Assignment 2

Due: Fri 29 April, 23:59

Question 1 (6 marks)

Leonardo DiCaprio won best actor Oscar for 'The Revenant' this year. Assume that we have the following schema: Movies (movieID, title, year), Actors(actorID, name), AppearsIn(actorID, movieID).

1) (1 mark) Write relational algebra expressions to find the movieIDs of the movie that "Leonardo DiCaprio" acted.

2) (2 marks) Write relational algebra expressions to find the name of the actors that appear in all the movies that "Leonardo DiCaprio" acted.

3)* (3 marks) Write relational algebra expressions to find the name of the actors that appear in all the movies that "Leonardo DiCaprio" acted. You are disallowed to use division, that is, using other relational algebra to represent a division.

Question 2 (10 marks)

Consider a relation $R(A, B, C, D, E, K, G, H, I, J)$ and its FD set

$F = \{A \to H, G \to A, E \to D, D \to AG, E \to HI, AB \to CD, ABC \to EK, ACD \to KG\}$.

1) (1 mark) Find a minimal cover F_m for F.

2) (2 marks) List the candidate keys for R.

3) (2 marks) Is the decomposition $\{ABC, DEKG, HIJ\}$ (with the same FD set F) of R lossless-join? Justify your answer.

4) (1 mark) Determine the highest normal form of R with respect to F. Justify your answer.

5) (2 marks) Decompose R into a set of 3NF relations if it is not in 3NF. Make sure your decomposition is dependency-preserving and lossless-join. Justify your answers.

6) (2 marks) Decompose R into a collection of BCNF relations if it is not in BCNF. Ensure that your decomposition is lossless-join and briefly justify your answers.

Question 3 (4 marks)

3. Give and justify the answers regarding the following problems:

1) (2 marks) Construct a scenario that LRU buffer replacement policy is better than MRU buffer replacement policy.

2) (2 marks) Construct a scenario that LRU buffer replacement policy is better than FIFO.

Note: questions labelled by * are difficult.

Assignment Submission

We accept electronic submissions only. You can 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)
- Type "give cs9311 ass2 ass2.pdf"
- If you submit your assignment more than once, the last submission will replace the previous one.
- To prove successful submission, please take a screenshot as assignment submission instructions show and keep it by yourself.

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 compressing the pdf file.
3. If you have any problems in submissions, please email to longyuan@cse.unsw.edu.au.

Late Submission Penalty

Zero mark