SOFTWARE REQUIREMENTS SPECIFICATION

for

Library Information System

Version 1.0 (Annotated Version)

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Contents

1 Introduction

1.1 Purpose

The Library Information System (LIS) serves to automate diverse tasks within our institute's library, aiming to boost efficiency in book management and member services. By offering a centralized platform, LIS endeavors to simplify processes like book issuance, return, reservation, and penalty management, thereby enhancing the library experience for staff and members alike. This document will delineate the functional and non-functional requirements of the software, encompassing aspects of the user interface as well.

This document will outline the functional and non-functional requirements of the software, including the user interface.

1.2 Intended Audience and Reading Suggestions

This document is intended for the following audience:

- The development team responsible for the implementation of the Library Information System (LIS) software.

- System administrators and users tasked with the installation, configuration, and utilization of the LIS software.

- Any other stakeholders involved in the development, testing, deployment, and ongoing maintenance of the LIS software, including librarians, IT support personnel, and management.

To comprehensively understand the requirements and constraints outlined in this document, readers are encouraged to have proficiency in the following areas:

- Object-oriented programming (OOPS) principles and practices, as the LIS software may leverage OOPS concepts.

- Database management systems (DBMS) and Structured Query Language (SQL), as the LIS software may involve database operations for managing book and member records.

- User interface (UI) design principles and experience with relevant technologies for developing intuitive and user-friendly interfaces.

To effectively navigate through the document and grasp a thorough understanding of the Library Information System (LIS) software, readers are advised to follow this suggested reading path:

- Overview Sections: Begin with the Introduction and Overall Description sections to gain insight into the purpose and scope of the LIS software.

- Role-Specific Sections: Proceed to sections that are most pertinent to your role or area of expertise. For instance:
    - Developers may find detailed guidance in sections such as Functional Requirements, Technical Requirements, and Data Management.
    - System administrators and users may focus on sections like Installation Instructions, User Interface Specifications, and System Administration.

- Appendices and Supplementary Information: Explore any appendices or additional materials provided, which may offer further clarification, examples, or technical specifications related to the LIS software.

1.3 Project Scope

The Library Information System (LIS) is envisioned to provide a comprehensive solution for efficiently managing library resources and interactions with members. With tailored functionalities for different user types, the system seeks to address the requirements of both library staff and patrons.

Accessible through web interfaces on desktops and laptops, the LIS will act as a centralized platform for library staff and members alike. It will support a range of activities including book management, member registration, borrowing, returning, reservation, and penalty management.

Developed with scalability in mind and employing industry-standard technologies, the LIS will prioritize reliability, security, and user-friendliness. It will cater to various categories of library members, each assigned specific privileges and borrowing limits. A robust book database featuring unique ISBNs will enable efficient tracking of book availability and location within the library.

Additionally, penalty management features will calculate charges for overdue items and issue reminders to members with outstanding loans.

The LIS ambitiously covers the entire spectrum of library resource management and member interactions, with the goal of streamlining operations, enhancing user satisfaction, and facilitating informed decision-making for library administrators.

2 Overall Description

2.1 Product Perspective

The Library Information System (LIS) represents an innovative and comprehensive solution specifically crafted to address the changing demands of educational institutions in effectively handling library resources and member interactions. It aims to modernize conventional library procedures by offering a user-friendly and intuitive platform accessible through web interfaces on desktops and/or laptops.

2.2 Product Functions

The Library Information System will include the following features and functionality:

- Login to personal pages as a user or an admin.

- Individual Profiles with all details of the account.

- Search for books based on categories, authors, and titles.

- Request for procuring new books.

- Inform about books misplaced from their allotted positions.

- Search for users with user code.

- Add/delete books and users.

- Edit book or User.

- User authentication and security.

- User status of active and reserved books.

- Make Book Transactions: Issue, Reserve, and Return Book.

- Send Notification and Generate Fine.

- Show latest transaction receipt.

- Show Recently Added Books.

- Recommend Books Based on Department and Transaction History.

- Search for transactions based on user.

2.3 User Classes and Characteristics

1. **Admin** − Admin is the most important class of our software. Admin is a singleton class which can only be accessed by the librarian. The admin is responsible for:

   - Add/Remove/Edit Books.
   - Add/Remove/Edit Users.
   - Search for Books.
   - Manage Book Transaction.
   - Return Books and impose dues.

2. **Users** − All the users of LIS software except the admin come under User class. A User can

   - Search for Books
   - View Active and Reserve Status for Books
   - Request for Issue Book if book is active
   - Request for Reserve Book if book is inactive but not reserved

   This is the most frequently used class. It is further subdivided into four types.

   - **Undergraduate (UG) Students** −
     - Can Issue or reserve Maximum of 2 books
     - Can Issue for Maximum of 1 month duration
   - **Postgraduate (PG) Students** −
     - Can Issue or reserve Maximum of 4 books
     - Can Issue for Maximum of 1 month duration
   - **Research Scholar (RS)** −
     - Can Issue or reserve Maximum of 6 books
     - Can Issue for Maximum of 3 months duration
   - **Faculty Member (FM)** −
     - Can Issue or reserve Maximum of 10 books
     - Can Issue for Maximum of 6 months duration

2.4 Operating Environment

The Library Information System software is designed to be compatible with computer devices utilizing Linux, Windows, and macOS operating systems. It must seamlessly integrate with the Library Management System software, alongside other essential components such as the Web server, Database system, and Network Infrastructure. The Library Information System operates within a networked environment, necessitating harmonious coexistence among various software components and applications.

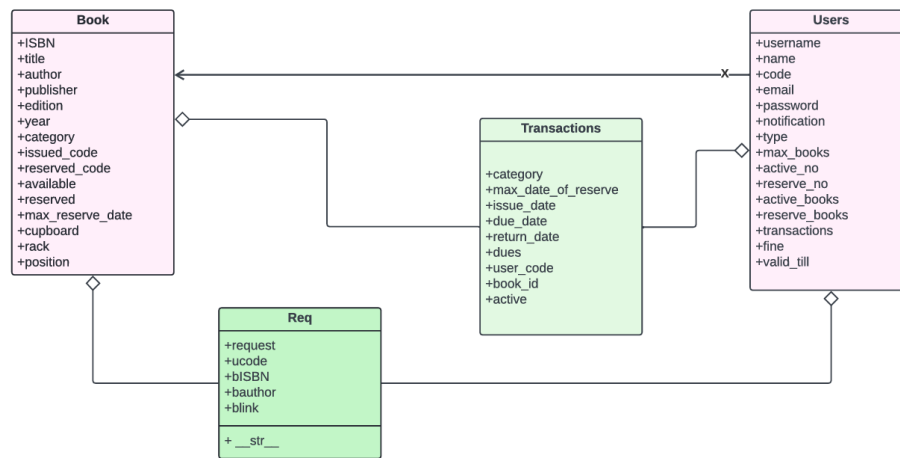## 2.5 Design and Implementation Constraints

2.5.1 Use-Case Diagram
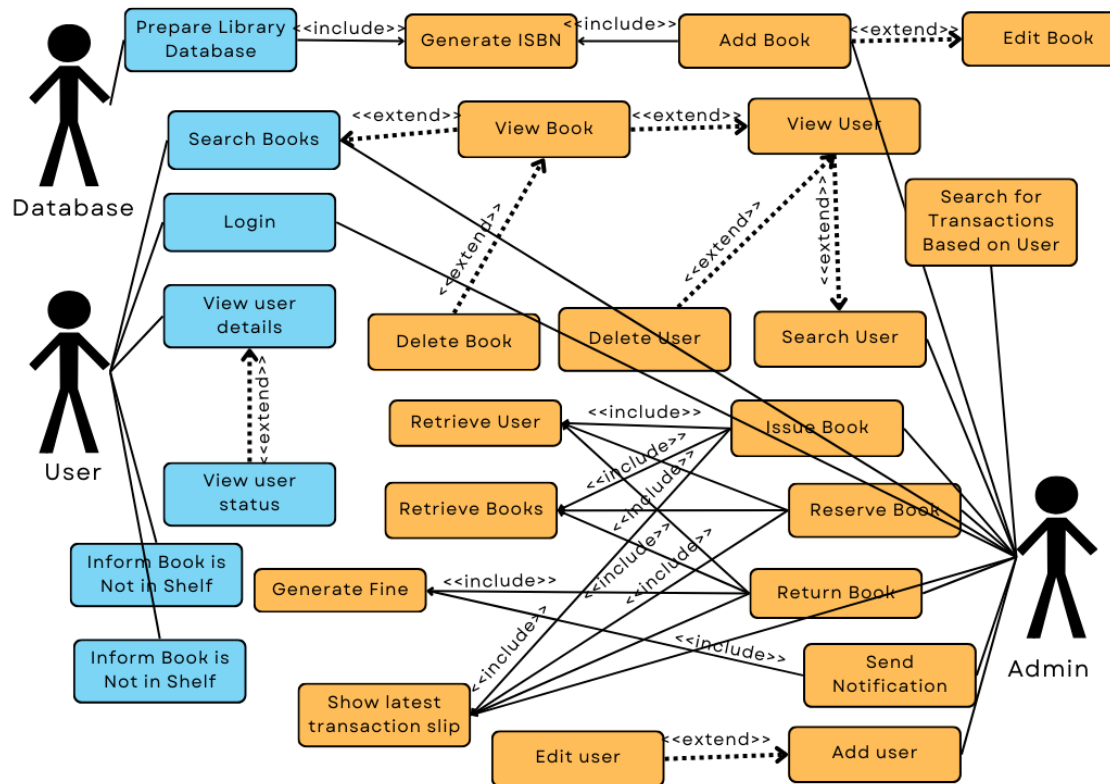
2.5.2 Class Diagram

2.5.3 Constraints

The development of the Library Information System (LIS) is subject to the following constraints:

- Time Constraints: The development team operates within a stringent timeline, necessitating efficient project completion.

- Adoption of New Frameworks: Implementation of unfamiliar frameworks demands additional time and resources for team training and skill acquisition.

- Security Imperatives: Given the handling of sensitive data such as member details, borrowing records, and financial transactions, robust security measures are indispensable. Attention to security concerns during design and development stages is paramount to mitigate risks of unauthorized access, data breaches, and confidentiality breaches.

- Resource Limitations: The project faces constraints in terms of budget, workforce, and infrastructure availability. Effective resource management is vital to navigate these limitations and ensure project success within defined boundaries.

2.6 User Documentation

The Library Information System (LIS) will be accompanied by a comprehensive user documentation package to assist users in installing, configuring, and utilizing the software effectively. The user documentation package will include the following materials:

- User manual: User manual including step-by-step instructions will be provided to guide users through installing and using the software.

- Quick reference guide: A quick reference guide will be provided to help users perform common tasks, such as taking attendance or generating and exporting reports.

- Relevant technology documentation: The user documentation package will also include links to relevant technical documentation, such as React Native documentation.

3 External Interface Requirements

3.1 User Interfaces

3.1.1 Home Page

The interface presents two distinct options: a login function and a book search feature. Upon selecting the *Login* option, users are redirected to the login page, facilitating access to secured functionalities. Conversely, choosing the *Search for Books* option enables any user, regardless of authentication status, to utilize the book search functionality without the necessity of logging in. This approach affords unrestricted access to the book search capability, enhancing user convenience and accessibility. The page also displays the latest books to arrive in the library, to provide easy information to anyone visiting the website.

3.1.2 Login Page

On this interface, the login process is facilitated by soliciting the username and password. It accommodates authentication for two distinct user categories: library users and library administrators. This bifurcation enables individuals with varying levels of access and privileges to authenticate themselves securely, thereby ensuring appropriate authorization to the system's functionalities based on their designated roles.

3.1.3 Library User Home Page

At the top of the page, the username of the authenticated user is prominently displayed alongside their name, user code number, and email address. Books recommended for them based on their departments and issue history are also displayed on this homepage. Additionally, a feature labeled *User Status* is available for user interaction. Upon selection, this feature provides the user with pertinent information including their assigned category, the maximum number of books permissible for both issuance and reservation, as well as a comprehensive overview of their current active and reserved book selections. This presentation ensures users have convenient access to essential details pertaining to their account status and library privileges. Also, there is a feature to make a request for procuring a new book the user thinks the library would benefit from. Additionally, a request to locate a misplaced book can also be made by the user.

3.1.4 Admin Home Page

The administration interface presents a range of options for managing both books and users, as well as accessing a log of book transactions. Administrators can navigate to this interface from the home page or return to the previous page as needed.

Upon selecting the *Manage Books* option, administrators are granted the ability to perform actions such as adding a new book, searching for a book within the system, editing an existing book, or removing a book from the inventory. Comprehensive details regarding each book are displayed, including title, author, ISBN, publisher, edition, publication year, category, cupboard and rack placement, position number, and availability status.

Alternatively, upon selecting the *Manage Users* option, administrators gain the capability to add new users to the system. The user creation process involves specifying pertinent information such as name, user code, email address, username, password, user type, department, and membership validity date. The system dynamically determines the maximum allowable number of books each user type can borrow. Administrators also have the ability to view and manipulate user details, including searching for specific users or removing them from the system.

Moreover, the *Book Transactions* section allows administrators to execute various actions related to book lending, returning, and reservation for designated users and specific books. Additionally, administrators have the capability to dispatch notifications to users regarding impending due dates for borrowed books or notifications regarding the unavailability of reserved books.

A *View Transactions* gives the admin a comprehensive overview of all transactions made, with a user code input, which returns all transactions pertaining to that particular user.

3.1.5 Explore Books

On this platform, all users possess the capability to conduct searches for books based on specific criteria, including title, author, and category. The library maintains an inventory encompassing eleven distinct categories of books. Moreover, the search functionality incorporates substring-based algorithms for both title and author searches, enhancing the precision and efficiency of the search process. This implementation ensures that users can efficiently locate desired books by employing flexible search parameters tailored to their preferences.

3.2 Software Interfaces

The system will be made to function on Windows, Linux (Ubuntu and Debian), and MacOS. Both the admins and the library users are supposed to use desktops or laptops.

4 System Features

4.1 Making Book Transactions

4.1.1 Description and Priority

Priority: **High**

This feature allows admins to issue, reserve and return books in real time based on the current book and user status. The feature enables users to view their own status, including notifications if any and search and check the availability of books. Users can also view the books pending for them to return, or books that have been reserved for them and the due dates for these.

4.1.2 Functional Requirements

- REQ-1: The system shall allow admins to issue, reserve and return books.

- REQ-2: The system shall allow admin to edit book and user status for each book and user respectively

- REQ-3: The system shall allow users to view their current active and reserved books, along with the due date for issued books.

4.2 User Authentication

4.2.1 Description and Priority

Priority: **High**

This feature allows users to log in to the app. The allowed user types are Undergraduate Students (UG), Postgraduate Students (PG), Research Scholars (RS), and Faculty Members. Only administrators can create or register new users and edit existing user details. They can also add, remove or edit books and users.

4.2.2 Functional Requirements

- REQ-1: The system shall allow users to log in for categories of UG, PG, RS and Faculty.

- REQ-2: The system shall allow administrators to log in to the app using correct credentials, and then register, remove or edit users.

- REQ-3: The system shall allow only administrators to add, remove or edit books from the library.

4.3 Searching for Books

4.3.1 Description and Priority

Priority: **High**

This feature should allow all users irrespective of their log in status to search for and view books in the library, and filter their search by title, author and category. They can also view the rack number, position number, and cupboard number of the book and its current availability status.

4.3.2 Functional Requirements

- REQ-1: System should let users to search for books, filtered by its title, author or category.

- REQ-2: System should allow users to view the availability status of the book searched for and also its position in the library.

4.4 Transaction Reports

4.4.1 Description and Priority

Priority: **Medium**

This feature allows administrators to view transaction reports for each book issue, return and reserve activity. Users can view transaction reports for all transactions he made, and also see his pending actions and dues to be cleared, if any.

4.4.2 Functional Requirements

- REQ-1: The system shall generate transaction overview for each and every book transaction made.

- REQ-2: The system shall allow admin to view transaction reports for all transactions they made.

- REQ-3: The system shall allow users to view their own pending transactions and fines to be paid.

- REQ-4: The system shall allow the admin to view all transactions, giving an option for it to be filtered by the user making them.

4.5 Generate Fines

4.5.1 Description and Priority

Priority: **Medium**

   This feature allows the administrator to impose a fine upon users who have crossed their due date of returning an issued book and have not done so as yet.

4.5.2 Functional Requirements

- REQ-1: The system should calculate fine as per the number of days of delay and add it to the user's account.

4.6 Notification System

4.6.1 Description and Priority

Priority: **Low**

   This feature allows administrators to send auto generated or manual notifications to users when they have crossed their date of book return or when a book they reserved is no longer available or reserved for themselves.

4.6.2 Functional Requirements

- REQ-1: System should be able to notify users.

- REQ-2: System should allow administrators to modify and send notifications to users.

4.7 Request System

4.7.1 Description and Priority

Priority: **Low**

   This feature allows users to send request to administrator for procurement of book. Additionally, they can give the ISBN of books which are misplaced from their allocated position so that the librarian can replace the book in its right place.

4.7.2 Functional Requirements

- REQ-1: System should be able to notify admin.

- REQ-2: System should allow users to send request to users.

5 Other Nonfunctional Requirements

5.1 Safety Requirements

- The system will handle sensitive information essential to the functioning of institutions that will be using it. Therefore, it's imperative to implement robust backup mechanisms to prevent data loss. Additionally, the system will cater to users such as administrators, students, and faculty members who may not be tech-savvy. Hence, ensuring the system is user-friendly without requiring specialized training is crucial. Moreover, it's essential to incorporate error-handling mechanisms to address any potential issues that may arise.

5.2 Security Requirements

- Given that the system will manage sensitive data such as student and faculty details, ensuring its security and preventing data leaks is paramount. Specific security measures include fortifying the login feature to resist brute force attacks and safeguarding the transaction report record feature against SQL injection attacks.

5.3 Software Quality Attributes

The system's quality attributes, prioritized from highest to lowest, are as follows:

1. Platform Independence: The application should operate seamlessly across various platforms, including Windows, Linux, and Mac devices.

2. Usability: As the system will be utilized by individuals with varying technical expertise, prioritizing ease of use is essential.

3. Codebase Documentation: Thorough documentation of the codebase is necessary for facilitating maintenance and the incorporation of new features.

4. Error Handling: Implementing effective error-handling mechanisms is crucial for maintaining system stability.

5. Performance: The application should be lightweight and responsive, ensuring optimal performance for users.