COMPSCI 557/557G Introduction to Database Systems
Spring 2025

Group Project

Goals

1. Be able to design and implement a database for a small-scale application.
2. Be able to create a GUI application and programmatically interact with a relational database management system.

Note

You have to work in a group on this project. Your group can be found on Canvas.

Submissions

There are several deliverables for the project. Each deliverable has its own Canvas Assignment posted under “Group Project” module.

1. Project Proposal: A brief description of the application you are building for the project. The project proposal must include a description of the database you intend to design, implement, and interact via the GUI application. You should include information about the RDBMS you will be using, kind of GUI application (desktop or web-based), the application language, etc. Also, submit a project timeline identifying tasks and components, planned completion dates, dependencies on and for other tasks/components, and who is responsible for this task/component. (you are encouraged to use a project management tool like Taiga/Jira to create the timeline and track progress). This will help you complete the project smoothly, within deadline, and with high quality. This will also form the basis of your intermediate report and one section in the final report. The timeline is a working document and will need to be updated frequently. You must also include which team members have contributed to the project proposal and which team members have not. I would like to know if a team is effectively communicating before it is too late. Optionally, you may include anything else that you have, such as links to references, draft ER diagram(s), skeletal working code, initial brief description of the GUI functionalities, etc. I will be grading the proposal very graciously. I just

want to ensure you have an idea prepared and all team members are working together. *One submission per team*.

2. Intermediate Project Status Report: Each team will submit an up-to-date project timeline document showing tasks/components completed, delayed, planned to be on time, and in risk of being delayed. (You may want to use color-coding to show task status). Also, write one paragraph commenting on how the project is going, if there are any issues, how are you planning to resolve those issues, etc. Indicate if all members of the team are contributing equally. You may want to include a table showing the number of hours each member worked on the project so far. *One submission per team*.
3. Final Project Team Report: Each team will submit several documents as part of the final report. Properly title the documents, write the team's name and the names of all the members at the top. *One submission per team*.

   The documents to upload on Canvas are:

   a. Project Report: This is the description of the system you designed and implemented. This will contain the languages, framework, RDBMS, etc. used to implement the system, functionalities provided by the GUI application, screenshots of different functionalities in action, output of query execution etc.
   b. ER Diagrams: Submit images (GIF, PNG, JPG) of your ER Diagrams corresponding to the database design. Name format for the ERD files: *ERD_Group_X.[jpg | png | gif]*
   c. Database Creation Script: Submit a single SQL file containing the SQL commands you used to create your database. Include any other SQL scripts you used to prepopulate the database if necessary. Name format for the SQL script: *Database_Script_Group_X.sql*
   d. Source Code: Compress the entire folder structure of your source code for the application in a zip file and upload. Name format for the source code: Source*_Code_Group_X.zip.*

If it's too heavy to upload, you may share the remote repository link such as Github.

e. Presentation Slides: Submit the Microsoft PowerPoint (or equivalent) slides that you will be using during your project presentation. Name format for the slide-deck: *Presentation_Slides_Group_X.pptx.*

f. Team Report: A document stating how the team completed the work for the assignment (team dynamics). This should include a high-level description of what work each team member did (who did what). Your final version of the timeline document may be used for this. Team report should also include an estimated amount of time each team member spent working on their tasks. Explicitly state the time each team member worked on the project for each task they have worked on. You may use a table for this. Any issues of concern can be addressed in the team report (what were the struggling points with the assignment). Include the team meeting times. Name format for the team report file: *Team_Report_Group_X.pdf*.

4. Individual Project Report: Each student will submit an individual report in the separate assignment on canvas. The individual report will include more specific details on what you have worked on. This differs from the team report, which will include only higher-level task information, where lower-level details can be discussed in this report. If the high-level details are sufficient, they can be restated. In addition to a more detailed description, any discrepancies in the team report can be included as well as any issues that you feel are important but did not feel comfortable including in the team report. You will rate yourself and your other team members on a scale of 1 (poor contribution) to 5 (high contribution). You have to add a justification to your rating if you give someone less than 3. The individual report should not be longer than a length of one page, however there is no strict page limit. Name format for the individual report file: *Individual_Report_<your_first_name>_<your_last_name>_Group_X.pdf*.

Project Task

Create an application of your choosing, which accesses and operates on MySQL database. The application should have a fully functional (not necessarily pretty) user interface, to interact with the database. The design of your database should follow all conventions and good practices taught in this course. I would like you to have a strong project, which you could potentially showcase in your resume at the end of this course.

1. **Database**

   Design and implement a database for your application.

   a. Relational Database Management Systems
      - MySQL

   b. The database must consist of at least 12 tables, and should include the following
      - Primary keys
      - Foreign keys
      - Unique keys
      - Other constraints (e.g., not null, check, multi-attribute unique, etc.)
      - Views
      - Triggers
      - Indices
      - Procedures and/or functions
      - Cursors

   c. Whenever feasible, do not allow invalid data to be stored in your database.

2. **ER Diagrams**

   You have to submit three ER diagrams to demonstrate that you followed the database design process. The diagram should have:

   - All columns/attributes with their data types, and constraints (if any) are shown
   - Primary keys are indicated
   - Foreign key relationships point to the specific attributes (not just the tables)
   - All unique constraints are labeled (single and multiple)

3. **Application**
   Create an application with a graphical user interface to interact with the database.

   a. The application should support password-based user authentication, and support at-least two types of users:
      - Administrator: Will have authorization to perform tasks that includes any schema and data manipulations and have access to all data in the database.
      - End-user: Will have limited authorization to perform tasks that includes query to view only the data pertaining to the user and modify user-specific (e.g., personal information, etc.) data only.
   b. The application should operate on the database in the following ways
      - Insert data
      - Select data
      - Update data
      - Delete data
   c. The application should validate all input values before using those in any SQL statement.
   d. The application should be error-free. The user interface does not need to be fancy and just needs to be functional.
   e. There are no size requirements (such as lines of code) for the application.
   f. The application can be a standard desktop application or a browser-based web application.
   g. The application should be free of SQL injection vulnerability.
   h. Programming languages permitted
      - Java (use JDBC)
      - C#
      - C++
      - Ruby
      - Python
      - PHP and other web development languages
      - Other (consult with me for other languages)

4. **Project Presentation**

Each team will prepare a 10-minute presentation to present during the project presentation period. The project presentation should consist of slides (PowerPoint or Google) and a demonstration of the application. The presentation slides should contain the following:

- Team name and Team members
- Programming language and database choice
- Description of application
- Key functionalities
- ER-Diagram of the database
- Live demo

The slide presentation will be followed by your live demonstration of the application. Slide presentation part should not be more than 6-minute long, demo around 3-4 mins. There will be a 2-minute Q/A session after each presentation.

Grading

Criteria	**Possible Points**
Project Proposal	10
Intermediate Project Status Report	10
Final Project Team Report	50
Project Presentation & Live Demo	10+15
Individual Report	5
Total	**100**