**Design Document**

**1. Introduction**

This programming project involves the creation of a library database and creation of a GUI which can be used to manipulate the database remotely

**2. Assumption**

1). The librarian will click each button once during the whole process

2). The librarian will close all subwindows by clicking the  in the window

3). All values inserted into tables are reasonable. for example, when creating a new

borrower, the name should not be numbers and ssn should be 9 numbers etc.

**3. Database Design and Programming**

The first step is to create tables used by this System

**TABLE BOOK**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Type | Valid Values | Null? | Description |
| Isbn | Character(10) | Valid ISBN10 | No | PK. Save the ISBN10 of a book. |
| Title | Varchar(250) | Book title | No | Save the name of a book |
| Num\_in\_stock | Int | 0 or 1 | No | 0: book is not available 1: book is available |

**TABLE BOOK\_AUTHORS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Type | Valid Values | Null? | Description |
| Isbn | Character(10) | Valid ISBN10 | no | PK. FK references to BOOK. Save the ISBN10 of a book |
| Author\_id | Int |  | no | PK. FK references to AUTHORS. Save the ID of an author. |

**TABLE AUTHORS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Type | Valid Values | Null? | Description |
| Author\_id | Int |  | No | PK. Save the ID of an author. |
| Author\_name | Varchar(100) | Valid name | No | Save the name of an author |

**TABLE BORROWER**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Type | Valid Values | Null? | Description |
| Card\_id | Char(6) | 6 numbers | No | PK. Save the card id of a borrower |
| Ssn | Char(9) | Valid SSN | No | Save 9 number ssn of a borrower |
| Borrower\_name | Varchar(50) | Valid name | No | Save name of a borrower |
| Borrower\_address | Varchar(100) | Valid address | No | Save address of a borrower.  Format: Road, City, State |
| Borrower\_phone | Char(14) | (xxx) xxx-xxxx | Yes | Save phone number of a borrower if has |

**TABLE BOOK\_LOANS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Type | Valid Values | Null? | Description |
| Loan\_id | Int |  | No | PK. Auto increment by 1 when check out a book. |
| Isbn | Character(10) | Valid ISBN10 | No | FK references to BOOK |
| Card\_id | Character(6) | Must in BORROWER | No | FK references to BORROWER |
| Date\_out | Date | Valid Date | No | Check out date |
| Due\_date | Date | Date\_out+14 days | No | Last day to free check in |
| Data\_in | date | Valid Date | Yes | Check in date |

**TABLE FINES**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Column Name | Type | Valid Values | Null? | Description |
| Loan\_id | Int | Must in BOOK\_LOANS | NO | PK. FK references to BOOK\_LOANS. Save the loan\_id of a loan having fines |
| Fine\_amt | Decimal(10,2) | N \* 0.25 | NO | Amount of fine |
| Paid | boolean | True or False | NO | True: Fine is paid False: Fine is not paid |

The second step is programming to make the requirements could be fulfilled. There are 9 python files:

Connectdb.py:

This file is used to connect MySQL database through MySQL—Python connector package. Then this file creates the database by running SQL script.

Readcsv.py:

This file is used to read original BOOK.csv and BORROWER.csv from local disk

initialDatabase.py:

This file contains a class initialDatabase and a function initialDatabase which is used to initialize the database, insert all book information and borrower information into tables: BOOK, BOOK\_AUTHORS, AUTHORS, BORROWER

System\_Gui.py:

This files is to create a GUI which could be used by librarian to achieve different functions:

Book search and availability check

Check out a book

Check in a book

Create a new Borrower

Manage FINES database

Quit the GUI

Check\_out\_search.py:

This file is to create a new search window.

Check\_window.py:

This file contains two function which are used to create new checkin window and new checkout window

SearchFunction.py:

This file contains two classes:

Book\_result used to search a book given isbn, book\_title or author\_name

Loan\_result used to search a loan given isbn, card\_id or borrwer’s name

Borrower.py:

This file is used to create a new borrower

FINES.py:

This file is used to achieve all functions of fines