# Software Requirements Specifications

***for***

# LIBRARY INFORMATION SYSTEM

***Version 1.0 approved***

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# LIBRARY INFORMATION SYSTEM

## 1. INTRODUCTION

With an increase in the number of readers and also in the number of books being authored and published, full-fledged computerized management systems for libraries are required. This *Library Information System* focuses on improving the management of a Library, particularly in a university. ”. The integrated *Library Information System* provides you the ease of issuing, returning, or reserving a book from a Library within your campus through a simple application as well as allows the administration to systematically manage and store the database of the Library using a computerized interface.

### 1.1. PURPOSE

The purpose of the project is to maintain the details of books available in the Library and the details of the members of a Library in a structured way. The principal motive is to maintain an easy circulation system between the individuals who use the Library and the management staff that comprises the clerks and the Librarian. The fundamental tasks that form the foundation of this application are issuing, returning, and reserving a book by a member; analyzing the popularity statistics of books (as to which books are issued more often and which ones less often), and maintaining accounts of the members as well as histories of all the activities that are associated with some of these, by the clerks and the Librarian.

### 1.2. DOCUMENT CONVENTIONS

- Names of entities important in the software begin with a capital letter
- Terms whose definitions are to be looked up in the Glossary have been underlined on the first occurrence
- Indentation of text is done wherever required.
- the abbreviations used in the document have been properly mentioned in section 1.5 *REFERENCES*

### 1.3. INTENDED AUDIENCE AND READING SUGGESTIONS

The intended readers of this document are the developers of this application, testers, library owners, managers, coordinators, and administrators.

### 1.3.1 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 contains all the necessary information required by the developers to start developing the software and will aid the developers right up till the end by providing a detailed guideline and structure for the implementation of the various components of the system as well as the dependencies and relationships among the different components.

Any suggested changes on the requirements listed on this document should be included on a fresh page succeeding the last page of this document so that it can be a reference to the development and validating teams.

### 1.3.1 Suggested Sequence for Users

● Section 1

● Section 2

● Appendix A: Glossary to be referred for certain terms

The readers are suggested to refer to section *1.5. REFERENCES* to understand the meaning of certain abbreviations and acronyms and to learn about the standard *SRS Document* format. The readers are also suggested to refer to *APPENDIX A: GLOSSARY* to know the meaning and context of certain keywords used in the document.

## 1.4. PRODUCT SCOPE

*LIS* product is a complete GUI-based user interface application for library management processes and library usage for ordinary users, specifically designed for the use of *Library administration* and *Library users*. *LIS* can be used by any existing or new library to manage its books and book borrowing, insertion, and monitoring, so that the users can know the details of their accounts, availability of books, and perform various tasks associated with issuing and returning books in a convenient and hassle-free manner. The goal of the project is to prevent the human errors that could be introduced due to manual

book-keeping as well as to overcome the limitations of physical storage of Library databases in registers and record books, by using digital storage technologies.

### 1.5. REFERENCES

● **Texts**

- IEEE 830-1998 Standard for writing SRS documents.
- I. Sommerville, Software Engineering, 8th ed. England: Addison-Wesley 2007

● **Links**

The UML Diagrams were designed on Lucidchart

# 2. OVERALL DESCRIPTION

## 2.1. PRODUCT PERSPECTIVE

The Library Information System will take care of the details and availability of all the books in the Library. The users can be students, faculty members or the management staff members that include clerks and the Librarian. The system will provide search functionality to facilitate the search of books based on various categories viz. **book's title**, **book's author,** or the **ISBN identity code**. Further, the Library staff personnel can register new or deregister the existing members from the system. The functionalities and interfaces available to every user depend on whether she is staff personnel (Librarian or a clerk) or a member of the library.

## 2.2. PRODUCT FUNCTIONS:

● REGISTRATION / DEREGISTRATION

- ➢ Only the Librarian has the authority to register a new member as a user or de-registering an existing user.
- ➢ A *Library Member* can be a *faculty member*, an *undergraduate student*, a *postgraduate student*, or a *research scholar*.
- ➢ Once a member's account is created by the Librarian, the member can sign into the LIS with the unique ***MemberID*** and a default password. The password can be reset by the member anytime by logging in.

- SEARCH AND QUERY
  - ➢ Query by a Member: A member can search for a book and check its availability by ***Book Title***, ***Author's Name***, and by the unique ***ISBN*** of the book after logging into the LIS web interface.
  - ➢ Query by Staff Members: A Librarian or a clerk can access further details for each book such as Issue status, Issue date, Member issued to, Reserved for, Return due date, etc., which are not accessible to the members.

- ISSUE / RETURN / RESERVE A BOOK
  - ➢ A book can only be issued/reserved/returned by a member on login to the LIS portal and sending a request for the concerned activity on the LIS portal.
  - ➢ For issuing/ reserving a book, the member's request would be sent to the portal only if the book is currently issuable/reservable by the member. The request would then be approved or rejected by the Library clerk, which would then be reflected in the member's account, after which the book can be taken by the member in case of an issue request, or is considered reserved by the member in case of a reserve request.
  - ➢ The process of returning a book requires sending a return request to the LIS portal which will be reflected in the Librarian's account. The concerned request would be approved by the Librarian through his account only after the user returns the book to the Librarian/Clerk physically and the Librarian/Clerk examines the book for any tampering/damage.
  - ➢ The LIS should update the concerned tables in all the databases after a request is catered to reflect the activity of issuing/returning/reserving performed.
  - ➢ A notification should automatically be sent to the member's account (with all the details) confirming the activity performed. Moreover, the member must be notified about the penalty along with a penalty bill in case a book is returned after the due date.

- ANALYSIS OF BOOK ISSUE STATISTICS:
  - ➢ The Librarian can check the statistics of the books issued and analyze which books are not issued for a long time (3-4 years) to decide if some books need to be disposed of, or some more copies of books that are issued more often need to be added.

- ADDING/REMOVING BOOKS FROM THE PORTAL:
  - ➢ A clerk has the authority to remove the details of a book when it is disposed of.
  - ➢ Similarly, she has the authority to add books to the portal when a new book is received by the Library.

## 2.3. USER CLASSES AND CHARACTERISTICS:

The system LIS provides different types of services, privileges and functionalities based on different types of users (members/librarian/clerks). The Librarian will be acting as a controller and will have most of the privileges of an administrator. A clerk conducts all the general office tasks related to managing books, fines, and issuing books. A member has the least control over the system in terms of access to the databases and transparency. The member can be either a student or faculty-staff of the university who will be accessing the Library through this portal.
In the Library, there is a single Librarian, but there can be more than one Clerk and Members.

**User Class 1: 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 log in before they are allowed to perform any operation. They do not have access to the database.

The derived classes of the Library Member Class are:
**Undergraduate Student** can issue up to 2 Books for atmost 1-month duration without incurring a penalty
**Postgraduate Student** can issue up to 4 Books for atmost 1-month duration without incurring a penalty
**Research Scholar** can issue up to 6 Books for atmost 3 months duration without incurring a penalty
**Faculty Member** can issue up to 10 Books for atmost six months duration without incurring a penalty

The functions that are available to a Member are -

- ➢ Ask queries through a search by book's title, author, or ISBN code and check the availability of books through the portal
- ➢ Issue, reserve, or return a book if the appropriate requirements are met by sending a request through the portal, which would be approved or rejected by the clerk.
- ➢ Check the details of the books issued or reserved by them currently or in the past
- ➢ Reset their account's password

**User Class 2: Librarian**
Manages the overall functioning of the Library hence needs access to the MEMBERS, BOOKS and RESERVATIONS tables of the database.
The functions that are available to the Librarian are -

- ➢ Register a new member of the Library as a user of LIS or de-register an existing member of the Library as a user of LIS, or get details of all the members of the Library

- ➢ Check the details of all the existing books in the catalog, the details of all currently issued books, the details of all books issued in the past
- ➢ Check the books that are currently issued out and are overdue
- ➢ Ask queries through a search by book's title, author, or ISBN code
- ➢ Reset her account's password
- ➢ Perform analytics on the popularity/usage of books in the Library

**User Class 3: Library Clerk**

The features that are available to the Clerk are -

- ○ Issue an available book for a member and update it in the system
- ○ Reserve an issued book for a member and update it in the system
- ○ Collect the book returned by a member and update it in the system
- ○ Collect fine paid by a member as a penalty of returning a book late
- ○ Add new books to the Library's catalog and update them in the system
- ○ Remove existing books from the Library's portal
- ○ Ask queries through a search by book's title, author, or ISBN code
- ○ Reset their account's password

## 2.4. OPERATING ENVIRONMENT

Since the software contains a web-based GUI interface over which the members and administrative staff will perform all the functionalities, it is platform-independent and can be run smoothly on any operating system. For the server, any operating system supporting python version >= 3.8 will suffice.

## 2.5. DESIGN AND IMPLEMENTATION CONSTRAINTS

- IMPLEMENTATION CONSTRAINTS
  - ➢ For version 1 of the software, the database will be deployed on SQLite, but for further development, it may be shifted to other relational databases.
  - ➢ For a simple and pleasant experience of different users, the system must have an easy-to-use User-Interface.

- SECURITY / PRIVACY CONSTRAINTS

  - ➢ Passwords must not be stored as plain texts in the database. Passwords must be hashed before storing them in the database.
  - ➢ Members must have full privilege to change their passwords that are unknown to the administration.

- Neither a clerk nor the Librarian can change/control the password of a member through the LIS, except when she is registered and is allotted a default password.

● LIMIT AND DUE-DATE CONSTRAINTS

- An undergraduate student can issue up to 2 Books for atmost 1-month duration without incurring a penalty.
- A postgraduate student can issue up to 4 Books for atmost 1-month duration without incurring a penalty
- A research scholar can issue up to 6 Books for atmost 3 months duration without incurring a penalty
- A faculty member can issue up to 10 Books for atmost six months duration without incurring a penalty
- Since the process of issue/reserve is based on a member sending request to the portal and the request first being approved by the clerk, the member can be denied from issuing a book, reserving a book if she has had past records of late return or mishandling of books many times.

● ACCESS CONSTRAINTS

- Members must not be able to access any underlying databases.
- The clerk should have write access to only the selected tables concerning the Library's catalog in the database; just to add and remove books.
- The librarian should have write access only to the Accounts database. The access must be as limited as possible so that only insertion and deletion of accounts are allowed. The librarian should not be allowed to change a member's personal information.

● COMMUNICATION CONSTRAINTS

- All the activity-related messages must be sent automatically by the LIS, without the administrators to explicitly write a message. The librarian or the clerk only needs to approve the requests for issuing, reserving, or returning a book and sending reminders for books due for return, but the corresponding messages and notifications must automatically be generated by the LIS portal.
- Members should not be able to send messages to a clerk, to the Librarian, or to other members.
- The administrators should not be able to send personal messages to any user.

● DESIGN CONSTRAINTS OF THE WEB INTERFACE

- ➢ All sections and modules on the web interface must fit and be properly spaced and arranged on the screen without causing any clutter.
- ➢ The role of each and every module/icon must be specified clearly by its name.
- ➢ Back-navigation must be allowed, and a member must remain logged in even if the webpage is refreshed.

### 2.6. ASSUMPTIONS AND DEPENDENCIES

1. A very basic assumption is the familiarity of the user in handling such a software and that the user is conversant with the English language (though we try to make our interface as user-friendly and interactive as possible).

2. Some other important assumptions are that the application is able to handle all use cases through errors and exceptions if needed in some scenarios, and that all the users know their login IDs and their passwords(but password may be changed in case a member forgets it).

3. Some assumptions affecting the performance and usability of the system are: the system deletes/frees records as and when needed to prevent an exponential rise in the memory used by the database(s), the interface between the product and the database is efficient and quick, the application has the ability to run for at least 15 hours a day as well as to handle a large user traffic without crashing.

4. 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.

5. For the database management, and in general, for backend, we will be using Django framework, which is well documented and highly recommended for python backend server management purposes.
6. We will mostly be using well-known, well-documented, and implemented libraries like Django-allauth, Django Crispy Forms, etc. hence the chances of bugs in external libraries will be minimized.

## 3. External Interface Requirements

## 3.1 User Interfaces

There are 3 major types of user interfaces to be displayed:

1. Library Clerk
2. Librarian
3. Member

Once the user enters correct login credentials, they are given access to one of these three interfaces accordingly:

### 3.1.1 Librarian Clerk Interface

The clerk gets the following options:

- Add a new Book to the Database
- Delete Books that were not issued in a long time
- Approve book return by different Members

### 3.1.2 Librarian Interface

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

- Add a new Member to the Database
- Delete a Member from the Database
- Send reminders for book overdue

### 3.1.3 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, again by 3 filters as specified previously.
    - Find rack numbers of a book.
    - Select a copy from the available copies
    - Issue Book
    - Reserve a Book if it is currently unavailable

## 3.2 Hardware Interfaces

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

**User Interface - for Output:**

A screen will be required to display various options available and interact with the system.

**User Interface - for Input:**

A keyboard and mouse/touchscreen functionality will be required to navigate between different users and access different functionalities.

**Scanner (optional):**

A scanner to scan the QR code on a book may be required to fully automate the process of issuing and returning the books.

**Printer (optional):**

A printer to print the penalty slips when book return due-data crosses.

## 3.3 Software Interfaces

**Language Used**

Python 3.9 for the designing system, both for User-Interface and Database.
SQLite is used for storing and applying queries on data.

**Libraries and Tools**

Python Libraries related to the Django framework. Other python libraries are used as per requirement.

**Database Management**

The database used will be SQLite.

**Operating Systems**

Works on all operating systems such as Linux/Windows, MacOS etc.

## 3.4 Communications Interfaces

The system will run equally and independently on all devices connected to the local server, which in turn will be connected to the database. Also, minimal network connection will be required for quick access to all functionality and pleasant

experience.

# 4. System Features

## 4.1 User Profiles

There are two possible types of user-profiles that LIS caters to :

- **Library Members**

  There are four categories of library members :

  - Undergraduate Students
  - Postgraduate Students
  - Research Scholars
  - Faculty Members

  Each category of members has different limits on the number of books they can issue and the maximum time for which the books can be issued.

- **Administrators**

  There are two possible categories of sysadmins :

  - **Library Clerk**
  - **Librarian**

  They carry out functions ranging from managing member records, adding and deleting books and processing the issue and return of books.

This feature classifies the various users of a library on the basis of their categories and allows LIS to cater to their individual requirements. Hence, this feature is of **high priority**.

## 4.2 Login System

### 4.2.1 Description And Priority

The LIS has a login system through which administrators and members can sign in and use the various functionalities. A login id and a password are needed to log into an account. All signed-in users can change their passwords and log out of their accounts.

This feature provides different login options for different categories of users and provides access to relevant functionalities after authorization. Hence, it is a **high risk, high priority** feature.

### 4.2.2 Stimulus/Response Sequences

- The user opens the login page by clicking a button on the home screen.
- The page asks for the user's login id and password.
- A member must enter his Member ID as the login id. On the other hand, an administrator (clerk or Librarian) must enter his Library ID as the login id.
- If the user enters the correct details, he will be able to log into his account and visit the main page.
- Features like logging out of the account or changing the account password can be accessed by visiting appropriate modules on the main page.

### 4.2.3 Functional Requirements

- Users should be able to log out and login into the system conveniently.
- The system should be able to remember(preferably) the user's previously entered login credentials and open his profile upon visiting the website instead of asking for the credentials every time.
- Issues like entering wrong credentials, trying access to restricted content should not be entertained and suitable messages are displayed on the user interface.

## 4.3 Issuing, Reserving and Returning Books

### 4.3.1 Description and Priority

**Issuing Books :** The user can make use of this feature to issue books after searching for them in the Library database.

**Reserving Books** : The user can reserve a book that is currently not available for issue, for a maximum period of 7 days. This allows her to issue the book of her choice as soon as it is available.

**Returning Books** : The user can return an issued book. On return, the LIS will generate a bill showing a penalty for late return, which will be validated by the library staff.

Since issuing, reserving and returning books are key features of the functionality of the library, this feature is of **high priority**.

### 4.3.2 Stimulus/Response Sequences

- The member will first search for a book by typing in some keywords related to the book in a search bar (i.e., Title, Author, ISBN).
- If the book exists in the library database, its relevant details (e.g. Rack number, no. of copies) will be displayed.
- If the member wishes to issue the book, the system will check if the book is available for issue.
- If the book is available for issue, the user can get the book issued provided he has not exceeded his issue limits. This process must be approved by the library clerk, following which an issue slip is generated.
- If the book is not available for issue but is reserved by someone else, the member cannot access it.
- If the book has not been reserved, the member can reserve it for himself.
- When an user returns a book, LIS calculates the penalty for overdue and generates a bill for the same, which is validated by the library clerk. If the book is reserved, LIS generates a reservation slip which disallows access for the book to other members for a maximum period of 7 days.

### 4.3.3 Functional Requirements

- Member should be able to login into the system through a device.

## 4.4 Reminders/Notifications to the members

### 4.4.1. Description And Priority

The member should have an inbox in their accounts where they receive all the notifications and reminders. The notifications are sent by the LIS to the user's account when certain activity like issuing a book, returning a book, reserving a book is approved by the clerk, or on paying a fine on returning a book after its due date. Besides these notifications, the members also receives reminders regarding books which are currently issued and are due in a few days, or regarding books which are issued by a member and are overdue. These reminders are not triggered by any activity by the user per se but are displayed if the Librarian finds that the member has some pending duty (like returning an issued book, collecting a reserved book that is already returned by the former issuer and pending payment of fines) and the Librarian specifically sends such reminders from his account to the member.

Since this priority maintains the collection of books in the library, this is of

**medium priority.**

### 4.4.2 Stimulus / Response Sequences

- A member has to be logged-into her account to be able to access her inbox. Once logged in, the member can open the inbox by clicking on the inbox icon on the first page after login.
- In the inbox, there is a list of notifications, with reminders on top of them, sorted by the date and time of when the notification was sent.
- The member can return to the Homepage by clicking on the Back icon.

The various stimuli that trigger sending a notification to the respective member are -

1. The member issues a book.
2. The member returns an issued book.
3. The member reserves an already issued book.
4. The member clears her fine/penalty of late return.
5. The reserved book is returned by the former issuer.
6. The reservation of a book got expired and the member did not issue that book.

The various situations when the Librarian sends a reminder to the respective member are-

1. The member issues a book and the due date is near or has passed.
2. To issue and collect a reserved book that is already returned by the former issuer.
3. If the member has pending payment of fines.

### 4.4.3 Functional Requirements

- Title : Privacy / Message Encryption
- Description : All the notifications that are explicitly sent to any member need to be remembered in the database, along with the date and time the notification was sent. (This is not the case with the reminders because they are displayed based on the current or recent state of the member. A member need not be reminded that he had a pending fine a month ago.) The notification messages in the database must not be stored as plain texts but rather as encrypted messages using some constant key that is remembered by the LIS. These messages are decrypted when they have to be displayed on the screen.

## 4.5 Member and Book Management

### 4.5.1 Description And Priority:

- Member addition and deletion is to be performed by the Librarian.
- Maintenance of books like addition, deletion, checking book statistics, sending notifications for penalties, to be performed by Library clerks.

This is a **high priority** feature.

### 4.5.2 Stimulus/Response Sequences

- **Add member**: Librarian adds all member credentials like name, Member ID, designation like UG/PG/RS etc. which in turn adds a new member in the database.
- **Delete member**: Librarian deletes a member from the database, only after he confirms to delete atleast twice.
- **Add Book**: Clerks add a book to the database by entering all the book details like ISBN number, author, name, shelf etc.

- **Delete Book**: Clerks delete a book from the database, whenever they feel necessary.
- **Check Statistics**: Clerks can check which books were not issued in past five years and may choose to delete them from the database.
- **Sending Notifications**: Clerks can send notifications to Members whenever there is a delay in book return task, thus also send a penalty slip for the same.

#### 4.5.3 Functional Requirements

- Should be able to access their respective accounts.

# 5. Other Non Functional Requirements

## 5.1 Performance Requirements

**Stability:**
The software should be able to handle multiple users together and not take more than 5-7 seconds to display the result of user queries.

**Reliability:**
The status of a book should be updated in real-time and data related to the issue/return/reservation of a book should be stored and presented accurately. Apart from that, the penalty amounts should be justifiable whenever user demands and thus, be calculated without any error.

## 5.2 Security Requirements

- Each user should be restricted to access and modify content which belongs to the Library, apart from his/her personal information.
- User's personal information should only be visible to him, and no other person should be able to modify the same.
- Only clerks and librarian should be able to access information stored in the database.

## 5.3 Software Quality Attributes

- Various functionalities available to a different type of users should be clearly visible on the Interface and easily understandable to the user.

- Different corner cases should be kept in mind and system be deployed accordingly to provide a pleasant user experience.
- Software should be updated every time a user uses a function to avoid the case of any discrepancies.
- Support for further versions of the software should be available and the design should be easily extensible for future use.

# 6. Other Requirements

The manual tasks should be done correctly, like a time-to-time check of different requests of book issue/return/reserve, placing books correctly in their shelf number, updating the database (by the Librarian/Clerk) in case of any non-avoidable matters like Library holidays/ book maintenance periods, etc.

# APPENDIX A : GLOSSARY

- **Acronyms / Abbreviations used**

  - IEEE: Institute of Electrical and Electronics Engineers
  - ISBN: International Standard Book Number
  - LIS: Library Information System
  - SQL: Structured Query Language
  - SRS: Software Requirement Specification
  - UML: Unified Modeling Language
  - UG: Undergraduate
  - PG: Postgraduate
  - RS: Research Scholar

- **Basic Definitions**

  - *Librarian:* The main handler of all top-level decisions related to the Library, can also remove unused books and remove Members from the database.
  - *Clerks:* The Library staff responsible for everyday management purposes like checking returned books, placing books in their respective shelfs/racks.

- *Members:* The regular users of the library, which include students, professors etc.
- *System/Portal*: The Software that implements Library Information System.
- *SQL*: A domain-specific language used in programming and designed for managing data held in a relational database management system, or for stream processing in a relational data stream management system.
- *Database*: An organized collection of data, generally stored and accessed electronically from a computer system.
- *Class Diagram*: A type of static structure diagram in UML that describes the structure of a system by showing the system's classes, their attributes, operations, and the relationships among objects.
- Use Case Diagram: A representation of a user's interaction in UML with the system that shows the relationship between the user and the different use cases in which the user is involved
- Administrators/Library management staff: refers to Librarian and clerks
- ISBN: Every copy of a particular book has the same ISBN. Books with different titles have different ISBNs.
- Member ID: It is the unique identification number for any user (faculty or student) which also serves as the user id for login by a member

# APPENDIX B : ANALYSIS MODELS

## USE CASE DIAGRAM:

Provided as a separate pdf file.

## CLASS DIAGRAM:

Provided as a separate pdf file.