**Design Document**

**Description**

This application is a web application that interfaces with a backend Node.JS (business layer) and MySQL as a database and in frontend JavaScript and jade ( templating language ) implementing the Library Management System.

Users of the system are understood to be librarians (not book borrowers).

**Design**

All interface with the Library database (queries, updates, deletes, etc.) are being done from a graphical user interface of our original design. The GUI application will interface with the Library database via an appropriate SQL connector. GUI is getting connected with database by passing appropriate username and password in mysql connection function of mysql module in node.js. Initial database creation is done by command line using the queries mentioned in init.sql file in the application folder.

Initial book and borrower data population is done by data provided in csv file using the scripts written in NodeJS.

For books, data is stored in three different table ( book table, book author table and author table ) and then joined on book’s ISBN and author id using book author table to avoid author’s name data redundancy. Created a view named book view by joining these three tables for efficient implementation of book search. Limiting the book search data by 10 to improve speed and getting next set of data using pagination.

Book can be checked out using Borrower’s card no. Card number in book loan table is a foreign key referencing to borrower table. Checkout data will be the current date and due date will be the 14 days after date out. Borrower is not allowed to check out more than 3 books.

Book can be checked with or without paying fines for late book. On check in of book, date in column for that book will be updated with the current date in book loan table.

Borrower is created using all the borrower data like name, address, city, state, phone, email, and SSN with the constraint on SSN as unique. Also storing date at which borrower is added to library management system. So that database won’t allow the duplicate entry of SSN and throw error message in the user interface layer. Borrower’s card number has the data type of varchar(8) which will have alphabets in first three characters and number in the end. Card number is devised using first letter of first name, first letter of middle name, and first letter of last name and concatenated by an auto-incremented number. Getting the auto-incremented id by querying for the card id of previous added borrower’s card number and splitting numeric id from the card number.

Fines are calculated for late books at the rate of $0.25 per day after the checked in date. Updating fine amount in fine table data as a batch job on click of a button. By default, paid column will have value 0 in the fines table. Both the paid fines and unpaid fines records are queried grouping on borrower’s card number.

Schema used for Database design discussed above:-

