Software Design Document

**Introduction**

This design document is to describe the system architecture of Library application. This application is prepared for the use of librarians. This system allows library staff to keep track of books, borrowers, and book loans. It also gives option to calculate fine for overdue or late returned books. And later record payment for those fines.

**System Overview**

System comes with 25000 preloaded books and 1000 preloaded borrowers (as per given definition). Search (among books, borrowers, fines, book loans), borrower management, fine calculation, payment record is the major functionalities of the system.

**System Architecture**

Book, Borrower, Author, Book loan and Fine has dedicated Models and controllers. Some views are shared among one or more than one entities. For example, when fine for each borrower is listed, it queries Fine, Book loan and Borrower combined.

**Decomposition description**

System is organized in many subsystems. For borrowers, search, creation, modification is a borrower management system. Book loan is another subsystem which gives the library to give some book on rent and accept it back. Fine calculation and payment record is also a subsystem. It calculates fine for overdue loans and shows payment amount either per book loan or per borrower. Then it allows to record payment.

**Data Design**

1. Data description

System uses MySQL as database. Book and Authors has many to many relationships. Book and Book loan has one to many relationship. Book loan and Fine has one to one relationship.Borrower and Book loan has one to many relationship.

1. Data dictionary

author [author\_id int, name(varchar)]

book [isbn(varchar), title(varchar)]

book\_loan [loan\_id int, isbn varchar, card\_id int , date\_out date, due\_date date, date\_in date]

book\_authors [author\_id int, isbn varchar]

borrower [card\_id int,ssn varchar,bname varchar,address varchar,phone varchar]

fines [loan\_id int, fine\_amt decimal ,paid tiny\_int]

**Component functionalities**

Book

availability: returns true if book is not currently checked out else returns false.

fine: returns fine amount for book which has passed due date.

Eligibility: checks if user is allowed to issue that book or not depending on the number of books issued previously.

Book-loan

paid: true if book is returned and dues paid if any

Borrower

Dues: returns all book loans which are pending and associated with the borrower.

Total-fine: returns sum of all fine amount for this borrower

**GUI**

All the expected operations can be performed from UI. Details are as per follow:

Book Search and Availability:

User will see the paginated list of books. With this list, there is a search box to fire queries. Entered search query will search for matching part in book title, authors’ name, ISBN. Availability of the book is visible in the list. If book is available, then a button for “New loan” will be available. If book is not available or overdue then button to check pending loan will be there.

Issue a book

Book loan can be initiated by clicking on the “issue” button in search list. It will ask for borrower’s Card id. By entering the card number, book can be issued. All the book loans can be checked on check in page.

Borrower management

Register tab will open form to fill out borrower’s details. Submitting the form will generate new card id for borrower.

Fines

User can refresh the fine with “Update Fines” button on check due page. Using check for dues page user can check all books which are due and corresponding fine for book. It also allows to pay fine and check in book there itself. For particular user total fine is also displayed.