Homework 3

ER/EER modeling

Total points: 40

Extra credit points: 10

Complete the following exercises (some are from the textbook). Submit a document with your solutions. You may submit a scanned, hand-drawn document. You will get 10 extra credit points for generating ER diagrams using a CASE tool, such as, Dia (or others) or 5 points if you generate it using word processing tools.

Note: All screenshots should be included in one document. Zip folder submissions will not be graded.

Scroll down to the end of this document for some useful tips when creating ER diagrams.

Chapter 7

7.0 (10 pts.) – This question is not included in the textbook.

Ø Consider the following set of requirements for a university database that is used to keep track of student's transcripts. This is not the same as the university database from the textbook.

• The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birth date, sex, class (freshman, sophomore, ..., graduate), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, state, and zip of the student's permanent address, and to the students' last name. Both social security number and student number have unique values for each student.

• Each department is described by a name, department code, office number, office phone and college. Both name and code have unique values for each department.

• Each course has a course name, description, code number, number of semester hours, level, and offering department. The value of code number is unique for each course.

• Each section has an instructor, semester, year, course, and section number. The section number distinguishes different sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ...; up to the number of sections taught during each semester.

• A grade report has a student, section, letter grade and numeric grade.

Draw an ER diagram for this database. Specify key attributes of each entity type and structural constraints on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

7.21 (10 pts.) – Only ER diagram. Hint: There is at least one ternary relationship in this design.

Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff in ordering cars.
Each vehicle is identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g., the XF is a model of the car brand Jaguar of Tata Motors).

Each model can be offered with a variety of options, but an individual car may have only some (or none) of the available options. The database needs to store information about models, brands, and options, as well as information about individual dealers, customers, and cars.
Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints.

7.26 (5 pts.) – Draw the EER diagram and explain. Include at least one attribute with each entity.

Design a generalization – specialization hierarchy for a motor vehicle sales company. The company sells motorcycles, passenger cars, vans, and buses. Justify your placement of attributes at each level of the hierarchy. Explain why they should not be placed at a higher or lower level.

7.30 (10 pts.) – This question is not included in the textbook.

Ø Forward engineer the EER diagram located at this site, to a relational schema:

http://www.texample.net/media/tikz/examples/PDF/entity-relationship-diagram.pdf

7.31 (5 pts.) – This question is not included in the textbook.

Ø Reverse engineer the relational database schema in figure 5.25 on page 212 in the textbook to an ER diagram. This is the Banking database. Make sure you document any assumptions.

branch (branch_name, branch_city, assets)
customer (customer_name, customer_street, customer_city)
loan (loan_number, branch_name, amount)
borrower (customer_name, loan_amount)
account (account_number, branch_name, balance)
depositor (customer_name, account_number)

Common mistakes made by students when generating ER diagrams:

1. A relationship cannot be related to another relationship. So, in your ER diagram you may not link two diamonds by a line.
2. You do not include foreign keys in the ER diagram. That's what the line between two entities is supposed to represent.
3. A relational schema diagram is NOT an ER diagram. Do not submit this. Look for the differences between a relational schema on page 47 and an ER diagram on page 282 in the textbook.
4. Do not restate what is represented in the diagram as assumptions, such as, I assume there is a many-to-many relationship between students and departments. Instead state that a student can be associated with multiple departments for different majors and minors and a department is allowed to have many students.
5. Weak entities are to be represented with a double line and so are their identifying relationships.
6. Generalization (superclass-subclass relationship) is specific to the EER model. Do not include this if you are specifically asked for an ER diagram.