**SQL ASSIGNMENT -1**

1. **What is a relational database management system (RDBMS)? What are the advantages of a database management system over a file system?**

Relational DataBase management system (RDBMS) is a software used to store, manage, query, and retrieve data stored in a relational database.

The RDBMS provides an interface between users and applications and the database, as well as administrative functions for managing data storage, access and performance.

RDBMS is basis for SQL and for all modern database systems as MS SQL server, Oracle, MYSQL and Microsoft Access. The data in RDBMS is stored in database objects called tables.

Advantages of a database management system over a file system are:

1. Data Redundancy and inconsistency
2. Data sharing
3. Data concurrency
4. Data searching
5. Data integrity
6. System crashing
7. Data security
8. **In a database management system, explain the ACID properties.**

**ACID properties in database management system:**

A transaction is a single logical unit of work which accesses and possibly modifies the contents of a database. Transactions access data using read and write operations.

In order to maintain consistency in a database, before and after the transaction, certain properties are followed. These are called **ACID** properties.

**ACID properties:**

1. **Atomicity:** Here the entire transaction takes place at once or does not happen at all. There is no midway i.e. transactions does not occur partially. Each transaction is considered as one unit and either runs to completion or is not executed at all. It involves the following two operations.

**--Abort:** If a transaction aborts, changes made to database are not visible.

**-**-**Commit:** If a transaction commits, changes made are visible.

Atomicity is also known as **“**All or nothing rule**”.**

1. **Consistency:** This means that integrity constraints must be maintained so that the database is consistent before and after the transaction. It refers to the correctness of a database.
2. **Isolation:** This property ensures that multiple transactions can occur concurrently without leading to the inconsistency of database state. Transactions occur independently without interference.Changes occurring in a particular transaction will not be visible to any other transaction until that particular change in that transaction is written to memory or has been committed. This property ensures that the execution of transactions concurrently will result in a state that is equivalent to a state achieved these were executed serially in some order.
3. **Durability:** This property ensures that once the transaction has completed execution, the updates and modifications to the database are stored in and written to disk and they persist even if a system failure occurs. These updates now become permanent and are stored in non-volatile memory. The effects of the transaction, thus, are never lost.

The ACID properties, in totally provide a mechanism to ensure correctness and consistency of a database in a way such that each transaction is a group of operations that acts as a single unit, produces consistent results acts in isolation from other operations and updates that it makes are durably stored.

1. **Explain the concept of normalization**.

Normalization is the process of organizing the data in the database.

Normalization is used to minimize the redundancy from a relation or set of relations. It is also used to eliminate the undesirable characteristics like Insertion, Update and Deletion Anomalies.

Normalization divides the larger table into the smaller table and links them using relationship.

The normal form is used to reduce redundancy from the database table.

Types of normal forms:

1NF

2NF

3NF

BCNF

**1NF**: A relation is in 1NF if it contains an atomic value.

**2NF**: A relation will be in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the primary key.

**3NF**: A relation will be in 3NF if it is in 2NF and no transition dependency exists.

**4NF:** A relation will be in 4NF if it is in Boyce Codd normal form and has no multi-valued dependency.

1. **Explain the many types of query languages used in relational databases. DQL, DML, DCL, and DDL are some examples.**

Some types of query languages used in relational databases are:

1. DQL
2. DML
3. DCL
4. DDL
5. **DQL (Data Query Language):** DQL has only one command i.e. “SELECT” command.

The purpose of DQL command is to get some schema relation based on the query passed to it.

EXAMPLE: let us consider a table with student data(i.e. name, age, class and section).

If we want to get entire schema as output then we have to write query using select command.

i.e. select \* from student

If we want only one row data then we can include that column name in place of \*.

i.e. select age from student;

From this query we will get age column as output.

1. **DML(Data Manipulation Language):** A data manipulation language is a language used for adding, deleting and modifying data in a database.

Basically DCL statements are grouped with DML commands.

List of DML commands:

* **INSERT**: It is used to insert data in to a table.
* **UPDATE**: It is used to update existing data within a table.
* **DELETE**: It is used to delete a records from a database table.

1. **DCL (Data Control Language)** : DCL includes commands such as GRANT and REVOKE which mainly deal with the rights, permissions and other controls of the database system.

List of DCL commands:

* **GRANT**: This command gives users access privileges to the database.
* **REVOKE**: This command withdraws the user’s access privileges given by using the GRANT command.

1. **DDL (Data Definition Language):**

List of DDL commands:

* CREATE: This command is used to create the database or its objects.
* DROP: This command is used to delete objects from the database.
* ALTER: This is used to alter the structure of the database.
* TRUNCATE: This is used to remove all records from a table.
* COMMENT: This is used to add comments to the data dictionary.

1. **What is the difference between the main key and composite key? Give instances of how primary key and composite key are used.**

**Main key:**

Main key is also known as primary key.

First, a primary key uniquely identifies each record in a database table. Any individual key that does this can be called a candidate key, but only one can be chosen by database engineers as a primary key.

**Composite Key:**

Next, there's the composite key, which is composed of two or more attributes that collectively uniquely identify each record.

**Difference between the main key and composite key is :**

While a primary key and a composite key might do the same things, **the primary key will consist of one column, where the composite key will consist of two or more columns**.

**Instances of how primary key and composite key are used**:

**Primary key:**

A primary key is needed: **In any table that is visited more than once in a process**, for example, a child table that has two or more parent tables referenced in the Access Definition. To enable the Point and Shoot feature for a Start Table.

**Composite key:**

A composite key is made by the combination of two or more columns in a table that can be **used to uniquely identify each row in the table when the columns are combined uniqueness of a row is guaranteed**, but when it is taken individually it does not guarantee uniqueness.

**6. Create a table with primary key, a column default value and a column unique constraint in SQL.**

Create table persons(

ID int not null UNIQUE,

LastName varchar,

FirstName varchar,

Age int,

Primary key(ID)

);

Now a table with primary key is created. Here primary key is ID, column UNIQUE constraint is also ID.