

LIBRARY MANAGEMENT SYSTEM

System Design Document

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1.Introduction

This Information management system implements a library management system application that solves a real-world problem.

Library management system is an automated system that allows librarians to manage the resources and services provided by a library. It is a crucial tool for libraries to maintain accurate records, monitor and manage resources, and offer efficient services to users.

This system design document outlines the functional and technical requirements of the LMS, including its architecture, components, and features.

Benefits of Library Management System The implementation of library management systems offers numerous benefits, including:

1. **Efficient resource management:** Library management systems allow librarians to manage their resources effectively by automating tasks such as cataloging, circulation, and collection management.
2. **Improved user experience:** Library management systems enhance user experience by allowing students to search for and reserve books online, reducing waiting time and improving access.
3. **Accurate record keeping:** Library management systems enable librarians to keep accurate records of library resources and transactions.
4. **Easy reporting:** Library management systems provide librarians with data that they can use to generate reports, analyse trends, and make informed decisions.

2. Business Requirements

LMS business requirements include the following:

1. Each book record should contain the fields: ISBN, Title, UnitPrice, YearPublished and QOH (quantity on hand). Each book must be categorized.

The screenshot shows a web interface for managing book records. It features five input fields labeled ISBN, Price, Title, Year, and QOH. To the right of these fields are two buttons: 'Save' and 'List'. Below the input fields is a search section with the label 'Input ISBN to search' and a 'Search' button. At the bottom of the interface is a table with five columns: ISBN, Price, Title, Year, and QOH. The 'Price' column header is highlighted in blue. The table has several empty rows for data entry.

ISBN	Price	Title	Year	QOH

2. More than one author can write each book and each author can participate in writing more than one book. Each book can be published by only one publisher.
3. Each author record should contain the following pieces of information such as authorID (for identification in case authors have the same name), first name, last name and email).

3. Features of Library Management System

Library management systems offer a range of features that help librarians to manage their resources efficiently. These features include:

- **Cataloging:** Library management systems provide a centralized database for cataloging library resources, including books, periodicals, and other materials.
- **Circulation:** Library management systems automate the process of checking books in and out of the library, reducing errors and improving efficiency.
- **Reservations:** Library management systems allow patrons to reserve materials online, reducing waiting times and improving access.
- **Reports:** Library management systems generate reports on resource usage, circulation, and other key metrics that librarians can use to make informed decisions.

4. DESIGN CONSIDERATIONS

This Library Management System (LMS) follows Model View Control (MVC) architecture.

This system is developed using Microsoft Visual Studio C# 2022 by applying Object-Oriented concepts by using built-in classes and structures.

This LMS contains following components:

1. For the GUI part we have 2 forms 'Form1.cs' and 'Form2.cs'
 - Form1 comprises of Author Record and Book Record by using various input fields and 2 form tables to display data of author and book.
 - Form 2 comprises of information related to college and university.

2. LMS uses .dat files that acts as database to manipulate data.

```
private static string filePath = Application.StartupPath + @"\Authors.dat";
```

```
private static string filePath = Application.StartupPath + @"\Book.dat";
```

```
private static string filePath = Application.StartupPath + @"\Client.dat";
```

3. The business model folder (BLL) consists of 3 internal classes for books, author, and client.

- These classes contain get/set for their respective fields.

```

5 references
public int ISBN { get; set; }
5 references
public int Price { get; set; }
5 references
public string Title { get; set; }
5 references
public string YearPublished { get; set; }
5 references
public int QOH { get; set; }

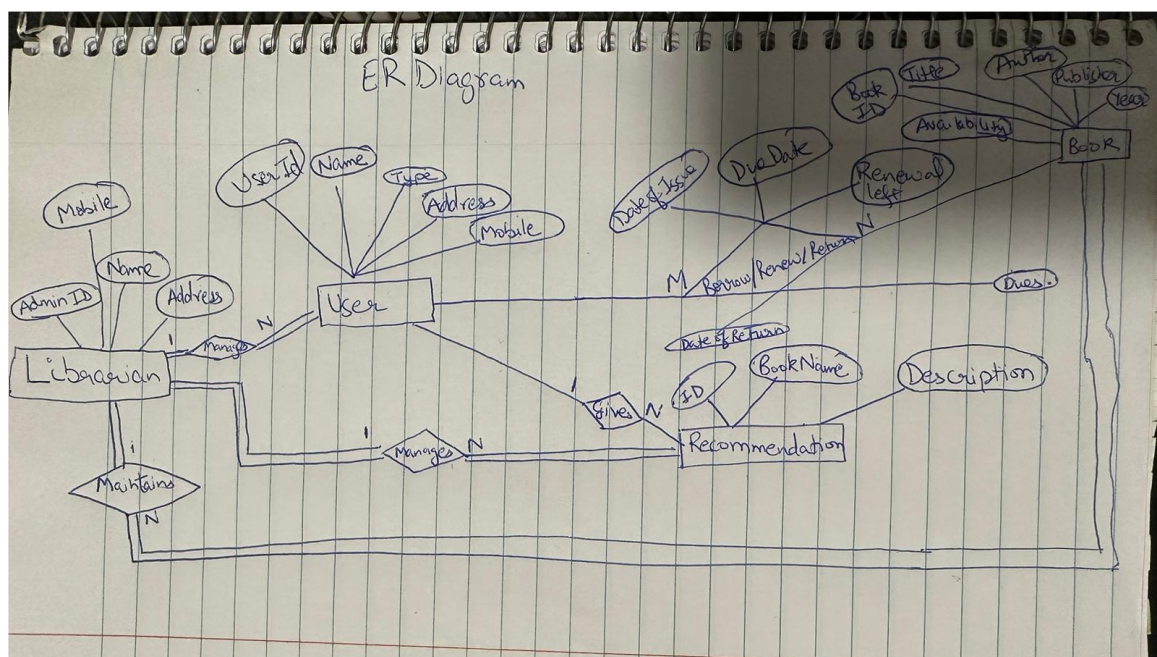
```

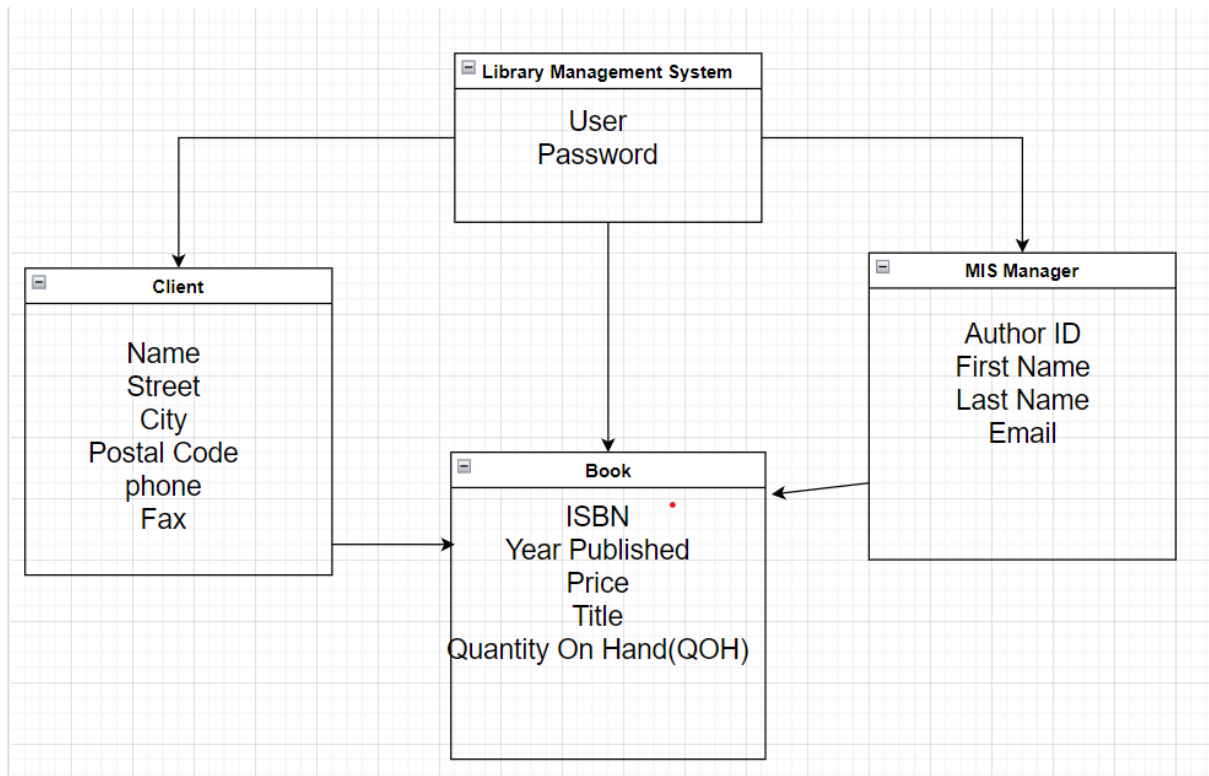
4. The Data folder (DLL) holds methods for various CRUD operations and connection to database.

- List
- Save
- Search
- Exit

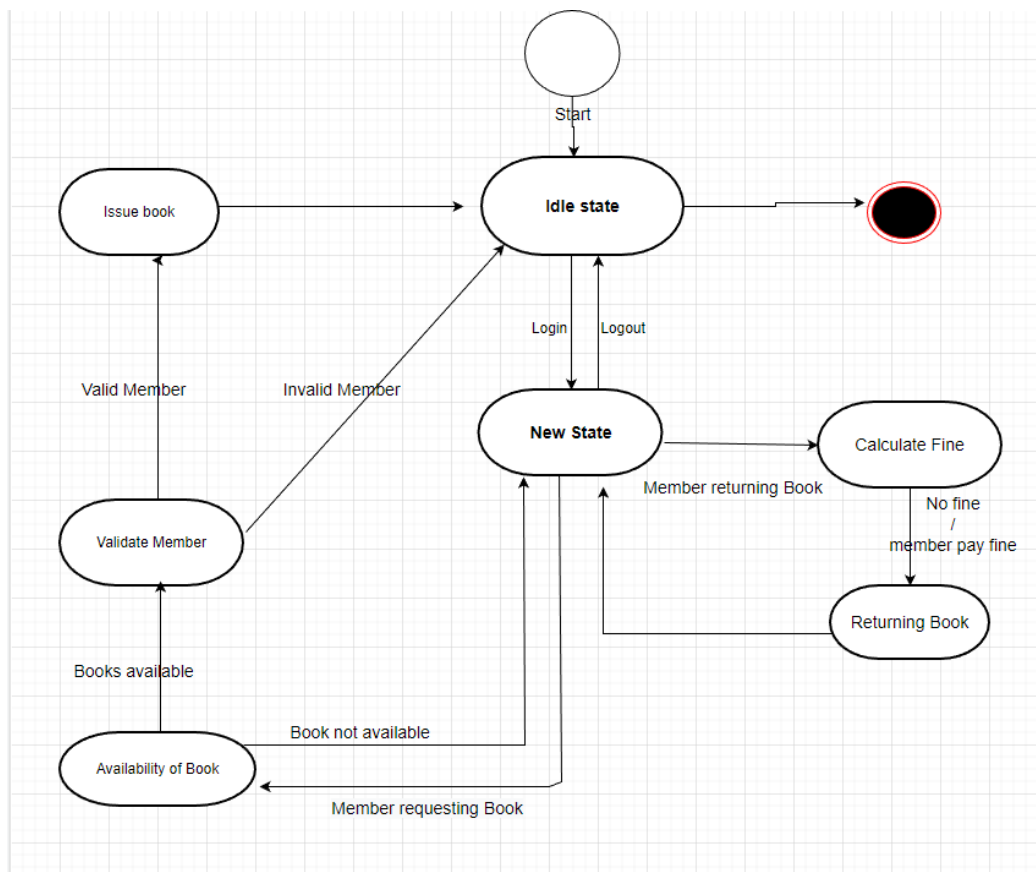
5. The validation folder carries various validation methods for different methods.

- Valid ID should be 3-digit number or string
- No numbers in name.
- ID should be unique

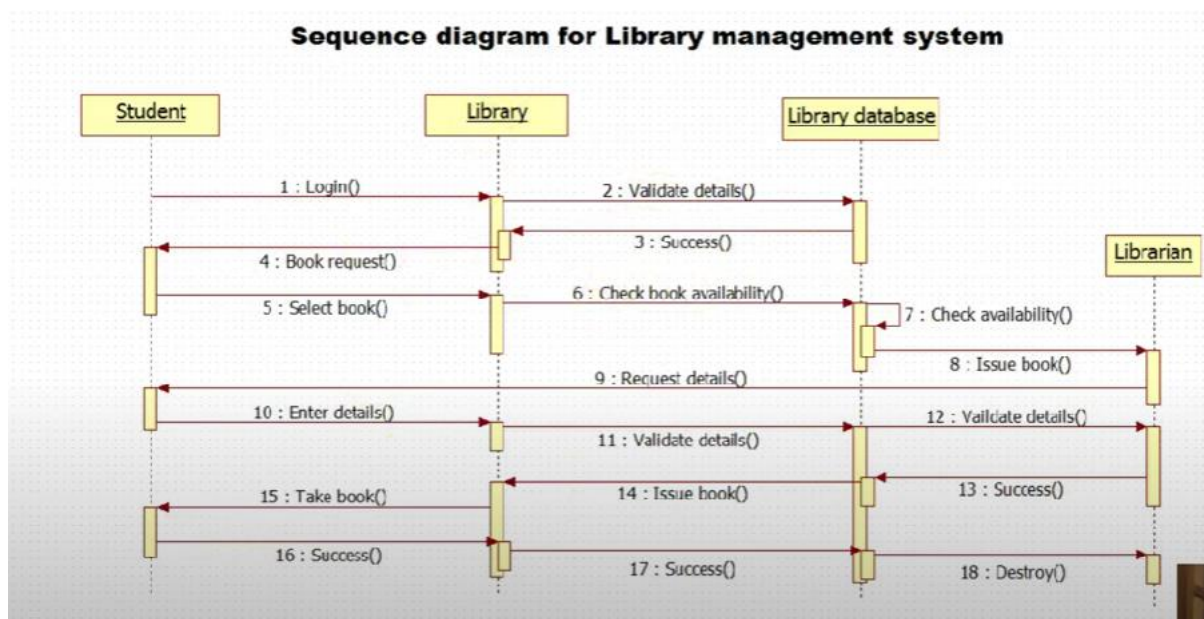




State Diagram



Sequence Diagram



5. Implementation Plan

The implementation of the LMS will involve the following steps:

Requirements Gathering: The development team will gather requirements from the library staff to ensure that the system meets their needs.

System Design: The development team will create a system design document outlining the functional and technical requirements of the system.

Development: The development team will implement the system using the chosen technologies.

Validation: The development team will add certain validations to ensure that the system works as expected.

Training: The library staff will receive training on how to use the system.

6. Conclusion

The Library Management System is an essential tool for libraries to manage their resources and offer efficient services to their patrons. The system will be a desktop application built on Visual Studio using C#. The system will offer features such as cataloging, circulation, reservations, user management, and reporting. The implementation of the system will involve requirements gathering, system design, development, testing, deployment, and training. By implementing the LMS, the library staff will be able to manage resources and offer efficient services to their patrons, improving their overall operations.