ECS – 402

PAPER ID : 0111   Roll No.

B.Tech.

(SEM IV) EVEN SEMESTER THEORY EXAMINATION, 2009-2010

DATABASE MANAGEMENT SYSTEM

Time : 3 Hours   *Total Marks : 100*

Note : (i)   *Attempt **all** questions.*

(ii) *All questions carry **equal** marks.*

1.   Attempt **any four** of the following questions :   (4x5=20)

(a) Distinguish between a file processing system and a database management system.

(b) What is the difference between logical data independence and physical data independence ? Why is the logical data independence important ?

(c) What is the difference between procedural DML and non procedural DML ?

(d) A company database needs to store information about employees (identified by *ssn*, with *salary* and *phone* as attributes), departments (identified by *dno*, with *dname* and *budget* as attributes), and children of employees (with *name* and *age* as attributes). Employees *work* in departments; each department is *managed* by an employee; a child must be identified uniquely by *name* when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.

Draw an Entity-Relationship diagram that captures this information using the concepts and notations of ER.

(e) Distinguish between super key, candidate key and primary key with an example.

(f) Differentiate generalization and aggregation with example of each.

2. Attempt **any two** parts : (2x10=20)

(a) Consider the following Relation Schema :

Suppliers (*sid* : integer, *sname* : string, *address* : string)

Parts (*pid* : integer, *pname* : string, *color* : string)

Catalog (*sid* : integer, *pid* : integer, *cost* : real)

The Catalog relation lists the prices charged for parts by Suppliers : Express the following statements into relational algebra expressions.

(i) Find the Supplier names of the suppliers who supply a red part that costs less than 100 dollars.

(ii) Find the Supplier names of the suppliers who supply a red part that costs less than 100 dollars and a green part that costs less than 100 dollars.

(iii) Find the Supplier ids of the suppliers who supply a red part that costs less than 100 dollars and a green part that costs less than 100 dollars.

(b) Consider the following Relation Schema :

Emp(*eid* : integer, *ename* : string, *age* : integer, *salary* : real)

Works(*eid* : integer, *did* : integer, *pcttime* : integer)

Dept(*did* : integer, *dname* : string, *budget* : real, *managerid* : integer)

Answer each of the following questions briefly :

(i) Give an example of a foreign key constraint that involves the Dept relation. What are the options for enforcing this constraint when a user attempts to delete a Dept tuple ?

(ii) Write the SQL statements required to create the preceding relations, including appropriate versions of all primary and foreign key integrity constraints.

(iii) Define the Dept relation in SQL so that every department is guaranteed to have manager.

(iv) Write an SQL statement to add John Doe as an employee with *eid* = 101, *age* = 32 and *salary* = 15,000.

(v) Write an SQL statement to give every employee a 10 percent raise.

(c) What do you mean by View ? Explain with an example. How these are implemented in relational database management system ? Discuss the advantages and disadvantages of View in detail.

Attempt **any two** parts :   (2x10=20)

(a) Consider the following relational schema :

R(A,B,C,D,E,F,G,H) with the FDs

$AB \rightarrow C, BC \rightarrow D, E \rightarrow F, G \rightarrow F, H \rightarrow A, FG \rightarrow H$

Is the decomposition of R into R1(A,B,C,D),R2(A,B,C,E,F),R3(A,D,F,G,H) is lossless ? Is it dependency preserving ?

(b) What is join dependency ? How is it different to that of Multivalued and Functional dependency ? Give an example each of join and multivalued dependency. Discuss the Fourth Normal Form (4NF) also in detail.

(c) What do you mean by Functional Dependency ? Explain BCNF with a suitable example. "A decomposition in BCNF may be lossless and dependency preserving". Is this statement correct ? Justify your answer with a suitable example.
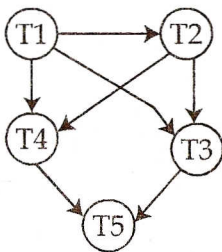

Attempt **any four** parts :   (4x5=20)

(a) List ACID properties of transaction. Explain the usefulness of each.

(b) What do you mean by serializability ? Discuss the conflict and view serializability with suitable example.

(c) Consider the precedence graph in following figure. Is the corresponding schedule conflict serializable ? Explain your answer.

Precedence Graph

(d) What is deadlock ? When does it occur ? How deadlock is detected in database system ? How it can be avoided ? Discuss in detail.

(e) Compare deferred database modification and immediate database modification versions of the log based recover schemes with example.

(f) Discuss different concurrency control techniques in distributed database system.

5. Attempt **any four** parts of following : (4x5=20

    (a) What is lock ? How locking is implemented in database management system ?

    (b) What are multi - version schemes of Concurrency Control ?

    (c) Discuss the various time stamping protocols for concurrency control.

    (d) What do you mean by multiple granularities ? How it is implemented in transaction system ?

    (e) Explain the phantom phenomenon. Devise a timestamp - based protocol that avoids the phantom phenomenon.

    (f) Consider the following two transactions :

T_{31} : read (A) ;

read (B) ;

if A = 0 them B := B + 1 ;

write (B) ;

T_{32} : read (B) ;

read (A) ;

if B = 0 then A := A + 1 ;

Write (A)

Add lock and unlock instructions to transaction T_{31} and T_{32}, so that they observe the two - phase locking protocol. Can the execution of these transactions results in a deadlock ?

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