Aim : Introduction to SQL

What is SQL?

SQL or Structured Query Language is a special-purpose domain-specific language used in programming and designed for managing data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS).

Originally based upon relational algebra and tuple relational calculus, SQL consists of a data definition language, data manipulation language, and data control language. The scope of SQL includes data insert, query, update and delete, schema creation and modification, and data access control. Although SQL is often described as, and to a great extent is, a declarative language (4GL), it also includes procedural elements.

SQL was one of the first commercial languages for Edgar F. Codd's relational model, as described in his influential 1970 paper, "A Relational Model of Data for Large Shared Data Banks." Despite not entirely adhering to the relational model as described by Codd, it became the most widely used database language.

Data manipulation language(DML)

A data manipulation language (DML) is a family of syntax elements similar to a computer programming language used for selecting, inserting, deleting and updating data in a database. Performing read-only queries of data is sometimes also considered a component of DML. A popular data manipulation language is that of Structured Query Language (SQL), which is used to retrieve and manipulate data in a relational database. Other forms of DML are those used by IMS/DLI, CODASYL databases, such as IDMS and others. Data manipulation language comprises the SQL data change statements, which modify stored data but not the schema or database objects. Manipulation of persistent database objects, e.g., tables or stored procedures, via the SQL schema statements, rather than the data stored within them, is considered to be part of a separate data definition language. In SQL these two categories are similar in their detailed syntax, data types, expressions etc., but distinct in their overall function.

Data manipulation languages have their functional capability organized by the initial word in a statement, which is almost always a verb. In the case of SQL, these verbs are:

- SELECT ... FROM ... WHERE ...
- INSERT INTO ... VALUES ...
- UPDATE ... SET ... WHERE ...
- DELETE FROM ... WHERE ...

Data definition language(DDL)

Many data description languages use a declarative syntax to define columns and data types.

Structured query language (e.g., SQL), however, uses a collection of imperative verbs whose effect is to modify the schema of the database by adding, changing, or deleting definitions of tables or other elements. These statements can be freely mixed with other SQL statements, making the DDL not a separate language.

Data control language(DCL)

A data control language (DCL) is a syntax similar to a computer programming language used to control access to data stored in a database (Authorization). In particular, it is a component of Structured Query Language (SQL).

Examples of DCL commands include:

GRANT to allow specified users to perform specified tasks.

REVOKE to cancel previously granted or denied permissions.

The operations for which privileges may be granted to or revoked from a user or role apply to both the Data definition language (DDL) and the Data manipulation language (DML), and may include CONNECT, SELECT, INSERT, UPDATE, DELETE, EXECUTE, and USAGE.

In the Oracle database, executing a DCL command issues an implicit commit. Hence you cannot roll back the command.

In PostgreSQL, executing DCL is transactional, and can be rolled back.

SQLite does not have any DCL commands as it does not have usernames or logins. Instead, SQLite depends on file system permissions to define who can open and access a database.