

## CS430/630 – Homework 3

Released March 28, Due Apr 8

50 points (5/100 of final grade)

**Instructions:** The homework is due on **Fri Apr 8<sup>th</sup>, 17:00**. Submissions must be **TYPESET**; submission must be in a single file called **HW3.pdf**.

The timestamp will be considered according to the UMB email server. Submissions received (i.e., tagged) later than the deadline **WILL NOT BE GRADED**. You are only allowed a **SINGLE** submission (i.e., you cannot send multiple emails – only the **first received** will be graded).

**Email submissions must be sent to Wenxiu Ye <Wenxiu.Ye001@umb.edu>**

### Question 1 (25 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 (25 points)

Consider a database schema with three relations:

```
Movies (movie_id, title, year, studio)
Actors (actor_id, name, nationality)
StarsIn(actor_id, movie_id, character)
```

Provide SQL statements for the following:

- (a) Create a view `CharactersPlayed` that lists actor names, their nationality and the characters they interpreted together with the year they interpreted it in. The view will have four columns with headings: `ActorName`, `ActorNationality`, `CharacterName` and `Year`.
- (b) Query the view above to retrieve the set of distinct nationalities for actors that interpreted "Forrest Gump".
- (c) Query the view above to find for each year the count of distinct nationalities of actors who starred in some role for that year.