[2024-2025]

Informatics Practices

Class - XII

LIBRARY MANAGEMENT

BY-

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Madhav Gupta

Ashwinder

CERTIFICATE

This is to certify that *Yuvraj Singh, Ashwinder, and Madhav Gupta* of class XII has successfully completed the project of Library Management System according to CBSE guidelines under my guidance and supervision during the academic year 2024-2025

Mr. Benoie Mathew

Head of the department

(Department of Computer Science)

External Examiner

ACKNOWLEDGEMENT

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Board Roll No:

INDEX

Introduction

- PROBLEM DEFINITION

Libraries are essential institutions that provide access to knowledge and resources, serving as a cornerstone for education and information dissemination. However, managing library operations effectively remains a significant challenge, especially in large-scale or resource-constrained environments.

Traditional methods of maintaining library records—such as manually tracking books, borrowers, and transactions—are often labor-intensive and prone to errors. These inefficiencies can result in mismanagement of resources, difficulties in locating specific books, and delays in tracking borrowed items or overdue returns. Moreover, without a proper system in place, maintaining transparency and accountability becomes a daunting task.

As the demand for library services grows, manual processes struggle to keep up. Librarians may face difficulties such as:

- Inconsistent or inaccurate record-keeping.
- Limited visibility into the availability of books and overdue returns.
- Challenges in managing a growing inventory and user base.
- Lack of security in accessing sensitive information, leading to potential misuse or data loss.

Furthermore, without a structured system, borrowers may face inconvenience in accessing resources or understanding their responsibilities, such as return deadlines or overdue fines.

These issues highlight the urgent need for a streamlined approach to library management, one that minimizes errors, optimizes resource utilization, and enhances both librarian and user experience.

- PYTHON INTRODUCTION

PYTHON HISTORY: Python was conceived in the late 1980s by Guido Van Rossum at Centrum Wiskunde & Informatica (CWI) in the Netherlands as a successor to the ABC programming language, which was inspired by SETL, capable of exception handling (from the start plus new capabilities in Python 3.11) and interfacing with the Amoeba operating system. Its implementation began in December 1989. Van Rossum shouldered sole responsibility for the project, as the lead developer, until 12 July 2018, when he announced his "permanent vacation" from his responsibilities as Python's "benevolent dictator for life", a title the Python community bestowed upon him to reflect his long-term commitment as the project's chief decision-maker. In January 2019, active Python core developers elected a five-member Steering Council to lead the project.

PYTHON: Python is a multi-paradigm programming language. Object-oriented programming and structured programming are fully supported, and many of their features support functional programming and aspect-oriented programming (including meta-programming and meta-objects). Many other paradigms aresupported via extensions, including design by contract. and logic programming.

Python uses dynamic typing and a combination of reference counting and a cycle-detecting garbage collector for memory management. It uses dynamic name resolution (late binding), which binds method and variable names during program execution.

- SQL INTRODUCTION

SQL HISTORY: SQL was initially developed at IBM by Donald D. Chamberlin and Raymond F. Boyce after learning about the relational model from Edgar F. Codd in the early 1970s. This version, initially called SEQUEL (Structured English Query Language), was designed to manipulate and retrieve data stored in IBM's original quasirelational database management system, System R, which a group at IBM San Jose Research Laboratory had developed during the 1970s.

Chamberlin and Boyce's first attempt at a relational database language was SQUARE (Specifying Queries in A Relational Environment), but it was difficult to use due to subscript/superscript notation. After moving to the San Jose Research Laboratory in 1973, theybegan work on a sequel to SQUARE. The name SEQUEL was later changed to SQL (dropping the vowels) because "SEQUEL" was a trademark of the UK-based Hawker Siddeley Dynamics Engineering Limited company. The label SQL later became the acronym for Structured Query Language.

SQL : **Structured Query Language**, abbreviated as **SQL** is a domain-specific language usedin programming and designed for managing data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS). It is particularly useful in handling structured data, i.e. data incorporating relations among entities and variables.

SQL offers two main advantages over older read-write APIs such as ISAM or VSAM. Firstly, it introduced the concept of accessing many records with one single command. Secondly, it eliminates the need to specify how to reach a record, e.g. with or without an index.

ABOUT PROGRAM

This is a **Library Management System** designed to assist librarians in managing library operations with greater efficiency and ease. The system is tailored to function like a specialized operating system for library management, optimized to run on low hardware requirements compared to other solutions.

KEY FEATURES:

1. **Security**:
    - Login authentication with password protection to ensure data safety.
    - A history log to keep track of activities for transparency and monitoring.
2. **Core Functionalities**:
    - **Book Management**: Add, search, issue, return, and remove books.
    - **Inventory Control**: Manage book copies and view all books in the system.
    - **Transaction Tracking**: View books that have not been returned and access fine details for overdue returns.
3. **User Management**:
    - Search, add, and delete borrowers and librarians efficiently.

This system is a comprehensive solution for libraries to streamline their daily operations, ensure data integrity, and provide a user-friendly interface for librarians to manage resources effectively.

SYSTEM REQUIREMENTS

- SOFTWARE REQUIREMENTS
    - **Operating System:**
        - Windows, macOS, or Linux (any modern version).
    - **Python Version:**
        - Python 3.8 or above.
    - **Required Python Libraries:**
        - tkinter: For building GUI applications.
        - mysql-connector-python: To connect and interact with the MySQL database.
    - **Database:**
        - MySQL Server (e.g., MySQL 8.0 or higher).
        - Properly configured MySQL user with access rights (default user in code: root, password: root).
- HARDWARE REQUIREMENTS
    - **Processor:**
        - Minimum: Dual-core processor.
        - Recommended: Quad-core or better for smooth multitasking.
    - **RAM:**
        - Minimum: 4 GB.
        - Recommended: 8 GB or more.
    - **Storage:**
        - Minimum: 500 MB for Python, MySQL, and the project files.
        - Additional storage for the database depending on the data size.
    - **Display:**
        - Resolution: 1024x768 or higher (required for tkinter GUIs).

TABLE DESIGN

- BOOK TABLE

```
mysql> desc book;
+---------+-------------+------+-----+---------+----------------+
| Field   | Type        | Null | Key | Default | Extra          |
+---------+-------------+------+-----+---------+----------------+
| Book_ID | int         | NO   | PRI | NULL    | auto_increment |
| Title   | varchar(255) | NO   | UNI | NULL    |                |
| Genre   | varchar(20)  | NO   |     | NULL    |                |
+---------+-------------+------+-----+---------+----------------+
```

- BOOK AUTHORS TABLE

```
mysql> desc book_authors;
+-------------+--------------+------+-----+---------+-------+
| Field       | Type         | Null | Key | Default | Extra |
+-------------+--------------+------+-----+---------+-------+
| Book_ID     | int          | NO   | PRI | NULL    |       |
| Author_Name | varchar(255) | NO   | PRI | NULL    |       |
+-------------+--------------+------+-----+---------+-------+
```

- BOOK COPIES TABLE

```
mysql> desc book_copies;
+--------------+------+------+-----+---------+-------+
| Field        | Type | Null | Key | Default | Extra |
+--------------+------+------+-----+---------+-------+
| Book_ID      | int  | NO   | PRI | NULL    |       |
| No_Of_Copies | int  | NO   |     | NULL    |       |
+--------------+------+------+-----+---------+-------+
```

- BOOK LOANS TABLE

```
mysql> desc book_loans;
+----------+------+------+-----+---------+-------+
| Field    | Type | Null | Key | Default | Extra |
+----------+------+------+-----+---------+-------+
| Book_ID  | int  | NO   | PRI | NULL    |       |
| Card_No  | int  | NO   | PRI | NULL    |       |
| Date_Out | date | NO   | PRI | NULL    |       |
| Due_Date | date | YES  |     | NULL    |       |
+----------+------+------+-----+---------+-------+
```

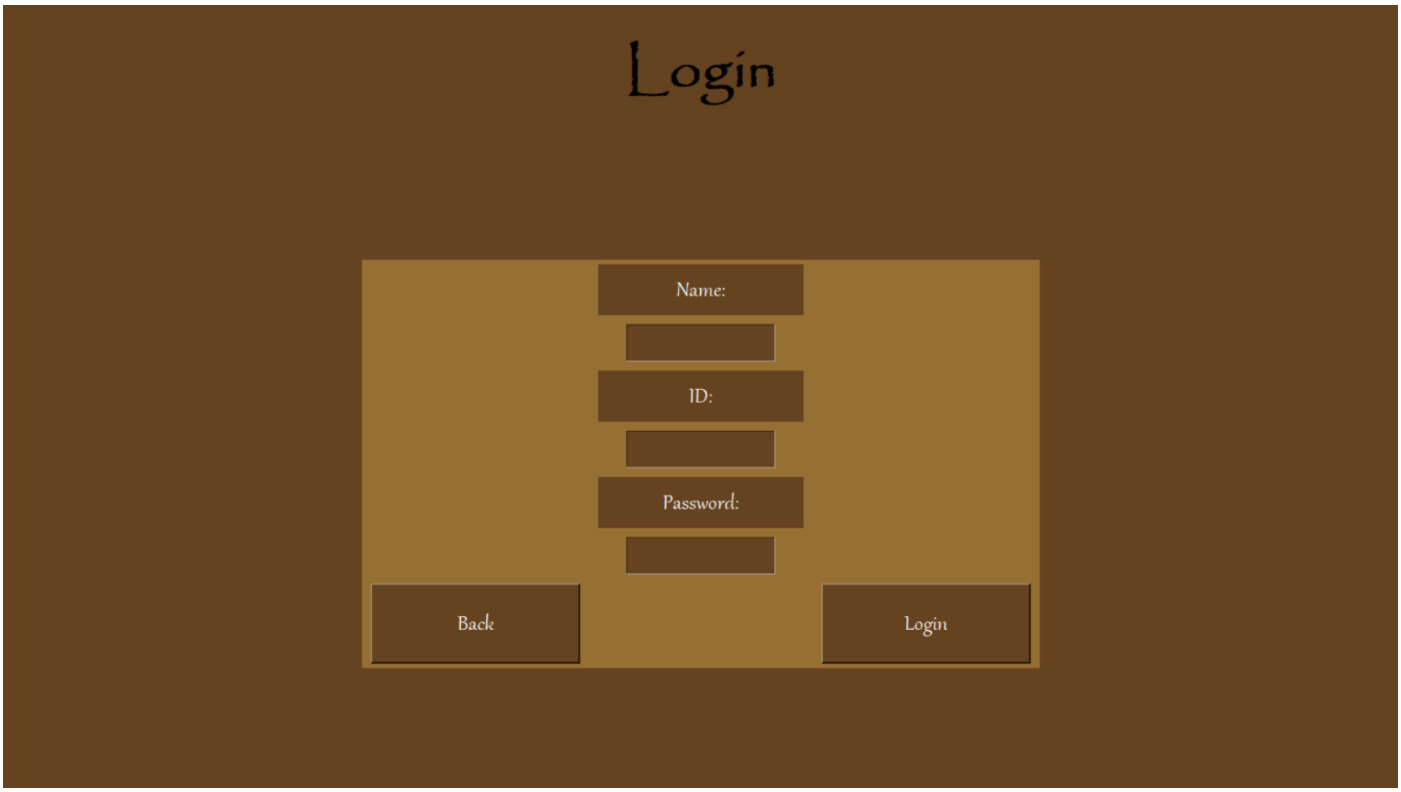
- BORROWER TABLE

```
mysql> desc borrower;
+---------+-------------+------+-----+---------+----------------+
| Field   | Type        | Null | Key | Default | Extra          |
+---------+-------------+------+-----+---------+----------------+
| Card_No | int         | NO   | PRI | NULL    | auto_increment |
| Name    | varchar(55) | NO   |     | NULL    |                |
| Address | text        | YES  |     | NULL    |                |
| Email   | varchar(255)| YES  | UNI | NULL    |                |
| Phone   | varchar(10) | NO   | UNI | NULL    |                |
+---------+-------------+------+-----+---------+----------------+
```

- LIBRARIAN TABLE

```
mysql> desc librarian;
+-------------+-------------+------+-----+---------+----------------+
| Field       | Type        | Null | Key | Default | Extra          |
+-------------+-------------+------+-----+---------+----------------+
| Librarian_ID| int         | NO   | PRI | NULL    | auto_increment |
| Name        | varchar(255)| NO   |     | NULL    |                |
| Address     | text        | YES  |     | NULL    |                |
| Email       | varchar(255)| YES  | UNI | NULL    |                |
| Phone       | varchar(15) | NO   | UNI | NULL    |                |
| Password    | varchar(255)| NO   |     | NULL    |                |
+-------------+-------------+------+-----+---------+----------------+
```

PREVIEW OF PROGRAM


Login
Name:
ID:
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Back
Login


Librarian Window
Search Borrower
View All Books
Search Book
Books Not Returned
Search Librarian
Add Borrower
Add Book
Issue Book
Manage Book Copies
Add Librarian
Delete Borrower
Remove Book
Return Book
View Fine Details
Delete Librarian
Back


Search Borrower Window
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Search
Back


Add New Borrower
Name:
Address:
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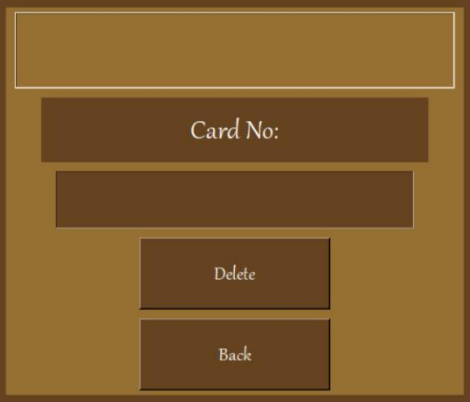
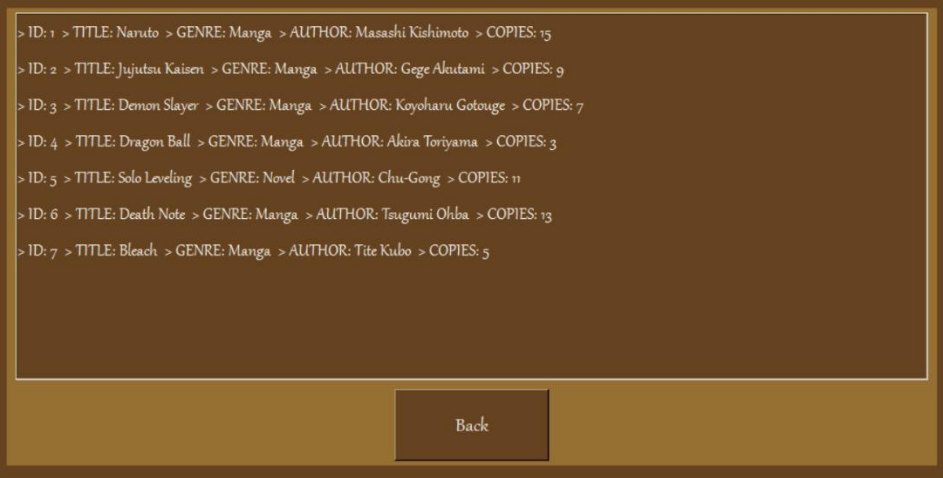
Back
Sign Up

Delete Borrower Window



View All Books




Add New Book
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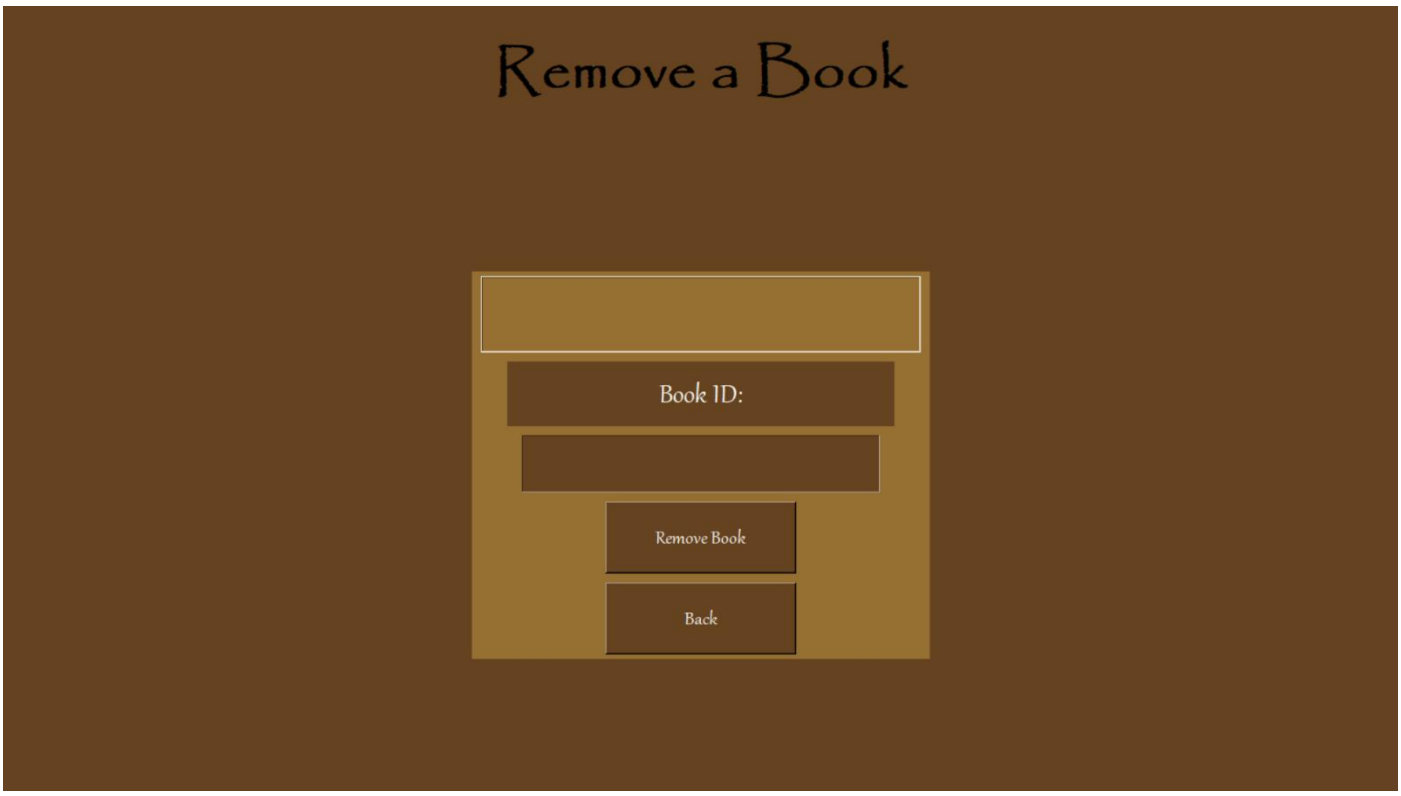
Author:
Genre:
Copies:
Back
Add Book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Search Book Window
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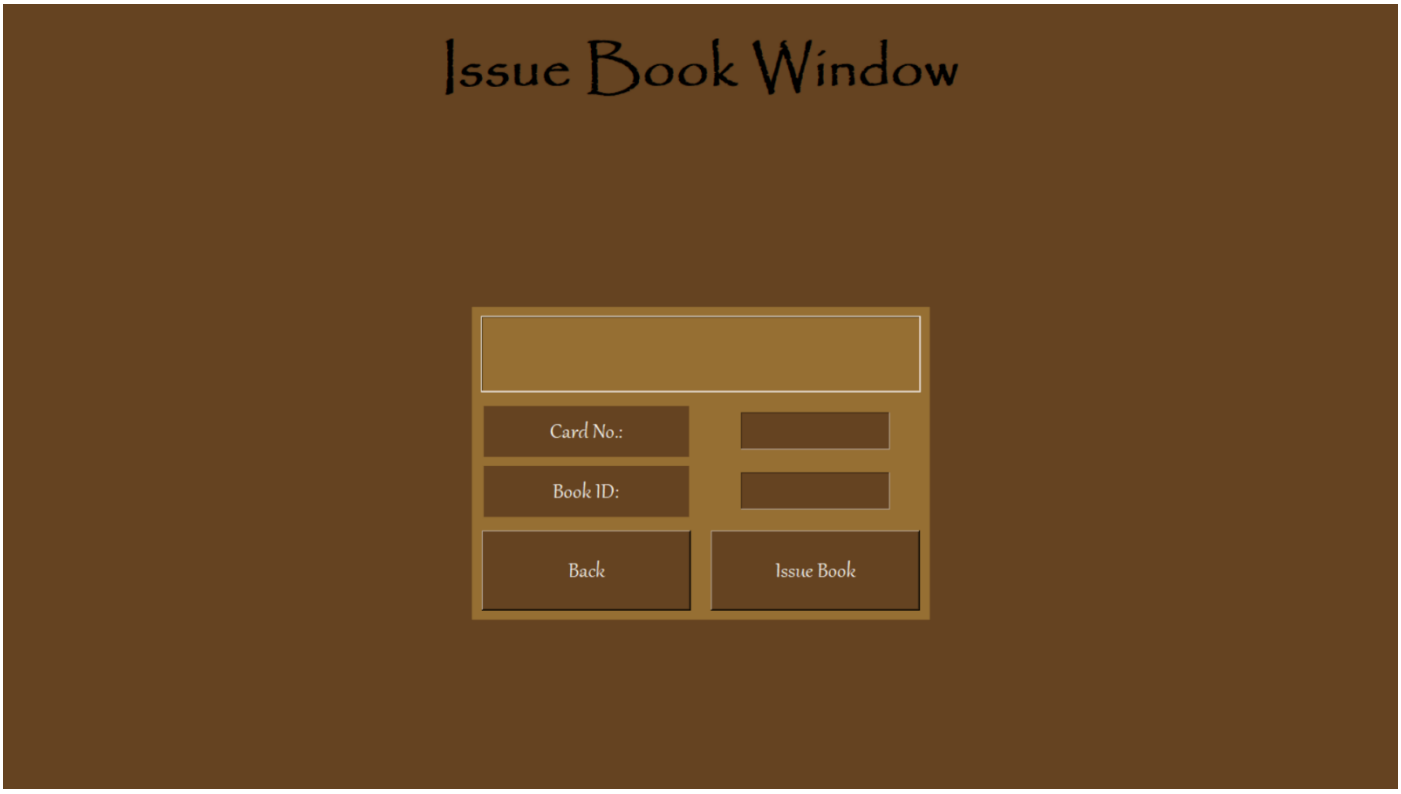
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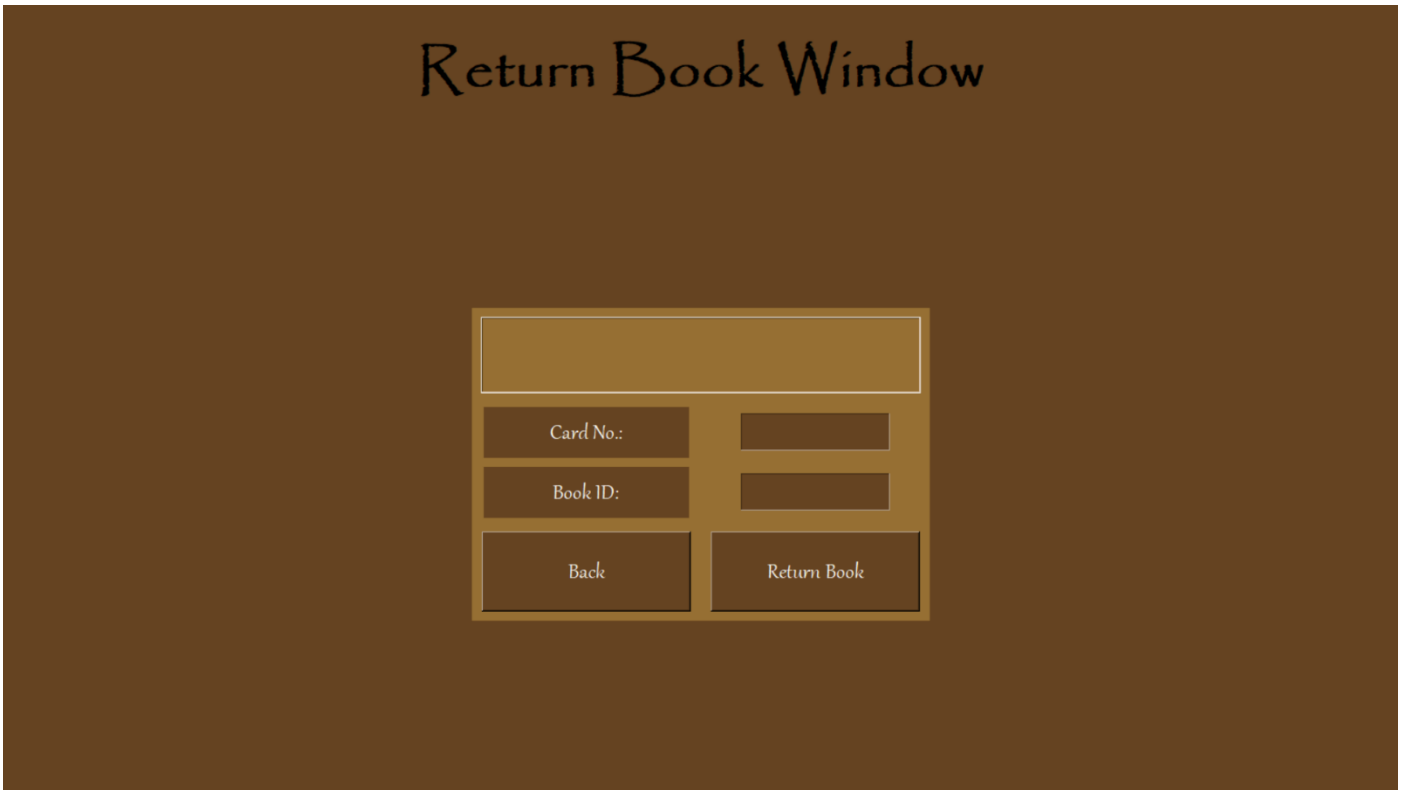
Return Book Window
Card No.:
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Return Book


Books Not Returned
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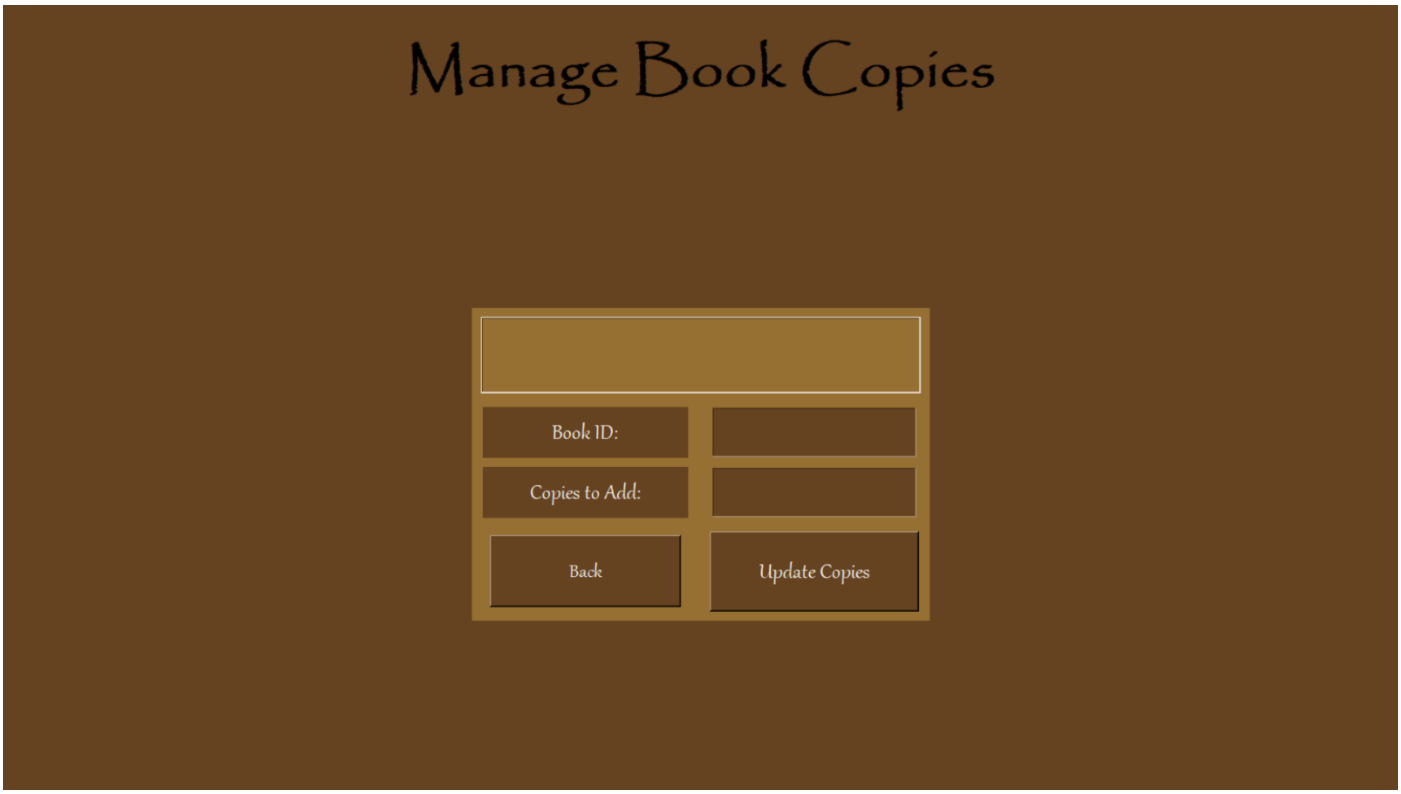
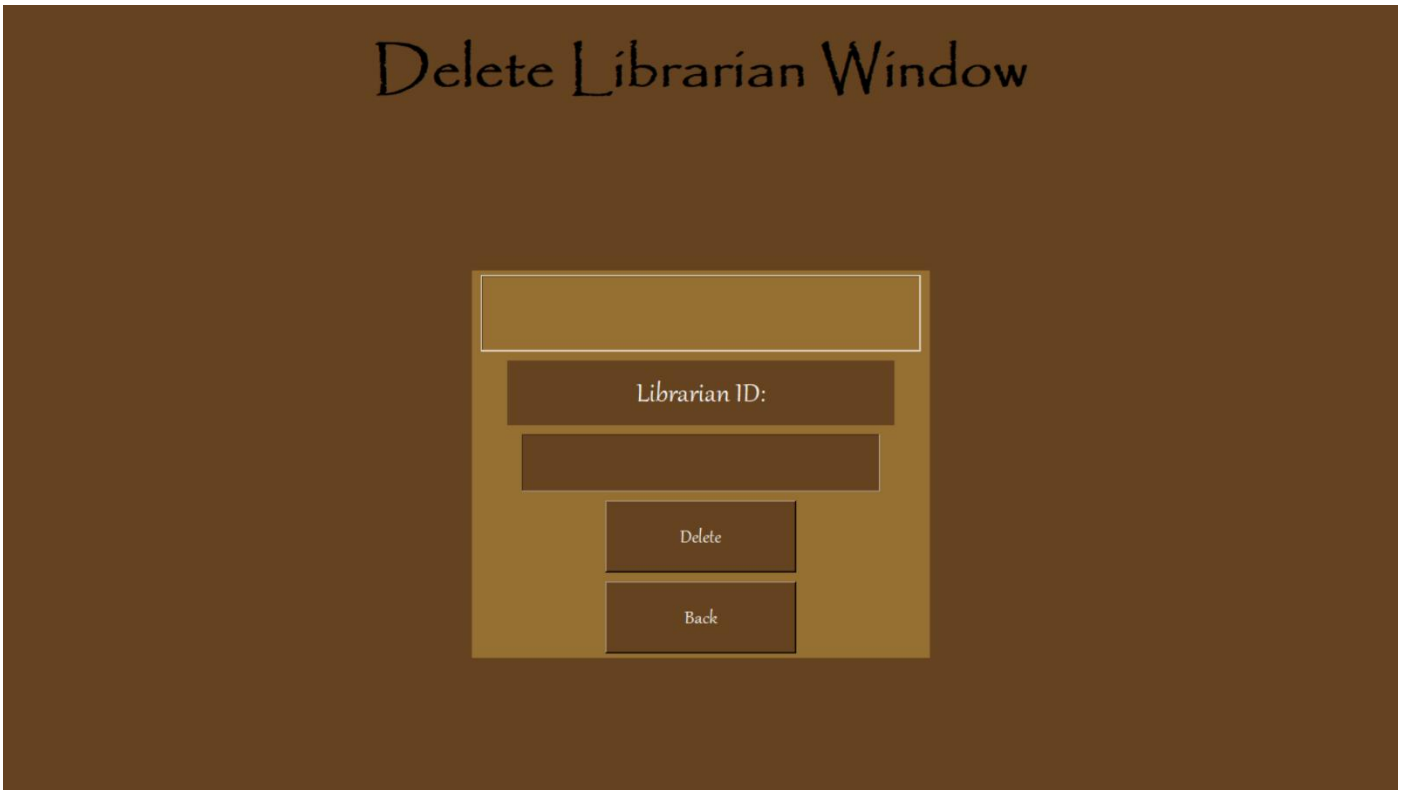
Back


Manage Book Copies
Book ID:
Copies to Add:
Back
Update Copies


Fine Management
Borrower: Dhaval (2), Book: Demon Slayer, Overdue Days: 35, Fine: ₹175
Borrower: Raghav (3), Book: Dragon Ball, Overdue Days: 16, Fine: ₹80
Back


Search Librarian Window
Librarian Name:
Search
Back


Add New Librarian
Name:
Address:
Phone No.:
Email:
Password:
Back
Sign Up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