SQL Database

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Table of Contents

Structured Query Language

City	Population (millions)	GDP (billion USD)
Karachi	14.91	164.0
Lahore	11.13	84.0
Islamabad	1.015	18.0
Quetta	1.001	4.2

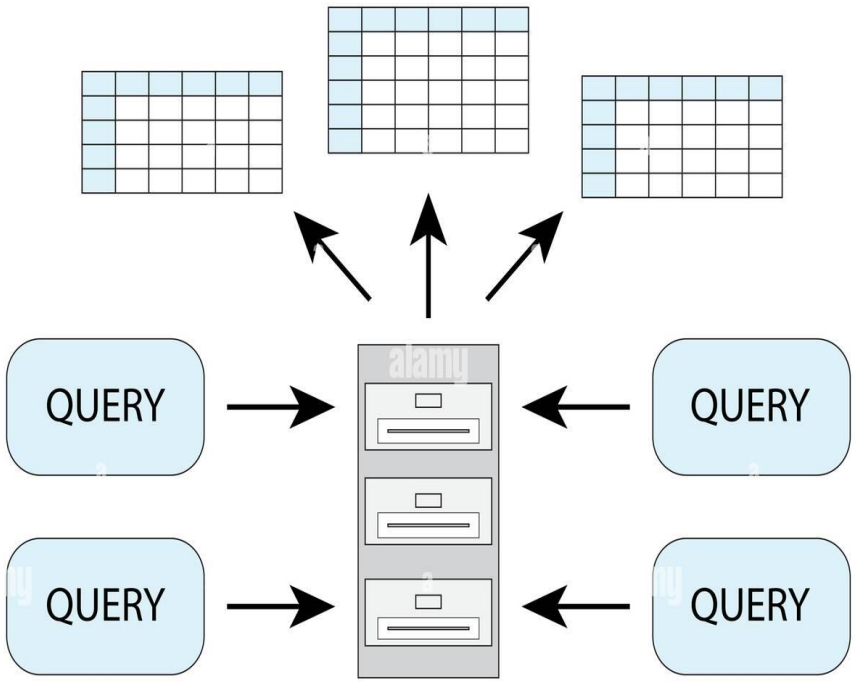
Introduction to SQL:

- SQL stands for Structured Query Language.
- It is a standard language for managing relational databases.

Key Components:

- SQL consists of commands for querying, updating, and managing databases.
- It includes data definition language (DDL), data manipulation language (DML), and data control language (DCL) commands.

Querying Single Table in SQL



Fetch all columns from single table

- **Syntax:** SELECT * FROM table_name;
- **Example:** SELECT * FROM employees;

Fetch specific columns from a single table:

- **Syntax:** SELECT column1, column2, ... FROM table_name WHERE condition;
- **Example:** SELECT name, age FROM customers;

Fetch specific columns and order the results:

- **Syntax:** SELECT column1, column2, ... FROM table_name ORDER BY column_name [ASC|DESC];
- **Example:** SELECT name FROM city ORDER BY rating ASC;

ALIASES

- **Syntax:** SELECT column_name AS alias_name FROM table_name;
- **Example:** SELECT first_name AS 'First', last_name AS 'Last' FROM employees;

Column Alias:

- SELECT first_name AS 'First', last_name AS 'Last' FROM employees;

Table Alias:

- SELECT e.first_name, d.department_name FROM employees AS e
- JOIN departments AS d ON e.department_id = d.department_id;

Alias for Aggregated Functions:

- SELECT AVG(salary) AS 'AverageSalary' FROM employees;

FILTERING THE OUTPUT

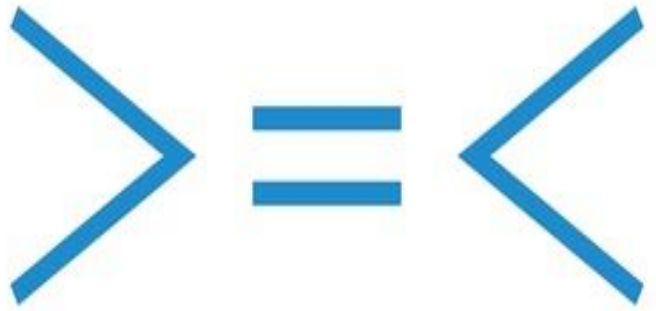
COMPARISON OPERATORS

Equal to Operator (=):

SELECT * FROM employees WHERE department = 'Sales'

Not Equal to Operator (<>, !=):

SELECT * FROM products WHERE price <> 100;



Greater Than Operator (>):

SELECT * FROM orders WHERE total_amount > 500;

Less Than Operator (<):

SELECT * FROM customers WHERE age < 30;

Greater Than or Equal to Operator (>=):

SELECT * FROM products WHERE stock_quantity >= 100;

Less Than or Equal to Operator (<=):

SELECT * FROM employees WHERE salary <= 50000;

JOINS

Types and syntax

INNER JOIN:

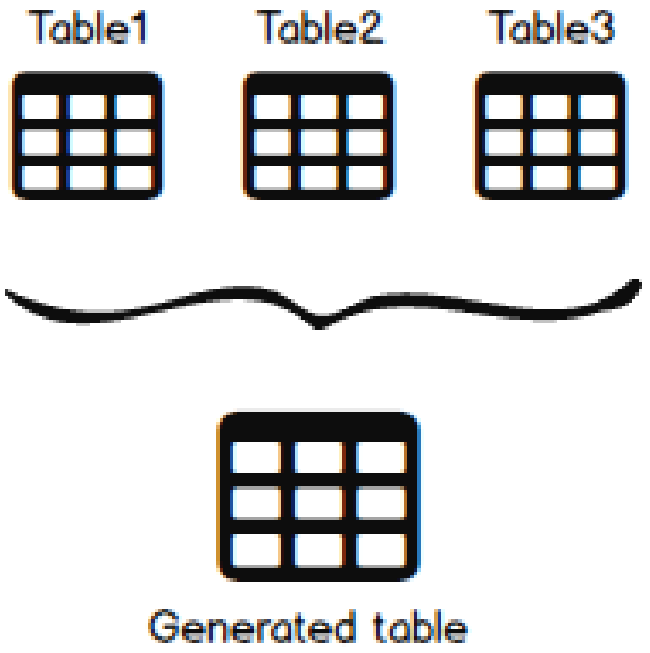
```
SELECT Students.Name, Courses.CourseName
FROM Students
INNER JOIN Courses ON Students.CourseID = Courses.ID;
```

LEFT JOIN:

```
SELECT Students.Name, Attendance.Status
FROM Students
LEFT JOIN Attendance ON Students.ID = Attendance.StudentID;
```

RIGHT JOIN:

```
SELECT Attendance.Status, Students.Name
FROM Attendance
RIGHT JOIN Students ON Attendance.StudentID = Students.ID;
```



JOINS Continue

Types and syntax

FULL JOIN:

```
SELECT Students.Name, Grades.Grade
FROM Students
FULL JOIN Grades ON Students.ID = Grades.StudentID;
```

CROSS JOIN:

```
SELECT Students.Name, Courses.CourseName
FROM Students
CROSS JOIN Courses;
```

NATURAL JOIN:

```
SELECT *
FROM Students
NATURAL JOIN Grades;
```

JOINS Continue

Types and syntax

Self Join:

```
SELECT e1.Name AS Employee, e2.Name AS Manager
FROM Employees e1
JOIN Employees e2 ON e1.ManagerID = e2.ID;
```

Non-Equijoin:

```
SELECT s.Name, c.CourseName
FROM Students s, Courses c
WHERE s.EnrollmentYear > c.StartYear;
```

Join with Multiple Conditions:

```
SELECT o.OrderID, c.CustomerName
FROM Orders o
JOIN Customers c ON o.CustomerID = c.CustomerID AND o.TotalAmount > 1000;
```

JOINS Continue

Multiple Joins

JOIN & JOIN:

```
SELECT o.OrderID, c.CustomerName, p.ProductName
FROM Orders o
JOIN Customers c ON o.CustomerID = c.CustomerID
JOIN Products p ON o.ProductID = p.ProductID;
```

Join & Left Join:

```
SELECT e.EmployeeID, e.EmployeeName, d.DepartmentName
FROM Employees e
JOIN Departments d ON e.DepartmentID = d.DepartmentID
LEFT JOIN Managers m ON e.ManagerID = m.ManagerID;
```

Left Join & Left Join:

```
SELECT p.ProductName, s.SupplierName, c.CategoryName
FROM Products p
LEFT JOIN Suppliers s ON p.SupplierID = s.SupplierID
LEFT JOIN Categories c ON p.CategoryID = c.CategoryID;
```

Aggregation

AVG ():

SELECT AVG(Marks) AS AverageMarks
FROM Exams;

COUNT():

SELECT COUNT(*) AS TotalStudents
FROM Students;

MAX ():

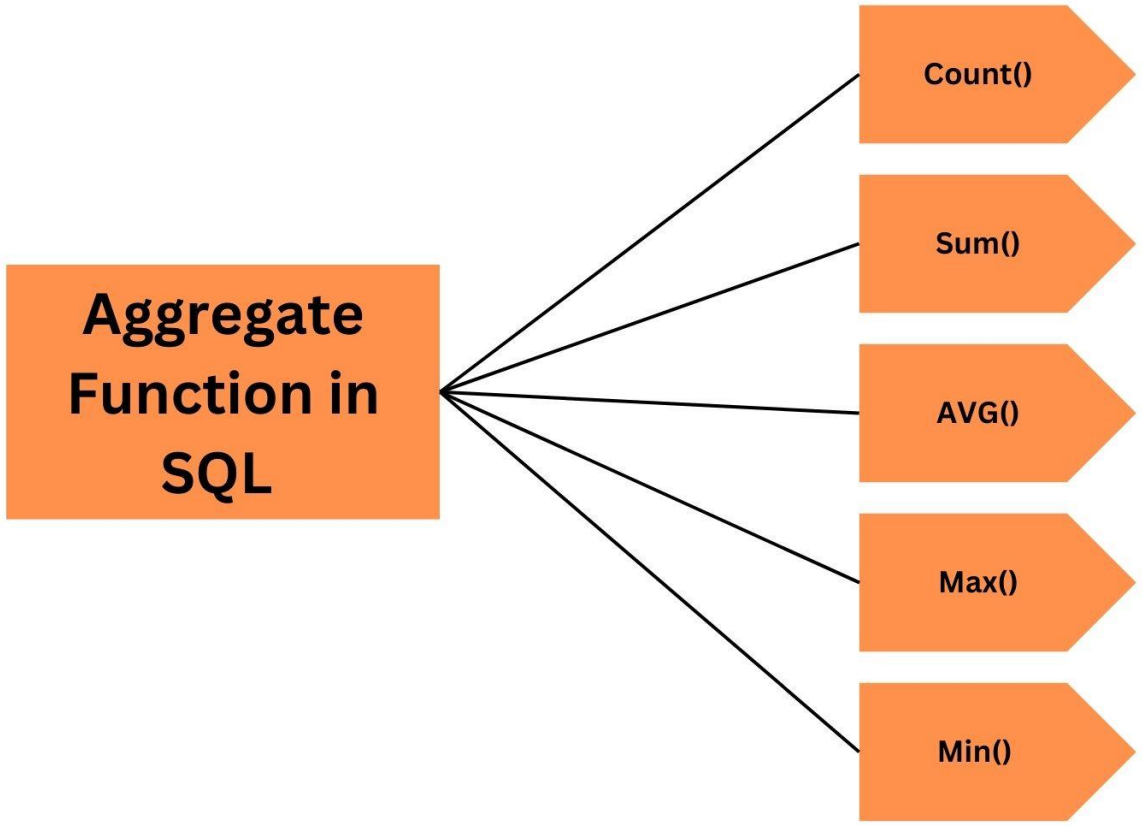
SELECT MAX(Salary) AS MaxSalary
FROM Employees;

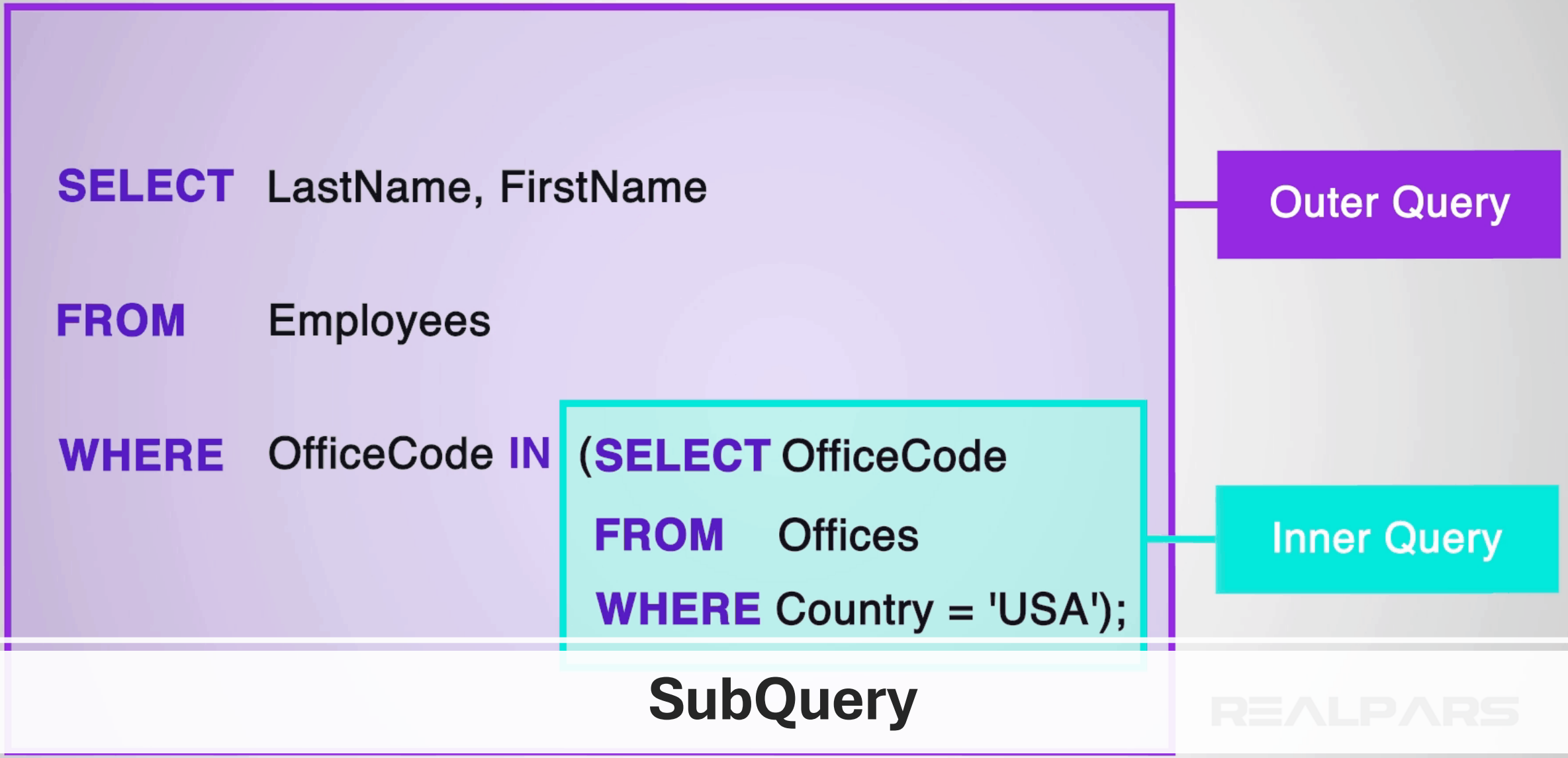
MIN():

SELECT MIN(Age) AS MinAge
FROM Customers;

SUM():

SELECT SUM(Price) AS TotalSales
FROM Orders;




SELECT LastName, FirstName
FROM Employees
WHERE OfficeCode IN (SELECT OfficeCode
FROM Offices
WHERE Country = 'USA');
Outer Query
Inner Query
SubQuery

SUBQUERIES

SINGLE VALUE :

```
SELECT Name, Age
FROM Students
WHERE Age = (SELECT MAX(Age) FROM Students);
```

Multiple Values:

```
SELECT Name
FROM Courses
WHERE CourseID IN (SELECT CourseID FROM Enrollments WHERE StudentID = 101);
```

Correlated :

```
SELECT Name
FROM Employees e
WHERE Salary > (SELECT AVG(Salary) FROM Employees WHERE Department =
e.Department);
```

SET OPERATIONS

UNION:

SELECT Name FROM Students

UNION

SELECT Name FROM Teachers;

INTERSECT:

SELECT Name FROM Students

INTERSECT

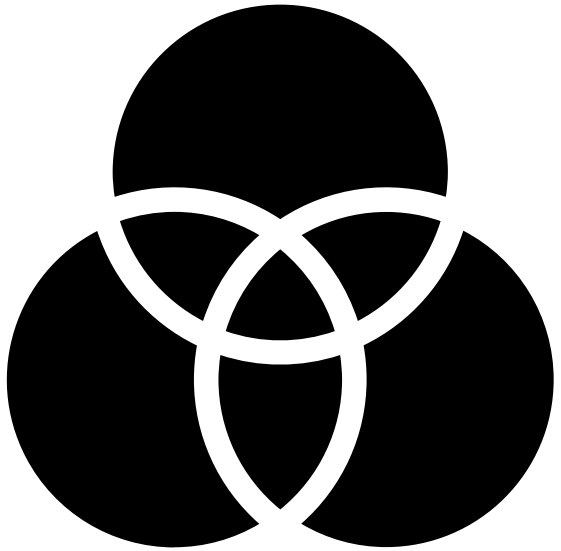
SELECT Name FROM TopPerformers;

EXCEPT:

SELECT Name FROM Students

EXCEPT

SELECT Name FROM Alumni;



Thank You