CS 348 - Homework 1

Entity Relationship Model
(100 Points)

Fall 2019

Due on: Friday 09/13/19 11:59pm

Instructions: Please answer the questions either by typing or handwriting. Upload the answer files as PDF to gradescope. Please *do not* change the HW latex form.

Note: There will be a 10% penalty for each late calendar day. After five calendar days, the homework will not be accepted.

1. Part 1 (20 points): Draw an E-R diagram for a database of your choice.
   Draw your E-R diagram here.

Identify and explain the following terms in your model.

1. Entity and Entity Set

2. Relationship and Relationship Set

3. Attribute and their types

4. Primary Key, Candidate Key and Super key

5. Mapping Cardinality

6. Integrity constraints

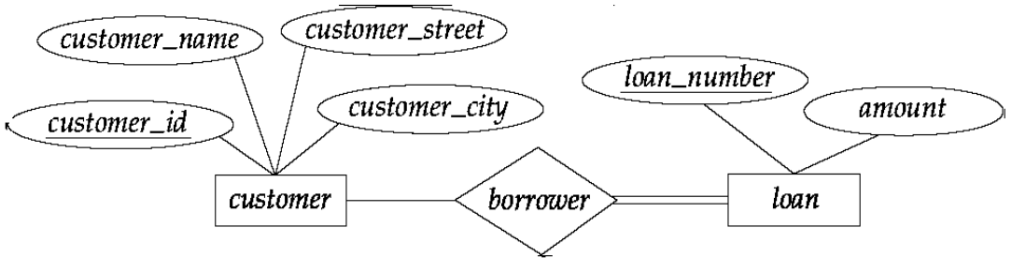

Figure 1: Question 1, Part 2. A borrower relationship where a a customer entity borrows a loan from a bank.

Part 2 (20 points): The E-R diagram shown in Figure 1 shows a borrower relation where a customer entity borrows a loan from a bank. Use this E-R diagram explain the concepts of Total Participation and Partial Participation.

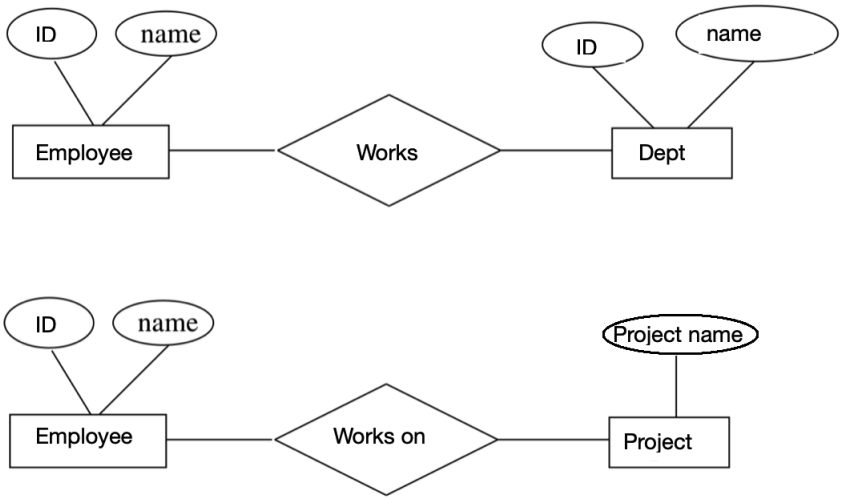

Figure 2: Question 2: ER diagram with a duplicate entity (Employee)

2. Consider the ER diagram illustrated in Figure 2 where the entity (Employee) is duplicated. Is duplicating entities a good design? Use Figure 2 to explain your answer. (20 points)

3. The ABC chain of pharmacies has offered to give you a free life-time supply of medicine if you design its database. Given the rising cost of health care, you agree. Here's the information that you gather:

   - Patients are identified by an SSN, and their names, addresses, and ages must be recorded.
   - Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded.
   - Each pharmaceutical company is identified by name and has a phone number.
   - For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
   - Each pharmacy has a name, address, and phone number.
   - Every patient has a primary physician. Every doctor has at least one patient.
   - Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
   - Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that, if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
   - Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.
   - Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

   Draw an ER diagram that captures the preceding information. Identify any constraints not captured by the ER diagram. (40 points)

Draw your E-R diagram here.