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प्रज्ञानं ब्रह्म

Manipal

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MANIPAL INSTITUTE OF TECHNOLOGY
(Constituent Institute of MAHE- Deemed University)
MANIPAL-576104

FIRST SEMESTER M.Tech.(CSE) END SEMESTER EXAMINATION – DEC– 2013
ADVANCED CONCEPTS IN DATABASE MANAGEMENT SYSTEMS (CSE 503)
7-12-2013

TIME : 3 HOURS MAX.MARKS : 50

Instruction to Candidates

- Answer **any five** full questions.

1A. Construct an ER diagram for an bookstore with a set of books, authors, publishers and customers. The store maintains the multiple copies of books and supports the purchase of multiple books in one transaction. Customers get 10% incentive for purchases above Rs. 1000. Whenever, the stock of a book falls below min. no. copies, store keeper generates the purchase order to the corresponding supplier.

1B. Consider the following library database schema:
Books(BId, BName, FirstAuthor, PurchaseDate, Publisher, Cost)
Members(MId, MName, Address, Phone, BirthDate)
IssueReturn(BId, MId, IssueDate, ReturnDate, ActualReturnedDate, Fine)
Write the following queries in SQL:
   a) Find the names of all members who is yet to return one or more books
   b) Find the name of the publisher with max. no. of books
   c) Find the name of the members who always return the books within the RetrunDate

1C. With a block diagram, explain the basic steps in query processing. (3+4 +3)

2A. Assume (for simplicity in this exercise) that only one tuple fits in a block and memory holds at most 3 blocks. Show the runs created on each pass of the sort-merge algorithm, when applied to sort the following tuples on the first attribute: (Kamal, 17), (Wazeer, 21), (Emanuel, 1), (Wood, 13), (Prakash, 3), (Lakshman, 8), (Warma, 4), (Zaheer, 11), (Meera, 6), (Henna, 9), (Harish, 2), (Babul, 12).

2B. Give block nested loop join algorithm. Compute Best case and worst case cost estimate. How the performance of the algorithm can be improved?

2C. How the dynamic programming is used in cost based optimization? Explain. (3+4+3)

3A. Explain the constructs in Object Relational Database which support the following:
i. Structure Types ii. Methods in Structure Types iii. Inheritance

3B. Consider a database schema with a relation Flat_Emp whose attributes are as shown below, with multivalued attributes Children and Skills normalized to 1NF.
Flat_Emp = (Ename, Address. Salary, Deisgnatin, ChildName, Skill)

a. Define the above schema flat_Emp in SQL, with appropriate types for each attribute.
b. Using the above schema, write the following queries in SQL.
   i. To nest the Flat_Emp relation on the attribute ChildName and Skill using collect()
   ii. To nest the Flat_Emp relation on the attribute ChildName(as array) and Skill (as multiset) using subqueries.

3C. Illustrate the creation of object-identity using the following methods:
i. system generated ii. user generated iii. Using primary key (3+4+3)

4A. Databases naturally lend themselves to parallelism. Justify
4B. Will the loss of speedup due to skew decreases or increases with parallelism? Justify your answer.
4C. How virtual processor partitioning handle Skew in range partitioning?
4D. Illustrate the following OLAP operations:
i. group by cube ii. group by rollup iii. rank() over iv. ntile(n) (2+2+2+4)

5A. Explain the following variations of distributed lock manager:
i. Primary copy ii. Majority protocol iii. Biased protocol iv. Quorum consensus
5B. Explain the global-wait for graph technique used in distributed database systems f r deadlock handling. How it may lead to false cycles?
5C. Consider the relations:

employee (name, address, salary, plant_name)
machine(machine_number, type, plant_name)

Assume that employee relation that is fragmented horizontally by plant_name and that each fragment is stored locally at the plant site. Assume that machine relation is stored entirely at the New York site. Describe a good processing strategy for the following queries entered at the San Jose site.

a. Find all employees at the Boca plant.
b. Find the average salary of all employees.
c. Find the highest-paid employee at each of the following sites:
Toronto, Edmonton, Vancouver, Montreal.
d. Find employee $\bowtie$ machine. (4+3+4)

6A. Give the DTD for an XML representation of the following normalized and nested-relational schema of bank database:

i. account(accno, bname, balance), customer(cname, city), depositor(accno, cname)
ii. account(accno, bname, balance, customerSet setof(customer))
customer(cname, city)

6B. How the tree representation is used in storage of XML documents in relational databases? Illustrate
6C. Differentiate between Valid and Transactional time.
6D. llustrate the usage of 'after, when, old and new' in triggers with an example.
(3+3+2+2)

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