HEALTH TRACKER

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1. Introduction

1.1 Purpose & Goals

Purpose:

The purpose of the system is to create an efficient platform for managing and documenting patients' visits to doctors, tracking the medication they receive, and facilitating a community of patients to share feedback and recommend healthcare providers based on their experiences. The system aims to enhance the overall healthcare experience for both patients and doctors by providing a centralized and organized approach to medical information and community engagement. In addition not all the patients get their treatment and healthcare from the hospital, sometimes they take it from independent doctors. Moreover, the system also incorporates a feature that allows laboratory personnel and pharmacists to access medical prescriptions through the application.

goals:

1. Efficient Patient Record Management
2. Accurate Medication Tracking
3. User-Friendly Interface(UI) for Patients and Doctors and Pharmacists
4. Community Engagement and Feedback
5. Secure Data Storage and Privacy
6. Interoperability with Healthcare Systems
7. Notification and Reminder System
8. Analytics and Reporting
9. Scalability and Future Expansion

1.2 Scope

This platform includes users from the West Bank of Palestine and excludes users from the occupied lands of Palestine and any other countries because the West Bank lacks those kinds of platforms that connect them easily with the doctors around them in addition there is almost no documentation to the patient's history in places other than hospitals.

1.3 Document Conventions

1. Terminology:

Patient: Refers to an individual receiving medical care.

Doctor: Refers to a healthcare professional providing medical services.

Laboratory Personnel: Refers to professionals responsible for conducting medical tests, such as blood tests and X-rays.

Pharmacist: Refers to a healthcare professional responsible for dispensing medications.

Medication: Refers to prescribed drugs or treatments.

Patient Record: Refers to a comprehensive collection of information about a patient, including personal details, medical history, prescribed medications, and treatment plans.

Must: Means the user must use those functional requirements (Features) in the system.

Want: Means that the user is not required to use those functional requirements or the system (it is optional).

2. Formatting Conventions:

Bold Text: Used for headings.

Normal Text: Used for paragraphs & subheadings.

3. Acronyms:

- The document uses acronyms for brevity and consistency. Key acronyms like:

API: Application Programming Interface.

AI: Artificial Intelligence.

GDPR: General Data Protection Regulation.

SOW: Statement of Work.

QA: Quality Assurance.

PACS: Picture Archiving and Communication Systems.

LIMS: Laboratory Information Management Systems.

PIN: Personal Identification Number.

SRS: Acronym for Software Requirements Specification.

UI: Acronym for User Interface.

UX: Acronym for User Experience.

IT: Information Technology.

EHR: Electronic Health Record.

FHIR: Fast Healthcare Interoperability Resources.

DICOM: Digital Imaging and Communications in Medicine.

XML: Extensible Markup Language.

JSON: JavaScript Object Notation.

CCDA: Consolidated Clinical Document Architecture.

WHO: world health organization.

REQ:requirement.

1.4 Intended Audience

Patients: They are a primary audience as they use the software to access their medical history.

Doctors and Healthcare Providers: Doctors are a crucial audience since they have the ability to edit and update patient records.

Medical Administrative Staff: This includes personnel at hospitals, clinics, and other healthcare facilities who may need access to patient information .

Healthcare IT Professionals: They are responsible for implementing, managing, and securing the software.

Healthcare Regulatory Bodies: Although not direct users, these entities are interested in ensuring that the software complies with healthcare regulations and standards, including data protection and privacy laws.

Health Insurance Companies: They might use the software, with proper authorization, to access patient records for claims processing and to verify treatments.

Researchers and Public Health Officials: With appropriate consent and anonymization, these users can analyze aggregated data for research purposes.

Pharmacists: They might use the software to review patient medication histories, ensuring safe and effective medication management.

Laboratories : They use the system to upload the patients PACS and LIMS into the system.

2. Overall Description

2.1 Product Perspective

New platform that interacts with governmental databases and hospitals. Interactions with notification services support timely reminders for patients. Integration with security and authentication systems ensures data protection. User-friendly interfaces for patients, doctors and pharmacists to facilitate interaction. The software operates within hardware and technology constraints, considering compatibility, scalability, and budget limitations.

2.2 Product Functions

1. **Patient Information Management:**
   Capture and manage comprehensive patient information, including personal details (name, age, contact information), medical history, and relevant health records. That can be used in several features.

2. **Doctor Visit Documentation:**
   Record and store information about patients' visits to doctors, including diagnoses, prescribed medications, treatment plans, and follow-up recommendations.

3. **Medication Tracking:**
   The system tracks prescribed medications, including details such as dosage, frequency, and duration of usage, to enhance medication management.

4. **Community Feedback and Recommendations:**

   Provide a platform for patients to share feedback about their healthcare experiences, recommend doctors, and engage with a supportive community of peers.

5. **User-Friendly Interfaces:**

   Design intuitive and friendly UI for both patients and doctors, ensuring ease of navigation and accessibility to relevant information.

6. **Notification and Reminder System:**
   Implement a notification system to remind patients about medication schedules and upcoming doctor appointments, improving adherence to treatment plans.

7. **Doctor Directory with Specialty Search:**
   Develop a directory feature that enables patients to search for doctors based on medical specialties, providing detailed information about each doctor's qualifications and expertise.

8. **Interoperability with Healthcare Systems:**
   Ensure seamless interoperability with existing healthcare systems, allowing for the exchange of patient data and medical information across different platforms.

9. **Security Measures:**
   Implement robust security measures, including data encryption and access controls, to protect patient data and maintain confidentiality in compliance with data protection standards.

10. **Analytical Tools and Reporting:**
    Integrate analytical tools and reporting features to extract valuable insights from patient data, supporting healthcare providers in informed decision-making and performance analysis.

11. **Scalability and Future Expansion:**
    Design the system with scalability in mind, allowing for future expansion, integration of new features, and adaptation to evolving healthcare practices and technological advancements.

12. **Third-Party Service Integration:**
    Incorporate third-party services, for specific functionalities such as AI and Machine Learning Platforms to give the doctor guidance and

advice about tests for genetic diseases, Appointment Scheduling Software or leveraging external APIs for extended capabilities.

13. **Accessibility Standards:**
    Adhere to accessibility standards to ensure inclusivity, making the software accessible to users with diverse needs and complying with usability best practices.

14. **Legal and Regulatory Compliance:**
    Implement features and processes to ensure compliance with legal and regulatory standards, including data protection laws (e.g., GDPR), to maintain ethical and lawful data handling practices.

2.3 User Classes and Characteristics

1. **Patients:**
    - **Characteristics:** End-users seeking medical care, accessing their personal health information, managing medications, and engaging with the community platform.
2. **Doctors/Healthcare Professionals:**
    - **Characteristics:** Authorized users responsible for documenting patient visits, prescribing medications, and accessing patient information for providing healthcare services.
3. **Community Managers:**
    - **Characteristics:** Users responsible for overseeing and managing the patient community platform, moderating discussions, and ensuring a positive and supportive environment.

4. **Administrators:**
    - **Characteristics:** System administrators with elevated privileges, managing user accounts, overseeing system security, and handling overall system configuration.

5. **Project Managers:**
    - **Characteristics:** Individuals responsible for overseeing the development project, managing timelines, budgets, and ensuring alignment with project goals.
6. **Quality Assurance (QA) Team:**
    - **Characteristics:** Testers responsible for evaluating the software, identifying and reporting bugs, and ensuring the quality and reliability of the system.
7. **System Administrators:**
    - **Characteristics:** IT professionals responsible for configuring, maintaining, and ensuring the optimal performance of the software's underlying infrastructure.
8. **Stakeholders:**
    - **Characteristics:** Individuals or groups with a vested interest in the project's success, including healthcare organizations, regulatory bodies, and investors.
9. **Community Participants:**
    - **Characteristics:** Users engaging in the patient community, sharing experiences, providing feedback, and seeking or offering advice.

10. **Legal and Compliance Professionals:**

    - **Characteristics:** Individuals responsible for ensuring that the software complies with legal and regulatory standards, particularly regarding patient data and privacy.

11. **UX Designers:**

    - **Characteristics:** Design professionals focusing on creating a user-friendly and accessible interface for patients, doctors, and other users.

2.4 Operating Environment

The system will look like an app can be installed from play store or apple store and the application requires network connection it can be installed and used by any phone and computer or laptop.

2.5 Design and Implementation Constraints

1. **Technology Stack Limitations**:
The software must adhere to the designated technology stack, limiting choices in programming languages, frameworks, and libraries.

2. **Compatibility with Existing Systems**:

Design and implementation must ensure compatibility with existing healthcare systems, necessitating adherence to interoperability standards.

3. **Budgetary Constraints**:

Development activities must operate within the allocated budget, influencing technology choices, feature prioritization, and project timelines.

4. **Time Constraints**:

Strict project deadlines may limit the extent of features or refinement in the initial release, requiring a phased development approach.

5.**Regulatory Compliance**:

Design and implementation must comply with relevant healthcare and data protection regulations, impacting data handling, storage, and security measures.

6. **Hardware Limitations:**

Consideration of potential limitations in the hardware infrastructure may impact system scalability and performance.

7. **Accessibility Standards**:

Design choices must align with accessibility standards, influencing user interface elements to ensure inclusivity for users with diverse needs.

8. **Integration Challenges**:

Interaction with external platforms or systems may present challenges, necessitating careful design to address compatibility issues.

9. **User Experience Design Constraints:**

Design choices may be limited by the need for a consistent and user-friendly experience across various devices and screen sizes.

10. **Training and Onboarding**:

Constraints related to user training and onboarding may influence the complexity of user interfaces and the need for comprehensive documentation.

11. **Scalability Requirements:**

Design and implementation must account for potential scalability requirements, influencing architectural decisions to accommodate future growth.

2.6 User Documentation

1. **User Manuals:**
   Comprehensive guides for patients and doctors outlining system features, functionalities, and step-by-step instructions for tasks such as accessing medical records, managing medications, and participating in the community.

2. **Video Tutorials:**

Visual guides demonstrating key system functions, providing a dynamic and accessible resource for users who prefer multimedia learning.

3. **FAQ Section:**

A frequently asked questions section addressing common queries and concerns, offering quick reference for users seeking immediate assistance.

4. **Interactive Help Features:**

In-system tooltips, pop-ups, or a contextual help center to provide real-time guidance as users navigate the platform.

5. **Community Guidelines:**

Guidelines for participating in the patient community, offering insights on etiquette, posting rules, and maximizing the community experience.

6. **Accessibility Guide:**

Information on how to use accessibility features within the platform, ensuring inclusivity for users with diverse needs.

7. **Privacy and Security Overview:**

A clear and concise document outlining the platform's privacy measures, data security protocols, and steps taken to protect user information.

8. **Contact Support Information:**

Contact details for user support services, including helpline numbers, email addresses, or a live chat feature for prompt assistance.

9. **Release Notes:**

Periodic release notes detailing updates, new features, and improvements, keeping users informed about system enhancements.

10. **Glossary of Terms:**

A glossary defining technical terms and medical jargon used within the system to enhance user understanding.

11. **Patient Education Materials:**

Educational resources for patients, providing information on common medical conditions, treatments, and wellness tips.

12. **Notification Settings Guide:**

Instructions on configuring and managing notification settings, allowing users to customize their experience.

2.7 Assumptions and Dependencies

Assumptions:

1. **User Internet Connectivity:**

Assumes that end-users (patients, doctors) have reliable internet connectivity to access the platform.

2. **Device Compatibility:**

Assumes that users have devices (computers, smartphones, tablets) compatible with the platform's supported browsers and technologies.

3. **User Proficiency:**

Assumes a basic level of digital literacy among users for effective interaction with the software.

4. **Data Accuracy:**

Assumes that the data provided by users, especially in community feedback, is accurate and genuine.

5. **Compliance Adherence:**

Assumes that users will adhere to community guidelines and legal regulations regarding data sharing and interactions.

Dependencies:

1. **Third-Party Services:**

Dependency on external services (e.g., payment gateways) for specific functionalities.

2. **Healthcare Systems Integration:**

Dependency on successful integration with existing healthcare systems for seamless data exchange.

3. **Regulatory Compliance Updates:**

Dependency on timely updates from legal and compliance bodies for maintaining adherence to regulations.

4. **Technological Advancements:**

Dependency on advancements in relevant technologies for future scalability and feature enhancements.

5. **User Feedback and Participation:**

Dependency on active user engagement for community feedback and recommendations to enhance the platform.

6. **Security Protocols:**

Dependency on the effectiveness of external security protocols and measures for safeguarding user data.

7. **Availability of Support Services:**

Dependency on the availability of support services for addressing user queries and issues in a timely manner.

8. **Timely Communication with Stakeholders:**

Dependency on effective communication with stakeholders to address project-related decisions and updates.

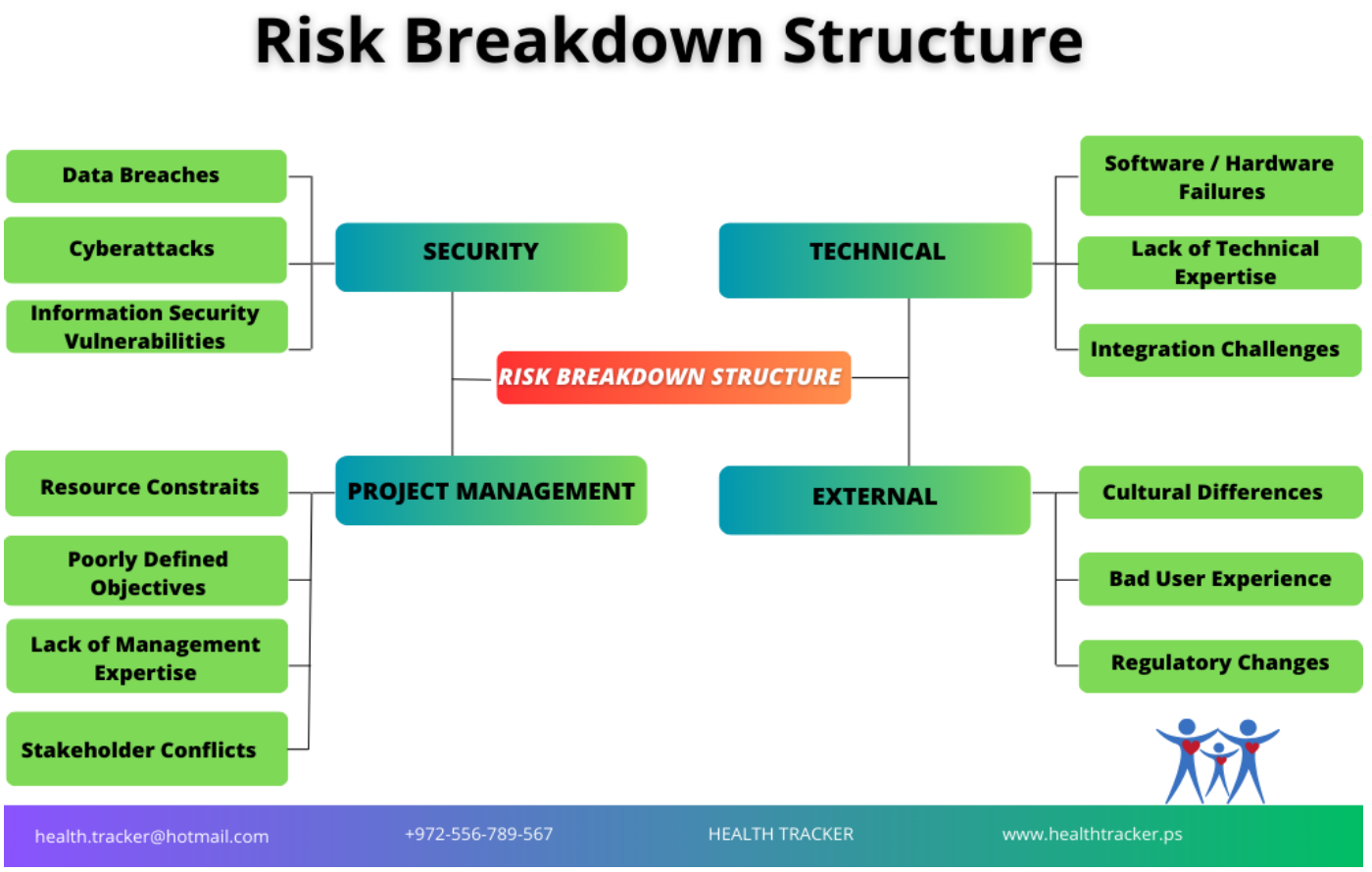


Figure 1: Project Risk Assessment Map.

3. System Features:

1. **Secure User Authentication**:

   Implement a robust authentication process that requires a person's unique ID number and a verification code sent to the patient's registered phone number for access.

2. **Role-Based Access Control**:

   Make different levels of access control where only authorized doctors or healthcare providers have the privilege to edit or update patient medical records, while patients can only view their information, also the pharmacists can only view the patient's medicine, and also the laboratory can only upload PACS and LIMS documents.

3. **Encrypted Data Storage**:

   Use strong encryption methods to safeguard patient data stored within the system. Use the standard encryption protocols to protect the patient's sensitive information from unauthorized access or leaking.

4. **Comprehensive Medical History**:

   Provide a detailed report of the patient's medical history, including chronic and non-chronic diseases, previous medications taken, surgical history, allergies, immunizations, lab results, the doctors he visited with specifying dates, and any ongoing treatments.

5. **Accessibility and User-Friendly interface**:

   Create a straightforward and intuitive interface that facilitates effortless access to medical records and history for both patients and doctors. Ensure smooth navigation and accessibility, prioritizing user-friendliness to enhance the ease of use for individuals accessing or managing healthcare information.

6. **Data Backup and Recovery**:

   Regularly backup the system data to prevent loss of information. Implement a powerful recovery plan to ensure that data can be restored in case of system failure or data corruption.

7. **Real-time Updates and Notifications**:

   Instant notifications for patients when new medical data or updates are added by healthcare providers, also alerts for doctors regarding critical patient information or updates in medical records.

8. **Compatibility**:

   Compatibility with different devices (desktop, mobile, tablets) and operating systems for accessibility.

9. **Integration**:

   Integration with Electronic Health Record (EHR) systems used by healthcare facilities for seamless data exchange, also integration with wearable devices such as a watch.

10. **Audit Trail and Logging:**

    Detailed logs recording every access, modification, or action performed on patient records for accountability and auditing purposes.

11. **Authorized Doctors and Pharmacists Alerts:**

    Alert both the doctors and the pharmacists if any of the medicines they gave him conflicts with other medicines that the patient is taking now or permanently.

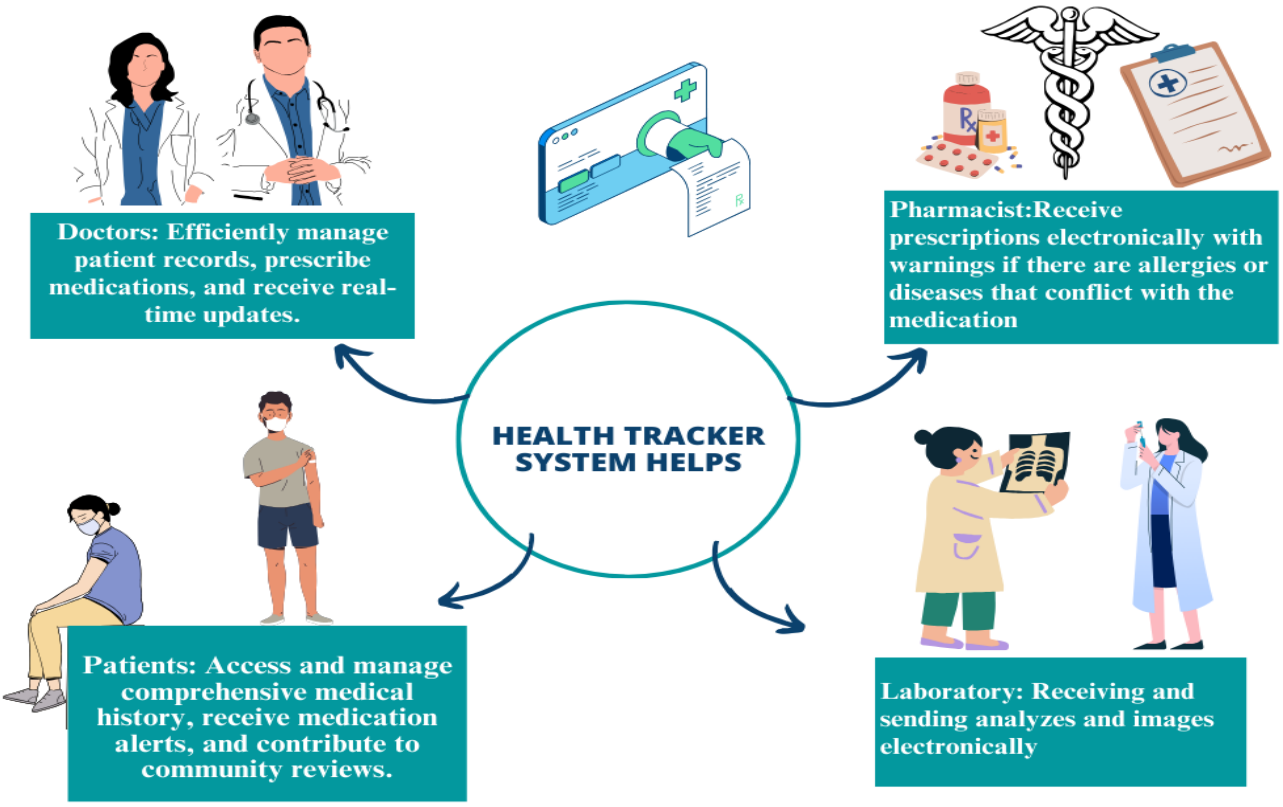


Figure 2: Health Tracker Workflow Illustration.

4.External Interface Requirements

4.1 User Interfaces

The system contains several interfaces divided as follows: The first interface is for the Ministry of Health and for licensed doctors, where the patient's medical record will be displayed, modified and updated. The second interface is intended for the ordinary user (the patient) who can view his complete medical record in addition to all the examinations and analyzes that were previously specified or that will be specified. The third interface will be dedicated to laboratories, through which tests, laboratory analyzes and x-ray images of the patient will be uploaded. Finally, the fourth interface will be allocated to accredited pharmacists to display prescriptions that have been ordered by the accredited doctor and dispensed to patients.

4.2 Hardware Interfaces

1.Servers:

Requirements: High-performance servers with sufficient processing power, storage capacity, and RAM to handle the large volume of patient data and health records.

Interaction: The software interacts with the servers to store, retrieve, and manage patient data securely. The servers may host databases, applications, and other essential components.

2.Databases:

Requirements: Reliable and scalable database systems capable of storing structured and unstructured health.

Interaction: The software interacts with databases to store patient information, medical histories, test results, and other health-related data. Database queries and transactions are essential for data retrieval and updating,It also interacts with a drug database so that the system can link medications that may cause conflicts with each other.

3.Network Infrastructure:

Requirements: Secure and robust networking equipment to ensure seamless communication between different components of the health system.

Interaction: The software relies on the network infrastructure to facilitate data exchange between various modules, such as connecting clients (e.g., hospitals, clinics) to central servers.

4.Workstations and Devices:

Requirements: PCs, laptops, tablets, and other devices for healthcare professionals to access and update patient records.

Interaction: The software should be compatible with various devices, allowing healthcare professionals to input and retrieve patient data efficiently. This may involve developing platform-independent applications or ensuring compatibility with commonly used operating systems.

5.Security Systems:

Requirements: Robust security measures, including firewalls, encryption protocols, and intrusion detection systems.

Interaction: The software interacts with security systems to protect patient data from unauthorized access, ensure data integrity, and prevent cybersecurity

threats. This includes implementing access controls, encryption for data in transit and at rest, and regular security audits.

6.Backup and Redundancy Systems:
Requirements: Backup servers, storage solutions, and redundancy mechanisms to ensure data availability in case of failures.
Interaction: The software should integrate with backup and redundancy systems to periodically backup patient data and enable quick recovery in the event of hardware failures or other disruptions.
7.Integration with Medical Devices:
Requirements: Compatibility with medical devices such as monitoring equipment, imaging devices, and laboratory instruments.
Interaction: The software may need to interface with medical devices to collect real-time data, such as vital signs or test results, and integrate this information seamlessly into the patient's health record.

8.Mobile Devices:
Requirements: Support for mobile devices to enable remote access to patient data for healthcare professionals on the go.
Interaction: The software should have a mobile-friendly interface or dedicated mobile applications, ensuring that healthcare providers can access patient information securely from smartphones or tablets.
9.Printing and Scanning Devices:
Requirements: Integration with printers and scanners for generating hard copies of medical records and digitizing paper-based documents.
Interaction: The software should allow users to print relevant documents and scan physical records into the system, ensuring a comprehensive and unified health record.
10.Communication Systems:
Requirements: Integration with communication tools such as email, messaging, and notifications.
Interaction: The software may utilize communication systems for sending alerts, reminders, and notifications to healthcare professionals, patients, and other stakeholders.

4.3 Software Interfaces

1.Picture Archiving and Communication Systems (PACS):

Integration with PACS enables the storage and retrieval of medical images, such as X-rays and MRI scans. The software should be capable of linking these images to the corresponding patient records for a comprehensive view of diagnostic information.

2.Laboratory Information Management Systems (LIMS):

The software should interface with LIMS to incorporate laboratory test results seamlessly into patient records. This integration streamlines the process of updating and accessing diagnostic information, enhancing the overall efficiency of healthcare delivery.

3.Pharmacy Information Systems:

Integration with pharmacy information systems ensures that medication-related information, including prescriptions and dispensing details, is seamlessly incorporated into the patient's health record. This supports medication management and reconciliation.

4.Billing and Health Insurance Systems:

The software should interface with billing and health insurance systems to capture relevant financial and insurance information. This integration streamlines the billing process, reduces errors, and ensures accurate documentation of financial transactions related to healthcare services.

5.Decision Support Systems:

The health system software may interface with decision support systems to provide healthcare professionals with relevant clinical guidelines, best practices, and alerts based on the patient's health data. This promotes informed decision-making and enhances patient care.

6.Government Health Information Systems:

Integration with government health information systems ensures compliance with national health regulations and standards. This may include reporting requirements, health statistics, and participation in national health initiatives.

4.4 Communication Interfaces

1.DICOM (Digital Imaging and Communications in Medicine):

Communication Protocol: DICOM is the standard for the communication and management of medical imaging information and related data.

Data Format: DICOM files use a specific format for storing and transmitting medical images and associated information.

2.FHIR (Fast Healthcare Interoperability Resources):

Communication Protocol: FHIR is a modern healthcare interoperability standard that builds on web standards and uses RESTful APIs for communication.

Data Format:
FHIR messages use JSON or XML for data representation, making it more accessible and easier to integrate with modern web-based systems.

3.CCDA (Consolidated Clinical Document Architecture):

Communication Protocol:
CCDA is a standard for the exchange of clinical documents, including patient summaries and clinical notes.

Data Format: CCDA documents are typically encoded in XML, providing a structured format for exchanging clinical information.

5.Functional Requirements

Requirement ID	Requirement Statement	Must/ Want
FR01	The system must prevent the creation of duplicate accounts by checking for matching ID information.	Must
FR02	The system should send a PIN to the user's registered email address or phone number upon login.	Must
FR03	The system should confirm update success by sending notification to the patient's number.	Want
FR04	The system should allow authorized doctors to add/change information to the patient's medical record.	Want
FR05	The system must show alerts for allergy, chronic and non chronic medications.	Must
FR06	Pharmacists should only view the medication prescription provided by the doctor and alerts (allergy).	Must
FR07	The system should generate automated reports every month and send them to the patient.	Want
FR08	The system should allow patients to make reviews.	Want
FR09	The system should allow the doctor to delete newly added information to the patient's medical record.	Want
FR010	The system must have a confirmation button for the doctor to confirm what he wants to add.	Must

Requirement ID	Requirement Statement	Must/ Want
FR011	The system should allow the doctor to insert the patient's symptoms into the system and it will provide suggestions for the doctor based on the patient's record and their family record for inherited diseases.	Want
FR012	The system should have a tab specified for PACS to analyze and print the document.	Must
FR013	The system should have a tab specified for LIMS to analyze and print the document.	Must
FR014	The system must have a reliable appointment system.	Must

6.Non-Functional Requirements

Req. ID	Req.*	Requirement Statement	Comments
NFR01	Response times	Data is updated on all servers within a maximum of 5 seconds.	Priority: Medium.
NFR02	Throughput	During peak hours, the system must handle at least 20,000 operations per second.	Priority: Medium.
NFR03	Security	The system must provide a secure way to view, update and store. Health data is shared only with hospitals, doctors, and pharmacists approved by the Ministry of Health.	Priority: High.
NFR04	Reliability	The system should have a low rate of failure time especially during processing rush hours.	In order to balance with higher priority requirements, reliability should be just enough to work properly.
NFR05	Size	The system must provide sufficient storage space for the Ministry of Health to accommodate current and future files of all patients and doctors.	Priority: High.
NFR06	Usability	The system should provide maximum usability by having a well-organized easy-to-use interface.	Priority: High.
NFR07	Portability	The system is available in hospitals, the Ministry of Health, accredited private clinics, and pharmacists. It is also available on users' devices as a reading history.	Priority: High.

7.Other Requirements:

7.1 Legal Requirements:

1. **Data Protection and Privacy Laws by Country**:
   Compliance with data protection laws specific to each country or region where the software operates.
2. **Healthcare Standards**:
   Adherence to international healthcare standards set by the WHO (World Health Organization).
3. **Consent and Authorization**:
   Implementing features that ensure patients provide informed consent and authorization for the collection, storage, and sharing of their health information.
4. **Healthcare Licensing and Credentialing Requirements**:
   Compliance with licensing and credentialing requirements for healthcare providers using the platform, ensuring they meet local standards and qualifications.
5. **Pharmaceutical Regulations and Drug Information**:
   Adherence to regulations governing the provision of pharmaceutical information, drug-related data, and adherence to local drug regulations in the country.
6. **Compliance and Regulations**:
   Compliance with healthcare data protection laws and regulations to ensure legal adherence and patient trust.
7. **International Standards for Security and Encryption**:
   Implementation of robust security measures aligned with internationally recognized standards for encryption, data protection, and secure transmission of information.
8. **Cultural Sensitivity and Adaptability**:
   Consideration of cultural differences and practices in healthcare delivery, ensuring the software's adaptability to diverse cultural contexts.
9. **Ethical Considerations**:
   Consideration of diverse ethical practices and norms in healthcare delivery across different cultures and regions.

7.2 Other Requirements:

1. **Feedback Mechanisms**:

   Implementing feedback mechanisms for users (Doctors & patients) to provide suggestions, report issues, or offer insights for continuous improvement of the software.

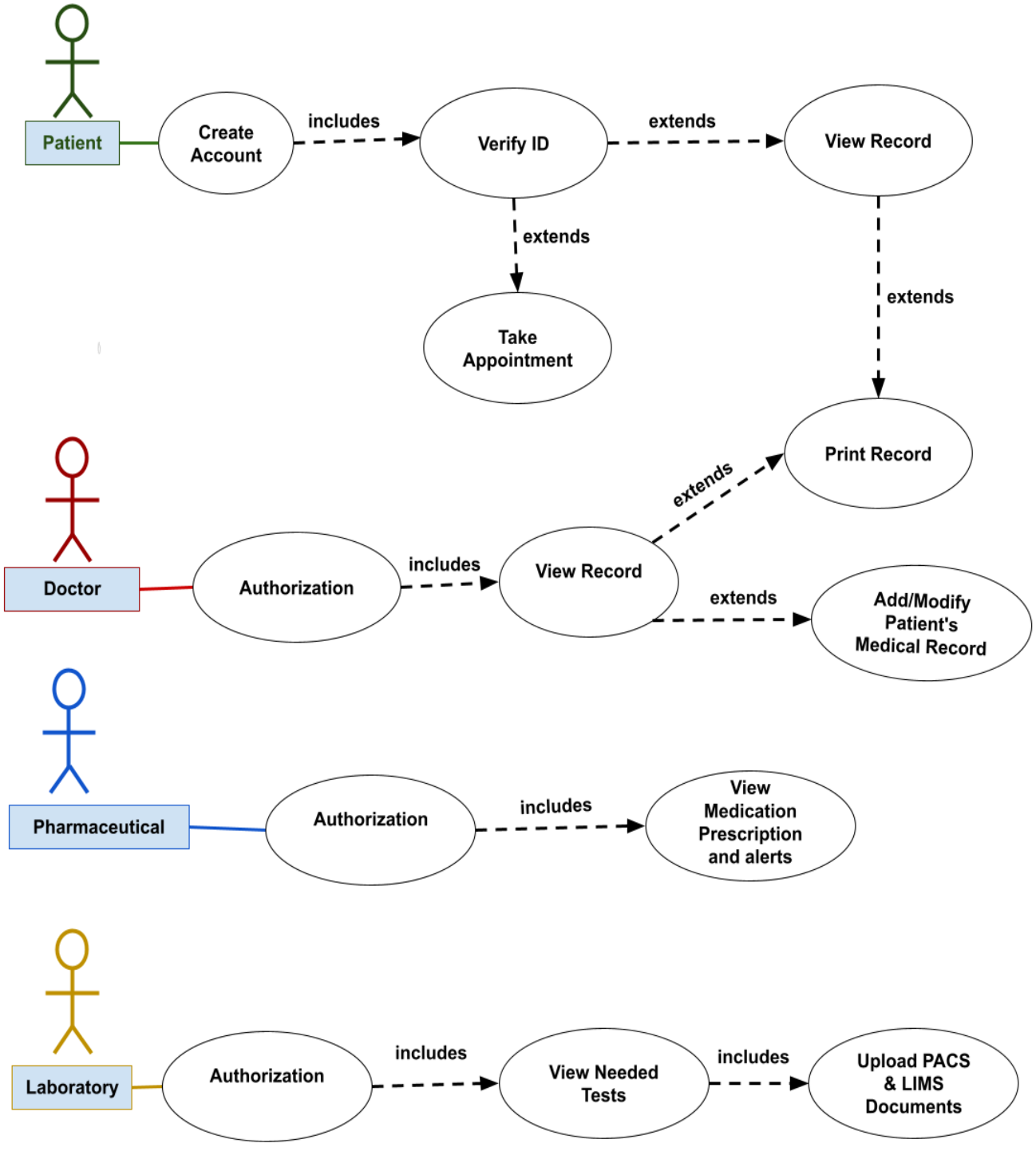
2. **Multilingual Support**:

   Support for multiple languages to accommodate diverse patient populations and healthcare providers.

3. **Environmental Sustainability**:

   Ensure the software design and operation are environmentally sustainable, minimizing energy consumption and optimizing for energy-efficient operation, particularly in data centers and cloud services.

8.Use Cases



Use Cases SRS