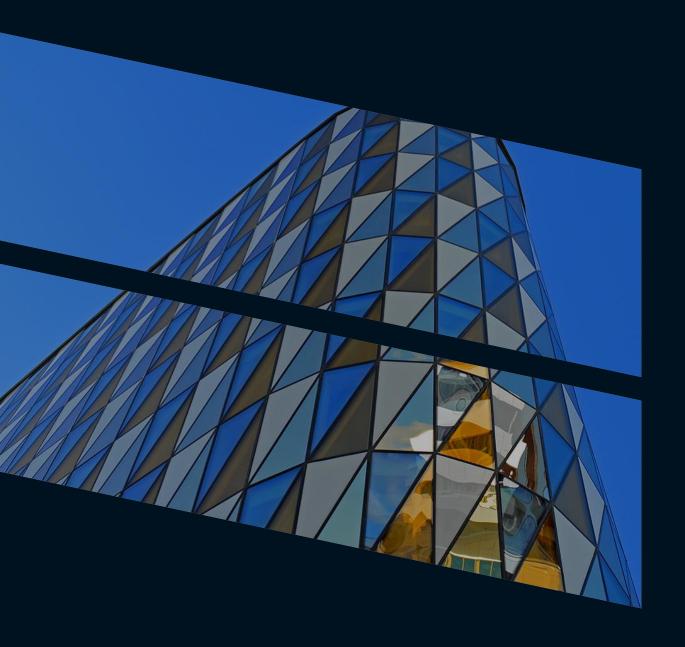# Subqueries and Derived Tables

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# What is SQL Subquery?

A Subquery is SQl query nested inside a larger query

# Derived tables

Derived tables are created by replicating the final state of an existing table

# Use of subqueries and derived tables

- Improve readability: Break queries into smaller, more manageable parts.

- Filter data: Filter data from other tables or aggregate functions.

- Manipulate data: Use subqueries in INSERT, UPDATE, and DELETE statements to manipulate data based on conditions.

- Avoid joins: Subqueries can be more efficient than joins, especially for large datasets or complex conditions.

- ewrite correlated subqueries: Many correlated subqueries can be rewritten to use a derived table to improve performance.

- Organize data flow: Use a query within another query to organize thoughts about data flow.

# COMPARISON

## Subquery

- Subquery - simply nested query most often used in WHERE clause.

- Could be used in SELECT and FROM clause (never returns a table)

## Derived Tables

- Always returns a table.

# Subquery Syntax

The inner query (sub query) executes before main (outer query)

The result of sub query used by main query

```
SELECT    select_list
FROM      table
WHERE     expr operator
                    (SELECT    select_list
          FROM      table);
```

# Subquery types

Single row : Returns zero or one row

Multiple row: Returns one or more row

Multiple column:Returns one or more Columns

# Single row Subqueries

```
mysql> select *from emp;
+-------+--------+-----------+------+---------+--------+
| empno | ename  | job       | mgr  | sal     | deptno |
+-------+--------+-----------+------+---------+--------+
|  7369 | SMITH  | CLERK     | 7902 |  800.00 |     20 |
|  7499 | ALLEN  | SALESMAN  | 7698 | 1600.00 |     30 |
|  7521 | WARD   | SALESMAN  | 7698 | 1250.00 |     30 |
|  7566 | JONES  | MANAGER   | 7839 | 2975.00 |     20 |
|  7654 | MARTIN | SALESMAN  | 7698 | 1250.00 |     30 |
|  7698 | BLAKE  | MANAGER   | 7839 | 2850.00 |     30 |
|  7782 | CLARK  | MANAGER   | 7839 | 2450.00 |     10 |
|  7788 | SCOTT  | ANALYST   | 7566 | 3000.00 |     20 |
|  7839 | KING   | PRESIDENT | NULL | 5000.00 |     10 |
|  7844 | TURNER | SALESMAN  | 7698 | 1500.00 |     30 |
|  7876 | ADAMS  | CLERK     | 7788 | 1100.00 |     20 |
|  7900 | JAMES  | CLERK     | 7698 |  950.00 |     30 |
|  7902 | FORD   | ANALYST   | 7566 | 3000.00 |     20 |
|  7934 | MILER  | CLERK     | 7782 | 1300.00 |     10 |
+-------+--------+-----------+------+---------+--------+
```

# Multi row Subqueries

- Uses set of comparison operators IN,ALL and ANY

| SYMBOL | MEANING |
|--------|---------|
| IN | Equal to any member in a list. |
| ANY | Return rows that match any value on a list. |
| ALL | Return rows that match all the values in a list. |

# IN Operator

- Returns true if comparison value is present in list

```
mysql> SELECT ENAME, SAL FROM EMP
    -> WHERE SAL IN (SELECT MIN(SAL) FROM EMP GROUP BY DEPTNO);
+--------+---------+
| ENAME  | SAL     |
+--------+---------+
| SMITH  |  800.00 |
| JAMES  |  950.00 |
| MILER  | 1300.00 |
+--------+---------+
```

# ANY Operator

- Returns true if comparison value matches any of the values in list

```
mysql> SELECT ENAME, SAL FROM EMP
    -> WHERE SAL>ANY (SELECT MAX(SAL) FROM EMP
    -> GROUP BY DEPTNO);
+--------+---------+
| ENAME  | SAL     |
+--------+---------+
| JONES  | 2975.00 |
| SCOTT  | 3000.00 |
| KING   | 5000.00 |
| FORD   | 3000.00 |
+--------+---------+
```

# ALL Operator

- Returns true if comparison value matches all the values in list

```
mysql> SELECT EMPNO, ENAME, JOB, SAL FROM EMP
    -> WHERE SAL<ALL (SELECT SAL FROM EMP WHERE JOB='MANAGER')
    -> AND JOB <> 'MANAGER';
+-------+--------+----------+---------+
| EMPNO | ENAME  | JOB      | SAL     |
+-------+--------+----------+---------+
|  7369 | SMITH  | CLERK    |  800.00 |
|  7499 | ALLEN  | SALESMAN | 1600.00 |
|  7521 | WARD   | SALESMAN | 1250.00 |
|  7654 | MARTIN | SALESMAN | 1250.00 |
|  7844 | TURNER | SALESMAN | 1500.00 |
|  7876 | ADAMS  | CLERK    | 1100.00 |
|  7900 | JAMES  | CLERK    |  950.00 |
|  7934 | MILER  | CLERK    | 1300.00 |
+-------+--------+----------+---------+
```

# THANK YOU!