

Florida International University
Knight Foundation School of Computing and Information Sciences

Software Engineering Focus

Final Deliverable

Take Control of Your Aging Baby Boomers

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Instructor: Masoud Sadjadi

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Abstract

This document aims to provide all the information necessary to understand the following iteration of the iCare for Baby Boomers application that has been developed as part of the Capstone project for the Spring Semester of 2022. The iCare for Baby Boomers application provides a multi-purpose tool to help keep track of senior individuals and collect health data from the user. The purpose is to promote good health for the senior user.

Table of Contents

INTRODUCTION	5
CURRENT SYSTEM	5
PURPOSE OF NEW SYSTEM	5
 USER STORIES	
IMPLEMENTED USER STORIES.....	6
PENDING USER STORIES.....	7
 PROJECT PLAN	
HARDWARE AND SOFTWARE RESOURCES.....	8
SPRINTS PLAN	9
<i>Sprint 1</i>	9
<i>Sprint 2</i>	10
<i>Sprint 3</i>	11
<i>Sprint 4</i>	12
<i>Sprint 5</i>	13
 SYSTEM DESIGN	
ARCHITECTURAL PATTERNS	15
SYSTEM AND SUBSYSTEM DECOMPOSITION	16
DEPLOYMENT DIAGRAM	17
DESIGN PATTERNS	17
 SYSTEM VALIDATION	18
 APPENDIX	20
APPENDIX A - UML DIAGRAMS	20
APPENDIX B - USER INTERFACE DESIGN	24
APPENDIX C - SPRINT REVIEW REPORTS	25
APPENDIX D - USER MANUALS, INSTALLATION/MAINTENANCE DOCUMENT, SHORTCOMINGS/WISHLIST DOCUMENT AND OTHER DOCUMENTS	28
 REFERENCES	31

Introduction

The world's elderly population is growing at a faster rate than it ever has before, and this growth is projected to continue. We will see the impacts of this shift on many aspects of society and some action will be needed at multiple levels and sectors to “prevent disease, promote health, maintain intrinsic capacity, and enable functional ability”. To assist in this healthy ageing of these populations we will require an “integrated, individual-centered solution” that will support senior people and will assist them, and their caregivers, in enabling their well-being. Our goal was the creation of an application that can be interacted with over a range of different devices and can be used by both the senior individuals and those providing care. The iCare for Baby Boomers app is meant to be a multi-purpose tool to help keep track of senior people. The application will collect different types of data and allow caregivers/senior users to view it and make use of it to promote good health for the senior user.

Current System

iCareForBabyBoomers is a completely new system, meaning that no current system was in place prior to the Spring 2022 semester, and all the software and assets were created that same semester.

Purpose of New System

The purpose of this new system was the creation of a new application from the ground up that would allow aging seniors to be able to monitor their health and work as a strong foundation to build upon for future semesters. The features introduced by this core iteration include user login and registration, a home page that the user is sent to upon logging in with a flexible dashboard composed of slivers to display quick information, a functioning pedometer bar, a series of health-related pages that can be built upon and improved, a profile page with a settable profile image, and a caregiver list feature where caregivers can be added and chatted with.

User Stories

The following section provides the detailed user stories that were implemented in this iteration of the Take Control of Your Aging Baby Boomers project. These user stories served as the basis for the implementation of the project's features. This section also shows the user stories that are to be considered for future development.

Implemented User Stories

- As a User, I want to be able to change my email, so that I can have better control over my account.
- As a user (caregiver), I want to be able to see a page with the list of my care recipients.
- As a user (baby boomer) I would like to create an emergency contact priority list so that my priority contacts get alerted first.
- As a developer, I would like to develop any UX/UI having to do with changing the email address and any additional account changes.
- As a caregiver, I would like to get notified of the boomer's emergency so that I can act accordingly.
- As a user (baby boomer) I would like to be able to chat/contact my caregivers about any concerns or questions that I may have regarding my health.
- As a caregiver, I want to see a separate dashboard, different from that of recipients, so that I can receive emergency messages from my recipients.
- As a boomer, I would like to add medications to the medications page and have them be accessible from any device.
- As a developer, I would like to implement the missing UI pages and ensure it stays true to the UI design.
- As a boomer/caregiver, I would like to receive notifications about emergencies or important dates regarding the medications.
- As a developer, I would like to implement the backend functionality of the "Emergency Contact" feature.
- As a caregiver, I want to receive emergency messages from my recipients.
- As a boomer, I would like to add medications to the medications page and have them be accessible from any device.
- As a boomer, I would like to see the medication's that I need to take on the dashboard.

- As a developer I would like to add the functionality for the different buttons on the profile page.

Pending User Stories

- As a boomer, I want my blood pressure to be monitored, so I can be aware if my blood pressure is within normal levels.
- As a boomer, I want my heart rate information to be monitored, so I can stay informed of my heart health.
- As a user, I want to authorize the BabyBoomer app to receive my health data so I could use the website.
- As a developer, I want to integrate app check so I can verify data requests originate from the app itself.
- As a user, I want to be able to authenticate utilizing local auth (Ex: Face ID, Touch ID, etc.)
- As a baby boomer, I would like to add a user as an authorized user so that they can access my health data.
- As a user, I want to be able to visualize the data that has been collected, so that I can interpret the data more easily.
- As a user, I want to be able to specify the period over which I can visualize data, so that I can reduce noise in the information I am analyzing.
- As a physician, I want to have a “Download Report” button in the web app, so I can save the file to my device.
- As a baby boomer, I would like to specify what data I want to share and with who, so that I have better control over my data.

Project Plan

This section describes the planning that went into the realization of this project. This project incorporated the agile development techniques and as such required the sprints to be planned. These sprint plannings are detailed in the section. This section also describes the components, both software and hardware, chosen for this project.

Hardware and Software Resources

The following is a list of all hardware and software resources that were used in this project:

- Visual Studio Code:
 - Integrated development environment.
- Flutter:
 - Platform agnostic UI framework for the Dart programming language.
 - Used to develop the UI of the application for all supported platforms with a single codebase.
- Firebase:
 - Backend technologies are provided by Firebase services.
 - Authentication
 - Firestore (NoSQL Database)
 - Storage
- Git:
 - Source control.
- Github:
 - Third-party service to store code repository.
- Google Drive:
 - General storage and collaborative editing of documents across the team.
- Discord:
 - Real-time text and voice communication amongst team members.

- Zoom:
 - Real-time voice communication with the professor and product owner

Sprints Plan

Sprint 1

Attendees: Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Katherine Diaz-Nunez, Xavier Fabian, Karen Martinez. Christian Hernandez, Destany Medina

Start time: 6:00 pm

End time: 7:00 pm

After discussion, the velocity of the team was estimated to be 327 hours.

1 story point = 3 hours

The product owner chose the following user stories to be done during the next sprint. They are ordered based on their priority.

- 1 - Review current documentation. - 2 story points
- 2 - Setup development environment. - 4 story points
- 3 - Review Flutter/Dart - 5 story points
- 4 - Optimize/Cleanup source code - 4 stories points
- 5 - Analyze the backend of the application / 5 story points
- 6 - Analyze the frontend of the application / 5 story points

The team members indicated their willingness to work on the following user stories.

- Carolina Martinez
 - 1, 2, 3 total 11 points
- Jasmine Restrepo-Gaitan
 - 1, 2, 3, - total of 11 points
- Roey Farag
 - 5, 6 total 10 story points
- Katherine Diaz-Nunez
 - 1, 2, 3 - total 11 story points
- Xavier Fabian
 - 1, 2, 3 - total 11 story points
- Karen Martinez
 - 1, 2, 6 total 11 story points
- Eduardo Cortes
 - 1, 2, 3 - total 11 story points

Christian Hernandez

- 1, 2, 3 - total 11 story points
- Destany Medina
 - 1, 2, 3 total 11 points
- Keiss De Los Santos
 - 1, 2, 3 - total 11 points

Sprint 2

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

After discussion, the velocity of the team was estimated to be.

1 story point = 1 day (3 hours)

The product owner chose the following user stories to be done during the next sprint. They are ordered based on their priority.

- 1- As a User, I want to be able to change my email, so that I can have better control over my account. (5 story points)
- 2- As a user (caregiver), I want to be able to see a page with the list of my care recipients. (6 story points)
- 3- As a user (baby boomer) I would like to create an emergency contact priority list so that my priority contacts get alerted first. (5 story points)

The team members indicated their willingness to work on the following user stories.

- Carolina Martinez
 - Story 1
- Jasmine Restrepo-Gaitan
 - Story 2
- Roey Farag
 - Story 1
- Katherine Diaz-Nunez
 - Story 1
- Xavier Fabian
 - Story 1
- Karen Martinez
 - Story 3
- Eduardo Cortes
 - Story 3
- Christian Hernandez
 - Story 3
- Destany Medina
 - Story 2

- Keiss De Los Santos
 - Story 2

Sprint 3

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

After discussion, the velocity of the team was estimated to be.

1 story point = 1 day (3 hours)

The product owner chose the following user stories to be done during the next sprint. They are ordered based on their priority.

- 1 - As a developer, I would like to develop any UX/UI having to do with changing the email address and any additional account changes (Carolina & Karen) -> 4 user story
- 2 - As a caregiver, I would like to get notified of the boomer's emergency so that I can act accordingly. (Jasmin & Destiny) -> 5 story points
- 3 - As a user (baby boomer) I would like to be able to chat/contact my caregivers about any concerns or questions that I may have regarding my health. (Roey & Eduardo) → 10 story points

The team members indicated their willingness to work on the following user stories.

- Carolina Martinez
 - Story #1
- Jasmine Restrepo-Gaitan
 - Story #2
- Roey Farag
 - Story #3
- Katherine Diaz-Nunez
 - Story #2
- Xavier Fabian
 - Story #1
- Karen Martinez
 - Story #1
- Eduardo Cortes
 - Story #3
- Christian Hernandez
 - Story #1
- Destany Medina
 - Story #2
- Keiss De Los Santos

- Story #2

Sprint 4

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

After discussion, the velocity of the team was estimated to be.

1 story point = 1 day (3 hours)

The product owner chose the following user stories to be done during the next sprint. They are ordered based on their priority.

- 1 - As a caregiver, I want to see a separate dashboard, different from that of recipients, so that I can receive emergency messages from my recipients.
- 2 - As a boomer, I would like to add medications to the medications page and have them be accessible from any device.
- 3 - As a developer, I would like to implement the missing UI pages and ensure it stays true to the UI design.
- 4 - As a boomer/caregiver, I would like to receive notifications about emergencies or important dates regarding the medications.
- 5 - As a developer, I would like to implement the backend functionality of the “Emergency Contact” feature.

The team members indicated their willingness to work on the following user stories.

- Carolina Martinez
 - Story #2 & 3 (In addition to Delete User Implementation)
- Jasmine Restrepo-Gaitan
 - Story #1
- Roey Farag
 - Story #5
- Katherine Diaz-Nunez
 - Story #2
- Xavier Fabian
 - Story #3
- Karen Martinez
 - Story #3 & 2
- Eduardo Cortes
 - Story #3
- Christian Hernandez
 - Story #2
- Destany Medina
 - Story #1

- Keiss De Los Santos
 - Story # 1

Sprint 5

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

After discussion, the velocity of the team was estimated to be.

1 story point = 1 day (3 hours)

The product owner chose the following user stories to be done during the next sprint. They are ordered based on their priority.

- 1 - As a caregiver, I want to receive emergency messages from my recipients.
- 2 - As a boomer, I would like to add medications to the medications page and have them be accessible from any device.
- 3 - As a developer, I would like to implement the missing UI pages and ensure it stays true to the UI design.
- 4 - As a boomer, I would like to see the medication's that I need to take on the dashboard.
- 5 - As a developer I would like to add the functionality for the different buttons on the profile page.

The team members indicated their willingness to work on the following user stories.

- Carolina Martinez
 - Story # 2,3
- Jasmine Restrepo-Gaitan
 - Story # 1
- Roey Farag
 - Story # 5
- Katherine Diaz-Nunez
 - Story # 3
- Xavier Fabian
 - Story # 4
- Karen Martinez
 - Story # 2
- Eduardo Cortes
 - Story #2, 4
- Christian Hernandez
 - Story # 3
- Destany Medina

- Story # 1
- Keiss De Los Santos
 - Story # 3

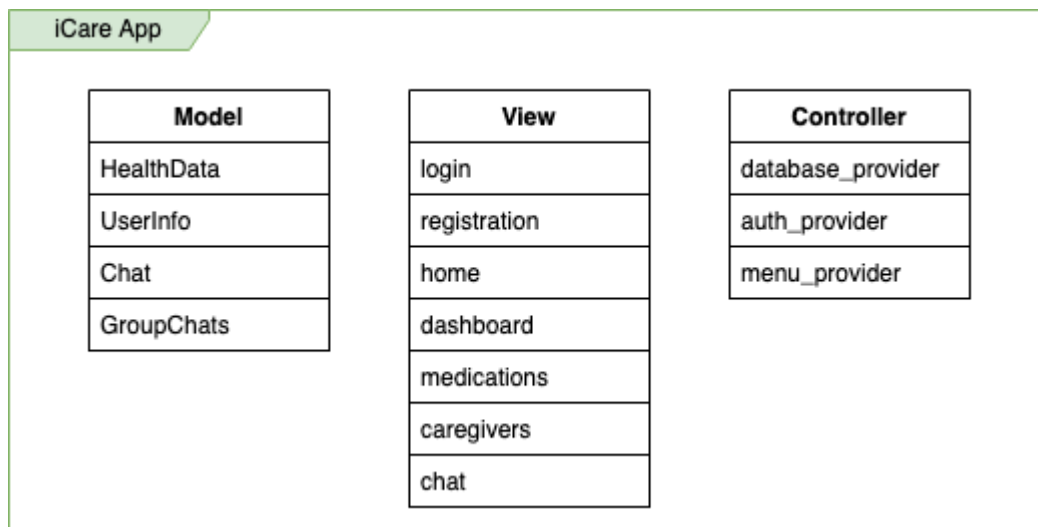
System Design

This section contains information on the design decisions that went into this project. The architecture patterns are outlined and explained. The entire system is shown in a package diagram and the subsystems are explained.

Finally, the design patterns used in the project are discussed.

Architectural Patterns

Our project was developed with a Model-View-Controller pattern in mind.



MVC Diagram of Project Architecture

System and Subsystem Decomposition

User System:

The user's system is the device they use to access the app, whether that be a mobile device or PC. The app is currently accessible on devices running android, iOS, or Windows operating systems.

iCarePro App System:

The iCarePro app system is what ties together all the other systems & subsystems and allows users to interact with them. Using UI elements, users can interact with the app to perform functions such as creating and logging into accounts, update their profile information, chat with their caregivers as well as all the other features available on the app. As this system is user-facing, it was built with Flutter to make

Firebase System:

Firebase is at the core of many features of the application such as user registration and authentication, storage of user data and hosting the database for the application. The three subsystems of Firebase are Firestore and Firebase Authentication.

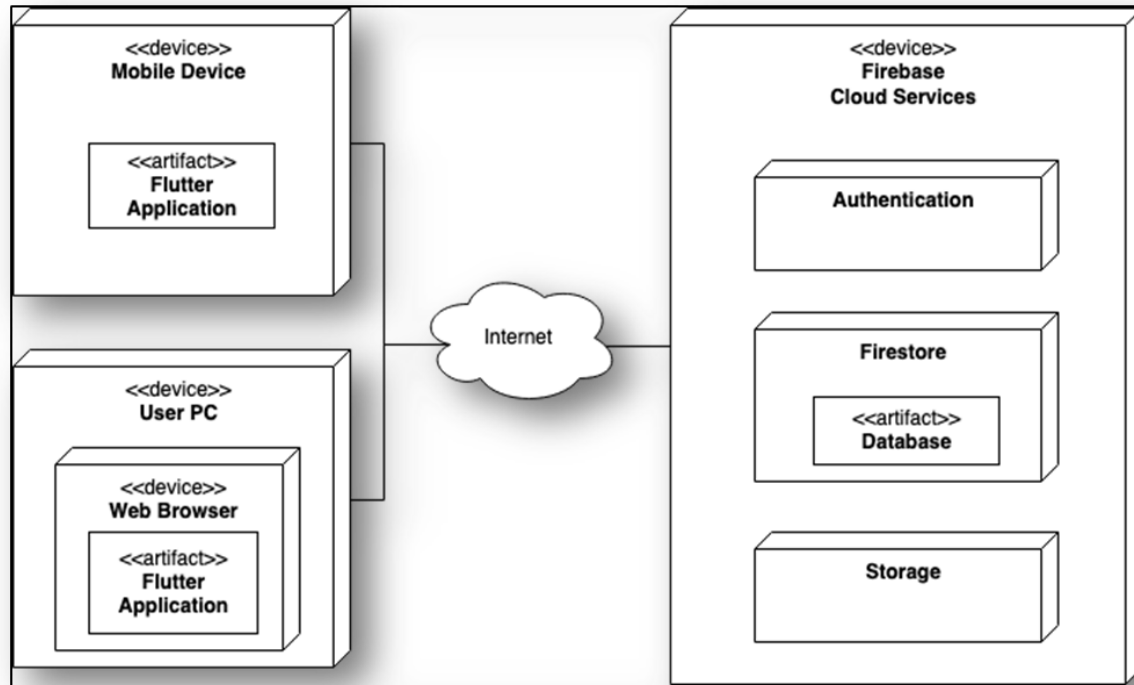
Firestore System:

Firestore is a NoSQL database which we use to store user information such as first names, last names, email addresses, phone numbers, user ID's as well as various other pieces of user information. Firestore also allows for the functionality of the in-app chat and group chat features.

Firebase Authentication System:

Firebase Authentication enables the registration of new users, assigning each of them a unique user ID and allows us to access these users through the associated email address with any given account. Firebase Authentication also allows us to login users, either through an email and password, or using social authentications such as google and facebook.

Deployment Diagram



Design Patterns

Singleton: We used the Singleton design pattern within the Health Model class to not have health data be overwritten by having multiple instances of the model exist in memory at a time.

State: We used a state design pattern in the creation of both the user login persistence and the menu bar navigation logic. Depending on the user's authentication state (logged in or not logged in) we would present them with either the home screen or the authentication screen. In the menu bar the current page that is displayed is also determined by setting the menu bar's state to the page that the user clicks.

System Validation

The following features were the main test for the apps functionality:

1. **Description:** Ensure that when any user logs in, their email is verified and the app can be accessed.

Procedure: User logs in with online credentials. When first testing our features, we used a test account with the username test@test.com and the password testing1234

Expected Outcome: Once user is authorized and logged in, they are greeted with the dashboard and a sidebar which allows them to choose which page they want to go to next

Actual Outcome: Once user is authorized and logged in, they are greeted with the dashboard and a sidebar which allows them to choose which page they want to go to next.

2. **Description:** Ensure that when a user moves, their steps are automatically updated

Procedure: User logs in with online credentials. User moves with the device with the app on their person.

Expected Outcome: Once an authorized and logged in user has signed in, if the device was with them when they were moving, the steps they have taken will be calculated.

Actual Outcome: Once an authorized and logged in user has signed in, if the device was with them when they were moving, the steps they have taken will be calculated.

3. **Description:** Ensure that a user can chat with their caregivers.

Procedure: User logs in with online credentials. Users access the chat to communicate with caregivers.

Expected Outcome: Once an authorized and logged in user has signed in, after they go to their chat, they can send messages to their caregivers and their caregivers can reply.

Actual Outcome: Once an authorized and logged in user has signed in, after they go to their chat, they can send messages to their caregivers and their caregivers can reply.

4. **Description:** Ensure that medications can be added and deleted in the Medications page.

Procedure: User logs in with online credentials. Users will add the medications they need or delete the

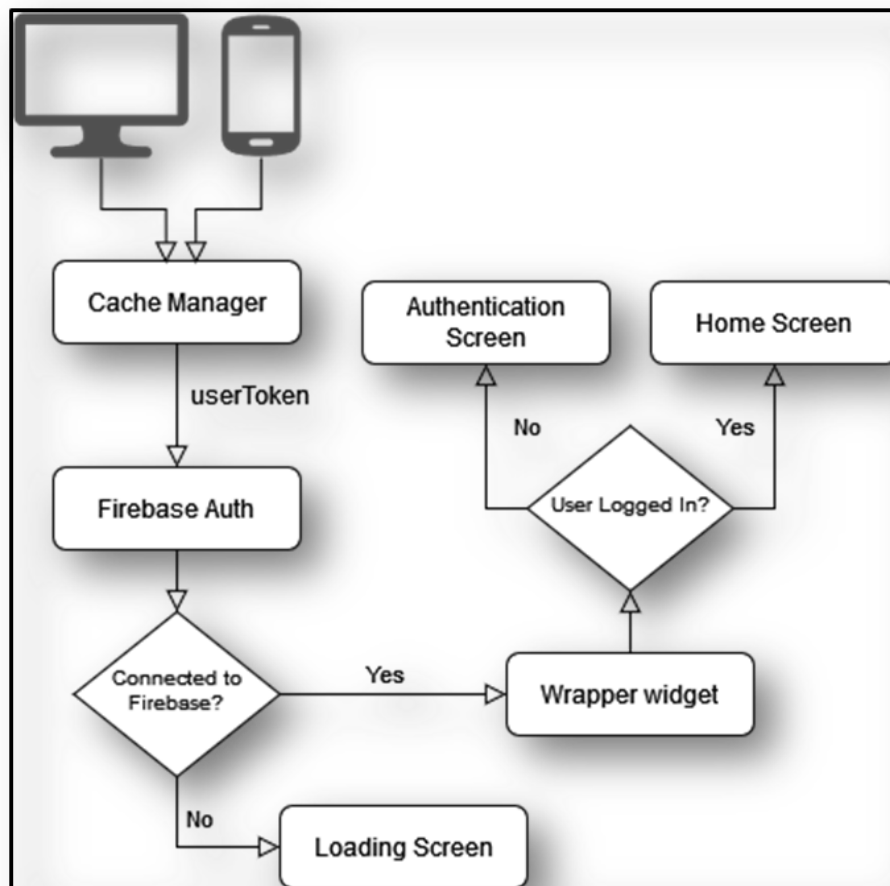
ones they longer need.

Expected Outcome: Once an authorized and logged in user has signed in, after going to the Medications page, they can add medications they need as well as delete medications they do no longer need.

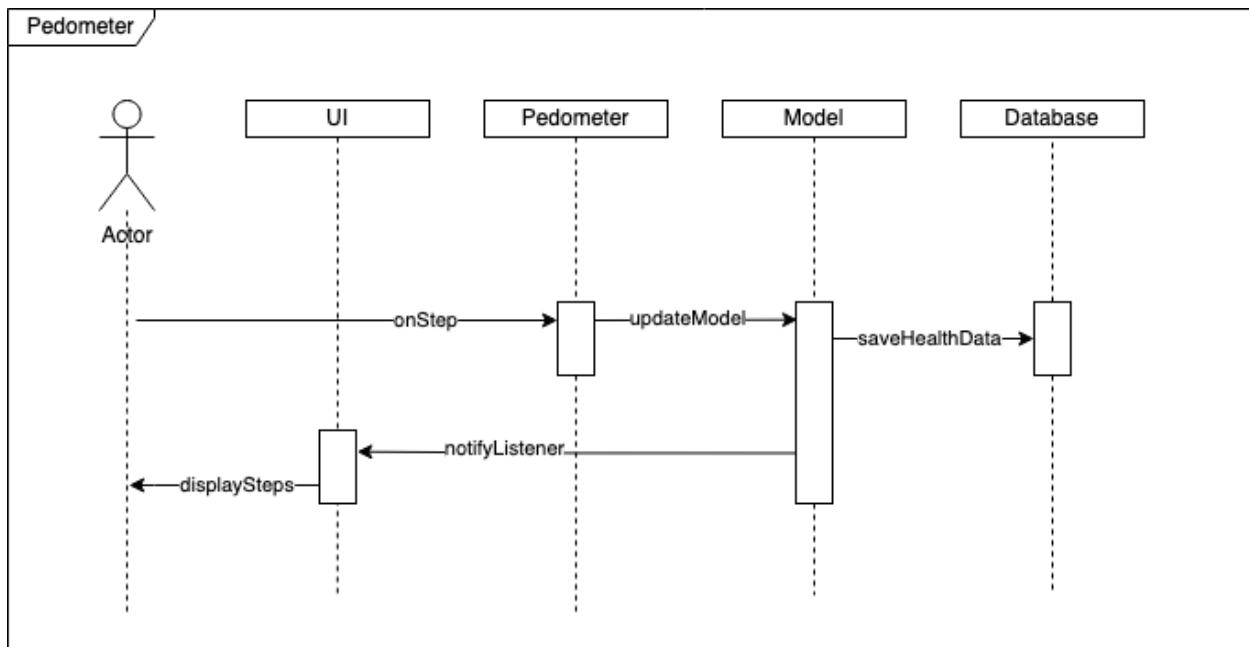
Actual Outcome: Once an authorized and logged in user has signed in, after going to the Medications page, they can add medications they need as well as delete medications they do no longer need.

Appendix

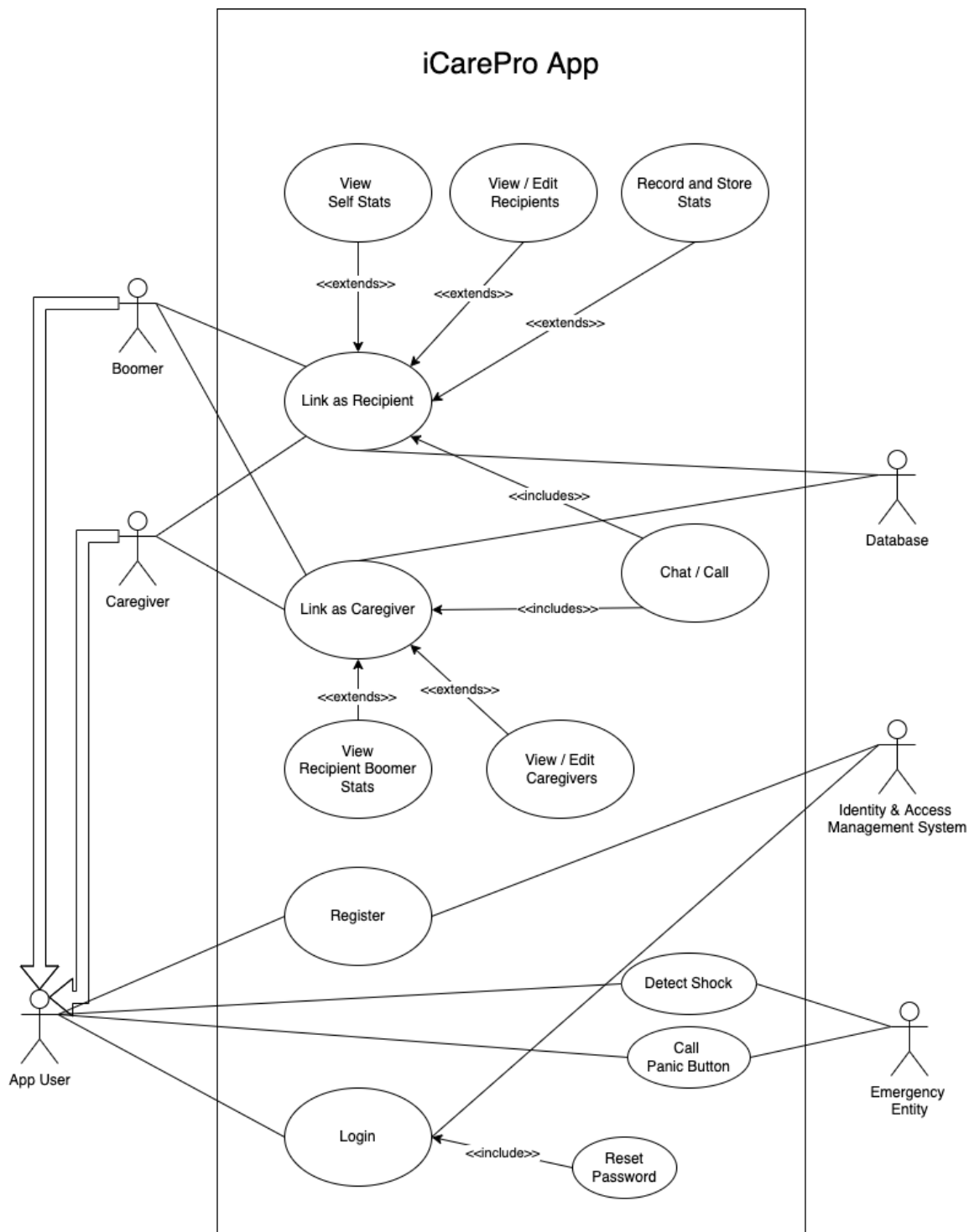
Appendix A - UML Diagrams



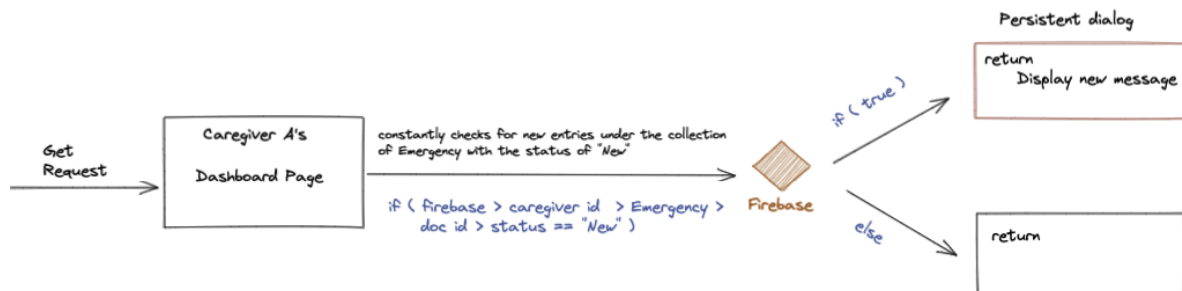
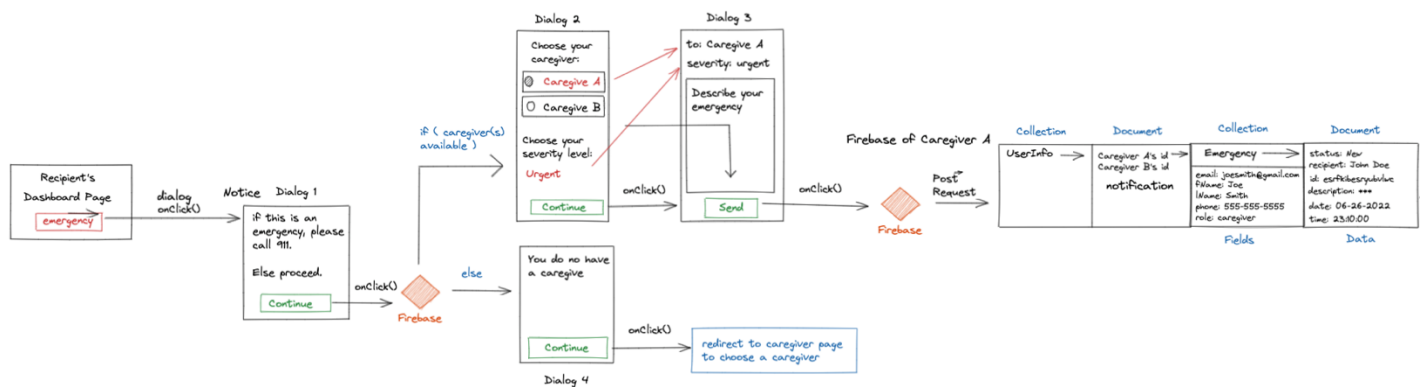
Login Persistence Flowchart



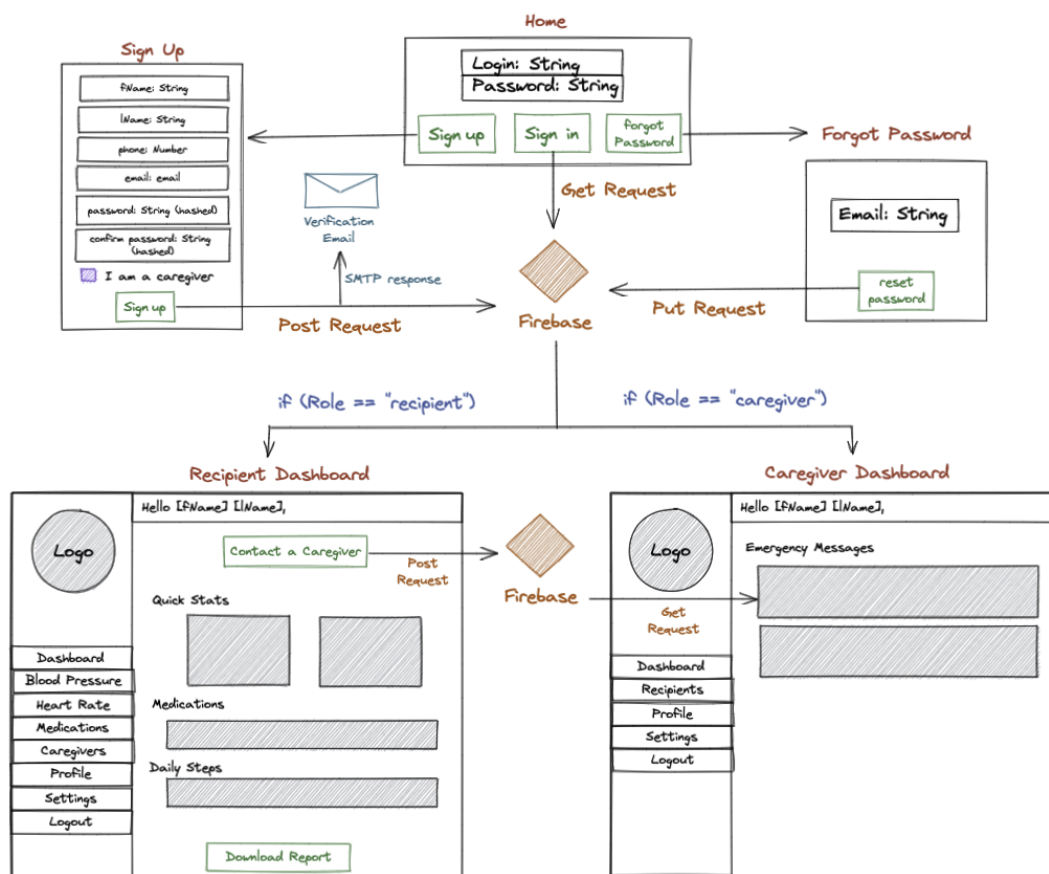
Pedometer Bar Sequence Diagram



Use Case Diagram for the application

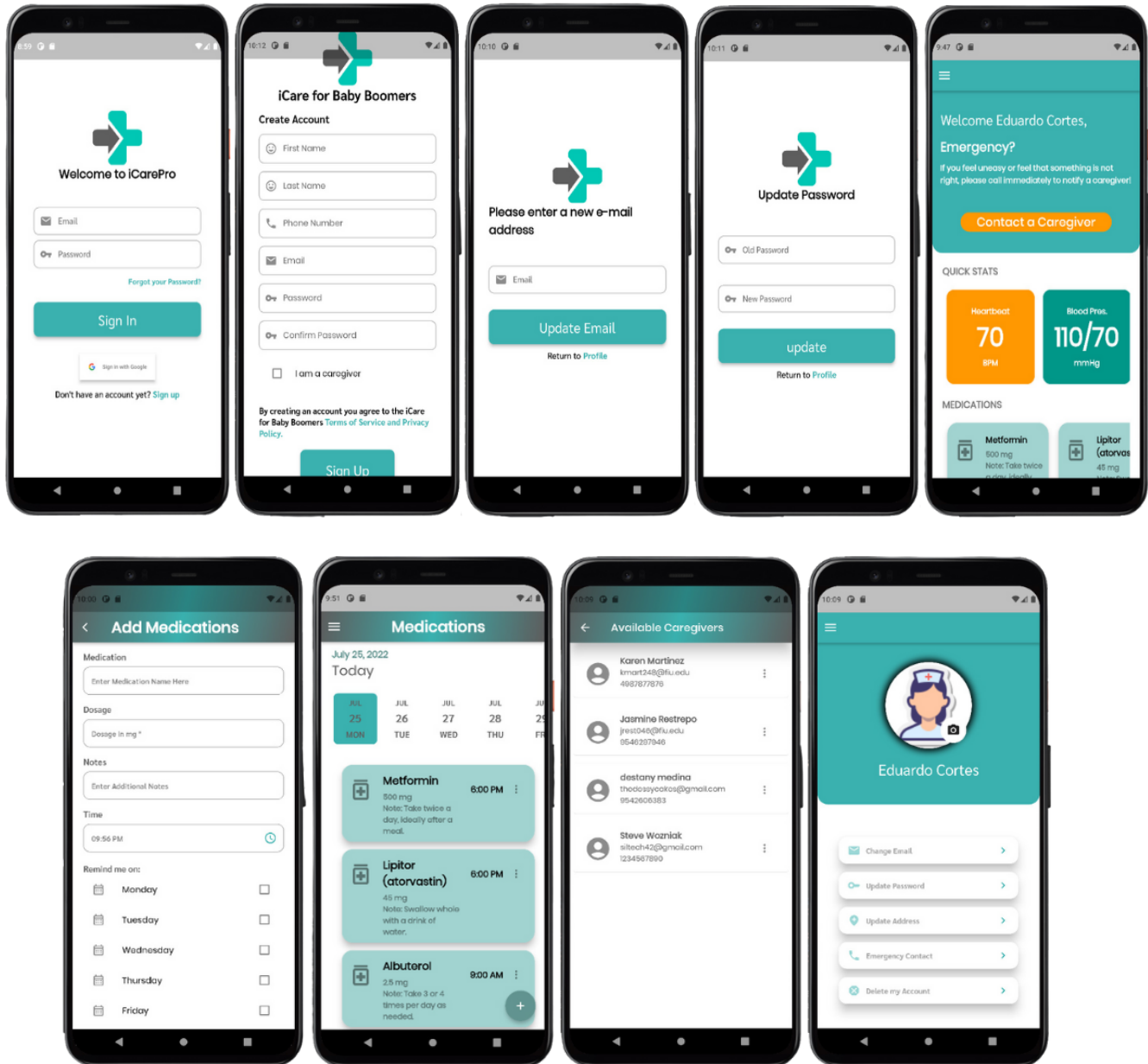


Emergency Message Process Diagram



Process Diagram

Appendix B - User Interface Design



Appendix C - Sprint Review Reports

Sprint Review 1

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

Start time: 6:00 PM

End time:

After a show and tell presentation, the implementation of the following user stories was accepted by the product owners: All.

- 1 - As a User, I want to be able to change my email, so that I can have better control over my account.
- 2 - As a user (caregiver), I want to be able to see a page with the list of my care recipients.
- 3 - As a user (baby boomer) I would like to create an emergency contact priority list so that my priority contacts get alerted first.

The following ones were rejected and moved back to the product backlog to be assigned to a future sprint at a future Sprint Planning meeting.

- None.

Sprint Review 2

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

Start time: 6:00 PM

End time: 6:15PM

After a show and tell presentation, the implementation of the following user stories was accepted by the product owners: All.

- 1-As a User, I want to be able to change my email, so that I can have better control over my account.
- 2-As a user (caregiver), I want to be able to see a page with the list of my care recipients.

- 3 - As a user (baby boomer) I would like to create an emergency contact priority list so that my priority contacts get alerted first.

The following ones were rejected and moved back to the product backlog to be assigned to a future sprint at a future Sprint Planning meeting.

- None.

Sprint Review 3

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

Start time: 6:00 PM

End time: 6:30 PM

After a show and tell presentation, the implementation of the following user stories was accepted by the product owners: All.

1 - As a developer, I would like to develop any UX/UI having to do with changing the email address and any additional account changes.

2 - As a caregiver, I would like to get notified of the boomer's emergency so that I can act accordingly.

3 - As a user (baby boomer) I would like to be able to chat/contact my caregivers about any concerns or questions that I may have regarding my health.

The following ones were rejected and moved back to the product backlog to be assigned to a future sprint at a future Sprint Planning meeting.

- None.

Sprint Review 4

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

Start time: 6:00 PM

End time: 6:30 PM

After a show and tell presentation, the implementation of the following user stories was accepted by the product owners: All.

1 - As a caregiver, I want to see a separate dashboard, different from that of recipients, so that I can receive emergency messages from my recipients.

2 - As a boomer, I would like to add medications to the medications page and have them be accessible from any device.

3 - As a developer, I would like to implement the missing UI pages and ensure it stays true to the UI design.

4 - As a boomer/caregiver, I would like to receive notifications about emergencies or important dates regarding the medications.

5 - As a developer, I would like to implement the backend functionality of the “Emergency Contact” feature.

The following ones were rejected and moved back to the product backlog to be assigned to a future sprint at a future Sprint Planning meeting.

- None

Sprint Review 5

Attendees: Destany Medina, Carolina Martinez, Eduardo Cortes, Jasmine Restrepo-Gaitan, Roey Farag, Keiss De Los Santos, Katherine Diaz-Nunez, Christian Hernandez, Xavier Fabian, Karen Martinez.

Start time: 6:00 PM

End time: 6:30 PM

After a show and tell presentation, the implementation of the following user stories was accepted by the product owners: All.

1 - As a caregiver, I want to receive emergency messages from my recipients.

2 - As a boomer, I would like to add medications to the medications page and have them be accessible from any device.

3 - As a developer, I would like to implement the missing UI pages and ensure it stays true to the UI design. (Continued from Prior Sprint)

4 - As a boomer, I would like to see the medication’s that I need to take on the dashboard.

5 - As a developer I would like to add the functionality for the different buttons on the profile page.

The following ones were rejected and moved back to the product backlog to be assigned to a future sprint at a future Sprint Planning meeting.

- None.

Appendix D - User Manuals, Installation/Maintenance Document, Shortcomings/Wishlist Document, and other documents

Shortcomings

During this semester the goal of our team was to refine the first iteration of the application that was developed last semester. We had the opportunity of implementing and improving many features. Due to time constraints and our semester having less development sprints we were not able to deliver the application in full completion.

Features to Improve

- Improved sign in with google, as off now you are not able to sign in into the application using google.
- Improved download report feature, you can find this button in the dashboard of the app, the current implementation only shows the UI which can also be improved by changing the color to make it match the theme of the application.
- Another feature that needs to be improved is the blood pressure and heart rate page of the app.
- Improved chat feature works perfectly fine but enhance by adding the option of voice messages between caregivers and recipients.

Features to Implement

- Facebook login across all platforms.
- Detailed health data collections as well as implementing new ways to visualize it.
- Other ways to authenticate (like Face ID AND Touch ID).

Developers Guide

The following guide will walk developers through the process of setting up an environment and getting the project up and running for the first time. There are several required pieces of software that need to be installed on the development machine, but all in all getting the project to run should be very simple. Most of your time will be spent getting all the prerequisite software installed if you don't already have it.

Prerequisite Software:

- Git
- Flutter
 - Follow the instructions for your platform here: <https://docs.flutter.dev/get-started/install>
- Either of the following IDE/editors:
 - Android Studio
 - VS Code
- XCode (If developing for iOS)

Now that we have all the required software you will be able to visit the GitHub repository for the project and clone the project to your development machine and follow the instructions below.

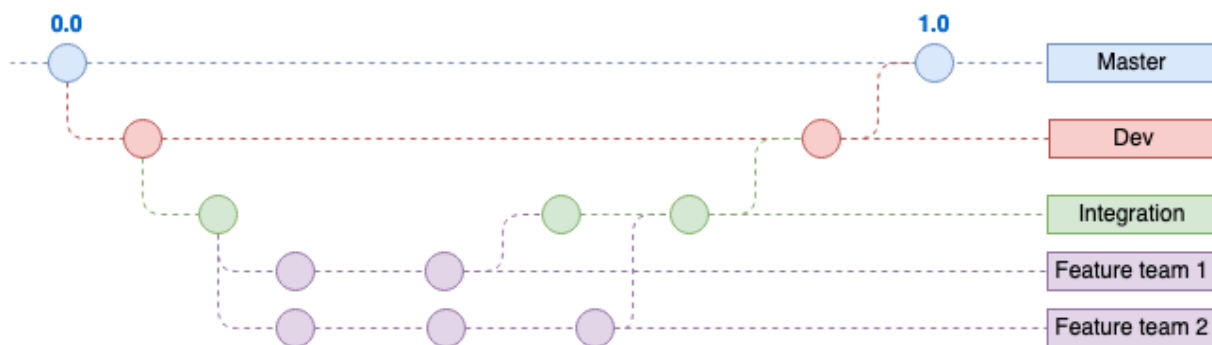
1. Clone the project
2. Install flutter packages (flutter pub get)
3. Open the project with your IDE of choice.
4. Run the project in whichever of the supported modes (iOS, Android, or Web)

That should be all you need to get the project running on your machine. Please see the following guides below that outline our branching/merging strategy and our branch naming conventions.

Branching/Merge Strategy

Now that we've covered the basics of git, we can move on to what's going to be a merging strategy for the rest of the project. We need to work intelligently and carefully, to ensure we don't trample over each other's work and if (when) we do, we use git in a way that it can help us remedy the situation with minimal headaches.

Looking at the diagram below we can see what the general flow of development is going to be.



We'll have a "main/master" branch that will only be used to push code that has been pushed into the "Dev" branch and will essentially be our "release" branch. Dev is going to be used to collect "features" until we have enough features implemented that would warrant a release. Integration is where we merge different feature branches into and stamp out any issues/bugs/conflicts that we might run into when merging different chunks of code together.

You, as a developer, are responsible for creating a new branch when you're going to work on a new feature. You should not be committing code directly into the integration, dev, or main branches.

Branch Naming Convention

When you first receive the project, you'll notice that many of the branches have seemingly nonsensical names, but the following information should provide the rationale, and a possible strategy for your team to use, behind our methodology.

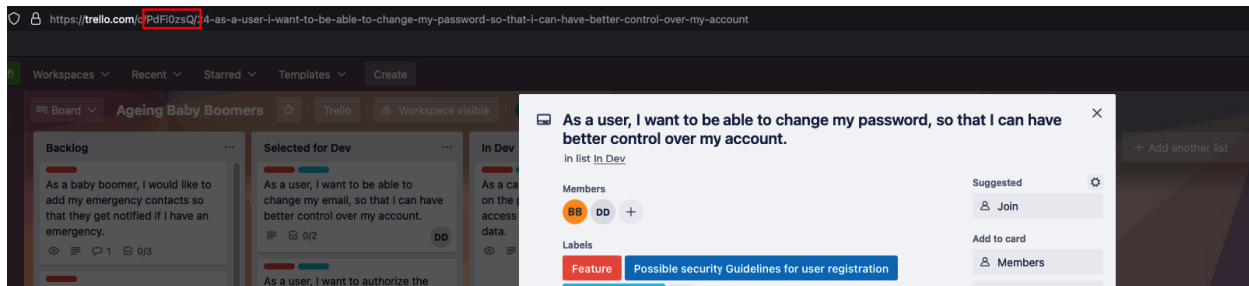
During our development process, we used Trello to help with our project management. If you've never used any sort of project management software before, the concept is very simple and commonly translates across different platforms. Trello is essentially a board composed of columns on which you place "cards" which represent tasks (or stories). These cards typically have some sort of unique ID. This ID provides a quick and easy way to name a

branch and guarantee that there won't be multiple branches with similar names causing confusion. Instead, by simply navigating to the card in question on Trello, we can quickly deduce the exact branch name by looking at the URL of the card.

When creating a new branch, you should name it according to the following convention:

“feature/<card_id>”

Where the card ID can be found in the card URL:



Example of creating/checking out a branch:

When you want to create a new branch, you need to use the command “git branch <branch_name>”, and then you need to use “git checkout <branch_name>” to "activate" said branch. The command “git checkout -b <branch_name>” is equivalent to using these last two commands and creates and checks out the new branch within a single command.

References

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