

Lab 1: Entity-Relationship Model and Relational Data Model

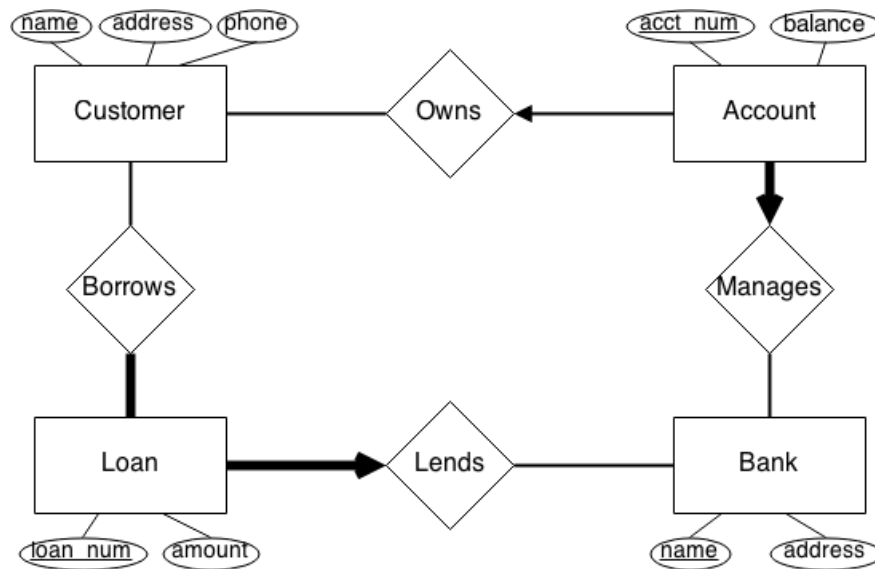
You may work with one other person on this lab. To submit your assignment, place a PDF in your `~/cs44/labs/1/` directory and use `handin44` to electronically submit the lab. Be sure both names are on the document. Your assignment should be submitted by 11:59pm on **Friday, February 13, 2015**.

1. ER Model

- (a) You have been tasked with modeling the book industry. Draw an ER diagram to model the following: books have a title, ISBN number (which is unique for each book), and subject. Books usually cite other books (i.e., references). In addition, each book must have at least one author, who has a Social Security number (unique for each individual), name, and a phone number. We would like to keep track of bookstores, who sell books, and have a store id, address, and name.
- (b) As a separate problem, we would like to keep track of all book sales. Books have the same attribute above, and for each we keep track of its transactions (i.e., daily sales). Each transaction has a date and quantity, neither of which is unique. But each book only has one daily entry. Draw the corresponding diagram.
- (c) Lastly, in this modern age, our database should keep track of whether a book is electronic or physical. Draw a diagram for books (which have similar attributes as above), where electronic books have a file size and physical books have a weight. Also, we would like to note relationships between electronic books and the platforms they can be used on. Platforms include a company and webpage (unique). E-books are limited to at most one platform. You do not need to model any other requirements from (a) or (b).

2. Relational Models

- (a) Briefly, explain how *views* can provide *logical data independence*.
- (b) Translate Figure 2.18 into a relational schema. You do not have to use SQL, but it should be clear what the attributes are and which are primary keys. Also, explicitly identify foreign key references.
- (c) **Exercise 3.8** Parts 1,3,4 only, Ramakrishnan and Gehrke
- (d) Show the SQL statements for converting the ER diagram on the next page to relations. Indicate any constraints in the ER diagram that you cannot capture in the SQL statements.



3. History of Relational Models

Read the seminal paper on relational models by E.F. Codd in 1970 titled “A Relational Model of Data for Large Shared Data Banks”. The paper is linked on the main schedule.

- (a) What is the advantage to having a normalized form?
- (b) What is Codd’s main argument for relational models with respect to data dependencies?
- (c) Open-ended question: briefly, describe how some of the central points apply today, almost 45 years after the release of the paper. Are some ideas obsolete based on current technology? Which still apply or are even more applicable today? Spend a paragraph or two exploring your central ideas.