Library Management System

The project is implemented in Eclipse IDE Oxygen Release (4.7.0) and the backend Database Management is handled using MySQL Release (5.7).

Tables or Relations used to manage the seamless GUI are –

a. BOOK
b. AUTHORS
c. BOOK_AUTHORS
d. BORROWER
e. BOOK_LOANS
f. FINES.

Assumptions –

a. Borrower SSN is a 9-digit number.
b. ISBN is assumed to be a 10-character long field.
c. Fines job has to be run manually each day.
d. Show Fines page will only show the pending dues if any.

Design Decisions –

First and foremost, we normalized and uploaded raw data to the MySQL Database. In order to normalize the data, I generated auto-incremented SSN for borrowers, auto-incremented Loan_id for BOOK_LOANS table.

Further, since some books had multiple authors so I took care of processing that data while inserting that into Library Database. Also, I segregated borrower first name, last name, city, state from raw data and inserted that into BORROWER relation.

There are two ways to check-out a book, either from Check-out page or from the View book page. Check-in page will show only if the book is already checked-out, otherwise not.

Apart from that for detailed explanation please go through each page description below.

Key and Foreign Key Constraints on Database --

Schema diagram or library.sql depicts all the constraints on the database relations.

Graphical User Interface Details –

The front end is built in JSP and the functionality of each page is described below:

View Book

1. On this page, a librarian can search if the book is present in the library or not. The page has one search field wherein librarian can enter Book ISBN or Book Name or Author Name and hit ENTER to search for a book.
2. The page will also give an option to check-out the book if available.
3. If book is not available (means the book is already checked-out), it will show it as "Not Available".

Add Borrower

1. This page provides a form to add new Borrower in the system.
2. All the fields in the form our mandatory with the unique SSN for each Borrower. Also, the code checks if the entered SSN and Phone number are valid 9-characters, 10-characters fields respectively or not. If not, it will ask borrower to correct the entered information.
3. Once entered, click "Save Form".
4. If user has mentioned Duplicate SSN, then it will display a pop-up to enter unique SSN.

Check-out Book

1. This page helps a librarian to check-out a book. Librarian can enter Book ISBN or Book Name or Author Name to search the book that is required to check-out.
2. Once clicked on "Check Out", it will ask for Borrower ID. If Borrower (assuming already present if not divert it to "Add Borrower" page) has already checked-out 3 books then it will generate the pop-up to discard check-out else will pass.

Check-in Book

1. The page will again give you a search field to check-in a book. A librarian can enter ISBN or Book Name or Author Name to search the book and click "Enter".

2. The page will display results only when the entered book is previously checked-out, otherwise it will show a pop-up that book is not checked out.
3. Once checked-in, the code will check for any pending dues. If yes, it will direct the librarian to pending dues page.

Show Fines

1. This page shows aggregate fines of all borrowers (i.e, grouped by Card ID) and will give show more option to pay the fines.
2. If clicked on "Show more", it will show the fines of individual borrower and help you to pay the dues.

Update Fine Table

1. It's a button when clicked will trigger the backend procedure, which will update the Fines table as per Book_loans data. Ideally it should be the backend job which should run every mid-night but here we are incorporating the same mechanism using this button.

Add Book (Additional Functionality)

1. This page gives a form to add new book to the library.
2. User must provide a 10-digit ISBN, Book Title and Author Name to add the book to the system.
3. If a book is written by multiple authors, then please add each author individually (don't enter comma separated fields).