Requirements Document
Patient Information System

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Contents

Revision History

Name	Date	Reason for Changes	Version
All	2023-01-26	Initial design	0.0
All	2023-02-02	Completing Initial Design	0.1
All	2023-02-09	Completing Initial Design	0.2

1 Introduction

1.1 Purpose

Requirements Document (henceforth known as RD) 1.0 describes the functionality of an Electronic Health Record (EHR) software system that has a variety of features that will allow users to more efficiently carry out tasks that are currently deemed difficult on already existing systems. Some of these features include:

- More effective system of storing lab reports
- Increase in usability for tracking patient history
- Greater efficiency in finding and retrieving information
- Increased security and privacy for user information

The client organization finds that by improving these tasks, there will be an increase in efficiency and usability. By increasing the efficiency of looking up patient data, it will allow for medical staff to be able to view patient data as quickly as possible.

1.2 Project Scope

The scope of the project is to build a Patient Information System (PIS) for Medi-Spoon. The management system will streamline the process for creating, editing, and modifying various types of medical records dealt with by the organization. The types of records will include lab reports and patient diagnoses. The system will also facilitate communication between healthcare providers while ensuring the security and privacy of patient data.

1.3 Glossary of Terms

Term	Definition
Client	Patient, Family Doctor
RFP	Request for Proposal
RD	Requirements Document
RSD	Requirements and Specification Document
EHR	Electronic Health Records
POG	Psychic Octo Guacamole
PIS	Patient Information System
PRI	Patient Record Interface

1.4 Overview

RD 1.0 begins by providing an overall description and leads into section 2, which includes: the Product Perspective, the Product Features, User Classes and Characteristics, Operating Environment, Design and Implementation Constraints, and Assumptions and Dependencies. Following this is the overview of the Functional Requirements of the system, covering the following requirements: . Next, the External Interface Requirements define requirements for the User Interface, Hardware Interface, Software Interface, and Communication Interfaces. The Non-Functional Requirements follows, defining Performance Requirements, Accessibility Requirements, Security Requirements, and Software Quality Attributes. Finally, a section for Self-Adaptation which describes the thought process behind the design of the system.

2 Overall Description

2.1 Product Perspective

The Patient Information System that is being developed will be an extension of the already existing EHR system that is currently being used. The perspective for the solution is listed below:

- The product will have a dynamic and secure webpage that can be used by doctors, nurses, and receptionists, where they can safely log in
- The product will include a simple and streamlined lab report interface (LRI)
- The product will allow for users to be able to customize individual profiles so that they can be easily recognized when edits are made for patient records
- The product will allow for patient history to be organized and accessible so that it can be easily be viewed by users (with the use of keyboard shortcuts)

2.2 Product Features

The product will provide users with a more efficient and secure way of storing and accessing patient records within the application. This will be done by including user profiles for easy identification and a simple web interface for the user's to interact with. Along with the previously mentioned features, users will be able to view a patient's history and be able to navigate through the application with keyboard shortcuts.

2.3 User Classes and Characteristics

There are 3 different types of users for the system: doctors, nurses, and hospital administrators. Each will need to interact with the system in different ways.

2.3.1 Doctors

Doctors will need to read patient data to make diagnoses and administer treatment. It's important that the interface and system design facilitates treatment and allows the doctors to make informed medical decisions.

2.3.2 Nurses

Nurses will need to use the EHR system to care for patients. They should be able to clearly find a patient's treatment regime and be able to implement it according to the patient's needs.

2.3.3 Hospital Administrators

Hospital administrators will need to manage patient's information to assist with medical logistics. They won't need access to a patient's sensitive information and so proper access control should be implemented to ensure patient privacy.

2.4 Operating Environment

- Frontend - The frontend must be accessible from modern versions of common web browsers (Chrome, Safari, Firefox). The browsers must be able to run the site on Windows, OSX, and Linux.
- Backend - The backend must run on a remote server and be accessible by the frontend over the internet. The backend system should be containerized and hardware agnostic so that it can be deployed at different scales based on need.

2.5 Design and Implementation Constraints

Patient privacy isolation
The retrieval of patients' data must obtain the policy rules and permission if the data is in use outside the organization.

System Restrictions
The system must guarantee eventual consistency. It might take some time for users to view the latest patient personal information.

Usability restriction
Our web app is designed and developed for primarily-used browsers such as Google Chrome, Firefox and Safari. The less used browsers such Microsoft Edge and IE might have some issues like image misalignment, a blank page from loading or a slower loading speed.

Hardware Restrictions
The client asked for the system to be built on Desktop Computers and Laptops.

System Maintenance
The design company is responsible for maintaining and further developing the delivered system. Additional third party services may be able to be added to the product in updates.

2.6 Assumptions and Dependencies

2.6.1 Assumptions

External Server Can be Used
The service can be hosted on an external server. Both the backend server and frontend devices will have access to the internet.

Internet Connection
Equipment used in the project will have an internet function.

Design Team and Client Team availability
All design team members are available during the project period to complete tasks. When issues occur, the client team is available to help.

Scheduling
Every feature in the list below can be completed in time.

2.6.2 Dependencies

External server providers
External server providers may be used to host the backend servers and databases. The providers must be able to guarantee a high degree of availability and reliability.

3 System Features

3.1 Secure Login

3.1.1 Description and Priority

Medical staff will be able to login to the Patient Information System to view the patient data. Patient data will only be accessible once login is successful and profiles will be customizable to easily distinguish between other staff members. Users will need to login to the system to access any of the other features in the system so this feature is of **high priority**.

3.1.2 Functional Requirements

REQ-1-1: Each user must be able to create an account along with a username and password

REQ-1-2: Each user must have a permission level assigned to them.

REQ-1-3: Each user must be able to customize their profile with features such as a photo, name, and "about me" section.

REQ-1-4: The login page must have a field for the username and password.

REQ-1-5: The login page must have a "login" button that directs users to the home page once they have successfully logged in.

3.2 Patient List Interface (Home page, with list of patients)

3.2.1 Description and Priority

This interface will act as the home page for the application. Users will be directed here once they have logged in and will be able to view a table that has a list of patients that have attended the facility. This table will also include general information about the patients such as their names, date of birth, reasons for coming to the hospital and links to other pages that include more specific information about the patients. This feature is of **high priority** as it is the page users will be interacting with the most.

3.2.2 Functional Requirements

REQ-2-1: This interface must have a search bar which can be used to sort by data found in the table.

REQ-2-2: Users must have the option to change the amount of patients that can be seen in the table by using pagination.

REQ-2-3: The table must have general information on the patients such as their names or date of birth.

REQ-2-4: The table must have a link that redirects the user to a page specific to the patient that was clicked.

3.3 Patient Records Interface (PRI) (page that is specific to each patient)

3.3.1 Description and Priority

The PRI will be its own page that is specific and unique to each individual patient. This page can be accessed from the Patient List Interface, and will display relevant information about the selected patient. This patient information will be selectable under each of their respective tabs, such as Overview, Medical History, Current Diagnosis, etc. This is a *high priority* feature.

3.3.2 Functional Requirements

REQ-3-1: A user must be able to easily see an overview of the selected patient.

REQ-3-2: A user must be able to quickly return to the Patient List (home), select a different patient, and return back to the PRI page.

REQ-3-3: A user must be able to see a lab report with a timeline with the patient's history, visits, operations and medication prescription.

REQ-3-4: Primary patient information(name, date of birth and gender etc) must be displayed as it is stored in the system.

REQ-3-5: A note section must be added for the doctor's convenience.

REQ-3-6:A back button must be added for user going back to the home page.

4 External Interface Requirements

4.1 User Interfaces

The software will have various sub-systems with that a user will interact. The system first asks the user to type in the username and the password to get accessibility. After successfully logging into the software, the user will see the homepage that displays the list of patients. The columns of the list are first name, last name, date of birth and patient records. Each cell under the first name is clickable. After clicking on a field's first name the system will redirect the user to the patient record interface, where an individual patient is listed out there. The user can simply click on each session like overview, history and Diagnosis to view more detail. And A user can click on the Patient List Interface session from the top to go back home page.

4.2 Hardware Interfaces

The system application will run on a desktop in a modern web browser. This is for the reason that most if not all Medical Facilities have desktops that run Windows 10 or similar operating systems that have modern web browsers. Users will be able to interact with the web application via a Mouse and a Keyboard. In the future, if time permits, users will be able to navigate the web application explicitly with the keyboard using keyboard shortcuts. (Refer to the Self Adaptation section below). Both the front end and backend will require a constant internet connection to function properly.

4.3 Software Interfaces

Users will be able to interact with the web application through their desktop. Doctors and Nurses will be able to make changes within the system such as updating patient information, viewing patient information and informing patients of their upcoming appointments. Patients will be able to access pages specific to themselves that will display information on their past appointments, current medications and current health conditions.

4.4 Communications Interfaces

The Patient Information System will have a notification sub-system that will send out no-reply automatically generated emails that will be sent to patients as a reminder for their upcoming appointment. When a user logs in to the Patient Information System, the web application will communicate with the database and ensure that the user signing in is in fact who they say they are, ensuring that it is a Secure Sign In. As well as this, each of the separate systems of the Patient Information System, such as the Patient List Interface and Patient Record Interface will communicate with the database, exchanging information and updating the appropriate tables in the system.

5 Other Non-Functional Requirements

5.1 Availability Requirements

Availability requirements for the system require high uptime of operation. The system must have a high percentage of availability since the application will be used by all staff in the hospital which is operating 24/7. Thus, the availability of the application should be 99.99%. The application will implement an effective deployment strategy in order to reduce downtime. Redundancy of data will also be implemented so that if the application fails to retrieve data at one location, there is another place that data can be fetched from to prevent downtime.

5.2 Security Requirements

Since the application will be handling patient medical data, security of patient data is of utmost importance. Access to the application will be protected by a login system which will ask for the user's healthcare worker ID and password. All traffic in between the application interface and the database will be encrypted to keep records safe. To follow B.C. FOIPPA guidelines on handling medical data, the database will be hosted in Canada.

6.0 Self Adaptation

This section includes various Self Adaptation topics that were discussed within the team. This list is more of a "nice-to-have", and may or may not be implemented, but are important to note for future consideration.

Text to Speech: This feature would allow a user to have the ability to have text on the web page be read to them aloud.

Search Functionality: This feature would allow for a user to select the "Search" button and type in a keyword and have information that is unrelated to those keywords filtered out. This feature would be used in tables that contain large amounts of data.

Color Blindness Capability: This feature would allow for users to select a "Color Blind" option in the settings, that would allow for colors in the system application to be adjusted so that users with color blindness will still be able to see the colors. There would be a variety of different Color Blind options, for the differing types of Color Blindness that exist.

Keyboard Shortcuts: This feature would allow for a user to have the ability of navigating the web application with only a keyboard available.

Pagination: This feature would allow for a user to select the pagination for a table that may contain a large amount of data entries, to allow for easier visibility of the data.
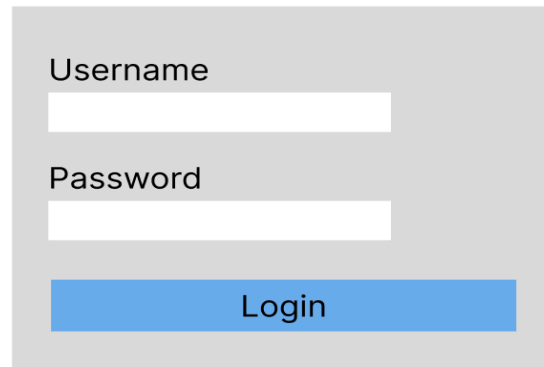
7.0 Technologies used

Front and Back End: We will be using Next.js, a full-stack React framework for the front and back end

Database: We will be using PostgreSQL for our database.

IDE: We will be using Visual Studio code as our IDE.

8.0 Web Application Mock-ups

8.1 EHR Login Page
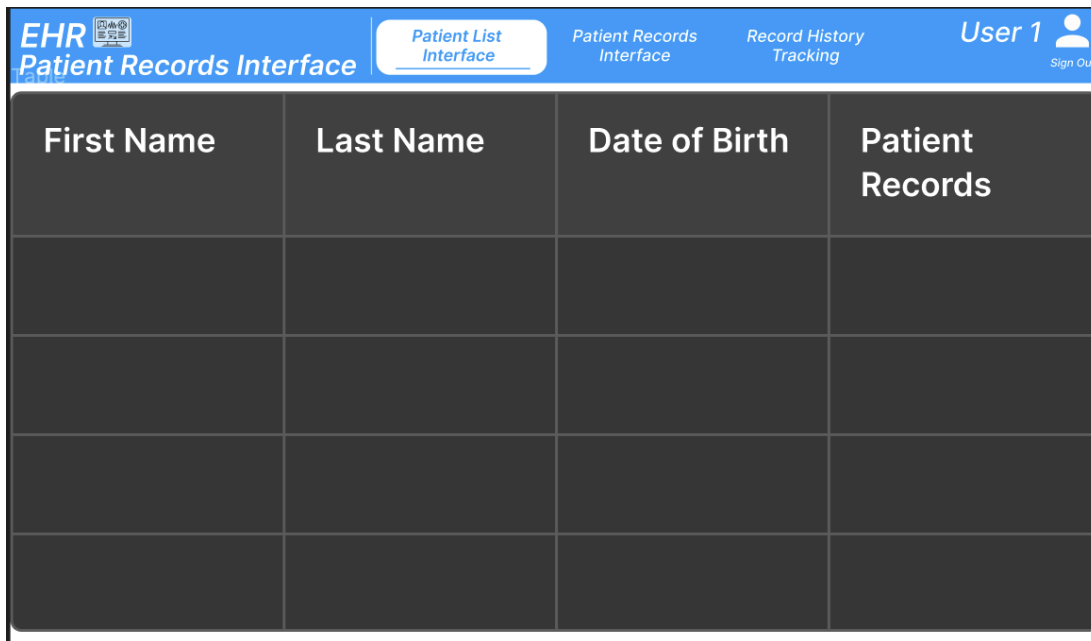
Figure 1, Login Page for EHR System

8.2 Patient List Interface (PLI)

Figure 2, Patient List Interface for EHR System

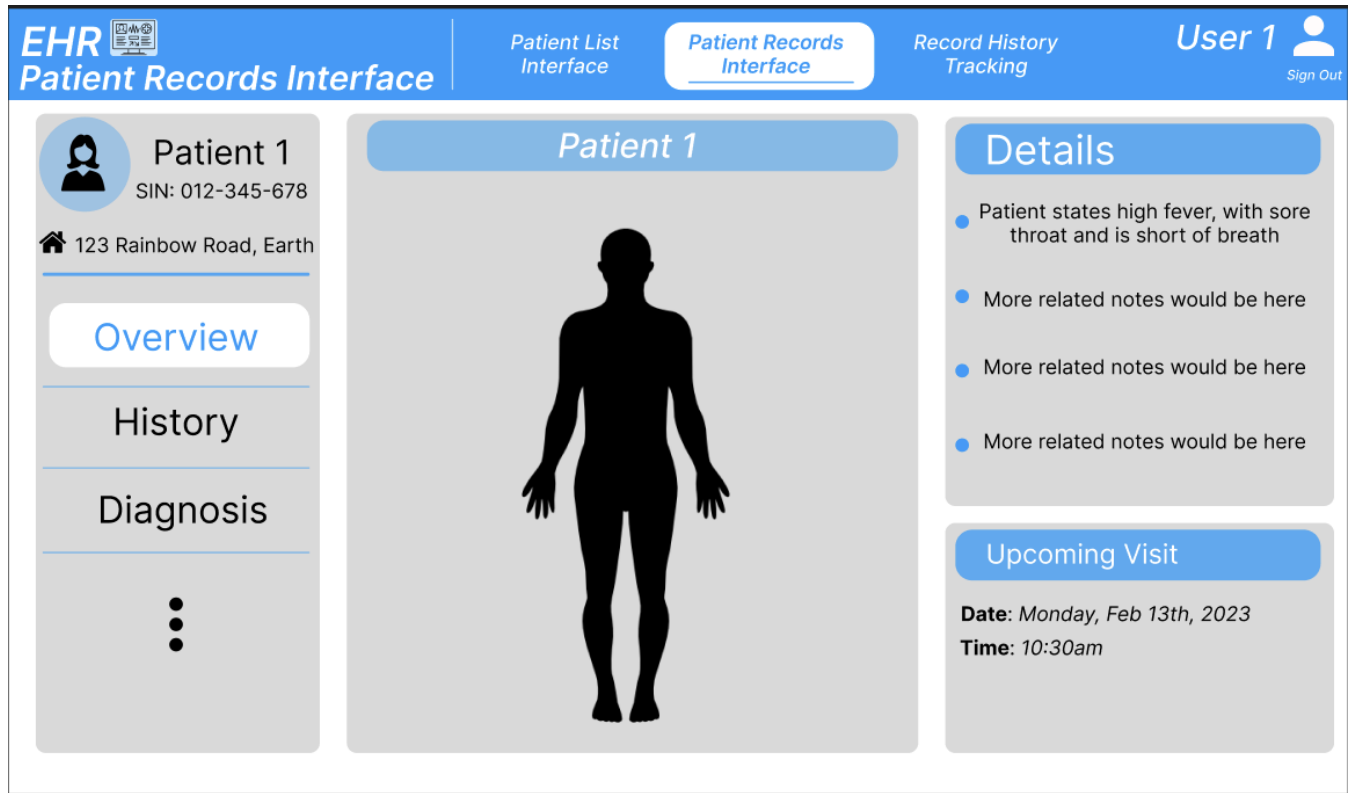## 8.3 Patient Record Interface (PRS)

Figure 3, Patient Record Interface for EHR System

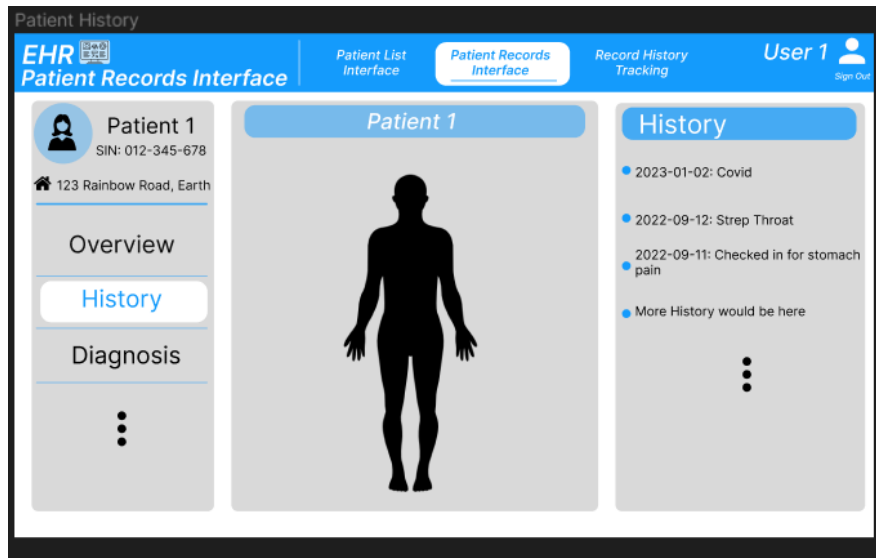## 8.3.1 Patient Record Interface (PRS) > History

Figure 4, Patient History Interface

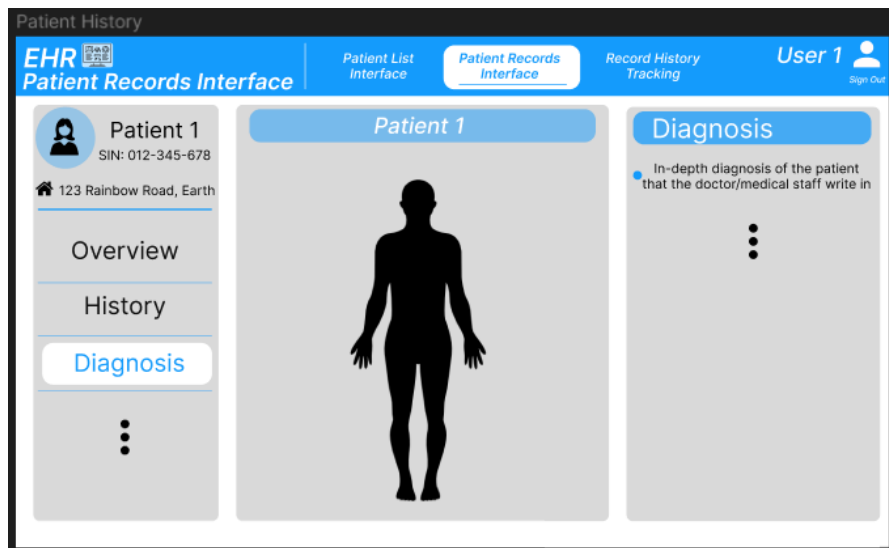## 8.3.2 Patient Record Interface (PRS) > Diagnosis

Figure 5, Patient Diagnosis Interface
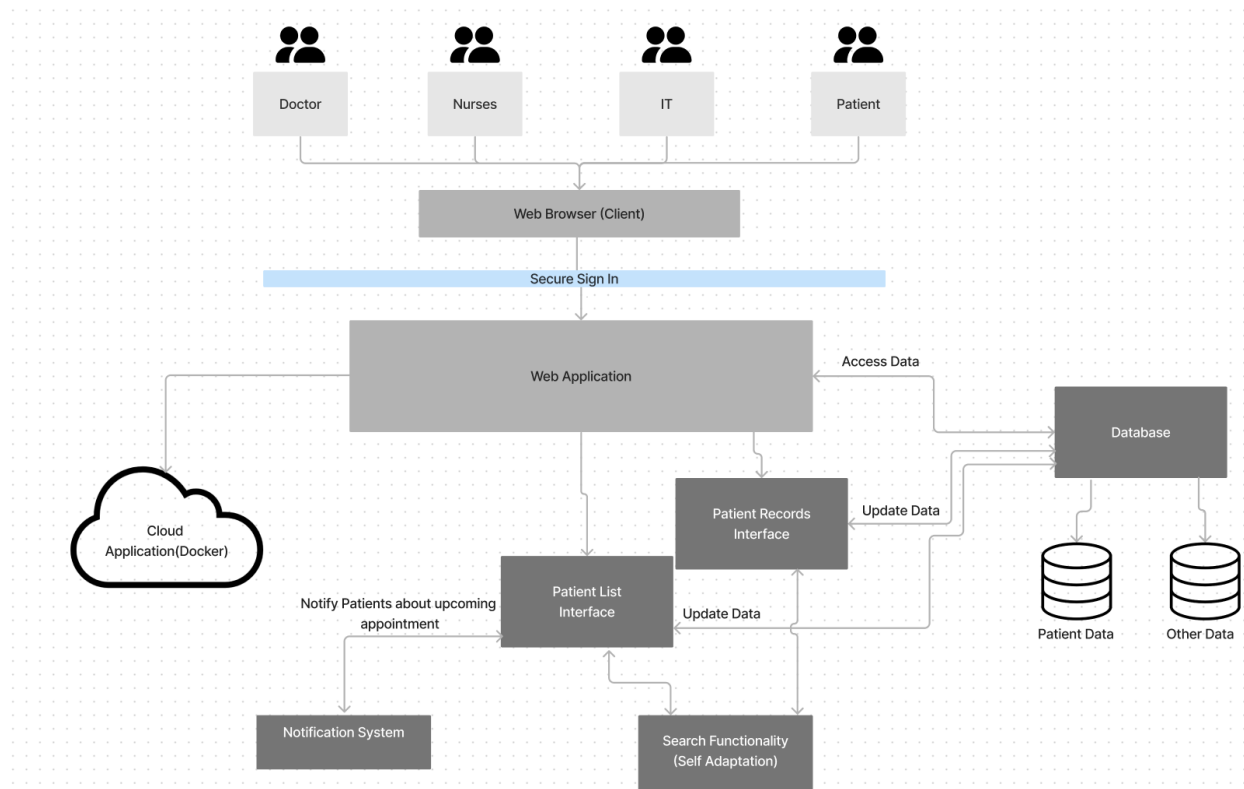
9.0 Architecture (Mental Model)

Figure 6, Architecture (Mental Model) for EHR System

In our architecture, it can be seen that there will be 4 users interacting with the system. Within the system, we will have a web page that allows the user to login and view a list of patients through the patient list interface. We will also have a patient records interface that will display information specific to each patient. These interfaces will retrieve information about patients from the database and display it to the user.

References

1. "Electronic Health Record System Case Study." Dribbble. [Access Online:Feb, 9.]
https://dribbble.com/shots/17950228-EHR-Electronic-Health-Record-System-Case-Study