**MODULE: 5 (Database)**

**Basics of Database**

* What do you understand By Database:
  + A database is an organized collection of structured information, or data, typically stored electronically in a computer system. A database is usually controlled by a database management system (DBMS).
* What is Normalization?
  + Normalization is the process of organizing data in a database. It includes creating tables and establishing relationships between those tables according to rules designed both to protect the data and to make the database more flexible by eliminating redundancy and inconsistent dependency.
* What is Difference between DBMS and RDBMS?
  + DBMS stands for Database Management System, and RDBMS is the acronym for the Relational Database Management system. In DBMS, the data is stored as a file, whereas in RDBMS, data is stored in the form of tables.
* What is EF Codd Rule of RDBMS Systems?
  + Dr. E.F. Codd, a computer scientist, formulated a set of rules known as Codd's 12 Rules to define the requirements for a database management system to be considered a true relational database management system (RDBMS). These rules were introduced to ensure the consistency and integrity of relational databases. Here is a summary of Codd's 12 Rules:
  + Information Rule:
    - All information in the database is to be represented in one and only one way, as values in a table.
  + Guaranteed Access Rule:
    - Each value in a relational database is guaranteed to be accessible by specifying a table name, primary key value, and a column name.
  + Systematic Treatment of Null Values:
    - The DBMS must allow each field to remain null, and it must provide systematic methods for dealing with null values.
  + Dynamic Online Catalog Based on the Relational Model:
    - The database catalog, which contains metadata about the database, must be stored in a tabular form, just like regular data.
  + Comprehensive Data Sublanguage Rule:
    - The DBMS must support a data sublanguage that can be used to define, manipulate, and query data in the database. SQL is the most common language that fulfills this requirement.
  + View Updating Rule:
    - Any view that is theoretically updatable must be updatable by the system.
  + High-Level Insert, Update, and Delete:
    - The capability of handling a base relation or a derived relation as a single operand applies not only to the retrieval of data but also to the insertion, update, and deletion of data.
  + Physical Data Independence:
    - Changes in the physical storage or organization of data do not affect access to that data.
  + Logical Data Independence:
    - Changes to the logical structure (table names, column names, etc.) do not affect the application programs.
  + Integrity Independence:
    - The rules defining the integrity constraints on the data must be stored in the catalog, not in the application programs.
  + Distribution Independence:
    - The distribution of portions of the database to various locations should be invisible to users of the database.
  + Nonsubversion Rule:
    - If a relational system has a low-level (record-at-a-time) language, that low level cannot be used to subvert or bypass the integrity rules and constraints expressed in the higher level relational language.
* What do you understand By Data Redundancy?
  + Data redundancy occurs when the same piece of data exists in multiple places, whereas data inconsistency is when the same data exists in different formats in multiple tables. Unfortunately, data redundancy can cause data inconsistency, which can provide a company with unreliable and/or meaningless information.
* What is DDL Interpreter?
  + It interprets the DDL (Data Definition Language) Instructions and stores the record in a data dictionary (in a table containing meta-data) Query Optimizer: It executes the DML Instructions and picks the lowest cost evaluation plan out of all the alternatives present.
* What is DML Compiler in SQL?
  + A DML (data manipulation language) refers to a computer programming language that allows you to add (insert), delete (delete), and alter (update) data in a database. A DML is typically a sublanguage of a larger database language like SQL, with the DML containing some of the language's operators.
* What is SQL Key Constraints writing an Example of SQL Key Constraints
  + SQL constraints are used to specify rules for the data in a table.
  + There are two SQL Key Constraints:
  + SQL PRIMARY KEY Constraint:
    - The PRIMARY KEY constraint uniquely identifies each record in a table.
    - Primary keys must contain UNIQUE values, and cannot contain NULL values.
    - A table can have only ONE primary key; and in the table, this primary key can consist of single or multiple columns (fields).
    - Example:
    - The following SQL creates a PRIMARY KEY on the "ID" column when the "Persons" table is created:
    - CREATE TABLE Persons (
    - ID int NOT NULL PRIMARY KEY,
    - LastName varchar(255) NOT NULL,
    - FirstName varchar(255),
    - Age int
    - );
  + SQL FOREIGN KEY Constraint:
    - The FOREIGN KEY constraint is used to prevent actions that would destroy links between tables.
    - A FOREIGN KEY is a field (or collection of fields) in one table, that refers to the PRIMARY KEY in another table.
    - The table with the foreign key is called the child table, and the table with the primary key is called the referenced or parent table.
    - Example:
    - The following SQL creates a FOREIGN KEY on the "PersonID" column when the "Orders" table is created:
    - CREATE TABLE Orders (
    - OrderID int NOT NULL PRIMARY KEY,
    - OrderNumber int NOT NULL,
    - PersonID int FOREIGN KEY REFERENCES Persons(PersonID)
    - );
* What is save Point? How to create a save Point write a Query?
  + The SAVEPOINT command in TCL is basically used to temporarily save a transaction so that we can roll back to that point (saved point) whenever required.
  + Below given is the syntax of the SAVEPOINT TCL command in SQL.
    - SAVEPOINT savepoint\_name;
  + After writing our query, we can write "SAVEPOINT;" followed by the savepoint\_name savepoint name, to create a save point and save the transaction to that point.
  + Also, we can release a savepoint, meaning, remove any particular savepoint. The syntax to release a savepoint is given below:
    - RELEASE SAVEPOINT savepoint\_name;
* What is trigger and how to create a Trigger in SQL?
  + A trigger is a stored procedure in database which automatically invokes whenever a special event in the database occurs.
  + For example, a trigger can be invoked when a row is inserted into a specified table.
  + As per below syntax Create a Trigger in SQL:
  + Create trigger [trigger\_name] [before | after]
  + {insert | update | delete} on [table\_name] [for each row] [trigger\_body]