**IT252 Database Systems Mid Sem Questions and Answers**

**1. Discuss Five main Characteristics of the database approach. How does it differ from Traditional file systems?**

1**. Self-Describing Nature of a Database System** - it has a complete definition or description of the database structure and constraints. This definition is stored in the system catalog, which contains information such as the structure of each file, the type and storage format of each data item, and various constraints on the data. This information stored in the system catalog is called, Meta-data and it describes the structure of the primary database. This allows the DBMS software to work with different databases.

2. **Insulation between Programs and Data and Data Abstraction** - Called program-data independence. Allows changing data storage structures and operations without having to change the DBMS access programs. The structure of data files is stored in the DBMS catalog separately from the access programs.

3. **Data Abstraction:** A data model is used to hide storage details and present the users with a conceptual view of the database. Programs refer to the data model constructs rather than data storage details.

4. **Support of Multiple Views of the Data** - Each users may see a different view database, which describes only the data of interest to that user.

5. **Sharing of Data and Multi-user Transaction Processing -** the DBMS must include concurrency control software to ensure that the result of multi-user access is correct. Allowing a set of **concurrent users** to retrieve from and to update the database. *Concurrency control* within the DBMS guarantees that each transaction is correctly executed or aborted *Recovery* subsystem ensures each completed transaction has its effect permanently recorded in the database. **OLTP** (Online Transaction Processing) is a major part of database applications; allows hundreds of concurrent transactions to execute per second. (5M)

#### Key Difference Between File System and Database

* A file system is a software that manages and organizes the files in a storage medium, whereas DBMS is a software application that is used for accessing, creating, and managing databases.
* The file system doesn’t have a crash recovery mechanism on the other hand, DBMS provides a crash recovery mechanism.
* Data inconsistency is higher in the file system. On the contrary Data inconsistency is low in a database management system.
* File system does not provide support for complicated transactions, while in the DBMS system, it is easy to implement complicated transactions using SQL.
* File system does not offer concurrency, whereas DBMS provides a concurrency facility. (3M)

**2. Consider the following relations for bank database(Primary keys are underlined):**

**Customer(customer-name. customer-street, customer-city)**

**Branch(branch-name, branch-city, assets)**

**Account(account-number, branch-name, balance) Depositor(customer-name, account-number)**

**Loan(loan-number, branch-name, amount)**

**Answer the following in SQL:**

* 1. **Create tables with primary keys and foreign keys.**
  2. **Create an assertion for the sum of all amounts for each branch must be less than the sum of all account balances at the branch.**

**(i) create table Customer**

(customer-name char(20),

customer-street char(30),

customer-city char(30),

primary key (customer-name)); (1 Mark)

**create table Branch**

( branch-name char(15),

branch-city char(30),

balance integer,

primary key (branch-name)

check (assets>=0)); (1 Mark)

**create table Account**

(account-number char(10),

branch-name char(15),

balance integer,

primary key (account-number),

foreign key (branch-name) references branch,

check (balance >= 0)); (1 Mark)

**create table Depositor**

(customer-name char(20),

account-number char(10),

primary key (customer-name, account-number),

foreign key (customer-name) references Customer,

foreign key (account-number) references Account); (1 Mark)

**create table Loan**

(loan-number char(10),

branch-name char(15),

amount integer,

primary key (loan-number),

foreign key( branch-name) references Branch); (1 Mark)

**(ii) create assertion sum-constraint check**

(not exists(select \* from Branch

where ( select sum(amount) from Loan

where Loan.branch-name = Branch.branch-name)

>= (select sum(balance) from Account

where Account.branch-name = Branch.branch-name))); (5 Marks)

**3. How is the purpose of where clause is different from that of having clause? Explain with example.**

The clause section **WHERE** only applies to whole groups (i.e., pre-set lines representing groups), while the clause "applies only to each row. The question can contain both the **THERE** paragraph and the POSSIBILITY section. In that case:

* The clause when used first in each row of tables or items with a table value in the drawing window. Only the lines that meet the conditions in the section WHERE they are collected.
* The HAVING clause is then applied to the lines in the result set. Groups that meet the HAVING criteria only appear in the query output. You can only use the WE-section in the re-columns in the GROUP BY or integration function. (5Marks)

Query: For each project on which more than two employees work, retrieve the project number, the project name, and the number of employees who work on the project.

SELECT Pnumber, Pname, COUNT (\*)

FROM PROJECT, WORKS\_ON

WHERE Pnumber = Pno

GROUP BY Pnumber, Pname

HAVING COUNT (\*) > 2;

selection conditions in the WHERE clause limit the tuples to which functions are applied, the HAVING clause serves to choose whole groups. (4Marks)

**4. How is a view created and dropped? What problems are associated with updating of views?**

In SQL, a view is a virtual table based on the result-set of an SQL statement.

**Definition of Views:**

i. Basically, a view is a single table derived from multiple tables or a logically representing subset of data.

ii. These other tables can be base tables or previously defined views.

iii. A view is considered to be a virtual table, in contrast to base tables, whose tuples are physically stored in database.

A view contains rows and columns, just like a real table. The fields in a view are fields from one or more real tables in the database. We can add SQL statements and functions to a view and present the data as if the data were coming from one single table. A view refers to a single table that is derived from other tables.

A view is created with the CREATE VIEW statement.

CREATE VIEW WORKS\_ON1 AS

SELECT FNAME, LNAME, PNAME, HOURS

FROM EMPLOYEE, PROJECT, WORKS\_ON

WHERE SSN=ESSN AND PNO=PNUMBER

A view is deleted with the DROP VIEW statement

A view can be dropped as DROP VIEW WORKS\_ON1 (5Marks)

**Problems in updating Views:**

i. Updating of views is complicated and can be ambiguous task.

ii. In general, an update on a view defined on a single table without any aggregate functions can be mapped to an update on the underlying base table under certain conditions.

iii. For a view involving joins, an update operation may be mapped to update operations on the underlying base relations in multiple ways. Hence, it is often not possible for the DBMS to determine which of the updates is intended.

iv. Generally, a view update is feasible when only one possible update on the base relations can accomplish the desired update effect on the view.

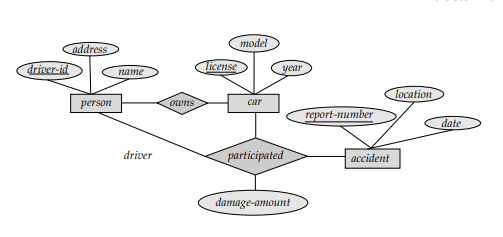
v. Whenever an update on the view can be mapped to more than one update on the underlying base relations, it is necessary to have a certain procedure for choosing one of the possible updates as the most likely one.

Thus problems with updating a view can be summarized as follows:

* A view with a single defining table is updatable if the view attributes contain the primary key of the base relation, as well as all attributes with the NOT NULL constraint that do not have default values specified.
* It is generally not possible to update views defined on multiple tables.
* It is not possible to update views defined using grouping and aggregate functions

Updating of Views Updating the views can be complicated and ambiguous. In general, an update on a view on defined on a single table w/o any aggregate functions can be mapped to an update on the base table A view with a single defining table is updatable if we view contain PK or CK of the base table View on multiple tables using joins are not updatable View defined using grouping/aggregate are not updatable. (4Marks)

**5. (a)Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. (b)Construct appropriate schema for the E-R diagram.**

(10Marks)

**Car insurance tables:**

person (driver-id, name, address)

car (license, year, model)

accident (report-number, date, location)

participated(driver-id, license, report-number, damage-amount) (4Marks)