Final Assessment Test - November 2016



Course: CSE2004 - Database Management Systems

Class NBR(s): **1360 / 1365 / 1374 / 1377 / 1382 / 1386** Slot: **D2**

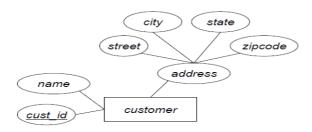
Time: **Three Hours** Max. Marks: **100**

PART – A (8 X 5 = 40 Marks) Answer ALL Questions

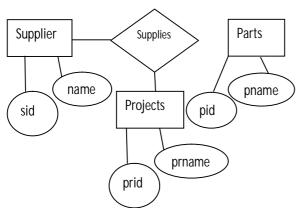
- 1. What is the difference between logical data independence and physical data independence? Which one is harder to achieve? Why?
- 2. Convert the following ER notations to Relational Schema

[2]

a)



b) [3]



3. Prove the following inference rules

$${A \rightarrow B, C \rightarrow D} \mid = {AC \rightarrow BD}$$

 ${A \rightarrow B, A \rightarrow D, DB \rightarrow C} \mid = {A \rightarrow C}$

- 4. A set of FD's for relation R(A,B,C,D,E,F,G,H) are {ABC->DE, E->BCG, F->AH}. Find a minimal cover for this set of FDs.
- 5. a) Based on the schema given, write a query in Relational Algebra that lists the employee names, salary, department number whose salary is 10000 and department location is Chennai.
 - b) Employee Table

Name	<u>SSN</u>	Salary	Address	Departmentnumber

c) Department Table

Department number	Department_name	Department_location	

Select e.name,e.salary, d.department_number, d.department_address from employee e,department d where e.department_number = d.department_number and e.salary>10000 and d.department_address = 'chennai':

- d) Construct the query tree by directly translations the RA query and then given the optimized tree based on heuristics.
- 6. Apply two phase locking protocol on the given transaction schedules and prove the elimination of lost update and Uncommitted dependency problem.

Schedule 1

Time	T1	T2
t1		begin-transaction
t2	begin-transaction	read(x)
t3	read(X)	x=x+100
t4	x=x-10	write(x)
t5	write(x)	commit
t6 commit		

Schedule 2

Time	T1	T2
t1		begin-transaction
t2		read(x)
t3		x=x+100
t4	begin-transaction	
t5	read(X)	
t6	x=x-10	rollback
t7	write(x)	
t8	commit	

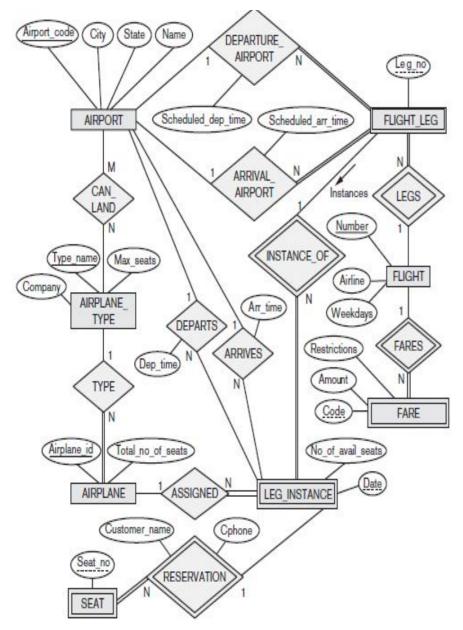
- 7. Detail the insertion and deletion algorithms for a B+ tree with suitable examples.
- 8. What is a Document Based NOSQL Database Management System? When will you opt for this model? Give Examples.

PART – B (6 X 10 = 60 Marks) Answer any <u>SIX</u> Questions

- 9. a) Detail the components that handle an application program for the database management system.
 - b) List any five advantages of the database approach.
- 10. Convert the given ER diagram to Relational Schema. Identify the constraints. Mention the rules invloved for each relation in the schema.

[6]

[4]



- 11. a) Consider a relation R with five attributes ABCDE. You are given the following dependencies: $A \rightarrow B$, $BC \rightarrow E$, and $ED \rightarrow A$. Is R in 3NF? Is R in BCNF?
 - b) Verify that DC2 = {R1, R2, R3} is a lossless join decomposition for R with the set of functional dependencies FD = { {A, B} \rightarrow {C}, {A} \rightarrow {D, E}, {B} \rightarrow {F}, {F} \rightarrow {G, H}, {D} \rightarrow {I, J} }, R1 = {A, B, C, D, E}, R2 = {B, F, G, H}, R3 = {D, I, J}
- 12. Consider the following relational schema:

Sailors(sid, sname, rating, age)

Boats(bid, bname, color)

Reserves(sid, bid)

Note: The attribute 'rating' in the relation 'Sailors' describes the rating awarded to each sailor based on their performance.

Write the following queries in relational algebra.

- i. List all the sailors who have a rating but not reserved.
- ii. Retrieve the total number of boats which are red.
- iii. List all the sailors who are either reserved or has a rating.
- iv. List names of all sailors who own all kinds of boats in the boat schema.

13. Consider the three transactions T1, T2, and T3, and the schedules S1 and S2 given below. Draw the precedence graphs for S1 and S2, and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule.

T1: $r_1(B) w_1(B)$

T2: $r_2(A) w_2(A) r_2(B) w_2(B)$

T3: $r_3(A) w_3(A)$

S1: $r_2(A) r_1(B) w_2(A) r_3(A) w_1(B) w_3(A) r_2(B) w_2(B)$

S2: $r_2(A) r_1(B) w_2(A) r_2(B) r_3(A) w_1(B) w_3(A) w_2(B)$

- 14. Construct a B+ Tree for the values (5, 10, 15, 20, 25, 28, 30, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95) with n=4.
- 15. Elaborate the following NoSQL Database Management Systems. Give Examples for each.
 - a) Key / Value Based NoSQL Database Management Systems.

[3]

b) Column Based NoSQL Database Management Systems.

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[4]

c) Graph Based NoSQL Database Management Systems.

[3]

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