CS430/630 – Homework 3

Released Nov 01, Due Nov 20

50 points (5/100 of final grade)

Instructions: The homework is due at midnight Fri 11/20, 23:59:59. Create a folder "HW3" under your main folder for the course, and put all answers there. For Q1 and Q2 submit files called Q1.pdf and Q2.pdf. For Question 3, you have to create a script named "Q3.sql".

Question 1 (20 points)

You are given the following database:

`Books(bid:integer, bname:string, author:string, year:integer, price:integer)`
`Orders(cid:integer, bid:integer, quantity:integer)`
`Customers(cid:integer, cname:string, zipcode:string)`

The meaning of attributes is as follows:

- `bid`: unique book identifier,
- `bname`: book name,
- `author`: book author,
- `year`: book publication year,
- `price`: book price,
- `quantity`: number of books purchased with an order,
- `cid`: unique customer identifier,
- `cname`: customer name,
- `zipcode`: customer address zipcode.

Solve the following questions according to the entity-relationship model:

(a) Draw the E/R diagram for this database, assuming no constraints hold other than what results from the schema.
(b) Modify the E/R diagram from (a) to reflect the constraint that each customer must have at least one order placed.
(c) Modify the E/R diagram from (b) to reflect the constraint that there must be an order placed for every book.
(d) Assume that this is a rare book shop. Modify the diagram from (a) such that a customer can place at most one order.
(e) [630 students only] Modify the diagram from (a) such that instead of zipcode, a customer can have a set of addresses (which are street-city-state triples) and a set of phones. Recall that in the E/R model there can be only primitive data types (no sets).
(f) [630 students only] Modify the diagram from (e) such that customers can have a set of addresses, and at each address there is a set of phones.

Question 2 (15 points)

Let `a` and `b` be integer-valued attributes that may be `NULL` in some tuples. For each of the following conditions that may appear in a `WHERE` clause, describe exactly the set of `(a,b)` tuples that satisfy the condition, including the case where `a` and/or `b` is `NULL`.

(a) `a=10 OR b=20`
(b) `a=10 AND b=20`
(c) `a<10 OR a>=10`
(d) [630 students only] `a=b`

Question 3 (15 points)

Using the the schema from Q1, write SQL statements for the following:

(a) Create a view `BestSeller` that lists book identifiers, titles, authors and total amount of sales (dollar amount) for books that sold more than 100,000 copies. The view will have four columns with headings: `BookID`, `Title`, `Author` and `Amount`.
(b) Query the view above to retrieve the best seller with the highest amount of sales.
(c) Query the view above to find the author(s) that brought the highest amount of revenue (assume author names are unique, i.e., if two books have the same author name then they are written by the same person).