Criterion B: Design

Section 1: Planning Phase

1.1 Interview Plan

Since I am the client who wants to solve the problem, I need to accurately understand my own requirements in order to design appropriate solutions based on them. Therefore, on October 9, 2023, I conducted my first interview with myself. This interview including the problems I am currently facing, how I hope to solve these problems, and the features I expect the software to have. The specific details of the interview presented as follows:

Q1: How are you currently managing your home library?

Q2: How many books do you estimate are in your collection, and how is it expected to grow?

Q3: What specific information about each book would you like the system to store?

Q4: How long would you expect to receive the final version of the software/program?

Q5: What are some addtional requirements that you would like to add for this software?

(Interview Response See Appendix)

Section 2: Designing Phase

2.1 Interface Design
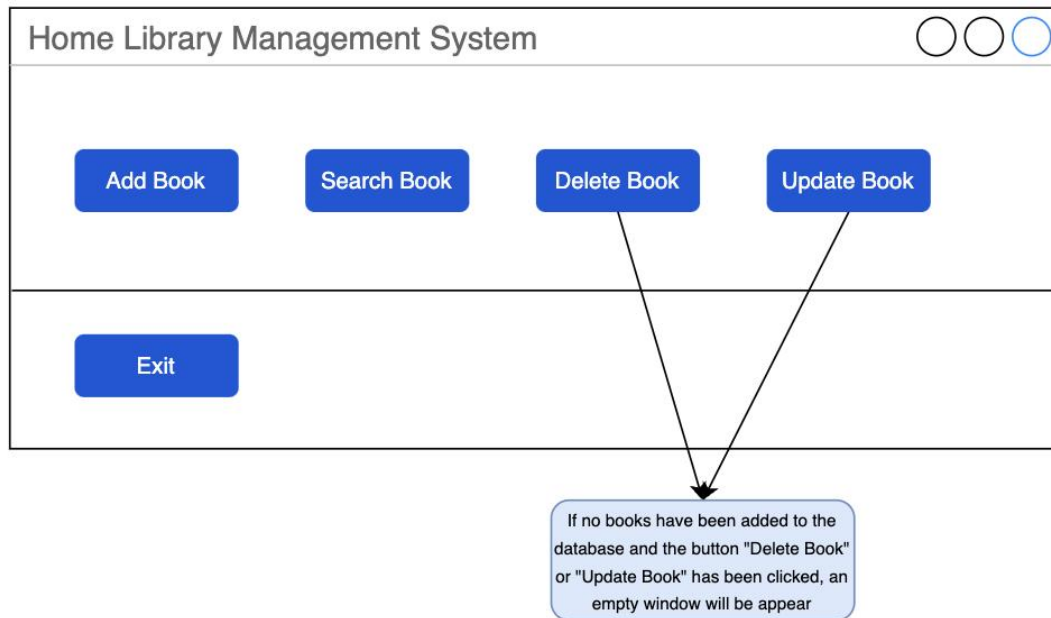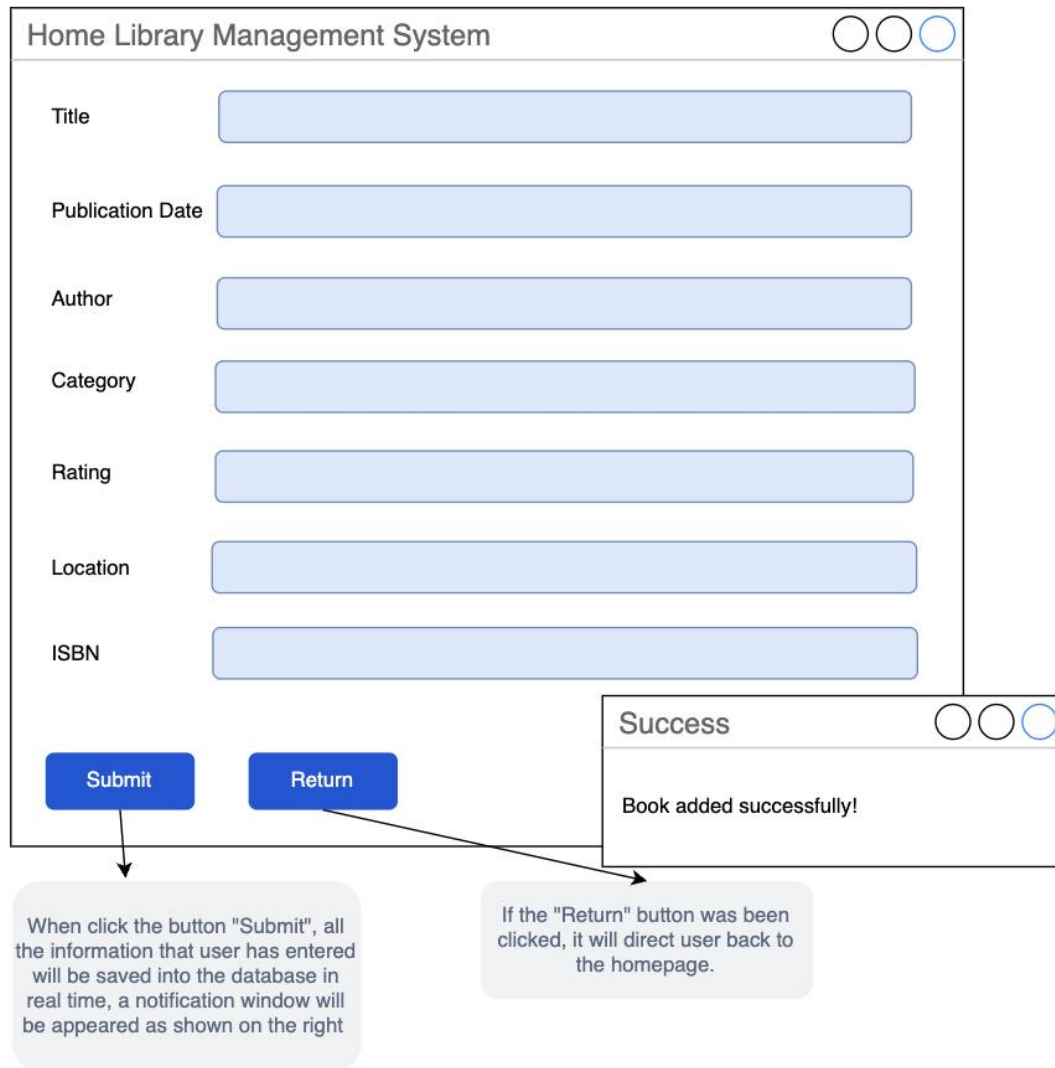
Figure 1(a): Opening Window Design

Figure 1(a) illustrate the homepage of this software program, which is the primary page when user accessing the software. As shown in the mock up, there are 5 buttons on the page, where each button correspond with a different algorithm.

Figure 1(b): Add Book Window Design

Home Library Management System

Title	
Publication Date	
Author	
Category	
Rating	
Location	
ISBN	

[Submit] [Return]

Success

Book added successfully!

When click the button "Submit", all the information that user has entered will be saved into the database in real time, a notification window will be appeared as shown on the right

If the "Return" button was been clicked, it will direct user back to the homepage.
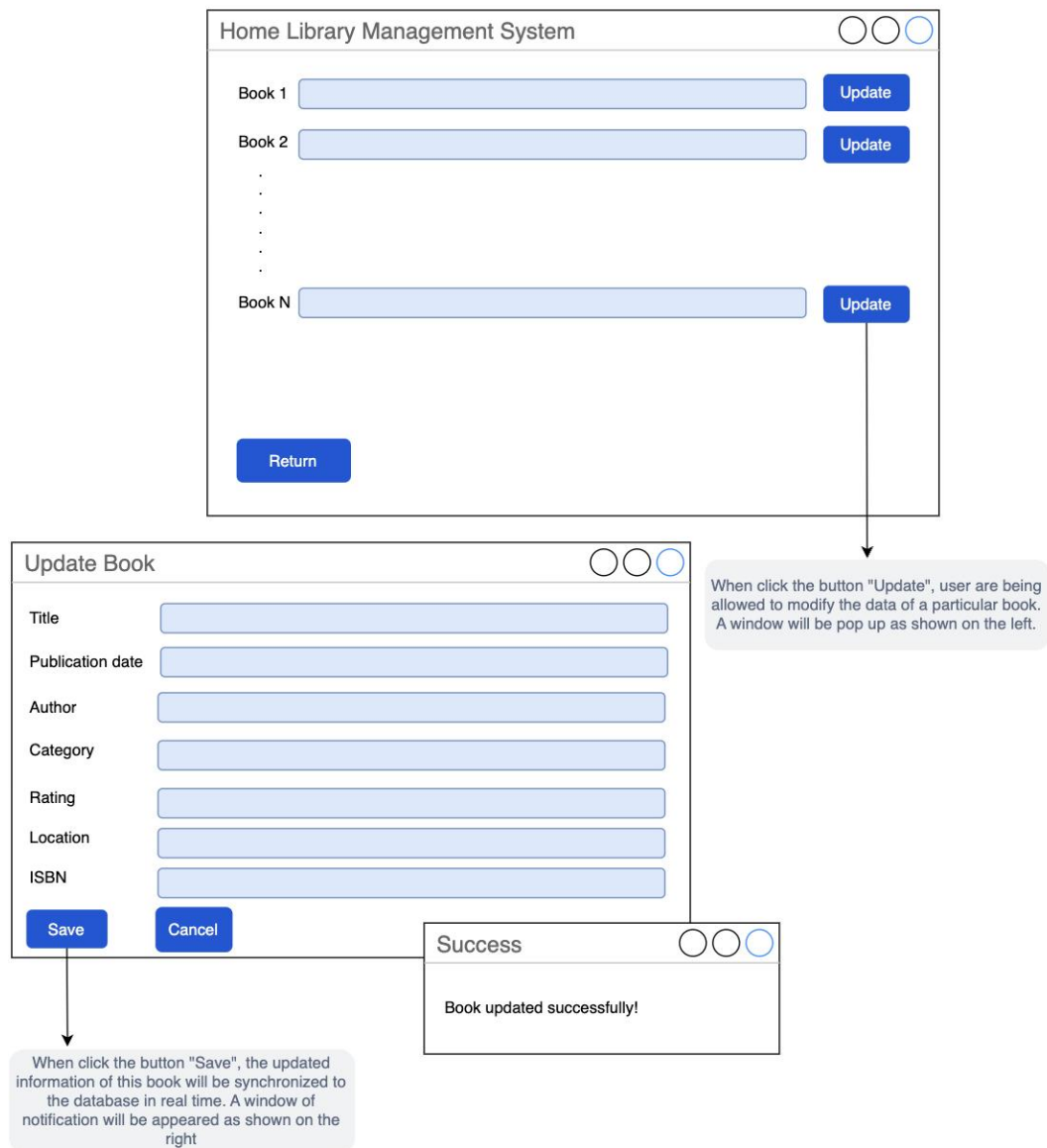
After the user clicks "Add Book" on the home page, they will be directed to the page as shown in Figure 1(b), which allows the user to enter the information of the book and add it to the database after clicking the "Submit" button.
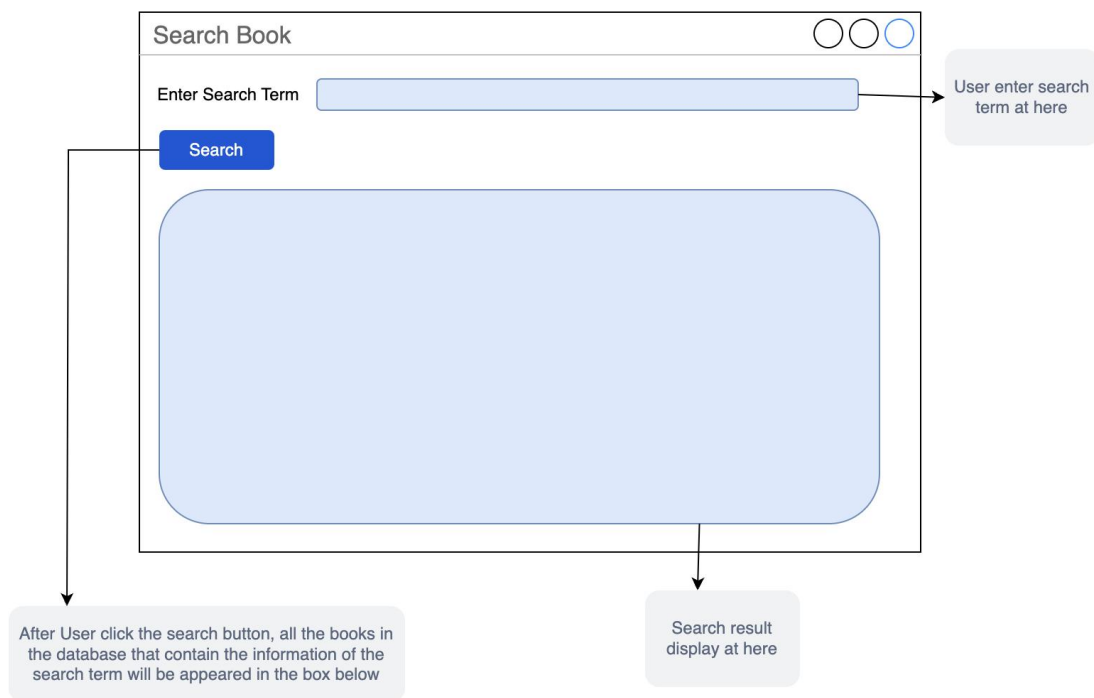
Figure 1(c): Delete Book Window Design
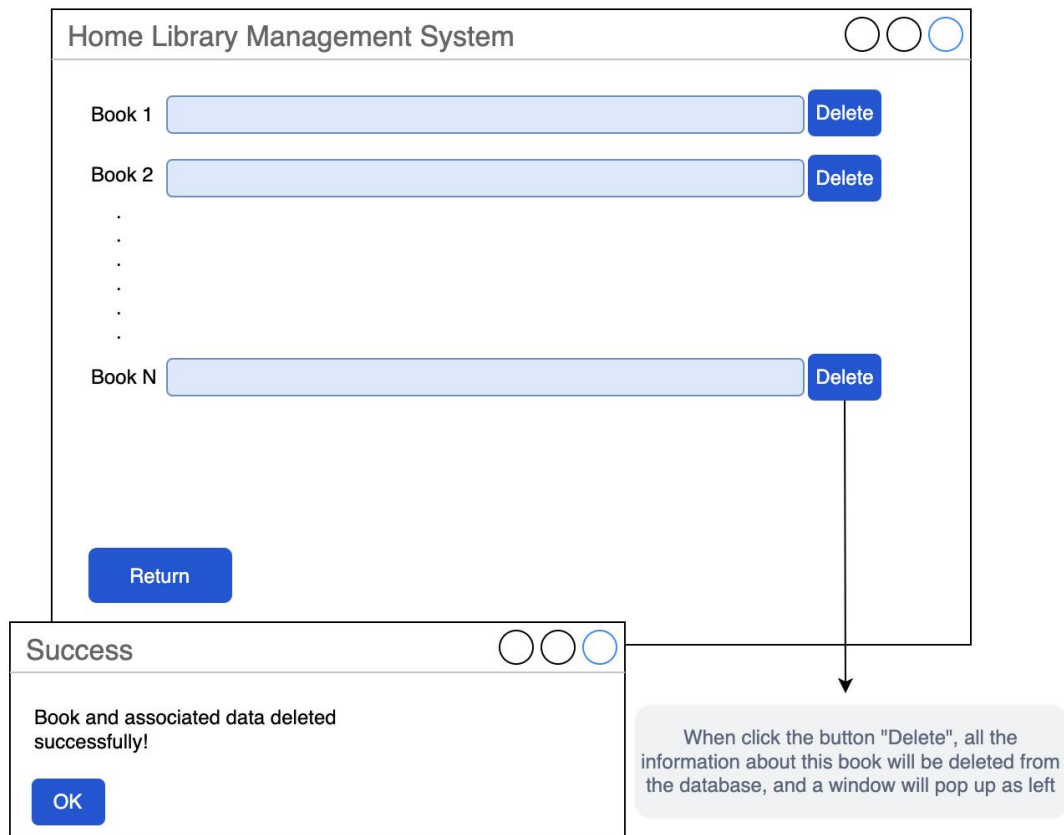
After the user clicks "Delete Book" on the home page, they will be directed to the page as shown in Figure 1(c), which allows the user to delete books that were previously stored in the database. After clicking the delete button, a small window will pop up as a notification that says, "Book and associated data deleted successfully!"

Figure 1(d): Update Book Window Design

After the user clicks "Update Book" on the home page, they will be directed to the page as shown in Figure 1(d), which allows the user to update the information of the books that were previously stored in the database. After clicking the "save" button, a swindow will pop up as a notification that says, "Book updated successfully!"

Figure 1(e): Search Book Window Design

After the user clicks "Search Book" on the home page, they will be directed to the page as shown in Figure 1(e), which allows the user to search for books that were previously stored in the database. After clicking the "search" button, all the books containing the information of the search term will appear in the box below.

2.2 Database Design

Figure 2: Entity Relationship Diagram for the Database
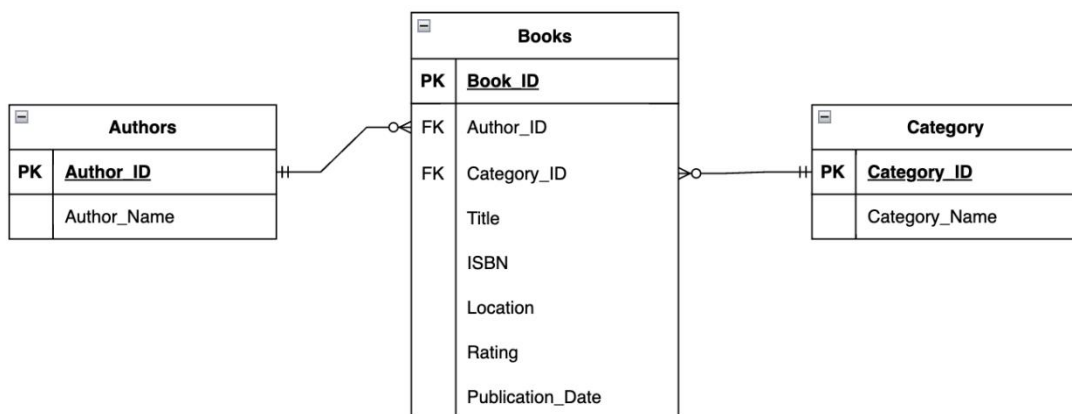
2.3 Algorithm Design

Pseudocode Representing the Algorithm of Home Library Management System

procedure HLMS_Algorithm()
Initialize database
Open Main Window with options [Add Book, Search Book, Delete Book, Update Book, Exit]

Loop until user exits:
If user selects Add Book:
Open Add Book window
On Submit, add book information to database
Close Add Book window

If user selects Delete Book:
Open Delete Book window listing all books
Loop until a book is selected or window is closed:
If a book is selected for deletion:
Delete the book from database
Refresh the book list
Close Delete Book window

If user selects Update Book:
Open Update Book window listing all books
Loop until a book is selected or window is closed:
If a book is selected for update:
Fetch current book details
Open a window to edit and save book details
Update book details in database
Close Update Book window

If user selects Search Book:
Open Search Book window
Loop until search is performed or window is closed:
If search is initiated:
Display search results
Close Search Book window

If user selects Exit:
Close application
end procedure

Section 3: Developmenting Phase --- Schdule for developing the product

Program will be divided in to three python files --- database.py, layout.py and main.py, each file are responsible for distinct parts of the application's functionality within the Home Library Management System.

3.1 main.py (2 weeks)

・Initializes the application and sets up/connect with the database

・Enters a loop to listen for user events like button clicks and input data.

・Opens secondary windows for adding, updating, deleting, or searching for books, using layouts defined in layouts.py.

・Calls functions from database.py to interact with the SQLite database(add, delete and update)

・Manages the opening and closing of various windows to ensure a smooth user experience.

3.2 database.py (8 weeks)

・Sets up the database and creates the necessary tables

・Designing specific functions for each database action adding, updating, deleting, and searching books

・Manages database connections and ensures that changes are committed or rolled back as appropriate.

・Handles errors and uses PySimpleGUI pop-ups to inform the user about the success or failure of database operations.

・Database Normalization (in 3rd Normal Form)

3.3 layouts.py (4 weeks)

・Defines functions to create layouts for the main window, add, delete, update and search book window.

・Structures the GUI elements including text boxes, buttons, and lists, determining where they appear on each window.

・Handles the dynamic parts of the interface, like populating lists of books and updating these lists when books are added, removed, or updated.

・Managing the size, style, and color of the character as well as the color of the background for users' interface.

Section 4: Testing Phase

	Comment
Function 1: Add Books When the client clicks the "Add Book" button on the homepage, they then enter the information for the book, including the Title, Publication Date, Rating, Location, Author, Category, and ISBN.	All the input text boxes will be clearly labeled for the user; however, if the same book is already found in the database, then it will report, "An error occurred: Duplicate ISBN entry."
Example 1 (Book successfully added): Title: Harry Potter Author: J.K. Rowling Category: Novel Publication Date: 26 June 1997 Rating: 4.9 Location: 3rd layer 8th position ISBN: 101100	A database file (library.db) containing all inputted data is stored on the computer, and the information about the books is automatically arranged into different entities (tables).
Example 2 (Same book added twice): Repeat the information entry as stated in Example 1.	Output: "An error occured: Duplicate ISBN entry"
Function 2: Delete Books When the client clicks the "Delete Book" button on the homepage, a window displaying all books that were previously stored in the database, along with their titles, will appear.	The corresponding book in the database will be deleted in real time. A window with output "Book and associated data deleted successfully!". And if the user clicks the "Delete Book" button again, the book that was just deleted will disappear from the list.
Example: Click "Delete" Button for the book "Harry Potter"	Output: "Book and associated data deleted successfully!" The information of the book "Harry Potter"in the database file (library.db) will be removed
Function 3: Update Books When the client clicks the "Update Book" button on the homepage, a window displaying all books that were previously stored in the database, allowing user to choose the one that they want to update.(Except ISBN since it act as primary key that uniquely identify the "Books" entity) After enter the information, click "Save" button to save the maded update.	Output "Book updated successfully!" Then, the corresponding information for that book will be updated in the database in real time.
Example: Title: Harry Potter 2	Output "Book updated successfully!" The new information of the book "Harry Potter 2"in the

Author: J.K. Rowling Category: Novel Publication Date: 2 July 1998 Rating: 4.8 Location: 1st layer position 4th ISBN: 101100	database file (library.db) will be updated
Function 4: Search Books When the client clicks the "Search Book" button on the homepage, a window will be displayed, allowing the user to input the key terms they wish to search for. After entering the data and clicking the "Search" button, all books containing the information specified in the key terms will be displayed.	All the books within the database that contain the information specified in the key terms will be displayed in the box below.
Example: Enter "Harry Potter"	After author click the button search, all the books that contain "Harry Potter" will be displayed in the box below.