Software Engineering
The University of Auckland

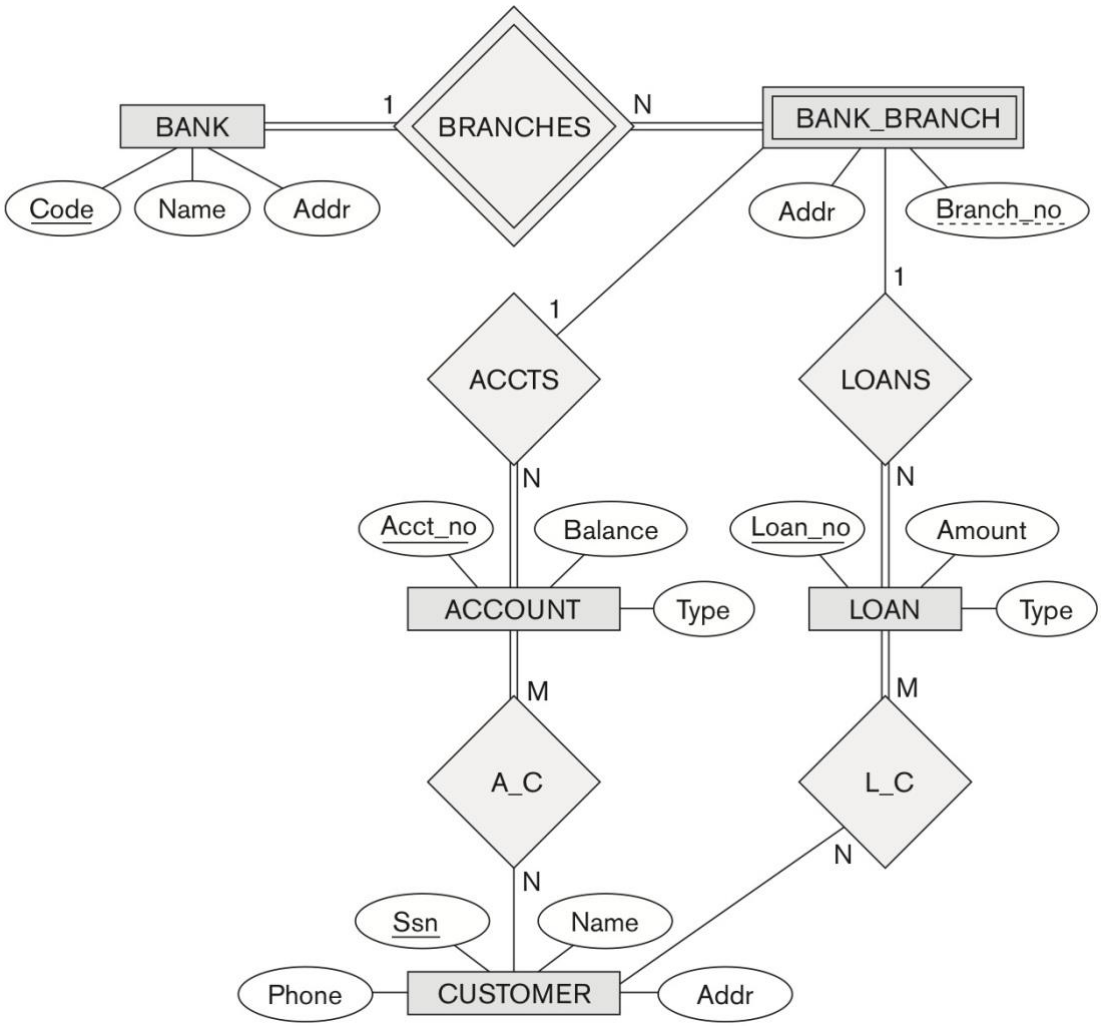
SOFTENG 351 S1 C – Assignment 1

Due Date: Sunday 22 March 2020 at 5pm

50 marks in total = 5% of the final grade

Q1. A Bank data model *(12 Marks)*

Consider the following ER diagram for part of a BANK database and answer the questions below. Note that each bank can have multiple branches, and each branch can have multiple accounts and loans.



a. List the strong (non-weak) entity types in the ER diagram.
b. Is there a weak entity type? If so, give its name, partial key, and identifying relationship.
c. What constraints do the partial key and the identifying relationship of the weak entity type specify in this diagram?
d. List the names of all relationship types, and specify the (min, max) constraint on each participation of an entity type in a relationship type. Justify your choices.

e. List concisely the user requirements that led to this ER design. State appropriate assumptions to make the specification complete.
f. Suppose that every customer must have at least one account but is restricted to at most two loans at a time, and that a bank branch cannot have more than 1,000 loans. How does this show up on the (min, max) constraints?

Q2. A Mail Order data model (12 Marks)

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.

Design an entity–relationship diagram for the mail order database. State any unspecified requirements, and make appropriate assumptions to complete the specification.

Q3. A Movie data model (12 Marks)

Consider a MOVIE database in which data is recorded about the movie industry. The data requirements are summarized as follows:

- 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.

Use the entity–relationship diagram to design a data model for the movie application. State any unspecified requirements, and make appropriate assumptions to complete the specification.

Q4. A Conference Review data model (14 Marks)

Consider a CONFERENCE_REVIEW database in which researchers submit their research papers for publication considerations. Reviews by reviewers are recorded for use in the paper selection process. The database system caters primarily to reviewers who record answers to evaluation questions for each paper they review and make recommendations regarding whether to accept or reject the paper. The data requirements are summarized as follows:

- Authors of papers are uniquely identified by e-mail id. First and last names are also recorded.
- Each paper is assigned a unique identifier by the system and is described by a title, abstract, and the name of the electronic file containing the paper.
- A paper may have multiple authors, but one of the authors is designated as the contact author.
- Reviewers of papers are uniquely identified by e-mail address. Each reviewer's first name, last name, phone number, affiliation, and topics of interest are also recorded.
- Each paper is assigned between two and four reviewers. A reviewer rates each paper assigned to him or her on a scale of 1 to 10 in four categories: technical merit, readability, originality, and relevance to the conference. Finally, each reviewer provides an overall recommendation regarding each paper.
- Each review contains two types of written comments: one to be seen by the review committee only and the other as feedback to the author(s).

Use the entity–relationship diagram to design a data model for the above database. State any unspecified requirements, and make appropriate assumptions to complete the specification.

Remark: *You can use **any** software tool to construct the design model and document the ER diagrams. You should submit the assignment in a single PDF file that contains all your answers to the above questions.*