Design Document

Project Setup Environment: The Schema has been built as per the actual schema provided. The schema has Book, Book_Authors, Authors, Borrower, Book_loans, Fines tables. The Schema is developed using MySQL (Community edition). The Front End and Back End is developed using PHP (version-7.3) and connected to the MySQL through MySQLi interface. MAMP is used to run the PHP pages, connect with MySQL and deploy the project. Used the data from the books.csv and borrowers.csv files.

Graphical User Interface (GUI) and Overall Design:

- The Search page deals with the tables Book, Authors and Book_authors. The Keyword searched in the search page is queried and the results are displayed in the Book_Loans page only if the book is available.
- The Book_Loans page is provided with the table of filtered book based on the search and the Check_OUT buttons are provided for each row of data.
- The Check_OUT buttons are provided such that the particular book is selected for checked out. The ISBN and Author_name details of the particular book that is chosen for check out is pushed to the Checkout page through the URL of the Checkout page.
- In the Checkout page the ISBN and Author_Name is retrieved, then the Loan_ID is incremented automatically to the next number. The Card_ID is obtained from the user as input. After checking all the constraints, if the user is eligible to take the book then the Load_ID is assigned with the necessary details of the book and the borrower in the Book_Loans table.
- The Check out details is updated in the Book_loans table with the date of check_out and the due date is updated as 14 days after the check-out date.
- The Checkin page is provided to Check in the returned book. The ISBN or Card_ID or Borrower name is obtained as the input from the user for searching the book to be Checked-IN. After searching Book_loans based on the keyword provided by the user, the result is displayed as a table with the corresponding details of the book to be checked-in and with the Check_IN button.

- The date_in column in the Book_loans table of that particular book is updated automatically with the date when the user checks in the book.
- The borrower page is also provided to include the new Borrower and provide him/her with a new automatically incremented Card ID. SSN, Borrower Name, Borrower Address, Contact Number is obtained as input from the user. These details are updated in the borrower table.
- The fines table is calculated (No. Of Days * $0.25) and updated by obtaining the input from the book_loans table. The sum of fines of each user is provided by grouping based on the Card_ID. Additionally, the Card_ID is obtained as input from the user to display the fines of that borrower, the borrowed book details and fine for each book.
- The Librarian can make the fines as paid after receiving payment from the user. The fines can be paid only after checking whether the borrower had returned the book or not.

Database Design:

- The Book table includes ISBN, Title and another column is augmented to check and update the book availability as (YES/NO). The ISBN is the primary key of Book table.
- The Book_authors table includes Author_ID and ISBN columns as primary keys.
- The Authors table includes Author_ID as primary key and Name. The Tables Book_authors and Authors can be referenced using Author_ID.
- The Borrower table includes Card_id(Primary Key), SSN, Bname, Address, Phone Number and num (No. of total books borrowed). The borrower is not allowed to borrow more than 3 books.
- Book_loans table includes Loan_ID , ISBN, Card_ID, date_out, due_date ,date_in and augmented Author name column because same book with same ISBN can have different Author name.
- The fines table is updated using the Book_loans table the fines are calculated (No. Of Days * $0.25). It includes Loan_ID (Primary Key), Fine_AMT, Paid columns.

Webpage and Database Constraints:

- The search keyword is split into multiple words and searched based on each word and the whole keyword. The input can be ISBN, Title, Author name. The output is ISBN, Book_Title , Book_author and availability. The Author Name for same ISBN are grouped together by using GROUP BY of ISBN.
- The Searched query for the book needs three tables join operation, so I created a view for two table join operation (author table and book_author table). Used that View for the Join operation with another table (book table).
- The books are checked out by giving Loan_ID as the input. The borrower can borrow only 3 books. If more than 3 books are checked-out, the user is provided with the error message "The Borrower exceeds three Book Loans". It also checks the availability of the books. The Date_out is updated as the date when the book is check_out(default today's date).
- The Check in is completed by updating the Date_in of Book_loans table (with the default today's date). The Check in book is searched by giving a keyword which is searched among ISBN, Card_ID and name of the borrower.
- The borrower management includes updating a new borrower with the SSN, Name, Address and Contact. The SSN of the borrower is checked if it is already updated in the table and allowed to possess exactly one library card. Card ID is incremented automatically from the maximum or last updated card number.
- The Fines are calculated based on the No. of days from the Due Date and the Date In. The Paid column is updated with (1/0) 1- if paid, 0- if not paid. If the date-in is NULL means the borrower has not returned the booked, so error message will be popped up stating that "The borrower must check in the book before paying the fine".