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# Constructing a Query

# Introduction

Queries are commands used to retrieve, modify, or manipulate data in a database. They allow users to interact with stored information efficiently. Constructing queries correctly is crucial for ensuring accurate results, optimizing performance, and preventing errors or unintended data modifications. A well-structured query enhances database efficiency and maintains data integrity.

# Basic Components of a Query

**A. Keywords** – SQL commands like SELECT, INSERT, UPDATE, DELETE

**B. Tables** – The source of data in the database

**C. Columns and Fields** – Specific data points retrieved or modified

**D. Conditions** – Filtering data using WHERE, HAVING, etc.

# Types of Queries

A. Data Retrieval Queries (SELECT)

- Selecting all columns
- Selecting specific columns

B. Data Modification Queries

1. Inserting Data (INSERT)
2. Updating Records (UPDATE)
3. Deleting Records (DELETE)

# Types of Queries

C. Conditional Queries (WHERE Clause)

- Filtering results based on conditions
- Using logical operators (AND, OR, NOT)

D. Sorting and Grouping Queries

- ORDER BY for sorting results
- GROUP BY for aggregating data
- HAVING for filtering grouped data

# Types of Queries

IV. Advanced Query Techniques

A. Joins – Combining multiple tables (INNER JOIN, LEFT JOIN, etc.)

B. Subqueries – Using queries inside other queries

C. Aggregate Functions – COUNT(), SUM(), AVG(), etc.

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# Objectives and Scope

- The primary goal of this query is to generate a report that lists active employees along with their key details (EmployeeID, FirstName, LastName, and Department). This report is intended for management review to ensure that only current personnel data is displayed and is organized in a meaningful way.

# Queries

**DESCRIBE** – Displays the structure of a table.

```
MariaDB [reporting]> describe employees;
+------------+---------------------------+------+-----+---------+----------------+
| Field      | Type                      | Null | Key | Default | Extra          |
+------------+---------------------------+------+-----+---------+----------------+
| EmployeeID | int(11)                   | NO   | PRI | NULL    | auto_increment |
| FirstName  | varchar(100)              | NO   |     | NULL    |                |
| LastName   | varchar(100)              | NO   |     | NULL    |                |
| Department | varchar(100)              | NO   |     | NULL    |                |
| status     | enum('active','inactive') | NO   |     | NULL    |                |
+------------+---------------------------+------+-----+---------+----------------+
5 rows in set (0.004 sec)
```

**INSERT** – Adds new records to a table.

```
MariaDB [reporting]> INSERT INTO employees (FirstName, LastName, Department, status)
    -> VALUES
    -> ('Alice', 'Smith', 'HR', 'active'),
    -> ('Bob', 'Johnson', 'IT', 'inactive'),
    -> ('Charlie', 'Brown', 'Finance', 'active');
Query OK, 3 rows affected (0.004 sec)
Records: 3  Duplicates: 0  Warnings: 0
```

# Queries

**SELECT** – Retrieves data from a table.

```
MariaDB [reporting]> SELECT * FROM employees;
+------------+-----------+----------+------------+----------+
| EmployeeID | FirstName | LastName | Department | status   |
+------------+-----------+----------+------------+----------+
|          1 | Alice     | Smith    | HR         | active   |
|          2 | Bob       | Johnson  | IT         | inactive |
|          3 | Charlie   | Brown    | Finance    | active   |
+------------+-----------+----------+------------+----------+
3 rows in set (0.000 sec)
```

```
MariaDB [reporting]> SELECT * FROM employees WHERE status = 'active';
+------------+-----------+----------+------------+--------+
| EmployeeID | FirstName | LastName | Department | status |
+------------+-----------+----------+------------+--------+
|          1 | Alice     | Smith    | HR         | active |
|          3 | Charlie   | Brown    | Finance    | active |
+------------+-----------+----------+------------+--------+
2 rows in set (0.000 sec)
```

# Queries

```
MariaDB [reporting]> SELECT * FROM employees WHERE Department = 'HR';
+------------+-----------+----------+------------+--------+
| EmployeeID | FirstName | LastName | Department | status |
+------------+-----------+----------+------------+--------+
|          1 | Alice     | Smith    | HR         | active |
+------------+-----------+----------+------------+--------+
1 row in set (0.000 sec)
```

```
MariaDB [reporting]> SELECT FirstName, LastName, Department FROM employees;
+-----------+----------+------------+
| FirstName | LastName | Department |
+-----------+----------+------------+
| Alice     | Smith    | HR         |
| Bob       | Johnson  | IT         |
| Charlie   | Brown    | Finance    |
+-----------+----------+------------+
3 rows in set (0.000 sec)
```

# Queries

```
MariaDB [reporting]> INSERT INTO employees (FirstName, LastName, Department, status)
    -> VALUES ('John', 'Doe', 'IT', 'active');
Query OK, 1 row affected (0.002 sec)
```

**UPDATE** – Modifies existing records in a table.

```
MariaDB [reporting]> UPDATE employees SET status = 'inactive' WHERE EmployeeID = 1;
Query OK, 1 row affected (0.006 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [reporting]> UPDATE employees SET Department = 'Finance' WHERE EmployeeID = 2;
Query OK, 1 row affected (0.002 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

# Queries

**DELETE** – Removes records from a table.

```
MariaDB [reporting]> DELETE FROM employees WHERE EmployeeID = 3;
Query OK, 1 row affected (0.003 sec)
```

```
MariaDB [reporting]> SELECT * FROM employees;
+------------+-----------+----------+------------+----------+
| EmployeeID | FirstName | LastName | Department | status   |
+------------+-----------+----------+------------+----------+
|          1 | Alice     | Smith    | HR         | inactive |
|          2 | Bob       | Johnson  | Finance    | inactive |
|          4 | John      | Doe      | IT         | active   |
+------------+-----------+----------+------------+----------+
3 rows in set (0.001 sec)
```