Assignment 2

Please note that we have different deadline for each question. Please make sure you have submitted each question by its own deadline:

Question 1 : Fri 7 April, 5:00 pm

Questions 2, 3 : Fri 28 April, 5:00 pm

Please make sure that you always use notations comply with lecture notes. We are not going to accept different notations.

Question 1 (8 marks)

Consider a relation $R(A, B, C, D, E, G, H)$ and its FD set $F = \{AB \rightarrow CD, E \rightarrow D, ABC \rightarrow DE, E \rightarrow AB, D \rightarrow AG, ACD \rightarrow BE\}$. Answer the following questions and justify your answers.

1) (2 marks) Find a candidate key for R.

2) (2 marks) Determine the highest normal form of R with respect to F.

3) (2 marks) Is the decomposition $\{ABCD, DEGH\}$ (with the same FD set F) of R lossless-join?

4) (2 marks) Decompose it into a collection of BCNF relations if it is not in BCNF. Make sure your decomposition is lossless-join.

Question 2 (4 marks)

Consider a relation $R(A, B, C, D, E, G, H)$ and its FD set $F = \{AB \rightarrow CD, E \rightarrow D, ABC \rightarrow DE, E \rightarrow AB, D \rightarrow AG, ACD \rightarrow BE\}$. Answer the following questions and justify your answers.

1) (2 marks) Find a minimal cover F_m for F.

2) (2 marks) Decompose into a set of 3NF relations if it is not in 3NF. Make sure your decomposition is dependency-preserving and lossless-join.

Question 3 (8 marks)

An IT company developed a new database system to record the statics data of the coming Opera House Open Day including the number of reservations X, remaining gifts Y and meals ordered Z. Here is a schedule of three transactions:

S1, R1(X), S2, R2(Y), W1(X), E1, R3(X), A, W2(Y), E2, R3(Y), B, W3(Y), W3(X), E3

Where Si indicates the start point of transaction i, Ei indicates the end point of transaction i, Ri(X) indicates a read operation in transaction i on a variable X, and Wi(X) indicates a write operation in transaction i on a variable Y.

Answer the following questions and justify your answers.

1) (2 marks) Assume that the system crashes at B, what should be done to recover the system?

2) (2 marks) Assume a checkpoint is made at point A, what should be done to the three transactions when the crash happens at B?

3) (2 marks) Is the transaction schedule conflict serializable?

4) (2 marks) Construct a schedule (may not be the same as above) of these three transactions which causes deadlock when using two-phase locking protocol. If no such schedule exists, explain why.

Assignment Submission

We accept electronic submissions only. Please submit your assignments as follows:

- Ensure that you are in the directory containing the file to be submitted. (note: we only accept files with .pdf extension)
- For question 1, type "give cs9311 ass2q1 ass2q1.pdf" to submit.
- For questions 2 and 3, type "give cs9311 ass2q23 ass2q23.pdf" to submit.
- Please keep a screen capture (including **timestamp** and the **size** of submitted file) for your submissions as proof in case that the system is not working properly. If you are not sure how, please have a look here.

Note:

1. We do not accept e-mail submissions, and the submission system will be immediately closed after the deadline.
2. If the size of your pdf file is larger than 2MB, the system will not accept the submission. If you face this problem, try converting to compressed pdf.
3. If you have any problems in submissions, please email to swan398@cse.unsw.edu.au or xwang@cse.unsw.edu.au.

Late Submission Penalty

Zero mark