Session 3:

Topic 1: Introduction to SQL

SQL stands for Structured Query Language. It is used for storing and managing data in relational database management system (RDMS).

It is a standard language for Relational Database System. It enables a user to create, read, update and delete relational databases and tables.

Important Terminologies:

1. **Attribute:** Attributes are the properties that define a relation. ROLL_NO, NAME etc.
2. **Tuple:** Each row in the relation is known as tuple.

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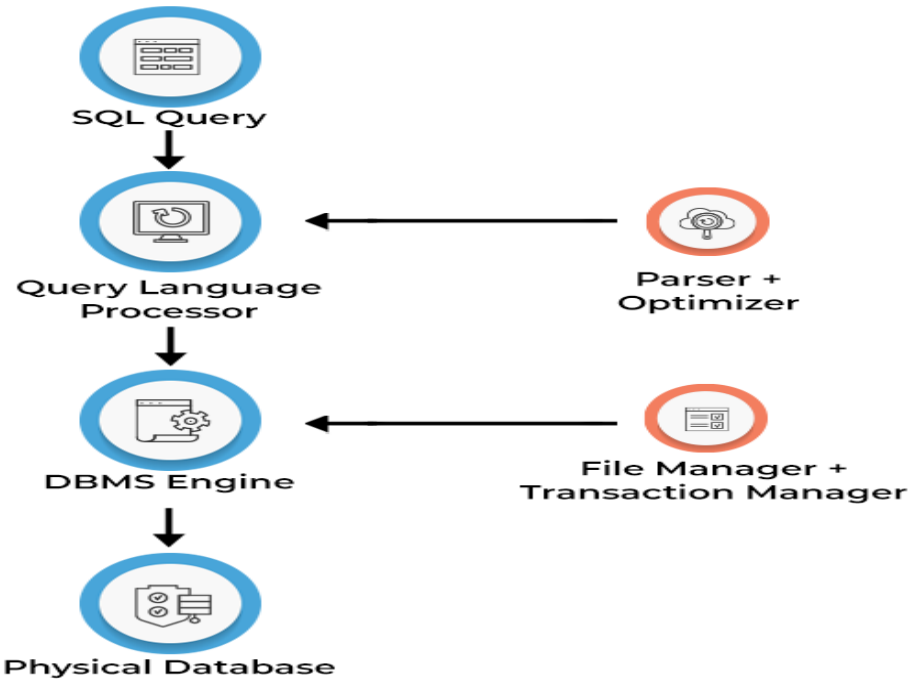
3. **Degree:** The number of attributes in the relation is known as degree of the relation. The **STUDENT** relation defined above has degree 5.
4. **Cardinality:** The number of tuples in a relation is known as cardinality. The **STUDENT** relation defined above has cardinality 4.
5. **Column:** Column represents the set of values for a particular attribute. The column **ROLL_NO** is extracted from relation STUDENT.

SQL Process:

The SQL query use the following terminologies to process the query in SQL environment:



Characteristics of SQL

- SQL is easy to learn.
- SQL is used to access data from relational database management systems.
- SQL can execute queries against the database.
- SQL is used to describe the data.
- SQL is used to define the data in the database and manipulate it when needed.
- SQL is used to create and drop the database and table.
- SQL is used to create a view, stored procedure, function in a database.
- SQL allows users to set permissions on tables, procedures, and views.

Applications of SQL

There are following applications of the SQL:

Advantage of SQL:

There are key advantages of SQL as Mentioned:

Dis-Advantage of SQL:

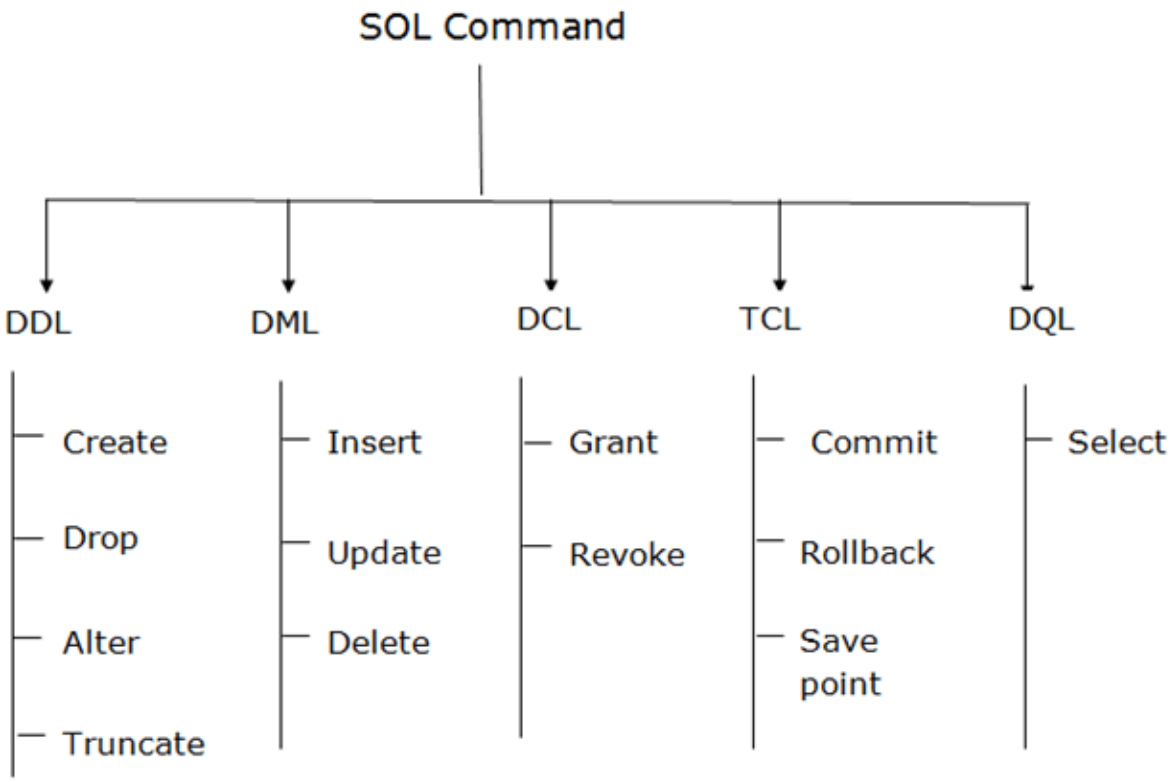
There are few disadvantages of SQL as mentioned below:

- Complexity
- Limited flexibility
- Limited scalability
- Vendor lock-in
- Poor performance with large data sets and complex queries
- Not suitable for unstructured data

SQL Commands

- SQL commands are instructions. It is used to communicate with the database. It is also used to perform specific tasks, functions, and queries of data.
- SQL can perform various tasks like create a table, add data to tables, drop the table, modify the table, and set permission for users.

There are five types of SQL commands: DDL, DML, DCL, TCL, and DQL.



Queries can be categorized to deal with relational database as:

- **Data Definition Language [DDL]:** It is used to define the structure of the database. e.g; CREATE TABLE, ADD COLUMN, DROP COLUMN and so on.
- **Data Manipulation Language: [DML]** it is used to manipulate data in the relations. e.g.; INSERT, DELETE, UPDATE and so on.
- **Data Query Language: [DQL]** it is used to extract the data from the relations. e.g.; SELECT So first we will consider the Data Query Language. A generic query to retrieve data from a relational database is:
- **Data Control Language [DCL]:** DCL commands are used to grant and take back authority from any database user.
- **Transaction Control Language[TCL]:** Here are some commands that come under TCL:
  - COMMIT
  - ROLLBACK
  - SAVEPOINT

Topic 2: DDL Commands

DDL commands are used to create, manipulate, and modify objects in Snowflake, such as users, virtual warehouses, databases, schemas, tables, views, columns, functions, and stored procedures.

There are the five DDL commands in SQL:

1. **CREATE Command :**

   Syntax to Create a Database:

   CREATE Database Database_Name;

   Example: Create Database Books;

2. **DROP Command**

   DROP is a DDL command used to delete/remove the database objects from the SQL database. We can easily remove the entire table, view, or index from the database using this DDL command.

   Syntax to remove a database:

   DROP DATABASE Database_Name;

   Example: DROP DATABASE Books;

3. **ALTER Command**

   ALTER is a DDL command which changes or modifies the existing structure of the database, and it also changes the schema of database objects.

4. **TRUNCATE Command**

   TRUNCATE is another DDL command which deletes or removes all the records from the table. This command also removes the space allocated for storing the table records.

5. **RENAME Command**

   RENAME is a DDL command which is used to change the name of the database table.

Topic 3:A. DML Commands

The DML commands in Structured Query Language change the data present in the SQL database. We can easily access, store, modify, update and delete the existing records from the database using DML commands.

Following are the four main DML commands in SQL:

1. **SELECT Command:** this command is used to fetch data from the SQL table.

   Select *from table_name;

2. **INSERT Command: This** command is use to insert data into the table.

   INSERT INTO TABLE_NAME (column_Name1 , column_Name2, column_NameN) VALUES (value_1, value_2, ... value_N) ;

3. **UPDATE Command: Allows** users to update or modify the existing data in database tables.

   UPDATE Table_name SET [column_name1= value_1… column_nameN = value_N] WHERE CONDITION;

4. **DELETE Command:** DELETE is a DML command which allows SQL users to remove single or multiple existing records from the database tables.

   DELETE FROM Table_Name WHERE condition;

   DELETE FROM Student WHERE age > 70;

B.DCL Commands: DCL command is a statement that is used to perform the work related to the rights, permissions, and other control of the database system.

There are two types of Privileges in database:

1. **System Privilege**
2. **Object Privilege**

Need Of DCL commands

- Unauthorized access to the data should be prevented in order to achieve security in our database
- DCL commands maintain the database effectively than anyone else other than database administrator is not allowed to access the data without permission.
- These commands provide flexibility to the data administrator to set and remove database permissions in granular fashion.

Commands in DCL

The two most important **DCL commands** are:

- **GRANT**
- **REVOKE**

GRANT

This command is used to grant permission to the user to perform a particular operation on a particular object. If you are a database administrator and you want to restrict user accessibility such as one who only views the data or may only update the data. You can give the privilege permission to the users according to your wish.

Syntax:

GRANT privilege_list

ON Object_name

TO user_name;

REVOKE

This command is used to take permission/access back from the user. If you want to return permission from the database that you have granted to the users at that time you need to run REVOKE command.

Syntax:

REVOKE privilege_list

ON object_name

FROM user_name;

Following commands are granted to the user as a Privilege List:

- EXECUTE
- UPDATE

- SELECT
- DELETE
- ALTER
- ALL

Advantages of DCL commands

- It allows to restrict the user from accessing data in database.
- It ensures security in database when the data is exposed to multiple users.
- It is the wholesome responsibility of the data owner or data administrator to maintain the authority of grant and revoke privileges to the users preventing any threat to data.
- It prevents other users to make changes in database who have no access to Database