**Design of Library Management System**

**1.System Overview**

***1.1 Software architecture***

The system is implemented with Java to provide the user GUI interface and JDBC to provide the connection with MySQL.

To build up the system, first, clean the source data by using excel. Second, using MySQL commands create library database with tables which are needed and import the given data into the database; Third, using JAVA SWING build up the user GUI interface and using JDBC connect the java program with library database.

***1.2 Schema of database***

|  |  |  |  |
| --- | --- | --- | --- |
| ISBN | TITLE | PUBLISHER | PAGES |

BOOK

|  |  |
| --- | --- |
| AUTHOR\_ID | ISBN |

BOOK\_AUTHORS

AUTHORS

|  |  |
| --- | --- |
| AUTHOR\_ID | NAME |

BORROWERS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CARD\_ID | SSN | BNAME | ADDRESS | PHONE |

BOOK\_LOANS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| LOAN\_ID | LOAN\_ISBN | CARD\_ID | DATE\_OUT | DUE\_DATE | DATE\_IN | FINE\_AMT | PAID |

USER

|  |  |  |
| --- | --- | --- |
| ID | USER\_NAME | PASSWORD |

·The primary key is shown as RED;

·The unique attribute is marked with underline；

·The arrow represents foreign key constraint.

·For the BOOK\_AUTHORS table, the primary key is composite by “AUTHOR\_ID” and “ISBN”.

**2. Application Features**

***a) Login System***

The user can login in library system by entering valid username and password at login window. The username and password cannot be Null and their validity will be checked.

***b) Book Searching***

The user can search for the book by entered isbn, title or author’s name of the book. The searching condition is case insensitive and supporting substring matching. The isbn, title, author(s) and availability of matching books will be showed in searching result table. User can get detailed information of the book by clicking the row of the table.

***c) Book Borrowing***

To borrow the book, clicking the “BORROW” button and entering the borrower card\_id at popped up window. The validity of card\_id will also be checked. If it is invalid, the borrowing action will be rejected. Otherwise, the borrowing information window will show up. It displays the information of the book which the user wants to borrow and also the card\_id and corresponded username. In addition, the window also contains the form of the borrow records of the user. For each user, they may borrow(keep) up to 3 books at the same. And they can only borrow the books which is in stock.

The check-out date will be the date when the user makes the borrowing action and the due date will be 14 days after check-out date.

***d) Book returning***

The user can return the book by searching isbn, borrower card\_id or name. Once located, the user can click the row in searching result table and “RETURN” button to check in the book.

The book with in-stock status cannot be returned. When the book returned, the status and fine amount will be updated by system.

***e) Borrower management***

The new borrower can be created in the “Add Borrower” window. The name, SSN and address are required. The card\_id is auto-increment. In addition, the SSN for each borrower should be unique. If the same SSN is provided, the system will reject creation and show error message.

***f) Fines management***

The fine rate is $0.25/day. The total balance due will be displayed in the table on the top of the window. It shows total balance due for each user (i.e. group by card\_id). The user can update total balance due by clicking “REFRESH” button. The rules are:

·The fine for each loan record is (Today’s date – Due date)\*0.25;

·For the book which is already returned , the fine will not be updated, it should be (Check-in date – Due date)\*0.25;

·If the book is returned within the due date, the fine will be 0.00 and it automatically set as “paid”;

By clicking the row in total balance due table, the fine information of each loan record of a specify borrower(card\_id), included previously paid fines records, will be displayed at detailed fines table. The loan record which its fine has already been paid will be shown with a selected check box in paid column. The user can click on a row to choose it and click “PAY FINE” button to make a payment. The user needs to return the book first before making a payment and the pay-fine action cannot be applied on a loan record which has a paid status.

***g) Safety Logout***

The user can safety logout by click the “LOGOUT” under “SYSTEM” menu.