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Question Paper Code : 80288

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Third Semester

Computer Science and Engineering

CS 6302 — DATABASE MANAGEMENT SYSTEMS

(Common to Information Technology and also common to Fifth Semester
for Mechanical and Automation Engineering)

(Regulations 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate File processing system with Database Management system.

2. What is a weak entity? Give example.

3. What is data definition language? Give example.

4. Differentiate between static and dynamic SQL.

5. What is "serializability"?

6. List the four conditions for deadlock.

7. List out the mechanisms to avoid collision during hashing.

8. What are the disadvantages of B Tree over B+ Tree?

9. Define a distributed database management system.

10. How does the concept of an object in the object-oriented model differ from the
concept of an entity in the entity-relationship model?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain select, project and Cartesian product operations in relational algebra with an example. (6)

    (ii) 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. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received. (7)

Or

    (b) Explain first normal form, second normal form, third normal form and BCNF with an example. (13)

12. (a) Let relations $r_1 (A, B, C)$ and $r_2 (C, D, E))$ have the following properties: r_1 has 20,000 tuples, r_2 has 45,000 tuples, 25 tuples of r_1 fit on one block and 30 tuples of r_2 fit on one block. Estimate the number of block transfers and seeks required, using each of the following join strategies for $r_1 \infty r_2$:

    (i) Nested-loop join

    (ii) Block nested-loop join

    (iii) Merge join.

    (iv) Hash join. (13)

Or

    (b) (i) Explain query optimization with an example. (8)

    (ii) What is embedded SQL? Give example. (5)

13. (a) (i) Consider the following two transactions:
        T_1 : read(A);
        read(B);
        if $A = 0$ then $B := B + 1$;
        write(B).
        T_2 : read(B);
        read(A);
        if $B = 0$ then $A := A + 1$;
        write(A).
        Add lock and unlock instructions to transactions T_1 and T_2, so that they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock? (6)

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(ii) Consider the following extension to the tree-locking protocol, which allows both shared and exclusive locks:

• A transaction can be either a read-only transaction, in which case it can request only shared locks, or an update transaction, in which case it can request only exclusive locks.

• Each transaction must follow the rules of the tree protocol. Read-only transactions may lock any data item first, whereas update transactions must lock the root first.

Show that the protocol ensures serializability and deadlock freedom. (7)

Or

(b) (i) Illustrate two phase locking protocol with an example. (6)

(ii) Outline deadlock handling mechanisms. (7)

14. (a) (i) Explain the architecture of a distributed database system. (7)

(ii) Explain the concept of RAID. (6)

Or

(b) (i) Describe benefits and drawbacks of a source-driven architecture for gathering of data at a data warehouse, as compared to a destination driven architecture. (7)

(ii) Explain the concept of spatial database. (6)

15. (a) Suppose that you have been hired as a consultant to choose a database system for your client's application. For each of the following applications, state what type of database system (relational, persistent programming language-based OODB, object relational; do not specify a commercial product) you would recommend. Justify your recommendation. (13)

(i) A computer-aided design system for a manufacturer of airplanes.

(ii) A system to track contributions made to candidates for public office.

(iii) An information system to support the making of movies.

Or

(b) Discuss Apriori algorithm for mining association rules with an example.

16. (a) Give the DTD or XML Schema for an XML representation of the following nested-relational schema :

    Emp = (*ename, ChildrenSet* **setof** (*Children*), *SkillsSet* **setof** (*Skills*))
    Children = (*name, Birthday*)
    Birthday = (*day, month, year*)
    Skills = (*type, ExamsSet* **setof**(*Exams*))
    Exams = (*year, city*)

    Or

    (b) Consider the following bitmap technique for tracking free space in a file. For each block in the file, two bits are maintained in the bitmap. If the block is between 0 and 30 percent full the bits are 00, between 30 and 60 percent the bits are 01, between 60 and 90 percent the bits are 10, and above 90 percent the bits are 11. Such bitmaps can be kept in memory even for quite large files.

    (i) Describe how to keep the bitmap up to date on record insertions and deletions.

    (ii) Outline the benefit of the bitmap technique over free lists in searching for free space and in updating free space information.

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