CPSC 304 Project Instructions: ER Diagram, Translation to Relational Model, and Normalization

Due Date: Monday, October 16, 2017 at 23:59

Last Update: October 6, 2017

Details

Your TA should have given you preliminary feedback on your Project Proposal by now (or Saturday, Oct. 7th at the latest). If you have not heard from your TA by the end of Oct. 7, send your TA an e-mail note or use a Piazza private posting (small group). Your grade for the proposal will take place later.

This part of the project (ER diagram, translation to relational, and FDs/normalization) will account for 13% of your project mark.

Assuming that your Project Proposal is acceptable, the next phase of the project, and therefore the next deliverable, is the entity-relationship diagram along with its translation to the relational model and an appropriate normalization.

1. For the **ER diagram**, you should use the same notation and style shown in the textbook and in our lectures. Do not use another ER modeling technique other than the one we've been using regularly. It is OK to hand-draw it, or to use software to draw your diagram. If you do use software, let us know (via your README.txt file) what kind of software you used. Microsoft Visio is one such tool. Microsoft Word also has some basic diagramming tools. There are other diagramming tools out there, including some that focus on ER diagrams. The end result should be a PDF document that's no more than 1 MB in size.

2. For the **translation of the ER diagram to the relational model**, follow the same instructions as for your tutorials. The process should be reasonably straightforward. You can list the table definition in the format: Table1 (Attribute1: Domain1, Attribute 2: Domain 2: etc.) Show the keys including foreign keys and other constraints that each table has to maintain. Turn your translation document into a PDF document.

3. Identify the **functional dependencies** in your relations, including the ones involving the primary keys. List all candidate keys. (Suggestion: Don't have too many attributes, or it's a lot of extra work.) Briefly describe each non-obvious functional dependency, in English, so that the TA can understand it.

   Once you have the FDs, **normalize** your design into BCNF or 3NF tables, with lossless join. You don't need to go as far as showing a minimal cover or dependency preservation. (If you want to do that, that's OK.) Also, you don't need to provide any formal proofs. List the tables, their primary keys, and foreign keys after normalization.

- If your tables, when designed, are already in BCNF or 3NF form, then you don't have to explicitly do those extra steps.

You do not have to create the SQL DDL to create the tables, yet.

You do not have to create data to populate your tables, yet.

If any details are missing from the above, make reasonable assumptions about them, and include them as appropriate. You can also post your question on Piazza, or consult your TA via your semi-private Piazza small group postings.

As a reminder, your project should have:

- At least 7 entities and 5 relationships
- Appropriate attributes for the entities and relationships
- Key constraints: all candidate keys should be identified, with the primary key being underlined, and any partial keys having a dotted underline
- The ability to handle multiple classes of users (e.g., customers and bank employees) through an ISA relationship
- Appropriate participation constraints

You should also think about at least 10 queries that users will be able to ask via the application interface. The data model (ER diagram) should be able to support these. Don't submit the queries (yet) as a deliverable, but think about the kinds of queries that your tables will need to support—and then make sure that you've identified the tables, attributes, etc. that will serve as the basis for those queries.

Note that you will create the formal specifications *later*. If you want to see a *preview* of both the formal specifications and the ER diagram, take a look at the following Bookstore (UBStore) example. (You may need to copy-and-paste the links.)

- https://www.ugrad.cs.ubc.ca/~cs304/2017W1/project/p1/p1-desc.html
- https://www.ugrad.cs.ubc.ca/~cs304/2017W1/project/p1/p1-solution.html
- Note that this example is based on a previous offering of this course—so, be sure that you follow the *current* instructions. You may *not* model any previous UBC example

data (e.g., discussed in lectures—although the music/radio case is fine), employee supervision (discussed in a textbook), a bookstore (project topic in this example), MP3 storage (may be discussed in class), Motor Vehicles Branch application, or a project given to you in the tutorials. Additionally, this must be a *new* project—you may *not* reuse a pre-existing project like something you got from someone else, a book, the Internet, a co-op term, etc.

You should also re-visit the SuperRent example from the tutorials since that shows the ER diagram and the translation to the relational model. Besides SuperRent, we also did some tutorial work on functional dependencies and normal forms. Also, check out the lecture notes.

What to Turn In

- A cover page: https://www.ugrad.cs.ubc.ca/~cs304/2017W1/project/CoverPage.html.
- Your ER diagram: Show the tables, relationships, attributes, ISA, and any brief annotations. In your diagram, you'll need to identify the primary keys (underline them) and the appropriate key and participation constraints—similar to what we did in the tutorials for the SuperRent application.
    - It is OK if you break your ER diagram into parts, but clearly identify how they fit together.
    - It is OK to hand draw it, or to use software to draw it, but please turn the final product into a PDF file (or files).
- The translation to the relational model. Again, put it in a PDF document.
- The normalization step and results. Again, put it in a PDF document.
- If you hand-draw them, or write them by hand, that's OK; but turn them into PDF before submitting them via `handin`.
- Keep your PDF files to under 1 MB each.
- A README.txt file listing any special instructions or comments. If you used a diagramming tool to draw your ER diagram, please state what tool it was.
- Summary: 5 things in all: 3 PDF files (ER diagram, translation to relational model, FDs and normal forms), a README.txt file (if necessary), and your cover page.

How to Use Handin

One group member should be the person doing all the electronic `handin` submissions. This will simplify things when the TAs have to check off the deliverables and associate them with the correct group. This person should be the same person who submitted the Project Proposal.

To submit your Cover Page and your PDF files, perform the following steps:

- On an undergraduate machine (e.g., using `ssh` on `remote.ugrad.cs.ubc.ca`), copy the file(s) that you want to hand in, to the directory `~/cs304/project_logical_design` (note that it will wind up in your home directory). You can create this directory using:
    - `mkdir ~/cs304/project_logical_design`
- Copy your file(s) into this directory.
- Then, from your home directory, run:
    - `handin cs304 project_logical_design`
- Take a screen shot of your successful submission, in case any problems exist.

Only one group member should submit the assignment. Group members: verify with your group that the submission has actually taken place!