Software Requirements Specification
for
Blood Distribution System

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Contents

Chapter 1

Introduction

The Blood Distribution System is a software solution designed to efficiently manage the distribution of blood products within a its users. Its primary goal is to improve the speed and accuracy of blood product requests, allocations, and deliveries, ensuring timely access to blood products in medical emergencies. This system will act as a centralized platform, facilitating seamless communication and coordination among blood banks, hospitals, healthcare facilities and users of this system to enhance patient care and safety. The inspiration of this project is to improve blood banks in Bangladesh and to develop a blood bank information system which focuses on making an online system that is accessible for both donors and administrators. Donors can directly receive information regarding their previous blood donations, including their blood results and donation history, in order to easily schedule their next donations. They can also update the personal information through the system, without having to contact the blood bank registry.

1.1 Purpose

The purpose of the Blood Distribution System is to provide a centralized and automated platform for managing the distribution of blood products within a medical network or blood bank. The system aims to streamline the process of requesting, allocating, and delivering blood products to healthcare facilities, ensuring timely access to the right blood type and quantity during medical emergencies. By improving efficiency, minimizing wastage, and enhancing communication among stakeholders, the system aims to contribute to better patient care and safety in critical situations that require immediate access to blood products.

1.2 Intended Audience

1.2.1 Patients

Individuals in need of blood products for medical treatments or emergencies.

1.2.2 Donors

Individuals who voluntarily contribute blood products to assist patients in need.

1.2.3 Hospitals and Healthcare Facilities

Medical institutions that require a steady supply of blood products to provide timely and effective patient care.

1.2.4 Blood Banks and Collection Centers

Organizations responsible for collecting, testing, storing, and distributing blood products.

1.2.5 Blood Bank Administrator

Personnel overseeing blood bank operations, inventory management, and allocation of blood products.

1.2.6 Medical Professionals

Physicians, nurses, and medical staff involved in the treatment and care of patients requiring blood products.

1.2.7 General Public

Individuals interested in blood donation, patient advocacy, and community health.

1.3 Intended Use

1.3.1 Blood Request Management

The system allows patients and healthcare facilities to create and manage blood product requests, ensuring that the right blood type and quantity are available for medical treatments and emergencies.

1.3.2 Donor Engagement

The system engages donors by notifying them about blood requests and enabling them to accept requests based on their blood type and availability. It also provides a platform for donors to schedule donation appointments and track their donation history.

1.3.3 Inventory Tracking

Blood banks and collection centers can monitor and maintain real-time inventories of blood products, ensuring an adequate supply for healthcare facilities' needs.

1.3.4 Urgency Prioritization

The system enables healthcare providers and blood bank administrators to prioritize blood requests based on urgency, ensuring that critical cases receive immediate attention.

1.3.5 Communication and collaboration

The system enhances communication and collaboration between blood banks, hospitals, donors, and patients, streamlining the coordination of blood product distribution.

1.3.6 Public Awareness

The system contributes to raising public awareness about blood donation and its impact on saving lives by providing a platform for donors to participate and engage.

1.4 Product Scope

1.4.1 Blood Request Management

Allow patients and healthcare facilities to create and manage blood product requests, specifying blood type, quantity, and urgency. Notify nearby donors and blood banks about new requests for timely response.

1.4.2 Donor Engagement

Enable donors to view and accept blood requests based on their blood type and location. Provide tools for donors to schedule blood donation appointments, track donation history, and receive notifications about donation opportunities.

1.4.3 Communication and Collaboration

Enable seamless communication and coordination among blood banks, hospitals, donors, and patients. Notify users about the status of blood requests, donation acceptances, and delivery updates.

1.4.4 Transparency and Traceability

Maintain digital records of blood requests, donations, and distributions to ensure transparency and accountability. Provide tracking mechanisms to monitor the status and location of blood products during delivery.

1.4.5 User Profiles and Management

Allow users (donors and patients) to create and manage their profiles, including personal information, blood type, and donation history.

1.4.6 Customization and Scalability

Provide an open-source framework that allows customization and adaptation to the specific needs of different healthcare facilities and regions. Support scalability to accommodate varying levels of demand and user engagement.

1.4.7 Public Awareness and Education

Raise public awareness about blood donation through the platform, promoting a culture of voluntary blood donation.

1.5 Risk Definition

The risk definition for the blood distribution system involves identifying potential risks that could impact the successful development, implementation, and operation of the system. Risks are uncertainties that, if realized, could lead to negative outcomes or hinder the achievement of project goals. These risks should be identified, assessed, and managed to minimize their potential impact. Here are some potential risks for the blood distribution system:

1.5.1 Data Security Breach:

Risk: Unauthorized access or data breaches could compromise sensitive patient and donor information, leading to legal and privacy concerns. Mitigation: Implement robust security measures such as encryption, access controls, and regular security audits to safeguard data.

1.5.2 System Downtime or Failures:

Risk: System outages or failures could disrupt blood distribution operations, impacting patient care and donor engagement. Mitigation: Implement redundancy, backup systems, and robust monitoring to minimize downtime and ensure quick recovery.

1.5.3 Lack of User Adoption:

Risk: Users, including donors and healthcare facilities, may not fully adopt the system, leading to underutilization and limited impact. Mitigation: Conduct user training, provide clear documentation, and gather user feedback to address usability concerns and enhance user experience.

1.5.4 Limited Donor Participation:

Risk: Insufficient donor engagement may lead to inadequate blood supply, affecting the system's ability to meet demand. Mitigation: Launch awareness campaigns, incentivize donors, and provide user-friendly features to encourage donation participation.

1.5.5 Lack of Continuous Development:

Risk: Inadequate maintenance and updates may lead to outdated features, security vulnerabilities, and decreased user satisfaction. Mitigation: Foster an active open-source community, encourage contributions, and allocate resources for ongoing development and improvement.

Chapter 2

Overall Description

2.1 User Classes and Characteristics

2.1.1 Patients:

Characteristics: Patients are individuals seeking blood products for medical treatments or emergencies. They may have varying levels of technical proficiency and may require an easy-to-use interface. They value timely access to blood products and clear communication regarding their requests.

2.1.2 Donors:

Characteristics: Donors are individuals who voluntarily contribute blood products to help those in need. They are motivated by altruism and the desire to save lives. They need a user-friendly platform to view requests, schedule donations, and receive notifications about donation opportunities.

2.1.3 Software Developers:

Characteristics: Developers contribute to the system's development, enhancement, and maintenance. They require well-documented code, clear guidelines, and collaboration tools to contribute effectively.

2.1.4 Regulatory Authorities:

Characteristics: Regulatory bodies oversee blood donation and distribution regulations. They may need access to data for compliance audits and require transparency and adherence to legal requirements.

2.1.5 General Public:

Characteristics: Individuals interested in blood donation and healthcare contribute to the system's success by participating in campaigns, volunteering, and spreading awareness about blood donation.

2.2 User Needs

2.2.1 Patients

Need: Timely access to the required blood type during medical emergencies or treatments. Need: Clear communication about the status of their blood requests and expected delivery times. Need: User-friendly interface for creating, tracking, and managing blood requests. Need: Assurance of data privacy and security for personal and medical information.

2.2.2 Donors

Need: Timely notifications about nearby blood requests to enable prompt response. Need: Convenient scheduling of blood donation appointments based on availability and location. Need: Access to a user-friendly platform to track their donation history and contributions. Need: Recognition and appreciation for their contributions to motivate continued donation.

2.2.3 Blood Bank Administrators

Need: Dashboard and reporting tools for monitoring inventory levels, requests, and allocations. Need: Real-time alerts about critically low inventory levels or urgent blood requests. Need: User management features to oversee donor profiles, permissions, and accounts. Need: Ability to customize and configure system settings to align with blood bank operations.

2.2.4 Software Developers

Need: Well-documented codebase, clear guidelines, and a collaborative development environment. Need: Flexibility to contribute to the system's enhancement, bug fixes, and new feature development. Need: Access to testing environments and resources to ensure the quality of contributions.

2.2.5 General Public

Need: Information and education about blood donation, its impact, and the process of getting involved. Need: Opportunities to participate in blood donation campaigns, volunteer activities, and community health initiatives.

2.3 Operating Environment

Hardware
- Servers and cloud infrastructure for hosting the system's software components.
- User devices, including desktops, laptops, tablets, and smartphones, used by donors, patients, healthcare professionals, and administrators.

Software
- Web-based or mobile application interfaces for donors, patients, hospitals, and blood bank administrators.
- Database management system to store and manage user profiles, blood requests, donor records, and inventory data.
- Integration capabilities to connect with existing hospital and blood bank systems.

Network
- High-speed internet access for users to interact with the system from various locations.
- Secure communication protocols to ensure the confidentiality and integrity of data transmissions.

- APIs and data exchange mechanisms for seamless interaction between the system and other healthcare systems.

2.4 Constraints

Budget: Limited financial resources for development, maintenance, and operation of the system.

Time: Fixed timeline for system development, testing, and deployment.

Manpower: Limited availability of skilled developers, designers, and other personnel for system development and maintenance.

Resource: Availability of hardware, software, and network resources for hosting and supporting the system.

2.5 Assumptions

The Assumptions of the system are listed below.

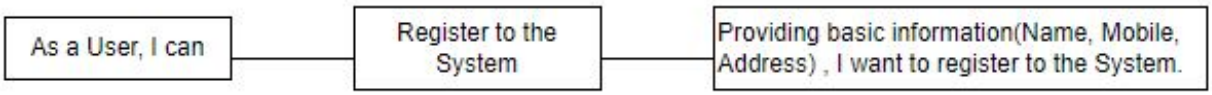
1. Availability of Adequate Blood Supply
2. Donor Willingness to Participate
3. Reliable Network and Internet Connectivity
4. Availability of Technical Expertise:
5. Public Awareness and Engagement
6. Continued Development and Maintenance

Chapter 3

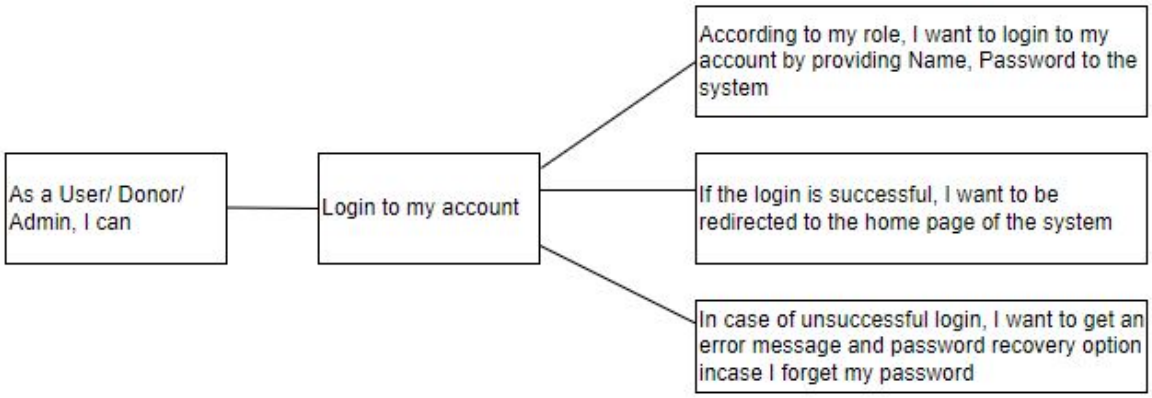
Requirements

3.1 Functional Requirements

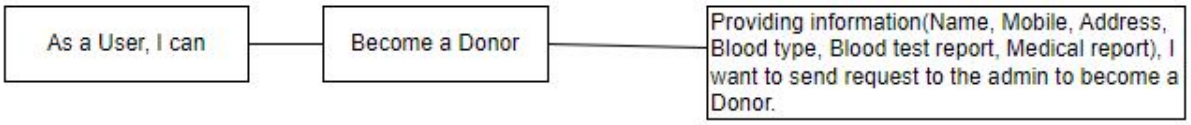
3.1.1 Register



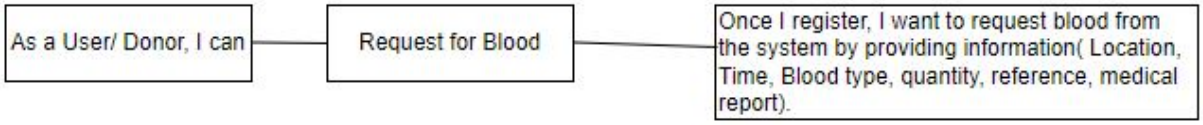
3.1.2 Login



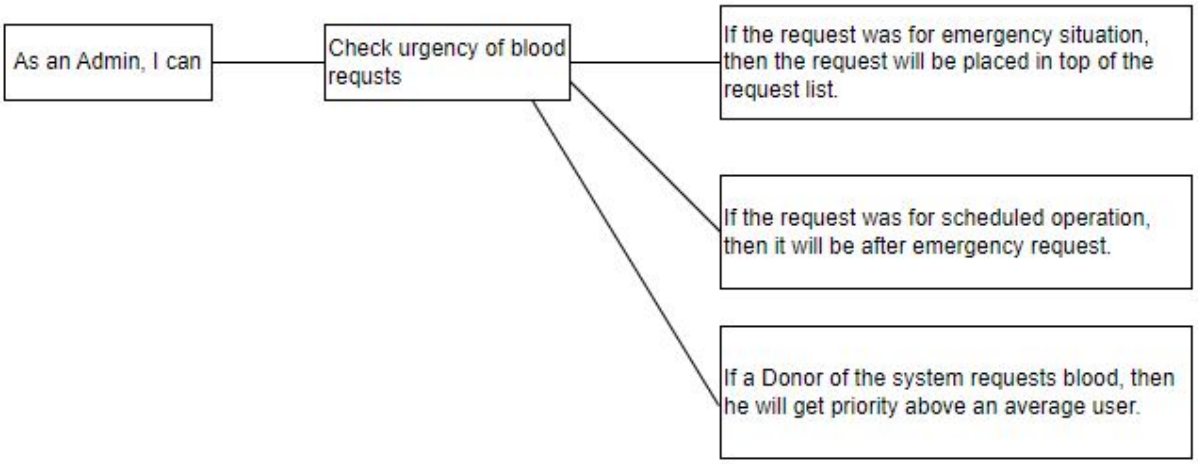
3.1.3 Become a Donor



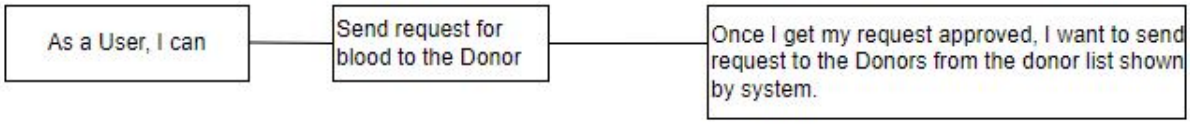
3.1.4 Request Blood



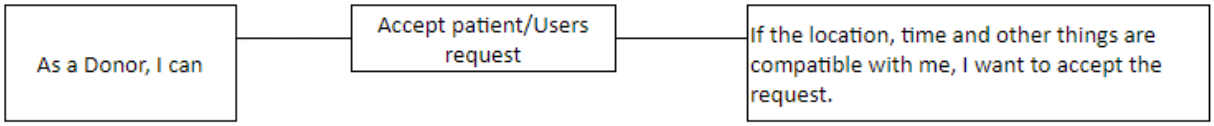
3.1.5 Check Urgency



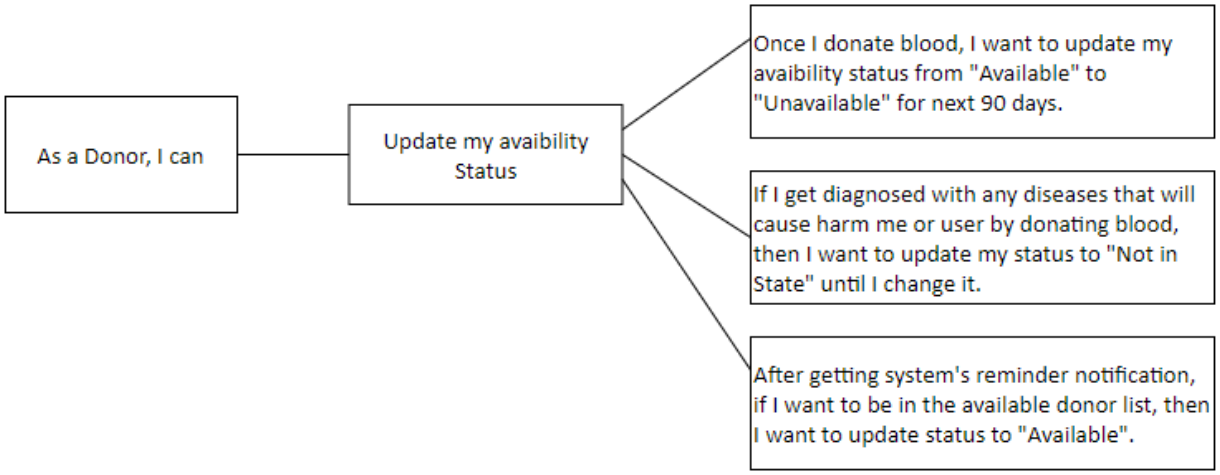
3.1.6 Send request to Donor



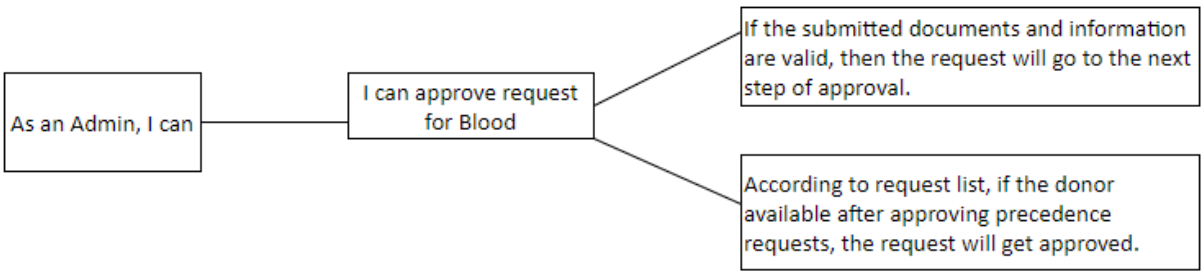
3.1.7 Accept user's request as Donor



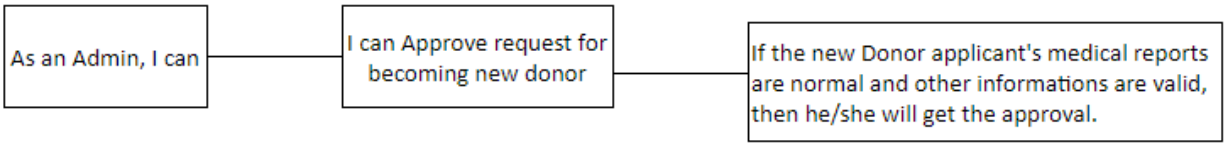
3.1.8 Update availability status



3.1.9 Approve blood request



3.1.10 Approve request for new Donor



3.2 Non Functional Requirements

3.2.1 Performance

- The system shall be able to handle a minimum of 500 concurrent users without significant degradation in response time.
- The average response time for critical actions, such as searching for blood donors or booking appointments, shall not exceed 2 seconds.
- The system shall be able to process at least 100 donation requests per minute.

3.2.2 Scalability

- The system architecture shall support horizontal scalability to accommodate increased user load during peak times.

3.2.3 Availability

- The system shall have an uptime of at least 99.5% in any given month.
- Planned maintenance windows should be communicated to users at least 48 hours in advance, and they should occur during off-peak hours.

3.2.4 Security

- User authentication and authorization shall be implemented, ensuring that only authorized personnel can access and modify sensitive information.
- Personally identifiable information (PII) and medical records shall be stored and transmitted securely using encryption protocols.
- Regular security assessments and penetration testing shall be conducted to identify and address vulnerabilities.

3.2.5 Data Privacy

- The system shall comply with relevant data protection laws and regulations, ensuring that user data is collected, stored, and processed with consent and transparency.
- Users shall have the ability to review, modify, or delete their personal data from the system.

3.2.6 Usability

- The user interface shall be intuitive and user-friendly, requiring minimal training for both donors and administrative staff.
- Font sizes, colors, and contrast shall adhere to accessibility standards to ensure usability for users with visual impairments.

3.2.7 Reliability

- The system shall have an automated backup mechanism that performs daily backups of critical data and configurations.
- In the event of a system failure, data loss shall be minimized, and the system should be able to recover gracefully.

3.2.8 Compatibility

- The system shall be accessible and functional across major web browsers (e.g., Chrome, Firefox, Safari, Edge) without significant discrepancies in appearance or behavior.

3.2.9 Performance Monitoring

- The system shall implement logging and monitoring tools to track performance metrics, system usage, and potential issues.
- Administrators shall receive alerts in real-time when critical errors or performance bottlenecks occur.

3.2.10 Documentation

- Comprehensive documentation shall be provided, including user guides, API documentation, system architecture diagrams, and deployment instructions.

3.2.11 Error Handling and Reporting

- The system shall provide clear error messages and user-friendly notifications for exceptional scenarios, guiding users on corrective actions.
- Critical errors and system failures shall trigger immediate alerts to administrators and technical support teams.

3.2.12 Network and Connectivity

- The system shall be designed to handle unreliable network connections, ensuring that data integrity is maintained even in cases of intermittent connectivity.

3.2.13 Response Time Variability

- The system's response time shall remain consistent across different geographical locations, minimizing the impact of network latency.

3.2.14 System Updates and Maintenance

- The system shall support seamless updates and patches to fix bugs, add features, and address security vulnerabilities without causing extended downtime.

3.2.15 Authorization Levels

- The system shall enforce role-based access control, ensuring that users have appropriate permissions based on their roles (e.g., donors, patient, administrators).

3.2.16 Long-Term Data Archival

- The system shall provide mechanisms for archiving and securely storing historical data beyond the immediate operational scope.

3.2.17 Feedback and Improvement Mechanisms

- The system shall include features for users to provide feedback and suggestions, enabling continuous improvement based on user input.

3.2.18 Authorization Levels

- The system shall enforce role-based access control, ensuring that users have appropriate permissions based on their roles (e.g., donors, patient, administrators).

Appendices

This software requirement for **Blood Distribution System** is written by Nasrin Akter Shimu,Sayeda Faria Sithi,Shakhawat Hosen,Sudipta Singha.We used **Draw.io** for drawing the user story.

Appendix A

Glossary