Homework Assignment 2

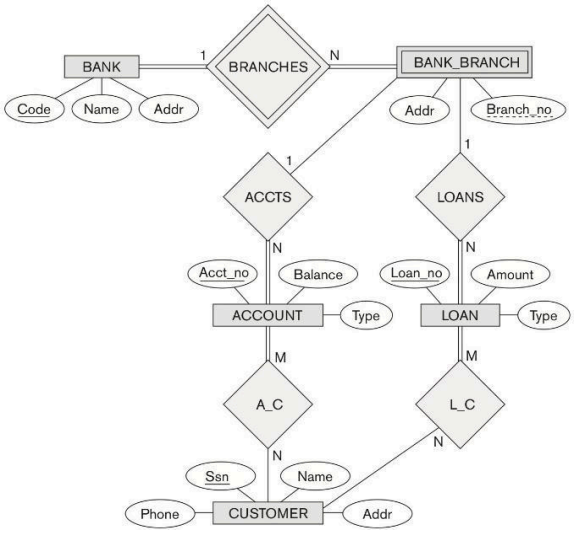
CMP 420 & CMP 758 - Database Systems
Spring 2022
Total points: 110

Due Date: **March 24 2022 by 11:59 pm**

Submission information and Instructions

- No late submission will be accepted and **no emailed work will be accepted.**
- All work must submitted on Blackboard in a PDF or Microsoft Word Document.
- You must do this work on your own.
- This work contains 10 points of extra credit.
- **Undergraduate (U) students, please answer questions 1 through 4. Graduate (G) students, please answer all questions.**

1. (U: 20 points) (G: 15 points) Map the following ER diagram for a Bank database into a relational database schema.



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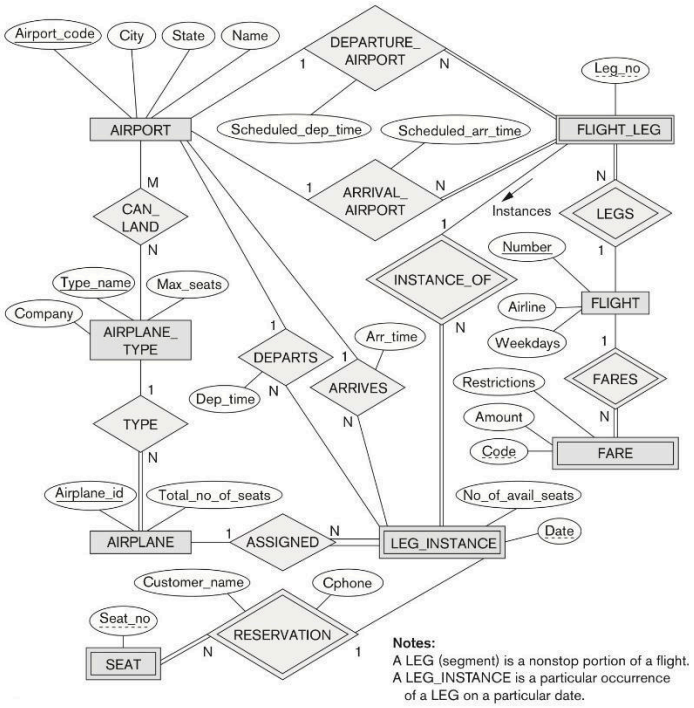
2. (U: 20 points) (G: 15 points) Map the following ER diagram for a Bank database into a relational database schema.



3. (U: 30 points) (G: 25 points) Consider a MAIL_ORDER database in which employees take orders for parts from customers. The data requirements are summarized as follows:
   - The mail order company has employees, each identified by a unique employee number, first and last name, and Zip Code.
   - Each customer of the company is identified by a unique customer number, first and last name, and Zip Code.
   - Each part sold by the company is identified by a unique part number, a part name, price, and quantity in stock.
   - Each order placed by a customer is taken by an employee and is given a unique order number. Each order contains specified quantities of one or more parts. Each order has a date of receipt as well as an expected ship date. The actual ship date is also recorded.

   a). Design an entity–relationship diagram for the mail order database and build the design using a data modeling tool such as ERwin or Rational Rose or a tool of your choice. (You already did this activity as homework 1 but feel free to improve it for this homework)

   b). Map the following EER diagram from the above step into a relational database.

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4. (U: 40 points) (G: 35 points) Design a database to keep track of information for an art museum. Assume that the following requirements were collected:
    - The museum has a collection of ART_OBJECTS. Each ART_OBJECT has a unique Id_no, an Artist (if known), a Year (when it was created, if known), a Title, and a Description. The art objects are categorized in several ways, as discussed below.
    - ART_OBJECTS are categorized based on their type. There are three main types: PAINTING, SCULPTURE, and STATUE, plus another type called OTHER to accommodate objects that do not fall into one of the three main types.
    - A PAINTING has a Paint_type (oil, watercolor, etc.), material on which it is Drawn_on (paper, canvas, wood, etc.), and Style (modern, abstract, etc.).
    - A SCULPTURE or a statue has a Material from which it was created (wood, stone, etc.), Height,Weight, and Style.
    - ART_OBJECTs are categorized as either PERMANENT_COLLECTION (objects that are owned by the museum) and BORROWED. Information captured about objects in the PERMANENT_COLLECTION includes Date_acquired, Status (on display, on loan, or stored), and Cost.
    - Information captured about BORROWED objects includes the Collection from which it was borrowed, Date_borrowed, and Date_returned.
    - Information describing the country or culture of Origin (Italian, Egyptian, American, Indian, and so forth) and Epoch (Renaissance, Modern, Ancient, and so forth) is captured for each ART_OBJECT.
    - The museum keeps track of ARTIST information, if known: Name, DateBorn (if known), Date_died (if not living), Country_of_origin, Epoch, Main_style, and Description. The Name is assumed to be unique.
    - Different EXHIBITIONS occur, each having a Name, Start_date, and End_date. EXHIBITIONS are related to all the art objects that were on display during the exhibition.
    - Information is kept on other COLLECTIONS with which the museum interacts, including Name (unique), Type (museum, personal, etc.), Description, Address, Phone, and current Contact_person.

    Draw an EER schema diagram for this application. Discuss any assumptions you make, and that justify your EER design choices.

    Map the following EER diagram from the above step into a relational database

3. (U: 0 points) (G: 20 points) Consider a MOVIE database in which data is recorded about the movie industry. The data requirements are summarized as follows:

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- Each movie is identified by title and year of release. Each movie has a length in minutes. Each has a production company, and each is classified under one or more genres (such as horror, action, drama, and so forth). Each movie has one or more directors and one or more actors appear in it. Each movie also has a plot outline. Finally, each movie has zero or more quotable quotes, each of which is spoken by a particular actor appearing in the movie.
- Actors are identified by name and date of birth and appear in one or more movies. Each actor has a role in the movie.
- Directors are also identified by name and date of birth and direct one or more movies. It is possible for a director to act in a movie (including one that he or she may also direct).
- Production companies are identified by name and each has an address. A production company produces one or more movies.

a). Design an Entity-Relationship diagram for the movie database and enter the design using a data modeling tool such as ERwin or Rational Rose.
b). Map the following EER diagram from the above step into a relational database