Software Requirements Specification

for

Online Library Management System

Version 1.0 approved

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1 Introduction

1.1 Purpose/Objective

The purpose of this Software Requirements Specification (SRS) is to provide a comprehensive and detailed outline of the requirements for developing an efficient and user-friendly online library management system. The objective is to create a digital platform that seamlessly manages the various aspects of library operations, including cataloging and organizing resources, facilitating user interactions, streamlining administrative tasks, and ensuring a smooth borrowing and returning process. This SRS aims to define the functional, non-functional, and performance-related requirements essential for the successful design, development, and deployment of the online library management system, ultimately enhancing the library's accessibility, usability, and overall effectiveness in serving its patrons.

1.1.1 Document Conventions (Definition, Acronyms, Abbreviations)

1.1.1.1. Document Format:

- Use a consistent font type and size for the entire document (e.g., Times New Roman, 12pt).
- Maintain consistent spacing and formatting throughout the document.
- Use page numbers and headers/footers for easy navigation.

1.1.1.2. Section Numbering:

Number the sections and subsections of your SRS using a hierarchical structure (e.g., 1, 1.1, 1.2, 2, 2.1, 2.2, etc.).

1.1.1.3. Headings and Subheadings:

- Use clear and descriptive headings for each section and subsection.
- Use bold or a larger font size for section headings, and italics or a slightly smaller font size for subheadings.

1.1.1.4. Acronyms

- **SRS:** Software Requirements Specification
- **API:** Application Programming Interface
- **UI:** User Interface
- **UX:** User Experience
- **GUI:** Graphical User Interface
- **SQL:** Structured Query Language
- **DBMS:** Database Management System
- **HTTP:** Hypertext Transfer Protocol

- **HTTPS:** Hypertext Transfer Protocol Secure
- **URL:** Uniform Resource Locator

1.1.2 Scope

The scope of this Software Requirements Specification (SRS) encompasses the development and implementation of an advanced online library management system that aims to revolutionize the efficiency, accessibility, and user experience of library operations. The system will cover a wide array of functionalities, including user registration, resource cataloging, search and retrieval, borrowing and returning of materials, administrative management, reporting, and integration with external systems if applicable. Additionally, the SRS outlines the requirements for both the user interface (UI) and the administrative interface, ensuring a seamless experience for patrons and library staff alike. While the primary focus is on the digital transformation of traditional library processes, the SRS also considers potential integration with mobile platforms to extend accessibility. It's important to note that this SRS does not cover hardware procurement, installation, or maintenance, as it is centered solely on software specifications and functionalities.

1.1.3 References

- Smith, J. A. (2019). "Modern Library Management: Digital Solutions for Enhanced Efficiency." Library Technology Journal, 43(2), 76-89.
- IEEE Computer Society. (1998). "IEEE Recommended Practice for Software Requirements Specifications." IEEE Std 830-1998.
- Brown, C. V., & Roush, W. R. (2008). "Applied Software Project Management." O'Reilly Media.

2 History/Background Study (Sources of Domain Knowledge)

2.1 Technical Literature

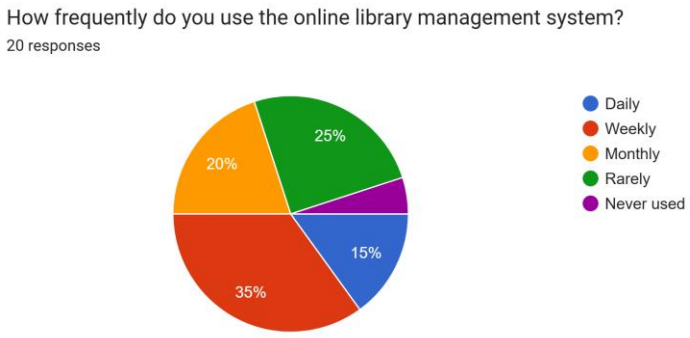
The technical literature relevant to this Software Requirements Specification (SRS) includes a range of scholarly articles, research papers, and technical documentation that address various aspects of online library management systems, software engineering, user experience design, and information retrieval. This literature provides insights into best practices for designing user-friendly interfaces, optimizing search algorithms, ensuring data security, and implementing effective database management. Additionally, studies examining the integration of emerging technologies such as RFID, OCR, and mobile applications within library management systems are essential to informing the technical decisions and design considerations outlined in this SRS. By drawing from this technical literature, the SRS aims to incorporate established principles and innovative solutions to develop a robust and efficient online library management system that meets the needs of both patrons and library administrators.

2.2 Existing Applications

- **Koha**: An open-source integrated library system used by libraries of all sizes. It offers features like cataloging, circulation, and patron management.
- **LibraryThing**: A social cataloging web application for storing and sharing your personal library collection online. It also allows users to discover new books based on their interests.
- **Alma**: A cloud-based library services platform that provides tools for acquisitions, cataloging, circulation, and electronic resource management.
- **WorldCat**: A global catalog of library collections that allows users to search for books and other materials in libraries worldwide.
- **Evergreen**: An open-source integrated library system that focuses on consortial resource sharing and collaboration among libraries.
- **Follett Destiny**: A comprehensive library management system for schools that covers cataloging, circulation, and resource management.
- **SirsiDynix Symphony**: A library management system that offers modules for circulation, cataloging, and patron management along with analytics and reporting features.
- **Vufind**: An open-source discovery platform that allows users to search and discover library resources, integrating with various library management systems.
- **Libib**: An online platform for cataloging personal or small institutional collections, with mobile apps for easy scanning and organizing.
- **Book Systems Atriuum**: A library management system designed for schools, offering features like cataloging, circulation, and report generation.

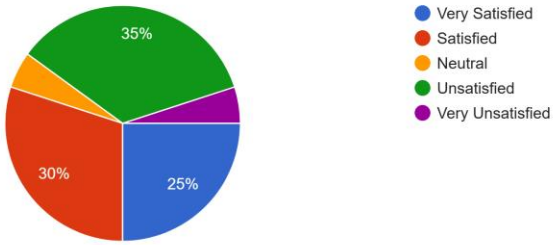
2.3 Customer Surveys

Link: https://forms.gle/tkGktcx3HAwB9tVT9



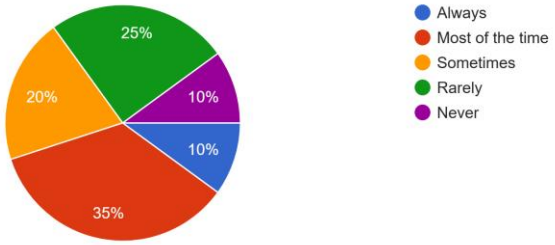
How satisfied are you with the search functionality of the system?

20 responses



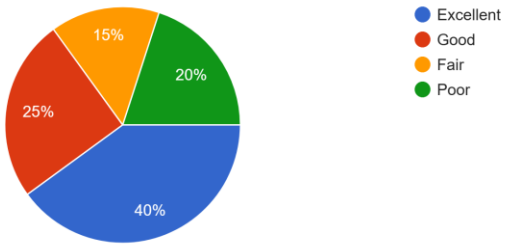
Are you able to easily find and access the resources you're looking for?

20 responses



How would you rate the user interface of the system in terms of user-friendliness?

20 responses



2.4 Expert Advice

- **Stakeholder Collaboration**: Involve all relevant stakeholders, including librarians, administrators, and potential end-users, in the requirement-gathering process. Their input is crucial to ensure the system meets the diverse needs of your library community.
- **Clear and Precise Requirements**: Write requirements that are specific, measurable, achievable, relevant, and time-bound (SMART). This clarity will help developers implement features accurately.

- **Modularity and Scalability**: Design the system with modularity in mind. This allows for easier maintenance, updates, and potential future enhancements. Ensure the system can scale to accommodate growing collections and users.
- **User-Centered Design**: Prioritize user experience (UX) and user interface (UI) design. The system should be intuitive, easy to navigate, and visually appealing to both tech-savvy and less tech-savvy users.
- **Security and Privacy**: Implement robust security measures to protect user data, including encryption, secure authentication, and access controls. Ensure compliance with relevant data protection regulations.
- **Integration Capabilities**: Consider the potential need for integrating your system with other library systems, databases, or external services. An application programming interface (API) can facilitate such integrations.
- **Search and Discovery**: Invest in advanced search and discovery functionalities. Efficient search algorithms and filters can greatly enhance the user experience and aid in finding resources quickly.
- **Reporting and Analytics**: Include reporting features to provide administrators with insights into library usage, popular resources, and trends. These insights can guide collection development and resource allocation.
- **Accessibility**: Design the system with accessibility in mind, adhering to accessibility standards (e.g., WCAG). This ensures that users with disabilities can navigate and use the system effectively.
- **Testing and Validation**: Plan thorough testing at various stages of development, including functional, usability, security, and performance testing. This ensures that the system works as intended and is free of critical issues.
- **Documentation**: Create comprehensive documentation that covers user guides, administrator manuals, and technical documentation. This will assist users and administrators in understanding and using the system effectively.
- **Version Control and Change Management**: Implement version control practices to track changes and updates to the system over time. This makes it easier to manage updates and rollbacks.
- **Training and Support**: Plan for training sessions and user support to ensure that library staff and patrons can effectively use the system. A well-trained user base leads to better adoption.
- **Feedback Mechanisms**: Include mechanisms for users to provide feedback and suggest improvements. Continuous feedback loops can lead to a more responsive and user-centric system.

2.5 Current/Future requirements

- Allow users to register accounts and log in securely.
- Support different user roles (students, faculty, librarians) with appropriate permissions.

- Enable efficient cataloging of various resources (books, journals, e-books, media, etc.).
- Provide options to update and edit resource information.
- Develop mobile apps for iOS and Android to enhance accessibility for users on the go.
- Integrate with university or school LMS platforms to streamline resource access.

3 Overall Description

3.1 Product Functions

3.1.1 Hardware Requirement

- Web Server: A robust web server (e.g., Apache, Nginx) to host the application.
- Database Server: A dedicated database server (e.g., MySQL, PostgreSQL) to manage the system's data.
- Application Server: A server to run the application logic and manage user requests.
- Adequate storage space is needed for storing user data, resource records, images, documents, and backups.
- Implement firewalls, intrusion detection systems, and encryption to ensure data security.

3.1.2 Software Requirement

- The system shall provide user authentication using secure username and password credentials.
- The system shall allow users to search for resources using keywords, filters, and sorting options.
- The system shall enable users to borrow and return resources, automatically updating availability status.
- The system shall generate automated notifications for overdue items and reservation pickups.
- The system shall provide administrators with a dashboard to manage resources, users, and generate usage reports.

3.2 Functional Requirements

3.2.1 Sign up/ Sign in

3.2.1.1 Create new account

Description: It is a fundamental feature that enables new users to sign up and register on the Online Library management System. Users can provide necessary details, such as name, email, and

password, to create their unique accounts. Once the information is submitted and verified, a new account is successfully established, granting the user access to all the functionalities

- **Input**: Enter name, surname, mobile number, email address, password, date of birth, gender. Agree to terms and conditions.
- **Output**: Account created prompt is displayed and verification link is sent to mail and contact number. Error message is displayed if any filled detail is wrong

3.2.1.2 Log in

Description: It is a key functionality that allows registered users to access their accounts on the Online Library management System. By entering their valid credentials, such as username/email and password, users can securely log in to their accounts, gaining full access to their profiles.

- **Input:** Email or phone number and password.
- **Output**: Send email to user if log in is done from a new device.

3.2.1.3 Forgot Password

Description: It is a key functionality that allows registered users to access the account when they forget their password. The link to reset password is sent to their respective email. The user resets the password and can login again.

- **Input:** Click forgot password.
- **Output:** The reset mail is sent to the user's email id.

3.2.2 Book Catalogue

Description: There is a collection of books available on the management system. It maintains a comprehensive catalogue of all the books available in the library, including information like title, author, ISBN, genre, and availability status. The users can select a plethora of books from the system of their choice.

- **Input**
  - Add book information
  - Update book information
- **Output**
  - Success Messages
  - Display book details
- **Error**
  - If the admin provides invalid or incomplete information during book addition, the system displays error message.

- Display message when book is already available.

3.2.3 Book search

Description: the system shall allow users to search for books based on various criteria, providing accurate and relevant results, along with meaningful error handling for unsuccessful searches.

- **Input**
  - Input keywords, book titles, author names, genres or other relevant attributes**.**
- **Output**
  - Display a list of books that matches the search criteria.
- **Error**
  - No matching result
  - Invalid search input
  - Database connection error

3.2.4 Borrowing and returning books

Description: The system shall facilitate the borrowing and returning of books by users, ensuring accurate processing, proper validation of user actions and informative error handling.

- **Input**
  - Borrowing request
  - Returning request
- **Output**
  - Successful message for borrowing confirmation
  - Successful message for returning confirmation.
- **Error**
  - Unavailability of book when trying to borrow.
  - Overdue return
  - Invalid return request when a book was not borrowed
  - Limit exceeded when maximum books have been borrowed.

3.2.5 Book reservations

Description: The system shall provide users the facility to place reservations on books that are currently unavailable, ensuring accurate reservation handling, user notifications, and proper error management.

- **Input**
  - User shall giver reservation request for a specific book that is currently unavailable.
- **Output**
  - Successful message for reservation confirmation.
- **Error**

- Book is already available and no need for reservation

3.2.6 Reporting and analytics

Description: The system shall provide administrators and librarians with the ability to generate various reports and access analytics, enabling them to monitor and analyze book usage, user activity and other relevant metrics.

- **Input:** Report type selection.
- **Output**: Report results
- **Error:** No data available.

3.2.7 Book Recommendation

Description: The system shall provide users with personalized book recommendations based on their reading history, preferences and similar user behavior, enhancing their experience and promoting relevant books.

- **Input**
  - Gather information regarding user reading history
  - Gather information regarding genres.
  - Gather information regarding favorite authors from the user history.
- **Output**
  - Display the recommended books.
- **Error**
  - Display no recommendations available.

3.2.8 Admin Panel

Description: The system shall provide administrators with a secure and user friendly admin panel to manage various aspects of the library system, including user management, book catalog, borrowing management, and system configuration.

- **Input**
  - Admin credentials: Administrators shall provide their username and password to login to the admin panel.
  - Configuration changes: Administrators shall input changes to system configurations such as borrowing periods, fine rates and user roles.
- **Output**
  - Successful message and a dashboard containing information pertaining to the system.
- **Error**

- Invalid Admin credentials
- Unauthorized access
- Data validation errors

3.3 Non-Functional Requirements

3.3.1 Correctness Requirement

- **Accurate Data Storage and Retrieval:** The Online Library management System shall ensure the accuracy of data storage and retrieval operations, minimizing data inconsistencies, duplicates, or data loss. User-generated content, user profiles, and interactions should be reliably saved and accurately presented to users across different platforms and devices.
- **Error Handling and Validation:** The platform shall implement robust error handling and data validation mechanisms to prevent erroneous input and maintain data integrity. It should display informative error messages to guide users in correcting any input errors during account creation, post creation, or other interactions.
- **Reliable Content Moderation:** The content moderation system shall be effective and accurate in detecting and handling inappropriate or harmful content. It should minimize false positives and negatives, ensuring that legitimate content is not mistakenly flagged or inappropriate content goes undetected.

3.3.2 Portability requirement

The Portability Requirement for the Online Library management System focuses on ensuring the platform's flexibility and ease of migration across different environments and devices. The system shall be designed and developed to be portable, allowing smooth deployment and operation on various operating systems, web browsers, and hardware configurations. Emphasizing adherence to industry standards and best practices, the Online Library management System should be compatible with multiple platforms, enabling users to access the platform seamlessly from desktop computers, laptops, tablets, and smartphones.

Furthermore, the Portability Requirement encompasses considerations for future scalability and adaptability. The platform should be built with a modular and component-based architecture to facilitate easy updates, enhancements, and integration with emerging technologies. Compatibility with different screen sizes and resolutions ensures a consistent user experience across devices, promoting user engagement and accessibility.

By meeting the Portability Requirement, the Online Library management System can reach a broader audience and adapt to evolving technological

landscapes, ultimately positioning itself as a versatile and user-friendly platform in the dynamic world of online social networking.

3.3.3 Efficiency Requirement

- **Response Time and Performance:** The Online Library management System shall strive for optimal response times and efficient performance, ensuring quick page loading, content delivery, and minimal latency for user interactions. The platform should be capable of handling a large number of concurrent users without significant degradation in response times.
- **Resource Utilization:** The system shall be designed to efficiently utilize computing resources, such as CPU, memory, and network bandwidth, to minimize resource contention and enhance overall system stability. Efficient resource management is crucial for accommodating increased user activity and traffic spikes.
- **Caching and Content Delivery:** Implementing intelligent caching mechanisms and content delivery networks (CDNs) shall enhance the efficiency of content retrieval and reduce server load. Frequently accessed data, images, and other static content should be cached to reduce repetitive data retrieval and improve overall performance.

3.3.4 Usability Requirement

- **Intuitive User Interface:** The Online Library management System shall have an intuitive and user-friendly interface, ensuring that users can easily navigate and access various features without the need for extensive guidance or training. Clear and consistent design elements, such as navigation menus, buttons, and icons, should promote a seamless user experience.
- **Accessibility and Inclusivity:** The platform shall be designed with accessibility in mind, adhering to web accessibility standards to accommodate users with disabilities. Features like keyboard navigation, alternative text for images, and sufficient color contrast contribute to a more inclusive and user-friendly experience.
- **Personalization and Customization:** The Online Library management System shall offer personalization options, allowing users to customize their profiles, content preferences, and notification settings. By empowering users to tailor their experience, the platform can enhance user engagement and satisfaction.

3.3.5 Reusability Requirement

- **Modular Code Architecture:** The Online Library management System shall be developed with a modular code architecture, allowing developers to create reusable components and modules. This design approach facilitates easier maintenance, updates, and the incorporation of new features, promoting code reusability across the platform.
- **API and Integration Support:** The platform shall provide well-documented and standardized APIs (Application Programming Interfaces) to enable seamless integration with external applications, services, and third-party platforms. By offering API support, developers can build complementary applications that interact with the social networking site, enhancing overall system reusability and interoperability.

3.3.6 Reliability Requirement

- **High Availability and Redundancy:** The Online Library management System shall be designed with high availability in mind, incorporating redundancy measures to ensure continuous operation even in the event of hardware failures or system issues. Implementing failover mechanisms and backup systems guarantees minimal downtime and data loss.
- **Error Handling and Recovery:** The platform shall have robust error handling and recovery mechanisms to gracefully handle unexpected errors and exceptions. The system should be able to recover from errors without affecting the overall functionality and user experience, minimizing the impact on users' interactions and content.

3.3.7 Maintainability Requirement

The Maintainability Requirement for the Online Library management System focuses on creating a system that is easy to maintain, modify, and enhance over time. To achieve this, the platform shall be developed with clean, well-documented, and organized code that follows coding best practices and standards. A modular and component-based architecture shall be adopted to facilitate easier updates and modifications to specific features without affecting the entire system.

3.4 User Characteristics

The application does not require any specific computer knowledge to use it except the developers and administrators of it. Standard users are thought to be from any gender

and any nationality but the age restriction is 18+ for females and 22+ for males, who can use just a computer's browser. On the other hand, administrators and potential developers need a high level of expertise to understand web technologies.

3.5 Design & Implementation Constraints

Any update regarding the article will have to be recorded and the correct information must be updated and all the cost calculations must be done as soon as possible. The backup of all the data must be done on a hard disk. There are not so many strong firewalls so proper antivirus scans must be done before use. There is no provision for saving incomplete data.

3.6 Assumptions & Dependencies

3.6.1 Assumptions

- **Internet Connectivity:** It is assumed that users accessing the Online Library management System will have a reliable internet connection to interact with the platform.
- **Device Compatibility:** The platform assumes users will access the site using modern web browsers and devices, such as laptops, desktops, smartphones, and tablets.
- **User Authentication:** Users are assumed to provide accurate and valid information during the registration process to create their accounts.
- **Privacy Settings:** Users are responsible for configuring their privacy settings and controlling the visibility of their posts and personal information.
- **Content Moderation:** It is assumed that users will adhere to community guidelines, and content moderation mechanisms will handle any inappropriate or harmful content.

3.6.2 Dependencies

- **Database Management System:** The proper functioning of the site depends on the availability and performance of the selected database management system for storing user data and content.
- **Web Server and Hosting:** The platform relies on a stable and secure web server environment and hosting infrastructure to ensure uninterrupted access and response times.
- **API Integration:** The successful integration of external APIs, such as those for social media sharing or third-party services, depends on the availability and compatibility of the respective APIs.
- **Third-Party Services:** If the platform utilizes third-party services for analytics, payment processing, or other functionalities, their proper functioning and API compatibility are essential for seamless operations.

- **Security Measures:** The platform's security measures, including encryption protocols and firewall configurations, are crucial for safeguarding user data and protecting against potential security breaches.

4 Interface Requirements

4.1 User Interfaces

The program offers a decent graphical interface for the user that can be run on the device by a user, performing the necessary tasks such as posting, reviewing, sharing. a. Login Page b. Home Page c. Page to display connection requests, suggestions, notifications, etc.

4.2 Hardware Interfaces

The system must run over the internet, all the hardware shall be required to connect to the internet. a. WAN - LAN Network b. Ethernet Cross-Cable c. Modem

4.3 Software Interfaces

The system is on the server so it requires any scripting language PHP, VBScript etc. The system requires a Database also to store any transaction of the system like MYSQL, etc. system also requires DNS (Domain Name Space) for the naming of the internet. At the last user needs a web browser to interact with the system.

4.4 Communication Interfaces

As a whole we will be a completely stand-alone system that lets other platforms connect, fetch and transform data at certain levels. The platform will provide APIs and tools for third-party developers to let them create high-level integrated plugins and programs. The main communication interface with the other platforms will be the application Platform. However, this integration and its level will be set by the user, who wants to integrate their accounts and information with other websites.

5 Conclusion

In conclusion, this Software Requirements Specification (SRS) outlines the essential blueprint for the development of an advanced online library management system. By meticulously capturing the needs and expectations of users, administrators, and stakeholders, this document serves as a guiding framework that lays the foundation for a robust and user-centric platform.