
Design Document (Report)

a. Design Choices

Tables Created and Purpose:

- **Author:** Stores information about book authors. Helps normalize the data and avoid repeating author names in every book entry.
- **Genre:** Categorizes books into genres (e.g., Fiction, Science, History) for better filtering and reports.
- **Book:** Main entity representing all library books. Includes ISBN, Title, AuthorID, GenreID, availability, and shelf details.
- **Borrower:** Holds student/user details. Essential for issuing and tracking books.
- **Issue:** Records each instance when a book is issued to a student, with issue date and due date.
- **Return:** Stores return date and any fine amount, connected to the Issue table.
- **Fine:** Maintains fine history separately, allowing detailed reporting (reason, amount, date).

Data Type Choices:

- **INT:** Used for primary keys (e.g., BookID, BorrowerID) for simplicity, indexing, and auto-increment.
- **VARCHAR:** Used for textual fields like Name, Title, GenreName, ContactNumber, and Email to allow flexibility in input.
- **DATE:** Chosen for IssueDate, DueDate, ReturnDate, and FineDate for accurate date calculations.
- **DECIMAL(6,2):** Used for FineAmount to handle monetary values properly.

b. Assumptions

- Each student can **borrow up to 3 books at a time**.
- Books must be returned **within 14 days** of issue.
- If a book is **returned late**, a **fine of ₹2 per day** is applied.
- Only students registered in the system can borrow books.
- A book is marked “Unavailable” if all copies are issued.

c. Additional Features

1. Fine Calculation Logic:

- Return table captures fine amount.
- System checks if the return date is beyond the due date.

- Fine = Days overdue * ₹2
 - 2. **Book Availability Check:**
 - Before issuing a book, system checks AvailableCopies > 0.
 - 3. **Overdue Alerts:**
 - Queries can highlight students who haven't returned books beyond due date.
 - Power BI can show these as charts or alerts.
 - 4. **Popular Books/Genres Tracking:**
 - Use Issue table to count how many times a book or genre has been issued.
 - 5. **Student Borrowing History:**
 - Join Borrower, Issue, Return to track borrowing habits per student.
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d. Enhancements and Their Benefits

- 1. For Librarians:** - Can quickly find overdue books and apply fines. - Real-time insights into which books are most or least used. - Reduces time spent tracking returns manually.
 - 2. For Students:** - Know which books are available before visiting. - Avoid fines by getting alerts or viewing due dates. - See their own borrowing history.
 - 3. For Administration:** - Analyze patterns of overdue or lost books. - Promote reading by seeing which genres students prefer. - Make better decisions on book purchasing and stocking.
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Prepared by: Divya Shree

Tool Used: MySQL Workbench, Power BI