library book inventory &borrowing management system

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1. Cover Page

Include project title, your name, roll number, course, instructor, and submission date.

Project Title: Library Book Management System
Submitted by: Bachamolla Sridhar
Roll Number: 25MIP10013
Course: Introduction to problem solving
Instructor: Dr. A.v.r Mayuri
Date: 23/11/2025

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2. Introduction

The Library Book Management System is a Python-based program that allows users to manage library books using a CSV file for storage. Core features include adding, viewing, searching, borrowing, returning, updating, and deleting books.

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3. Problem Statement

Libraries often struggle with manual tracking of books, leading to errors, lost records, and inefficient book lending and returning. There is a need for a simple, automated system for managing book inventory and transactions.

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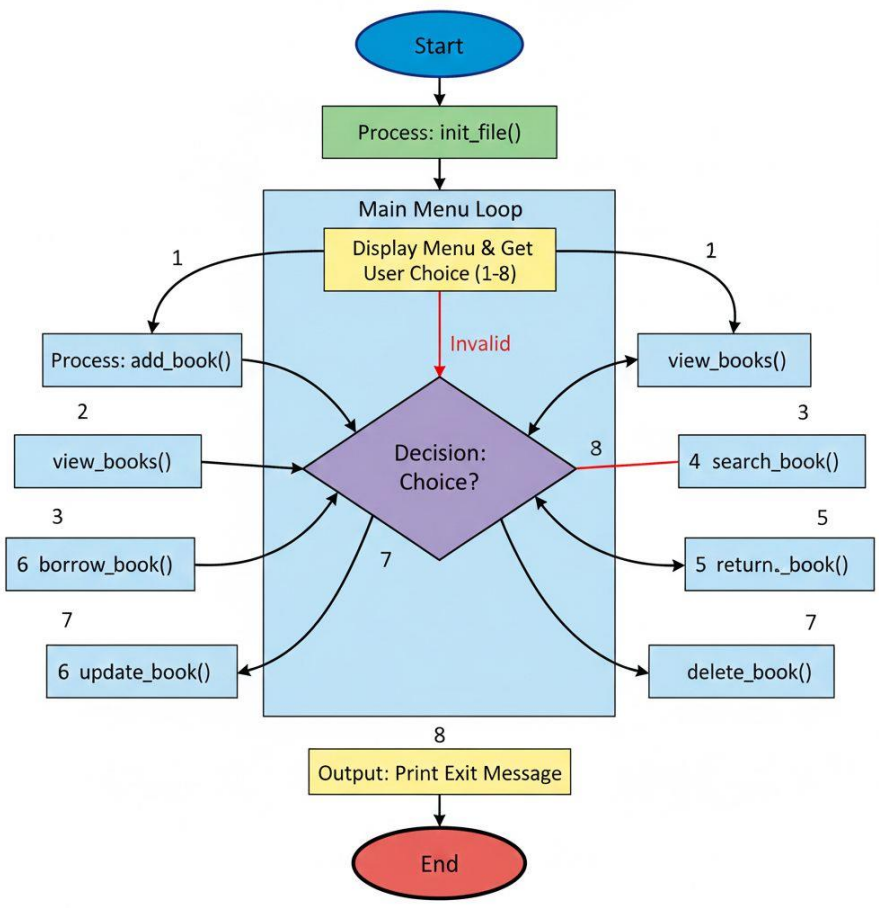
4. Functional Requirements

- Add new books with unique IDs.
- View all books in the library.
- Search for books by ID or title.
- Borrow and return books, updating quantity.
- Update book details or quantity.
- Delete books from the system.
- CSV file-based storage for persistence.

5. Non-functional Requirements

- User-friendly command-line interface.
- Reliable read/write operations on CSV file.
- Error handling for invalid inputs and file access.
- Portability across OS with Python installed.
- Fast execution for small/medium datasets.

6. Design Diagrams



7. Design Decisions & Rationale

- Chose CSV for storage due to simplicity and ease of management.
- Command-line interface for accessibility.

- Modular functions to separate concerns and improve maintainability.

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8. Implementation Details

- Implemented in Python using csv and os modules.
- Each feature mapped to a function: add_book(), view_books(), etc.
- Handles errors and guides user for correct input.
- Data persisted in "library.csv".

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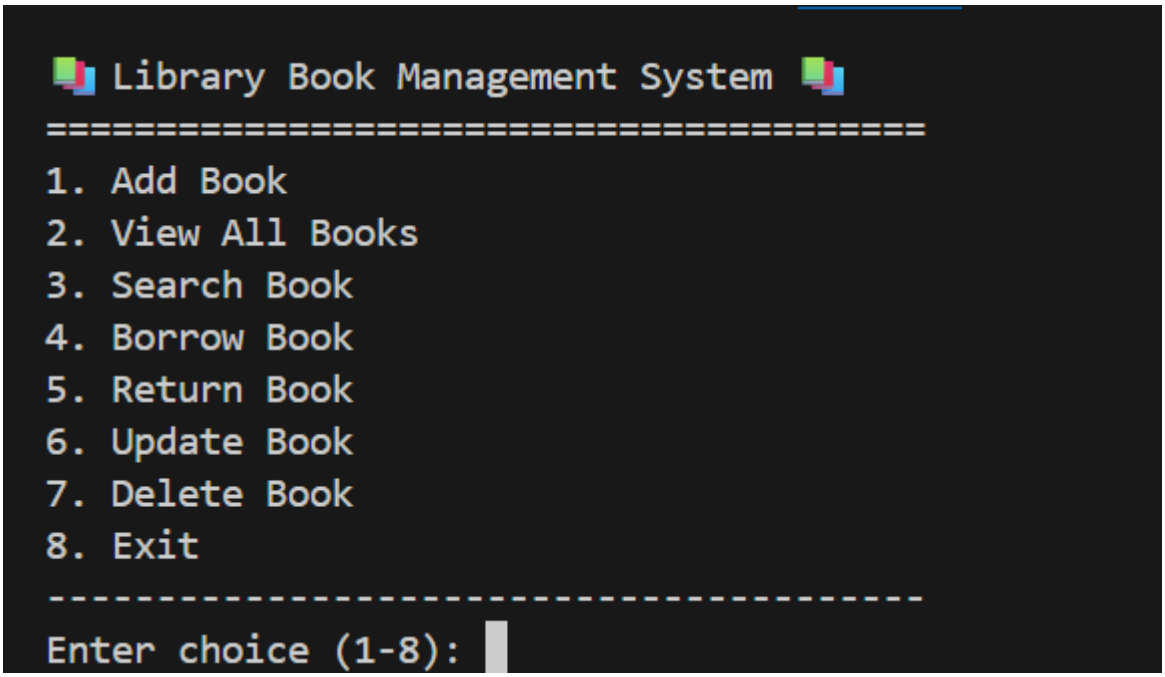
9. Screenshots / Results

- Screenshot of main menu.



- Before and after adding a book.

```
📚 Library Book Management System 📚
========================================
1. Add Book
2. View All Books
3. Search Book
4. Borrow Book
5. Return Book
6. Update Book
7. Delete Book
8. Exit
----------------------------------------
Enter choice (1-8):  1

--- Add New Book ---
Enter Book ID (must be unique):  22
Enter Book Title:  VITyarthi
Enter Author Name:  Sanjay
Enter Quantity:  50
Book added successfully!
```

- Book search and borrow operation.

```
📚 Library Book Management System 📚
========================================
1. Add Book
2. View All Books
3. Search Book
4. Borrow Book
5. Return Book
6. Update Book
7. Delete Book
8. Exit
----------------------------------------
Enter choice (1-8):  3

--- Search Book ---
Enter Book ID or Book Title (partial match is OK) to search:  150
Book(s) found:
ID        Title                     Author              Quantity
------------------------------------------------------------------------
150       Mahabharath               Veda Vyas           24
```

```
----------------------------------------
📚 Library Book Management System 📚
========================================
1. Add Book
2. View All Books
3. Search Book
4. Borrow Book
5. Return Book
6. Update Book
7. Delete Book
8. Exit
----------------------------------------
Enter choice (1-8):  4

--- Borrow Book ---
Enter Book ID to borrow:  101
Book issued successfully!
```

- Book return and quantity update.

```
----------------------------------------
📚 Library Book Management System 📚
========================================
1. Add Book
2. View All Books
3. Search Book
4. Borrow Book
5. Return Book
6. Update Book
7. Delete Book
8. Exit
----------------------------------------
Enter choice (1-8):  5

--- Return Book ---
Enter Book ID to return:  150
Book returned successfully!
```

```
📚 Library Book Management System 📚
========================================
1. Add Book
2. View All Books
3. Search Book
4. Borrow Book
5. Return Book
6. Update Book
7. Delete Book
8. Exit
----------------------------------------
Enter choice (1-8):  6

--- Update Book ---
Enter Book ID to update:  101
Current details: Title='Bhagavadgeetha', Author='Shanmugam ', Quantity='49'
New Title (leave blank to keep current):  Vaaranasi
New Author (leave blank to keep current):  Chandrahas
New Quantity (leave blank to keep current):  40
Book updated successfully!

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10. Testing Approach

- Manual testing for each feature covering typical usage and edge cases (e.g., duplicate IDs, invalid quantity).
- Tested error handling for file absence and invalid data.
- Verified persistent storage after program exit.

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11. Challenges Faced

- Ensuring unique book IDs.
- Handling concurrent file access.
- User input validation.
- Managing edge cases in borrow/return logic.

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12. Learnings & Key Takeaways

- Importance of data validation and error handling.
- Benefits of modular code organization.
- Practical experience with CSV file operations in Python.

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13. Future Enhancements

- GUI-based interface.
- Advanced search (by author, genre).
- User authentication and tracking individual borrowers.
- Integration with larger database (SQLite, MySQL).
- Report generation for usage statistics.

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14. References

- Python documentation
- csv module documentation
- Project guidelines from Vityarthivityarthi.proj.report.jpg
- Online tutorials for file handling in Python
