Project Proposal – Library Borrowing Tracker

Course: Database CSA

Group Name: Group 7

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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 Many libraries still rely on manual logs or outdated spreadsheets, which often cause issues such as duplicate records, lost data, and difficulty tracking overdue books.

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.

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** – Add, edit, delete, or view book records.
- **Borrower Management** – Register new borrowers and update their details.
- **Loan Management** – Record borrow/return dates and calculate overdue fines.
- **Search & Reporting** – Search by title, author, or borrower; generate reports of overdue books.

6. Tools and Technologies

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

7. ER Diagram Overview

The following diagram illustrates the relationships between the main entities in the Library Borrowing Tracker system.

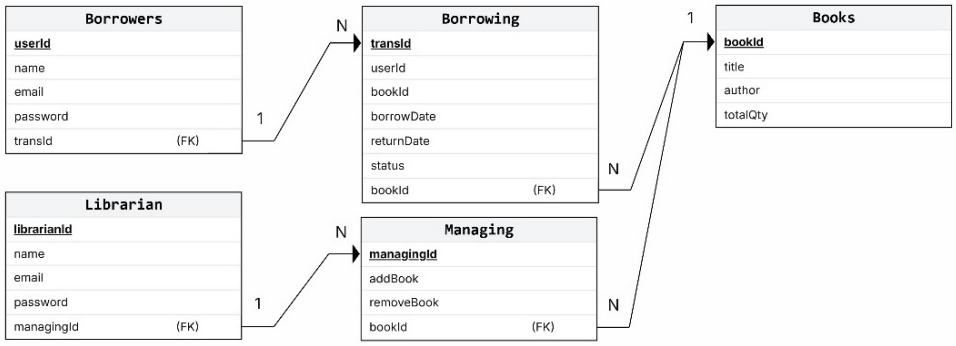

Figure 1: Entity Relationship Diagram of the Library Borrowing Tracker System

The ER Diagram for the Library Borrowing Tracker consists of five main entities: **Borrowers**, **Librarian**, **Books**, **Borrowing**, and **Managing**. Each entity plays a key role in tracking book transactions and management activities within the library system.

- **Borrowers** (*userId, name, email, password, transId (FK)*)
  Represents users who borrow books from the library. Each borrower has a unique ID and can be linked to multiple borrowing transactions.
- **Librarian** (*librarianId, name, email, password, managingId (FK)*)
  Represents staff responsible for managing the library's collection and overseeing borrowing and returning activities.
- **Books** (*bookId, title, author, totalQty*)
  Contains information about all books available in the library, including the total quantity of copies for each title.
- **Borrowing** (*transId, userId, bookId, borrowDate, returnDate, status*)
  Represents the record of a book being borrowed. It links a borrower to a specific book, records the borrowing and return dates, and keeps track of the loan status (e.g., borrowed, returned, overdue).
- **Managing** (*managingId, addBook, removeBook, bookId*)
  Records librarian activities related to adding or removing books from the library database. It connects each librarian to the books they manage.

Relationships:

- A **Borrower** can make many **Borrowing** transactions, but each transaction belongs to one borrower.
- A **Book** can appear in many **Borrowing** transactions.
- A **Librarian** can perform multiple **Managing** actions.
- Each **Managing** record is associated with one **Book**.

Cardinalities:

- One Borrower → Many Borrowing
- One Book → Many Borrowing
- One Librarian → Many Managing
- One Book → Many Managing

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`