School of Computer Science, McGill University

COMP-421B Database Systems, Winter 2016

Project 1: Data Modelling

Due date: February 11, 23:30 pm

In the programming project of this course, you will develop and build a database application for a real-world domain. Step by step, you will design a schema, create a database using DB2/PostgreSQL, populate your database with data, maintain, query and update your data, develop application programs, and implement a user-friendly interface. The interface can be very simple so no requirement for web-programming, etc. You will only use a standard programming language in the last project deliverable. The course itself will cover Java but you can use another programming language (with approval from the instructor and the TAs). Each team turns in one solution for each project deliverable.

As I posted on MyCourses (and hopefully do not forget to mention in class), if you fulfill the requirements below you will receive a total of 90 points (representing a solid A). You can get a 100 points on a deliverable if you do something that is beyond what is exactly required and described in the individual tasks or you do something that is of extremely high quality. The motivation behind this is to encourage some creativity! After all, this is a 400-level course – time to look beyond the required horizon...

For this first deliverable, you could get the extra 10 points, e.g., by providing an extremely well formulated requirement analysis, or a more sophisticated / larger E/R schema than required.

1 Assignment

In this first assignment you have to choose an application domain and design your database. Below are several possibilities. But you can choose any other application that can be typically found on the Internet. If you choose an application not listed below consult with me to see whether it is ok. You have to perform the requirement analysis for your application, design the entity-relationship schema (E/R) for the data described in the data analysis, and translate it into the relational model. Choose an application you are interested in; then you will have more motivation doing this project!

The application should be substantial but not too big. Consider a range of 8 to 12 entity sets, and a similar number of relationship sets. The model should include different kinds of relationships and different data types. Do not force features such as weak entity-sets or is-a relationships if they are not appropriate.

You have to turn in the following:

1. (35 Points) A requirement analysis of the application. This is a half-formal specification. It should list in a coherent way all data that needs to be stored in the database (data requirements), and the operations that need to be executed on the data (functional requirements). The E/R schema developed in the next step should not contain data that is not described here in the specification.
   If there are any unique or difficult aspects, point them out. Be precise about the real-life concepts that you want to model, their relationships etc. Also consider constraints, restrictions or special requirements that your application might have. An example of how such a description should look like can be found in the written assignment which will be handed out soon. We also discussed examples in class when we looked at Minerva or the airline example. Your description is expected to be very detailed.
2. (40 Points) An E/R schema/diagram including your data requirements. Be careful not to forget to underline key attributes, indicate the types of relationship sets etc. If there are any constraints within the application that you cannot depict in the E/R diagram, point them out.

3. (15 Points) Use the method for translating an E/R diagram to relations described in class and depict each resulting relation in the form `Relationname(attr1, attr2, attr3,...)` underlining the key attributes (e.g. `Students(sid, name, age, gpa)`). Indicate when attributes are foreign keys to other relations by writing something like "attr3 foreign key referencing relation X" beside the relation.
   Are there opportunities to combine relations without introducing redundancy? If so, indicate which, and if not, tell us there are none.
   Note: You do not yet need to give the SQL create statements or decide on the data types.
4. (0) Points. Indicate one or two web-sites that inspired your design.

2 Project Topics

Below are several, pretty widely defined topics that your application could be chosen from. Of course, you have to decide on a more specific domain/area/application/enterprise within the topic and do research on what are the specific characteristics of the application.

The data you want to store should be realistic in the sense that for the chosen application domain, this is really the information that is relevant and should be maintained.

- A store/company/enterprise/organization that *sells* something to customers. Choose a specific enterprise of your choice, e.g., a bookstore selling books to clients, maintaining its stock, etc. A music center selling concert tickets, an online music store, etc. There are no limits. There are two minimum conditions: (i) The process of a customer buying something (i.e., a purchase) must be reflected in the schema. (ii) A purchase should allow the inclusion of more than one product item (you can buy more than one book in one purchase). You may want to go through one of the online stores and see what information is all needed to perform such a purchase (but do not finally submit your reservation! I am not responsible for any purchases that you might make on these systems ;) Look also what is the other functionality provided by such an online store.
- A car rental company, a hotel, a driving school, a spa, a travel agency or any other type of enterprise that includes a *reservation system*. The process of making a reservation by a customer must be reflected in the schema. Try do be realistic. You may want to go through one of the systems online and see what information is all needed to perform such a reservation (but do not finally submit your reservation! I am not responsible for any reservations that you might make on these systems ;)
- A social networking site.

If the application you would like to develop does not fit in the three topics listed above, please talk to me to check whether it is ok.

I DO NOT ACCEPT

- A university database
- An airline company
- A general purpose enterprise consisting of employees, projects, products etc. Although your application might include any of these entity sets, you should choose a more specific enterprise (what kind of products, projects etc.)
- A database that resembles the example database project that is provided from a previous year.