Assignment 2

CSC 370, Fall 2013

Due: October 15, 2013 (handed in class at start of lecture)

What you must submit

- Handwritten submission are acceptable. Ensure your answers are legible.
- You must have a cover sheet at the front of your submission (course, assignment, name, student number).
- All sheets must be stapled together. *The teaching team will not be responsible for missing pages or incomplete answers associated with unstapled submissions.*
- All diagrams mus be drawn by hand. I realize many of you would prefer to use a drawing tool, but you will not have access to such a tool during the exams, so you may as well get the drawing practice in now.
- In your answers please list all assumptions.

Question 1 (20 marks)

Provide an E/R diagram for a database storing information involving *teams*, *players* and their *fans*. Some additional information you must include in your design:

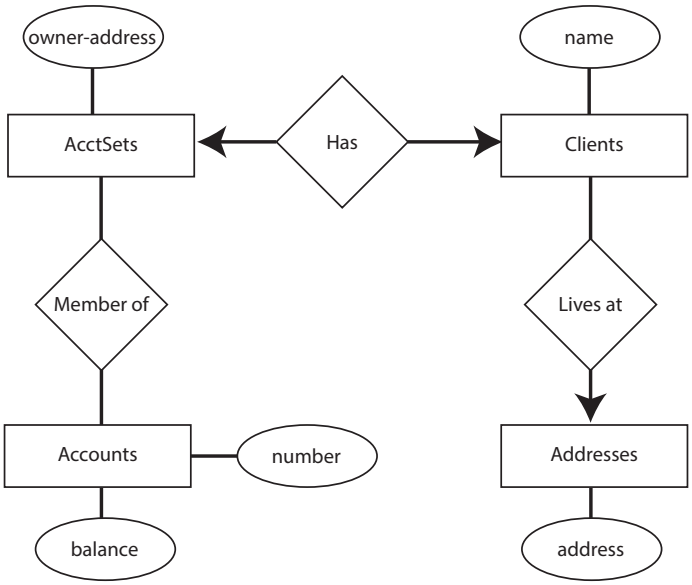
- For each team – its name, its players, its team captain (who is one of its players), and the colours of its uniform.
- For each player – their name.

- For each fan – their name, favorite teams, favorite players, and favorite colour.

Here note that a set of colours is not a suitable attribute type for teams. You must find a way around this restriction.

Question 2 (20 marks)

Below is an E/R diagram for a credit union named "The Trust-Us Trust". The diagram is for a database involving clients and accounts. Clients may have more than one account, and those accounts may be held jointly by more than one client. Therefore each client is associated with an *account set*, and accounts are members of one or more account sets. Assuming the meaning of the various relationships and attributes are as normally expected by their names, provide a thorough critique of the design. What design rules appear to be violated in the diagram? Why? How would you modify the design?



E/R diagram for Question 2

Question 3 (20 marks)

Referring to your E/R diagram prepared in question 1:

- Select and specify keys.
- Indicate appropriate referential integrity constraints

You must motivate and explain your choices.

Question 4 (30 marks)

We may think of relationships in the E/R model as having keys, just as entity sets do. Let R be a relationship among the entity sets $E_1, E_2, \ldots, E_n$. Then a *key* for R is a set K of attributes chosen from the attributes of $E_1, E_2, \ldots, E_n$ such that if $(e_1, e_2, \ldots, e_n)$ and $(f_1, f_2, \ldots, f_n)$ are two different tuples in the relationship set for R, then it is not possible that these tuples agree in all the attributes of K. Now, suppose $n = 2$: that is, R is a binary relationship. Also, for each i, let K_i be a set of attributes that is a key for the entity set E_i. In terms of E_1 and E_2, give the smallest possible key for R under the assumption that:

(a) R is many-to-many.

(b) R is many-to-one from E_1 to E_2.

(c) R is many-to-one from E_2 to E_1.

(d) R is one-to-one.

Question 5 (25 marks)

Consider the following situation that involves weak entity sets. There exist entity sets named *Courses* and *Departments*. A course is given by a unique department, but its only attribute is its number. Different departments can offer courses with the same number. Each department has a different name. Draw the E/R diagram that models all of this.

Question 6 (25 marks)

Consider the E/R diagram shown in the assignment writeup for this question (refer to page 4). Convert the design into a relational schema.

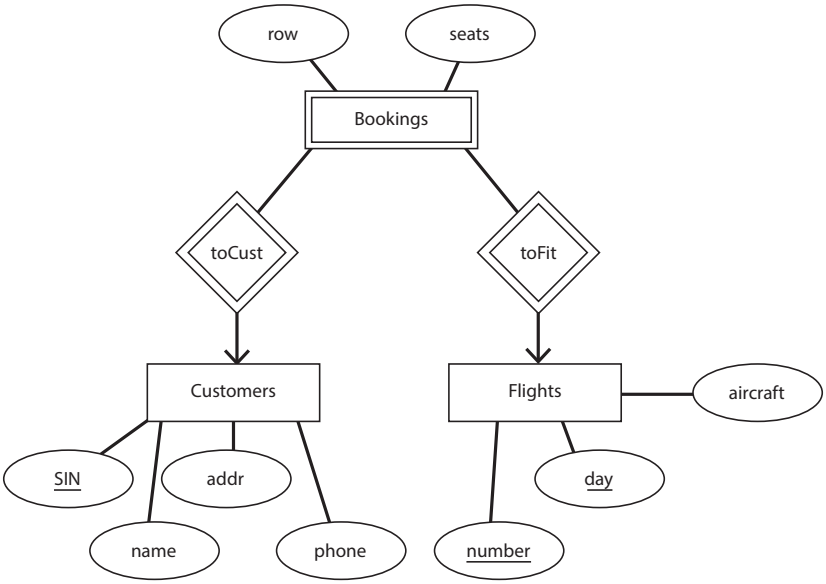
Question 7 (30 marks)

Consider the E/R diagram shown in the assignment writeup for this question (refer to page 5). Convert the design into a relational schemas using, in turn, each of the following:

(a) The straight E/R method.

(b) The object-oriented method.

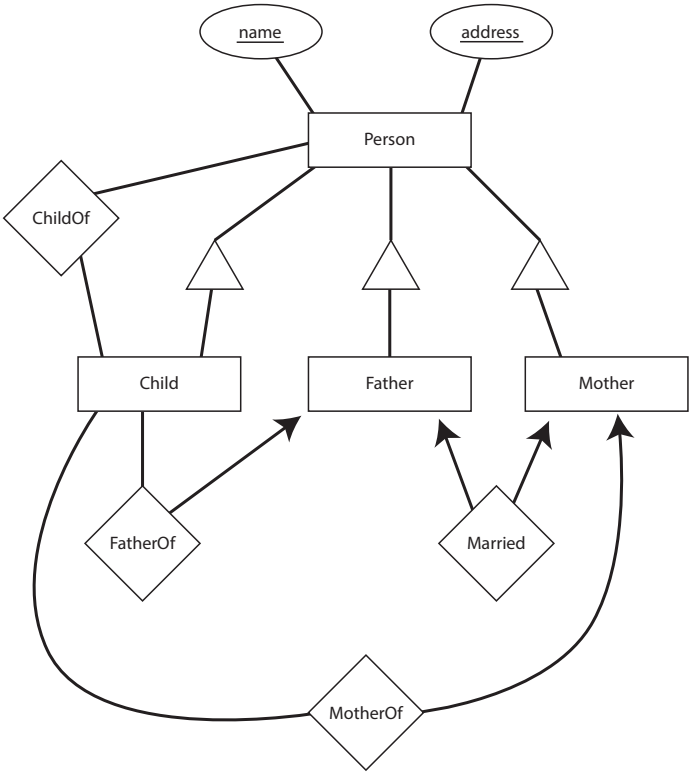
(c) The *nulls* method.



E/R diagram for Question 6

Question 8 (30 marks)

Recall the database-design problem from Question 1. For the question, please convert your design into the *Object Definition Language*. Make sure you include the keys as you deem them appropriate. The original question introduced a complication involving team colours. Explain why this is not an issue for ODL, and do so by providing a small example.



E/R diagram for Question 7