Homework 1

Due date: Tuesday, January 29, in class.

Problem 1

You are building a credit card transactions database. The following information is made available to you.

- The credit card company issues credit cards to individuals and corporations. Each credit card account is uniquely identified by its *number*. The database must also store information about the *date of issue* of the credit card, its *expiration date* (both are stored as *month, year* pairs), *billing address*, *phone number*, *credit limit*, *interest rate*, *date of last statement*, and *current ballance*.
- Each credit card account, both individual, and corporate allows for a number of authorized users. Each individual account is associated with a list of customers. Each corporate account is associate with a company and the company, in turn has a list of authorized users for the account, also customers.
- Individual customers may have multiple credit card accounts with the credit card company. Corporate customers have only one account.
- For each person (customer) the database record his/her *name* and *date of birth*.
- For each corporation, the database records its *name*, *corporate address* (may be different from the billing address on the account), and a contact phone number.
- The database records credit card transactions. Each transaction involves a specific account. For each transaction we store *transaction id* – the unique identifier of a transaction, *date it occurred*, *date is was posted*, *type* of transaction (credit, payment, cash advance, finance charge, fee), *vendor* and the *amount*.

1. Specify all entity sets present in the database. For each entity set specify its attributes and indicate the primary keys.

2. Specify all relationship sets present in the database. For each relationship set specify the entity sets it associates with each other and any additional attributes that may be needed.

3. Specify any constraints present in the database.

4. Draw the ER diagram of the database you are proposing to build. (note: you do not need to indicate all attributes on the diagram, only primary keys, identifying attributes and relationship sets attributes will be enough)

Problem 2

Suppose, you are asked to make the following adjustments to the credit card database from the previous problem.

- Each credit card account can be of one of a number of types (e.g., "platinum", "gold", "student", "rewards", etc...). Each account type has a *name*, *allowed categories* (individual only, corporate only, both), *interest rate*, *fee amount* (the fee amount assessed for late payments), *annual fee* (can be 0), and a *description of any special conditions/promotions associated with the account type*.
- In addition, for accounts with corporate customers, the database now needs to store information about *the total number of transactions* to date. Similarly, for individual credit card accounts, the database stores the *number of customer service calls* and the *date of last call*.

1. Describe the changes in your database design. What new entity sets, relationship sets, if any, will be introduced? What new attributes? Are there any new constraints? What are the changes in the existing entity and relationship sets and constraints, if any?

2. Draw the E-R diagram for the modified database.

Problem 3 *Exercise 4.1.9, textbook (A First Course, 3d Edition), page 140.*

Problem 4 *Exercises 4.2.5 and 4.2.6, textbook (A First Course, 3d Edition), pages 147-148.*

Problem 5 *Exercise 4.4.4 a), b) textbook, (A First Course, 3d Edition), page 157.*