Design Document for Library Management Project

1.) GUI design

GUI is implemented using python and its library tkinter. Running the main function, opens home page.

2.) Book Search and Availability

In **StartPage.py**, the search bar is implemented in **showsearchbar().** When the user enters a **searchEntry** and clicks on **searchbutton,** a connection to **LibraryManagementSystem** is created. SearchEntry's string (**searchstring**) is split with delimiter as a white space and stored in array **searchList.** Three different queries are executed on search list items and data is retrieved from **Books** and **Authors** table.

    a.) For each **searchList** item, select ISBN, Title, Author Name, Availability where item exactly matches ISBN value.

    b.) For initial i searchList items, select ISBN, Title, Author Name, Availability where initial i searchList item matches the book title.

    c.)For each searchList item, select ISBN, Title, Author Name, Availability where item exactly matches Author name.

Results of the above queries are stored in **result** array and then inserted in **my_tree** widget.

When the user clicks on the book and clicks on the **Select** button, the book is added in **isbn_arr**.

When the user clicks on **CheckOut** button, **show_Page1()** is called and **isbn_arr** is passed as an argument and the Checkout page is opened.

3.) Book loans

In Page1.py, all the select items in **isbn_arr** are displayed in **tree_2**.

When the user enters the card id and clicks on check out, following conditions are checked:

    a.) If the borrower has any pending fine amount, do not allow him/ her to check out a book.

    b.) If the borrower has already borrowed more than 3 books, then do not allow him/ her to check out a book.

 Otherwise allow the borrower to check out a book and display a successful message. A row is created in **book_loans** with loan id = (**total_loans** + 1). A row is created in **fines table** with foreign key as **loan_id** in **book_loans** and amount as 0.

4.) Checking In Books

When the user enters borrower name, isbn or card id in search bar in **Page_2()**, search entry is searched from **book_loan**s table and the results are stored in **my_tree.**

If there is no search result, error is displayed. When the user selects the results by clicking on **select,** loan_id is stored in **loan_arr**. When the user clicks on checkin button, for all the items in **loan_arr,** book_loans table is updated with **date_in = CURRENT_DATE().**

If there is any pending fines for the borrower, fines page is opened. Otherwise, book is checked in by updating **date_in** in **book_loans** and setting **paid = true** in fines.A success message is displayed.

5.) Borrower Management

When the user clicks on **add borrower** in home page. **Page_4** opens up. The user needs to add SSN, Borrower Name, Address and Phone. If any field is empty, error pops up. If the SSN does not already exist in the **Borrower** table, a new row is created in the **borrower** table.

6.) Fine Management

When the user clicks on **check in** on check in page , if the borrower has any remaining fines of the books he has already checked in, are displayed. After

clicking on **Pay Amount**, all the fines are cleared and Paid = true in **fines** table. No partial fines are allowed.