

Software Requirements Specification

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1. Abstract

The Library Management System (LMS) is designed to facilitate easy and efficient management of library operations, including book borrowing and returning, with user registration and login functionalities. The system allows users to view the available books, borrow them based on availability, and return borrowed books. Users can register, log in, and perform actions like browsing and managing books within the library. The system employs modern design principles such as error handling, logging, and dependency injection to ensure reliability and scalability. Additionally, the LMS supports role-based access control, allowing administrators to manage books and users to borrow and return them.

2. Modules

2.1 Home Page

The application starts with the Homepage where users have options to login, register, or exit. The Homepage consists of a welcome message welcoming the user to the application.

2.2 User Login

From the homepage, users can log in to the application to access the LMS. They must enter their username and password for authentication. The entered values must go through a validation phase to confirm if the user is registered.

2.3 User Registration

For non-existing users, they can register in the application by just entering their username, password, and role (User or Admin).

2.4 Book Catalogue

Displays available books along with their title, author, available copies details. Handles the logic for borrowing and returning books, including updating book quantities. Admins can add, remove, and increase book copies.

3. Functional Requirements

3.1 User Registration and Login

User must be able to register by providing a username and password also must be able to log in using their registered credentials.

3.2 Book Selection and Borrowing

Users can borrow available books by selecting the book id, only if the book is of sufficient quantity.

3.3 Book Return

Users must be able to return books they have borrowed and update the book quantity accordingly.

3.4 Book Management (Admin)

- Admins can add new books to the catalogue.
- Admins can remove books from the catalogue.
- Admins can increase the number of copies of existing books.

3.5 Error Handling

System should handle common errors such as unavailable books, invalid user credentials and incorrect data inputs.

4. Non - Functional Requirements

4.1 Performance

The system should perform all the tasks like borrowing and returning books efficiently. Realtime update on borrowed details for users.

4.2 Reusable code

The system emphasizes code re-usability to streamline development, maintenance and scalability. By employing a modular design, reusable components such as authentication, book management, and logging are encapsulated into distinct classes and services.

4.3 User friendly

It is designed to be user-friendly, offering an intuitive interface for seamless navigation and easy access to core features like book borrowing, returning, and catalog browsing. Clear prompts, concise error messages, and a smooth login/sign-up process ensure an enjoyable and efficient user experience.

5. High-Level Design

The system is designed to provide users with seamless access to its core functionalities. The homepage acts as a central hub, welcoming users with a brief introduction and offering a navigation menu for easy access to options like viewing available books, borrowing, and returning books. To use these features, users can either sign up by creating an account or log in with existing credentials. The sign-up process ensures data validation, while the login system allows secure access. Once authenticated, users can borrow books from the catalog or return previously borrowed ones effortlessly. Admins have additional capabilities to manage the book catalog.

5.1 Home page

```
#####  
Welcome to the LMS, Choose an option :  
#####  
1. Register User  
2. Login User  
3. Exit
```

5.2 User Authentication

```
-----  
Enter username to login:  
aashin  
Enter password:  
*****  
info: LibraryManagementSystem.Services.LoggerService[0]  
Login successful!
```

5.3 Book Borrow and Return

```
Welcome-----aashin----to the Library Management System
```

```
Please choose an option:  
1. View Available Books  
2. Borrow a Book  
3. Return a Book  
5. Exit
```

```
Please choose an option:  
1. View Available Books  
2. Borrow a Book  
3. Return a Book  
5. Exit  
2  
Enter the ID of the book you want to borrow: 6  
info: LibraryManagementSystem.Services.LoggerService[0]  
aashin successfully borrowed 'To Kill a Mockingbird'.
```

```
Please choose an option:  
1. View Available Books  
2. Borrow a Book  
3. Return a Book  
5. Exit  
3  
Enter the ID of the book you want to return: 6  
info: LibraryManagementSystem.Services.LoggerService[0]  
aashin successfully returned 'To Kill a Mockingbird'.
```

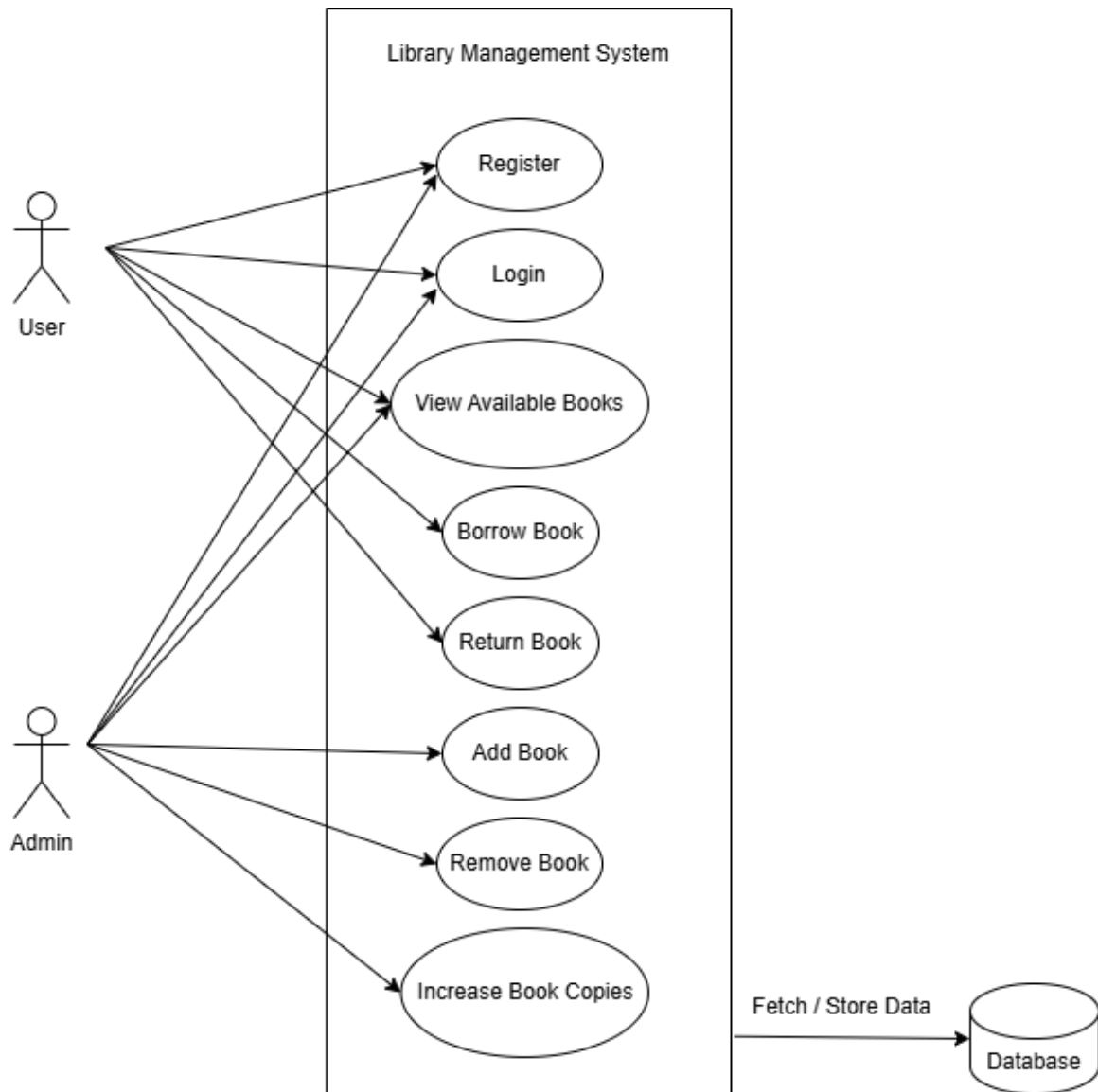
5.4 Book Management (Admin)

```
-----  
Enter username to login:  
admin  
Enter password:  
*****  
info: LibraryManagementSystem.Services.LoggerService[0]  
      Login successful!  
  
Welcome-----admin----to the Library Management System  
  
Please choose an option:  
1. View Available Books  
2. Add a New Book  
3. Remove a Book  
4. Increase Book Copies  
5. Exit
```

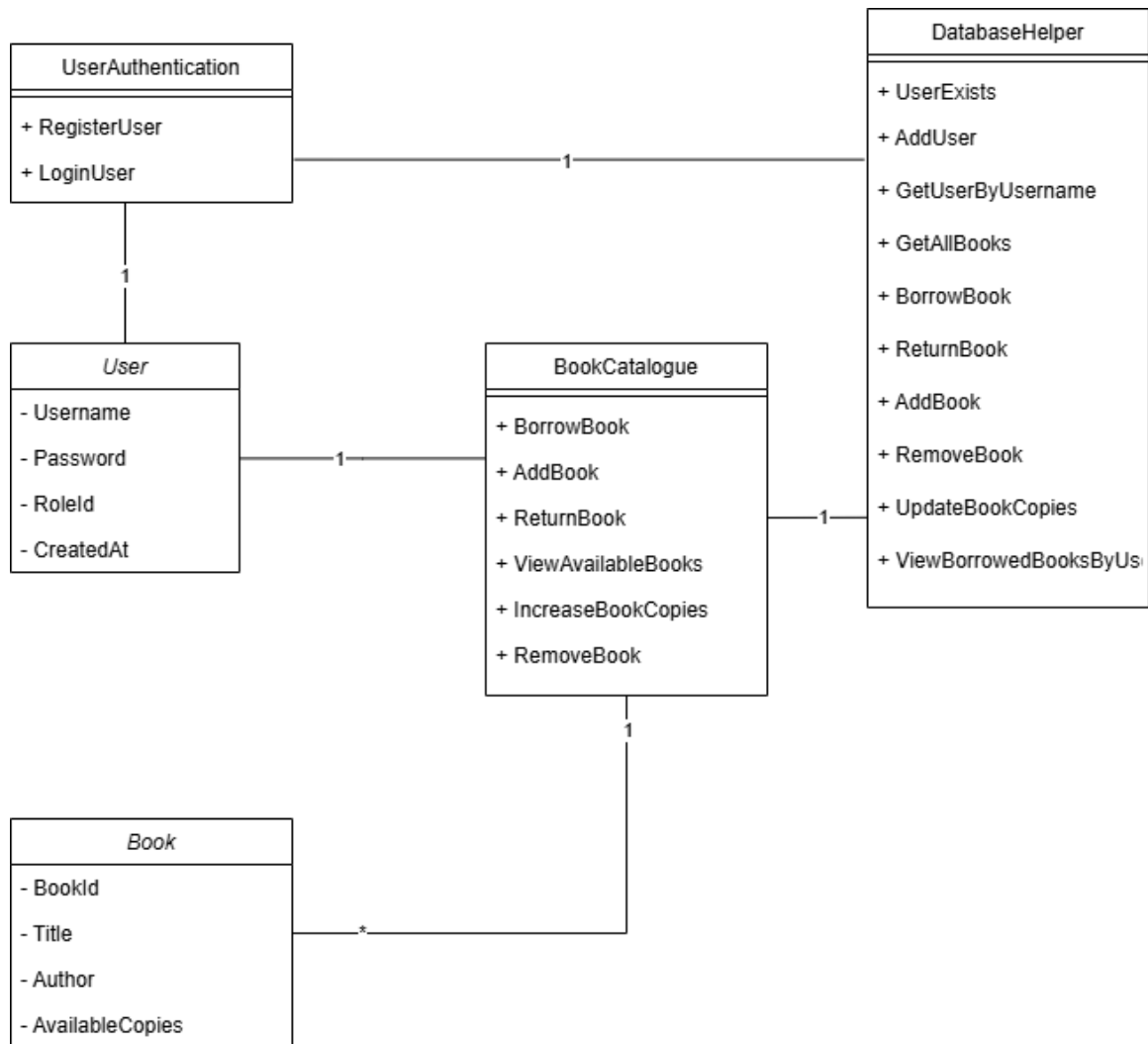
6. Low-Level Design

- User can browse available books, which will display details such as the book's title, author and number of copies available.
- The user authentication process ensures a secure sign-up and login experience by validating usernames and passwords.
- Users can borrow books by specifying the book id, following the same procedure when returning them.
- Admins can add new books, remove books, and increase the number of copies for existing books.

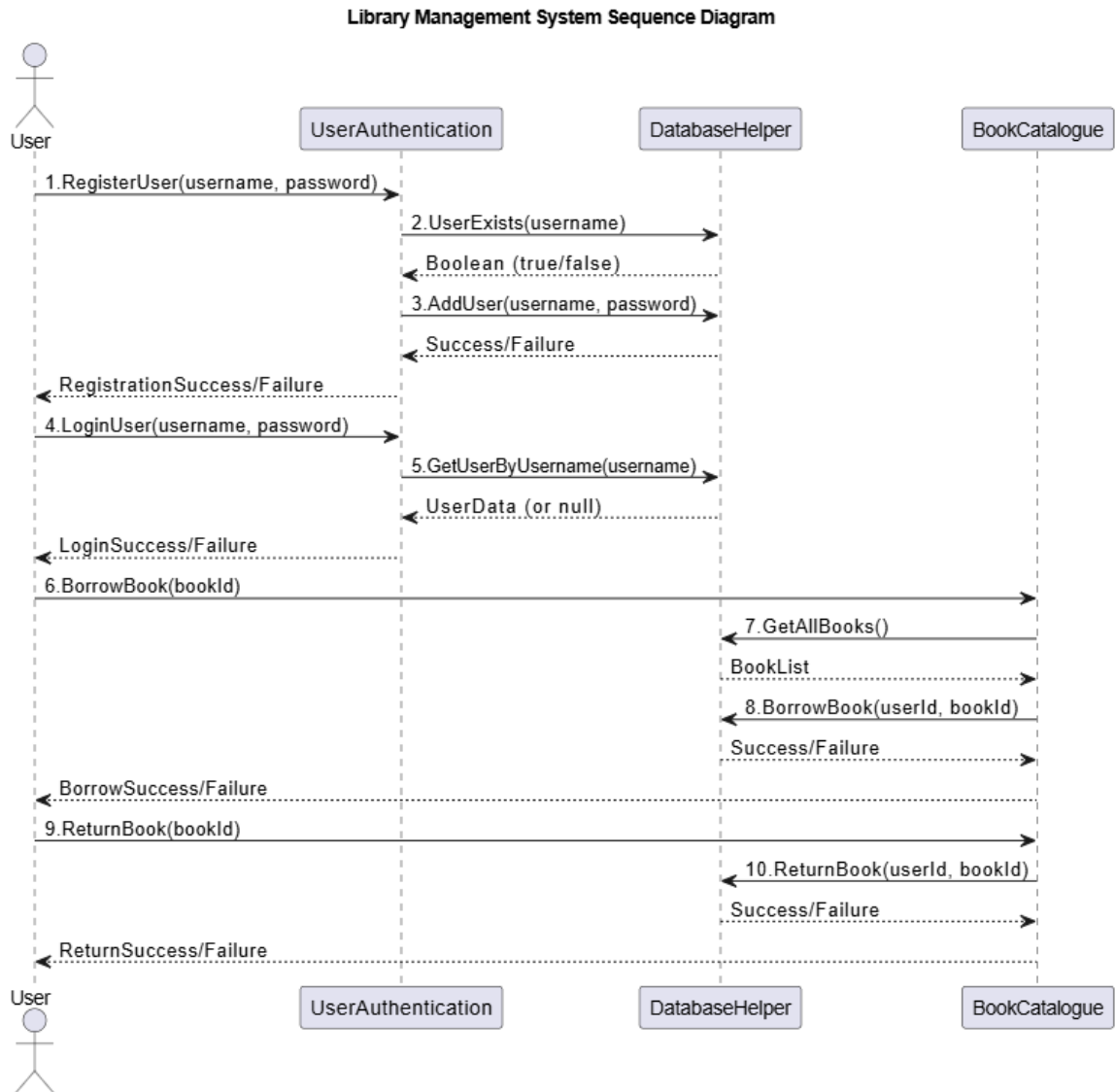
7. Use Case Diagram

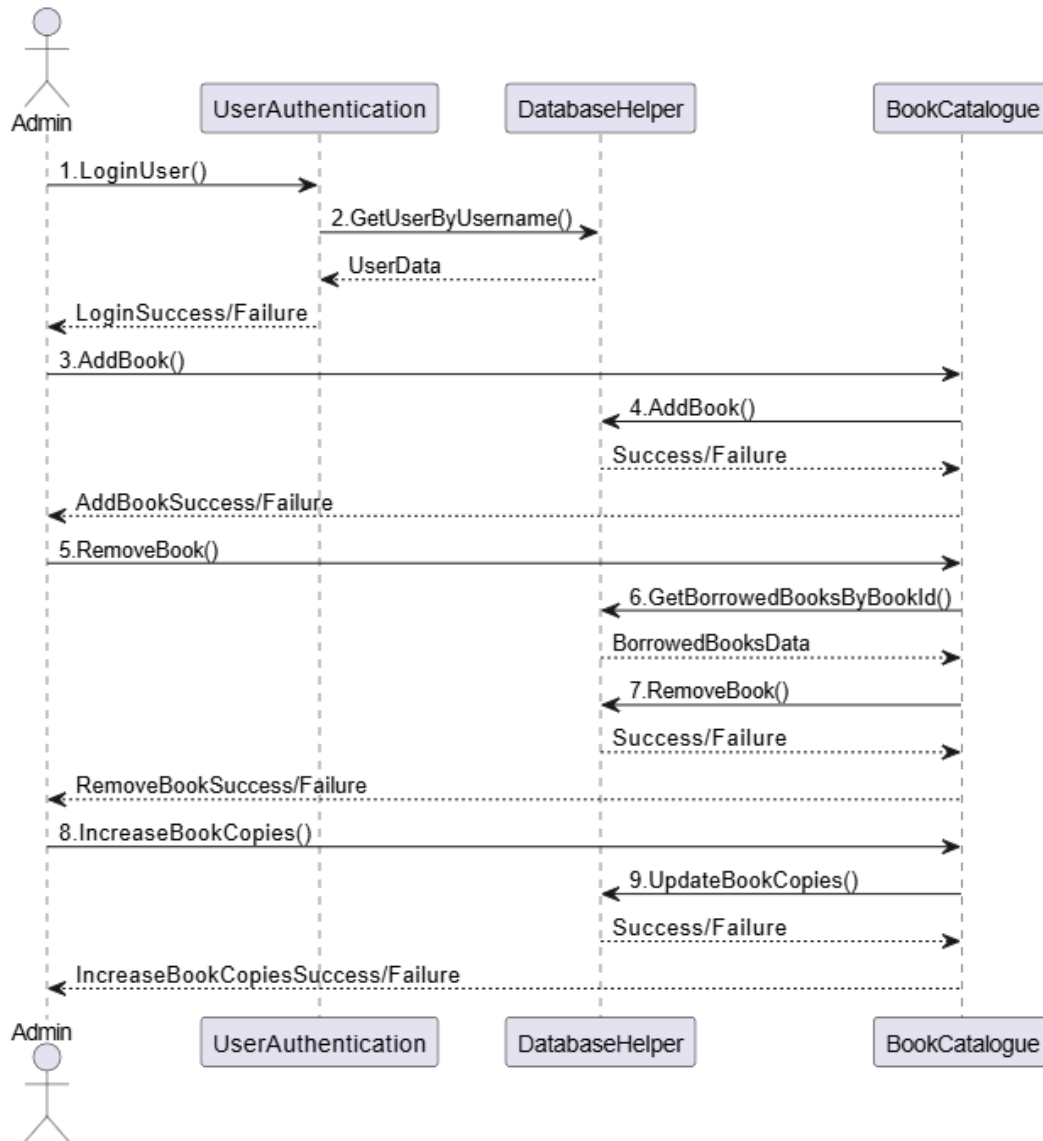


8. Class Diagram

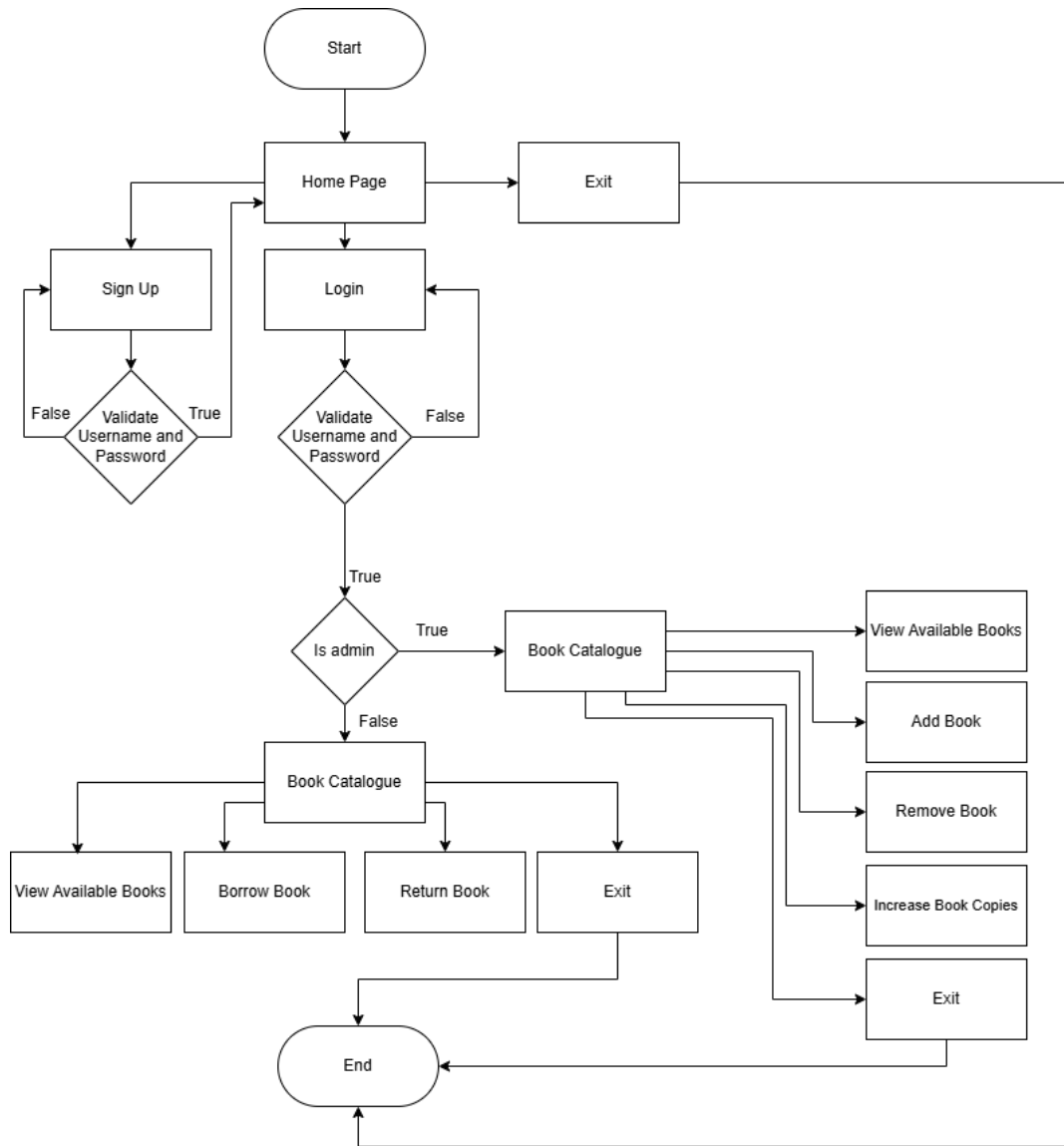


9. Sequence Diagram





10. Flow Chart



11. ER Diagram

