DATA DEFINTION LANGUAGE

Data Definition Languages (DDL): It establish the structure and organization of database objects, including tables, views, indexes, and schemas. They provide commands for creating, altering, and dropping these objects, it allow users to define the layout and characteristics of their database elements.

We can enter the correct data in the database by applying the constraints in the DDL languages.

The DDL Languages or commands are categorized into five commands which are widely used in the SQL queries:

CREATE DDL Command

ALTER DDL Command

DROP DDL Command

TRUNCATE DDL Command

RENAME DDL Command

**CREATE DDL Command:**

This DDL command allows us to create the new table, function, stored procedure, and other database objects.

Example:

using the CREATE command in SQL to create a new table called "Employees" with columns for employee ID, name, and salary could be:

**CREATE TABLE Employees (**

**EmployeeID INT PRIMARY KEY,**

**Name VARCHAR(50),**

**Salary DECIMAL(10, 2)**

**);**

This SQL statement creates a new table named "Employees" with three columns: "EmployeeID" as an integer primary key, "Name" as a variable-length string, and "Salary" as a decimal number with precision.

ALTER DDL Command:

This DDL command allows us to modify the structure of database objects.

Example:

Using the ALTER command in SQL to add a new column named "Email" to an existing table called "Employees" could be:

ALTER TABLE Employees

ADD Email VARCHAR(100);

This SQL statement alters the "Employees" table by adding a new column called "Email" with a maximum length of 100 characters.

DROP DDL Command:

This DDL command allows us to remove the table definition and data from the SQL systems.

Example:

Using the DROP command in SQL to delete an existing table called "Employees" could be:

DROP TABLE Employees;

This SQL statement removes the "Employees" table from the database, along with all its associated data and structure. It's important to exercise caution when using the DROP command, as it permanently deletes the specified database object and its contents.

TRUNCATE DDL Command:

This DDL command allows the database users to remove all the existing records from the table.

Example:

Using the TRUNCATE command in SQL to remove all records from an existing table called "Employees" could be:

TRUNCATE TABLE Employees;

This SQL statement deletes all rows from the "Employees" table, effectively emptying it while keeping the table structure intact. Unlike the DELETE command, which removes individual rows and can be rolled back, TRUNCATE is a faster operation and cannot be rolled back. It's commonly used when you want to quickly remove all data from a table without dropping and recreating the table itself.

**RENAME DDL Command:**

This DDL command allows the users to change the name of the existing table.

Example:

Using the RENAME command in SQL to change the name of an existing table from "Employees" to "Staff" could be:

RENAME TABLE Employees TO Staff;

This SQL statement renames the "Employees" table to "Staff". It effectively changes the name of the table within the database schema without altering its structure or data. It's important to note that the RENAME command might not be supported by all database management systems, and alternative methods might need to be used depending on the specific SQL implementation.

Data Manipulation Language

Data Manipulation Language (DML) is a subset of SQL (Structured Query Language) used for managing data within the database. Unlike Data Definition Language (DDL), which focuses on defining and modifying the structure of database objects, DML deals with the manipulation of data itself.

The four DML Languages or commands used in the SQL queries:

SELECT DML Command

INSERT DML Command

UPDATE DML Command

DELETE DML Command

**SELECT DML Command:**

Retrieves data from one or more tables based on specified criteria.

Example:

Using the SELECT command in SQL to retrieve data from a table called "Employees" could be:

SELECT \* FROM Employees;

This SQL statement selects all columns ('\*') from the "Employees" table. It retrieves all records (rows) stored in the table and presents them as a result set.

**INSERT DML Command:**

Adds new records (rows) of data into a table.

Example:

using the INSERT command in SQL to add a new record (row) into a table called "Employees" could be:

INSERT INTO Employees (EmployeeID, Name, Salary)

VALUES (1, 'John Doe', 50000);

This SQL statement inserts a new record into the "Employees" table with the specified values for the "EmployeeID", "Name", and "Salary" columns. In this example, the EmployeeID is set to 1, the Name is set to 'John Doe', and the Salary is set to 50000.

**UPDATE DML Command:**

Modifies existing data within a table based on specified conditions.

Example:

Using the UPDATE command in SQL to modify existing data within a table called "Employees" could be:

UPDATE Employees

SET Salary = 55000

WHERE EmployeeID = 1;

This SQL statement updates the "Salary" column in the "Employees" table for the employee with an "EmployeeID" of 1. It changes the salary from its current value to 55000. The WHERE clause specifies which records should be updated; in this case, only the record with an "EmployeeID" of 1.

**DELETE DML Command:**

Removes existing records (rows) of data from a table based on specified conditions.

Example:

Using the DELETE command in SQL to remove existing records (rows) from a table called "Employees" could be:

DELETE FROM Employees

WHERE EmployeeID = 1;

This SQL statement deletes the record from the "Employees" table where the "EmployeeID" is equal to 1. It removes the specific row that matches the specified condition in the WHERE clause.

Data Control Language

Data Control Language (DCL) in SQL is a subset of commands used for controlling access to data stored in the database. DCL commands manage permissions and privileges, determining who can perform specific actions on database objects. The primary actions governed by DCL are granting and revoking access rights.

The two DCL Languages or commands used in the SQL queries:

Grant DCL Command

Revoke DCL Command

**Grant DCL Command:**

This command allows users to grant specific permissions to other users or roles. Permissions can include the ability to select, insert, update, delete, or execute certain operations on database objects like tables, views, or procedures.

Example:

Using the GRANT command in SQL to grant SELECT permission on a table called "Employees" to a user named "user1" could be:

GRANT SELECT ON Employees TO user1;

This SQL statement grants the SELECT permission on the "Employees" table to the user named "user1". After executing this command, "user1" will have the ability to retrieve data from the "Employees" table but won't be able to perform other operations like INSERT, UPDATE, or DELETE unless explicitly granted.

**Revoke DCL Command:**

This command enables users to revoke previously granted permissions from other users or roles. It removes specific access rights previously granted using the GRANT command.

Example:

An example of using the REVOKE command in SQL to revoke SELECT permission on a table called "Employees" from a user named "user1" could be:

REVOKE SELECT ON Employees FROM user1;

This SQL statement revokes the SELECT permission on the "Employees" table from the user named "user1". After executing this command, "user1" will no longer have the ability to retrieve data from the "Employees" table, unless SELECT permission is granted again.

**Transaction Control Language**

**Transaction Control Language (TCL) in SQL is a subset of commands used for managing transactions within a database. TCL commands allow users to control the transactions' behavior, ensuring data consistency, integrity, and reliability.**

TCL includes the following main commands:

Commit TCL Command

Rollback TCL Command

**COMMIT TCL Command:**

This command allows the database users to save the operations in the database.

Example:

using the COMMIT command in SQL to permanently save changes made during a transaction could be:

BEGIN TRANSACTION;

UPDATE Employees

SET Salary = Salary \* 1.1

WHERE Department = 'Sales';

COMMIT;

a transaction is started using the BEGIN TRANSACTION command. Then, an UPDATE statement increases the salary of employees in the Sales department by 10%. Finally, the COMMIT command is used to permanently save these changes to the database. Once committed, the changes become visible to other users and cannot be undone unless another transaction is initiated.

**Rollback TCL Command:**

This command allows the database users to restore the transactions to that state which was last committed.

Example:

using the ROLLBACK command in SQL to undo changes made during a transaction could be:

BEGIN TRANSACTION;

UPDATE Employees

SET Salary = Salary \* 1.1

WHERE Department = 'Sales';

-- Something went wrong, so rollback the transaction

ROLLBACK;

a transaction is started using the BEGIN TRANSACTION command. Then, an UPDATE statement increases the salary of employees in the Sales department by 10%. However, if something goes wrong during the transaction, such as an error occurring or an unexpected outcome, the ROLLBACK command is used to undo the changes made during the transaction. After the ROLLBACK command is executed, the database is reverted to its state before the transaction began, ensuring data consistency and integrity.

Data Query Language

A Data Query Language (DQL) is a way to ask questions or retrieve information from a database. It's like having a conversation with the database, where you can ask for specific data using commands like "show me all the customers who bought a product last month" or "tell me the total sales for each category". It's a language used to get the data you need from a database without changing anything in it.

XQuery: Primarily used for querying and transforming XML data.

SPARQL: Designed for querying RDF (Resource Description Framework) data, commonly used in semantic web applications.

GraphQL: A query language for APIs (Application Programming Interfaces) developed by Facebook, designed to provide clients with precisely the data they request.

LINQ (Language-Integrated Query): Used in .NET programming languages like C# and VB.NET to query collections, databases, and XML.

SQL, or Structured Query Language, is a versatile tool for managing databases. It enables users to perform various tasks such as querying, updating, inserting, and deleting data. There are different types of SQL commands, including:

Data Query Language (DQL): Used to retrieve data from a database. The primary DQL command is SELECT, which allows users to specify the columns and conditions for retrieving data.

Data Definition Language (DDL): Used to define and manage the structure of database objects. DDL commands include CREATE (to create tables and other objects), ALTER (to modify existing objects), and DROP (to delete objects).

Data Manipulation Language (DML): Used to manipulate data within database objects. DML commands include INSERT (to add new records), UPDATE (to modify existing records), and DELETE (to remove records).

Data Control Language (DCL): Used to control access to data within the database. DCL commands include GRANT (to give permissions) and REVOKE (to revoke permissions).

These types of commands allow users to interact with databases in various ways, making SQL a powerful language for data management and manipulation.