

**‘COVER TO COVER’
LIBRARY MANAGEMENT
SYSTEM
DESIGN DOCUMENT**

The Library Management System has been designed for the Librarians at the 'Cover to Cover' Library and it provides the following functionalities

1. Book Search and Availability
2. Check Out Books
3. Check In Book
4. Create Borrowers
5. Manage Fines and Payments

SYSTEM ARCHITECTURE

- **Programming Language:** Java
- **Graphical User Interface:** JSP, Servlet, Bootstrap js
- **DMBS:** MySQL
- **IDE & Tools Used:** Eclipse, MySQL Workbench
- **Seed Data:** TSV, CSV converted into SQL queries through a java script and normalized data was seeded into the database
- **Database Schema:**
 - BOOK: This table provides information about all the books in the Library
 - ISBN, ISBN13, Title, Cover, Publisher, Pages and Availability
 - AUTHORS: This table provided information about all the Authors associated with the Books
 - Author_ID, Name
 - BOOK AUTHORS: Mapping table between the books and their author
 - ISBN, Author_ID
 - BORROWER: This tables contains information about all the borrowers in the system
 - Card_ID, First_name, Last_name, SSN, email, Address, city, state Phone
 - BOOK LOANS: This table contains information about the books loaned [i.e checked out] by each borrower
 - Loan_ID, Card_ID, ISBN, Date_Out, Date_In, Date_Due
 - FINES: This table contains the information about all the fines that are pending or paid by a Borrower
 - Loan_ID, Fine_Amt, Paid

DESIGN DECISIONS AND ASSUMPTIONS

Book Search and Availability

- The Librarian can search based on Book Title, ISBN and or the author names through the single search field provided
- Substring matching is allowed on all the three fields
- If no search input is provided, then all the list of books in the system are displayed
- The details of the book along with its availability is displayed
- There is no minimum no of characters needed in the input to begin the search
- There is only one copy of each book that exists in the library

- ISBN10 [ISBN] version of the book reference has been considered through the entire flow

Check Out

- The Librarian can select multiple books for check out from the Book Search page
- The system has a validation in place if
 - The no. of books selected are more than three
 - The selected books involve any unavailable books
 - The borrower already has some loaned books and is now trying to check out books which would make the total loaned books count more than three
- The due date is set to 2 weeks [14 days] from the date of check out

Check In

- The Librarian can search for the list of books from borrower that are to be checked in
- Search can be based on the Book ISBN, Borrower ID or any substring on the borrower's name
- At most one book can be checked from the Check In page in this version

Create New Borrowers

- The Librarian can create a new borrower in the system
- The required fields are the first & last name, address, SSN
- Phone number, Email are optional fields
- The system throws a validation message if a new borrower is being created with an existing SSN in the system, thereby enforcing a borrower to have only one card Id
- The Borrower ID is automatically generated in the earlier system format [6 digit number prefixed with the necessary number of zeroes]
- The card Id is assumed to be six-digit number. Even if the card id is a single digit number, it must be left padded with appropriate zeros
- In some places in the application the terms Borrower ID and Card ID have been used interchangeably

Manage Fines and Payments

- The Librarian can check for fines for a particular borrower and make payment for them
- When the payment is made against the fines for a particular borrower, only the fines for the returned books are cleared
- An error message is returned if the Librarian tries to clear the fines for a borrower who still has some loaned books
- The Librarian can check all the unpaid and the paid fines for all the borrowers
- When searched for a particular borrower, only the borrower's unpaid fines are shown
- The Librarian can refresh the fine amount by clicking the refresh fines button once a day
- The total fine amount against each borrower is displayed, i.e details of the individual books against which fines are amounted are not displayed in this version