\title{Software Requirements Specification}

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\date{\today}

\documentclass[12pt]{article}

\usepackage{placeins}

\usepackage{graphicx}

\usepackage{float}

\usepackage{tabularx}

\begin{document}

\maketitle

\section{Introduction}

\subsection{Purpose}

The purpose for this document is to present a complete description of the proposed mobile medical information application: MedConnect. This document will explain the purpose, functionality, and interfaces of the application, as well as the co nstraints under which it must operate and how it will react to stimuli. The intended audience for this SRS is the stakeholders associated with the product, including the developers, testers and users.

\subsection{Scope}

MedConnect will be a mobile medical records system to be used by doctors, nurses and patients. The system will be designed to maximize security for the purp ose of maintaining the confidentiality, integrity and availability of the information. The system will store data remotely in a digital format, reducing the need for paper usage to keep track of patient records. By maximizing the security and portability of user information, the system will meet the users' needs for privacy while remaining efficient.

The system will be used by doctors, nurses and patients to coordinate appointments and track relevant medical information about patients. MedConnect will allow authorised users to view, create, modify, and remove patients, charts and appointments based on permissions. The system will also include a feature for doctors to plot certain patient data. All data will be stored in an encrypted form. MedConnect will restrict users from accessing certain information based on user permissions.

\subsection{Definitions, Acronyms, Abbreviations}

\begin{tabularx}{\textwidth}{|l|X|} \hline

\textbf{Term} & \textbf{Definition} \\

\hline

Group & Identifier for the type of user (doctor, nurse, patient or administrator) \\ \hline

Patient Chart (PC) & A chronological written account of a patient's examination and treatment that includes the patient's medical history. \\ \hline

User & A doctor, nurse, patient or administrator who has an account with MedConnect \\ \hline

\end{tabularx}

\subsection{References}

\begingroup

\renewcommand{\section}[2]{}%

%\renewcommand{\chapter}[2]{}% for other classes

\begin{thebibliography}{}

\bibitem{MobileApp} EarthFlare (2013). \emph{Med Helper Pill Reminder (2.7.4)} [Mobile application software]. Retrieved from \emph{[https://play.google.com/store/apps/details?\\id=com.earthflare.android.medhelper.lite\&hl=en](https://play.google.com/store/apps/details?//id=com.earthflare.android.medhelper.lite/&hl=en)}

\bibitem{CMPARules} Canadian Medical Protective Association (2009). \emph{Electronic Records Handbook} [Policy]. Retrieved from \emph{http://www.cmpa-acpm.ca/cmpapd04/docs/submissions\\_papers/pdf/com\\_electronic\\_records\\_handbook-e.pdf}

\end{thebibliography}

\endgroup

\subsection{Overview}

The next section of this document describes the informal requirements and is used to establish a context for the technical requirements. Following, the functional and non-functional requirements of the product will be defined explicitly. These sections are written primarily for the developers and describe in technical terms the details of the functionality of the product. The appendix contains a signed document that confirms that contributions of each team member.

\section{Overall Description}

\subsection{Product Perspective}

MedConnect is an independent application and is completely self-contained. The application has similar user functionality for patients as the Android mobile a pplication ``Med Helper Pill Reminder" \cite{MobileApp}. However, the overall functionality of the system is original.

%\begin{figure}[!htbp]

%\begin{center}

%\includegraphics[height=2.5in,width=3in]{UseCaseDiagram.png}

%\caption{\small \sl A high level description of how the system will function.\label{fig:Stupendous}}

%\end{center}

%\end{figure}

%\FloatBarrier

\subsection{Product Functio ns}

Doctors will be able to modify and view PCs, and view appointments. Doctors will also be able to plot the height and weight of a patient over time. Nurses will be able to view PCs, and modify, add, and delete appointments for doctors and patients. Patients will be able to view appointments, prescriptions, reminders, and view, modify, add and delete notes. The administrator will be able to add, delete, and modify user profiles (such as contact information, username or password), but will have no access to any patient's medical information.

The product will also include a \textbf{bonus feature} that will allow doctors and nurses to retrieve information from another user by scanning a QR (quick response) code generated by the other user's phone. For example, if a doctor wishes to view or modify a PC, he or she could scan the patient's generated QR code instead of manually entering the patient's username. Likewise, if a nurse wishes to schedule an appointment for a doctor and a patient, the nurse could scan the QR codes generated by the doctor and the patient instead of manually entering their names. This feature is intended to reduce typing errors and make the application more user-friendly.

%\begin{figure}[!http]

%\begin{center}

%\includegraphics[height=2.8in,width=5.4in]{BlockDiagram3.png}

%\caption{\small \sl User functionality.\label{fig:Stupendous}}

%\end{center}

%\end{figure}

%\FloatBarrier

\subsection{User Characteristics}

MedConnect assumes the technical expertise associated with the group of the user. For example, if a user has doctor permissions, MedConnect assumes the user is a doctor. The only assumption about the education level of the user is that the user can understand english. MedConnect also assumes that users know how to operate Android devices.

\subsection{Constraints}

\begin{enumerate}

\item The product must be completed by December 3, 2013

\item The product must be compatible with Android OS

\item The product will be developed with a budget of \$0

\end{enumerate}

\subsection{Assumptions and Dependencies}

\begin{enumerate}

\item Each user has an internet connection during th e duration of their use of MedConnect

\item Each user has a device that runs Android OS

\item The system administrator is responsible for creating accounts for patients, nurses and doctors

\item The system administrator manually distributes the appropriate username and password combination to all users in the system

\item Users keep the same username and password for the life of the system

\item Doctors in the hospital are responsible for updating patient charts

\item Doctors update patient charts after every appointment

\item Nurses in the hospital are responsible for scheduling appointments for doctors and patients

\item Each user is a member of one and only one group

\item All users have unique usernames

\end{enumerate}

\subsection{Apportioning of Requirements}

Currently, all requirements of the system are included in the next two sections.

\section{Functional Requirements}

\subsection{Viewpoints}

\underline{\textbf{VP1. System}}

\subsubsection\*{BE1.1 User starts the application}

\begin{enumerate}

\item The system shall prompt the user for login credentials (username and password)

\end{enumerate}

\subsubsection\*{BE1.2 User provides login credentials and attempts to login}

\begin{enumerate}

\item The system shall check for a matching username and password pair in the system:

\begin{description}

\item[a)] If the pair exists, the system shall display the correct group specific interface

\item[b)] If the pair does not exist

\begin{description}

\item[i)] The system shall display an error message \item[ii)] The system shall prompt the user for new login credentials

\end{description}

\end{description}

\end{enumerate}

\subsubsection\*{BE1.3 User logs out}

\begin{enumerate}

\item The system shall close the interface

\item The system shall prompt the user for new login credentials

\end{enumerate}

\subsubsection\*{BE1.4 User closes the application}

\begin{enumerate}

\item The system shall be closed\\

\end{enumerate}

\subsubsection\*{BE1.5 User requests to view remote data}

\begin{enumerate}

\item The system shall retrieve the remote data

\item The system shall display the retrieved data

\end{enumerate}

\subsubsection\*{BE1.6 User requests to store or modify remote data }

\begin{enumerate}

\item The system shall store or update the remote data

\end{enumerate}

\underline{\textbf{VP2. System Administrator}}

\subsubsection\*{BE2.1 Administrator requests to add a user account}

\begin{enumerate}

\item The system shall prompt the administrator for the following account credentials:

\begin{itemize}

\item Username

\item Password

\item Group

\item Associated relationships (for example, a patient will have to specify their family doctor)

\item First Name

\item Last Name

\item Middle Name

\item Phone Number

\item Email

\item Address Line 1

\item Address Line 2

\item Postal Code

\item Emergency Contact Name

\item Emergency Contact Phone Number

\end{itemize}

\end{enumerate}

\subsubsection\*{BE2.2 Administrator supplies data to add a user account to the system}

\begin{enumerate}

\item The system shall check if the username already exists in the system

\begin{description}

\item[a)]If the username exists, the system shall prompt the administrator for a different username

\item[b)]If the username does not exist

\begin{description}

\item[i)] User credentials shall be added to the system. If the user is a member of the patient group, their PC will added to their family doctor's account.

\item[ii)] The system shall display the original administrator interface.

\end{description}

\end{description}

\end{enumerate}

\subsubsection\*{BE2.3 Administrator requests to delete a user account}

\begin{enumerate}

\item The system shall prompt the administrator for a username

\end{enumerate}

\subsubsection\*{BE2.4 Administrator supplies a username to delete a user account}

\begin{enumerate}

\item The system shall check if the username exists:

\begin{description}

\item[a)] If the username exists

\begin{description}

\item[i)] The user shall be deleted from the system

\item[ii)] The original administrator interface shall be displayed

\end{description}

\item[b)] If the username does not exist

\begin{description}

\item[i)] An error message shall be displayed

\item[ii)] The administrator shall be prompted for a different username

\end{description}

\end{description}

\end{enumerate}

\subsubsection\*{BE2.5 Administrator requests to modify a user account}

\begin{enumerate}

\item The system shall prompt the administrator for a username

\end{enumerate}

\subsubsection\*{BE2.6 Administrator supplies a username to modify a user}

\begin{enumerate}

\item The system shall check if the username already exists in the system

\begin{description}

\item[a)] If the username exists, the system shall prompt the administrator for changes to:

\begin{itemize}

\item Username

\item Password

\item Group

\item Associated relationships (for example, a patient will have to specify their family doctor)

\item First Name

\item Last Name

\item Middle Name

\item Phone Number

\item Email

\item Address Line 1

\item Address Line 2

\item Postal Code

\item Emergency Contact Name

\item Emergency Contact Phone Number

\end{itemize}

\item[b)] If the username does not exist

\begin{description}

\item[i)] The system shall display an error message

\item[ii)] The system shall prompt the administrator for a new username

\end{description}

\end{description}

\end{enumerate}

\subsubsection\*{BE2.7 Administrator provides new account information to modify a user}

\begin{enumerate}

\item The system shall change the account information of the user

\item The system shall display the original administrator interface\\

\end{enumerate}

\underline{\textbf{VP3. Doctor}}

\subsubsection\*{BE3.1 Doctor requests to modify a PC}

\begin{enumerate}

\item The system shall prompt the doctor for a patient username

\end{enumerate}

\subsubsection\*{BE3.2 Doctor provides a username to modify a PC}

\begin{enumerate}

\item The system shall check if the patient username exists in the system

\begin{description}

\item[a)] If the username exists, the doctor shall be prompted for the patient information that he or she wishes to modify (prescriptions, height, weight, illnesses)

\item[b)] If the username does not exist

\begin{description}

\item[i)] The system shall display an error message

\item[ii)] The system shall prompt the doctor for a new patient username

\end{description}

\end{description}

\end{enumerate}

\subsubsection\*{BE3.3 Doctor provides the patient information to modify a PC}

\begin{enumerate}

\item The system shall update the PC with the information provided

\item The system shall display the original doctor interface

\end{enumerate}

\subsubsection\*{BE3.4 Doctor requests to view a PC}

\begin{enumerate}

\item The system shall prompt the doctor to enter a patient username

\end{enumerate}

\subsubsection\*{BE3.5 Doctor provides the username to view a PC}

\begin{enumerate}

\item The system shall check if the patient username exists

\begin{description}

\item[a)] If the patient username exists, the system shall display the PC of the patient

\item[b)] If the patient username does not exist, the system shall prompt the doctor for a new patient username

\end{description}

\end{enumerate}

\subsubsection\*{BE3.6 Doctor requests to plot patient data}

\begin{enumerate}

\item The system shall prompt the doctor to enter a patient username

\end{enumerate}

\subsubsection\*{BE3.7 Doctor provides the username to plot patient data}

\begin{enumerate}

\item The system shall check if the patient username exists in the system

\begin{description}

\item[a)] If the username exists, the system shall generate a scatter plot of the patient’s height and weight over time

\item[b)] If the username does not exist, the system shall prompt the doctor to enter a new patient username

\end{description}

\end{enumerate}

\subsubsection\*{BE3.8 Doctor requests to view appointments}

\begin{enumerate}

\item The system shall display the times and locations of all of the doctor's future appointments

\end{enumerate}

\subsubsection\*{BE3.9 (Bonus) Doctor requests to generate a QR code}

\begin{enumerate}

\item The system shall generate a QR code containing the doctor's username

\end{enumerate}

\underline{\textbf{VP4. Nurse}}

\subsubsection\*{BE4.1 Nurse requests to book an appointment}

\begin{enumerate}

\item The system shall prompt the nurse for the patient username, the doctor username, the time of the appointment, the length of the appointment, the date of the appointment, and the location of the appointment

\end{enumerate}

\subsubsection\*{BE4.2 Nurse provides the required information to book an appointment}

\begin{enumerate}

\item The system shall check if the patient username and doctor username both exist, and that the time of the appointment is in the future

\begin{description}

\item[a)] If the usernames exist and the time of the appointment is in the future,

\begin{description} \item[i)] The appointment shall be added to the system

\item[ii)] The system shall display the original nurse interface

\end{description}

\item[b)] If either of the usernames do not exist or the time of the appointment is in the past

\begin{description}

\item[i)] The system shall display an error message

\item[ii)] The system shall prompt the nurse for new appointment information

\end{description}

\end{description}

\end{enumerate}

\subsubsection\*{BE4.3 Nurse requests to delete an appointment}

\begin{enumerate}

\item The system shall prompt the nurse for the doctor username and the time of the appointment

\end{enumerate}

\subsubsection\*{BE4.4 Nurse provides the information to delete an appointment}

\begin{enumerate}

\item The system shall check if the doctor username exists in the system and if the appointment exists in the system

\begin{description}

\item[a)] If the doctor username and the appointment exist in the system

\begin{description}

\item[i)] The appointment shall be removed from the system \item[ii)] The system shall display the original nurse interface

\end{description}

\item[b)] If the doctor username or the appointment do not exist in the system, the system shall prompt the nurse to enter new appointment information

\end{description}

\end{enumerate}

\subsubsection\*{BE4.5 Nurse requests to modify an appointment}

\begin{enumerate}

\item The system shall prompt the nurse for the doctor username and the time of the appointment

\end{enumerate}

\subsubsection\*{BE4.6 Nurse provides the information to modify an appointment}

\begin{enumerate}

\item The system shall check if the doctor username exists in the system and if the appointment exists in the system

\begin{description}

\item[a)] If the doctor username and the appointment exist in the system, the system shall prompt the nurse to enter new information (time, date, length, location, doctor, patient) for the appointment

\item[b)] If the username of the doctor or the appointment do not exist in the system, the system shall prompt the nurse to enter new appointment information

\end{description}

\end{enumerate}

\subsubsection\*{BE4.7 Nurse provides new information for modified appointment}

\begin{enumerate}

\item The system shall check if the new time is in the future

\begin{description}

\item[a)] If the time is in the future,

\begin{description}

\item[i)] The information for the appointment shall be updated by the system

\item[ii)] The system shall display the original nurse interface

\end{description}

\item[b)] If the time is in the past, the system shall prompt the nurse to enter a new time

\end{description}

\end{enumerate}

\subsubsection\*{BE4.8 Nurse requests to view a PC}

\begin{enumerate}

\item The system shall prompt the nurse to enter a patient username

\end{enumerate}

\subsubsection\*{BE4.9 Nurse provides the username to view a PC}

\begin{enumerate}

\item The system shall check if the patient username exists

\begin{description}

\item[a)] If the patient username exists, the system shall display the PC of the patient

\item[b)] If the patient username does not exist, the system shall prompt the nurse for a new patient username

\end{description}

\end{enumerate}

\underline{\\ \textbf{VP5. Patient}}

\subsubsection\*{BE5.1 Patient requests to view appointments}

\begin{enumerate}

\item The system shall display the times and locations of all of the patient's appointments

\end{enumerate}

\subsubsection\*{BE5.2 Patient requests to view prescriptions}

\begin{enumerate}

\item The system shall display all of the patient's current prescriptions

\end{enumerate}

\subsubsection\*{BE5.3 Patient requests to view reminders}

\begin{enumerate}

\item The system shall display all of the patient's prescriptions that need refilling and appointments that are scheduled for the next 24 hours after the patient made the request to view reminders

\end{enumerate}

\subsubsection\*{BE5.4 Patient requests to view notes}

\begin{enumerate}

\item The system shall display all of the patient's notes

\end{enumerate}

\subsubsection\*{BE5.5 Patient requests to add notes}

\begin{enumerate}

\item The system shall prompt the patient to enter a new note

\end{enumerate}

\subsubsection\*{BE5.6 Patient enters a new note to add}

\begin{enumerate}

\item The note shall be added to the system

\end{enumerate}

\subsubsection\*{BE5.7 Patient requests to delete a note}

\begin{enumerate}

\item The system shall prompt the patient to select a note

\end{enumerate}

\subsubsection\*{BE5.8 Patient selects a note to delete}

\begin{enumerate}

\item The note shall be deleted from the system

\end{enumerate}

\subsubsection\*{BE5.9 (Bonus) Patient requests to generate a QR code}

\begin{enumerate}

\item The system shall generate a QR code containing the patient's username

\end{enumerate}

\underline{\\ \textbf{VP6. Security}}

\subsubsection\*{BE6.1 User requests to view remote data}

\begin{enumerate}

\item The system shall decrypt the remote data

\end{enumerate}

\subsubsection\*{BE6.2 User requests to store or modify remote data }

\begin{enumerate}

\item The system shall encrypt the new or updated data

\end{enumerate}

\section{Non-Functional Requirements}

\subsection{Look and Feel Requirements}

\subsubsection{Appearance Requirements}

\begin{enumerate}

\item The system shall have a simple and professional interface

\item The system shall have screen layouts that shall consist of default Android SDK colours

\item The system shall have a vibrant colour palette used to attract attention to important details, while still looking and feeling professional

\item The system shall have textual and graphical displays that shall be featured to accommodate different users

\end{enumerate}

\subsubsection{Style Requirements}

\begin{enumerate}

\item The system shall incorporate an appropriate icon of the team logo

\end{enumerate}

\subsection{Usability and Humanity}

\subsubsection{Ease of Use Requirements}

\begin{enumerate}

\item The system shall be easy to use on the first attempt by all users

\end{enumerate}

\subsubsection{Personalization and Internationalization Requirements}

Not applicable

\subsubsection{Learning Requirements}

\begin{enumerate}

\item The system shall include a user manual that provides instructions for using the system correctly

\end{enumerate}

\subsubsection{Understandability and Politeness Requirements}

Not applicable

\subsubsection{Accessibility Requirements}

Not applicable

\subsection{Performance Requirements}

\subsubsection{Speed and Latency Requirements}

\begin{enumerate}

\item The system shall load and store data in less than 5 seconds

\item The system shall transition between interfaces in less than 0.5 seconds

\item The system shall load within 5 seconds of it being initiated by user

\end{enumerate}

\subsubsection{Safety Critical Requirements}

\begin{enumerate}

\item The system shall distinguish between patients records by referencing unique usernames to avoid mixing patient records

\end{enumerate}

\subsubsection{Accuracy Requirements}

\begin{enumerate}

\item The system shall only make appointment dates available if and only if they are actually available.

\item The system shall fetch correct patient data when a user requests data for a certain patient

\end{enumerate}

\subsubsection{Availability Requirements}

\begin{enumerate}

\item The system shall be available at all times from December 3, 2013 to December 24, 2013, assuming the remote data repository remains connected

\end{enumerate}

\subsubsection{Robustness Requirements}

\begin{enumerate}

\item The system shall ensure that data passed through is either valid data or no data is passed through at all if there is a network error during data retrieval or storage.

\end{enumerate}

\subsubsection{Capacity Requirements}

\begin{enumerate}

\item The system shall be able to handle at least 25 Patients, 10 Doctors, 4 Nurses and 1 System Administrator

\item The system shall be able to accommodate data transfer from different users simultaneously

\end{enumerate}

\subsubsection{Scalability Requirements}

\begin{enumerate}

\item The system shall have a data source that shall be scalable in order to handle 500 new users

\end{enumerate}

\subsubsection{Longevity Requirements}

Not applicable

\subsection{Operational and Environmental Requirements}

\subsubsection{Expected Physical Environment Requirements}

\begin{enumerate}

\item The system shall not interfere with any other electronic medical devices

\end{enumerate}

\subsubsection{Requirements for Interfacing with Adjacent Systems}

Not applicable

\subsubsection{Productization Requirements}

\begin{enumerate}

\item The system shall be downloadable from the Google Play Store

\end{enumerate}

\subsubsection{Release Requirements}

Not applicable

\subsection{Maintainability and Support Requirements}

\subsubsection{Maintenance Requirements}

Not applicable

\subsubsection{Supportability Requirements}

Not applicable

\subsubsection{Adaptability Requirements}

\begin{enumerate}

\item The system shall be usable by different versions of the Android OS.

\end{enumerate}

\subsection{Security Requirements}

\subsubsection{Access Requirements}

\begin{enumerate}

\item The system shall ensure that access permissions for each user shall only be changed by the system administrator

\end{enumerate}

\subsubsection{Integrity Requirements}

Not applicable

\subsubsection{Privacy Requirements}

\begin{enumerate}

\item The system shall ensure that patient information shall only be viewable by those authorized to do so

\end{enumerate}

\subsubsection{Audit Requirements}

Not applicable

\subsubsection{Immunity Requirements}

Not applicable

\subsection{Cultural and Political Requirements}

\subsubsection{Cultural Requirements}

\begin{enumerate}

\item The system shall use Canadian English spelling.

\end{enumerate}

\subsubsection{Political Requirements}

Not applicable

\subsection{Legal Requirements}

\subsubsection{Compliance Requirements}

\begin{enumerate}

\item The system shall allow patients to examine, record, and copy all of their information in compliance to the CMPA’s rules and regulations \cite{CMPARules} for patient access.

\item If a patient record is to be transferred to another physician, then the product shall conform to the CMPA’s rules and regulations for transferring patient files.

\end{enumerate}

\subsubsection{Standards Requirements}

\begin{enumerate}

\item The system shall conform to the CMPA’s patient record standards.

\end{enumerate}

\newpage

\appendix{\huge{Appendix: Contributions}}\\

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\underline{\textbf{\\Work Objectives:}}\\

\begin{enumerate}

\item System Functionality (Figuring out how the system will work)

\item \LaTeX Formatting

\item Document Editing

\item Section 1: Introduction

\item Section 2: Overall Description

\item Section 3: Functional Requirements

\item Section 4: Non Functional Requirements-

\begin{itemize}

\item Security

\item Maintainability

\item Usability

\item Look and Feel

\item Performance

\item Operational

\item Legal

\item Cultural

\end{itemize}

\end{enumerate}

\underline{\textbf{Member Contributions:}}\\

\\

\textbf{Matt Paine:} System functionality (14\%), Introduction (14\%), Overall Description (15\%), Functional Requirements (15\%), Security (100\%), Legal (75\%), Operational (25\%), Editing (20\%).\\ \\

\textbf{Phil Gabardo:} – System functionality (14\%), Introduction (30\%), Overall Description (40\%) Functional Requirements (25\%), Operational (50\%), Cultural (100\%), Editing (20\%), \LaTeX Formatting (100\%)\\ \\

\textbf{Jeff Buscarino:} – System functionality (14\%), Introduction (10\%), Overall Description (10\%) Functional Requirements (5\%), Look and Feel (100\%), Usability (75\%)\\ \\

\textbf{Josh Barkovic:} – System functionality (14\%), Introduction (14\%), Overall Description (10\%) Functional Requirements (25\%), Maintainability (100\%), Editing (20\%)\\ \\

\textbf{Jonathan Beadle:} – System functionality (14\%), Introduction (13\%), Overall Description (10\%) Functional Requirements (10\%), Legal (25\%), Operational (25\%), Usability (25\%), Editing (20\%)\\ \\

\textbf{Shane Noormohamed:} – System functionality (14\%), Introduction (14\%), Functional Requirements (15\%), Overall Description (10\%), Performance (100\%), Editing (20\%)\\ \\

\textbf{Thomas Woudenberg:} – System functionality (14\%), Introduction (5\%), Functional Requirements (5\%), Overall Description (5\%),

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Note:

The amount of entries in each member’s contribution list is not necessarily a good depiction of how much work they have completed. As some work objectives were much larger than others.\newline

Signatures:

\end{document}