Software Requirements Specification

for

MediCare

Version 1.0 approved

Prepared by Team Beta

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Revision History

Name	Date	Reason For Changes	Version
NAN WENTAI	4/11/2021	Writing introduction, overall description, and system features.	1.1
WAN YAXIN	5/11/2021	Writing external interface requirements and other non-functional requirements.	1.2
WANG YIYIN, GAO SITIAN, GUPTA AMEESHI, NAN WENTAI, WAN YAXIN	6/11/2021	Modification of the entire document	1.3

1. Introduction

1.1 Purpose

This document specifies the requirements of the android application MediCare. External interface requirements, system features and other non-functional requirements will be explained in detail.

1.2 Document Conventions

Title - font: Times New Roman, size: 18, style: Bold
Subtitle - font: Times New Roman, size: 14, style: Bold
Text - font: Times New Roman, size: 12, style: Normal

1.3 Intended Audience and Reading Suggestions

- This document is intended for:
    - Software developers and project managers who are interested in working on the further development of this project.
    - Users who want to use the healthcare functions provided by this app.
    - Marketing staff who want to promote this app to the general public.
- It is suggested that you read this document in the order that it is organised.

1.4 Product Scope

MediCare is an android mobile application for users to search for clinics in Singapore on the map, search for medicine registered in the Singapore Health Science Authority, and set personalised reminders for taking medicine. The purpose of this application is to provide an integrated platform for Singapore residents to access healthcare information quickly and remind the user to take medicine.

1.5 References

https://developer.android.com/
https://data.gov.sg/dataset/listing-of-registered-therapeutic-products
https://data.gov.sg/dataset/chas-clinics
https://firebase.google.com/docs/auth

2. Overall Description

2.1 Product Perspective

MediCare is a newly developed android mobile application for users to search for healthcare information and set reminders for taking medicine.

2.2 Product Functions

Medicare's core functionalities include:

- Searching for nearby clinics
- Viewing details of clinics
- Rating clinics
- Searching for medicine
- Viewing details of medicine
- Creating and editing medicine reminders
- Specifying medicine name, time and frequency of the medicine reminder
- Creating and logging in using a Medicare account

2.3 User Classes and Characteristics

Our users cover people with health issues that desire a convenient all-in-one tool that helps them to source the help they need with respect to getting in touch with doctors and clinics, as well as manage their self-medication.

1. Busy adults
2. Elderly and their caretakers
3. People with disabilities

4. People with health problems

2.4 Operating Environment

1. The application runs on mobile phones with Android 10 and above installed.
2. The application utilizes the Google Maps API to access google maps.
3. The application utilizes clinic and medicine data from 2 Data.gov APIs.
4. Clinic rating and user generated data are stored in the database provided by Firebase.

2.5 Design and Implementation Constraints

1. The clinic and medicine information may not be up-to-date since they are retrieved from the APIs provided by data.gov.sg, which were last updated a few years ago.
2. Considering that storing data locally requires a large memory, all data, except those related to medicine reminders, are stored in a cloud database called Firebase.
3. In order to ensure that the local data is in sync with the data in the APIs, data refresh is carried out every time the app is started anew, which results in longer loading times.

2.6 Assumptions and Dependencies

1. Assumptions

1.1. The app runs on a phone with Android 10 or higher versions installed.
1.2. The phone has enough memory to install the app.
1.3. Stable network connection is established while running the app.
1.4. The app is given permission to access the user location and phone storage.

2. Dependencies

1.1. The reliability of the medicine and clinic information depends on the API provided by Data.gov.sg.

1.2. The app depends on the related government regulations. Changes may be made if related policies are changed.

3. External Interface Requirements

3.1 User Interfaces

The user interface is designed based on Ben Shneiderman's Eight Golden Rules of Interface Design, which will be demonstrated briefly with sample screen images in this section.

3.1.1 Strive for consistency

Consistency is applied by standardizing how the information is conveyed to the user. By using consistent font type and standard buttons, users are able to apply knowledge from one pattern to another rather than learning new representations of the same actions.

3.1.2 Enable to use shortcuts

Our app supports shortcut sets pre-settled in Android. Users are able to use various keyboard shortcuts, such as extended press for copying/pasting. As the users become more experienced, they can operate the user interface easily to achieve their goals.

3.1.3 Offer Informative feedback

Users are able to know where they are at and what is going on concurrently, with interactive buttons indicating changes made by the users. For example, when a user zooms in the map inside the clinic search function, he/she can see the visual map physically zoom according to his/her action.

3.1.4 Design dialogs to yield closure

A condensed message should be displayed when users finish an activity. For example, "Successfully logged out!" will be displayed on the screen if the user chooses to log out on the profile page.

3.1.5 Offer error handling

Human readable feedback is given within a reasonable time when the system receives an invalid input. Users should be able to recognize the error they made quickly and fix it after receiving the error message from the system. For example, when user is setting the password unsuccessfully, he/she will know why the password is invalid immediately after receiving the error message (e.g. “The length of the password should not be less than 6!”).

3.1.6 Permit easy reversal of actions

The users are able to reverse their actions, which relieves users as they are allowed to make changes on their actions. For example, users can delete a medicine reminder after creating one.

Another example is that users can cancel to create a medicine reminder at any point they want in the “Add medicine reminder” page.

3.1.7 Keep users in control

Our system allows the users to be the initiators of actions. They are in full control of all activities inside the app. The main functions are clinic search, medicine search and setting medicine reminder.

3.1.8 Reduce short-term memory load

The user interface is simple and all pages maintain consistency. The homepage contains 3 buttons with each one indicating one main functionalities. Users are able to jump from main page to the function page easily by clicking the button respectively. The button style remains the same and every page has a return bar linking to the homepage. This allows the reduction of short term memory load and uses our app easily.

3.2 Hardware Interfaces

3.2.1 Supported device types

Our application is mainly supported on Android mobile phone devices with a stable internet connection.

3.3 Software Interfaces

3.3.1 Databases Server

Our application uses Firebase to achieve Cloud computing. Firebase is a complete package of products that manages and synchronizes all data real-time in the database. Those data include users' ratings on clinic and user information such as password and username. We can create our application without a backend server or hardware issues.

3.3.2 External APIs

Our application uses CHAS Clinic API and Listing of Registered Therapeutic Products API from data.gov.sg to retrieve locations of clinics with community health assist scheme and medicine information to serve our main functionalities.

3.4 Communications Interfaces

3.4.1 Communication Standards

Our communication protocol depends on the WIFI and the internet protocol (IP). HTTP connection is used to retrieve data from Google Maps API and APIs from Data.gov.sg.

4. System Features

4.1 User sign up

4.1.1 Description and Priority

The feature allows a new user to create their own account.

Priority: Medium

4.1.2 Stimulus/Response Sequences

1. The user clicks ‘create’ on the launch page.
1. The user keys in the user name.
2. The user keys in the email they want to use for account registration.
3. The user sets the password for their new account and re-enters their password to confirm it.
4. A new account is created after clicking the “Register” button.

4.1.3 Functional Requirements

REQ-1: The app must require the user to key in their username.

- If the user does not enter the username, an error message “Username is required” will be displayed.

REQ-2: The app must require the user to enter their personal email that will be linked with the account.

- If the user does not key in the email, an error message “Email is required” will be displayed.
- If the entered email does not have the correct format, an error message “Error! The email is badly formatted” will be displayed.
- If the entered email has already been used by another account, an error message “Error! The email is already in use by another account” will be displayed.

REQ-3: The app must require the user to set the password and confirm it by re-entering the password.

- If the password is less than 6 characters, an error message “Password must be at least 6 characters” will be displayed.
- If the re-entered password does not match the previously entered password, an error message “Two passwords are not identical” will be displayed.
- The app must prompt the message “Success registration!” if the registration is successful.

4.2 User login

4.2.1 Description and Priority

The feature allows a new user to login to their own account.

Priority: High

4.2.2 Stimulus/Response Sequences

1. The user enters their email used for registration.
2. The user enters the password.
3. The user logs in to their own account after clicking the “Login” button.

4.2.3 Functional Requirements

REQ-1: The app must require the user to enter their registered email.

- If the user does not key in the email, an error message “Email is required” will be displayed.
- If the entered email does not have the correct format, an error message “Error! The email is badly formatted” will be displayed.
- If the email does not exist in the database, an error message “Error! There is no user record corresponding to this identifier” will be displayed.

REQ-2: The app must require the user to enter the password.

- If the password is less than 6 characters, an error message “Password must be at least 6 characters” will be displayed.

- If the password is wrong or invalid, an error message "Error! The password is invalid or the user does not have a password" will be displayed.

4.3 Change password

4.3.1 Description and Priority

The feature allows the user to reset the password for their account.

Priority: Low

4.3.2 Stimulus/Response Sequences

1. The user clicks on 'Forgot your password?' on the login page or 'Reset password' on the user profile page.
2. The user keys in the email address they used for account registration
3. The user clicks the 'Send' button.
4. A verification email with a verification link will be sent to the respective email.
5. The user clicks the verification link they have received.
6. A password reset dialogue will be prompted for the user to set a new password.
7. Password is reset successfully.

4.3.3 Functional Requirements

REQ-1: The app must require the user to enter their email.

- If the user does not key in the email, an error message "Email is required" will be displayed.
- If the entered email does not have the correct format, an error message "Error! The email is badly formatted" will be displayed.
- If the email does not exist in the database, an error message "Error! There is no user record corresponding to this identifier" will be displayed.

4.4 Search for Medicine

4.4.1 Description and Priority

Users search for medicine by medicine name, dosage form, ingredients or manufacturer.

Priority: High

This function grants the user knowledge to make decisions on self medication.

4.4.2 Stimulus/Response Sequences

1. User clicks on the medicine search bar and types in keywords associated with the target medicine.
2. A list of medicine in order of relevance is returned based on the search requirements.

4.4.3 Functional Requirements

REQ-1: The app must allow the user to search for medicine based on the medicine name, dosage form, ingredients and manufacturer.

- If no results are found, The message “No result found” will be displayed in place of the search results.
- The app must display the search results in order of search relevance.

4.5 Select Medicine

4.5.1 Description and Priority

User selects medicine from search results.

Priority: High

This function shows the user more information about the selected medicine.

4.5.2 Stimulus/Response Sequences

1. The user selects a medicine from the list of search results.
2. The details of the medicine are displayed.
3. The user presses a back button to go back to the search results.

4.5.3 Functional Requirements

REQ-1: When selected, the app must display the medicine's medicine name, dosage form, ingredients or manufacturer.
REQ-2: If any field of the medicine's information is incomplete, "No information found" will be displayed in the relevant text field.

4.6 Search for Clinic

4.6.1 Description and Priority

Users search for clinics by clinic name, address or postal code.
Priority: High

4.6.2 Stimulus/Response Sequences

1. User clicks on the clinic search bar and enters keywords associated with the target clinic.
2. If results are found, the results will be displayed according to string-matching relevance.

4.6.3 Functional Requirements

REQ-1: The app must allow the user to search for a clinic based on the name of the clinic and the address of the clinic.

- The app must allow the user to search for a clinic by part of the name of the clinic.
- The app must allow the user to search for a clinic by part of the address of the clinic.
- The app must display a list of results that can be sorted by the following characteristics:
  - Distance from the user (in ascending order)
  - Name of the clinic (in alphabetical order)
  - Users' rating (in descending order)
- The app must display a message if no results are found

4.7 View Nearby Clinics

4.7.1 Description and Priority

User searches for nearby clinics with respect to the user's current location.
Priority: Medium

4.7.2 Stimulus/Response Sequences

1. User taps on the "Nearby Clinics" button on the screen.
2. The app will present a prompt in order to request permission to access the user's current location.
3. If the user grants the permission, the location provided by the user's mobile phone will be set as the user's current location.
4. If the user does not grant the permission, the location will be set to default location.
5. The map zooms to the user's current location.

4.7.3 Functional Requirements

REQ-1: The app must present a runtime permission prompt in order to request permission to access the user's location when the user search for nearby clinics
If the user has granted the permission:

- The app must get the user's location and zoom in to the user's current location.

If the user has denied the access:

- The app must display a map on which all clinics are denoted with their name and a marker.

4.8 View Clinic List

4.8.1 Description and Priority

The user can view a list of relevant clinics based on the search input.
Priority: High

4.8.2 Stimulus/Response Sequences

1. User enters text in the searching bar.
2. The results will be sorted according to relevance.
3. After clicking a clinic in the list, the user will be directed to the information page of that clinic.

4.8.3 Functional Requirements

REQ-1:The app must display all results relevant to the user's input. A result should display the clinic's name, address, rating and rating count.

4.9 View Map

4.9.1 Description and Priority

Clinics' locations are denoted on the map with red points.
Priority: High

4.9.2 Stimulus/Response Sequences

1. Users are able to pan around and zoom in or out of the map to view the location of a clinic.
2. Users will be able to view information of a clinic after tapping on a red point.

4.9.3 Functional Requirements

REQ-1: The app must allow the user to view a clinic by

- Moving around the map
- Zooming in or out of the map
- Scrolling through the list of clinics

4.10 View Clinic's information

4.10.1 Description and Priority

The user is able to see detailed information about a clinic.

Priority: Very high

4.10.2 Stimulus/Response Sequences

1. The name, address, contact number, operating hours, official website (if any) and average rating of a selected clinic will be displayed to the user.

4.10.3 Functional Requirements

QER-1: The app must display the information of a clinic when the clinic icon is clicked on the map or on the list, and the information shall include:

- Name of the clinic
- Full address of the clinic
- Contact number
- Operating hours
- Official website (if any)
- The average user rating.

4.11 Submit Rating

4.11.1 Description and Priority

The user is able to submit ratings for clinics.
Priority: Medium

4.11.2 Stimulus/Response Sequences

1. User rates the clinic out of five starts to indicate his or her satisfaction.
2. User taps on the ‘Submit a Rating’ button on the clinic information page.

4.11.3 Functional Requirements

REQ-1: The app must allow the user to submit a rating on the service and environment of the clinic.

4.12 Create medicine reminder

4.12.1 Description and Priority

The user can set reminders for what time to take medicine.

Priority: High. Reminds users about the specific time of taking medicine to ensure the dose is not missed.

4.12.2 Stimulus/Response Sequences

1. User enters the name of medicine
2. User then sets the time for taking the medicine and specifies which days in the week to take the medicine.
3. User sets the dosage quantity and dosage form.
4. User click “finish” button to finish setting the reminder

4.12.3 Functional Requirements

REQ-1: The app must allow the user to set the reminder of taking the medicine based on the following characteristics:

- The medicine name
- The medicine dose(s) type
- The medicine dosage
- The specific weekdays of taking the medicine
- The specific time of taking the medicine

4.13 Delete medicine reminder

4.13.1 Description and Priority

Users can delete medicine reminders at any point they want

Priority: High since the function should follow the “keep user in control” from Ben Shneiderman’s Eight Golden Rules of Interface Design

4.13.2 Stimulus/Response Sequences

1. User chooses the medicine reminder that he/she wants to delete
2. User clicks on the “Delete” icon on the medicine reminder.

4.13.3 Functional Requirements

REQ-1: The delete button must be displayed on each medicine reminder

REQ-2: The medicine reminder must disappear after user deleted it

4.14 Choose Calendar Date to View Reminder List

4.14.1 Description and Priority

The user can view the reminder list based on which date he/she chooses.
Priority: Medium.

4.14.2 Stimulus/Response Sequences

1. User choose the expand calendar view
2. User clicks on the specific day on the calendar
3. List of medicine reminders are shown based on the day that user chooses

4.14.3 Functional Requirements

REQ-1: The expected medicine reminder list must be displayed according to the date chosen on the calendar. Each medicine reminder should contain the following information:

- The medicine name
- The medicine dose(s) type
- The medicine dosage
- The time to take the medicine

4.15 User profile

4.15.1 Description and Priority

The user can view the profile information, reset password or log out on this page.
Priority: Low

4.15.2 Stimulus/Response Sequences

User clicks the profile button on the top right corner of the main page.
The user views their profile information.

4.15.3 Functional Requirements

1. The app must allow the user to view the profile information.
2. The app must allow the user to go to the reset password UI if the user clicks the "Reset Password" button.
3. The app must allow the user to log out if the user clicks "Log out" button.

4.16 Main Menu

4.16.1 Description and Priority

The user can access main functionalities of the app, namely, search for clinics, search for medicine, manage medicine reminders and user profile directly from the main menu when they first open the app.
Priority: High

4.16.2 Stimulus/Response Sequences

1. The user logs in successfully to their account.
2. The user will be directed to the main menu.

4.16.3 Functional Requirements

REQ-1: The app must have a main menu page that contains buttons to allow the user to access all the other main functionalities of the app:

- Set and manage the medicine reminder
- Searching for clinics
- Searching for medicine information
- Managing the user's account

REQ-2: The app must direct the user to the corresponding page of a function when the user taps on the button of the function

5. Other Nonfunctional Requirements

5.1 Performance Requirements

1. The app requires a stable network connection to ensure good performance.
2. The app must be able to fetch the location of clinics within 1 seconds when the user taps the button on the map.
3. The app must be able to fetch the list of registered therapeutic products within 5 seconds when the user taps the button on medicine search.
4. On opening the app, the app must be able to display the first page within 5 seconds.
5. The app must be able to notify the user to take the medicine at expected time.
6. The app must be able to send a "change password" link to the user email within 1 miniute.

5.2 Safety Requirements

1. The app must be able to retain user data for at least 1 year.
2. The app must have a low crash rate.

5.3 Security Requirements

1. The app must only be used and accessed by registered users.
2. The application must protect the user's personal information from unauthorized access.
    - In order to achieve that, the application uses the authentication system provided by Firebase.
3. The app must only access the data which is granted access permission by the user.

5.4 Software Quality Attributes

1. **Availability**

   1.1. The app must be available on Android mobile operating systems that have android 10 or higher versions.

1.2. The system of the app shall be responsive to the user within 10 seconds for 95% of the time that it is requested. It shall be responsive to the user within 20 seconds the rest of the time.

2. **Maintainability**

2.1. The app must be able to update the clinic information on the map via API.

2.2. The system of the app shall not be shut down for maintenance more than once in a 24-hour period.

2.3. The app developers must troubleshoot problems faced by the users every week.

2.4. The app developers must maintain and update the app on a monthly basis.

3. **Reliability**

3.1. The app must be able to carry out failure-free operations.

4. **Usability**

4.1. The new product must be easy to use by users from age 12 onwards.

4.2. The app must be available in English.

5.5 Business Rules

5.5.1 User must register before using the app

As our application allows users to give the rating on clinic, we require users to register first before accessing any functionalities inside the app.

5.5.2 User must be able to perform all functionalities

Users are the initiators of all actions. They must be in full control of all activities inside the app. The main functions including clinic search, medicine search and setting medicine reminders should be fully controlled by the users.

6. Other Requirements

The app requires the real-time database and firestore provided by Firebase for data storage.

Appendix A: Glossary

Term	Description
User	A person who uses the app and its services.
Clinic	An establishment where patients are given medical treatment or advice.
Rating	A measure of a user's satisfaction ranging from 1 to 5 stars. 1 star represents 'very dissatisfied', while 5 stars represents 'very satisfied'.
Average Rating	A measure of what users on average rate a clinic.
Dose Type	The appearance of the medicine and the way it is to be applied. (Example: Oral tablet)
Medicine	A drug or other preparation for the treatment or prevention of disease.
Target Illness	The illnesses for which a specific medicine is aimed at preventing or treating.
Ingredients	A list of chemical compounds contained in each unit dosage of medicine.
Active Ingredient	The ingredient in a pharmaceutical drug or pesticide that is biologically active.
Manufacturer	The brand that produces a certain medicine.
Medicine Dose	A quantity of medicine prescribed to be taken at one time.
Notification Permission	A request from an app to ask for permission to send notification messages on a user device, which the user can allow or deny.
MTBF	Abbreviation of Mean Time Between Failure, which indicates the average time between system breakdowns.

Appendix B: Analysis Models

All documents and deliverables are attached in a separate file.