

Practice Questions

Question 1

- (a) Consider the following transaction, T100, on the Social Networking database:

```

Begin;
Update Profile
Set NumFriends = NumFriends + 1
Where ProfileId = 3556;
Update Profile
Set ProfileType = 'Premium'
Where ProfileId = 3556;
Commit;

```

- (i) Show the entries that would be made in the Transaction Log if transaction T100 executed successfully. Assume that the previous value of NumFriends was 299 and ProfileType was 'Basic'.
- (ii) Suppose that the second update on the Profile table failed. Show what would be recorded in the transaction log in this case. Assuming an immediate-write environment, explain how the Recovery Manager will recover from this transaction failure and restore the database to a consistent state.

[10 marks]

- (b) Consider the following snapshot of the transaction log while three transactions T1, T2 and T3 were executing.

T1: Changing the employee who manages a profile.
 T2: Updating the password of member Penny@hotmail.com
 T3: Updating the rating of App 345.

LogId	TransId	Operation	Table	RowId	ColumnName	Before	After
101	T1	Start					
102	T2	Start					
103	T2	Update	Member	Penny@hotmail.com	Password	4#6B)	myPWD
104	T1	Update	Profile	28000	EmployeeId	E55	E89
105	T2	Commit					
106	CHKPT	T1					
107	T3	Start					
108	T3	Update	Application	345	Rating	3	4
109	T3	Commit					

After logId 109, a system failure occurred. Briefly explain how the system will recover from this system failure. Your explanation should include the actions which will be performed for transaction T1, T2 and T3 when the system restarts and state why these actions are necessary.

Question 2

TriniDevivers UPS requires a company-wide information system. Shipped items are the heart of the TriniDevivers product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the TriniDevivers system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard TriniDevivers transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a deliveryRoute.

Please create an Entity Relationship diagram that captures this information about the TriniDevivers system.

[18 marks]

Question 3

An employment agency has employees (with unique names). Interviews with job applicants are done and the following rules are maintained:

- a. one applicant is interviewed by one employee
- b. the job applicants also have unique names.
- c. the interviewer makes appointments for interviews with the applicants.
- d. each applicant may be interviewed at several occasions, possibly by different interviewers, but in that case the interviews take place during different days.
- e. The company has special interview rooms. Each interviewer uses the same room for all interviews during a day. A room may, however, be used by different interviewers during a day, as long as the interviews do not clash.

The reservation of interview appointments is to be computerized. The database developer has decided to use a single relation for all data, with the following schema:

Interviews(interviewer, applicant, day, time, room)

- a) From the text, find functional dependencies in the relation.
- b) Find the keys of the relation.
- c) Show that the relation is in 3NF but not in BCNF.
- d) Decompose the relation in relations that are in BCNF.