

Software Requirements Specification

for

Hospital OPD and Pathology Management Software

Version 1.0 Approved

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DATE :- XX. 09. 2024

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1 Introduction

1.1 Purpose

The purpose of the Hospital OPD and Pathology Management Software is to design a system that can improve the overall efficiency and effectiveness of hospital operations. It is designed to address the complexities of managing outpatient and pathology services by providing a cohesive solution that integrates various aspects of these departments. The software aims to support hospitals in delivering high-quality care, enhancing patient management, and streamlining administrative processes, ultimately contributing to better health outcomes and operational excellence.

1.2 Intended Audience and Reading Suggestions

This Software Requirements Specification (SRS) document is intended for a diverse audience involved in the development, implementation, and use of the Hospital OPD and Pathology Management Software. The primary audience includes software developers, system architects, and project managers who will be responsible for designing, building, and overseeing the development of the software. This document will provide them with detailed requirements and guidelines essential for ensuring that the software meets the desired functional and non-functional specifications.

Additionally, hospital administrators and other stakeholders, such as doctors, pathologists, and other support staff, are key readers of this document. For them, the SRS outlines the expected capabilities and limitations of the software, helping them understand how it will integrate into existing hospital workflows and support daily operations.

For optimal understanding, readers are encouraged to review the document in its entirety, focusing on the sections relevant to their roles. This will provide a comprehensive overview of the system's requirements and help ensure all stakeholders are aligned with the project's objectives.

1.3 Product Scope

The Hospital OPD and Pathology Management Software is designed to enhance the management of outpatient departments (OPD) and pathology services within healthcare facilities. Its primary purpose is to streamline the workflow, improve patient care, and ensure accurate and efficient handling of medical records, test results, and billing processes. By automating key administrative and clinical tasks, the software aims to reduce operational inefficiencies, minimize errors, and improve the overall patient experience.

This software aligns with corporate goals of enhancing healthcare delivery through technological innovation and improving patient satisfaction. By integrating various hospital functions into a unified system, the software supports the broader business strategy of optimizing resource utilization, reducing costs, and ensuring compliance with healthcare standards. The adoption of this software is expected to contribute to the long-term objective of providing high-quality healthcare services while maintaining financial sustainability.

1.4 References

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2 Overall Description

2.1 Product Perspective

The Hospital OPD and Pathology Management Software is a comprehensive solution designed to enhance the efficiency and effectiveness of managing outpatient and pathology services. It addresses key functions such as patient registration, appointment scheduling, test ordering, billing and others, providing a unified platform for seamless operations. The system is intended to operate as a standalone application with a user-friendly interface tailored to the needs of patients, doctors, pathologists, pharmacists, and administrators. Its design supports straightforward implementation and integration with existing hospital systems, ensuring a smooth and efficient workflow.

2.2 Product Functions

The Hospital OPD and Pathology Management Software encompasses a range of functionalities designed to streamline and enhance the operations of a hospital's outpatient department and pathology services. The primary functions include:

Patient Registration: Allows new patients to create and manage their profiles, including personal details, contact information, and medical history.

Appointment Management: Enables patients to book, cancel, or reschedule appointments with doctors. Doctors can view and manage their appointment schedules.

Test Orders and Management: Facilitates the ordering, scheduling, and tracking of medical tests. Pathologists can view test orders and upload results.

Medicine Ordering and Management: Allows patients to order medicines and pharmacists to manage orders, including delivery and inventory management.

Billing and Payment: Handles billing for medical services and medications, processes payments from patients, and manages insurance claims and approvals.

Profile Management: Enables administrators to create, update, and manage profiles for doctors, pathologists, and pharmacists, including setting roles and permissions.

2.3 User Class and Characteristics

The Hospital OPD and Pathology Management Software is designed to accommodate various user classes, each with specific roles and characteristics:

Patients

- **Characteristics:** Typically, individuals seeking medical care or services.
- **Access:** Patients can register, view and update personal information, book appointments, cancel or reschedule appointments, order medicines and tests, view their medical records, file insurance claims and pay their bills.

Doctors

- **Characteristics:** Medical professionals who need to manage patient consultations, generate prescriptions, and view their appointment schedules.
- **Access:** Doctors can view their own appointments, generate and manage prescriptions, and receive payments for their services.

Pathologists

- **Characteristics:** Specialists who handle diagnostic testing and report generation.
- **Access:** Pathologists can view test orders, upload test reports, and receive payments related to their services.

Pharmacists

- **Characteristics:** Personnel responsible for managing medication orders and dispensing medicines
- **Access:** Pharmacists can view medicine orders, deliver medicines, and receive payments.

Administrators

- **Characteristics:** Staff members who manage overall system operations, including user profiles, appointments, insurance approvals, and employee payments.
- **Access:** Administrators need comprehensive access to all system functions to ensure smooth operations and administrative oversight. They can create new profiles for doctors, pathologists, and pharmacists, view employee lists, view all appointments, schedule tests, approve insurance claims, generate billing reports, receive payment from patient, bifurcate payments for employees.

2.4 Operating Environment

The Hospital OPD and Pathology Management Software is intended to function in a standard healthcare facility environment. The operating environment encompasses:

Physical Environment: The software will be used in various settings within the hospital, including outpatient departments, pathology labs, and administrative offices. It is designed to integrate seamlessly into the existing infrastructure of the hospital.

Network Environment: The software assumes a stable network infrastructure that supports reliable communication between different user terminals and the central server. Network security and data protection measures are essential to safeguard information and ensure uninterrupted service.

User Environment: The software will be accessed by various user classes, including patients, doctors, pathologists, pharmacists, and administrators. Each user will interact with the system through a user-friendly interface tailored to their specific needs and roles.

2.5 Design and Implementation Constraints

The design and implementation of the Hospital OPD and Pathology Management Software are subject to the following constraints:

Compliance Requirements: The software must adhere to relevant healthcare regulations and standards, such as data protection laws (e.g., GDPR, HIPAA) to ensure patient information is managed securely and in compliance with legal requirements.

Integration Limitations: While the software is designed to be standalone, it should be compatible with common hospital management systems and electronic medical records if integration is necessary. However, the scope does not include extensive customization for integration with all potential external systems.

Performance Constraints: The application must be optimized for performance to handle typical data volumes and user loads expected in a medium-sized hospital or clinic. This includes considerations for system response times and transaction processing.

Scalability: The software should be scalable to accommodate an increasing number of users and data without significant redesign. However, it is not designed for large-scale deployment across multiple facilities.

Technology Stack: The choice of technology stack, including programming languages, frameworks, and databases, must align with the project's objectives and ensure that it supports the required functionality and performance.

User Interface: The design of the user interface should be intuitive and user-friendly to accommodate users with varying levels of technical expertise, including patients, medical staff, and administrators.

Budget and Resource Constraints: The development and implementation must adhere to the allocated budget and available resources, impacting decisions related to features, technology, and project scope.

2.6 Assumptions and Dependencies

- **User Training:** It is assumed that end users (patients, doctors, pathologists, pharmacists, and administrators) will receive adequate training to effectively use the software.
- **Stable Network:** The software assumes the presence of a stable network infrastructure within the hospital or clinic to ensure reliable connectivity and performance.
- **Hardware Availability:** It is assumed that the necessary hardware, such as computers and servers, will be available and meet the minimal specifications required to run the software efficiently.
- **Data Accuracy:** The system assumes that the data entered by users (such as patient information, test results, and prescriptions) will be accurate and complete.
- **Compliance:** The implementation assumes that the hospital or clinic will adhere to relevant legal and regulatory requirements for data protection and healthcare standards.
- **External Services:** If applicable, the software may depend on integration with external services for functionalities like insurance processing or payment gateways.

3 External Interface Requirements

3.1 User Interfaces

The User Interfaces (UI) of the Hospital OPD and Pathology Management Software are designed to ensure an intuitive and efficient interaction for all user classes. The key aspects of the user interfaces include:

Patient Portal: An interface where patients can register, book or cancel appointments, view records, order tests and medicines, and make payments. The portal should be user-friendly.

Doctor Dashboard: An for doctors to view their appointments, generate prescriptions, and access patient information. It should provide easy navigation and data entry functionalities.

Pathologist Interface: An interface for pathologists to view test orders, upload test reports, and manage related tasks.

Pharmacist Interface: An interface for pharmacists to view medicine orders, check availability, deliver medicines, and manage payments.

Admin Panel: An interface for administrators to create profiles, view employee lists, manage appointments, process insurance claims, generate bills, and handle payments. The interface should include administrative controls and reporting features.

3.2 Hardware Interfaces

- **Processor:** Intel Core i5 or equivalent.
- **RAM:** Minimum 8 GB.

- **Storage:** Minimum 50 GB of free disk space for the operating system, development tools, database, and application files.
- **Display:** Resolution of at least 1024 x 768 pixels for effective interaction with the development and user interfaces.
- **Network:** Standard internet connection with at least 1 Mbps bandwidth for development, updates, and testing.

3.3 Software Interfaces

- **Operating System :** Windows 10 or later, macOS Mojave or later, or a recent version of a Linux distribution (e.g., Ubuntu 20.04).
- **Web Browser :** Latest versions of Google Chrome, Mozilla Firefox, or Microsoft Edge for accessing the web-based interfaces.
- **Database Management System (DBMS) :**
 - H2 Database: For lightweight, in-memory database suitable for development and testing.
 - MySQL 8.0 or PostgreSQL 13: For a more robust local database solution, if needed.
- **Web Server :**
 - Embedded Tomcat: Spring Boot includes an embedded Tomcat server, which is sufficient for local development and testing.
- **Development Framework :**
 - Java 17 or later: Required for running Spring Boot applications.
 - Spring Boot 3.0 or later: Framework for developing the application.
- **Build Tools :**
 - Maven or Gradle: For managing project dependencies and building the application.
- **Integrated Development Environment (IDE) :**
 - IntelliJ IDEA or Eclipse: Recommended IDEs for Java and Spring Boot development.

4 System Features

4.1 Patient Registration

The Patient Registration feature allows new patients to create an account by entering their personal and medical details into the system.

- Provide a registration form for inputting personal and medical information.
- Validate all entered data for completeness and accuracy.
- Create and securely store the patient profile upon successful registration.
- Send a confirmation email to the patient with login details.
- Display error messages for incomplete or incorrect inputs.

4.2 Book Appointment

The Book Appointment feature enables patients to schedule, cancel, or reschedule appointments with doctors through the system.

- Display available doctors, dates, and time slots for appointments.
- Allow patients to select a doctor, date, and time slot to book an appointment.
- Validate the availability of the selected time slot before confirming the appointment.
- Notify patients of successful bookings, cancellations, or reschedules via email or SMS.

4.3 Cancel / Reschedule Appointment

The Cancel/Reschedule Appointment feature allows patients to modify or cancel their existing appointments, including checking the status of their bookings.

- Provide patients with a list of their current appointments.
- Allow patients to select an appointment to cancel or reschedule.
- Offer options to choose a new date and time when rescheduling.
- Update the appointment status in the system after cancellation or rescheduling.

4.4 View Patient Record

The View Patient Record feature allows patients to access their personal medical records, including previous consultations, prescriptions, and test results.

- Display detailed information such as past consultations, diagnoses, prescriptions, and test results.
- Allow patients to download or print their medical records.
- Ensure that only the authorized patient can view their own records, maintaining privacy and confidentiality.
- Offer a search function to quickly find specific records or information.

4.5 Order Medicine

The Order Medicine feature enables patients to order prescribed medications online through the system and have them delivered or prepared for pickup.

- Allow patients to view and select prescribed medications available for order.
- Provide an interface for confirming the order, including selecting the quantity and delivery method (e.g., home delivery or pharmacy pickup).
- Check the availability of the selected medications in the pharmacy's inventory.
- Notify patients of the order status, including confirmation and estimated delivery or pickup time.
- Handle scenarios where medicines are out of stock.

4.6 Order Tests

The Order Tests feature allows patients to request medical tests as prescribed by their doctor, with options for scheduling the tests and viewing results.

- Provide a list of available tests prescribed by the doctor for the patient to order.
- Allow patients to select a test and schedule an appointment for sample collection or lab visit.

- Confirm test orders and provide details on the scheduled date and time.
- Notify patients when test results are available and allow them to view or download the results.

4.7 Bill Payment

The Bill Payment feature allows patients to pay for medical services and medications online and facilitates insurance claim processing.

- Provide an interface for patients to view and review their bills, including detailed breakdowns of charges.
- Allow patients to select payment methods (e.g., credit/debit card, online banking) and process payments securely.
- Confirm payment transactions and update the billing status in the system.
- Integrate with insurance filing to handle claims if applicable, extending the billing process.
- Send payment receipts and confirmation to patients via email or SMS.

4.8 View Own Appointments

The View Own Appointments feature allows doctors to access and manage their scheduled appointments through the system.

- Display a list of upcoming, past, and canceled appointments.
- Allow doctors to view details for each appointment, including patient information and appointment time.
- Provide options for doctors to update appointment statuses or add notes.
- Ensure data privacy and security, allowing only authorized doctors to view their own appointments.

4.9 Generate Prescription

The Generate Prescription feature enables doctors to create and issue electronic prescriptions for patients, including details of prescribed medications.

- Provide a form for doctors to enter prescription details, including medication names, dosages, and instructions.
- Allow doctors to review and confirm the prescription before finalizing.
- Generate and securely store an electronic copy of the prescription in the patient's record.
- Provide options for doctors to print or email the prescription to the patient.
- Ensure the prescription is accessible only to authorized users, such as the patient and pharmacist, to maintain confidentiality.

4.10 View Test Orders

The View Test Orders feature allows pathologists to access and review test orders submitted by patients or doctors.

- Display a list of pending and completed test orders, including patient details and test types.
- Allow pathologists to view detailed information for each test order, such as sample collection requirements and deadlines.
- Provide options for pathologists to update the status of test orders as they are processed.
- Ensure that only authorized pathologists can access test orders to maintain patient confidentiality.

4.11 Upload Test Report

The Upload Test Report feature allows pathologists to submit and manage test results for completed medical tests.

- Allow pathologists to attach test results, including detailed findings and any relevant documentation.

- Ensure the uploaded reports are associated with the correct patient and test order.
- Notify patients and relevant healthcare providers when a test report is available.
- Ensure that test reports are securely stored and accessible only to authorized users, including patients and doctors.

4.12 View Medicine Orders

The View Medicine Orders feature allows pharmacists to access and review medicine orders placed by patients.

- Display a list of pending and completed medicine orders, including patient details and medication names.
- Allow pharmacists to view detailed information for each order, including quantities and delivery instructions.
- Provide options for pharmacists to update the status of orders (e.g., prepared, delivered).
- Ensure that only authorized pharmacists can access medicine order details to maintain privacy and accuracy.

4.13 Deliver Medicine

The Deliver Medicine feature allows pharmacists to manage and execute the delivery of ordered medications to patients, including handling availability checks.

- Allow pharmacists to confirm the availability of ordered medicines in inventory before processing the delivery.
- Offer options for pharmacists to update the status of the delivery order, such as marking it as delivered.
- Notify patients of the delivery status, including estimated delivery time and confirmation upon receipt.
- Handle scenarios where medicines are out of stock by offering alternatives or rescheduling the delivery.

4.14 Create Profile

The Create Profile feature allows administrators to set up and manage profiles for doctors, pathologists, and pharmacists within the system.

- Provide a form for administrators to enter details for new profiles, including name, contact information, role, and qualifications.
- Allow administrators to assign roles and permissions to each profile based on their responsibilities (e.g., doctor, pathologist, pharmacist).
- Validate the entered information for completeness and accuracy before creating the profile.
- Securely store profile information and ensure only authorized administrators can create or modify profiles.

4.15 View Employee List

The View Employee List feature allows administrators to access and manage the list of all employees, including doctors, pathologists, and pharmacists.

- Provide a secure interface for administrators to view a list of all employees.
- Display relevant employee details such as name, role, contact information, and status (active/inactive).
- Allow administrators to search and filter the employee list by various criteria (e.g., role, department).
- Provide options to view detailed profiles or update employee information as necessary.
- Ensure that access to employee details is restricted to authorized administrators to maintain confidentiality and privacy.

4.16 View All Appointments

The View All Appointments feature allows administrators to access and review all scheduled appointments across the system.

- Provide a secure interface for administrators to view a comprehensive list of all scheduled appointments.
- Display appointment details such as patient name, doctor, date, time, and status (confirmed, canceled, rescheduled).
- Allow administrators to search, filter, and sort the list based on various criteria (e.g., date, doctor).
- Provide options to view detailed information for individual appointments or modify appointment statuses if needed.

4.17 Insurance Approval

The Insurance Approval feature allows administrators to manage and process insurance claims for medical services and treatments.

- Provide a secure interface for administrators to review and process insurance claims submitted by patients.
- Display claim details including patient information, medical services, and treatment costs.
- Allow administrators to approve or reject insurance claims based on the provided documentation and eligibility criteria.
- Notify patients of the status of their insurance claims, including approval or rejection details.
- Maintain records of all processed claims and ensure that sensitive insurance information is handled securely and in compliance with relevant regulations.

4.18 Generate Bill

The Generate Bill feature allows administrators to create and issue bills for medical services, tests, and medications provided to patients.

- Provide an interface for administrators to create detailed bills based on services rendered, tests performed, and medications ordered.
- Include options to review and adjust bill details before finalizing, such as adding discounts or correcting errors.
- Generate a final bill that includes a breakdown of charges and applicable taxes.
- Send the generated bill to the patient via email or physical mail, and update the patient's billing record in the system.

4.19 Receive Payment

The Receive Payment feature allows administrators to record and confirm payments made directly by patients for medical services, tests, and medications.

- Provide an interface for administrators to record the receipt of payments from patients.
- Update the billing status and patient account to reflect the received payment.
- Generate and provide a receipt or payment confirmation to the patient.
- Handle any discrepancies or issues related to the payment, such as incomplete or incorrect amounts.

4.20 Bifurcate Payment

The Bifurcate Payment feature allows administrators to allocate received payments among different employees based on predefined criteria.

- Provide an interface for administrators to input the total payment amount and specify the distribution criteria for different employees.
- Automatically calculate and allocate the specified amounts to each employee according to the predefined distribution rules.
- Update each employee's payment record with the allocated amount and adjust the overall payment status accordingly.
- Generate and provide a breakdown of the payment distribution to relevant employees.

5 Non - Functional Requirements

5.1 Performance Requirements

Response Time: The system shall provide a response to user actions (e.g., logging in, booking an appointment) within 2 seconds under normal operating conditions. For tasks involving file uploads or complex queries, the system should complete the operation within 5 seconds.

Availability: The system shall be available 99.9% of the time, excluding scheduled maintenance. This includes providing uptime and reliability to ensure continuous access to critical functions.

Data Storage: The system shall be able to handle a database size of up to 1 TB, with efficient indexing and querying to ensure performance does not degrade as the data volume grows.

5.2 Security Requirements

Authentication: The system shall require users to authenticate with a username and password. Passwords must be encrypted using a secure hashing algorithm and follow complexity requirements (e.g., minimum length, combination of characters).

Authorization: The system shall implement role-based access control (RBAC) to ensure users can only access functions and data pertinent to their roles (e.g., patients, doctors, administrators).

Audit Logging: The system shall maintain audit logs of all user activities, including login attempts, data modifications, and administrative actions.