

## DESIGN DOCUMENT

**Language:** Java, JavaScript, MySQL

**Operating System:** Windows 10

**Platform:** Eclipse

**Software Libraries:**

- gson-2.2.2
- javax.json-1.0.2
- mysql-connector-java-5.1.45-bin
- org.json

**Server:** apache-tomcat-7.0.85-windows-x64

**Technologies used:** JavaScript, Java, jQuery, AJAX, MySQL, Bootstrap, CSS, HTML

This project uses JSP for the front-end and MySql database at the back-end.

## DESIGN FLOW

- Once we have opened the home page in the browser say Book Search page, on writing a search query and clicking on submit button, the javaScript calls the jQuery.
- jQuery forms the request parameters and hits the java servlet along with passing the request parameters as the input arguments to the servlet.
- The doGet function of the servlet is invoked.
- The servlet calls the respective java class.
- First database connection is established.
- Then according to the functionality, JSON object is created with the result appended.
- JSONArray is returned to the servlet.
- From the servlet JSONArray is returned to the javaScript and rendered to the browser.
- The same flow is followed for each of the four functionalities namely, Book Search, Book loans, Borrower Management and Fines.

## DESIGN DECISIONS

- ISBN is of 10 characters.
- In Book Search functionality, substring matching is enabled.
- Loan id is auto incremented.
- Borrower id is auto incremented.
- Fine is a dollar amount having 2 decimal places.

## BACKEND

### Tables:

- Book
- Authors
- Book\_authors
- Borrower
- Book\_Loans
- Fines

## CODE

### Servlets:

- *PopulateBook*  
Servlet for book search functionality.
- *CheckOutServlet*  
Servlet for Check out functionality.
- *CheckInServlet*  
Servlet for getting relevant records for Check In.
- *CheckInServletUpdate*  
Servlet for updating the selected record for check in.
- *NewBorrowerServlet*  
Servlet for adding a new borrower.
- *FineUpdateServlet*  
Servlet for updating the fines table.
- *FinePaymentServlet*  
Servlet for fetching the relevant records from fines tables.
- *FinePaymentPayServlet*  
Servlet for payment of the fine for the selected record.
- *FinePaymentDisplayServlet*  
Servlet for displaying all the fines records group by the borrower.

### Java:

- DbConnection
- Book
- FetchBook
- CheckOut
- CheckIn
- CheckInUpdate
- NewBorrower
- FineUpdate

- FinePayment
- FinePaymentPay
- FinePaymentDisplay

## JavaScript:

- *BookSearch*: Searches for a book, given any combination of ISBN, title, and/ or Author(s)
- *CheckIn*: Facilitates check in of the books.
- *CheckOutIn*: Facilitates check out of the books
- *BorrowerEntry*: Facilitates adding new borrowers.
- *Fines*: Facilitates updating fines.
- *FinePay*: Facilitates payment of fine and display of all the fine details.
- *Index*: Main page.

## FUNCTIONALITY:

- **BOOK SEARCH AND AVAILABILITY**
  - Provided a single text search field.
  - Search is case insensitive.
  - Given any combination of ISBN, title, and/ or Author(s), it searches for the books and displays all the relevant records.
  - Displayed output consists of ISBN, Book Title, Author(s) name, Book Availability.
- **BOOK LOANS**
  - **Check Out**
  - Provide following details – Borrower Card Id and Book Isbn number.
  - Click on check out button.
  - A new tuple is created in BOOK\_LOANS table.
  - If a borrower has already borrowed 3 books, check out fails displaying appropriate message.
  - If the book is already checked out and currently unavailable, check out fails displaying appropriate message.
  - **Check In:**
  - Provide following details – Card Id, Book Isbn, Borrower Name.
  - Click on submit button. It fetches all the relevant results.
  - Click on the row specifying details of the book that needs to be checked in.
  - Click on check in button.

- Check in date is updated in the corresponding BOOK\_LOANS row.

- **BORROWER MANAGEMENT**

- Provide the following Details – SSN, Name, Address, Phone Number.
- Click Submit.
- A new row inserted in BORROWER table.
- Borrower can have only one library card. If a borrower already has a card then insertion fails with an appropriate message.

- **FINES**

- Fines imposed at \$0.25 per day.
- **Fine Update**
- Click on Update Button. The fines table is updated.
- **Fine pay/display**
- Provide the details – Card Id and Book ISBN.
- Click on Get Fine Details Button.
- It fetches all the fine records for that borrower and that book.
- Click on the record for which fine has to be paid.
- Click on Pay button.
- Payment of the fine for which book is yet not returned fails with an appropriate message.
- **DISPLAY**
- Click on Display fines button.
- For each borrower it displays the total fine paid and total fine pending.