Reg No.										

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

SIXTH SEMESTER B.E (CSE) DEGRE END SEMESTER EXAMINATION
MAY/JUNE 2013

Advanced Database Systems (CSE 310.2)

(REVISED CREDIT SYSTEM)
-07-2013

TIME: 3 HOURS MAX.MARKS: 50

Instruction to Candidates

- Answer **any five** full questions

1 A) Assume (for simplicity in this exercise) that only one tuple fits in a block and memory holds at most 3 page frames. Show the runs created on each pass of the sort-merge algorithm, when applied to sort the following tuples on the first attribute: (kangaroo, 17), (wallaby, 21), (emu, 1), (wombat, 13), (platypus, 3), (lion, 8), (warthog, 4), (zebra, 11), (meerkat, 6), (hyena, 9), (hornbill, 2), (baboon,12).

B) Explain any SIX selection operations on a relation whose tuples are stored together in one file.

C) Let relations $r1(A,B,C)$ and $r2(C,D,E)$ have the following properties: $r1$ has 20,000 tuples, $r2$ has 45,000 tuples, 25 tuples of $r1$ fit on one block, and 30 tuples of $r2$ fit on one block. Estimate the number of block accesses required, using each of the following join strategies for $r1 \bowtie r2$:
a. Nested-loop join
b. Block nested-loop join

(3+3+4)

2 A) Suppose that a B+-tree index on building is available on relation department, and that no other index is available. What would be the best way to handle the following selections that involve negation?

i). $\sigma \neg$ (building <"Watson")(department)

ii). $\sigma \neg$ (building ="Watson")(department)

iii) $\sigma \neg$ (building <"Watson" $\vee$ budget <50000)(department)

B) i) Write a nested query on the relation account(account_number,branch_name, balance) to find, for each branch with name starting with B, all accounts with maximum balance at the branch.
ii)Rewrite the above query ,without using nested query (decorrelate the query)

((2+2+2)+(2+2))

3 A) Show that the two-phase locking protocol ensures conflict serializability, and that transactions can be serialized according to their lock points

B) Explain why log records for transactions on the undo-list must be processed in

reverse order, whereas redo is performed in a forward direction

C) Explain the purpose of the checkpoint mechanism. How often should checkpoints be performed? How does the frequency of checkpoints affect:
i) System performance when no failure occurs?
ii)The time it takes to recover from a system crash?
iii)The time it takes to recover from a media (disk) failure?
(4+3+3)

4 A) Explain deferred database modification and immediate database modification

B) Explain the checkpoint mechanism with an example. (6+4)

5 A) Consider a database schema with a relation Emp whose attributes are as shown below, with types specified for multivalued attributes.
Emp = (ename, ChildrenSet **multiset**(Children), SkillSet **multiset**(Skills))
Children = (name, birthday)
Skills = (type, ExamSet **setof**(Exams))
Exams = (year, city)
Using the above schema, write the following queries in SQL.
i. Find the names of all employees who have a child born on or after January 1, 2000.
ii) Find those employees who took an examination for the skill type "typing" in the city "Dayton".
iii. List all skill types in the relation Emp.

B) Explain the persistent C++ systems. ((2+2+2) + 4)

6 A) Consider a distributed database for a bookstore chain called National Books with 3 sites called
East, Middle and West and Stock is replicated in all the three sites.
Books(book_Id, primary_author, topic, total_stock, price)
BookStore(Store_Id,city,state,zip,inventory_value)
Stock(Store_Id, Book_Id, city)
Consider that Books are fragmented by price amounts into:
B1:Book1:price up to $20 B2:Book2:price from $ 20.01 to $50
B3:Book3: price from $ 50.01 to $ 100 B4:Book4: price from $100.01 and above.
Similarly, BookStore is divided by ZIP code into:
East: Zip up to 35000 Middle: Zip 35001 to 70000 West: Zip 70001 to 99999
Assume further that Books are allocated as East site:B1,B4 West site:B1,B2 Middle site:B1,B2,B3,B4
i)If the book price of book_id=1234 is updated to from $45 to $55 at site middle, what update does generate?
Describe a good strategy for processing each of the following queries.
ii) Retrieve the book_id, total_stock of books whose price is in between 15 and 55.
iii) Retrieve all the books stored in "Mangalore" bookstore.

B) Explain the following i) single lock manager approach ii)Distributed lock manager approach. . ((2+2+2) + 4)