

CMPT 275: Software Engineering I

Assignment 2 - Design Document

Group: 8

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Revision History

Table 1 - Revision history of document

Revision	Status	Publication/Revision Date	By
1.0	Created - Data Requirements	October 9, 2019	David Song
1.1	Created - Systems Diagrams	October 14, 2019	Joseph Dillman
1.2	Changed - Formatting	October 16, 2019	Kevin Jerome

Guidelines

Technical Guidelines

Our application will be developed mainly using Xcode version 10/11 on Apple's macOS High Sierra operating system. Swift 5 and the iOS 11 software development kit will also be utilized. The back-end of our application will use the Firebase platform, Xcode 10/11 and the dependency manager, CocoaPods 1.7, for the development process. For the companion website, Firebase, HTML, CSS, and Javascript will be used.

The physician will be required to set up an account prior to logging into the website for the first time. On the website, physicians may create patient profiles which in turn will automatically create a patient account. When the physician creates a new patient's account, an email containing authentication information will be sent to the patient's email, and the patient will need to use that provided username and password to log in to the app.

Our application shall have buttons using an image or text label with a large font and the website and mobile application will all use English.

Legal Guidelines

Data privacy is the main priority concern for; therefore, the user's information will not be disclosed to other parties without user acknowledgement. The protected data includes the user's contact information, their medication(s), and exercise schedule. Using Firebase, users' data will be encrypted during the transmission process between the application and server and the website and server. We will not advertise for any third party, such as pharmaceutical companies, and all our medication and exercise are used for demonstration purposes.

Ethical Guidelines:

Our development process will adopt the ACM/ IEEE Code of Ethics [1] as guiding software engineering ethics philosophy; additionally, the application will not use any violent, obscene, or profane words or images. The app and website are to provide a supplementary service and should not be treated as a substitute for any professional medical advising. All the text and pictures in the app will be carefully selected such that they will not offend the emotional, intellectual, and spiritual sensibilities of Parkinson patients.

System Diagrams

The following system diagrams will provide general guidelines for the development of Remedi. As development of Remedi progresses, design choices and approaches may change, however it is important to have a clear understanding of the direction the application is intended to go. A UML Use Case Diagram, UML Class Diagram, and UML Sequence Diagram have been chosen to describe the desired result for Remedi.

Several systems are involved in order to service several distinct users of Remedi. Figure 1 below shows a UML Use Case Diagram displaying the major functionalities available to each specific user at a high level. From the diagram, there are three distinct systems, each for one user. The physician's main actions will be creating patient profiles to start the process of assigning activities, creating the schedules and activity specifications, and retrieving reports on the patient's progress. The patient's main actions are logging into the application to link their profile and complete the activities assigned by the physician. Finally, the Firebase backend will serve both the web client and the mobile application and will provide an interface for a database engineer to make changes and view statistics on the data being contained.

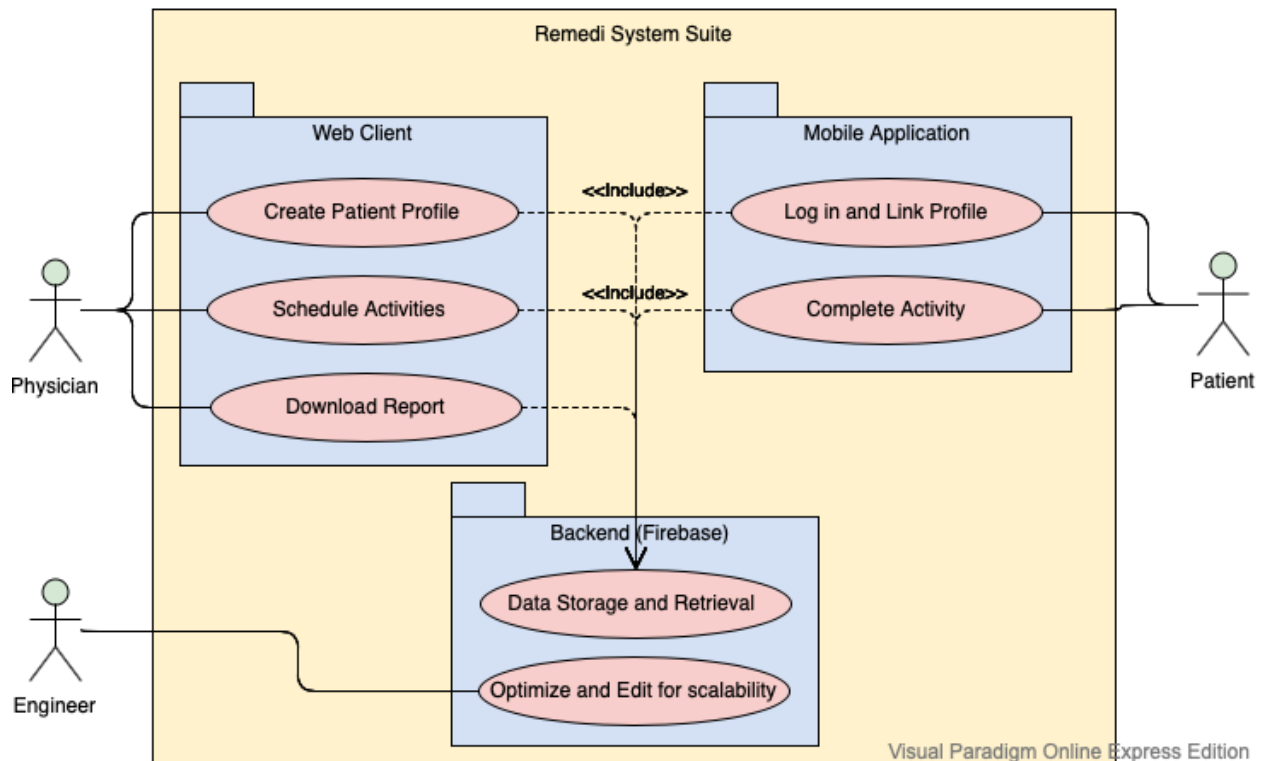


Figure 1: UML Use Case Diagram

Below is a UML Class Diagram, describing at a high level, the general relationships and classes we wish to implement in the mobile application. The arrows represent inheritance and as shown below, the two main tasks assigned to patients may be medication or exercise, both inherited from the action object. The scheduler object will enable the actions to be displayed to the user and once completed, each action will update the user object to complete the action.

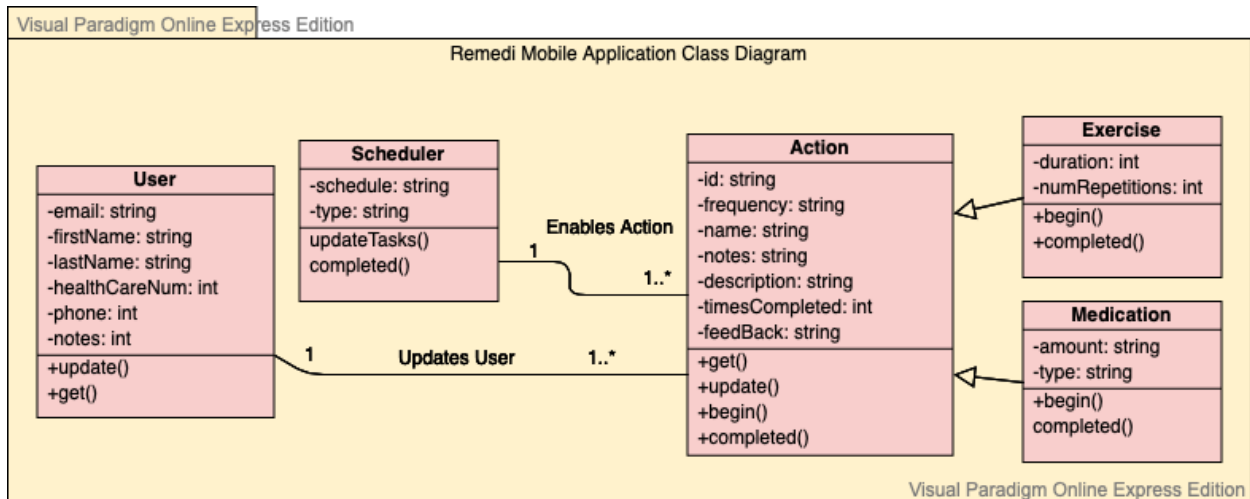


Figure 2: UML Class Diagram

Finally, below in Figure 3 describes the UML Sequence Diagram for the general interface of the mobile application. This diagram describes at a high level, the sequence of actions implemented in the backend in response to user input. The Login Page will access the Settings which will access the Local Database as well as Firebase for authentication. The Home Page primarily interacts with the Action modules to complete exercises/medication which will save its changes to the database.

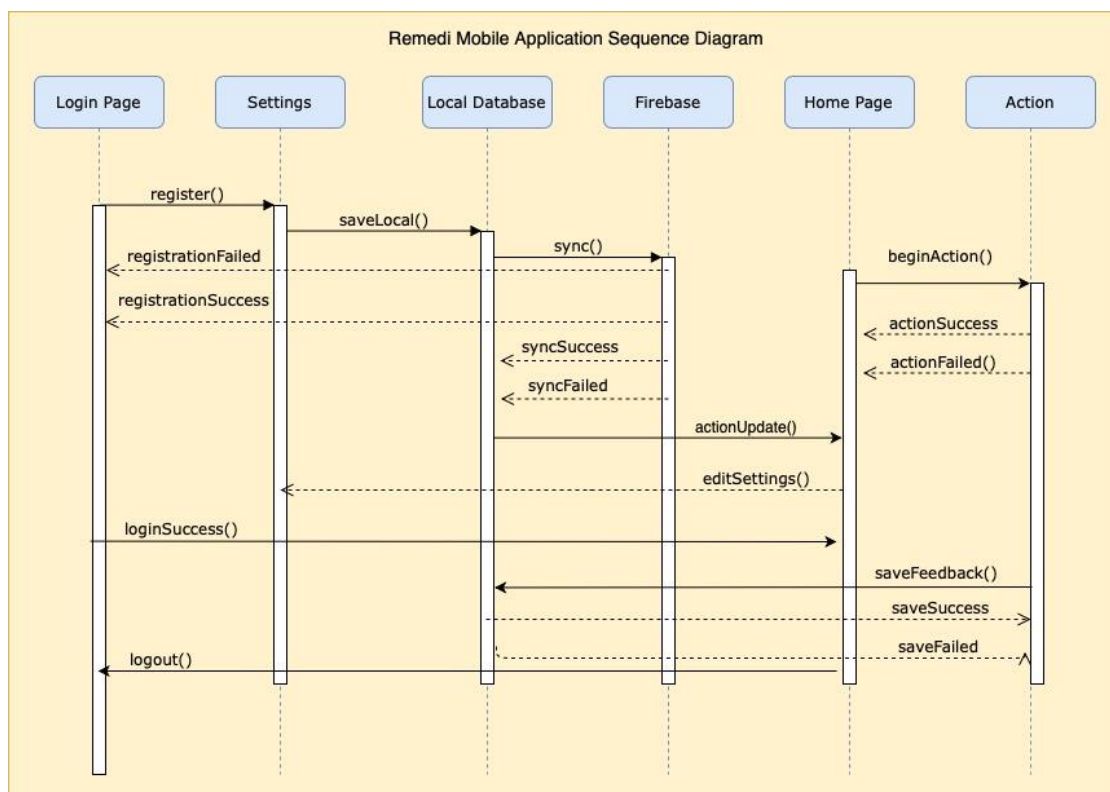


Figure 3: UML Sequence Diagram

Data Requirements

Web application

Web users will use the mouse and keyboard as their primary source of input and navigation. Data transferred into the app through this input will include login credentials and patient data when editing or adding a new patient profile. Data retrieved from the database will be displayed on the web application so that web users will be able to view or edit patient profiles as well as use statistics of the patient.

iOS application

Mobile users will interact with the app through the touchscreen of their iPhone. The server shall collect data on patient reported usage of the app such as times of completion of scheduled exercises and medications. The mobile user will be able to view their daily activities and specific information on said activities as well as an overview of their scheduled prescriptions. This information will be stored in the database and retrieved by the app when needed. Another output of our iOS application is the usage statistics such as graphs showing the number of exercises performed over a period. The user will be able to request this information and the database will send the required data to the application.

Database

The Database we will be working with for this project is Firebase's Cloud Firestore which is a NoSQL database that stores data in a JSON-like format. Figure 4 shows our database schema.

```
▼ Doctor {3}
  name : string
  email : string
▼ Patient {9}
  name : string
  email : string
  date of birth : timestamp
  gender : string
  health care number : number
  stage of disease : number
  notes : string
▼ Prescribed Exercise {4}
  exercise : reference
  amount : string
  frequency : string
  ▼ Completion {1}
    array : timestamp
▼ Prescribed Medication {4}
  medication : reference
  amount : string
  frequency : string
  ▼ Completion {1}
    array : timestamp
▼ Exercise {3}
  name : string
  description : string
  image : string
▼ Medication {2}
  name : string
  description : string
```

Figure 4: Database schema

Feature priority

Version 1 - First iteration

A supplementary website for users (physicians):

- A basic user interface will be implemented at this point.
- Login screen feature, including logging in and registration for the users (physicians).
- Ability to add new patient profile. This includes the patient's name, contact info and medical treatments.
- Email authentication will be set for users (patients) to register their accounts.

The iOS application:

- The interface has functioning elements that reflect major features.
- Login screen feature including logging in and registration for the users (patients).
- Users' (patients) profile will be saved in the database and transferred from the users' (physicians) website and get displayed on the iOS application.
- Edit and update buttons for some selected data categories for users (patients) profile.

Version 2 - Second iteration

A supplementary website for users (physicians):

- Medication and exercise buttons will be added at this stage for the users (physicians) to be able to add prescribed medication and exercise for each patient.
- User interface for medication and exercise.
- Medication: drop-down list for medication, quantity, frequency and a note button.
- Exercise: drop-down list for type of exercises, duration, repetitions and a note button.

The iOS application:

The database shall hold information obtained from both the application and website and act as an intermediary between the application and website. After transferring the data from users (physicians) prescribed to users (patients), the patient will be automatically alerted and provided with details for each prescribed action according to the users (physicians) input.

a. Exercise:

- Friendly UI that allows users (patients) to be able to view the names, descriptions, and quantity of exercises that are prescribed by their users (physicians).
- Display a list of all exercises on that day with an instructional illustration on how to carry out each exercise.
- Checkbox button on the side that allows users (patients) to tick on once they finish the exercise.

b. Medication

- Friendly UI that allows users (patients) to be able to view the names of medications, quantity and frequency of medications that are prescribed by their users (physicians) on today's date.
- Checkbox button on the side that allows users (patients) to tick on once they take the medications.

Version 3 - Final iteration

A supplementary website for users (physicians):

- A record of completion and feedback as time progresses of users (patients) will be shared and displayed on users (physicians)' end
- Summary of users (patients)' performed exercises can be exported into a comma-separated-value (csv) file and/or .pdf file.
- Edit and update buttons will be added to users (patients)' profile so that the users (physicians) be able to edit any updated information.
- Edit, update and delete buttons will be added for the medication and exercise for users (physicians) to be able to update new exercise and medication schedule based on the users (patients)' progress

The iOS application:

a. Statistics

- Basic and friendly UI that allows users (patients) to be able to track the progress of their actions and share what they've done with their users (physicians).
- Visual and analytic representations of historical exercise data to view their exercise completion over time.

b. Settings

- Users (patients) have an option to turn on or off the medication and exercise reminder feature
- Frequency and time preference for medication and exercise reminder will be implemented

c. Schedule

- Friendly UI for schedule that allows users (patients) to see their exercise and medication in a form of day, month and year.
- Once they keep track of therapeutic exercises according to a schedule decided by their users (physicians) via a website.
- Add push notifications reminding users (patients) to perform exercises or to take medication, with notifications.

References

- [1] Association for Computing Machinery's Committee on Professional Ethics, "The Software Engineering Code of Ethics and Professional Practice". [Online]. Available: <https://ethics.acm.org/code-of-ethics/software-engineering-code/>. [Accessed: Oct. 12, 2019].