Design Document

The Users of the Library Management System are Librarians. It helps them to carry out various functions like searching a book, checking out books, checking in books, tracking fines, updating payments and borrower management.

The application has Node.js back end and React front end.

The library database was created as per the given schema initially using MYSQL Workbench. The books and borrowers data is normalized and loaded into tables.

The react app makes appropriate REST api calls to the server. Server interacts with the library database and returns required result which is again rendered by the react app.

Below is the detailed functionality of services:

1) Search for a Book
- Librarian can search for books using ISBN or title or Author name. Search is case insensitive and substring matching is also supported.
- Availability details of each of the returned books is also displayed along with ISBN, Title, Author details.
- Empty search results in returning all the books in database.

2) Check Out Books
- Librarian can select a book from the list of selected books.
- A book can be checked out only if it is available.
- Check out is not possible for Unavailable books.
- Card Id of Borrower is necessary to check out and is required to be entered on prompt.
- Each Borrower can check out only a maximum of 3 books. More than 3 check outs without any check in of previous books, results in failure of check out.
- Check out creates a new loan tuple in BOOK_LOANS table with a new loan id, current date as Date out and Date due as 14 days from current date.

3) Check In Books
- Librarian can search for book loans using by book id or card id or borrower name.
- Search is case insensitive and substring matching is also supported.

- Check In of Books is simply updating the date in as current date.

4) Fines
- All Fines are displayed in Fines Page with an option to hide or show paid fines.
- Fines of a borrower that are unpaid can be paid by selecting the pay fine option.
- All the loans of borrowers with fines will be displayed, of which librarian can record payment.
- A Fine cannot be paid for an unreturned book.

5) Add new Borrowers
- Librarian can add new borrowers to the system by filling the required details.
- Successful creation of a borrower generates a new card id.
- Duplicates in SSN are not allowed in database and rejects such additions.

Assumptions
- Only ISBN13 has been considered in the entire processing.
- Search values are simple (Ex: William) not complex(Ex: Abdul Kalam Wings of Fire)

Technological Details

Front End:
- React 18/17
- react-router-dom 6
- axios 0.27.2
- bootstrap 4.6.2

Back End:
- Express (web framework)
- Node.js (v16.17.1)
- Mysql2 (npm module)

Database:
- MySQL (8.0.31)

I used python pandas to parse the books file and separate authors data into new text files. Then used excel on individual files to normalize.