The University of British Columbia

Computer Science 304

Midterm Examination
May 25, 2011

Time: 50 minutes   Total marks: 53

Instructor: Rachel Pottinger

Name_____Student No_____

(PRINT)   (Last)   (First)

Signature_____

This examination has 3 sheets of paper.

Check that you have a complete paper.

This is a closed book, closed notes exam. No books or other material may be used.

Answer all the questions on this paper.

Give very **short but precise** answers.

State any assumptions you make

Work fast and do the easy questions first. Leave some time to review your exam at the end.

Good Luck

Question	Mark	Out of
1		8
2		15
3		14
4		16
Total		53

1.   {8 marks} Consider the schema S(A, B, C, D, E) together with the functional dependencies:

   CDE$\rightarrow$A
   A$\rightarrow$B
   C$\rightarrow$D
   DE$\rightarrow$A

   Is S in BCNF? Why or why not? If not, decompose into a collection of BCNF relations using the method we used in class and the book and *circle the relations in your final answer. Show all your work.*

2. {15 marks} Consider the schema R(A, B, C, D, E) together with the functional
    dependencies:

    BD → A
    AB→ C
    D→ A
    B→ C
    C→E

Is R in 3NF? Why or why not? If not, decompose into 3NF using the method we used in class
and the book and *circle all relations in your final answer. Show all your work.*

3. (a){10 marks} Create the simplest ER diagram that you can that models the following specification:

- A hockey team has multiple players
- Each team has a name and a home city. No two teams can have the same name and home city combination. We do not need to retain past home city or name information.
- A player can only play for one team (we do not retain past team information), and every player must be on a team
- Each player has a unique jersey number; the combination of the jersey number and the team information is unique
- Every team must have players
- We retain the date when the player last started playing for the team.

(b) {4 marks} If we modified the question so that we needed to retain all the dates that a player has been on each team (so that fairer bonuses can be made if they win the Stanley Cup), describe how you would modify your diagram, and what constraints, if any, you would have trouble expressing.

4.   {16 marks}
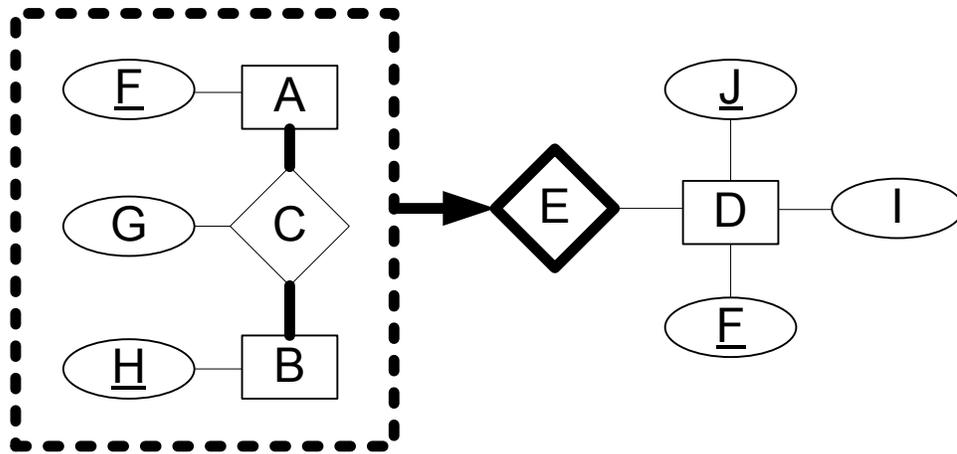
Transform the ER diagram into a relational schema using the methods discussed in class/the book. If there are any conflicting attribute names, rename them something appropriate and easy to understand. State any assumptions that you make – but your assumptions cannot contradict the facts given.

a.   {12 marks} What should the relational schema be? You do NOT have to create SQL DDL, just underline the keys and note foreign keys and not null constraints after the relation definition, e.g., you might have "M(n,o): foreign key (o) references R(q), o is not null"

b.   {4 marks} Are there any constraints in the relational schema that cannot be modeled without using assertions? If so, which constraint(s)? If not, why not?