

LIBRARY MANAGEMENT SYSTEM

The applications is developed using Java, JSP, HTML and Javascript.

Th source code is divided into 3 packages : connection, servlets, valueObj

Connection has a connection class is used to set up the database connection. Each functionality is written in a separate “servlet” and “value object” classes are used to support the transfer of data from java to frontend.

Connection : MyConnection

Value objects : SearchFields, FineFields, CheckInFields

Servlets : AddBorrower , BookSearch, BookCheckOut, BookCheckIn, RefreshFine, PayFine. ShowFine, BookCheckInSearch is used as helper servlets to display the search results before PayFine and BookCheckIn respectively.

GUI is written using JSP, HTML and inline CSS in a single file, index.jsp, as it is a single page application and does not need re routing. Javascript file, library.js, is used to handle all function calls, HTTP requests and front-end validations.

Folder structure :

- >src
 - >connection
 - >MyConnection.java
 - >servlets
 - >AddBorrower.java
 - >BookCheckIn.java
 - >BookCheckInSearch.java
 - >BookCheckOut.java
 - >BookSearch.java
 - >PayFine.java
 - >RefreshFines.java
 - >ShowFines.java
 - >valueObj
 - >CheckInFields.java
 - >FineFields.java
 - >SearchFields.java
- >WebContent

```

->javascript
    ->library.js
->jsp
    ->index.jsp

```

Database schema changes :

1. First name and last name are stored in separate columns for borrowers.
2. Available column is added in Books table to indicate the current availability of the book in Boolean format. This is used to easily identify if a book is available for checkout. As every book search needs to know the availability, a dedicated column is used to avoid multiple frequent querying of book_loans table for better performance.
3. ISBN10 is used to identify the book. ISBN 10 is ignored as only both ISBN10 and ISBN13 are unique columns and one is sufficient to uniquely identify each book.
4. Borrower address has separate Address, City and State columns keeping in mind scalability and all the columns are kept in the Borrower table as the street address plus city plus state can uniquely identify an address. Assumption : country is considered to be only United state. If we want to extend it to add more countries, a new country column can be added to borrower table.
5. Borrower SSN column has unique restriction as the primary key for the table is card_id but every SSN(borrower) can have only one card id. The system does not allow adding a new borrower if the SSN is already present in database.

Tables :

```
mysql> desc authors;
```

Field	Type	Null	Key	Default	Extra
AUTHOR_ID	int(100)	NO	PRI	NULL	auto_increment
NAME	varchar(200)	NO		NULL	

```
mysql> desc book;
```

Field	Type	Null	Key	Default	Extra
ISBN	varchar(50)	NO	PRI	NULL	
TITLE	varchar(200)	NO		NULL	
AVAILABLE	varchar(5)	NO		NULL	

```
mysql> desc book_authors;
```

Field	Type	Null	Key	Default	Extra
AUTHOR_ID	int(100)	NO	PRI	NULL	
ISBN	varchar(50)	NO	PRI	NULL	

```
mysql> desc borrower;
```

Field	Type	Null	Key	Default	Extra
CARD_ID	varchar(10)	NO	PRI	NULL	
SSN	varchar(20)	NO		NULL	
first_name	varchar(14)	NO		NULL	
last_name	varchar(16)	NO		NULL	
ADDRESS	varchar(50)	NO		NULL	
CITY	varchar(50)	NO		NULL	
STATE	varchar(50)	NO		NULL	
PHONE	varchar(20)	NO		NULL	

```
mysql> desc book_loans;
```

Field	Type	Null	Key	Default	Extra
loan_id	int(11)	NO	PRI	NULL	auto_increment
isbn	varchar(50)	NO	MUL	NULL	
card_id	varchar(10)	NO	MUL	NULL	
date_out	date	NO		NULL	
due_date	date	NO		NULL	
date_in	date	YES		NULL	

```
mysql> desc fines;
```

Field	Type	Null	Key	Default	Extra
loan_id	int(11)	NO	PRI	NULL	
fine_amt	decimal(10,2)	YES		NULL	
paid	tinyint(1)	YES		NULL	

SSN is stored in 000-00-0000 format, therefore kept as VARCHAR(20)
CARD ID is store id format ID000000, therefore kept as VARCHAR(10)
Phone number is stored as (999) 999-9999 format, therefore kept as VARCHAR(20)