
Software Requirements Specification

for

Library Information System

Version 1.0 approved

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Revision History

Name	Date	Reason For Changes	Version
Neha Dalmia	20/03/21	Library Information System	1.0

1. Introduction

1.1 Purpose

In this document, the software requirements of Library Information System version 1.0 are specified. This is the first release of the software. This product is meant to be used in libraries, by Library Clerks, Library Members as well as the Librarian in order to automate the day to day functions of issuing and returning Books as well as other employee operations like handling Members and keeping statistics of Books.

1.2 Document Conventions

- 1.2.1 Names of entities important in the software begin with capital letter
- 1.2.2 Database table names written in all caps
- 1.2.3 Terms whose definitions are to be looked up in the Glossary have been underlined on first occurrence

1.3 Intended Audience and Reading Suggestions

1.3.1 Suggested Sequence for Users

- Section 1
- Section 2
- Appendix A: Glossary to be referred for certain terms

1.3.2 Suggested Sequence for Developers

- Section 1
- Section 2 for Overview
- Section 3 and 4 for Technical Details
- Appendix A: Glossary to be referred for certain terms

This document is meant for developers to streamline their process of development. This document contains all the necessary information required by the software to start developing and will aid the developer right up till the end. It will also aid testers, users and documentation writers by giving them a comprehensive overview of the software and its specifications.

1.4 Product Scope

1.4.1 Overview

Different activities of the Library of our institute pertaining to the issue and return of the Books by the Members of the Library and various queries regarding Books as listed below have been automated:

Pertaining to Members:

- a. Search for Book
- b. Reservation of a Book if unavailable
- c. Issuing of Books
- d. Check availability of a Book in the Library and its Rack Number
- e. Calculation of Penalty on late return

Pertaining to Library Clerks (Employees):

- f. Adding Books to the LIS
- g. Removing (obsolete) Books from the LIS
- h. Carrying out Return of Books

Pertaining specifically to the Librarian:

- i. Adding Members to the LIS
- j. Removing Members from the LIS
- k. Check Issue Statistics of all Books for disposing obsolete ones
- l. Send Reminders to Members to return Book if overdue

1.4.2 Goal

The goal of this software is to do away with errors with respect to manual Book-keeping, management, issuing and return of Books in the Library. It also aims to ensure accurate calculations of late penalties and avoid human error in the calculation.

1.5 References

IEEE. IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications. IEEE Computer Society, 1998.

2. Overall Description

2.1 Product Perspective

- This product is a replacement for the existing system in libraries where the issuing, return, record-keeping, etc. of Books is done by Library Clerks / Librarians manually. This software will run on several machines in the Library where users can log in to the software, search for Books, check their availability and rack number in the Library. The software also supports log in for Library Clerks and the Librarian. Some machines will also be connected to printers which will print the bill in case of late return of Books.
- The application has a GUI so that it can be used easily by its different users.

- This software is built in the context that Library Clerks and users alike have to face a lot of hassle in the day to day activities described above. This software would aid in making the experience of all users in the Library smooth and hassle-free.

2.2 Product Functions

- **Library Member : Search Book**

Searches for a Book in the Library

- **Library Member : Check Availability**

Shows the Book available to be issued by the logged in Member, depending on his reservation status as well. Display racks in which available Books are present.

- **Library Member: Issue Book**

Allows a Library Member to issue a Book from a list of available Books. Generates an issue slip to the Member.

- **Library Member: Reserve Book**

If a Book is unavailable, a Member can reserve it.

- **Library Clerk : Delete Book**

Library Clerk can delete Books from the database

- **Library Clerk : Add Book**

Library Clerk can add Books to the database

- **Library Clerk: Return Book**

Library Clerk can process the return of Books and register changes in the database. Penalty can be calculated and collected accordingly.

- **Librarian : Check Issue Statistics**

The Librarian can access the BOOKS table to see when was the last time a Book with a given Unique ID (UID) was issued. Can ask for selected Books not issued in the last 5 years to be disposed off.

- **Librarian: Adding and Removing Members from the LIS**

Librarian can deregister or register a Member using the MEMBERS table

- **Librarian: Send Reminders to Members**

This is used to remind Members that they have a Book currently issued by them and whose due date has passed.

2.3 User Classes and Characteristics

- The Library Members and the Librarian are the primary users of this software.
- The Library Clerks are the secondary users as they have limited functionality and the Librarian being a specialization of Library Clerk can perform all their functions.

2.3.1 User Class: Library Member

The Library Members are not involved in the internal functioning of the Library. They differ in constraint of issuing Books. Each Library Member has to login before they are allowed to perform any operation. They do not have access to the database.

User Class 1.1 Undergraduate Student

can issue up to 2 Books for 1 month duration

User Class 1.2 Postgraduate Student

can issue up to 4 Books for 1 month duration.

User Class 1.3 Research Scholar

can issue up to 6 Books for 3 months duration.

User Class 1.4 Faculty Member

can issue up to 10 Books for six months duration.

2.3.2 User Class: Librarian

Manages the overall functioning of the Library hence needs access to the MEMBERS, BOOKS and RESERVATIONS tables of the database.

2.3.3 User Class: Library Clerk

Can only add/delete Books hence access only to the BOOKS and RESERVATIONS tables of the database.

2.4 Operating Environment

The software is platform independent and can be run smoothly on any operating system.

2.5 Design and Implementation Constraints

- The generation of a hard copy (if required) of the penalty receipts will require printers. The software on its own can at most generate a soft copy on the screen.
- Optimal utilization of memory whilst storing the data is also a must.
- It will also require SQL databases to be workable on the system.
- The customer's organisation will be required for maintaining the software, changes involving changing the application interface like changing preset penalty rate will require technicians to make changes to the application interface.
- The passwords will be encrypted so even the Librarian will not be able to the original password hence, the chances of security breach is slim.

2.6 User Documentation

Two different user manuals will be provided along with the software. These will be:

1. Manual for the Librarian
2. Manual for the Library Clerks

These manuals will assume no prior technical knowledge w.r.t. the user.

An online tutorial will be available for the Library Members, which can be viewed on YouTube in case the Member has any difficulty operating the software.

2.7 Assumptions and Dependencies

1. A very basic assumption is the familiarity of the user in handling such software, (though we try to make our interface as user friendly and interactive as possible).
2. Currently, we depend on the Librarian to not delete any item from the databases by mistake as that would make the system display incorrect. Although the chances of this happening is scarce, In the future versions we will add more functionality to ensure these mistakes do not happen. For example, rightnow, if the Librarian deletes any Book or Member by mistake, the only fix is adding them again.
3. For smooth functioning of the system on which we work with our software, along with proper coordination between the hardware and software interfaces, the system should have enough space for the database to properly store the data and process it as and when required.
4. We will mostly be using well-known, well-documented and implemented libraries like tkinter, numpy etc. hence the chances of bugs in external libraries will be minimised.

3. External Interface Requirements

3.1 User Interfaces

When a user runs the software, they have three kinds of login available upfront:

1. Library Member Login

2. Library Clerk Login

3. Librarian Login

If the user enters correct credentials their login is authorized and they are given access to one of these three interfaces accordingly:

3.1.1 Library Member Interface

- Member receives a reminder (if sent by Librarian) if they have any Books due within the next 7 days
- Member gets the following options:
 - Search for a Book - by entering a search string in a Text Box - displayed as List
 - Find which rack numbers have the Book - by pressing a Button
 - Select a copy from the available copies - from a List
 - Issue Book - by pressing a Button
 - Reserve a Book (if Book is unavailable) - by pressing a button

3.1.2 Library Clerk Interface

Clerk gets the following options:

- Add a new Book to the LIS - by entering details in Text Boxes
- Delete those Books from LIS that have been disposed - by pressing a Button
- Process Book Return - by selecting from a List of Books issued by Member

3.1.3 Librarian Interface

Librarian gets the following options (in addition to whatever was in Library Clerk Interface):

- Add a new Member to the LIS - by entering details in Text Boxes
- Delete a Member from the List - by selecting Member from a filtered List (filtered according to search string)
- Check Statistics of All Books - more than 5 year old Books displayed in a List
- Mark Books as disposed - through a Checklist
- Send reminders to Members who have Books overdue - by Toggle Button

3.2 Hardware Interfaces

Computers with the following peripherals will be required for the functioning of the software

Console Output

A monitor will be required to display various kinds of information to the users.

Console Input

A keyboard and/or a mouse and a touchscreen display are required. These are required to feed data into the system, which the software then processes.

Server

A local server to store the database.

Printer

Well-functioning printers are required for printing late penalty receipts.

3.3 Software Interfaces

Language Used

Python 3.8.7 for designing both the front-end as well as the back-end. MySQL is used for querying databases.

Libraries and Tools

GUI libraries and tools for integrating Python with MySQL. Other Python libraries may be used too.

Database Management

We use MySQL to manage the database. The description of the database used is given below

Specifications of Database (*Change format of all*)

The software will use one database consisting of four tables.

MEMBERS table

This contains information about the Members of the Library. This is for the purpose of the Librarian.

Format:

Member ID | Name | Member Type | List of Books Issued | Reserved Book |
GotReminder | Password

BOOKS table

This contains information about each individual Book (copies are considered individual Books) in the Library which has its own Unique ID.

Format:

UID | Book Name | ISBN | Rack Number | Last Issued Date | IsDisposed

RESERVATIONS table

It is used to keep track of issuing/reservations of Books with the same ISBN.

Format:

ISBN | Available Copies (UIDS) | Taken Copies (UIDS) | Pending Reservations | Active Reservations | Active Reserved Copies (UIDS) | Number of Copies (UIDS) Available

EMPLOYEES table

This contains information about the Employees (Clerks, including Librarian) of the Library.

Format:

Employee ID | Employee Name | Password

Operating Systems

Works on all operating systems

3.4 Communications Interfaces

This software would run independently on multiple machines in the Library connected to a single local server (also present in the Library) that would store the database required for the functioning of the software.

We assume that the communication between the machines and the server is uninterrupted and speedy and that latency is minimal.

4. System Features

4.1 Issue and Reserve Book

4.1.1 Description and Priority

The Issue feature allows Library Members to issue Books from the Library after Searching in the Library database. This feature is of high priority as it is the primary function of the Library to issue Books.

The Reserve feature allows Library Members to reserve a Book when the Book is unavailable. As this feature allows more people to have access to a popular Book, it is a high priority feature.

4.1.2 Stimulus/Response Sequences

The Member will first look up a Book through a Search bar, by typing in some keywords related to the required Book.

Following this, the Member can check availability of a certain Book.

If the Member has a reservation on this Book (i.e. this particular ISBN):

- If the Member is one of the candidates with an active reservation, the Member can claim his reserved Book.
- If the Member is one of the candidates with a pending reservation, the Member is denied issue.

If the Member does NOT have a reservation on this Book (i.e. this particular ISBN):

- If the Book is available, they can issue if they do not exceed their issue limit.
- If the Book is unavailable we give the Member a chance to reserve this Book (provided they do not already have a reservation)

The system performs the necessary update operations on the database. The user is then taken to the main screen.

Issuing Books

- If Book is available, the Member shall be shown a list of all the copies (with Unique ID) available in the Library, along with their Rack Numbers
- Member can go to the racks and see which Book they want to issue
- They can come back and select one copy of the particular Book they want to issue
- An Issue slip is printed for the Member which is to be preserved for Return

Reserving Books

- Similar to issuing a Book, after querying for a Book from a search bar the user can check its availability. If the Book is not available and the user does not have an active reservation or pending reservation, they can proceed to reserve the Book provided they do not already have a reservation.
- When a Book is available for them, the pending reservation changes to active reservation and the user can claim it within 7 days for becoming available.

4.1.3 Functional Requirement

REQ-1: Access to a computer in the Library

REQ-2: Presence of a Printer

4.2 Return Book

4.2.1 Description and Priority

This feature allows the Clerks to record the Returning of a Book by a Library Member. This feature has high priority because it is important for maintaining the record of circulation of Books of the Library.

4.2.2 Stimulus/Response Sequences

- The Member wishes to return his issued Book.

- They approach the Clerk to hand over the Book physically along with the issue slip.
- The Clerk inputs the Member ID and UID from receipt into the system.
- If the Book is overdue, the penalty is calculated by multiplying the number of days it is overdue with the fixed penalty rate. A bill for the same is generated and printed.
- This ends the process of returning an issued Book.

If there is reservation for this particular ISBN

The Member that is on top of the list of pending reservations, gets shifted to the list of active reservations and a Reservation slip (for notifying the Member) is printed in their name. This can also be emailed if required.

4.2.3 Functional Requirements

REQ-1: Access to a computer in the Library

REQ-2: Presence of a Printer

4.3 Manage Members

4.3.1 Description and Priority

This feature allows the Librarian to add and delete Members. This is of medium priority as it is not very often that new Members are added or deleted.

4.3.2 Stimulus/Response Sequences

Add Member

- Librarian wants to add a Member
- They choose the Add Member option
- They type the required details like Member ID and Name.
- This adds a new entry in the MEMBERS table of the database.

Delete Member

- Librarian wants to remove a Member
- They choose the Remove Member option which displays a menu with the option of filtered searching.
- They select the Member she wants to remove from this dropdown menu.
- This deletes an entry from the MEMBERS table of the database.

4.3.3 Functional Requirements

REQ-1: Access to a computer in the Library

4.4 Manage Books

4.4.1 Description and Priority

Check Issue Statistics

This feature allows the Librarian to view when a Book (particular UID) was last issued. This helps in understanding which Books might be old/damaged.

Delete Book

The Librarian can choose to dispose of Books (particular UID) based on the above information. The Clerks can then check which Books have been disposed of and accordingly delete their records from the system.

Add Book

The Clerks can add new Books (particular UID) into the system.

Send Reminder If Overdue

The Librarian can send reminders to the Members when their issued Books are overdue

As these features involve maintenance of the primary resource of the Library, these are of high priority.

4.4.2 Stimulus/Response Sequences

Check Issue Statistics

- The Librarian can click on an option called view statistics which will list out all the Books which have not been issued for the last 5 years.
- The Librarian can select some (or all) Books and get them disposed physically. The Librarian marks these Books as disposed of in the system.

Delete Book

- A Library Clerk or the Librarian can then delete the disposed of books from the system.
- A list of Books that have been flagged as Disposed is displayed.
- They can proceed to delete each of the books one by one.
- The entries corresponding to the disposed Books are removed from the BOOKS table and the RESERVATIONS table is updated accordingly.

Add Book

- A Library Clerk or the Librarian would like to add new books from the system.
- They enter the details of the new book like Name, ISBN, etc. of the Book.
- A new entry is created in the BOOKS table of the database

- If the Book is a new title altogether then a new entry is created in the RESERVATIONS table
- A new UID will be assigned to this Book

Send Reminder if Overdue

- Librarian feels the necessity of reminding all of Members of the return of their Overdue Books.
- Librarian sets the above reminder
- Every Member who has an overdue book will receive a notification that they need to return on their main screen when they log in.

4.4.3 Functional Requirements

REQ-1: Access to a computer in the Library

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Reliability and Accuracy

The penalty bill generated by the software must be accurate and take into consideration the type of Library Member while calculating the penalty. The software should ensure nobody is allowed to issue more Books than their limit and that nobody has reserved more than 1 Book. All updates must be done in real time to ensure the availability status of Books is always accurate.

Fast

The software should not lag anytime during its operation. All processes must be fast given the limited working hours of the Library.

User Friendly

Since the user of the software might not always be acquainted with such systems, the more interactive and visual the interface is, the better. This is because a Library is accessed by a spectrum of individuals, not just by software engineers.

5.2 Security Requirements

The software must be secure and nobody except for the Member themselves should get access to their Library account. Login password encryption must be implemented. Nobody other than Library workers should be able to change the databases.

5.3 Software Quality Attributes

Human-computer interface issues

Our interface is more visual than textual to enable easy handling of the software by the user and the Library workers along with an interactive interface. The buttons and options are descriptive and easy to understand. Drop down menus have been made searchable for ease of use.

Reusability

The software is not really specific to any particular institute's Library. With minor changes in the software, it can be used for any Library. Very few modifications will have to be by the developer like adding a new class of students if necessary (eg exchange students) or changing the penalty rate or issue restrictions. We have made the software extensible hence it is easy to incorporate these changes.

Real Time Updates

All updates to the databases have to be made in realtime . This is because of the presence of multiple Library computers and if a Book is issued on one the change in its availability should be reflected on the rest . Thus, the 3 tables of our database are updated in real time using SQL queries and by using various data structures in the BookHandler utility class. It can easily be tested and verified whether the database is being updated in real time or not.

6. Other Requirements

Database Requirements

The proper functioning of this software requires a reliable local server for hosting the database. The whole system fails, if the server is tampered with (with malicious intent). It is essential that the physical location of the server is at place with access only to authorized personnel.

Manual Management Requirements

As the Members return Books, it is highly essential that the staff who place the Books back into the shelves, place them correctly otherwise the whole search system fails.

Appendix A: Glossary

LIS	Library Information System
Members	Library Members
Clerks	Library Clerks
Active Reservations	Reservation made and Book available to be claimed
Pending Reservations	Reservation made but Book unavailable to be claimed
Active Reserved Copies (UIDS)	UIDS that are available but only to the Members who reserved them. If they go unclaimed for 7 days and there are no pending reservations, then they are made available to all Members
MEMBERS table	A table in the database that contains information about Members
RESERVATIONS table	A table in the database that contains information about the Reservations and Issuing of Books
BOOKS table	A table in the database that contains information about each of the Books in the Library
EMPLOYEES table	A table in the database that contains information about the people working in the Library
Unique ID (UID)	Every single Book (meaning every single copy) in the Library has a unique identification number called the UID. It is important to as it helps to keep track of the statistics of each Book

ISBN	Every copy of a particular book has the same ISBN. Books with different Titles have different ISBNs
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Appendix B: Analysis Models

Refer to Class Diagram document and Use Case Diagram Document

Appendix C: To Be Determined List

None