Lab 3: Database design
Section 01

Due date: April 24, midnight.

This is a **team lab**. Each group submits one set of deliverables.

Lab Overview

This lab includes the following tasks:

- Revisit your Lab 2 design submission and enhance/update it to take instructor comments (once you receive them!), and unsatisfied customer requirements into account.
- Analyze the incoming datasets and determine functional dependencies between the attributes in each of them.
- Prepare the relational database schema for your design.

Assignment

Functional Dependencies in Customer Data

Each team is asked to review their E-R model based on the instructor's comments. To facilitate this process, and to let you better understand the intricacies of data provided to you, you are asked to complete one extra exercise.

Each team will analyze the four datasets[1] as described in the user documentation. **For each dataset, each team is asked to document all functional dependencies.**

[1] These will be the four input files provided to you.

The list of functional dependencies will help you redesign your E-R model, as it might point out to you where the entity sets and relationship sets are in the data.

The deliverable for this part of the lab is a soft copy document (it can be integrated with the rest of the Lab 3 deliverables) that enumerates all *non-trivial* functional dependencies in each of the four datasets. For any functional dependencies where the team feels an explanation is needed, feel free to add the appropriate comment/note/explanation - this will speed up and simplify grading.

Database Redesign

You should receive your initial design documents with instructor's comments on Wednesday, April 15 during the lab period.

Each team shall prepare a revised design document. The document shall contain a revised version of your Entity-Relationship model.

The redesign shall essentially follow the same structure as the initial design and shall contain the Entity-Relationship Diagram of the database, accompanied by the lists of entity sets (with all attributes) and relationship sets (with any attributes, multiplicity specification and full lists of participating entity sets). All weak entity sets shall be identified together with their identifying relationship sets and owners.

The revision shall be prepared as a single, text-processed file, and submitted to the course Github wiki, preferably in PDF format. All figures, tables and diagrams shall be included in the design document. The document **shall contain the team name and the names of all team members**. You can combine the contents of the revision with the new material you have to submit into a single document.

The design document must be typeset (handwritten submissions will not be accepted). The E-R diagram shall be designed using drawing software. (if you are using Windows, you can use MS Powerpoint; if you are using Linux, CS labs have xfig, which allows exporting designed diagrams into .eps (Encapsulated Postscript) format).

Change Log

To simplify grading, and to simplify tracking the changes in your design, each team shall compile a changelog document. This document shall include the following:

- List of specific changes in the design of the database.
- List of responses to any instructor's comments on your Lab 3 submission, which were not addressed by the redesign (e.g., you believe that your original design already does what was needed).

The changelog shall be maintained on the Github wiki as a standalone document.

Logical Database Design

Based on your E-R model design and redesign, each group shall prepare the initial logical database design.

The logical database design is the relational database schema obtained from your E-R diagram. Each group shall prepare the following:

- Database description, which consists of the following information:
  1. List of relational tables in the database.
  2. For each relational table, list of all attributes.
  3. Identification of primary keys for **all** tables.
  4. Identification of any foreign keys (this can be done on separate lines, in the form, `"Attributes X, Y, Z are a foreign key referencing table R"`.
  5. Specification of any constraints on the database that cannot be preserved in the database schema, but must be kept track of by the software (if such exist).
- SQL DDL commands creating the database.

Submission Instructions

Each group shall document their design activities fully on the Github wiki. Each deliverable for this lab, except for the Lab 2 hardcopy with comments, shall exist in soft copy as part of the team's wiki space. (you can either attach documents, or create wiki pages, or both; the specific decisions are left to you). Note, that you can submit all deliverables as a single PDF file to the wiki (as long as you maintain previous submissions intact).

The following deliverables shall be submitted on the due date:

1. **[Hardcopy]:** your **original** Lab 2 submission — **the one with all the comments**. I will be using my comments to your Lab 2 submission to judge your Lab 3 submission.
2. **[Wiki]:** the E-R model redesign document.
3. **[Wiki]:** the change log.
4. **[Wiki]:** the list of functional dependencies.
5. **[Wiki]:** logical database design document.
6. **[Wiki]:** electronic copy of the DDL commands. Name the file `DB-setup.sql`.

7. **[Wiki]:** electronic copy of the DDL commands deleting all the tables in the database. Name the file `DB-cleanup.sql`.

Submit the harcopy deliverable during the April 22 class. Submit your work on the wiki by the end of the day on April 24.

Note: I will be gone on April 24. Because of this, we will have a double lecture on April 22 (Wednesday) and a double lab on April 24 (Friday). I will inquire with the customer, whether he will be able to join you for April 24 lab.