

Florida International University
Knight Foundation School of Computing and Information Sciences

Software Engineering Focus

Final Deliverable

Project Title:
NuMom (Keeping Mothers and Infants Healthy)

Team Members: Miguel Sablan, Samuel Pellot, Jason Francis, Vanya Farzamipour

Product Owner: Jean Hannan

Mentor: Eduardo Morales

Instructor: Masoud Sadjadi

The MIT License (MIT)
Copyright (c) 2016 *Florida International University*

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Abstract

This document presents the information necessary to gain a good understanding of the current state of NuMom (Keeping Moms and Infants Healthy) after the Spring 2023 Capstone II development cycle. NuMom is an application for both Android and iOS devices made with the intent to provide free and easy access to prenatal and postnatal learning resources to low-income, minority mothers, who have been found to regularly have reduced access when compared to other populations. Besides providing features such as location searching and document/immunization/appointment recording, the resources provided by this app include of but are not limited to: growth milestones, feeding, safe sex practices, STDs, applying to help programs, etc.. The application is fully translated between English, Spanish, and Haitian Creole to ensure larger populations can access support systems for mothers and children alike. Throughout this semester, the development team of four people has put a focus on upgrading the application from Expo version 45 to 48. This means while various smaller features were implemented, a good amount of development time was spent on resolving both major and minor bugs.

Table of Contents

INTRODUCTION	5
CURRENT SYSTEM	5
PURPOSE OF NEW SYSTEM	5
USER STORIES	6
IMPLEMENTED USER STORIES	7
PENDING USER STORIES	10
PROJECT PLAN	12
HARDWARE AND SOFTWARE RESOURCES	12
SPRINTS PLAN	13
<i>Sprint 1</i>	13
<i>Sprint 2</i>	13
<i>Sprint 3</i>	14
<i>Sprint 4</i>	15
<i>Sprint 5</i>	16
<i>Sprint 6</i>	17
<i>Sprint 7</i>	18
SYSTEM DESIGN	20
ARCHITECTURAL PATTERNS	20
SYSTEM AND SUBSYSTEM DECOMPOSITION	21
DEPLOYMENT DIAGRAM	22
DESIGN PATTERNS	22
SYSTEM VALIDATION.....	23
GLOSSARY	37
APPENDIX	38
APPENDIX A - UML DIAGRAMS	38
<i>Static UML Diagram.....</i>	38
<i>Dynamic UML Diagrams.....</i>	40
APPENDIX B - USER INTERFACE DESIGN	52
APPENDIX C - SPRINT REVIEW REPORTS	69
APPENDIX D - USER MANUALS, INSTALLATION/MAINTENANCE DOCUMENT, SHORTCOMINGS/WISHLIST DOCUMENT AND OTHER DOCUMENTS	74
REFERENCES	80

INTRODUCTION

Current System

The current system consists of a mobile app with support for both Android and iOS devices. Users can sign up for an account within the app to gain access to a variety of useful features. This includes the ability to search for clinics and shelters, learn about feminine sexual and reproductive health, and use tabs to keep track of important vaccination records, documents, and appointments. The application's target audience is new mothers from low-income minority households and/or single mothers.

Purpose of New System

The primary objective for this semester was to ensure the smooth functioning of the app when upgrading from Expo version 45 to 48. This goal was achieved successfully. However, during the process of upgrading other dependencies, a few additional challenges were encountered. Nevertheless, all required upgrades have now been completed, and the app is fully functional. Additionally, a various bugs and UI changes were made in order to ensure the user has a great experience when using the app.

USER STORIES

The following section provides the detailed user stories that were implemented in this iteration of the NuMom 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

User Story ID	Belongs To	Description	Assignee
#01	Developers	Review Pull Requests for each Sprint	All members
#02	Developers	Post a new issue to GitHub	All members
	Developers	Task #1: Welcome Spring 2023!	Entire team
#583	Developers	Task #2: Password Strength Checker	Entire team
#594	Developers	Update UI for phone number text	Miguel Sablan
#486	Developers	Condensing info on multiple STD tabs	Vanya Farzamipour
#399	Developers	Add Password Strength Progress Bar to Sign Up page	Samuel Pellot
#553	Developers	Text Visibility and Words Cut-Off within Feeding Section	Jason Francis
#479	Developers	Change font color to white when in dark mode on Appointment Tab: Dates	Samuel Pellot
#602	Developers	Update phone number text in settings	Miguel Sablan
#608	Developers	Darken Information on Steps and Feeding Pages	Jason Francis
#611	Developers	Get rid of Unused imports in file	Vanya Farzamipour
#545	Developers	Upgrade Expo to version 48	Miguel Sablan, Jason Francis, Samuel Pellot
#1000	Developers	Finish Final Deliverable and Prepare for Showcase	Vanya Farzamipour, Miguel Sablan,

			Samuel Pellot, Jason Francis
--	--	--	---------------------------------

Pending User Stories

User Story ID	Belongs To	Description
#611	Developers	Get rid of unused imports
#610	Developers	Stop the user from being logged out when they press the previous page button (mobile)
#607	Developers	Fix word/letter spacing for the relevant information sections in the Feeding page.
#600	Developers	Add Date of Birth restrictions on sign-up page
#593	Developers	Change the font color for Text Fields
#592	Developers	Improve password screen feedback (weak password)
#574	Developers	Clean up formatting of Birth Control Section
#501	Developers	Sorting for the Immunization Schedule page
#486	Developers	Make information more concise on several different pages

Final Deliverable

Project Name

#406	Developers	Add a way to Rename/Delete Uploaded Documents
------	------------	---

Date

Page 8 of 33

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:

iOS	Android	Software
iPhone 14 Pro Max	Samsung Galaxy S10	Visual Studio Code
iPhone XR	Samsung Galaxy S23	Firebase
		Git
		iPhone Simulator

Sprints Plan

Sprint 1

Team was assigned to a previous project before being reassigned to the NuMom project, thus nothing was done for Sprint 1.

Sprint 2

User Story 1 - Welcome Spring 2023!

Install expo, run the app, and make the first pull request on the repo to make sure everyone can access the app.

User Story 2 - Password Strength Checker

After the meeting, Capstone 2 students should do this as an introductory task in the app.

User Story 3 - Post a new Issue to the Github

Test the app and post a new issue on Github.

Sprint 3

User Story 1 – Update UI for phone number text in Sign Up

The UI for the phone number in the sign up tab should be formatted.

User Story 2 – Add Password Strength Progress Bar to Sign Up page

A password strength progress bar should be added to the sign up page.

User Story 3 – Text visibility and words cut off within Feeding Section

The words within the feeding section were a bit too bright and thus made it difficult to see it clearly. In addition words were being cut off on the right side of the screen.

User Story 4 – Condensing info on multiple STD tabs

The STD tabs had a lot of information on them. Condensing the information would make page easier to read.

Sprint 4User Story 1 – Change font color to white when in dark mode on Appointment Tab: Dates

The font color when in dark mode made the text under Appointment Tab: Dates difficult to read. Changing the font color to white would greatly help its readability.

User Story 2 – Update UI for phone number text in Settings

The UI for the phone number in the settings tab should be formatted.

User Story 3 – Darken information on Steps and Feeding pages

The text on the Steps and Feeding pages were bright and difficult to read. Darkening the text would help solve this issue.

Sprint 5User Story 1 – Get rid of unused imports

Getting rid of unused imports needed to be completed in order to do the upgrade

User Story 2 – Upgrade expo version to 48

The expo version was updated from version 45 to 48

Sprint 6User Story 1 – Upgrade expo version to 48

The expo version was updated from version 45 to 48

User Story 2 – Update Icon for Immunization Tab

The Icon for the Immunization Tab should be updated.

Sprint 7

User Story 1 – Work on Final Deliverable

Work on completing the final documentation as well as the four videos and our individual posters.

SYSTEM DESIGN

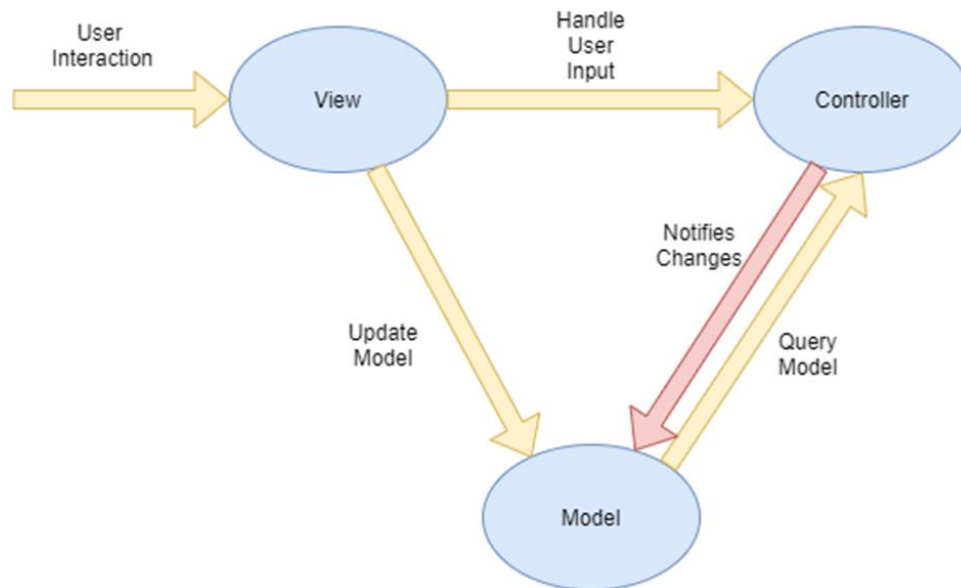
This section contains information on the design decisions that went into this project. The architecture patterns are outlined and explained. The entire system is shown in a package diagram and the subsystems are explained. Finally, the design patterns used in the project are discussed.

Architectural Patterns

Model-view-controller, popularly known as MVC, was the pattern that we employed. The application was separated into three sections using this structure:

- View - displays the information to the user, the user interface (UI).
- Controller - handles the user's inputs.
- Model - contains the core functionality, logic, and data of the application.

The data model, user-facing information, and control information were all intended to be contained in this MVC. Because it permits code reuse within the application, this design pattern is effective.

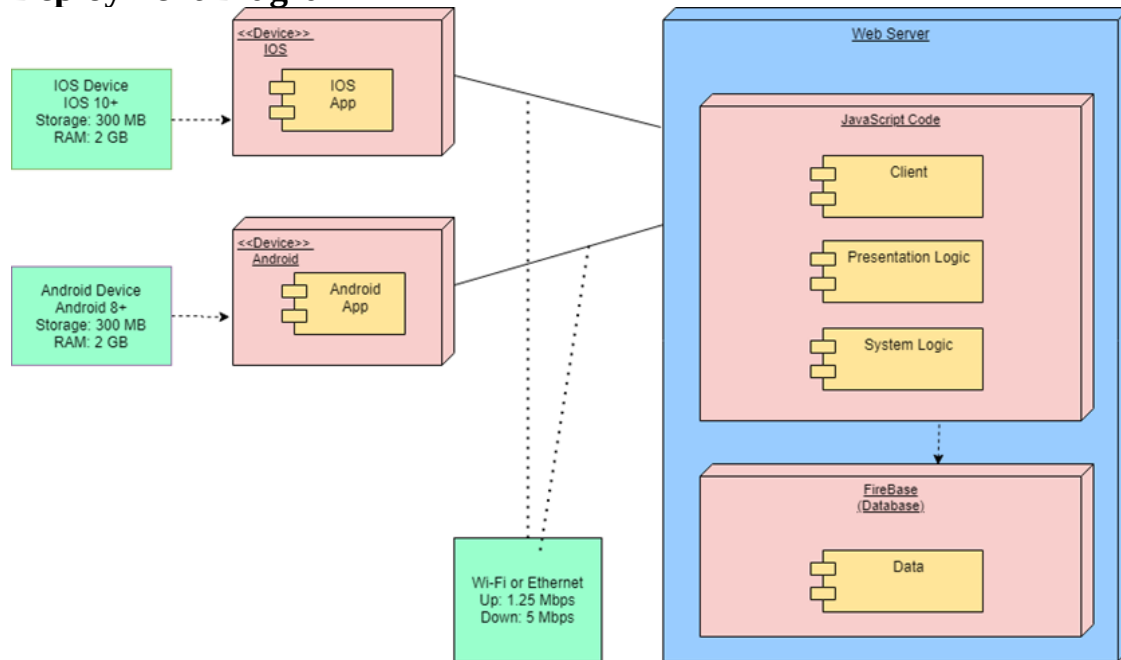


- View- displays the information to the user, the UI
- Controller- handle the user input
- Model- contains the core functionality and data

System and Subsystem Decomposition

The app was built with React Native and deployed with Expo packages and scanned a given QR code with the Expo GO app. Source code and assets are available in the src folder of the project, as well as the translation files for the English, Spanish, and Creole versions of the app. To replace class inheritance, we used React Hooks throughout the program. React Hooks is similar to class inheritance, but it has functions passing returns that are used anytime a component is called within another component

Deployment Diagram



Design Patterns

- Facade: The app uses a Facade design pattern to represent the UI in a user-friendly way without exposing the logic of the system to the user.
- Singleton: The app uses a Singleton design pattern to maintain only one instance of Firebase, with only one global access point to avoid instantiating the database API multiple times.
- Iterator: The app uses the Iterator design pattern to display multiple buttons, as well as display the Clinics and the Shelters.
- Chain of Responsibility: In the app several components delegate access of functions to other components which use a chain of responsibility design pattern.

SYSTEM VALIDATION

Using Github as our version control system, every user story had a branch that pertained to changes relating to it. Our changes came about with the help of IDE debugging (whether the developer decided to use Visual Studio Code or JetBrains WebStorm), and the frameworks we used throughout development (React Native and JavaScript). Only once the code was verified would we merge it into the main development branch. Verification of our work was a collaborative effort, where each one of our pull requests required reviews from two other team members to be considered ready. When reviewing, we would run the app locally using Expo on our own devices and ensure the issue was completed correctly and caused no new issues along the way. Issues were reported if necessary, and we always made sure to check on both Android and iOS devices to ensure consistency. At the end of the semester, the development branch was merged into the release branch and the culmination of our work was released into the world.

GLOSSARY

API: Short for Application Programming Interface. a set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service.

Authentication: The process of confirming if the user is who the user says it is

Cloud Functions: Cloud Functions is a server-less execution environment for building and connecting cloud services.

Dependencies: is a broad software engineering term used to refer when a piece of software relies on another one

Expo: Expo is a platform that allows you to develop and quickly iterate on applications that are based in React Native and JavaScript.

Feature: A capability that the software offers

Framework: A basic structure underlying a system, concept, or text.

IDE: Short for Integrated Development Environment. is a software application that provides comprehensive facilities to computer programmers for software development.

Product Owner: The person responsible for guiding changes and talking to developers about things that need to be modified on a software.

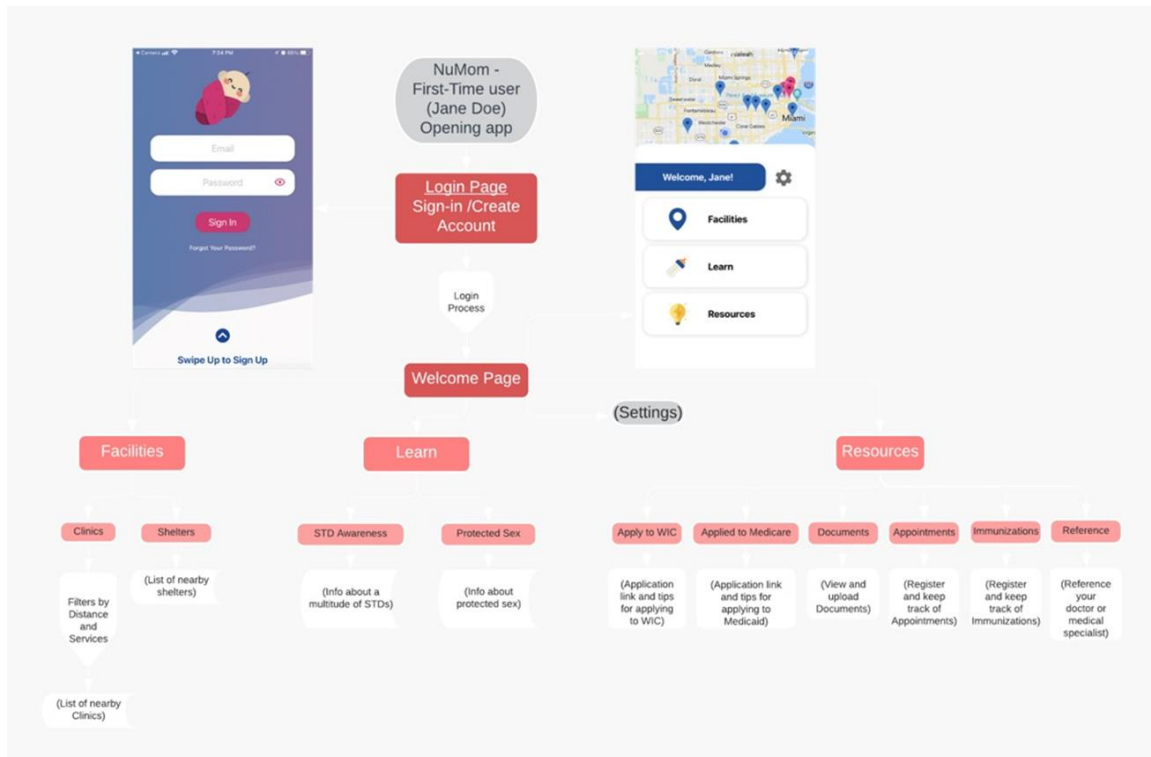
TestFlight: is an online service for over-the-air installation and testing of mobile applications, currently owned by Apple Inc. and only offered to developers within the iOS Developer Program

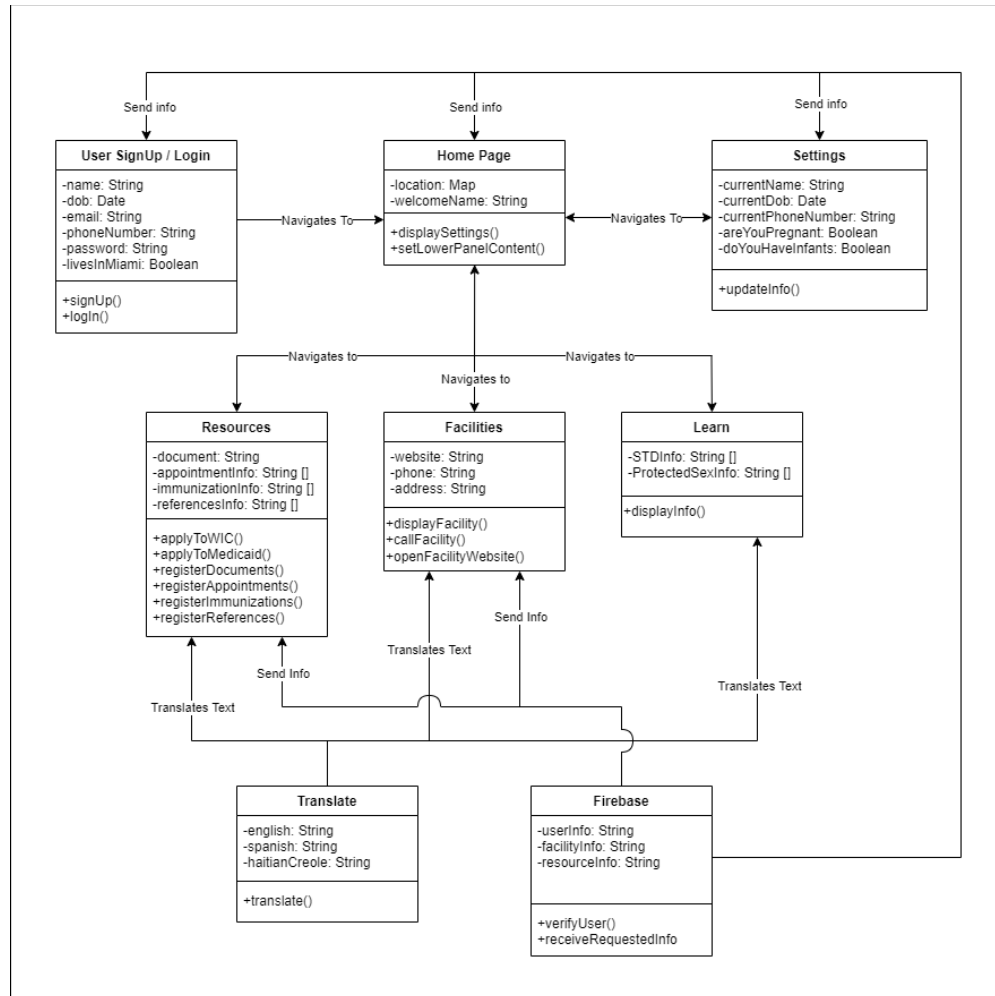
UI: Short for User Interface. Is the display on which the user interacts.

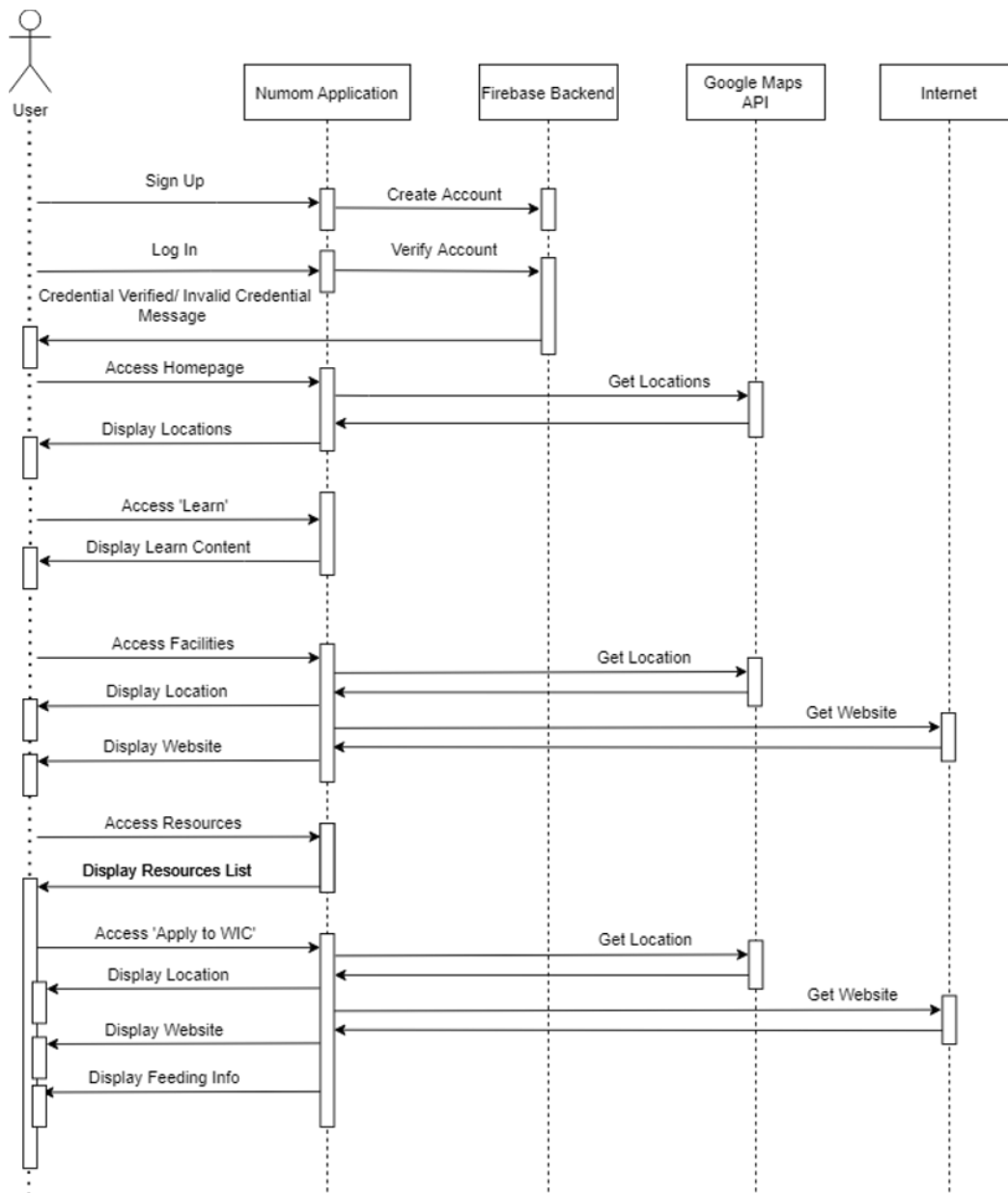
UML diagram: Is a diagram based on the UML (Unified Modeling Language) with the purpose of visually representing a system along with its main actors, roles, actions, artifacts or classes, to better understand, alter, maintain, or document information about the system.

APPENDIX

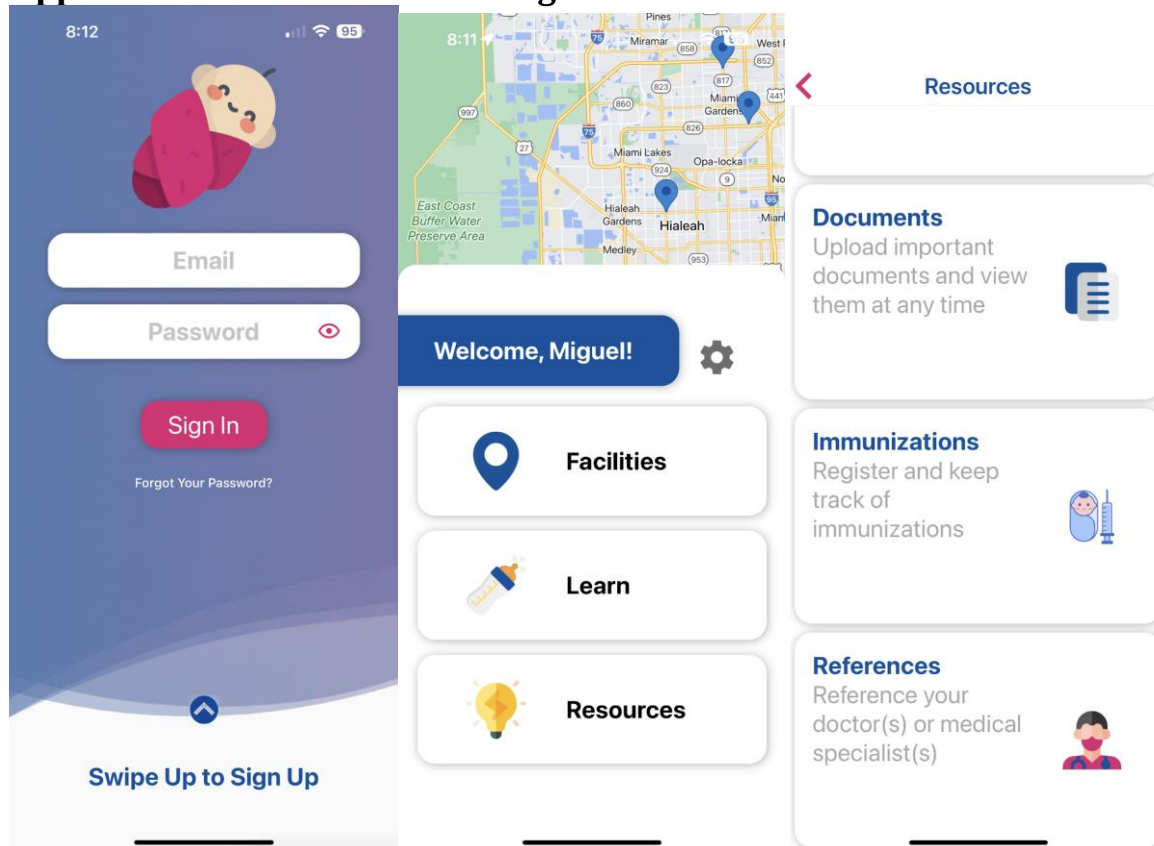
Appendix A - UML Diagrams

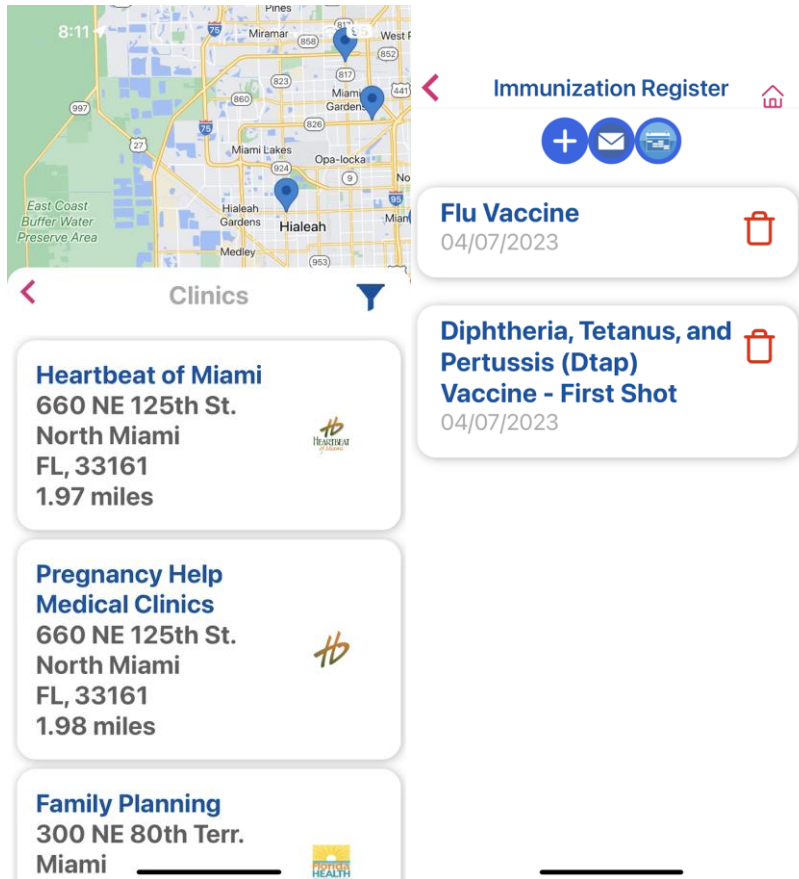






Appendix B - User Interface Design





Appendix C - Sprint Review Reports

Sprint Review 2 Meeting Minutes

Attendees: Vanya Farzamipour, Jason Francis, Samuel Pellot, Miguel Sablan

Start time: 8pm

End time: 8:30

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

- User Story: Tasks 1&2 Running the app & solving an issue

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

- This will flow into the next Sprint as we keep advancing

Sprint Review 3 Meeting Minutes

Attendees: Vanya Farzamipour, Jason Francis, Samuel Pellot, Miguel Sablan

Start time: 8:30pm

End time: 9pm

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

- User Story : worked on self assigned tasks

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

- User Story #2 How this should be reflected on the user story definition in Mingle:
 - All team members worked individually this sprint

Sprint Review 4 Meeting Minutes

Attendees: Vanya Farzamipour, Jason Francis, Samuel Pellot, Miguel Sablan

Start time: 9:30pm

End time: 10pm

After a show and tell presentation, the implementation of the following user stories were accepted by the product owners: Almost all.

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

- User Story: Part of a team members issue wasn't completed & will be made up & completed within the first days of the following sprint
How this should be reflected on the user story definition in Mingle:

Sprint Review 5 Meeting Minutes

Attendees: Vanya Farzamipour, Jason Francis, Samuel Pellot, Miguel Sablan

Start time: 8:30

End time: 9:00

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

- User Story: Update version of project as a team

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

- User Story: Errors from fixing unused imports from last sprint was resolved How this should be reflected on the user story definition in Mingle:
 - The team worked well together during this sprint

Sprint Review 6 Meeting Minutes

Attendees: Vanya Farzamipour, Jason Francis, Samuel Pellot, Miguel Sablan

Start time: 8:30pm

End time: 9pm

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

- User Story: Working on any smaller tasks the product owner needed to be complete to improve the product. Started prepping showcase materials/final deliverable

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

- User Story: All tasks planned to be completed this sprint were successful How this should be reflected on the user story definition in Mingle

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

User Manual

When the user first launches the application, they are greeted with the Login page. On this page, the user can log in to their account, and there is a "Forgot Password" button that will take them to another page where they can enter their email address to reset their password. There is also a "Swipe up to Sign Up" option, which takes users to a welcome page before prompting them to enter their name and birth date. During the signup process, the user is asked for previous information in order to gain access to the application, as well as any other information required to create an account. The app will enroll the user in the SMS messaging service during the sign-up process. The user should receive a text message shortly after creating their account.

When they log in, they are taken to the homepage, where they are greeted by the app and see five things: a map with available clinics, a cog for the settings page, a 'Facilities' tab, a 'Learn' tab, and a 'Resources' tab. When the user presses the cog, they will see account-related fields such as their phone number, date of birth, name, and answers to questions such as "Do You Live in Miami?", "Are you Pregnant?", and "Do You Have Any Infants?" They can change these at any time and save their changes at the bottom of the page. The user can log out of the website from the upper right-hand corner of the Settings page. This is the only way the user can completely log out of the app.

The user can then exit the Settings tab and return to the homepage, where they can click on the Facilities page, where they are given two options: "Clinics" and "Shelters." When the user clicks the "Clinics" tab, they will see a list of clinics sorted by proximity. The clinic's name, address, and distance from the user's current location are displayed to the user. The user can filter the list of clinics at the top of the page by distance (five, ten, and fifteen miles) or by services (abortions, free materials, and immunization). The shelters can also be filtered by distance. The user can tap on a specific location to get the location's website, phone number, and services offered if it is a clinic.

After returning to the homepage, the user may proceed to the "Learn" page. The Learn page provides the user with two tabs: "STD Awareness" and "Protected Sex." The "STD Awareness page" lists the diseases that can be transmitted through unprotected sex. The user can view information on the symptoms, the testing procedure for diagnosis of said STD, treatment for the STD, the consequences if the STD is left untreated, and when it is safe to begin sexual activity for each STD. There is also a button that links to outside government sources if the user wants more information.

The "Protected Sex" section emphasizes safe sex and makes use of female condoms as a safe sex resource. At the top of the page, there is a brief explanation of what a female condom is and a picture of one. On this page, the user can choose between two options: "Female Condom Do's and Don'ts" and "How to Insert and Remove a Female Condom." The "Female Condom Do's and Don'ts" section instructs the user on how to use female condoms properly, essentially what to do and what not to do. The Dos are listed at the top, while the Don'ts are listed at the bottom. "How to Insert and Remove a Female Condom" walks the user through the process of inserting a condom step by step. This page explains how to use condoms, care for them, and dispose of them properly.

The user can then exit the Learn tab and return to the homepage. When the user clicks on the "Resources" tab, a list of tabs appears, including "Apply to WIC," "Apply to Medicaid," "Appointments," "Documents," "Immunizations," and "References."

When the user navigates to the "Apply to WIC" page, he or she will see a "Checklist," "Feeding," "Locations," and "Website." The Checklist page allows the user to enter the following information needed to apply for WIC: "Family members" - Each member applying for WIC; "Proof of Income of all family members" - Salaries, child support, alimony, foster care payments, interest withdrawn, unemployment, and so on. The Feeding tab informs the mother about the feeding guidelines for infants aged 0 to 12 months. By scrolling, the user must select the correct age range for the infant. Each age range includes information on infant food options and alternatives, and each food option has a graphic icon showing what types of foods pertain to it. When the user reaches the bottom of the list, additional information on foods to avoid for infants and important notes for the mother are provided. The Location tab displays a list of WIC facilities in the user's general vicinity and can be filtered by distance like the other maps. The Website tab takes you directly to the WIC home page.

The "Apply to Medicaid" tab will take the user to a page that includes a link to the Medicaid site, a checklist of items to bring to their Medicaid appointment, and a locations tab that contains nearby Medicaid offices, similar to the "Facilities" tab, but for Medicaid locations.

By going to the "Appointments" tab, the user may be able to add and remove appointments, as well as rename them. The user can add appointments by clicking the plus (+) sign at the top of the page. Once entered, the data is saved in the Firebase system and is ready to be viewed. In order to sync their appointments, the user will be prompted for access to their device's calendar. To delete an appointment, simply tap the trash can icon next to the appointment details.

The "Documents" tab works similarly to the "Appointments" tab, with the main difference being that the user can upload an image, crop it, and then click "OK." The user will then be presented with an input box in which to name the file. These files will be immediately saved in the cloud via Firebase and can be viewed on the documents page.

Users are greeted at the top of the "Immunizations" page with three buttons: a plus (+) sign to add to the Immunization Register, an envelope to send an email of the immunizations listed on the page, and a calendar icon. By tapping the plus sign, the user will be taken to a page

where they can enter the type of immunization their child received, the dosage, the date, and any other information. The envelope generates an email for each immunization listed on the Immunization Register using the user's primary email address. Finally, the calendar icon will take the user to the "Immunization Schedule," where they can view their child's immunization history and check off any new immunizations. The list is arranged according to the infant's age, starting at birth and going up to 2 months, 4 months, etc. There is a list of immunizations received under each age group. The Immunization Schedule's list of immunizations is automatically checked off as the user adds immunizations to the Immunization Register. This gives the user a simpler alternative for keeping track of their child's immunizations.

The "References" tab is the user's last option. At the top of the page, the user will see a plus (+) sign where they can enter details for a financial or medical reference. Once entered, the data is immediately available for viewing on the references page after being stored in Firebase. Every reference has a trash bin button, similar to the "Appointments" tab, allowing the user the ability to remove the reference.

Installation/Maintenance**Step 1:**

- Install git on your computer <https://git-scm.com/downloads>
- Install Node.js (comes with npm) <https://nodejs.org/en/>

Step 2:

Download Visual Studio Code from your browser through:

<https://code.visualstudio.com/download>

Step 3:

Open Visual Studio Code and select get from version control; from the dropdown, select git. A link will be requested where you will input the following link:

<https://github.com/edumorlom/nuMom.git>

Step 4:

After the project is cloned in your computer you will be able to access it from your command line interface. After that, go to your project from the terminal by using “cd” and going to the folder where the project is in.

Step 5:

Install all the backend node dependencies and expo by running the following commands in the root directory:

- npm install --global expo-cli
- npm install && expo install

Step 6:

You must now download the firebase api key file and place it into the /src directory in your local repository. In order to obtain this file, you must contact NuMom Lead Mentor, Eduardo Morales for it at edmorales.97@gmail.com

Step 7:

Install the expo client on your mobile device (or install an Android/iPhone simulator on your computer):

iOS: <https://apps.apple.com/app/apple-store/id982107779>

Android: <https://play.google.com/store/apps/details?id=host.exp.exponent&referrer=www>

Step 8:

Once everything is completed, use the command within the root folder “expo start” or “npm start” to start expo. A window will open in your default browser with a QR code to be scanned with your phone. The application now will show up in your phone on the application of the expo client.

Step 9 (optional):

You can run expo on a virtual device on your computer, which allows further testing on additional devices. View the following links to get started for either iOS or Android:

iOS: <https://docs.expo.io/workflow/ios-simulator/>

Android: <https://docs.expo.io/workflow/android-studio-emulator/>

Shortcomings/Wishlist

1. Add a way to Rename/Delete Uploaded Documents

Adding the ability to rename and delete uploaded documents is a feature we were unable to complete but can significantly benefit the end user as they would be able to update previously uploaded documents that are no longer relevant adding to a cleaner interface.

2. Stop the user from being logged out when they press the previous page

When trying to go to the previous page the user will be logged out of their account. We were unable to complete this issue however adding this feature would make for a more positive experience when using the app

3. Add date of birth restrictions on sign-up page

When making an account, the user is able to select a date, month, and/or year in the future as their date of birth and proceed making their account. They currently able to add a date that would not be possible. We were unable to complete this issue however adding these restrictions would greatly benefit the app.

REFERENCES

- [1] Firebase Documentation. (n.d). retrieved September 14, 2020, from: <https://firebase.google.com/docs>
- [2] JavaScript documentation. (n.d). retrieved September 14, 2020, from: <https://devdocs.io/javascript/>
- [3] Twilio. (n.d). retrieved September 14, 2020, from: <https://www.twilio.com/docs>
- [4] CDC. (n.d). retrieved September 14, from: <https://www.cdc.gov/>
- [5] React Native Documentation. (n.d). retrieved September 14, from: <https://facebook.github.io/react-native/docs/getting-started>

[6] Expo Documentation. (n.d). retrieved September 14, from:
<https://docs.expo.io/versions/latest/>

[7] Git documentation. (n.d). retrieved September 14, from: <https://git-scm.com/doc>

[8] Medicaid application. (n.d). retrieved September 14, 2020 from:
<https://www.healthcare.gov/medicaid-chip/>

[9] WIC application. (n.d.). retrieved September 14, 2020 from:
<https://www.fns.usda.gov/wic/wic-how-apply>