CS 1555 – Database Management Systems (Spring 2020)
Dept. of Computer Science, University of Pittsburgh

Assignment #9: E-R Model

Release: Apr. 5, 2020 Due: 8:00 PM, Monday, Apr. 13, 2020

Goal
The goal of this assignment is to understand and gain familiarity with conceptual database design. You will design a database using the E-R Model and then translate it into a relational schema.

Questions [100 points total]

1. Design a database system that facilitates the operations of an animal shelter.

   - The database needs to store data about animals, their admission and discharge from the shelter's departments, and their treatments.
   - For each animal, we know the name, type, sex, age, identification number, and pet insurance code (if any).
   - For each department, we know the department's name, its location, the number of cages available, and the number of cages occupied.
   - We also need the relevant information about the pet doctors as well as their department and the department of which they are potentially heads of.
   - Each animal gets admitted at a given date and discharged at a given date. Each animal may have one or more doctors assigned to its case and may go through multiple treatments. Animals can also undergo lab tests during their hospitalization.
   - For each test we store its name and result for the animal it was performed on and for each treatment we store its name and duration. Also we want to know potential reactions that an animal had on one of its treatments.
   - Tests and treatments must be authorized by one of the animal's supervising doctors.
   - Note that you are free to make reasonable assumptions about the application requirements as long as you state them explicitly. Please also state all constraints that need to be specified in the database schema.

   (a) [70 points] Produce a conceptual design of the schema using the E-R Model and express it using E-R diagrams from the above natural language description. Please state any assumptions that you make.
      - In order to enhance the readability of your E-R diagrams, you may specify only the key attributes for each entity/relationship type and the constraints on relationships.
      - You are also asked to provide separately the complete diagram of an entity type with complex attributes.
      - Please state all assumptions explicitly.

   (b) [30 points] Translate your E-R diagram of conceptual schema into a relational model schema. Please specify all constraints clearly (i.e., primary keys, alternative, and foreign keys). The translation algorithm from E-R diagrams to relational schema is available in our E-R Model class notes (Set #4: ER-2-Relational.pdf).

What to submit

You are expected to submit the following file:

- `hw9-<pitt_user_name>.pdf`
  In this file, please submit your answers to all questions. In addition to providing the answers, you are expected to:
  - Include your names and pitt user-names at the top of the file.
  - For the E-R diagrams, use a graph editor (such as dia, MS-Word, MS-PowerPoint, MacDraw, idraw, xfig, etc.) to generate your diagrams. **Handwritten diagrams, even if they are scanned and submitted electronically, will not be accepted/graded.**

How to submit your assignment

1. Submit your assignment (the file described above) through the Web_base submission interface you have used for previous homeworks. **It is your responsibility to make sure the assignment was properly submitted.**
2. Submit your assignment by the due date (8:00 PM, Monday, Apr. 13, 2020). There is no late submission.

Academic Honesty

The work in this assignment is to be done *independently*. Discussions with other students on the assignment should be limited to understanding the statement of the problem. Cheating in any way, including giving your work to someone else will result in an F for the course and a report to the appropriate University authority.