Project Proposal – Library Borrowing Tracker

Course: Database CSA

Group Name: Group 7

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Date: 4 November 2025

1. Project Overview

The **Library Borrowing Tracker** is a database-driven system designed to manage book collections, borrowers, and loan records efficiently. Many libraries still rely on manual logs or outdated spreadsheets, which often cause issues such as duplicate records, lost data, difficulty tracking overdue books, and general confusion of the librarian in managing many book records through spreadsheets.

This project aims to digitize and automate the library's core operations—borrowing, returning, cataloging, and tracking fines—through a simple web or desktop interface connected to a relational database so that librarians are able to manage and track the registered books in a more automated and convenient ways to avoid mismanagement.

2. Problem Domain

The traditional library system faces several challenges, such as:

- Manual book lending and returning records that are vulnerable to errors.
- Difficulty identifying which books are currently borrowed and by whom.
- Lack of a centralized database for quick searches, management, and/or reporting (e.g., overdue books).
- No automated way to notify late borrowers.

Our Library Database system addresses these issues by implementing a structured and normalized database with CRUD and search functionalities.

3. System Users

1. **Librarian** – Manages book inventory, borrower registration, and handles loans/returns.
2. **Borrower** – Can borrow, return, and view their loan history.

4. System Objectives

- To create a relational database that stores books, borrowers, and loan transactions.
- To support CRUD operations for all entities (Create, Read, Update, Delete).
- To track borrowed and returned books with timestamps and status updates.
- To provide a search/report function to find books, check availability, and list overdue loans.
- To ensure data consistency using constraints and normalization up to Third Normal Form (3NF).

5. System Scope and Features

- **Book Management** – Covers all activities related to organizing and maintaining the library's collection. Librarians can add new books, update existing information, or remove outdated records.
- **Borrowing Management** – Represents the process of borrowers taking out and returning books. This includes tracking which books are currently borrowed and maintaining borrowing history.
- **User Management** – Handles registration and maintenance of user data for both borrowers and librarians, ensuring each user's information is properly stored and managed.
- **Managing Relationship** – Describes the interaction between librarians and the library's book collection, including monitoring stock and performing administrative tasks.

6. Tools and Technologies

- **Database:** MySQL or PostgreSQL or SQLite or Firebase (tentative – yet to be discussed)
- **ERD Design:** Draw.io or ERDPlus
- **Frontend (later):** Flask or PHP (tentative – yet to be discussed)
- **Version Control:** GitHub

7. ER Diagram Overview

The conceptual Entity-Relationship Diagram (ERD) illustrates the overall structure of the Library Borrowing Tracker system at a high level. It focuses on how the main entities are related to one another without detailing foreign keys or implementation-specific attributes.

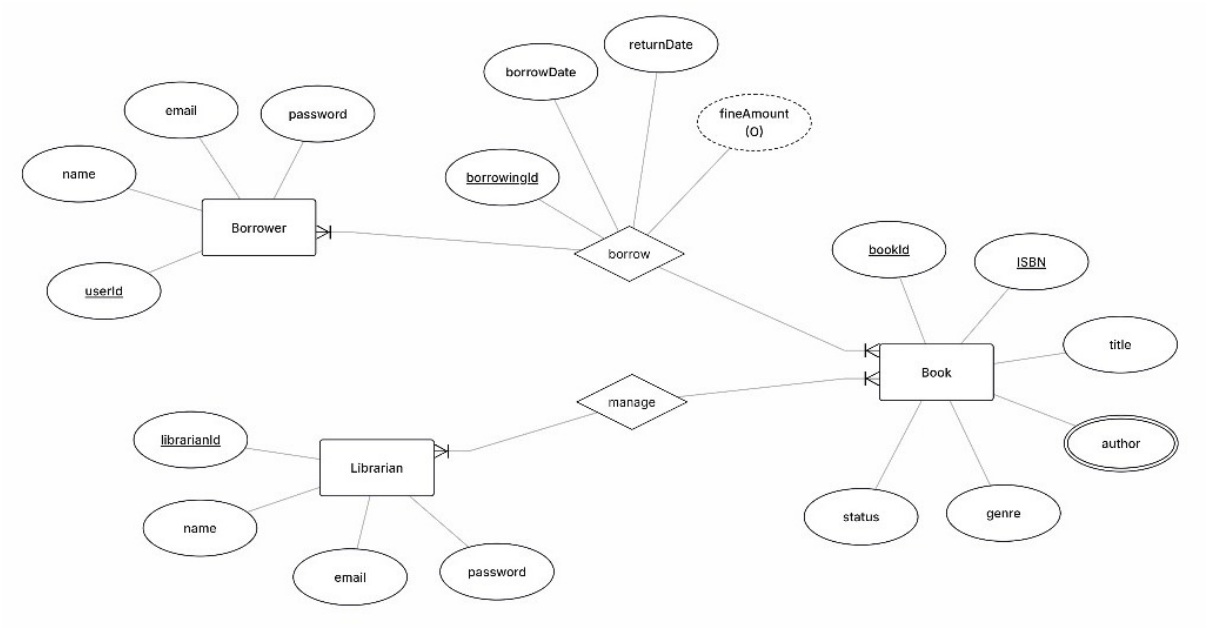

Figure 1: Conceptual Entity Relationship Diagram of the Library Borrowing Tracker System

The conceptual ERD consists of three primary entities: **Borrower**, **Book**, and **Librarian**, connected by two main relationships: **Borrow** and **Manage**.

- **Borrower** represents users who borrow books from the library. Each borrower has attributes such as *userId*, *name*, *email*, and *password*.
- **Book** represents the collection of books available in the library. It includes attributes such as *bookId*, *ISBN*, *title*, *author*, *genre*, and *status*.
- **Librarian** represents staff members responsible for managing books and overseeing transactions. Its attributes include *librarianId*, *name*, *email*, and *password*.

The relationships are defined as follows:

- **Borrow** connects **Borrower** and **Book**, representing the action of a borrower taking out a book. This relationship includes attributes such as *borrowingId*, *borrowDate*, *returnDate*, and an optional *fineAmount*. One borrower can borrow many books over time, while each borrowing instance involves exactly one book.
- **Manage** connects **Librarian** and **Book**, representing the librarian's role in maintaining the collection—adding, updating, or removing books. One librarian can manage multiple books, and each book may be managed by multiple librarians.

This conceptual model serves as the foundation for the logical and physical database design, ensuring that all key relationships and attributes are well-defined before implementation.

Repository Information

The full project files, including the ERD, schema, proposal, and implementation code, will all be available at the following GitHub repository:

`https://github.com/farrelta/DBProject_Group7_Library-Borrowing-Tracker.git`