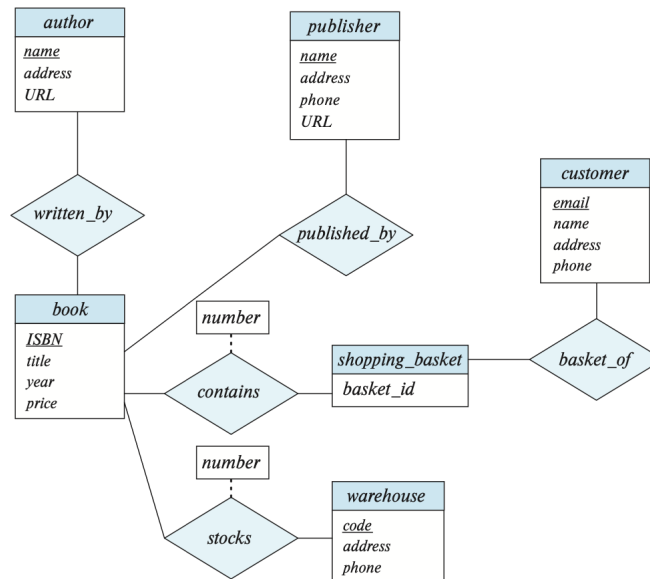# Homework 3

Instructions

Due on Friday, Dec. 13th, at 11:59pm.

   You must submit this assignment electronically, via Blackboard, as a PDF.

Questions

1. Ch. 6, Problem 6.21, modified

Figure 1: E-R Diagram for modeling an online bookstore.

Consider the E-R diagram in Figure 1.

(a) List the entity sets and their primary keys

(b) Suppose the bookstore adds Blu-ray disks and downloadable video to its collection. The same item may be present in one or both formats, with differing prices. Extend the E-R diagram to model this addition, ignoring the effect on shopping baskets.

(c) Now extend the E-R diagram, using generalization, to model the case where a shopping basket may contain any combination of books, Blu-ray disks, or downloadable video.

2. Ch. 6, Problem 6.22

Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff in ordering cars.

Each vehicle is identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g., the XF is a model of the car brand Jaguar of Tata Motors). Each model can be offered with a variety of options, but an individual car may have only some (or none) of the available options. The database needs to store information about models, brands, and options, as well as information about individual dealers, customers, and cars.

Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints.

3. Consider the following set F of functional dependencies on the relation schema $r(A, B, C, D, E, F)$:

$$A \rightarrow BCD$$
$$BC \rightarrow DE$$
$$B \rightarrow D$$
$$D \rightarrow A$$

(a) Compute B^+

(b) Prove (using Armstrong's axioms) that AF is a superkey.

(c) Compute a canonical cover for the above set of functional dependencies F; give each step of your derivation with an explanation.

(d) Give a 3NF decomposition of r based on the canonical cover

(e) Give a BCNF decomposition of r using the original set of functional dependencies.

(f) Can you get the same BCNF decomposition of r as above, using the canonical cover?

PHP and Web Pages

The assignment is to create two web sets of web pages and scripts. Please place your scripts in sql.cs.oberlin.edu /var/www/html/your_user_name. Include a README file in the directory, explaining what you did and any issues that you may have had with your implementation.

1. The first page will display a question to the user, asking whether they are interested in ratings from Males or Females, and for which year. Use /var/www/html/311-demo/dbForm.html as a sample form. You can use the AJAX implementation of the year popup menu in dbForm.html if you want, but it is not required. The gender should be either a popup menu or a radio button, you may choose. There should be a "Submit" button, which when clicked, will send the web form to the server, which will process and return the results of the query on the database.

   /var/www/html/311-demo/dbDemo.php contains a sample PHP script that you can modify. Please use your own username and password. You should use the movie ratings database that we used for in-class exercises. This script should return the results of your query in a tabular form. You may use an HTML Table or div blocks, if you prefer, but you should not return a raw dump of text.

2. The second page will allow the user to change the ratings for movies that they have previously rated. Pick a userID from the database that has rated more than 10 movies, and present a list of movies that they have rated with the values. Present the ratings as either a popup menu or as a set of radio buttons. The submit button should send the values to the server to be inserted into the database. You will need to update the entry in the database with an UPDATE statement, not delete and insert.

   The form handler in the back end should perform input validation. Make sure that the movies are movies that have been rated previously. Make sure that the userID is a valid userID in the system. Return a web page that summarizes the changes. If a movie rating has not been changed, it should not be shown in the output.

   Do not worry about authentication. We are assuming that it is working.

Honor Code

Please affix the required "I have adhered to the Honor Code in this assignment." at the bottom of your submission.