

CS281 - Spring 2023-2024

PROJECT DESCRIPTION

1. *Introductory Information*

In this project you will be asked to develop a simple database application using Python and SQLite. SQLite is library that implements a self-contained and full-featured SQL database engine. First of all, to build your application, you should design the schema structure of the database. The best way to do this is to prepare an Entity/Relationship diagram and then to translate it into actual tables in SQLite. For this purpose, you will use SQLiteStudio, which is a cross-platform GUI application for managing SQLite databases. Later, you should populate your tables for test purposes. The second step will be to design possible queries on your tables and write them in SQL using SQLite with Python programming language. The third step will be to learn how to design a graphical user interface (GUI) in Python, utilizing PySimpleGUI, and finally to connect your tables and queries together in a menu system using these GUIs. For example, you should have screens that allow the user to manipulate (insert, update and delete tuples) the data in your tables as well as other screens that let the user to execute some meaningful queries.

2. *Schedule*

You will adhere to the following schedule (all submissions will be through Moodle and until 23:55 unless otherwise specified; for all group submissions, it is sufficient for one member to upload the related document).

- **7 February, Wednesday:** Project topics will be announced
- **12 February, Monday:** Form your group and submit the group form. If you are unable to find a group within the given time, you will be assigned to a random group. However, for your own benefit, it is highly recommended that you form the group yourself.
- **16 February, Friday:** Finalized project groups and projects topics (as assigned by the TAs) will be announced.

A. Design Stages

- **28 February, Wednesday:** E/R diagram drawn with Draw.io will submitted (Will be graded)
- **11 March, Monday:** E/R Revisions and feedback are given by TAs.
- **15 March, Friday:** Functional requirements document will be posted. This document includes three use case scenarios for each project topic. We expect all the functionality to be complete for the final demo.
- **22 March, Friday:** Revised E/Rs, relations (table schemas, keys, etc.), table normalizations are **submitted** (Will be graded).
- **1 April, Monday:** Feedback given by TAs. **Start** implementation in SQLite.

B. Implementation Stages

- **17 April, Wednesday:** Tables, relations, referential integrities in SQLite are created and tables are populated. You will use SQLiteStudio for this task. SQLite database file will be submitted. (Will be graded.)
- **2-3 May (exact dates will be arranged for each group):** For **one** of the scenarios in the functional requirements document, provide user interface and corresponding SQL queries that would be executed to perform the required tasks.

In particular, **you provide the screen** to show how the user interacts with the system in the typical scenarios and **the underlying queries** that would be called to achieve the tasks in these scenarios. Notice that, SQL queries should include data retrieval (SELECT) queries and data modification (add/delete/update) queries on one or more tables or views. You will need to write Python code to execute multiple SQL queries simultaneously or successively to achieve the required functionality. Finally, you should implement screens that achieve add/delete/update operations on all major tables in your database.

All members that continue the project should attend this meeting; members who do not attend the demo will not get any points from this phase. For this stage, demonstrate your work at the meeting and answer your TA's questions. (Will be graded.)

- **Final Demo (13– 17 May; exact dates will be arranged for each group):** Final demonstrations. You will implement all **three** scenarios in the functional requirements document, and showcase the usage during a meeting with the TA. All members that continue the project should attend this meeting; members who do not attend the demo will not get any points from this phase. You should be ready for questions about your implementation. After the demo, you will submit your code. All GUI constructs and the functionality should be included in **one** Python (py) or Python Notebook (ipynb) file, note that you also need your SQLite database file. (Will be graded).

Scheduled labs will include tutorials focusing each stage of the project. Additional online meetings may be arranged for the implementation stages for each group if necessary.

3. Rules

- You will work on this project in groups. The teams can consist of 5-6 students.
- You will be asked to demonstrate your work when the project is underway. The first one will be in the form of a short demo (Implementation Stage 2). The second one is going to be the final demo. The demonstration dates are strictly determined in advance, with no tolerance for rescheduling. Since you are working as a team, each of the team members **must** participate in the implementation. For the demonstration, all of the members must be present and be ready to answer questions in a reasonable manner. The grades of those who fail to do so, or do not come at all will be severely reduced.
- Do not forget that the aim of the project is to simulate a real-life problem in a smaller domain. This means that all the names etc. must be meaningful and the application must satisfy the requirements of the selected topic as good as possible. You are free and in fact required to add anything in the implementation, which you think is necessary and/or helpful. Do not forget that not all of the possible entities, relationships or attributes are explicitly given in the problem sets. So be careful while you are designing your E/R diagrams. You can make any reasonable assumptions and deductions from the given problem definitions without restricting them further (for example you can not delete a given relationship but you may add one if you have sensible justification).
- There will be a peer review process (optional) at the end of the semester, where students can evaluate their team members. Peer reviews will be kept confidential and affect your project grade.

4. Grading

- The project will be 20% of the overall grade for this course.
- Members of each group will be evaluated **independently** by the lab assistant.
- The stages of the project (i.e., design and implementation) and the final demo have their own grade percentages. Exact points for each project stage will be announced.