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

SIXTH SEMESTER B.E (CSE) DEGRE END-SEM EXAMINATION
MAY/JUNE 2012
Advanced Database Systems (CSE 310.2)
(REVISED CREDIT SYSTEM)
24-05-2012

TIME: 3 HOURS   MAX.MARKS: 50

Instruction to Candidates
- Answer **any five** full questions

1 a) Consider the following Company Database relation and the SQL query, where the primary keys are underlined.
Employee(ssn,fname,lname,address,sex,slary) Dependent(essn,dependent_name)
SQL: Select A.fname, A.lname
from Employee A
where A.ssn IN (SELECT essn
                 FROM Dependent
                 WHERE essn = A.ssn and dependent_name = A.fname and sex = A.sex)
Write an efficient relational algebra expression that is equivalent to this query.

b) Let relations $r1(A, B, C)$ and $r2(C, D, E)$ 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 $r_1 \bowtie r_2$:
i). Nested-loop join.
ii). Block nested-loop join.
iii). Merge join.
iv) Hash join

c) Explain the Sort-Merge Algorithm with example.

$(3 + 4 + 3)$

2 a) Consider the following schema of bank database:
Branch(branch_name,branch_city,assets) account(account_number,branch_name,balance)
i). Write a nested query to find, for each branch with name starting with B, all accounts with the maximum balance at the branch.
ii). Rewrite the preceding query, without using a nested subquery; in other words, decorrelate the query.

b) Explain the use of materialized views with example.

c) List and Explain the equivalence rules for the transformation of relational expressions into its equivalent form.
d) Explain immediate database modification recovery algorithm with example.

$(3 + 2 + 2 + 3)$

3 a) How do you check the presence of deadlock in the schedule? If present explain the deadlock recovery method.
b) Explain how delete and insert will affect concurrency control?

c) In multiple-granularity locking, what is the difference between implicit and explicit locking?

$(4+3+3)$

4 a) Consider the relational schema
employee(person_name,street,city),works(person_name,company_name,salary)
company(company_name, city) and manages(person_name, manager_name).
 A. Give a schema definition in SQL corresponding to the relational schema, but using references to express foreign-key relationships.
 B. Write in SQL for the each of the following
   a) Find the company with the most employees.
   b) Find the company with the smallest payroll.
   c) Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.

b) Explain the database buffering with example.
c) Explain the distinction between a type x and a reference type ref(x). Under what circumstances would you choose to use a reference type?

$((2+4) +2 + 2)$

5 a) Consider a relation : employee (name, address, salary, plant_number) and
machine (machine_number, type, plant_number).
Assume that the employee relation is fragmented horizontally by plant_number and that each fragment is stored locally at its corresponding plant site. Assume that the machine relation is stored in its entirety at the "Armonk" site. Describe the good strategy for processing the following queries:
 i) Find all employees at the plant that contains machine number 1130.
 ii) Find all employees at the plant that contains machine whose type is "milling machine".
 iii) Find all machines at the "Almaden" plant.
 iv) Find: employee ⋈ machine.
b) Explain the semi-join strategy in distributed database.
c) Explain the different types of coordinator selection algorithms in distributed database.

$((1+1+1+2) + 2+ 3)$

6 a) List and explain the aspects needed to be addressed when adding persistence support to C++ language.
b) Explain the following with example.
i)Array and Multiset types ii)Nesting and Unnesting.
c) Explain Fragment-and-Replication join method.

$(4 + 3 + 3)$