

| **TITLE:** Requirement **S**pecification Document |
| --- |

**AIM:** To learn and understand the way of analysing the gathered information in the previous phase for the development process and prepare requirement specification document. A concept of software engineering. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Expected Course outcome of Experiment:**

Process of gathering requirements and converting them into specifications.

Document created will be used by both, the customer and the developer, to understand WHAT is going to be developed.

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**Books/ Journals/ Websites referred:**

1. Roger Pressman, Software Engineering: A practitioners Approach, McGraw Hill, 2010 ,6th edition

2. Ian Somerville, Software Engineering , Addison Wesley,2011,9th edition

1. http://en.wikipedia.org/wiki/Software\_requirements\_specification

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**Pre Lab/ Prior Concepts:**

**Requirements analysis** in systems engineering and software engineering, encompasses those tasks that go into determining the needs or conditions to meet for a new or altered product, taking account of the possibly conflicting requirements of the various stakeholders, such as beneficiaries or users. It is an early stage in the more general activity of requirements engineering which encompasses all activities concerned with eliciting, analyzing, documenting, validating and managing software or system requirements.

Requirements analysis is critical to the success of a systems or software project. The requirements should be documented, actionable, measurable, testable, traceable, related to identified business needs or opportunities, and defined to a level of detail sufficient for system design.

Conceptually, requirements analysis includes three types of activities:

* **Eliciting requirements**: the task of identifying the various types of requirements from various sources including project documentation, (e.g. the project charter or definition), business process documentation, and stakeholder interviews. This is sometimes also called requirements gathering.
* **Analysing requirements**: determining whether the stated requirements are clear, complete, consistent and unambiguous, and resolving any apparent conflicts.
* Recording requirements: Requirements may be documented in various forms, usually including a summary list and may include natural-language documents, use cases or process specifications.

New systems change the environment and relationships between people, so it is important to identify all the stakeholders, taken into account all their needs and ensure they understand the implications of the new systems. Analysts can employ several techniques to elicit the requirements from the customer. These may include the development of scenarios, the identification of use cases, the use of workplace observation or ethnography, holding interviews, or focus groups (more aptly named in this context as requirements workshops, or requirements review sessions) and creating requirements lists. Prototyping may be used to develop an example system that can be demonstrated to stakeholders. Where necessary, the analyst will employ a combination of these methods to establish the exact requirements of the stakeholders, so that a system that meets the business needs is produced

Different types of Requirements

* Functional requirements
* Usability requirements
* Reliability requirements
* Performance requirements
* Security requirements

A typical SRS document template is shared subsequently. This document acts as a reference and will be used by both, the customer (for whom the software system is to be developed), and the organization which develops the solution. Typically, prepared by the development organization at the early stage of development by the professionals after interacting with the customer.

**Software Requirements Specification for:**

**Le Miele Mists**

***(An online perfume shopping website)***

**Version 1.0**

**Prepared by**

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**29th August, 2024**

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**Chapter 1: Introduction**

**1.1 Purpose**

This Software Requirement Specification (SRS) document defines the requirements for Le Miele Mists, version 1.0. This document serves as a formal agreement between the stakeholders and the development team, detailing the essential features and functionalities of the online retail system for perfumes. The purpose of this SRS is to ensure a clear, shared understanding of the system’s requirements, which will guide the design, development, and testing processes.

The scope of this SRS encompasses the core functionalities required for the initial release of Le Miele Mists. Specifically, it includes:

- User Registration and Account Management

- Comprehensive Product Catalog with Advanced Search Capabilities

- Shopping Cart Functionality and Seamless Checkout Process

- Integration with Payment Gateways for Secure Transactions

- Order Tracking and Management Tools

- Customer Service and Support Mechanisms

This document focuses on these foundational components to establish a robust and scalable system for the online sale of perfumes. Future versions of this SRS will address additional features, performance enhancements, and potential system expansions. By adhering to the requirements specified herein, the development team will deliver a system that meets stakeholder expectations and supports a high-quality user experience.

**1.2 Product Scope**

Le Miele Mists is an advanced e-commerce platform meticulously designed to provide an exceptional and seamless shopping experience for fragrance enthusiasts. The primary goal of this software is to offer customers an intuitive and efficient way to explore, select, and purchase a diverse range of perfumes from renowned brands. By integrating user-centric features and a sleek, easy-to-navigate interface, the platform aims to enhance overall customer satisfaction and streamline the purchasing process.

Key Benefits and Objectives:

- Convenient Shopping Experience: Customers can browse through an extensive catalog of perfumes, make informed decisions, and complete purchases from the comfort of their own homes, with access available 24/7.

- Improved Product Discovery: The platform features advanced search functionalities and filters that help users find specific fragrances or explore new options based on their tastes, ensuring a tailored shopping experience.

- Streamlined Order Management: Tools for tracking orders, managing returns, and handling customer service inquiries are integrated to facilitate smooth and efficient order processing, contributing to better operational efficiency.

- Secure and Reliable Transactions: The platform utilizes state-of-the-art payment gateways to ensure that all financial transactions are conducted securely, protecting customer data and reducing the risk of fraud.

- Personalized User Experience: Through data-driven recommendations and user account features, the system aims to offer personalized suggestions and a more engaging shopping experience, encouraging customer loyalty and repeat business.

Le Miele Mists is strategically aligned with our corporate goals to enhance our digital presence and capitalize on the growing online retail market. By adopting cutting-edge technology and focusing on a superior user experience, the platform is set to drive significant revenue growth, expand our customer base, and strengthen our competitive position in the fragrance industry. This initiative not only supports our business strategy but also positions us as a leader in online fragrance retail.

For a more comprehensive overview of the project’s vision and alignment with corporate strategies, please refer to the detailed Vision and Scope document.

**1.3 References**

<https://www.parcos.com/cat/fragrance>

<https://www.themancompany.com/collections/fragrance>

<https://www.zinodavidoff.com/fragrances>

<https://www.embarkperfumes.com/collections/perfume-gift-sets>

**Chapter 2: Overall Description**

**2.1 Product Perspective**

Le Miele Mists is conceived as a new, standalone e-commerce solution specifically designed to cater to the fragrance retail market. Unlike existing systems, which may have been developed for broader or unrelated retail purposes, this product is dedicated solely to providing an optimized and specialized shopping experience for perfumes and related products.

**2.2 Context and Origin:**

* **New Product:** This Jeroku Store is not a follow-on member of an existing product family nor a replacement for any current systems. It is being developed as a new, self-contained product with a focus on the fragrance industry, designed from the ground up to meet the specific needs of perfume consumers and retailers.
* **Standalone Solution:** As a self-contained system, Le Miele Mists will operate independently but will be integrated with external systems for payment processing, order management, and customer support. It does not rely on any pre-existing infrastructure or legacy systems, ensuring that it can deliver a tailored and modern user experience.

**2.3 Relation to Larger System:**

Although Le Miele Mists functions as a standalone product, it interfaces with several external components and systems:

* **Payment Gateways:** Integration with payment processing services to handle transactions securely.
* **Customer Relationship Management (CRM):** Interfaces with CRM systems to manage customer data, support, and marketing activities.
* **Order Fulfillment Systems:** Connects with logistics and order management systems to track and manage order shipments and returns.

In summary, Le Miele Mists is a standalone product aimed at delivering a specialized e-commerce experience for perfume retail. Its design and functionality are tailored to meet the specific needs of the target market while integrating seamlessly with external systems for payment processing, order management, and customer support.

**2.4 Product Functions**

Le Miele Mists is designed to encompass a wide range of functionalities aimed at delivering a superior and efficient shopping experience. The major functions of the product are summarized below, organized into key areas for clarity. This overview outlines the core capabilities of the system, which will be detailed further in Section 3.

***2.4.1 User Account Management***

*Account Registration and Login:*

Users can create new accounts by providing necessary details such as name, email, and password.Returning users can log in using their credentials to access personalized features.

*Profile Management:*

Users can view and update their profile information, including contact details and password settings. Options to manage privacy settings and communication preferences are provided.

*Password Management:*

Functionality for resetting forgotten passwords and updating current passwords securely. Enhanced security measures, such as multi-factor authentication (MFA), can be optionally implemented.

***2.4.2 Product Catalog and Search***

*Product Browsing:*

Users can explore a categorized catalog of perfumes, with detailed product pages showcasing descriptions, high-quality images, ingredients, and prices. Options for sorting products based on various criteria like popularity, price, and brand.

*Advanced Search Functionality:*

Users can perform searches using keywords, filters, and sorting options to narrow down product results. Filters may include product categories, brands, price ranges, and customer ratings.

***2.4.3 Shopping Cart and Checkout***

*Shopping Cart Management:*

Users can add items to their shopping cart, modify quantities, or remove items as needed. The cart provides a summary of selected items, including product details, quantities, and total price.

*Checkout Process:*

A streamlined checkout process includes order review, entry of shipping details, and selection of payment methods. Secure payment processing integrated with multiple payment gateways to handle various payment methods, such as credit/debit cards and digital wallets. Users receive an order confirmation with a summary of their purchase and estimated delivery times.

***2.4.4 Order Processing and Management***

*Order Confirmation:*

Automatic generation of order confirmation details upon successful purchase, including a unique order number and transaction summary. Email notifications sent to users with order details and tracking information.

*Order Tracking:*

Users can track the status of their orders through their account or by using a tracking link provided in confirmation emails. Real-time updates on shipment progress and estimated delivery times.

***2.4.5 Payment Integration***

*Secure Transactions:*

Integration with leading payment gateways to ensure secure and reliable processing of payments. Compliance with industry standards such as PCI-DSS to protect user payment information and prevent fraud. Support for multiple payment methods, including major credit/debit cards and alternative payment options.

***2.4.6 Customer Support***

*Help and Support:*

Access to a comprehensive help section, including frequently asked questions (FAQs) and troubleshooting guides.Live chat support and email support options for real-time assistance and issue resolution.

*Returns and Refunds:*

Users can initiate returns and request refunds through their account interface.A streamlined process for handling return requests, issuing refunds, and updating users on the status of their returns.

***2.4.7 Personalization and Recommendations***

*Product Recommendations:*

Personalized product suggestions based on user browsing history, purchase behavior, and preferences. Algorithmic recommendations that adapt to user interactions and trends.

*User Preferences:*

Ability for users to save favorite products and create wish lists.Customized shopping experiences based on user preferences and previous interactions.

This detailed summary of product functions provides a structured overview of the core capabilities of Le Miele Mists. Each function is designed to support a specific aspect of the user experience, ensuring that the platform meets the needs of its users while integrating effectively with external systems.

**2.5 Operating Environment**

Le Miele Mists is designed to be a web-based application accessible through modern web browsers. It will be hosted on a cloud platform to ensure scalability, reliability, and ease of maintenance. The following details describe the operating environment:

##### *2.5.1 Hardware Platform*

The system does not have specific hardware requirements for end users beyond a device capable of running a modern web browser. The application will be hosted on a cloud infrastructure, which may include the following hardware components:

* **Web Servers**: Cloud-based virtual machines or containers.
* **Database Servers**: Cloud-based relational database services.
* **Load Balancers**: To distribute traffic evenly across web servers.

##### *2.5.2 Operating System and Versions*

The application will be developed and deployed on the following operating systems:

* **Server-Side**: The cloud infrastructure will use a Linux-based operating system, such as Ubuntu or CentOS, for hosting web and database servers.
* **Client-Side**: The application will be accessible on any operating system that supports modern web browsers, including:
  + Windows 10 and above
  + macOS Catalina and above
  + Linux distributions such as Ubuntu, Fedora, and Debian

##### *2.5.3 Web Browsers*

The system will be optimized for compatibility with the following web browsers:

* **Google Chrome** (latest version)
* **Mozilla Firefox** (latest version)
* **Apple Safari** (latest version)
* **Microsoft Edge** (latest version)

##### *2.5.4 Software Components*

The software will interact with several key components and services, including:

* **Web Server**: Nginx or Apache to serve web pages.
* **Application Server**: Node.js or a similar environment for running server-side code.
* **Database Management System (DBMS)**: MySQL, PostgreSQL, or a similar relational database to store user, product, and order data.
* **Payment Gateway**: Integration with third-party payment processors such as Stripe or PayPal for handling transactions.
* **Email Service**: Integration with an email service provider like SendGrid or Amazon SES for sending transactional emails (e.g., order confirmations, password resets).
* **Shipping API**: Integration with shipping service providers such as FedEx or UPS for order tracking and shipment management.

##### *2.5.5 Compatibility and Coexistence*

The software must coexist peacefully with the following applications and services:

* **Content Delivery Networks (CDNs)**: For serving static assets like images, CSS, and JavaScript files quickly and efficiently.
* **Analytics Services**: Integration with Google Analytics or a similar service for tracking user behavior and site performance.
* **Security Services**: Usage of services like Cloudflare for DDoS protection and SSL certificate management.

By ensuring compatibility and integration with these hardware platforms, operating systems, web browsers, and software components, Le Miele Mists will provide a seamless and reliable user experience.

**2.6 Design and Implementation Constraints**

***2.6.1 Corporate or Regulatory Policies:***

- Data Protection: Compliance with GDPR, CCPA, and other data protection regulations to ensure customer data privacy and security.

- Accessibility: Adherence to WCAG 2.1 guidelines to ensure the application is accessible to users with disabilities.

- Consumer Protection Laws: Ensuring that all product information, return policies, and terms of service comply with consumer protection regulations in the regions where the store operates.

***2.6.2 Interfaces to Other Applications:***

- Payment Gateways: Secure and reliable integration with Stripe, PayPal, and other local payment processors.

- Shipping Services: Seamless integration with shipping service APIs (e.g., UPS, FedEx, DHL) for real-time shipping rates and tracking.

- CRM Systems: Integration with CRM systems like Salesforce or HubSpot for managing customer relationships.

- Analytics Tools: Integration with Google Analytics, Mixpanel, or similar tools for tracking user behavior and sales metrics.

***2.6.3 Specific Technologies, Tools, and Databases:***

- Frontend Framework: Use of React, Vue.js, or Angular for the PWA frontend.

- Backend Technologies: Node.js, Python (Django/Flask), or PHP for the server-side application logic.

- Database: MySQL, PostgreSQL, or MongoDB for storing product, user, and transaction data.

- Cache: Redis or Memcached for caching frequently accessed data to improve performance.

***2.6.4 Parallel Operations:***

- Scalability: The system must support horizontal scaling to handle increased traffic and parallel operations without performance degradation.

- Concurrency Management: Use of appropriate concurrency management techniques to handle multiple simultaneous transactions, particularly during sales or promotions.

***2.6.5 Language Requirements:***

- Multi-language Support: The application should support multiple languages to cater to a diverse customer base. This includes both the user interface and product descriptions.

Communications Protocols:

- HTTP/HTTPS: Use of HTTPS for secure communication between the client and server.

- WebSockets: For real-time features such as live chat support or real-time notifications.

***2.6.6 Security Considerations:***

- Authentication and Authorization: Secure user authentication (preferably using OAuth 2.0) and role-based access control for administrative functions.

- Data Encryption: Use of SSL/TLS for encrypting data in transit and encryption mechanisms for sensitive data at rest.

- Regular Security Audits: Regular security audits and vulnerability assessments to identify and mitigate potential security risks.

- PCI DSS Compliance: Ensuring that the payment processing system complies with the Payment Card Industry Data Security Standard (PCI DSS).

***2.6.7 Design Conventions or Programming Standards:***

- Code Quality: Adherence to coding standards and best practices (e.g., PEP 8 for Python, ESLint for JavaScript).

- Documentation: Comprehensive documentation for both the codebase and the user interface to facilitate maintenance and future development.

- Version Control: Use of Git for version control, with a clear branching strategy to manage development, testing, and production releases.

- Testing: Implementation of automated testing (unit tests, integration tests, and end-to-end tests) to ensure the reliability and stability of the application.

These constraints ensure that the development of Le Miele Mists adheres to necessary standards and practices, resulting in a secure, reliable, and high-performance application.

**2.7 User Documentation**

Le Miele Mists will be accompanied by comprehensive user documentation designed to ensure both customers and administrators can effectively navigate and utilize the system's features. This section outlines the various components of user documentation, detailing the format, content, and accessibility considerations.

##### *2.7.1 User Manuals*

**Customer User Manual**:

* **Introduction**: This section will provide an overview of Le Miele Mists, its purpose, and key features. It will introduce users to the main functionalities they can expect to find and how these features will enhance their shopping experience.
* **Getting Started**: Detailed steps on how to access the website, system requirements for optimal performance, and an overview of the user interface.
* **Account Management**:
  + **Creating an Account**: Instructions on how to register for a new account, including filling out personal details, setting a secure password, and confirming registration via email.
  + **Logging In**: Step-by-step guide on how to log in using email and password, including troubleshooting tips for common login issues.
  + **Managing Account Settings**: Information on updating personal information, changing passwords, setting preferences, and managing communication settings.
  + **Password Recovery**: Detailed steps on how to recover a forgotten password through email verification.
* **Browsing and Searching Products**:
  + **Browsing Categories**: Instructions on how to navigate through different product categories and subcategories.
  + **Product Filters**: How to use filters to narrow down search results based on price, brand, fragrance type, and other attributes.
  + **Search Functionality**: Guide on using the search bar to find specific products, including tips on effective search queries.
  + **Product Details**: Explanation of the product detail page, including product descriptions, images, pricing, availability, and customer reviews.
* **Shopping Cart Management**:
  + **Adding Items to Cart**: Steps to add products to the shopping cart from the product detail page.
  + **Viewing Cart**: How to view the shopping cart, including a breakdown of items, quantities, prices, and estimated total.
  + **Updating Cart**: Instructions on changing item quantities, removing items, and applying discount codes or vouchers.
  + **Saving Cart**: How to save the current cart for future visits or share it with others.
* **Checkout Process**:
  + **Proceeding to Checkout**: Guide on initiating the checkout process from the shopping cart page.
  + **Entering Shipping Information**: Detailed instructions on providing shipping details, selecting shipping methods, and estimated delivery times.
  + **Payment Processing**: Steps to choose a payment method, enter payment information, and securely complete the transaction.
  + **Order Review and Confirmation**: How to review the order summary, confirm details, and receive an order confirmation email.
* **Order Management**:
  + **Viewing Order History**: Instructions on accessing and reviewing past orders, including order details and status.
  + **Tracking Orders**: How to track the shipping status of current orders, including integration with shipping service providers.
  + **Handling Returns and Cancellations**: Guide on initiating a return or cancellation, understanding return policies, and processing refunds.
  + **Customer Support**: Information on how to contact customer support for assistance with orders, returns, or any other issues.

**Administrator User Manual**:

* **Introduction**: Overview of the administrative functions and how they support the overall operation of Le Miele Mists.
* **Getting Started**: Instructions for administrators on how to log in to the admin panel and an overview of the interface.
* **Product Management**:
  + **Adding Products**: Detailed steps on adding new products to the inventory, including inputting product details, uploading images, and setting prices.
  + **Editing Products**: How to edit existing product information, update prices, change availability, and manage product descriptions.
  + **Deleting Products**: Instructions on safely removing products from the inventory.
  + **Managing Inventory**: Guide on monitoring stock levels, setting reorder thresholds, and updating inventory records.
* **Order Management**:
  + **Viewing Orders**: Instructions on accessing and reviewing all customer orders, including filtering and sorting options.
  + **Updating Order Status**: How to update the status of orders (e.g., processing, shipped, delivered) and notify customers.
  + **Handling Returns and Refunds**: Steps to process return requests, issue refunds, and manage returned inventory.
* **Sales Reports**:
  + **Generating Reports**: Instructions on generating various sales reports, including daily, weekly, and monthly sales data.
  + **Interpreting Reports**: Guide on understanding report data, identifying trends, and making data-driven decisions.
  + **Custom Reports**: How to create and save custom reports based on specific criteria.
* **System Maintenance**:
  + **Regular Maintenance Tasks**: Overview of routine maintenance tasks to ensure system performance and reliability.
  + **Data Backup**: Instructions on performing data backups and restoring data in case of system failure.
  + **Troubleshooting**: Common issues and solutions, including how to contact technical support for more complex problems.

##### *2.7.2 Online Help*

* **Context-Sensitive Help**:
  + Integrated help sections that provide relevant guidance based on the user’s current activity or page within the application.
  + For example, while on the checkout page, help topics might include payment options, shipping methods, and order confirmation.
* **FAQ Section**:
  + A comprehensive list of frequently asked questions covering a wide range of topics, from account management to order processing.
  + Each FAQ will be categorized for easy navigation and include detailed answers and step-by-step instructions where applicable.

##### *2.7.3 Delivery Formats*

* **PDF Documents**:
  + User manuals and step-by-step tutorials will be available as downloadable PDF files, allowing users to access them offline.
  + These documents will be professionally formatted and include a table of contents for easy navigation.
* **Web-Based Help**:
  + The online help system, FAQs, and tutorials will be hosted on the website and accessible via a dedicated help section.
  + Users will be able to browse help topics, search for specific issues, and view instructional videos directly on the site.

##### *2.7.4 Standards and Accessibility*

* **Web Content Accessibility Guidelines (WCAG) 2.1**:
  + All user documentation will comply with WCAG 2.1 to ensure accessibility for users with disabilities.
  + This includes providing text alternatives for non-text content, ensuring sufficient contrast, and making all functionality available via a keyboard.
* **Consistent Formatting and Style**:
  + All documentation will follow a consistent formatting and style guide to ensure clarity and ease of use.
  + This includes standardized headings, bullet points, numbered lists, and consistent use of fonts and colors.

By offering a variety of user documentation components in accessible and user-friendly formats, Le Miele Mists aims to provide a seamless and supportive experience for all users, ensuring they can easily navigate, utilize, and benefit from the system's features.

**2.8 Assumptions and Dependencies**

The development and successful operation of Le Miele Mists are based on several assumptions and dependencies. These factors could impact the project if they are incorrect, not shared, or change during the course of development or after deployment. This section outlines these assumptions and dependencies to provide a clear understanding of the potential risks and considerations.

##### *2.8.1 Assumptions*

**User Access to Technology**:

* **Internet Access**: It is assumed that all users will have reliable internet access.
* **Modern Web Browsers**: Users are expected to use modern web browsers that support HTML5, CSS3, and JavaScript ES6 features.
* **Device Compatibility**: Users will access the application using devices that meet minimum system requirements, such as desktops, laptops, tablets, and smartphones.

**External Services**:

* **Payment Gateways**: It is assumed that third-party payment gateways (e.g., Stripe, PayPal) will be reliable and provide stable APIs for transaction processing.
* **Shipping Services**: Integration with shipping service providers (e.g., FedEx, UPS) will be stable and provide accurate tracking and delivery information.
* **Email Services**: Email service providers (e.g., SendGrid, Amazon SES) will reliably handle the sending of transactional emails such as order confirmations and password resets.

**Data Privacy and Security**:

* **Compliance**: All data privacy and security measures will comply with relevant regulations such as GDPR.
* **User Authentication**: Secure methods for user authentication and password management will be used, and users are assumed to keep their credentials secure.

**Development and Maintenance**:

* **Skillset Availability**: The development team will have the necessary skills and expertise in web development, database management, and system integration.
* **Technology Stack**: The chosen technology stack (e.g., Node.js for server-side scripting, PostgreSQL for the database) will remain suitable and will not face major issues or deprecation during the development lifecycle.
* **Resource Availability**: Adequate resources (e.g., development tools, cloud hosting services) will be available throughout the project.

**User Behavior**:

* **User Engagement**: Users will engage with the platform as expected, utilizing search, browsing, and purchasing functionalities as designed.
* **Feedback and Support**: Users are assumed to provide feedback and report issues promptly, allowing for continuous improvement and troubleshooting.

##### *2.8.2 Dependencies*

**Third-Party Components**:

* **Payment Processing Services**: The project is dependent on third-party payment gateways like Stripe and PayPal for secure payment transactions. Any changes in their API or service availability could impact the payment functionality.
* **Shipping and Logistics**: Integration with shipping service providers is crucial for order fulfillment and tracking. Dependencies include accurate and timely data from these services.
* **Email Services**: Sending transactional emails depends on the availability and performance of third-party email services. Any service disruption could affect communication with users.

**Software Libraries and Frameworks**:

* **Web Development Frameworks**: The project relies on various web development frameworks and libraries (e.g., React.js for the front end, Express.js for the back end). Updates or changes to these frameworks could impact the development process.
* **Database Systems**: The project depends on a relational database management system like PostgreSQL or MySQL. Any issues with database performance, scalability, or security could affect the overall system.
* **Security Libraries**: The use of security libraries for encryption, secure user authentication, and data protection is a dependency. Any vulnerabilities or updates to these libraries need to be managed carefully.

**External APIs**:

* **Integration APIs**: The project integrates with several external APIs for functionalities such as payment processing, shipping tracking, and email notifications. Changes in these APIs could require modifications to the system.
* **Regulatory Compliance**: Compliance with data protection regulations (e.g., GDPR) requires ongoing monitoring and updates to ensure that all external integrations also comply with these regulations.

**Hosting and Infrastructure**:

* **Cloud Hosting Services**: The project is hosted on a cloud platform (e.g., AWS, Azure). The availability and performance of cloud services are critical for the application's uptime and reliability.
* **Load Balancers and CDNs**: The use of load balancers and Content Delivery Networks (CDNs) for optimizing performance and handling traffic efficiently is a dependency. Any issues with these services could affect the user experience.

**User Inputs and Content**:

* **User-Generated Content**: Product reviews and ratings are user-generated content that adds value to the platform. The project depends on users actively participating in providing feedback and reviews.
* **Product Information**: Accurate and detailed product information provided by suppliers is crucial for the platform. Dependencies include timely updates and accuracy of the product data.

**Legal and Regulatory**:

* **Compliance with E-commerce Laws**: The project must comply with local and international e-commerce laws and regulations. Dependencies include keeping up-to-date with legal requirements and ensuring all aspects of the platform adhere to these laws.
* **Intellectual Property**: Ensuring that all content, images, and product descriptions comply with intellectual property laws is a dependency. Any issues here could lead to legal challenges.

By identifying and detailing these assumptions and dependencies, the project team can better manage risks and prepare for potential changes that may impact the development and operation of Le Miele Mists. This comprehensive understanding will help in making informed decisions and planning for contingencies to ensure the project's success.

**Chapter 3: External Interface Requirements**

**3.1 User Interfaces**

The user interface (UI) for Le Miele Mists is designed to provide a seamless, intuitive, and visually appealing experience for both customers and administrators. This section describes the logical characteristics of each interface between the software product and its users. It outlines the UI standards, layout constraints, common elements, and specific design considerations. Detailed user interface design will be documented separately in the User Interface Specification.

##### *3.1.1 General UI Standards and Guidelines*

**Consistency**:

* The UI will maintain a consistent look and feel across all pages and functionalities to provide a cohesive user experience.
* Consistent use of color schemes, fonts, and button styles will be implemented throughout the application.

**Responsiveness**:

* The UI will be fully responsive, ensuring usability across various devices and screen sizes, including desktops, laptops, tablets, and smartphones.

**Accessibility**:

* The design will adhere to Web Content Accessibility Guidelines (WCAG) 2.1 to ensure the platform is accessible to all users, including those with disabilities.
* Features such as text alternatives for non-text content, keyboard navigability, and sufficient color contrast will be incorporated.

##### *3.1.2 Customer Interface*

**Home Page**:

* **Layout**: The home page will feature a clean and organized layout with a prominent search bar, navigation menu, featured products, and promotional banners.
* **Standard Elements**: The header will include the logo, navigation links (e.g., Home, Shop, About Us, Contact Us), a search bar, and user account links (e.g., Sign In, Register).

**Product Listing Page**:

* **Layout**: Products will be displayed in a grid format with images, names, prices, and quick view options.
* **Filters and Sorting**: Side panel for filters (e.g., price range, brand, fragrance type) and sorting options (e.g., popularity, price, newest).

**Product Detail Page**:

* **Layout**: Detailed view of a selected product with images, descriptions, reviews, price, and add-to-cart button.
* **Standard Elements**: Product images, detailed description, customer reviews, related products section.

**Shopping Cart Page**:

* **Layout**: Overview of selected products, quantities, prices, and total cost.
* **Standard Elements**: Product list, price breakdown, discount code input, proceed to checkout button.

**Checkout Page**:

* **Layout**: Multi-step process including shipping details, payment information, order review, and confirmation.
* **Standard Elements**: Form fields for address and payment details, order summary, place order button.

**Account Management Page**:

* **Layout**: Sections for viewing and editing personal information, order history, and saved preferences.
* **Standard Elements**: Profile information, order history list, account settings.

##### *3.1.3 Administrator Interface*

**Admin Dashboard**:

* **Layout**: Overview of key metrics and links to manage products, orders, users, and reports.
* **Standard Elements**: Summary panels for sales, new orders, inventory status, and user activity.

**Product Management Page**:

* **Layout**: Interface for adding, editing, and removing products, including detailed product information fields.
* **Standard Elements**: Product list, edit forms, save and delete buttons.

**Order Management Page**:

* **Layout**: List of customer orders with options to view details, update status, and manage returns.
* **Standard Elements**: Order list, status filters, order detail view.

**User Management Page**:

* **Layout**: Tools for managing user accounts, including viewing, editing, and deactivating accounts.
* **Standard Elements**: User list, account details, role management.

**Reports Page**:

* **Layout**: Access to various sales and performance reports with options to generate and export data.
* **Standard Elements**: Report filters, data tables, export buttons.

The user interfaces are designed to be intuitive and user-friendly, ensuring that both customers and administrators can efficiently perform their respective tasks. Detailed specifications and additional screen designs will be documented in the User Interface Specification document.

**3.2 Software Interfaces**

Le Miele Mists software integrates with several key components to ensure smooth operation.

The primary database management system is PostgreSQL (version 13), which handles all data storage needs, including product details, user information, and order history. The software communicates with the database through SQL queries for various operations such as retrieval, insertion, and updates. The system requires database hosting, regular backups, and recovery services.

The application will run on Linux (Ubuntu 20.04 LTS), which provides the necessary runtime environment. Interaction with the operating system involves standard system calls and API requests for file handling, process management, and networking. This ensures that the application can perform tasks such as managing files and processes efficiently.

External services include payment gateways like Stripe and PayPal, which are used for secure payment processing. These services handle incoming payment requests and provide confirmation and transaction details. The software communicates with these APIs over HTTPS using JSON for data exchange. Similarly, shipping service APIs from FedEx and UPS manage logistics and provide tracking information, also using HTTPS and JSON for secure communication.

For email communications, the system utilizes services such as SendGrid and Amazon SES to send transactional and promotional emails. The emails are sent via HTTPS with JSON-formatted requests, and delivery statuses and metrics are returned.

Internally, the software includes custom APIs for authentication and authorization, product management, and order processing. These APIs use JWT for user authentication, handle product data operations, and manage customer orders. Communication within these internal services is secured with HTTPS and JSON.

Data sharing is centralized through the PostgreSQL database, ensuring consistency across different components. Additionally, caching mechanisms like Redis may be used to enhance performance and reduce database load.

All API interactions are conducted using RESTful protocols over HTTPS, with JSON as the data format. This setup ensures secure, efficient communication between the application components and external services.

**3.3 Communications Interfaces**

Le Miele Mists software requires various communication functions to operate effectively, including email, web browser interactions, and network server communications.

**Email Communications**: The system will use email services like SendGrid or Amazon SES for sending transactional and promotional emails. Emails will be formatted in standard HTML or plain text, depending on the type of message. The communication will adhere to SMTP (Simple Mail Transfer Protocol) standards, and messages will be sent over HTTPS to ensure secure transmission. The system will handle email queuing and retries to manage delivery issues.

**Web Browser Interaction**: The application will be accessed through modern web browsers such as Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge. It will support HTTPS for secure data transmission between the client and server. Web pages will be formatted using HTML5 and CSS3, with JavaScript handling client-side interactions. The system will ensure compatibility with major browsers and adhere to responsive design principles to accommodate various screen sizes and devices.

**Network Server Communications**: The backend server will use HTTP/HTTPS protocols to handle client requests and responses. All communication will be encrypted using TLS (Transport Layer Security) to protect data integrity and privacy. The RESTful API endpoints will use JSON for data formatting and will support standard HTTP methods such as GET, POST, PUT, and DELETE. The server will be configured to handle concurrent connections efficiently, with load balancing and failover mechanisms in place.

**Data Transfer Rates and Synchronization**: The application will be optimized for efficient data transfer, with caching strategies in place to reduce the load on the database and improve response times. Data synchronization between the client and server will be managed using asynchronous requests to ensure smooth user experiences without blocking operations. Additionally, background synchronization tasks will be employed for updates and data consistency.

**Security and Encryption**: Communication security is paramount. All data exchanged between the client and server will be encrypted using HTTPS. Sensitive information, such as payment details and user credentials, will be encrypted at rest and in transit using industry-standard encryption protocols (e.g., AES-256). The system will also implement security measures such as rate limiting, IP whitelisting, and authentication to protect against unauthorized access and attacks.

By adhering to these communication standards and security practices, Le Miele Mists will ensure reliable, secure, and efficient interactions between its software components and external services.

**Chapter 4: System Features**

The following sections detail the major system features of Le Miele Mists. Each feature is described, prioritized, and broken down into its stimulus/response sequences and functional requirements.

### 4.1 User Registration and Authentication

**Description and Priority**: This feature handles how users create accounts, log in, and manage their profiles. It covers registration, login, password recovery, and profile updates. This feature is highly important because it ensures secure user access.

**Stimulus/Response Sequences**:

1. **User Registration**: When a user fills out and submits the registration form with their username, email, and password, the system checks the details, creates a new account, and sends a confirmation email.
2. **Login**: When a user enters their username and password on the login page, the system verifies the credentials, starts a user session, and takes the user to their home page.
3. **Password Recovery**: When a user requests to recover their password by providing their email, the system sends a password reset link to that email.
4. **Account Management**: When a user updates their profile or changes their password, the system checks the new information, updates the user’s account, and confirms the changes.

**Functional Requirements**:

* **REQ-1**: Validate registration inputs like unique email and strong password.
* **REQ-2**: Encrypt passwords securely.
* **REQ-3**: Manage user sessions to track logins.
* **REQ-4**: Handle incorrect login attempts and lock accounts after several failures.
* **REQ-5**: Provide a secure method for password recovery, including email verification.

### 4.2 Product Management

**Description and Priority**: This feature allows admins to manage products in the store, including adding new items, updating existing ones, and removing products. This is crucial for maintaining the store’s inventory and is highly prioritized.

**Stimulus/Response Sequences**:

1. **Add New Product**: When an admin submits product details (name, description, price, image), the system checks the information, adds the product to the catalog, and confirms the addition.
2. **Update Product**: When an admin updates product information, the system validates the changes, updates the catalog, and confirms the update.
3. **Remove Product**: When an admin selects a product to be removed, the system confirms the removal and updates the catalog.

**Functional Requirements**:

* **REQ-6**: Validate product details like price and required fields.
* **REQ-7**: Handle image uploads securely and optimize images.
* **REQ-8**: Allow removal of products and update the catalog accordingly.
* **REQ-9**: Confirm successful addition, update, or removal of products.

### 4.3 Order Processing

**Description and Priority**: This feature manages orders from placement to delivery, including payment processing and order tracking. It is essential for operations and customer satisfaction, making it highly prioritized.

**Stimulus/Response Sequences**:

1. **Place Order**: When a customer finalizes their cart and submits payment details, the system processes the payment, creates an order, and sends a confirmation email.
2. **Process Payment**: When payment details are submitted, the payment gateway processes the transaction and returns a success or failure response.
3. **Track Order**: When a customer requests their order status, the system retrieves and provides the current status.

**Functional Requirements**:

* **REQ-10**: Securely process payments using third-party gateways.
* **REQ-11**: Store and manage order details like items and quantities.
* **REQ-12**: Send order confirmation emails and provide shipment tracking information.
* **REQ-13**: Update order status based on fulfillment and shipping.

### 4.4 Customer Service and Support

**Description and Priority**: This feature handles customer inquiries, complaints, and support requests. It involves creating support tickets, tracking their status, and resolving issues. It is important for customer satisfaction but is medium priority.

**Stimulus/Response Sequences**:

1. **Submit Support Ticket**: When a customer submits a support request through a form, the system creates a ticket and sends a confirmation.
2. **Track Ticket Status**: When a customer checks their ticket status, the system provides the current status and any updates from support staff.
3. **Resolve Ticket**: When support staff updates a ticket with resolution details, the system updates the ticket status and notifies the customer.

**Functional Requirements**:

* **REQ-14**: Create and track support tickets with customer details and issue descriptions.
* **REQ-15**: Allow customers to view their ticket status and history.
* **REQ-16**: Enable support staff to update and resolve tickets.
* **REQ-17**: Notify customers of ticket updates and resolutions.

**Chapter 5: Other Nonfunctional Requirements**

This chapter outlines various nonfunctional requirements essential for the successful implementation and operation of Le Miele Mists.

**5.1 Performance Requirements**

Performance requirements ensure that the system operates efficiently under various conditions.

1. **Response Time**: The system should respond to user requests within 2 seconds under normal load conditions. This includes page loads, search queries, and transaction processes. This response time is critical to maintaining a smooth user experience and avoiding user frustration.
2. **Scalability**: The system must support up to 10,000 simultaneous users without a noticeable degradation in performance. This requirement ensures that the system can handle peak loads during high traffic periods, such as sales or promotions.
3. **Data Processing**: The system should process order transactions and update inventory in real-time or within 5 seconds. This ensures accurate stock levels and prompt order processing.
4. **Backup and Recovery**: The system should perform full backups every 24 hours and incremental backups every hour. In case of data loss or corruption, the system must be able to recover data to the point of the last backup within 1 hour.

These requirements are designed to maintain optimal system performance, ensuring a positive user experience and operational reliability.

#### 5.2 Safety Requirements

Safety requirements are crucial to prevent harm or damage resulting from system use.

1. **Data Integrity**: The system must include mechanisms to prevent unauthorized data alterations. This includes regular audits and validation checks to ensure data consistency and integrity.
2. **Error Handling**: The system should handle errors gracefully without exposing sensitive information to the user. For example, error messages should be generic and not reveal system internals that could be exploited.
3. **Compliance**: The system must adhere to data protection regulations, such as GDPR or CCPA, to ensure that user data is handled securely and privacy is maintained.

There are no specific safety certifications required beyond these standard practices, but adherence to relevant regulations is mandatory.

#### 5.3 Security Requirements

Security requirements ensure that user data and system operations are protected from unauthorized access and breaches.

1. **User Authentication**: The system must implement strong authentication mechanisms, such as multi-factor authentication (MFA), to verify user identities.
2. **Data Encryption**: All sensitive data, including user credentials and payment information, must be encrypted both in transit and at rest using industry-standard encryption protocols (e.g., AES-256).
3. **Access Controls**: The system must enforce role-based access controls to ensure that users have access only to the data and functions necessary for their roles.
4. **Compliance**: The system must comply with relevant security standards and regulations, such as PCI-DSS for payment processing and ISO/IEC 27001 for information security management.

Security certifications or compliance with specific standards may be required depending on the jurisdiction and industry.

#### 5.4 Software Quality Attributes

These quality attributes are essential for maintaining the overall quality and user satisfaction of the product.

1. **Usability**: The system must have an intuitive user interface that facilitates ease of use. User testing should demonstrate that new users can complete primary tasks within 5 minutes without prior training.
2. **Maintainability**: The system’s code should be modular and well-documented to support easy maintenance and updates. Code should adhere to established coding standards and include inline comments.
3. **Reliability**: The system should have an uptime of 99.9% over any given month, ensuring high availability and minimal downtime.
4. **Scalability**: The system should be designed to easily scale up to accommodate growing user numbers and increased load without significant reengineering.
5. **Interoperability**: The system must integrate smoothly with third-party services, such as payment gateways and shipping providers, without requiring extensive customizations.

These attributes help ensure that the system performs well, remains reliable, and is easy to maintain and use.

**5.5 Business Rules**

Business rules define how the system should operate under various circumstances.

1. **Role-Based Access**: Only administrators should have the capability to manage product listings, while standard users can only view and purchase products.
2. **Order Limits**: Users are allowed to purchase up to 10 units of any product in a single order. This rule helps manage inventory and prevents bulk purchasing issues.
3. **Discount Application**: Discounts or promotional codes can only be applied during the checkout process and cannot be combined with other promotions.
4. **Return Policy**: Customers must request returns within 30 days of purchase. The system should enforce this policy and process return requests accordingly.

**Chapter 6: Other Requirements**

1. **Database Requirements**: The system should use a relational database management system (RDBMS) for storing user and product data. The database should support ACID transactions to ensure data integrity.
2. **Internationalization**: The system should support multiple languages and currencies to cater to a global audience. Localization features should be implemented to adjust content based on the user's region.
3. **Legal Requirements**: The system must comply with all relevant e-commerce regulations, including consumer protection laws and digital rights.
4. **Reuse Objectives**: The system should use existing libraries and frameworks where possible to minimize development time and leverage proven solutions.

**Appendix A: Glossary**

**Admin**: A user role with elevated privileges, responsible for managing products, users, and other administrative tasks within the system.

**API (Application Programming Interface)**: A set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service.

**Authentication**: The process of verifying the identity of a user or system.

**Authorization**: The process of determining what an authenticated user or system is allowed to do.

**Availability**: The degree to which a system is operational and accessible when required for use.

**Backup**: The process of copying and archiving data to ensure its availability in case of data loss or corruption.

**Compliance**: Adherence to laws, regulations, guidelines, and specifications relevant to the business or industry.

**Data Integrity**: The accuracy and consistency of data stored in a database or other storage system.

**Encryption**: The process of converting information or data into a code to prevent unauthorized access.

**GDPR (General Data Protection Regulation)**: A regulation in EU law on data protection and privacy in the European Union and the European Economic Area.

**GUI (Graphical User Interface)**: A user interface that includes graphical elements, such as windows, icons, and buttons, for interaction with the system.

**HTTPS (Hypertext Transfer Protocol Secure)**: An extension of HTTP used for secure communication over a computer network, encrypted with SSL/TLS.

**Internationalization (i18n)**: The process of designing a software application so that it can be adapted to various languages and regions without engineering changes.

**ISO/IEC 27001**: An international standard on how to manage information security.

**MFA (Multi-Factor Authentication)**: A security system that requires more than one method of authentication from independent categories of credentials to verify the user’s identity.

**PCI-DSS (Payment Card Industry Data Security Standard)**: A set of security standards designed to ensure that all companies that accept, process, store, or transmit credit card information maintain a secure environment.

**RBAC (Role-Based Access Control)**: A method of regulating access to a computer or network resources based on the roles of individual users within an enterprise.

**Reliability**: The probability that a system will perform without failure over a specified period under specified conditions.

**Scalability**: The ability of a system to handle a growing amount of work, or its potential to accommodate growth.

**Session Management**: The process of securely handling multiple requests from a single user or session to ensure that each request is authenticated and authorized.

**SSL/TLS (Secure Sockets Layer/Transport Layer Security)**: Cryptographic protocols designed to provide communications security over a computer network.

**Usability**: The degree to which a system is easy to use and learn by its intended users.

**User**: Any individual who interacts with the system, including customers and administrators.

**User Interface (UI)**: The means by which a user interacts with a computer system, software, or application.

**Appendix B: Analysis Models**

**Post Laboratory Activity:**

1. You are required to prepare SRS document for any project. (It could be the mini project you have completed in semester IV.

**Done as above.**

1. Prepare questionnaire for the allotted project considering your lab instructor is the client for requirement gathering.

#### Project Overview

1. Can you provide a brief description of the project's purpose and goals?
2. What are the main objectives you hope to achieve with this online perfume store?

#### User and Stakeholder Information

1. Who will be the primary users of the online perfume store?
2. Are there any specific roles or user types (e.g., customers, admins) that we need to consider?
3. Are there any other stakeholders involved in this project?

#### Functionality Requirements

1. What core functions should the online perfume store offer to its users?
2. Do you have any specific requirements for user registration and authentication?
3. What actions should users be able to perform (e.g., browsing, purchasing, reviewing)?
4. Are there any specific features for product management (e.g., adding, updating, removing products)?
5. What payment methods should be supported?

#### User Interface (UI) and User Experience (UX)

1. How would you describe the desired user interface design and user experience of the website?
2. Are there any specific design elements or branding guidelines to follow?
3. Do you have preferences regarding the layout, color scheme, or typography?
4. How should the navigation structure be organized?

#### Security and Privacy

1. Are there any specific security measures or requirements that need to be implemented, such as data encryption or user data protection?
2. Do you have any privacy concerns that need to be addressed, especially regarding user data?
3. Are there any compliance requirements (e.g., GDPR, PCI-DSS) that need to be met?

#### Performance Requirements

1. Are there any expectations regarding the website's loading speed and responsiveness?
2. Are there any peak usage times that we need to account for in terms of performance?
3. Do you have any specific requirements for system uptime and availability?

#### Integration and Compatibility

1. Are there any existing systems, databases, or APIs that the online perfume store needs to integrate with?
2. Should the website be compatible with specific web browsers or devices?
3. Are there any third-party services or platforms that need to be integrated (e.g., payment gateways, shipping services)?

#### Content and Data Management

1. How do you envision users browsing and searching for perfumes? Are there specific filters or categories to include?
2. Should users be able to leave reviews and ratings for products?
3. Should users be able to upload various types of media, such as images or videos, in their reviews?

#### Legal and Regulatory Considerations

1. Are there any legal or regulatory requirements that the website should adhere to, such as data protection laws or terms of use?
2. Do you need any specific terms and conditions or privacy policy displayed on the website?

#### Future Enhancements and Maintenance

1. Are there any plans for future enhancements or features that you foresee being added to the website?
2. How often do you anticipate the website requiring maintenance or updates?
3. Are there any anticipated scalability needs for the future?

#### Budget and Timeline

1. Do you have any budget constraints for this project?
2. Is there a specific timeline or deadline that needs to be considered?
3. Are there any critical milestones or phases that the project should follow?

#### Additional Comments

1. Is there any other information, suggestions, or requirements that you would like to share?
2. Are there any examples of similar websites you admire or want to model this project after?
3. Do you have any concerns or potential challenges you foresee with this project?
4. Consider following scenario: An institute is interested in developing a Library Information System (LIS) for the benefit of students and employees of the institute. LIS will enable the members to borrow a book (or return it) with ease while sitting at his desk/chamber. The system also enables a member to extend the date of his borrowing if no other booking for that particular book has been made. For the library staff, this system aids them to easily handle day-to-day book transactions. The librarian, who has administrative privileges and complete control over the system, can enter a new record into the system when a new book has been purchased, or remove a record in case any book is taken off the shelf. Any non-member is free to use this system to browse/search books online. However, issuing or returning books is restricted to valid users (members) of LIS only.

The final deliverable would a web application (using the recent HTML 5), which should run only within the institute LAN. Although this reduces security risk of the software to a large extent, care should be taken no confidential information (e.g. passwords) is stored in plain text.

Prepare SRS document for the same in the format discussed in the write-up.

**Software Requirement Specification (SRS) Document for Library Information System (LIS)**

## 1. Introduction

### 1.1 Purpose

The purpose of this SRS document is to detail the requirements for the Borrow and Return Books module of the Library Information System (LIS) for the institute. This module will enable members to borrow and return books conveniently while assisting the library staff in handling these transactions efficiently.

### 1.2 Scope

The Borrow and Return Books module is part of the larger LIS web application that will run exclusively within the institute's LAN. This module will allow valid users (members) to borrow and return books, extend borrowing periods, and enable non-members to search and browse the book catalog. Library staff will use this module to manage daily transactions and inventory control.

### 1.3 Definitions, Acronyms, and Abbreviations

* **LIS**: Library Information System
* **LAN**: Local Area Network
* **HTML**: Hypertext Markup Language

### 1.4 References

* Institute IT Policy Document
* HTML5 Documentation
* Institute Library Policy Manual

### 1.5 Overview

This document includes the functional and non-functional requirements for the Borrow and Return Books module of the LIS. It describes the system's intended functions, user interactions, and design constraints.

## 2. Overall Description

### 2.1 Product Perspective

The Borrow and Return Books module is a component of the LIS web application. It interacts with other modules such as user authentication, book catalog management, and administrative functions. The module will use a centralized database to store and retrieve data.

### 2.2 Product Functions

* Borrowing books
* Returning books
* Extending borrowing periods
* Browsing/searching book catalog
* Managing book transactions (library staff)
* Adding/removing books (librarian)

### 2.3 User Classes and Characteristics

* **Students/Employees (Members)**: Can borrow, return, and extend borrowing periods.
* **Non-members**: Can browse and search the book catalog but cannot borrow or return books.
* **Library Staff**: Can manage daily book transactions.
* **Librarian**: Has administrative privileges to add or remove books from the system.

### 2.4 Operating Environment

The web application will run on HTML5-supported web browsers within the institute's LAN. The server-side will be hosted on the institute's internal servers, ensuring secure and reliable access within the local network.

### 2.5 Design and Implementation Constraints

* Data security: Passwords and sensitive information must be encrypted.
* Browser compatibility: The application should support all major HTML5-compatible browsers.
* LAN operation: The system will only be accessible within the institute's LAN.

### 2.6 User Documentation

* User manual for students/employees detailing how to borrow, return, and extend book borrowing periods.
* Admin manual for library staff and the librarian on managing transactions and book records.
* Online help integrated within the application.

### 2.7 Assumptions and Dependencies

* Users will have valid credentials to log in to the system.
* The institute's LAN will be stable and secure.
* The centralized database will be properly maintained and backed up regularly.

## 3. System Features

### 3.1 Borrow Books

#### 3.1.1 Description and Priority

This feature allows members to borrow books from the library using the LIS web application. **Priority: High**

#### 3.1.2 Stimulus/Response Sequences

1. **Borrowing a Book**:
   * **Stimulus**: Member searches for a book and initiates the borrowing process.
   * **Response**: The system checks book availability, records the borrowing transaction, and updates the book status.

#### 3.1.3 Functional Requirements

* **REQ-1**: The system must allow members to search for books by title, author, or ISBN.
* **REQ-2**: The system must display book availability status.
* **REQ-3**: The system must record borrowing transactions with member ID, book ID, and borrowing date.
* **REQ-4**: The system must update the book status to 'borrowed' upon successful transaction.

### 3.2 Return Books

#### 3.2.1 Description and Priority

This feature allows members to return borrowed books using the LIS web application. **Priority: High**

#### 3.2.2 Stimulus/Response Sequences

1. **Returning a Book**:
   * **Stimulus**: Member initiates the return process for a borrowed book.
   * **Response**: The system records the return transaction and updates the book status.

#### 3.2.3 Functional Requirements

* **REQ-5**: The system must allow members to view their currently borrowed books.
* **REQ-6**: The system must record return transactions with member ID, book ID, and return date.
* **REQ-7**: The system must update the book status to 'available' upon successful return.

### 3.3 Extend Borrowing Period

#### 3.3.1 Description and Priority

This feature allows members to extend the borrowing period for books if no other booking has been made. **Priority: Medium**

#### 3.3.2 Stimulus/Response Sequences

1. **Extending Borrowing Period**:
   * **Stimulus**: Member requests to extend the borrowing period for a book.
   * **Response**: The system checks for existing bookings and extends the borrowing period if none are found.

#### 3.3.3 Functional Requirements

* **REQ-8**: The system must check for any existing bookings for the requested book.
* **REQ-9**: The system must extend the borrowing period and update the due date if no bookings are found.
* **REQ-10**: The system must notify the member of the new due date upon successful extension.

## 4. Other Nonfunctional Requirements

### 4.1 Performance Requirements

The system should handle up to 100 concurrent users without significant performance degradation. Response time for borrowing, returning, or extending a book should be under 2 seconds.

### 4.2 Safety Requirements

The system must ensure that no books are lost or incorrectly recorded during transactions. Regular backups of the database should be maintained to prevent data loss.

### 4.3 Security Requirements

Passwords and sensitive data must be encrypted. Only authenticated users should be able to borrow, return, or extend book borrowing periods. The system should log all transactions for auditing purposes.

### 4.4 Software Quality Attributes

The system must be reliable, with an uptime of 99.9%. It should be maintainable, allowing easy updates and bug fixes. Usability is crucial; the system should have a user-friendly interface.

### 4.5 Business Rules

Only valid members can borrow or return books. Borrowing periods can only be extended if no other booking exists for the book. Library staff can manage transactions but only the librarian can add or remove book records.

## 5. Appendix A: Glossary

* **Member**: A valid user of the LIS, including students and employees of the institute.
* **Librarian**: An admin user with privileges to manage book records.
* **LAN**: Local Area Network, the network within the institute.
* **ISBN**: International Standard Book Number, a unique identifier for books.

**Post Lab Descriptive Questions answers must be handwritten and to be submitted BEFORE the next tern**.

* 1. What are different techniques to gather information for software development?

Gathering information for software development involves various techniques to ensure comprehensive understanding and accurate requirements. Here’s a summary of common techniques:

### Techniques to Gather Information

* **Interviews**: Conducting one-on-one or group interviews with stakeholders to understand their needs and expectations.
* **Surveys and Questionnaires**: Distributing structured forms to collect responses from a larger group of stakeholders.
* **Workshops**: Organizing collaborative sessions with stakeholders to brainstorm and gather requirements collectively.
* **Observation**: Watching users interact with existing systems or workflows to identify pain points and areas for improvement.
* **Document Analysis**: Reviewing existing documentation, such as business process descriptions, user manuals, and system specifications, to gather relevant information.
* **Prototyping**: Developing preliminary versions of the software to gather feedback from users and stakeholders early in the process.
* **Use Cases and User Stories**: Creating detailed scenarios and narratives to capture functional requirements from the user's perspective.
* **Competitive Analysis**: Analyzing similar systems or products in the market to identify features and requirements that may be relevant.
* **Brainstorming**: Generating a wide range of ideas and requirements through group discussions and creative thinking.
* **Focus Groups**: Engaging a selected group of users or stakeholders in discussions to explore their needs and opinions in depth.

2. List verification and validation techniques for requirements.

#### Verification Techniques

1. **Reviews**: Systematic examination of requirements documents by stakeholders or experts to ensure accuracy and completeness.
2. **Inspections**: Formalized review processes where requirements are checked against predefined criteria or standards.
3. **Walkthroughs**: Structured walkthroughs where requirements are discussed and reviewed by team members to identify discrepancies or issues.
4. **Checklists**: Using predefined lists of criteria to ensure all aspects of the requirements are addressed.
5. **Prototyping**: Creating prototypes to verify that the requirements are accurately represented and feasible.
6. **Test Case Development**: Creating test cases based on requirements to ensure they can be validated through testing.

#### Validation Techniques

1. **User Acceptance Testing (UAT)**: Conducting tests with actual users to ensure that the system meets their needs and expectations.
2. **Validation Workshops**: Engaging stakeholders in workshops to validate that the requirements align with their needs and business goals.
3. **Modeling and Simulation**: Using models and simulations to validate that the requirements can be implemented as intended.
4. **Requirements Traceability**: Ensuring that each requirement can be traced through the design, development, and testing phases to confirm its implementation.
5. **Prototyping and Feedback**: Using prototypes to gather feedback from stakeholders and validate that the requirements are being correctly interpreted and implemented.
6. **Validation Testing**: Performing testing to confirm that the system meets the specified requirements and performs as expected in real-world scenarios.