**SQL Command Types – Full Notes**

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## ✅ 1. DDL – Data Definition Language

### 🔹 Definition:

DDL commands are used to **define, create, and modify the structure** of database objects such as **tables, schemas, indexes, and views**.

### 🔹 Key Characteristics:

- Operates on the **schema or structure** of the database.
- Changes are **auto-committed** (cannot be rolled back).
- Affects **entire tables or database objects**.

### 🔹 Common DDL Commands:

| Command | Purpose |
|---|---|
| CREATE | Creates new tables, views, databases, etc. |
| ALTER | Modifies an existing object (e.g., adds/removes a column). |
| DROP | Deletes an object permanently. |
| TRUNCATE | Removes all records from a table without logging individual row deletions. |
| RENAME | Renames database objects. |

### 🔹 Example:

sql

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```
CREATE TABLE students (id INT, name VARCHAR(50));


ALTER TABLE students ADD age INT;


TRUNCATE TABLE students;


DROP TABLE students;
```

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✅ **2. DML – Data Manipulation Language**

🔹 **Definition:**

DML is used to **manipulate the data stored inside the tables**.

🔹 **Key Characteristics:**

- Affects the **rows (records)** in the table.
- Changes can be **rolled back**.
- Works with **TCL** commands (COMMIT, ROLLBACK).

🔹 **Common DML Commands:**

| Command | Purpose |
| --- | --- |
| INSERT | Adds new rows into a table. |
| UPDATE | Modifies existing data in the table. |
| DELETE | Removes specific rows from the table. |

🔹 **Example:**

sql

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```
INSERT INTO students (id, name) VALUES (1, 'Amit');


UPDATE students SET name = 'Rahul' WHERE id = 1;


DELETE FROM students WHERE id = 1;
```

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✅ **3. DQL – Data Query Language**

🔹 **Definition:**

DQL is used to **fetch/query data** from the database.

🔹 **Key Characteristics:**

- **Read-only** operations.

- Does **not affect** data or schema.
- Primarily involves the SELECT statement.

🔹 **DQL Command:**

| Command | Purpose |
| --- | --- |
| SELECT | Retrieves data from one or more tables. |

🔹 **Example:**

sql

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```
SELECT * FROM students;


SELECT name, age FROM students WHERE age > 20;
```

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✅ **4. DCL – Data Control Language**

🔹 **Definition:**

DCL commands are used to **control access** to data in the database by **granting or revoking permissions**.

🔹 **Key Characteristics:**

- Affects **authorization and security**.
- Changes are **auto-committed** (cannot be rolled back).

🔹 **Common DCL Commands:**

| Command | Purpose |
| --- | --- |
| GRANT | Gives user permissions to perform actions. |
| REVOKE | Removes previously granted permissions. |

🔹 **Example:**

sql

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```
GRANT SELECT, INSERT ON students TO 'user1';
```

REVOKE INSERT ON students FROM 'user1';

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### ✅ 5. TCL – Transaction Control Language

🔹 **Definition:**

TCL commands are used to **manage transactions** in a database to ensure **data integrity and consistency**.

🔹 **Key Characteristics:**

- Works with **DML commands**.
- Controls **commitment or rollback** of changes.
- Important in multi-step data operations.

🔹 **Common TCL Commands:**

| Command | Purpose |
|---|---|
| COMMIT | Permanently saves changes made in the current transaction. |
| ROLLBACK | Reverses changes made in the current transaction. |
| SAVEPOINT | Sets a point within a transaction to rollback to later. |
| SET TRANSACTION | Configures transaction properties. |

🔹 **Example:**

sql

START TRANSACTION;

UPDATE students SET name = 'Karan' WHERE id = 2;

SAVEPOINT before_change;

UPDATE students SET age = 25 WHERE id = 2;

```
ROLLBACK TO before_change;


COMMIT;
```

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## ✅ 6. THE – Transaction Handling & Execution (Concept)

### 🔹 Transaction:

A **transaction** is a sequence of one or more SQL operations that are executed as a **single logical unit of work**.

### 🔹 Properties of Transactions – ACID:

| Property | Meaning |
|---|---|
| **A** – Atomicity | All steps in a transaction either succeed or fail together. |
| **C** – Consistency | A transaction must leave the database in a valid state. |
| **I** – Isolation | Each transaction should execute independently of others. |
| **D** – Durability | Once committed, changes should persist even after failures. |

### 🔹 Transaction Lifecycle:

1. **Begin** (optional)
2. Perform operations (INSERT, UPDATE, etc.)
3. COMMIT or ROLLBACK

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✅ **Summary Table**

| Category | Full Form | Affects | Rollback Possible | Auto-commit | Example Commands |
|---|---|---|---|---|---|
| DDL | Data Definition Language | Table structure/schema | ❌ No | ✅ Yes | CREATE, ALTER, DROP |
| DML | Data Manipulation Language | Table data (rows) | ✅ Yes | ❌ No | INSERT, UPDATE, DELETE |
| DQL | Data Query Language | Data (read-only) | ❌ Not needed | ❌ Not needed | SELECT |
| DCL | Data Control Language | Permissions & security | ❌ No | ✅ Yes | GRANT, REVOKE |
| TCL | Transaction Control Language | Transactions | ✅ Yes | ❌ No | COMMIT, ROLLBACK |

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📝 **Tip for Interview or Exam:**

- **DDL = Structure**
- **DML = Data**
- **DQL = Query**
- **DCL = Control**
- **TCL = Transactions**