

PROJECT REPORT:

Library Management System:

Language: Python

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Programme: B.tech Cse

Registration Number: 25BCE11049

Institution: VIT Bhopal University

Course: CSE1021-Introduction to problem solving & Python Programming

Academic Year: 2025-2026

1. Introduction:

The **Library Management System** is a software application designed to automate the core workflows of a library. In traditional settings, managing book records, tracking issued books, and calculating fines for late returns are manual, time-consuming processes prone to human error.

This project utilizes **Python** to create a Command Line Interface (CLI) based application. The system provides a centralized interface for librarians to manage inventory and circulation efficiently.

2. Problem Statement:

Manual library management faces several challenges:

- **Data Redundancy:** Multiple records for the same transaction.
- **Inefficiency:** Searching for a specific book in a physical register takes time.
- **Calculation Errors:** Manually calculating due dates and fines is prone to mistakes.
- **Inventory Tracking:** It is difficult to know the exact quantity of books available in real-time.

Solution: This project solves these issues by automating the storage, retrieval, and updating of book records using digital files, ensuring accuracy and speed.

3. Functional Requirements:

The system provides the following specific functionalities:

1. Book Management:

- **Add Book:** Input details (ID, Title, Author, Quantity) and save to storage.
- **Display Books:** List all books currently in the catalog.
- **Search Book:** Find books by title keywords.
- **Update Book:** Modify details of existing books.
- **Delete Book:** Remove obsolete records.
- **Total Count:** View total titles and total physical copies available.

2. Circulation Management:

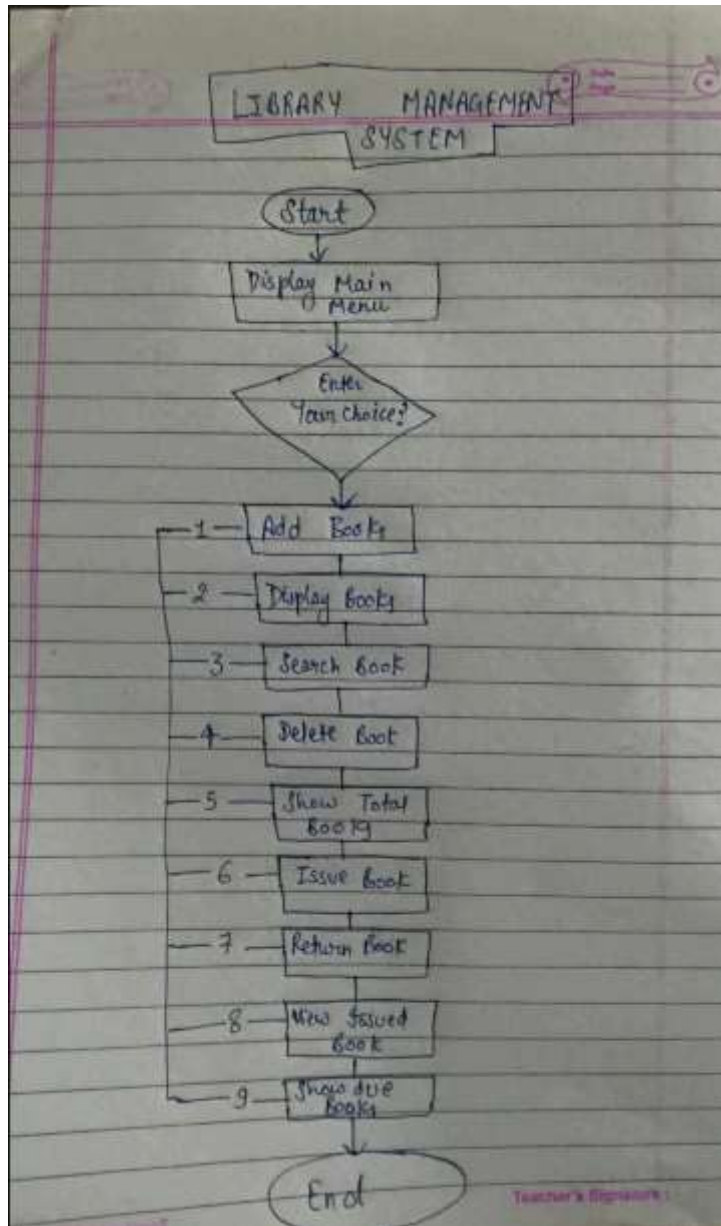
- **Issue Book:** Assign a book to a student, decrease stock, and record issue/due dates.
- **Return Book:** Accept books back, increase stock, and calculate fines if late.
- **View Issued:** See a list of all currently borrowed books.
- **Track Due/Late Books:** Filter transactions to see who has missed deadlines.

4. System Architecture:

The system follows a simple **Modular Architecture** centered around the Python script and File I/O.

- **User Interface:** Command Line Interface (CLI) accepting numeric inputs for menu choices.
- **Logic Layer:** Python functions (e.g., addbook(), issuebook()) containing the business logic.
- **Data Layer:** Text files acting as the database:
 - library.txt: Stores Book Inventory.
 - issued_books.txt: Stores Circulation Data.

5. System Design:



6. Implementation Details:

The project is implemented in a single Python script using procedural programming. Key modules and functions include:

- **datetime module:** Used to capture `datetime.now()` for issue dates and `timedelta(days=7)` to automatically set due dates.
- **File Modes:**
 - "a" (Append): Used in `addbook` to add new records without erasing old ones.

- "r" (Read): Used in searchbook and display functions.
- "w" (Write): Used in deletebook, updatebook, and returnbook to rewrite the file after modifying specific lines.
- **Error Handling:** Extensive use of try...except blocks to prevent the program from crashing if files are missing or user enters non-integer values for quantity.

7. Screenshots of Results:

```
===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit

Enter your choice: 1
Enter Book ID: 3
Enter Book Title: Dopamine Detox
Enter Author Name: Thibaut Meurisse
Enter Quantity: 100

Book added Successfully.....!!!!!!
```

```
===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit

Enter your choice: 2

----- All Books -----

Book Id : 1
Title  : Cant Hurt Me
Author : David Goggin
Qty    : 100

-----

Book Id : 2
Title  : 48 Laws Of Power
Author : Robert Green
Qty    : 100
```

Book Id : 2
Title : 48 Laws Of Power
Author : Robert Green
Qty : 100

Book Id : 3
Title : Dopamine Detox
Author : Thibaut Meurisse
Qty : 100

===== LIBRARY MANAGEMENT SYSTEM =====

1. Add Book	2. Display Books	3. Search Book
4. Delete Book	5. Update Book	6. Show Total Books
7. Issue Book	8. Return Book	9. View Issued Books
10. Show Due Books	11. Show Late Books	12. Exit

Enter your choice: 3
Enter title to search: Cant Hurt Me

Book Found Successfully.....!!!!
Id : 1
Title : Cant Hurt Me
Author : David Goggin
Qty : 100

===== LIBRARY MANAGEMENT SYSTEM =====

1. Add Book	2. Display Books	3. Search Book
4. Delete Book	5. Update Book	6. Show Total Books
7. Issue Book	8. Return Book	9. View Issued Books
10. Show Due Books	11. Show Late Books	12. Exit

Enter your choice: 4
Enter Book ID to delete: 2

Book deleted Suceesfully.....!!!!

```
===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit
```

Enter your choice: 2

----- All Books -----

Book Id : 1
Title : Cant Hurt Me
Author : David Goggin
Qty : 100

Book Id : 3
Title : Dopamine Detox
Author : Thibaut Meurisse
Qty : 100

```
===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit
```

Enter your choice: 5
Enter Book ID to update: 1

1. Update Title
2. Update Author
3. Update Quantity
Enter choice: 3
Enter new quantity: 99

Book updated Successfully.....!!!!

===== LIBRARY MANAGEMENT SYSTEM =====

- | | | |
|--------------------|---------------------|----------------------|
| 1. Add Book | 2. Display Books | 3. Search Book |
| 4. Delete Book | 5. Update Book | 6. Show Total Books |
| 7. Issue Book | 8. Return Book | 9. View Issued Books |
| 10. Show Due Books | 11. Show Late Books | 12. Exit |

Enter your choice: 2

----- All Books -----

Book Id : 1
Title : Cant Hurt Me
Author : David Goggin
Qty : 99

Book Id : 3
Title : Dopamine Detox
Author : Thibaut Meurisse
Qty : 100

===== LIBRARY MANAGEMENT SYSTEM =====

- | | | |
|--------------------|---------------------|----------------------|
| 1. Add Book | 2. Display Books | 3. Search Book |
| 4. Delete Book | 5. Update Book | 6. Show Total Books |
| 7. Issue Book | 8. Return Book | 9. View Issued Books |
| 10. Show Due Books | 11. Show Late Books | 12. Exit |

Enter your choice: 6

----- Total Books -----

Total Titles : 2
Total Quantity: 199

===== LIBRARY MANAGEMENT SYSTEM =====

- | | | |
|--------------------|---------------------|----------------------|
| 1. Add Book | 2. Display Books | 3. Search Book |
| 4. Delete Book | 5. Update Book | 6. Show Total Books |
| 7. Issue Book | 8. Return Book | 9. View Issued Books |
| 10. Show Due Books | 11. Show Late Books | 12. Exit |

Enter your choice: 7
Enter Book ID to issue: 1
Enter Student Name: Atul
Enter Student ID: 101

Book issued Successfully.....!!!!!!
Student : Atul
Issue Date: 2025-11-24
Due Date : 2025-12-01

```
===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit
```

Enter your choice: 9

----- Issued Books -----

Book Id : 1
Title : Cant Hurt Me
Student : Atul (101)
Issue Date: 2025-11-24
Due Date : 2025-12-01

```
===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit
```

Enter your choice: 8

Enter Book ID to return: 1

Enter Student Name: Atul

Enter Student ID: 101

Book returned on time. No fine.....!!!!

Issued record removed.....!!!


```

===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit

```

Enter your choice: 2

```

----- All Books -----

```

```

Book Id : 1
Title  : Cant Hurt Me
Author : David Goggin
Qty    : 99

```

```

-----
Book Id : 3
Title  : Dopamine Detox
Author : Thibaut Meurisse
Qty    : 100

```

```

===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit

```

Enter your choice: 10

```

----- Due Books -----

```

No due books.....!!!!!!!!!!!!!!

```

===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit

```

Enter your choice: 11

```

----- Late Books-----

```

No late books.....!!!!!!!!!!!!!!

```

===== LIBRARY MANAGEMENT SYSTEM =====
1. Add Book          2. Display Books      3. Search Book
4. Delete Book       5. Update Book        6. Show Total Books
7. Issue Book        8. Return Book        9. View Issued Books
10. Show Due Books   11. Show Late Books   12. Exit

Enter your choice: 12
Program Exited Successfully.....!!!!

```

8. Challenges Faced:

1. **Data Consistency:** When updating or deleting a book, the entire file had to be read into a list, modified in memory, and then rewritten completely. This was tricky to implement without losing data.
2. **String Parsing:** Reading lines from text files includes the newline character `\n`. Using `.strip()` was necessary to prevent formatting errors.
3. **Date Comparison:** Converting string dates stored in the text file back into Python date objects for comparison required careful use of `datetime.strptime`.

9. Learnings & Key Takeaways:

Through this project, I learned:

- How to perform **CRUD operations** (Create, Read, Update, Delete) using Python file handling.
- The importance of **Exception Handling** to make software user-friendly.
- Logic building for real-world scenarios like stock management and date-based fine calculations.
- How to format CLI output to make it look structured and professional.

10. Future Enhancements:

In future versions, the following features can be added:

1. **GUI Implementation:** Using Tkinter or PyQt to replace the command line interface with a graphical window.
2. **Database Integration:** replacing text files with SQLite or MySQL for better data security and scalability.
3. **User Authentication:** Adding a Login system for Librarians and Students.
4. **Barcode Scanner:** Integrating input via barcode for faster book entry.

11. Conclusion:

In this project, I learned how a Library Management System helps in keeping library records in an easy and organized way. By using Python, I understood how to add books, store details, issue and return books, and check their availability. Overall, this Library Management System makes library work faster, accurate and more efficient, and I gained good practical knowledge while making it.