**Advanced Database Management Systems - Project 2**

Due date: 11:59 pm Friday Jul 28, 2023.

**General information**

This is a take home project to help you having more time understanding the questions and preparing the answers.

You can use all available resourses: notes, AI apps, Google search... But you need to do all the work on your own. You cannot discuss or share your work with your friends or classmates.

The instructor and TA will not provide any clarification or suggestions. You should work with the best of your knowledge and understanding.

You need to submit 1) a report documenting your process and designs; 2) the code written for the project and all binary database files, 3) a screen recording showing how you test your database and software application.

**Task**

You need to develop an information system for a library management. This system has the following main use cases: 1) a user can search for a book; 2) a user can borrow or return a copy of a book; 3) a user assigned as a library manager can add, update, or delete information for books and loan records.

A book has id, title, description, price, author, publisher. A library can have several copies of the same book. Each copy has a different id.

A user has id, username, password, full name, address, phone number, email. She can also have a field specifying if she is a library manager.

A user can login into the user system (assuming that she has already registered). If the user is a library manager, she will have a main screen to manage book and loan information. If the user is a normal user, her screen allows her to borrow or return books. This user system is developed as a desktop-based GUI application.

A user can search for books using a web-based system. In the web browser, she can specify in the URL to search on book title, author, or publisher. The web page displays search results ranked by relevance based on text similarity. You should use a vector database for words for calculating text similarity.

A user can borrow a copy of a book. The loan record has at least the borrow date and the due date. When the user returns the book, the loan record is added with the actual return date.

A library manager can add a new book to the database or update its field (e.g., title, price). She can also add or remove a copy of a book.

A library manager can also view the loan records. She can extend the due date for a loan record.

1 (10 pt). You need to design a document-based database for this system. You should use MongoDB Atlas as a free cloud-based DBMS. Then, you fill your database with at least 10 user, 2 library managers, and 30 books. Each book has randomly 2-5 copies.

2 (20 pt). Develop a GUI-based software application to demostrate this online shopping system.

The user (or library manager) can:

a (2 pt) Login to the system with his/her username and password;

b (3 pt) Borrow a book copy;

c (3 pt) Return a book copy;

d (3 pt) Add a new book.

e (3 pt) Update information of a book.

f (2 pt) Add or remove a copy for a book.

g (2 pt) View all borrowing records.

h (2 pt) Extend the due date for a borrowing record.

3. Develop a web-based software application for book search:

a (5 pt) Allow users to search based on book title, author, or publisher.

b (3 pt) Calculate the relevance of search results based on how many times each book is borrowed.

c (3 pt) Calculate the relevance of search results using text similarity provided by a vector database and word vectors.