# LIBRARY MANAGEMENT SYSTEM DESIGN DOCUMENT

**Net ID : gxr170001**

**PURPOSE :**

The library management system is for the use by librarian to keep track of books available, their authors, books borrowed, books returned, fines on each book for late returns and the borrowers in the system. The information is stored in lms database. The GUI to interact with the database and perform operations are available in Java.

**Database schema design :**

Database name : **lms**

1. Table **book** :
   Contains primary key ISBN & title of the books.

2. Table **authors**:
   Contains primary key Author ID and Author Name.

3. Table **book_authors** :
   Contains primary key ISBN of every book and their corresponding primary key Author ID. The ISBN in this table must be present in table Books and Author ID must be present in table Authors due to foreign key constraints.

4. Table **borrower** :
   Contains primary key card ID, unique SSN, full name, address and phone number of the borrowers in the system.
   The Card ID is autogenerated and autoincremented for borrowers.

5. Table **book_loans** :
   Contains primary key Loan ID, ISBN, Card ID, Check out date, Due date & Check in date of a book.
   The loan id is autogenerated and autoincremented for transaction, ISBN must be present in the table Books, card id must be present in the table Borrower due to foreign key constraints.

6. Table **fines** :
   Contains primary key Loan ID , Fine amount and Payment status of fine.
   Loan ID has must be present in table book_loans due to foreign key constraint.
   'paid' is a tinyint field where if the fine is paid it is set to 1 else it is set to 0.

## Design Decisions :

1. Table borrower will have the full name (first name and last name) in the field fname.
2. SSN is an input password field for user privacy and is of the format XXX-XX-XXXX in Borrower tab.
3. The application is started from Borrower.java from NetBeans.

## Design Specifications :

1. **To search for a book :**
   - Query in table book, table book_authors to get ISBN, Title, Author Name to be displayed in search results.
   - Query in table book_loans to set availability of book to be displayed in search results.

2. **To check-out a book :**
   - Query in table book_loans to check if book is available for check out.
   - Error message displayed if book is not available for check out.
   - If book is available to be checked out, getting card_id as input from user.
   - Query in table book_loans to check if the card_id has more than 3 books checked out and not checked in back.
   - If more than 3 books are checked out and not checked in back for the card id entered, error message displayed.
   - If lesser than 3 books are checked out for the card id entered, record inserted in table book_loans .

3. **To check-in a book :**
   - Query in table book, table book_loans, table borrower to get ISBN, Card ID and Borrower Name to be displayed in search results.
   - To check in the selected result, update table book_loan and set date_in with check in date.

4. **To add a new Borrower :**
   - Get fields Name, Address, Phone and SSN as input from user.
   - Insert in table borrower the input values.
   - If the input SSN already exists in table borrower, error message displayed.

5. **To view current fines in the system :**
   - Query in table book_loans and table fines to insert a record in tables fines which has fine to be applied on it and update records whose fines are to be updated.

6. **To pay a fine :**
   - Query in table book_loans and table fines to find the loan amount for each ISBN
   - Query in table book_loans to check if book has been checked-in.
   - If the book has not been checked-in, error message is displayed.
   - If the book has been checked-in, fine is set to be paid.
   - Query in table book_loans and table fines to refresh the fines applicable

**Assumptions :**

1. There is only 1 instance of every book. Hence a book can either be checked out or available.