

Library Management System Project Report

Submitted by

Amal Krishna K P
Muhammad Shuhaibh
Muhammed Adhil P P
Nadha K M

Contents

1	Introduction	1
2	Project Objectives	1
3	Database Design	1
3.1	Entity-Relationship Diagram	1
3.2	Normalization	1
4	Site Interface	3
5	Conclusion	6

1 Introduction

The Library Management System (LMS) project aims to create a structured database to manage library resources efficiently. Libraries hold various resources, and a well-organized LMS can streamline the management, tracking, and lending of books, faculty details, and student information.

In this project, we built a database model using PostgreSQL. This system ensures that users (students, faculty, and staff) can easily access and update resource availability, user information, and historical data.

2 Project Objectives

The main objectives of the Library Management System are as follows:

- To design a structured database for managing library resources.
- To create relationships between entities such as books, users, and lending records.
- To enforce normalization standards (up to 4NF) to reduce redundancy and maintain data integrity.
- To develop a system that allows for effective tracking and management of books and users.

3 Database Design

3.1 Entity-Relationship Diagram

The Entity-Relationship (ER) Diagram provides a conceptual model of the LMS. Key entities in the design include **book**, **publish**, **faculty**, **student**, and **library_user**. Relationships between these entities define how information is organized and accessed within the database.

3.2 Normalization

To ensure data integrity and reduce redundancy, normalization was applied up to the 4th Normal Form (4NF). Each table was normalized to eliminate dependencies:

- **1NF**: Ensures each field contains atomic values and removes duplicate columns.
- **2NF**: Removes partial dependencies by ensuring that all non-key attributes are fully functionally dependent on the primary key.
- **3NF**: Eliminates transitive dependencies.
- **4NF**: Ensures no multi-valued dependencies.

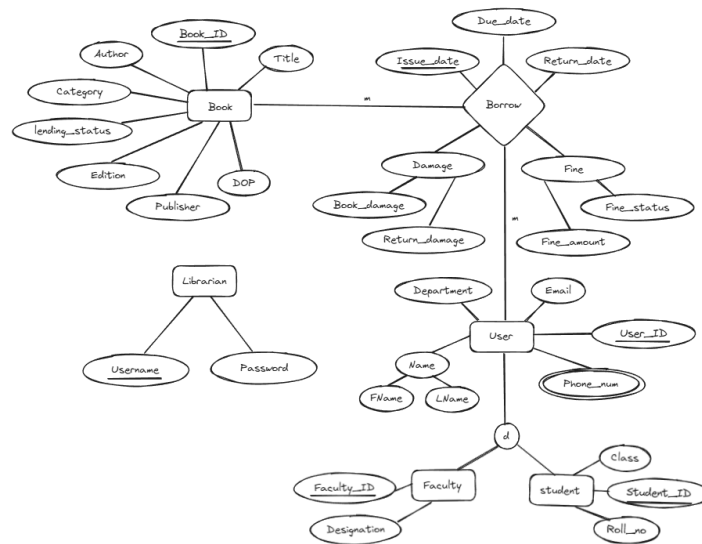
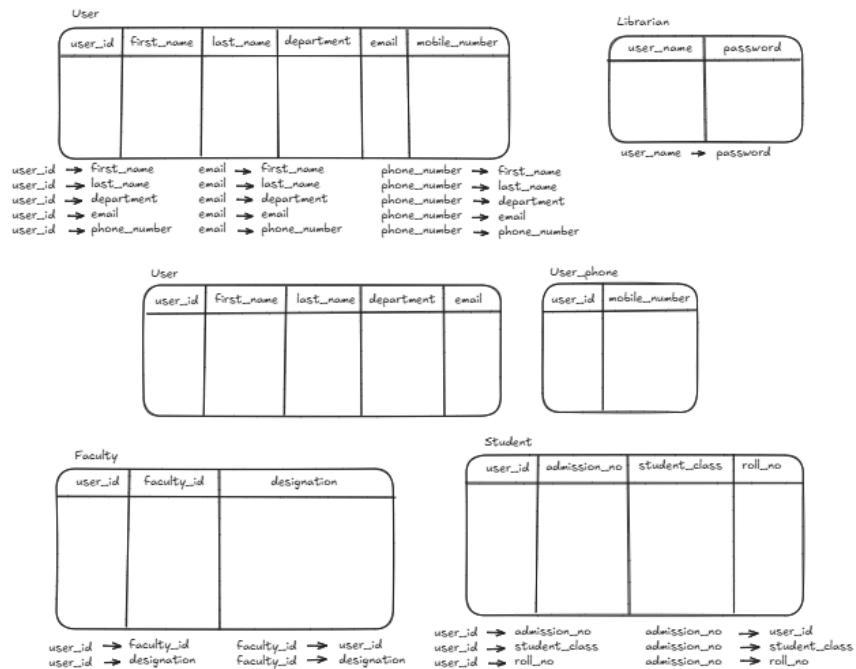


Figure 1: Entity-Relationship Diagram



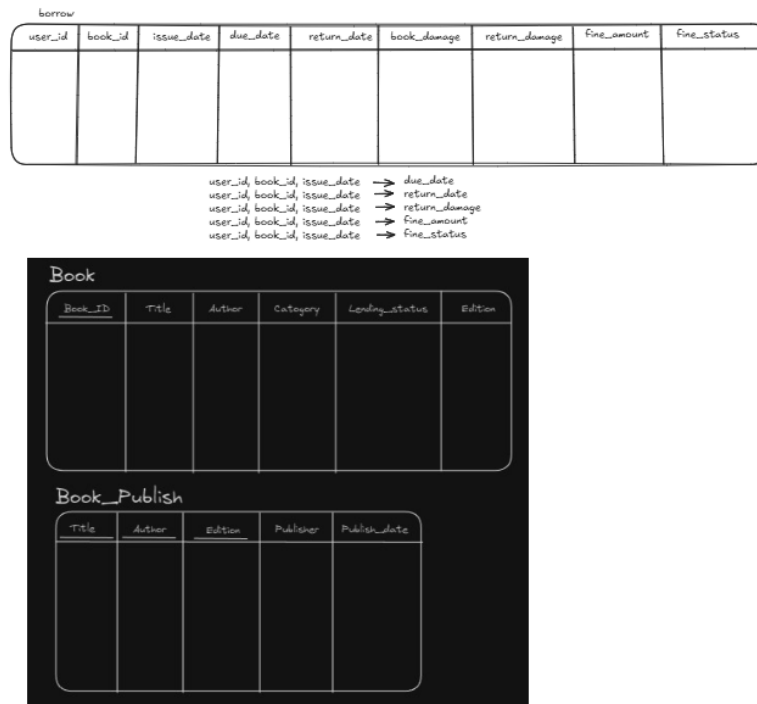


Figure 2: Normalization

4 Site Interface

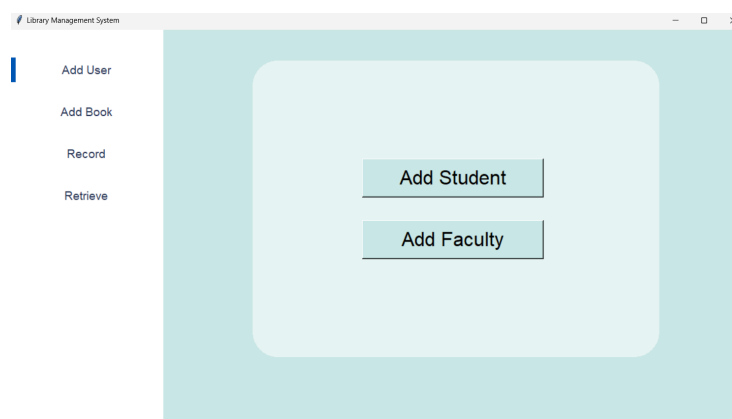


Figure 3: Add User Interface

Library Management System

- Add User
- Add Book
- Record
- Retrieve

Add Student

Name:

Admission No:

Year:

Roll no:

Department:

Email Id:

Mobile Number:

Figure 4: Add Student Interface

Library Management System

- Add User
- Add Book
- Record
- Retrieve

Add Book

Title:

Author:

Book Category:

Edition:

Publisher:

Publish Date:

Figure 5: Add Book Interface

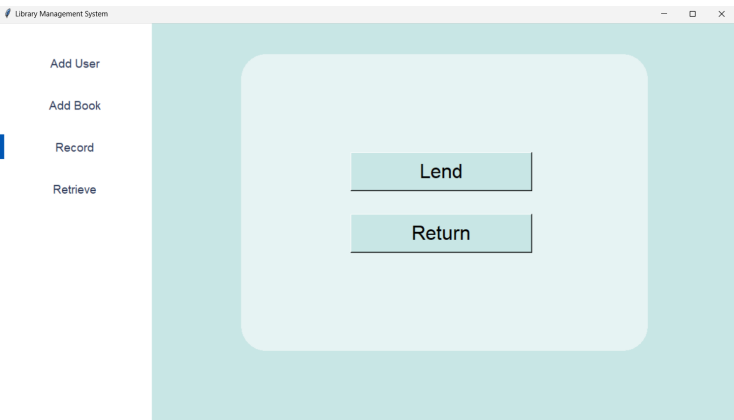


Figure 6: Record Interface

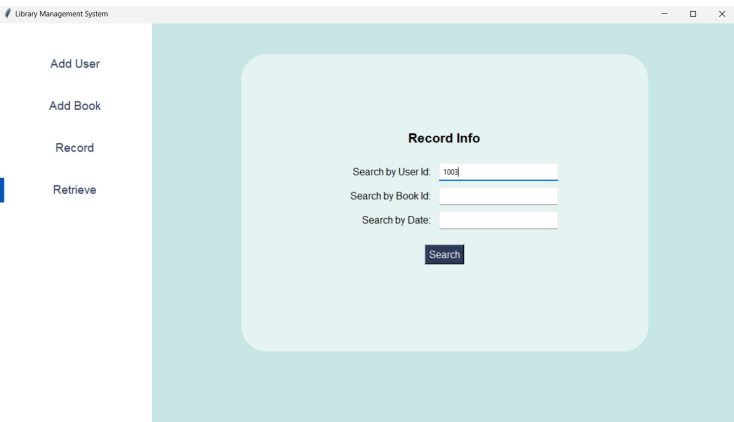


Figure 7: Retrieve Interface

The screenshot shows the 'Search Results' window, which displays a table of search results. The table has 11 columns: User ID, User Name, Department, Book ID, Title, Author, Issue Date, Due Date, Return Date, Book Damage, and Fine Amount. There are two rows of data.

User ID	User Name	Department	Book ID	Title	Author	Issue Date	Due Date	Return Date	Book Damage	Fine Amount
1003	Kavya Reddy	Civil	10001	In Search of Lost Ti	Marcel Proust	2024-10-05	2024-10-19	2024-10-18	No Damage	0
1003	Kavya Reddy	Civil	10008	The Republic	Plato	2024-10-22	2024-11-05	None	No Damage	0

Figure 2: Retrieval Result Window

5 Conclusion

The Library Management System project was successfully implemented with a robust PostgreSQL database and a user-friendly front-end interface. By following a structured ER design and applying normalization, the LMS effectively organizes library data and minimizes redundancy. This system enables smooth data management, supporting efficient library operations and user interaction. Future improvements include adding an interface for library staff and users and expanding the system to manage additional resource types like journals and digital media.