**SQL ASSIGNMENT 1**

1.What is Relational Database Management System(RDBMS)?What are the advantages of a database management system over a file system?

Ans:-

**Relational Database Management System(RDBMS):-**

* RDBMS stans for Relational Database Management System.
* It is called Relational Database Management System because it is based on relational model introduced by E.F.Codd.
* All modern database management systems like SQL,ORACLE,MS SQL Server,IBM DB2,Microsoft access are based on RDBMS.
* Data is represented in terms of tuples means rows in RDBMS.
* Relational Database is most commonly used database.It contains number of tuples and each table has its own primary key.
* Due to collection of organized set of tables,data can be accessed easily in RDBMS.

**Data Integrity:-**

These are the following categories of data integrity exist with each RDBMS:

* Entity Integrity:It specifies that there should be no duplicate rows in a table.
* Domain integrity:It enforces valid entries for a given column by restricting the type,the format,or the range of values.
* Referential Integrity:It specifies that rows can not be deleted,which are used by other records.
* User-defined Integrity:It enforces some specific business rules that are defined by users.These rules are different from entity,domain or referential integrity.

**Adavantages of database management system over a file system:-**

Few of them are given below.

1. No redundant Data:Redundancy removed by data normalization.No data duplication saves storage and improves access time.
2. Data consistency and Integrity:The root cause of data inconsistency is data redundancy,since the data normalization take care of the data redundancy,data inconsistency also been take care of as part of it.
3. Data security: It is easier to apply access constraints in database systems so that only authorized user is able to access the data.
4. Privacy: Limited access means privacy of data.
5. Easy access to data :Database systems manages data in such a way so that the data is easily accessible with fast response times.
6. Easy recovery: Since database systems keeps the backup of data, it is easier to do a full recovery of data in case of a failure.
7. Flexible: Database systems are more flexible than file processing

2. In a database management system, explain the ACID properties.

Ans:-

**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.

**Atomicity:-**

* In this,the entire transaction takes place at once or doesn’t happen at all. There is no midway i.e. transactions do 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 the ‘All or nothing rule’.

**Consistency:-**

* In this, the integrity constraints must be maintained so that the database is consistent before and after the transaction. It refers to the correctness of a database.
* Lets take the example,  
  The total amount before and after the transaction must be maintained.   
  Total before T occurs = 500 + 300 = 800.   
  Total after T occurs = 400 + 400 = 800.   
  Therefore, database is consistent. Inconsistency occurs in case T1 completes but T2 fails. Finally,the result T is incomplete.

**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.

**Durability:-**

In this,the 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,they are never lost.

The ACID properties, in totality, 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 a single unit, produces consistent results, acts in isolation from other operations and updates that it makes are durably stored.

3. Explain the concept of normalization.

Ans:-

**Normalization:-**

* It is the process of organizing the data in a database. It helps in removing the duplicate values in the database. Normalization divides the large table into smaller tables and links them using relationships.
* The normal form is used to reduce redundancy from the database table. Normalization is the name given to the process of simplifying the relationship among data elements in a record.
* Normalization is the process of organizing data to minimize.

(i)Redundancy/duplication/repetition.

(ii)Insertion, deletion, updating anomalies.

**Types of Normal Forms:-**

There are six Normal forms which are as follows :

* First Normal Form (1NF)
* Second Normal Form (2NF)
* Third Normal Form (3NF)
* Boyce-Codd Normal Form (BCNF)
* Fourth Normal Form (4NF)
* Fifth Normal Form (5NF)

**1.First Normal Form (1NF):-**

A relation is in 1NF if it contain atomic values.

**2.Second Normal Form(2NF):-**

A relation is in 2NF if it is in 1NF and all non-key attributes are fully functional dependency on primary key.

**3.Third Normal Form(3NF):-**

A relation is in 3NF if it is in 2NF and no transition dependency exists.

**4. Boyce-Codd Normal Form (BCNF):-**

A relation is in BCNF if it is in 3NF and no overlapping dependency.

**5.Fourth Normal Form(4NF):-**

A relation is in 4NF if it is in BCNF and has no multi-valued dependency.

**6.Fifth Normal Form(5NF):-**

A relation is in 5NF if it is in 4NF and not contains any join dependency and joining should be lossless.

**Objective of Normalization:-**

The main objectives of using normalization technique are as follows −

* It provides a formal framework for analysing the relations based on the key attributes and their functional dependencies.
* Freeing the relations from insertion, update and delete anomalies.
* Reducing the need of re-structuring the tables.

While decomposing, the normalization process should ensure the following two properties are satisfied :

* **Lossless join or nonadditive property** :- It guarantees that the spurious tuples are not generated with respect to the relation schemas created after decomposition.
* **Dependency preservation property** :-It ensures that every functional dependency is represented in some of the individual relations resulting after decomposition.
* **Denormalization** :- It is the process of storing the join of higher normal form relations as a base relation- which is in a lower normal form.

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

Ans:-

**Types of SQL:-**

The five types of widely used SQL queries.

* Data Definition Language (DDL)
* Data Manipulation Language (DML)
* Data Control Language(DCL)
* Transaction Control Language(TCL)
* Data Query Language (DQL)

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

Data Definition Language helps you to define the database structure or schema.

Five types of DDL commands in SQL are:

### **CREATE**

CREATE statements is used to define the database structure schema:

**Syntax:**

CREATE TABLE TABLE\_NAME (COLUMN\_NAME DATATYPES[,....]);

**example**:

Create database university;

Create table students;

Create view for\_students;

### **DROP**

Drops commands remove tables and databases from RDBMS.

**Syntax**

DROP TABLE ;

**example:**

Drop object\_type object\_name;

Drop database university;

Drop table student;

### **ALTER**

Alters command allows you to alter the structure of the database.

**Syntax:**

To add a new column in the table

ALTER TABLE table\_name ADD column\_name COLUMN-definition;

To modify an existing column in the table:

ALTER TABLE MODIFY(COLUMN DEFINITION....);

**example:**

Alter table student add subject varchar;

### **TRUNCATE:**

This command used to delete all the rows from the table and free the space containing the table.

**Syntax:**

TRUNCATE TABLE table\_name;

**Example:**

TRUNCATE table students;

## 2. Data Manipulation Language(DML):-

Data Manipulation Language (DML) allows you to modify the database instance by inserting, modifying, and deleting its data. It is responsible for performing all types of data modification in a database.

There are three basic constructs which allow database program and user to enter data and information are:

Here are some important DML commands in SQL:

* INSERT
* UPDATE
* DELETE

### **INSERT:**

This is a statement is a SQL query. This command is used to insert data into the row of a table.

**Syntax:**

INSERT INTO TABLE\_NAME (col1, col2, col3,.... col N)

VALUES (value1, value2, value3, .... valueN);

Or

INSERT INTO TABLE\_NAME

VALUES (value1, value2, value3, .... valueN);

**For example:**

INSERT INTO students (RollNo, FIrstName, LastName) VALUES ('60', 'Tom', Erichsen');

### **UPDATE:**

This command is used to update or modify the value of a column in the table.

**Syntax:**

UPDATE table\_name SET [column\_name1= value1,...column\_nameN = valueN] [WHERE CONDITION]

**example:**

UPDATE students

SET FirstName = 'Jhon', LastName= 'Wick'

WHERE StudID = 3;

### **DELETE:**

This command is used to remove one or more rows from a table.

**Syntax:**

DELETE FROM table\_name [WHERE condition];

**example:**

DELETE FROM students

WHERE FirstName = 'Jhon';

## 3.Data Control Language(DCL):-

DCL (Data Control Language) includes commands like GRANT and REVOKE, which are useful to give “rights & permissions.” Other permission controls parameters of the database system.

Commands that come under DCL:

* Grant
* Revoke

### **Grant:**

This command is use to give user access privileges to a database.

**Syntax:**

GRANT SELECT, UPDATE ON MY\_TABLE TO SOME\_USER, ANOTHER\_USER;

**example:**

GRANT SELECT ON Users TO'Tom'@'localhost;

### **Revoke:**

It is useful to back permissions from the user.

**Syntax:**

REVOKE privilege\_nameON object\_nameFROM {user\_name |PUBLIC |role\_name}

**example:**

REVOKE SELECT, UPDATE ON student FROM BCA, MCA;

**4.Transaction Control Language(TCL):-**

Transaction control language or TCL commands deal with the transaction within the database.

Commands that comes under TCL:

### Commit

ROLL BACK

SAVE POINT

## 5.Data Query Language(DQL):-

Data Query Language (DQL) is used to fetch the data from the database. It uses only one command:

### **SELECT:**

This command helps you to select the attribute based on the condition described by the WHERE clause.

**Syntax:**

SELECT expressions

FROM TABLES

WHERE conditions;

**example:**

SELECT FirstName

FROM Student

WHERE RollNo > 15;

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

Ans:-

**Primary Key:-**

* A column or columns is called “primary key (PK) “that *uniquely identifies each row in the table*.
* If wewant to create a primary key, we should define a PRIMARY KEY constraint when we create or modify a table.
* When multiple columns are used as a primary key, it is known as “composite primary key”.
* In designing the composite primary key, we should use as few columns as possible. It is good for storage and performance both, the more columns we use for primary key the more storage space you require.

**Important points of Primary Key:-**

* Primary key enforces the entity integrity of the table.
* Primary key always has unique data.
* A primary key length cannot be exceeded than 900 bytes.
* A primary key cannot have null value.
* There can be no duplicate value for a primary key.
* A table can contain only one primary key constraint.

**SQL syntax to specify Primary key:-**

CREATE TABLE Students

(

S\_Id int ,

LastName varchar (25) ,

FirstName varchar (25,

Address varchar (50),

City varchar (30),

PRIMARY KEY (S\_Id)

)

**Composite key:-**

* A composite key is a 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 is guaranteed, but when it taken individually it does not guarantee uniqueness.
* Sometimes more than one attributes are needed to uniquely identify an entity. A primary key that is made by the combination of more than one attribute is known as a composite key.
* In other words we can say that:

Composite key is a key which is the combination of more than one field or column of a given table. It may be a candidate key or primary key.

**SQL Syntax to specify composite key:**

CREATE TABLE TABLE\_NAME

(COLUMN\_1, DATA\_TYPE\_1,

COLUMN\_2, DATA\_TYPE\_2,

PRIMARY KEY (COLUMN\_1, COLUMN\_2, ...));

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

Ans:-

**Queries:-**

create database example

use example

create table sample

(

s\_no int primary key,

stu\_id int not null UNIQUE,

stu\_name varchar(20),

college varchar(20) DEFAULT 'KIET'

)

insert into sample values(1,101,'rithvik','KIET')

insert into sample values(2,102,'karthik','Aditya')

insert into sample values(3,103,'keerthi','pydha')

insert into sample(s\_no,stu\_id,stu\_name) values(4,104,'satwika')

insert into sample(s\_no,stu\_id,stu\_name) values(5,105,'suresh')

select \* from sample;

**output:-**

|  |  |  |  |
| --- | --- | --- | --- |
| s\_no | stu\_id | stu\_name | college |
| 1 | 101 | rithvik | KIET |
| 2 | 102 | karthik | Aditya |
| 3 | 103 | keerthi | pydha |
| 4 | 104 | satwika | KIET |
| 5 | 105 | suresh | KIET |