Design Document

1. Introduction

1.1 Purpose

The purpose of this document is to describe the implementation of an application that interfaces with a backend SQL database implementing a Library Management System.

1.2 Scope

Document describes how can Librarians use this application for searching a book, checking in and checking out books, adding borrower details and updating and calculating book fines.

2. Design Overview

2.1 Description of Problem

Application users are Librarians. The activities of librarians in Library Management are implemented.

2.2 Technologies Used

PHP, HTML and CSS are used for GUI
MySQL is used for database

2.3 System Architecture

2.3.1 Navigation bar

A navigation bar is provided on the left of every page of this application. This navigation bar enables users to navigate between the pages which performs different actions as below:

- Searching a book
- Check In/Check Out a book
- Borrower Management
- Update/Refresh/Display Fines

2.3.2 Searching a Book

In this functionality user can sear a book given any combination of ISBN, title, and/or Author(s) name.
The search results are shown in a table below the search bar. Availability of the books is also shown next to each displayed row containing book details.

2.3.3 Checking Out a book

This can be done on entering ISBN of the book, Borrower ID and clicking on submit button. A book is checked out after doing the below validations:

- Valid ISBN and Borrower ID
- Availability of the book
- Each borrower is permitted to borrow maximum of 3 books
- The date_out by default set to today's date and due_date is set to 14 days after the date_out

2.3.4 Checking In a book

This can be done on entering ISBN of the book, Borrower ID and clicking on submit button. A book is checked out after doing the below validations:

- Valid ISBN and Borrower ID
- Book should be borrowed by the same borrower with entered Borrower ID

2.3.5 Borrower Management

This is to create new borrowers in the system. Following validations are included

- All name, SSN, and address attributes are required to create a new account
- Generate Borrower ID
- Borrowers should possess exactly one library card. This check is based on ssn provided.

2.3.6 Fines

The following features are present

- Fines are assessed at a rate of $0.25/day
- Button is provided to update/refresh entries in the fines table
- Estimating the fine amount for returned books and those which are still out
- Mechanism for librarians to enter payment of fines
- Not to allow payment of a fine for books that are not yet returned
- Display of Fines should be grouped by card_no. i.e. SUM the fine_amt for each borrower
- Display of fines by filtering out previously paid fines

2.3.7 Styling

Layout.css is used for styling the page

2.3.8 Database

Following tables are created in Library Schema:
Authors(Author_id,Author_name)
Book(Isbn,Title,Cover,Publisher,Pages)
Book_Authors(Author_id, Isbn)
Book_Availability(Isbn,Availability)
Book_Loans(Loan_id, Isbn,Card_id, Date_out, Due_date, Date_in)
Borrower(Card_id, Ssn, First_name, Last_name, Email, Address, Phone)
Fines(Loan_id, Fine_amt, Paid)

3. References

- Fundamentals of Database Systems (7th Edition) 7th Edition by Ramez Elmasri and Shamkant B. Navathe
- https://www.w3schools.com/php/default.asp