UNIT-III

Introduction to Database Languages

The main objective of a database management system is to allow its users to perform a number of operations on the database such as insert, delete, and retrieve data in abstract terms without knowing about the physical representations of data. To provide the various facilities to different types of users, a DBMS normally provides one or more specialized programming languages called **Database** (or **DBMS**) **Languages**.

There are many popular RDBMS available to work. They are as follows:-

- MySQL
- MS SQL Server
- ORACLE
- MS ACCESS

SQL:-

SQL (Structured Query Language) is a database sublanguage for querying and modifying relational databases. It was developed by IBM Research in the mid 70's and standardized by ANSI in 1986.

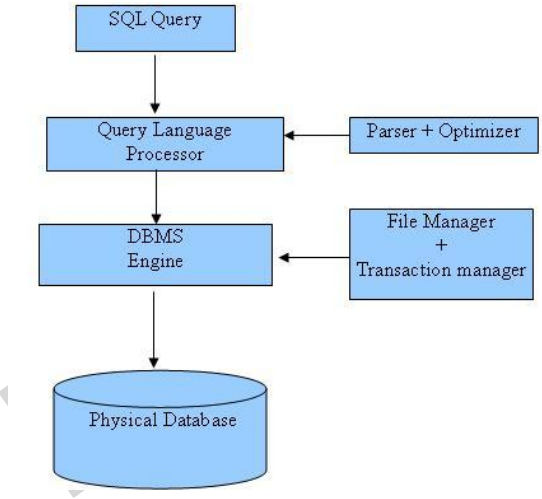
SQL (pronounced "ess-que-el") stands for Structured Query Language. SQL is used to communicate with a database.

SQL statements are used to perform tasks such as update data on a database, or retrieve data from a database. Some common relational database management systems that use SQL are: Oracle, Sybase, Microsoft SQL Server, Access, Ingres, etc.

Characteristics of SQL:-

- Allows users to describe the data.
- Allows users to define the data in database and manipulate that data.
- Allows embedding within other languages using SQL modules, libraries & pre-compilers.
- Allows users to create and drop databases and tables.
- Allows users to create view, stored procedure, functions in a database.
- Allows users to set permissions on tables, procedures, and views

SQL Process:



SQL Functions:-
SQL has many built-in functions for performing calculations on data.

SQL Aggregate Functions
SQL aggregate functions return a single value, calculated from values in a column.
The Useful aggregate functions are as follows:

- AVG() - Returns the average value
- COUNT() - Returns the number of rows
- FIRST() - Returns the first value
- LAST() - Returns the last value
- MAX() - Returns the largest value
- MIN() - Returns the smallest value
- SUM() - Returns the sum

SQL Scalar functions
SQL scalar functions return a single value, based on the input value.
The Useful scalar functions are as follows:

- UCASE() - Converts a field to upper case
- LCASE() - Converts a field to lower case
- MID() - Extract characters from a text field
- LEN() - Returns the length of a text field
- ROUND() - Rounds a numeric field to the number of decimals specified
- NOW() - Returns the current system date and time
- FORMAT() - Formats how a field is to be displayed

Components of SQL:-
SQL commands are instructions used to communicate with the database to perform specific task that work with data. SQL commands can be used not only for searching the database but also to perform various other functions like, for example, you can create tables, add data to tables, or modify data, drop the table, set permissions for users. SQL commands are grouped into four major categories depending on their functionality:

- **Data Definition Language (DDL)** - These SQL commands are used for creating, modifying, and dropping the structure of database objects. The commands are CREATE, ALTER, DROP, RENAME, and TRUNCATE.
- **Data Manipulation Language (DML)** - These SQL commands are used for storing, retrieving, modifying, and deleting data. These commands are SELECT, INSERT, UPDATE, and DELETE.
- **Transaction Control Language (TCL)** - These SQL commands are used for managing changes affecting the data. These commands are COMMIT, ROLLBACK, and SAVEPOINT.
- **Data Control Language (DCL)** - These SQL commands are used for providing security to database objects. These commands are GRANT and REVOKE.

Some of the Most Important SQL Commands

- **SELECT** - extracts data from a database
- **UPDATE** - updates data in a database
- **DELETE** - deletes data from a database
- **INSERT INTO** - inserts new data into a database
- **CREATE DATABASE** - creates a new database
- **ALTER DATABASE** - modifies a database

- **CREATE TABLE** - creates a new table
- **ALTER TABLE** - modifies a table
- **DROP TABLE** - deletes a table
- **CREATE INDEX** - creates an index (search key)
- **DROP INDEX** - deletes an index

Some of the Most Important SQL Commands with SQL statement

DML: Data Manipulation Language
SQL-Data Statements -- query and modify tables and columns
- SELECT Statement -- query tables and views in the database
- INSERT Statement -- add rows to tables
- UPDATE Statement -- modify columns in table rows
- DELETE Statement -- remove rows from tables

TCL:- Transaction Control Language
SQL-Transaction Statements -- control transactions
- COMMIT Statement -- commit the current transaction
- ROLLBACK Statement -- roll back the current transaction

DDL:- Data Definition Language
SQL-Schema Statements -- maintain schema (catalog)
- CREATE TABLE Statement -- create tables
- CREATE VIEW Statement -- create views
- DROP TABLE Statement -- drop tables
- DROP VIEW Statement -- drop views
- GRANT Statement -- grant privileges on tables and views to other users
- REVOKE Statement -- revoke privileges on tables and views from other users

The SQL SELECT Statement:-
The SELECT statement is used to select data from a database.
Syntax:
SELECT *column_name,column_name*
FROM *table_name*;
Or
SELECT * FROM *table_name*;

WHERE clause: - It is used to filter records.
SELECT *column_name,column_name*
FROM *table_name*
WHERE *column_name operator value*;

Operators in where clause:-

Operator	Description
=	Equal
<>	Not equal.
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal
BETWEEN	Between an inclusive range
LIKE	Search for a pattern
IN	To specify multiple possible values for a column

SQL **AND & OR** Operators:-

- The AND & OR operators are used to filter records based on more than one condition.
- The AND operator displays a record if both the first condition AND the second condition are true.
- The OR operator displays a record if either the first condition OR the second condition is true.

IN

IN operator is used when you know the exact value you want to return for at least one of the columns

SQL ORDER BY Keyword:-

The ORDER BY keyword is used to sort the result-set. The ORDER BY keyword is used to sort the result-set by one or more columns.

The ORDER BY keyword sorts the records in ascending order by default. To sort the records in a descending order, you can use the DESC keyword.

Syntax:-

SELECT *column_name,column_name*
FROM *table_name*
ORDER BY *column_name,column_name* ASC|DESC;

SQL INSERT INTO Statement

The INSERT INTO statement is used to insert new records in a table.

The first form does not specify the column names where the data will be inserted, only their values:

INSERT INTO *table_name*
VALUES (*value1*,*value2*,*value3*,...);

The second form specifies both the column names and the values to be inserted:

INSERT INTO *table_name* (*column1*,*column2*,*column3*,...)
VALUES (*value1*,*value2*,*value3*,...);

SQL UPDATE Statement

The UPDATE statement is used to update records in a table.

UPDATE *table_name*
SET *column1=value1*,*column2=value2*,...
WHERE *some_column=some_value*;

SQL DELETE Statement

The DELETE statement is used to delete records in a table.

DELETE FROM *table_name*
WHERE *some_column=some_value*;

SQL CREATE TABLE Statement

The CREATE TABLE statement is used to create a table in a database.
Tables are organized into rows and columns; and each table must have a name.

CREATE TABLE *table_name*
(
column_name1 data_type(*size*),
column_name2 data_type(*size*),
column_name3 data_type(*size*),
....
);

The DROP TABLE Statement

The DROP TABLE statement is used to delete a table.

DROP TABLE table_name;

The ALTER TABLE Statement

The ALTER TABLE statement is used to add, delete, or modify columns in an existing table.
To add a column in a table, use the following syntax:
ALTER TABLE table_name
ADD column_name datatype

SQL GRANT Command

SQL GRANT is a command used to provide access or privileges on the database objects to the users.

The Syntax for the GRANT command is:

GRANT privilege_name
ON object_name
TO {user_name |PUBLIC |role_name}
[WITH GRANT OPTION];

- *privilege_name* is the access right or privilege granted to the user. Some of the access rights are ALL, EXECUTE, and SELECT.
- *object_name* is the name of an database object like TABLE, VIEW, STORED PROC and SEQUENCE.
- *user_name* is the name of the user to whom an access right is being granted.
- *user_name* is the name of the user to whom an access right is being granted.
- *PUBLIC* is used to grant access rights to all users.
- *ROLES* are a set of privileges grouped together.

- *WITH GRANT OPTION* - allows a user to grant access rights to other users.

SQL REVOKE Command:

The REVOKE command removes user access rights or privileges to the database objects.

The Syntax for the REVOKE command is:

REVOKE privilege_name
ON object_name
FROM {user_name |PUBLIC |role_name}

The COMMIT Command:

The COMMIT command is the transactional command used to save changes invoked by a transaction to the database.

The COMMIT command saves all transactions to the database since the last COMMIT or ROLLBACK command.

Syntax:-

COMMIT;

The ROLLBACK Command:

The ROLLBACK command is the transactional command used to undo transactions that have not already been saved to the database.

The ROLLBACK command can only be used to undo transactions since the last COMMIT or ROLLBACK command was issued.

The syntax for ROLLBACK command is as follows:

ROLLBACK;

SQL Data Types:-

SQL data type is an attribute that specifies type of data of any object. Each column, variable and expression has related data type in SQL.

SQL offers six categories of data types for your use:

- **Exact Numeric Data Types:** int, numeric, bit etc
- **Approximate Numeric Data Types:** Float, real
- **Date and Time Data Types:** Datatime, date, time, smalldatetime
- **Character Strings Data Types:** Char, varchar,varchar(max), text
- **Unicode Character Strings Data Types:** Nchar, nvarchar,ntext
- **Binary Data Types:** Binary,varbinary
- **Misc Data Types**

SQL Operator

An operator is a reserved word or a character used primarily in an SQL statement's WHERE clause to perform operation(s), such as comparisons and arithmetic operations.

Operators are used to specify conditions in an SQL statement and to serve as conjunctions for multiple conditions in a statement.

- Arithmetic operators
- Comparison operators
- Logical operators
- Operators used to negate conditions

Set operators:-

SQL support few of set operators on the SQL tables. They are as follows:-

- ✓ Union
- ✓ Intersect
- ✓ minus