

**CSC 545 – Theory of Database Systems**  
**Term Project**  
**(100 points)**  
**Due Date: Tuesday, March 30**

### Overview

In this project, you will work in groups to design and implement a database application. The goal is to apply the basic database design theory, use Oracle SQL to create and manipulate a database, and use JDBC to implement a database application.

This database application will help users find cooking ideas. It should at least include the following functionalities:

- Managing a collection of recipes. Each recipe should include major ingredients, instructions, and category (e.g., appetizers, soups, salads, desserts, breads, main dishes - beef, main dishes - pork, main dishes - seafood, ...).
- Keeping track of the current items in the fridge. Each food should include the name, group (diary, meat, grain/beans, fruit, vegetables, others) and major nutrition facts (calories, sugar, protein, sodium, fat).
- Managing the weekly meal plan, i.e., breakfast, lunch and dinner for every day of the week.
- Generating the shopping list according to the weekly menu and what are already in the fridge.
- Allowing users to search for recipes according to the specified food ingredient(s) and/or recipe category.

### **Part I (30 pts): Problem Definition and ER Diagram (Due on Sunday, April 11)**

Assume the course instructor is your client of this database application. If you have any questions about the application requirements, please interview with the client to find out the detailed requirements and then write the problem statement. You will need to clearly outline the functionality requirements. If you make any assumptions on the application requirements or any constraints, state them as necessary.

Draw an ER diagram to show your design of the database.

What to submit:

- PDF file for the problem statement and ER diagram.

### **Part II (25 pts): Relational Schema and Refinement (Due on Sunday, April 18)**

Convert the ER diagram to a relational schema. Identify the primary key for each relation.

Convert bad-designed relational schemas, if any, into BCNF or 3NF. Also justify that the final schemas you use are well designed based on the analysis on functional dependencies.

What to submit:

- PDF file for the relational schema, refinement and justification.

### **Part III (35 pts): Database and Application Programs (Due on Tuesday, April 27)**

Create a database using Oracle SQL and write a program in JAVA to allow users to access the

database. You do not need to provide a lot of data in the database. However, the database should be good enough to demonstrate that you can implement the database solution. Your program should also be user-friendly.

What to submit:

- Oracle SQL script file to declare database objects (e.g., tables) and constraints, and insert initial data.
- Java source code.
- Readme file to describe how to set everything up and how to run your program.

#### **Part IV (10 pts): Project Presentation (Due on Thursday, April 29)**

Present the project in class (8 minutes for presentation, 2 minutes for questions).

- Use PowerPoint slides to present your design of the database and the key technical techniques you have used, discuss related issues, and share lessons you have learnt if any.
- Demo the database application.

What to submit as a group:

- PowerPoint slides used for the presentation.

What to submit individually:

- Team member evaluation form.
- Project Presentation evaluation form.

#### **Other Requirements**

- Every team needs to submit only one copy of the required documents and programs onto Blackboard. Make sure to include the names of all team members.
- If you use any code that you did not write yourself (e.g., you found it on the web, read it in a book, etc.), you must cite where you got the code. Even if you found code and then modified it, you must say where it came from.