SPRING END SEMESTER EXAMINATION-2017

4th Semester B.Tech & B.Tech Dual Degree

DATABASE MANAGEMENT SYSTEMS
CS-2004 / CS-402

(Regular-2015 & Back of Previous Batches)

Time: 3 Hours | Full Marks: 60

Answer any Six questions including question No.1 which is compulsory.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

1. (a) What is the difference between a primary key and candidate key. Provide example to support your answer. [2 × 10]

   (b) What do you mean by outer join operation? Give Example.

   (c) Let R= (A, B, C, D) and functional dependencies
   i. A→C
   ii. AB→D, what is the closure of {A,B}

   (d) Describe one example of referential integrity.

   (e) What is the difference between DBMS physical structure and logical structure?

   (f) Explain lost update and dirty read with suitable example.

   (g) What is aggregation in ER model? Explain with example.

   (h) Identify and explain the roles of database administrator.

   (i) What is serializable schedule? Why a serial schedule is considered correct?

   (j) What do you mean by "lossless join decomposition"? Explain with an example.

2. (a) What is data abstraction? Explain the difference between logical and physical data independence. [4]

(b) Discuss various components of DBMS with schematic diagram. [4]

3. (a) Explain the join and selection operators in an RDBMS. How can join operators can be used to simulate a selection? [4]

(b) The data requirements of MAIL-ORDER database are summarized as follows: [4]

- The mail order company has employees, each identified by a unique employee number, name and zip code.
- Each customer of the company is identified by a unique customer number, name and zip code.
- Each part sold by the company is identified by a unique part number, a part name, price and quantity in stock.
- Each order is placed by a customer is taken by an employee and is given a unique order number. Each order certains specified quantities of one or more parts. Each order has a date of receipt as well as an expected ship date.

Design an ER diagram for thze MAIL-ORDER database.

4. (a) State Armstrong's Axioms. Show that Armstrong's axioms are correct. [4]

(b) Which normal form is considered adequate for normal relational database design? Consider relation R with set functional dependencies (F) as R (ABCDEF) [4]

F=AB→ CDEF, C→ A, D→ B, C→ D, E→F and B→ E

What is the normal form of the relation?

5. (a) Explain with example how B trees overcome the disadvantage of sequential file. [4]

(b) A B^+ tree index is to be built in the name attribute of the relation STUDENT. Assume that all student names are of length 8 byte, disk block are of size 512 byte and index pointer are of size 4 bytes. Given this scenario what would be the best choice of degree (i:e number of pointer per nodes) of the B^+ tree. [4]

6. (a) What is strict 2 phase locking? What are the characteristics of schedulers using strict 2-phase locking? [4]

(b) What is timestamps? How serializability is enforced by ordering transactions based on their timestamps? Explain. [4]

7. The following relation schema are given: [2 × 4]

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)

(i) Give an example of a foreign key constraint that involves the Dept relation. What are the options for enfocing this constraint when a user attemps to delate a DEPT tuple?

(ii) Write the SQL statement required to create the preceeding relations, including appropriate version of all primary and foreign key integrity constraints,

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

(iv) Write an relational algebra statement to add John Doe as an employee with eid=101, age=32 and salary =15000.

8. Write short notes (any Two) [4 × 2]

(a) 4NF

(b) Generalization and specialization in ER model

(c) Tuple relational calculus Vs domain relational calculus

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