InTouch With Your Health

PRD v2

By
InTouch With My Health

Table of Contents

Team Info

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Team: Intouch With My Health
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Introduction & Problem

The InTouch operating system provides a simple and reliable communication platform between physicians and patients. Although patient data is collected during a session, to further track a patient's health and enhance current methods of life-saving interventions, data should be collected on a regular basis. With the power of modern wearable devices, vitals can be taken remotely and much more often in comparison to the occasional hospital visits.

With the newest release of the Apple Watch Series 4, specifically with the electrocardiography (ECG) capability, wearable devices take a step further in the direction towards medical appliances. This important feature allows more real-time and frequent measurements to be collected and provide physicians with supplementary data points, leading to a more accurate diagnosis and treatment for the patient.

The problem with traditional healthcare is that doctor's only get a glimpse of the patient's condition through hospital visits. With the help of wearable technology, doctors are now able to view vitals over time and able to observe trends and gain a further insight into the patient's data. Wearable technology really boomed over the past half decade as technology progresses and becomes smaller. Today, Apple Watch Series 4 is capable of board certified ECG readings. With this breakthrough technology, we are able to help our patients provide doctors with much more data that fills the gap between hospital visits.

For our group project, we will leverage Apple Watch engineering to utilize medical data including heart rate, ECG, and patient symptoms to access during a doctor's session and provide further clinical data for diagnostic assessment. This will not only provide live data which can alert medical assistants once measurements reach abnormal rates, but the watch integration will also build a health history for each patient that can later be used by the physician.

We will build an Apple Watch/iOS app that collects patient data including heart rate and ECG information and then routes it to InTouch Health's DeviceManager server. We will be the first users of this new system built by InTouchHealth, which provides a streamlined method of authorizing and identifying devices associating other metrics such as heart rate with them. The iOS app will have a user signin and use Firebase for authentication. The iOS will use Apple's HealthKit in order to access heart rate data, and will prompt users for permissions to use this service.

For the physician's side, we will build an intuitive web app that allows the physician to quickly select a specific patient and see all pertinent medical data such as heart rate over time and ECG. We will build a login system for the physician viewing the web app. This webapp will be built using Ruby on Rails and hosted using Google's App Engine and cloudSQL. The webapp will make requests from the DeviceManager server for a list of all devices as well as all the important data for those devices in order to display to the physician.

The team will make several assumptions including that all devices are able to successfully authenticate themselves with InTouch Health's DeviceManager system in order to send heart rate data. This assumption allows us to ignore building a secondary signup system that would involve users sending their device UID to our server in order to create a device specific API key to allow that device to upload data to DeviceManager.

One of the big stretch goals for this project is to do some machine learning analysis on the data received in order to notify physicians when patients display abnormal conditions. For example, if a patient's heart rate is fluctuating wildly, the physician should be notified in order to take further action, whether it be to alert local authorities or to make a note for the next physical appointment with the patient.

Project Outcome

We will collect ECG and heart rate data from the Apple Watch and send it through an iOS app to the Intouch IO backend before being able to be displayed and viewed by physicians on the web app.
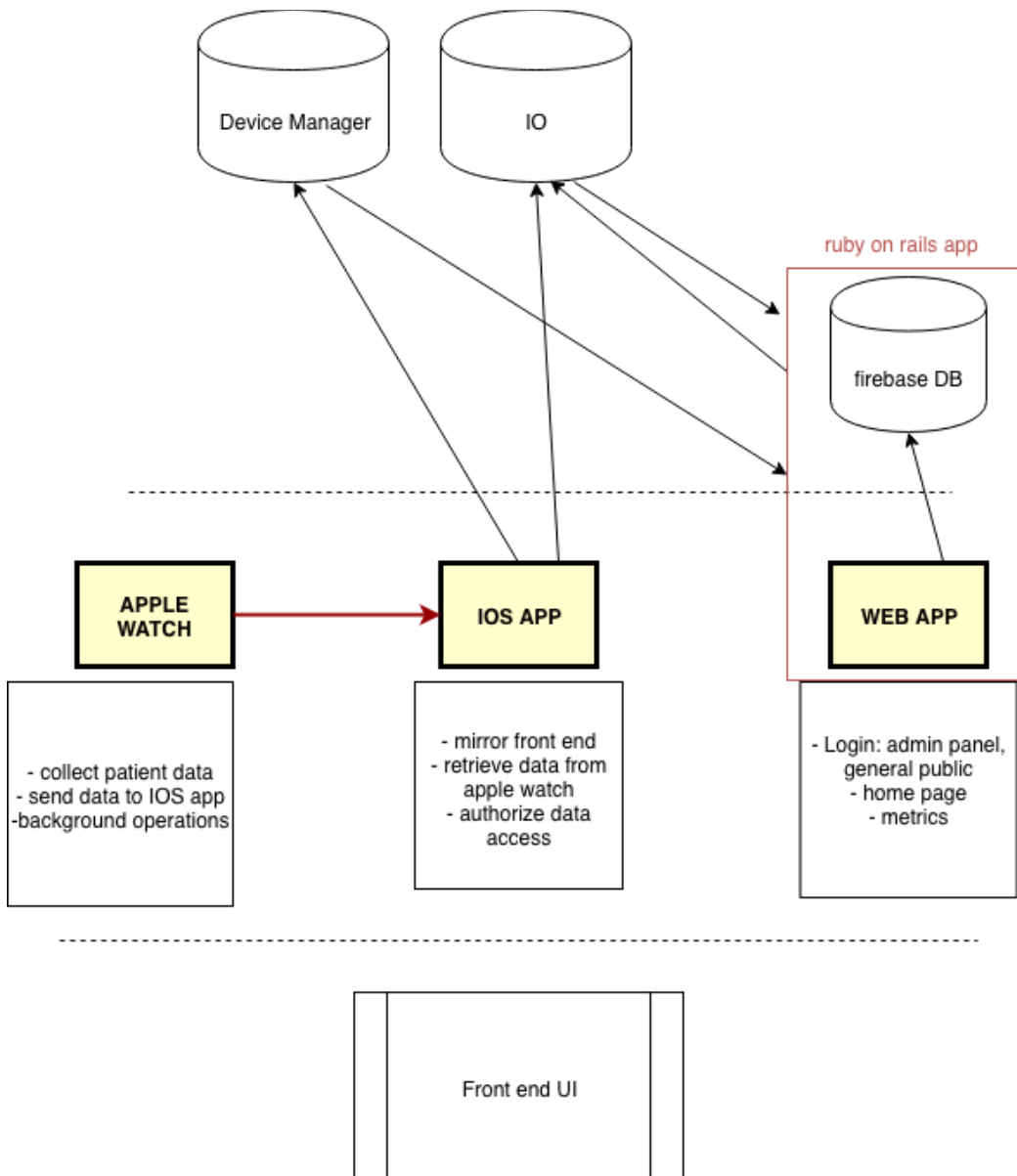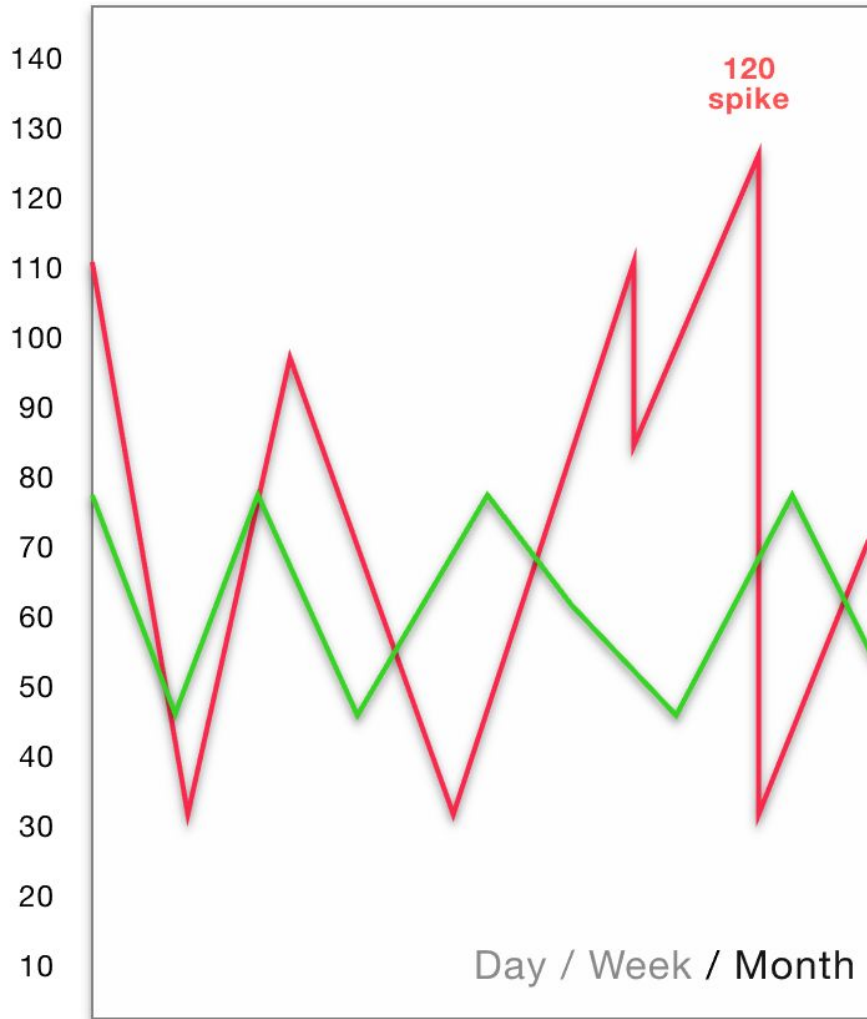
To implement each section of the diagram, we will be using XCode and Swift to implement the Apple Watch and iOS app. In terms of the web app, Ruby on Rails and Google App Engine.
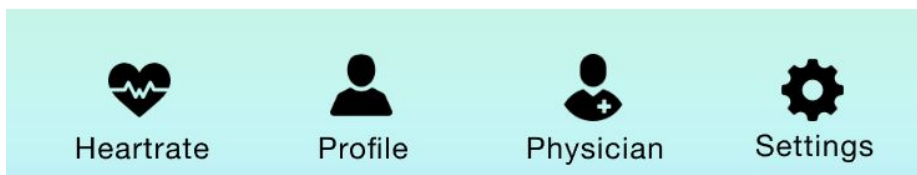
Web App

CURRENT HEARTRATE

140
130
120
110
100
90
80
70
60
50
40
30
20
10

120 spike

Day / Week / **Month**
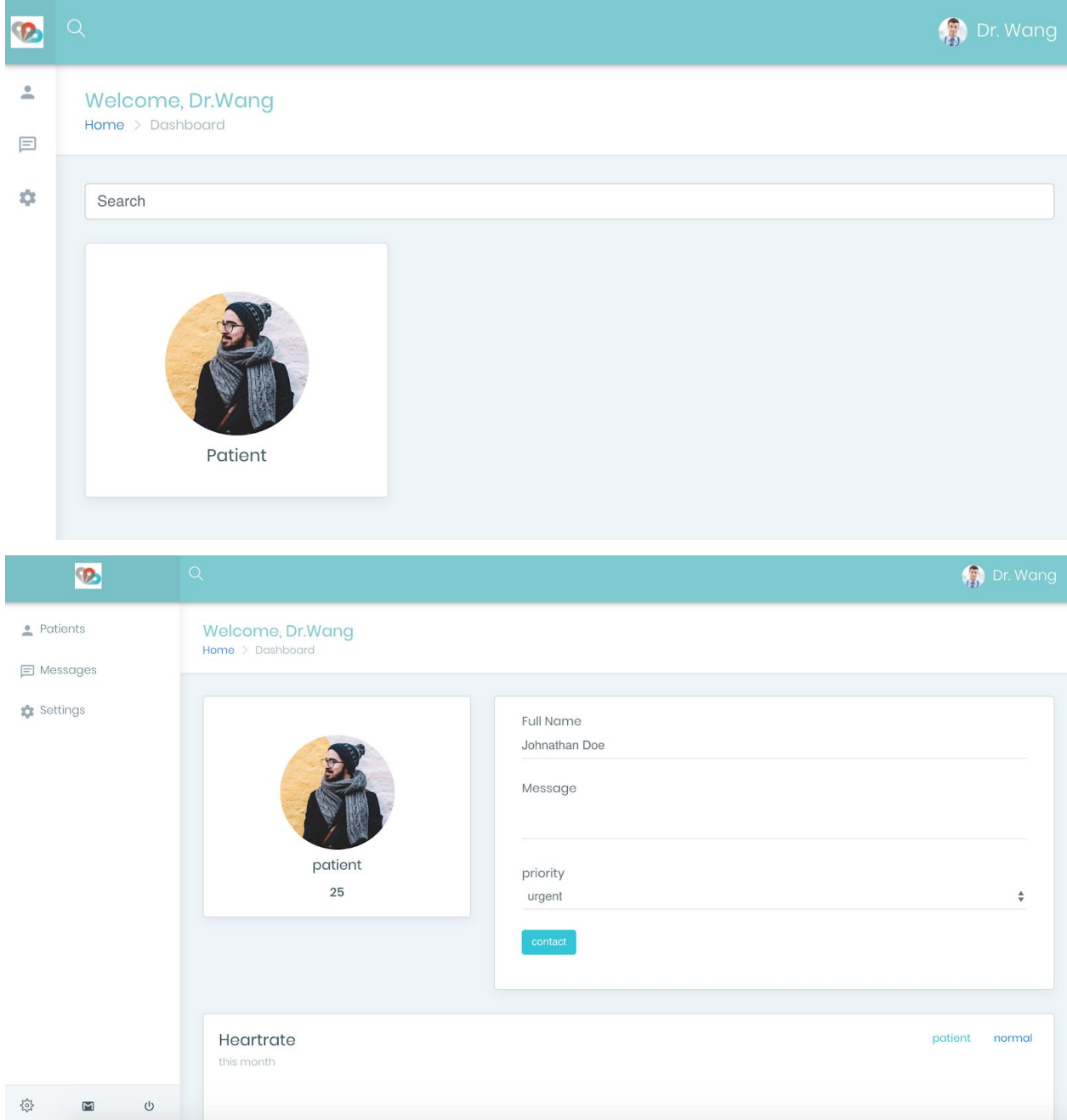
145 BPM
caution

Normal
Yours

Heartrate   Profile   Physician   Settings

User stories & Use cases

Users:
- Physicians: Intouch Health contract physicians
- Patients: anyone using an apple watch to monitor their data
- Admins

Web App User Cases:

1. As a physician I can see all of my patients on the home screen (2 days)
   a. Actors: The physician
   b. Preconditions: The physician has an account
   c. Flow of Events: The physician logs in.
   d. Postcondition: The first page the physician can see shows a list of patients with images of them.
   e. Acceptance test: Visual test that when the user logs in all patients are displayed.
   f. Trello: https://trello.com/c/oDsLO0Xu/66-as-a-physician-i-can-see-all-of-my-patients-on-the-home-screen
   g. Github: https://github.com/vickiic/capstone/commit/c9dcd0ac41d50d7928871a7c5c69e00d91144591

2. As a user, I can look at more data about a patient by clicking on their picture (1 day)
   a. Actors: Physician
   b. Preconditions: The physician is logged in.
   c. Flow: The physician clicks on the patient's profile picture
   d. Postcondition: The physician is taken to a new page that shows more information about the patient.
   e. Acceptance test: Visual test that the web app loads a new page
   f. Trello: https://trello.com/c/6GFTiKNS/67-as-a-user-i-can-look-at-more-data-about-a-patient-by-clicking-on-their-picture
   g. https://github.com/vickiic/capstone/commit/d7a5130c17f2db21fbd71f3bb5ba0a1d148368d3

3. As a physician, I can search for a specific patient. (1 day)

a. Actors: Physician
b. Preconditions: The patient has been onboarded and the physician has signed in.
c. Flow: The physician navigates to the page that shows the list of patients. The user clicks on the search bar and types in the name of the patient or the patient ID.
d. Postcondition: Anything related to that patient that matches the user's search are visible.
e. Acceptance Test: Unit test that given a list of patients doing a filter on a string returns the correct set of patients.
f. Trello: https://trello.com/c/b2UloQ6f/63-as-a-physician-i-can-search-for-a-specific-patient
g. Github: https://github.com/vickiic/capstone/issues/13

4. As a user, I can look at heart rate data for a specific device as a graph. (3 days)
a. Actors: Physician
b. Preconditions: The physician is logged in.
c. Flow: The user finds a device they want to know more about by either scanning down the list of patient or by searching for a device. The user clicks on the device in the list.
d. Postcondition: A graph is displayed to the user which shows heart rate if there is there is sufficient data present (>10 data points). Otherwise, the user sees an image saying there is currently not enough data for the device and to check back later
e. Acceptance test: Visual test when using the app the graph appears
f. Trello: https://trello.com/c/6W5qJmF7/64-as-a-user-i-can-look-at-heart-rate-data-for-a-specific-device-as-a-graph
g. Github: https://github.com/vickiic/capstone/issues/15

5. As any user, the site looks like an ITH product (1 day)
a. Actors: any user
b. Precondition: None
c. Flow:
   i. The user logs in and views pages
   ii. The user only sees the login page
d. Postcondition: The user feels that the design of the website is in line with other ITH products

e. Acceptance Test: The color scheme of the site is the same as other ITH products.
f. Trello: https://trello.com/c/OS4eNTqh/69-as-any-user-the-site-looks-like-an-ith-product
g. Github: https://github.com/vickiic/capstone/commit/7f15779c92f43d40c922bde3313330625a52f334

6. As a physician, I am able to filter through the collected data by *day* (4 days)
   a. Actors: Physician
   b. Precondition: The patient has created the account on the watch app and data has been collected for a period of time
   c. Flow: Physician logs onto the web app, selects patient and can filter the heart rate data to see different days of data using the day parameter
   d. Postcondition: A graph is displayed showcasing the filtered data
   e. Acceptance Test: Unit tests that will take sample data and filter based on day, and then check that the filtered data is the correct data.
   f. Trello: https://trello.com/c/3sxT8OTI/70-as-a-physician-i-am-able-to-filter-through-the-collected-data-by-day
   g. Github: https://github.com/vickiic/capstone/issues/18

7. As a physician, I am able to filter through the collected data by *month* (1 day)
   a. Actors: Physician
   b. Precondition: The patient has created the account on the watch app and data has been collected for a period of time of at least a month
   c. Flow: Physician logs onto the web app, selects patient and can filter the heart rate data to see different months of data using the year parmeter
   d. Postcondition: A graph is displayed showcasing the filtered data
   e. Acceptance Test: Unit tests that will take sample data and filter based on month, and then check that the filtered data is the correct data.
   f. Trello: https://trello.com/c/oM1pSZSo/77-as-a-physician-i-am-able-to-filter-through-the-collected-data-by-month#
   g. Github: https://github.com/vickiic/capstone/issues/17

8. As a physician, I am able to filter the collected data by *specific time period* (3 days)
   a. Actors: Physician
   b. Precondition: The patient has created the account on the watch app and data has been collected for a period of time
   c. Flow: Physician logs onto the web app, selects patient and can filter the heart rate data to see different periods of data by selected specific dates for start time and end time.
   d. Postcondition: A graph is displayed showcasing the filtered data
   e. Acceptance Test: Unit tests that will take sample data and filter based on time periods, and then check that the filtered data is the correct data.
   f. Trello: https://trello.com/c/8HONBh33/78-as-a-physician-i-am-able-to-filter-the-collected-data-by-specific-time-period
   g. Github: https://github.com/vickiic/capstone/issues/19

9. As a physician, I can filter through different types of data collected by a patient. (1 day)
   a. Actors: Physician
   b. Precondition: The physician has created an account and invited at least one new patient to register. The iOS / Apple Watch application have begun to collect this patients data. The physician should be logged in to the web interface.
   c. Flow: The physician selects a device type that corresponds to the patient he is trying to access data for. A data filter list is visible. The physician can choose one type of data to view exclusively. (Heart rate, ECG, Symptoms)
   d. Postcondition: A data filter is applied so the physician only sees the relevant data that he is looking for on the web interface.
   e. Acceptance test: Visual test when using the app the graphs for the specific datatype appear.
   f. Trello: https://trello.com/c/euMQG1Dm/79-as-a-physician-i-can-filter-through-different-types-of-data-collected-by-a-patient
   g. Github: https://github.com/vickiic/capstone/issues/14

10. As a physician, I can set a password for my new account. (2 days)
    a. Actor: Physician
    b. Preconditions: An admin has created an account for me and an email has been sent with a username and temporary password

c. Flow: The user logs in and is greeted with a set new password screen. The user is able to create a new password.
d. Postcondition: The user is able to log into the site with the created password, and is no longer able to log in with the temp password.
e. Acceptance tests: Visual/flow test and unit tests
f. Trello: https://trello.com/c/eiyWHV1a/80-as-a-physician-i-can-set-a-password-for-my-new-account
g. Github: https://github.com/vickiic/capstone/issues/31

11. As a physician, I can reset my password after being logged in. (2 days)
a. Actor: Physician
b. Preconditions: A user already has an account and is able to successfully log in.
c. Flow: The user clicks a button on the home screen or in a menu which redirects them to a screen that lets them reset their password.
d. Postconditions: The user is able to log in with the new password that they created, and the old password no longer works. Also, an email is sent to the user's email address saying that their password was recently changed.
e. Acceptance tests: Visual/flow test and unit tests
f. Trello: https://trello.com/c/qoOtAR9C/81-as-a-physician-i-can-reset-my-password-after-being-logged-in
g. Github: https://github.com/vickiic/capstone/issues/32

12. As a physician, I can invite a new user (patient) to allow their data to be tracked. (1 day)
a. Actors: Physician, Patient
b. Precondition: The physician already has an account and is able to successfully log in.
c. Flow: The physician logs into an account, clicks the "Add a new patient" button. The physician is then redirected and then prompted for the user email (and any other appropriate information).
d. Postcondition: The patient receives an invitation email with an authorization code allowing him or her to create an account on the InTouch Health mobile app
e. Acceptance Test: Visual/flow test and unit tests

     f. Trello:
https://trello.com/c/0pA8K3E0/82-as-a-physician-i-can-invite-a-new-user-patient-to-allow-their-data-to-be-tracked#

     g. Github: https://github.com/vickiic/capstone/issues/33

13. As a physician, all my patients data will be able to be drawn from the ITH DM when I ask for it (2 days)
   a. Actors: Physician, patient
   b. Precondition: The patient's device number/identification is successfully stored in ITH DM
   c. Flow: The patient creates and allows their watch to send data to ITH DM which will automatically create a patient for the physician to view his/her data.
   d. Postcondition: The physician will be able to access patient data after linking his/her account with the patient.
   e. Acceptance test: the patient uid/device name will be associated with the patient photo and name in the web app that the physician can see
   f. Trello:
   https://trello.com/c/8fRewkLL/76-as-a-physician-all-my-patients-data-will-be-able-to-be-drawn-immediately-from-the-ith-dm
   g. Github: https://github.com/vickiic/capstone/issues/30

iOS User Cases:

1. As a patient, I can authorize the use of my HealthKit data (1 day)
   a. Actors: Patient
   b. Preconditions: The patient has downloaded the Apple Watch and iOS app and the user has created an account
   c. Flow: From the iOS app, the user logs into his or her patient account.
   If it is the first time logging in, the user will be prompt to allow data access permissions.
   Alternative Flow: The user has logged in before and has declined access to health permissions. The app would the give a list of steps to allow these permissions from the Settings app.
   d. Postcondition: The application is able to access and upload the heart rate data to the InTouch database

    e. Acceptance Test: Permission can be verified on the iPhone under Settings. "Success" response on isHeartRateDataAvailable

    f. Trello:https://trello.com/c/CesgjNaR/71-as-a-patient-i-can-authorize-the-use-of-my-healthkit-data

    g. Github: https://github.com/vickiic/capstone/issues/25
https://github.com/vickiic/capstone/commit/bfa92d83882200cce3a779e3627e2eb64c681fba

2. As a user with privacy concerns, I am able to use the iOS/Apple Watch app intuitively (1 day)

    a. Actors: Patient

    b. Preconditions: The patient has downloaded the app onto their phone.

    c. Flow of Events: The patient goes through the onboarding flow of agreeing to terms and conditions with all of the correct buttons getting focus at the right times.

    d. Postcondition: The user is able to agree to let the iOS app to collect data and transmit it to the ITH servers.

    e. Acceptance test: The user can successfully navigate to the main interface after having created an account, logged in, and authorized healthkit data. All data is correctly reflected in the database and settings app.

    f. Trello:https://trello.com/c/9L1HRVKx/91-as-a-user-with-privacy-concerns-i-am-able-to-use-the-ios-apple-watch-app-intuitively

    g. Github: https://github.com/vickiic/capstone/issues/34
https://github.com/vickiic/capstone/commit/e1a4360e333dd9dada34af6bf4dfa9d6bf09d76c

3. As a patient, I can authorize the use of my HealthKit data after previously rejecting (1 day)

    a. Actors: Patient

    b. Precondition: The user has created an account and has logged in already, but has rejected HealthKit usage permissions.

    c. Flow: The user reopens the app after having rejected HealthKit permissions. The application prompts the user to allow access again in order to access any of the other features of the app,

    d. Postcondition: The application is able to access and upload the heart rate data to the InTouch database

    e. Acceptance test: User is unable to proceed to app main activity without authorizing use of HealthKit data. User can also turn off access to healthkit data sharing.
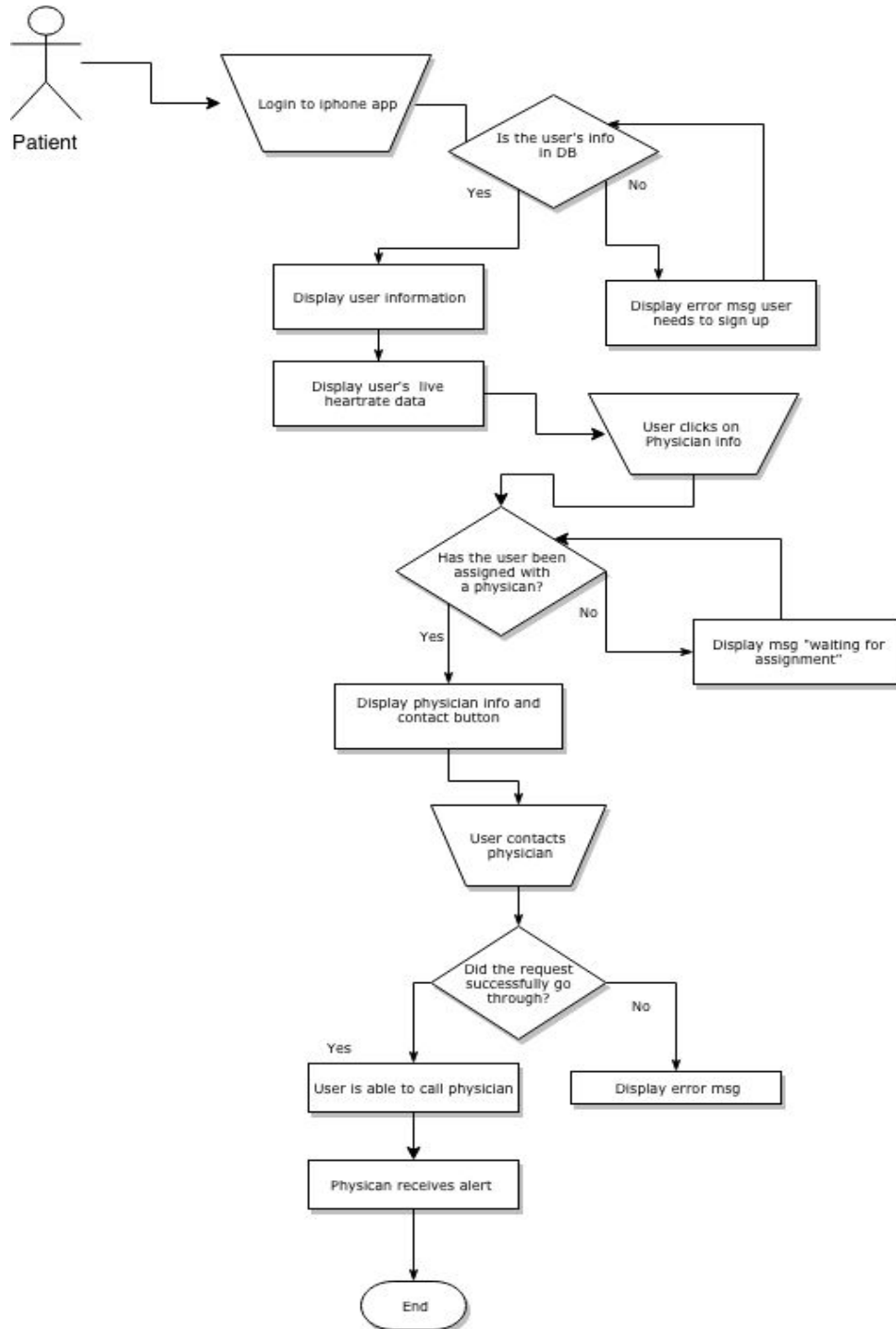
     f.   Trello:https://trello.com/c/9ch2qJBW/90-as-a-patient-i-can-authorize-the-u se-of-my-healthkit-data-after-previously-rejecting

     g. Github: https://github.com/vickiic/capstone/issues/35 https://github.com/vickiic/capstone/commit/e1a4360e333dd9dada34af6bf4 dfa9d6bf09d76c

4. As a patient, I can view the physician I have been assigned with (1 day)
     a. Actors: Patient
     b. Precondition: The user is already signed up and has an account with previously collected data
     c. Flow: User goes into IOS app, clicks on the icon that will show physician information and contact information
     d. Postcondition: The user is able to view information regarding the Physician as well as contact information
     e. Acceptance Test: User can display physician information
     f. Trello:https://trello.com/c/fNniqr2O/89-as-a-patient-i-can-view-the-physicia n-i-have-been-assigned-with
     g. Github: https://github.com/vickiic/capstone/issues/41

5. As a patient, I can contact the physician I am in network with (3 days)
     a. Actors: Patient
     b. Precondition: The user is already signed up and has an account with previously collected data and associated with the physician
     c. Flow: User goes into IOS app, clicks on the icon that will show physician information and contact information and then taps 'contact'
     d. Postcondition: The patient is able to message physician
     e. Acceptance Test: Patient can contact physician through the contact button
     f. Trello:https://trello.com/c/ngZ9HTZU/88-as-a-patient-i-can-contact-the-phy sician-i-am-in-network-with
     g. Github: https://github.com/vickiic/capstone/issues/37

6. As a patient, I can view my profile information (1 day)
     a. Actors: Patient
     b. Precondition: The user has been invited by a physician to make an account and has registered for that account.
     c. Flow: User logs in on the iPhone app and clicks the profile icon.
     d. Postcondition: The patients user information (Name, contact information, etc) is displayed for review.
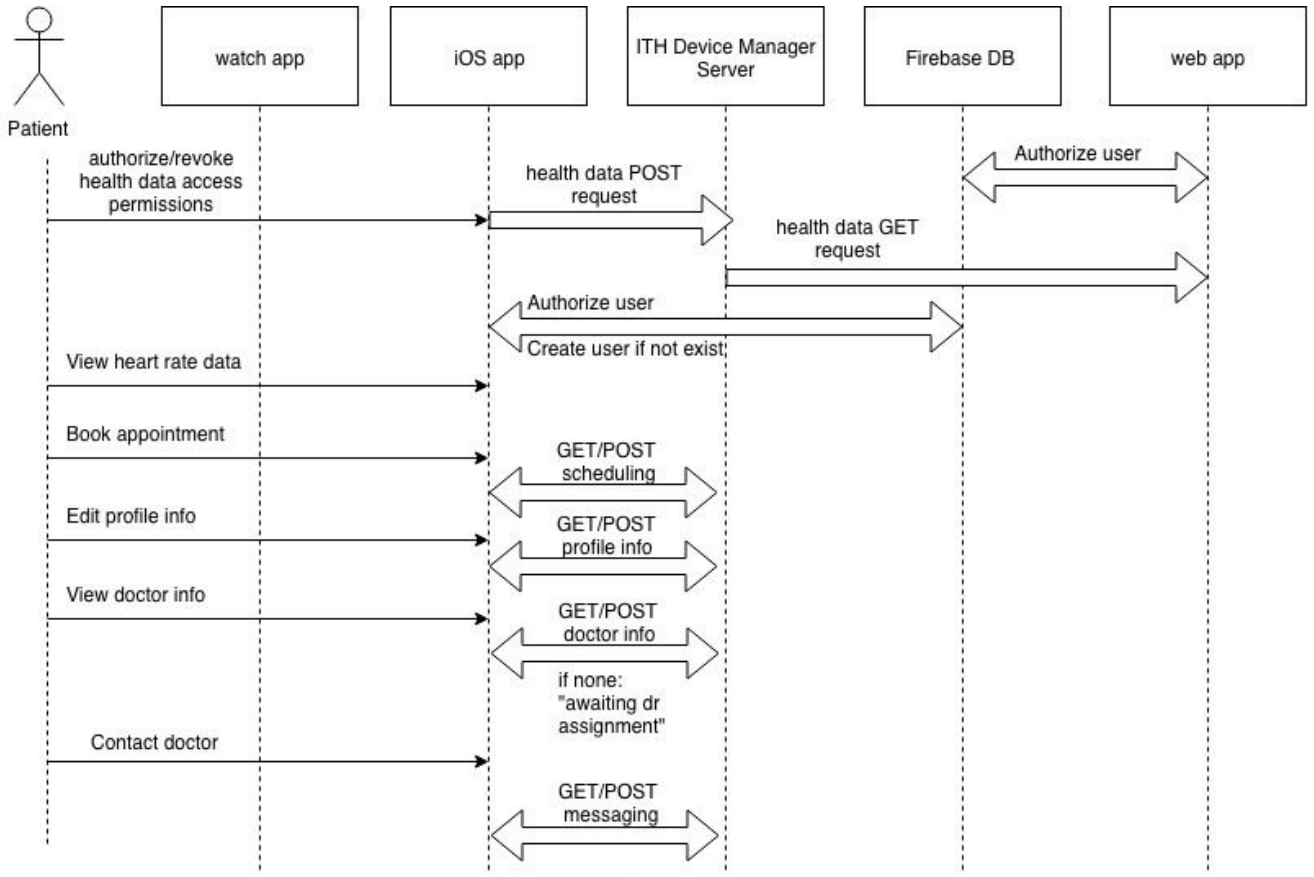   e. Acceptance Test: User can display their own information

      f. Trello:https://trello.com/c/mQICj8Zi/87-as-a-patient-i-can-view-my-profile-information
      g. Github: https://github.com/vickiic/capstone/issues/40

7. As a patient, I can reset my account password (1 day)
   a. Actors: Patient
   b. Precondition: The user has created an account on the iOS platform and allowed HealthKit access permissions.
   c. Flow: Once logged in, the patient clicks the profile icon to view account information. A "Change Password" button is visible that the user should click. Once clicked, the user is prompted for the old password, new password, and confirmed new password.
   d. Alternate Flow: The user enters a new password that does not meet the conditions. He or she is prompted again.
      Alternate Flow: The user enters an incorrect old password. He or she is prompted again.
   e. Postcondition: If the user enters an acceptable new password, he or she will be informed that the password has been changed successfully.
   f. Acceptance Test: New password is updated in firebase DB
   g. Trello:https://trello.com/c/j6UCJsWf/86-as-a-patient-i-can-reset-my-account-password
   h. Github: https://github.com/vickiic/capstone/issues/38

8. As a patient, I can report a symptom to my physician through apple watch functionality (4 days)
   a. Actors: Patient
   b. Precondition: The user has created an ITH account and allowed access to HealthKit data.
   c. Flow: On the apple watch app, the user clicks "Report a Symptom" button. This initiates a speech to text functionality in which the patient can speak into the apple watch to report what he or she is feeling.
   d. Postcondition: The apple watch will record this data and store it for viewing by the physician at the next consultation.
   e. Acceptance Test: User has available symptoms to select from
   f. Trello:https://trello.com/c/4AI5YJWY/83-as-a-patient-i-can-report-a-symptom-to-my-physician-through-apple-watch-functionality
   g. Github: https://github.com/vickiic/capstone/issues/36

9. As a patient, I am able to schedule an appointment with my physician (2 days)

a. Actors: Patient

b. Precondition: The user has created a account on the IOS app

c. Flow: On the iOS app, the user presses "schedule an appointment" on the dashboard and selects a date.

d. Postcondition: The physician the patient has been assigned with will receive a notification of the scheduled appointment

e. Acceptance Test: User can select available time send appointment request

f. Trello:https://trello.com/c/wOY1IoFI/84-as-a-patient-i-am-able-to-schedule-an-appointment-with-my-physician

g. Github: https://github.com/vickiic/capstone/issues/39

10. As a patient, I am able to view my heart rate data in the app (2 days)

a. Actors: patient

b. Precondition: the user has an account and the app and accepted authorization

c. Flow: on the iOS app, the user navigates to the page that displays their data

d. Postcondition: the patient able to see their data

e. Acceptance Test: there is a view controller page in iOS app that users can see their own heart rate data

f. Trello:https://trello.com/c/CesgjNaR/71-as-a-patient-i-can-authorize-the-use-of-my-healthkit-data

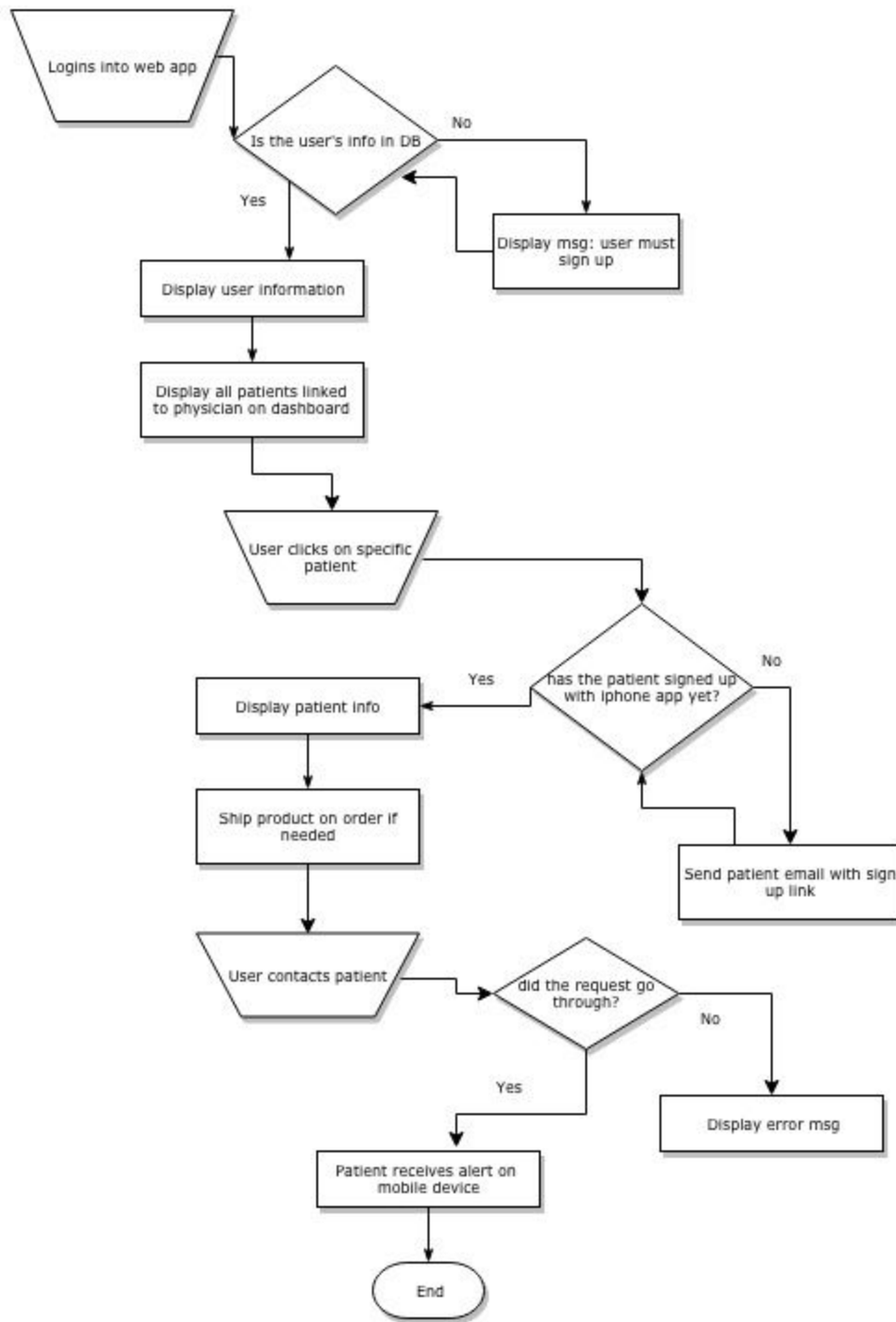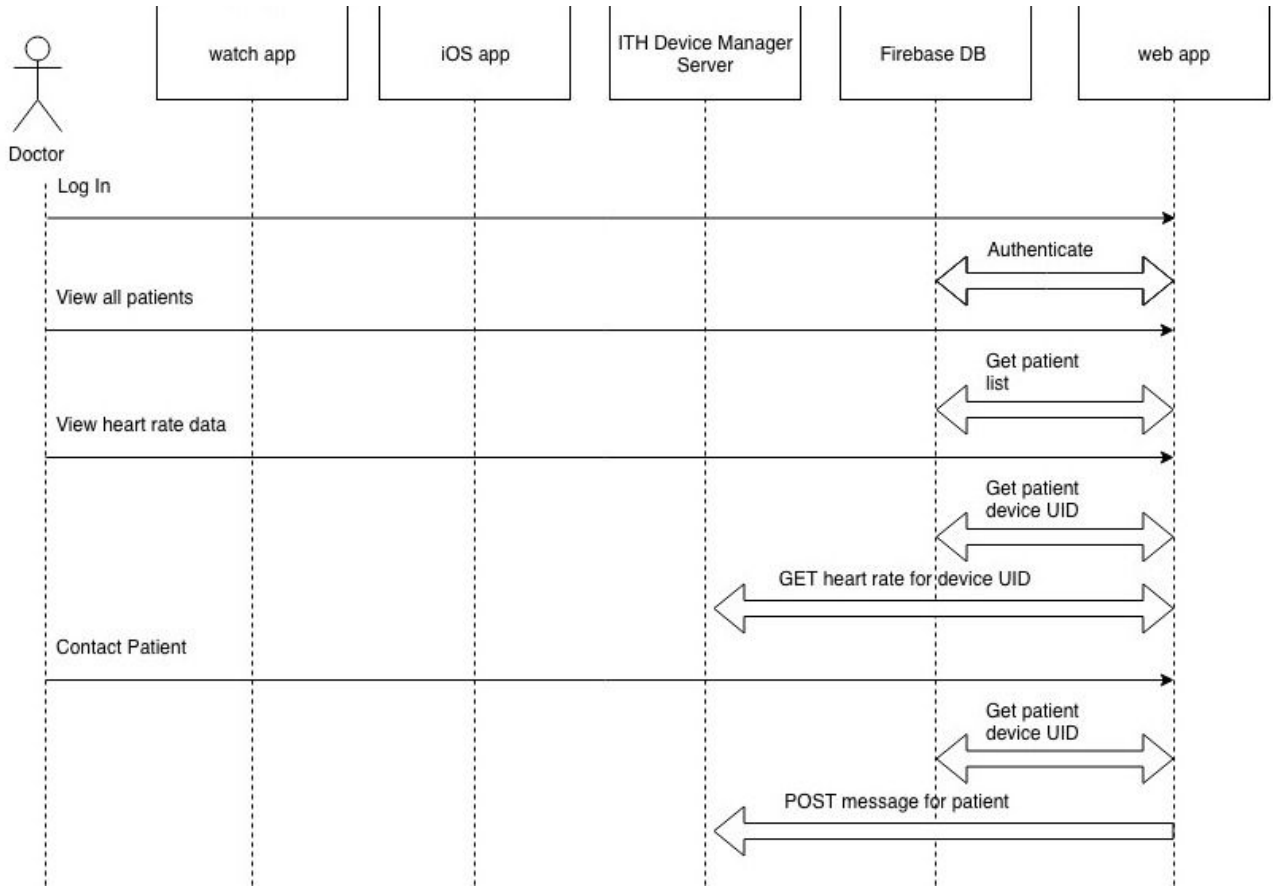g. Github: https://github.com/vickiic/capstone/issues/26

System Models

iOS App Behavior Sequence

Web App Behavior Sequence

iOS class diagram
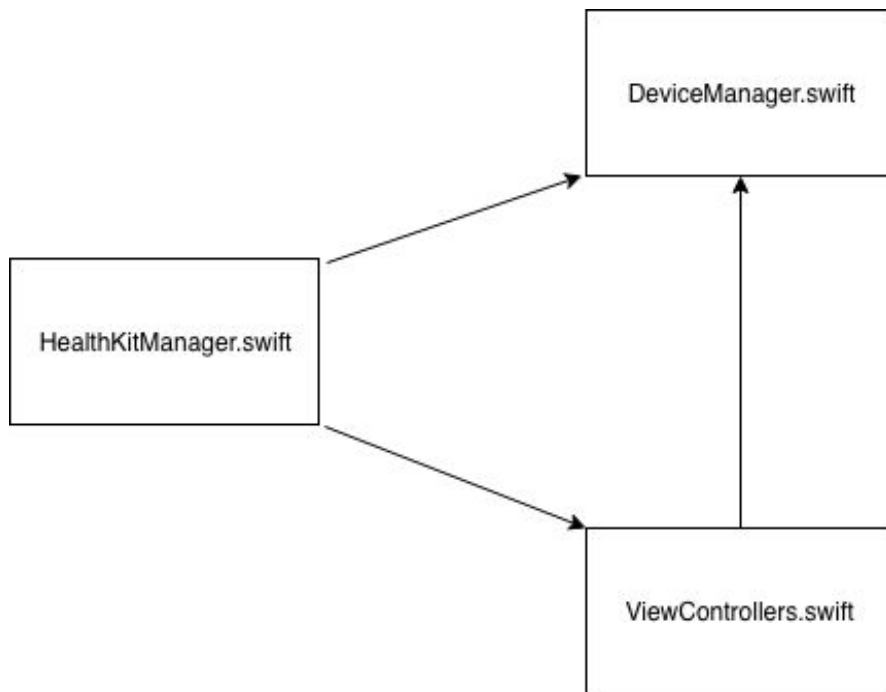
Appendix:

Technologies Utilized:

iOS/Watch App	Swift
	HealthKit
	Git
Web App/Server	Ruby
	Ruby on Rails
	Html/Css
	Firebase
	Google App Engine
	Git