Introduction to Opal

Stacey Beard

The HIG Group

- **Health Informatics Group:** Initiative started in 2014 by Laurie Hendren, John Kildea, and Tarek Hijal.
- **Goal**: Patient empowerment through information readily available and relevant to patients.

" No one cares about you as much as you do"

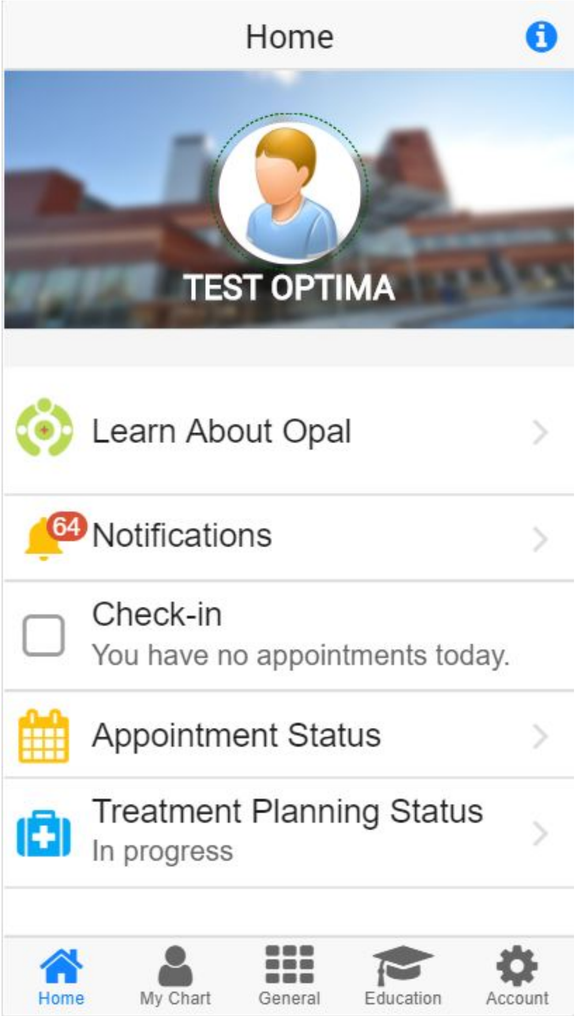
Opal's Guiding Principles

Opal is a mobile application that serves as a hub between the patient and their health.

- Material is **personalized** according to each individual patient.
- Data is **contextualized** by attaching educational material. The patient should be able to understand everything they are given.
- Content is provided **at the right time** it is needed to accompany treatment.

What does Opal offer?

- Announcements
- Appointments
- Checking in
- Clinical Documents
- Diagnoses
- Doctor contact info
- Patients for Patients



Home

TEST OPTIMA

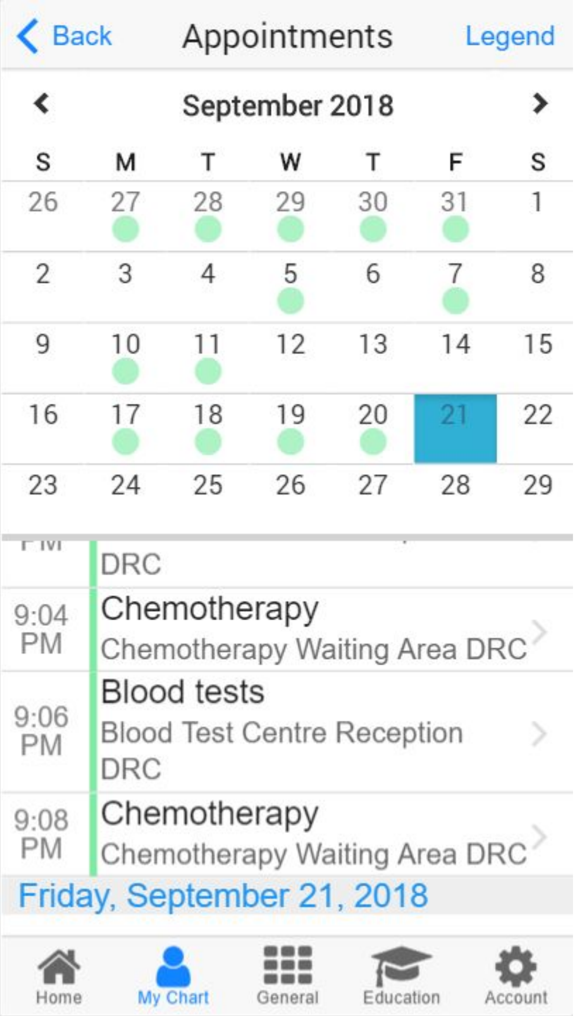
Learn About Opal

64 Notifications

□ Check-in
You have no appointments today.

Appointment Status

Treatment Planning Status
In progress



< Back — Appointments — Legend

September 2018

S	M	T	W	T	F	S
26	27 ●	28 ●	29 ●	30 ●	31 ●	1
2	3	4	5 ●	6	7 ●	8
9	10 ●	11 ●	12	13	14	15
16	17 ●	18 ●	19 ●	20 ●	21	22
23	24	25	26	27	28	29

PM — DRC

9:04 PM — Chemotherapy
Chemotherapy Waiting Area DRC

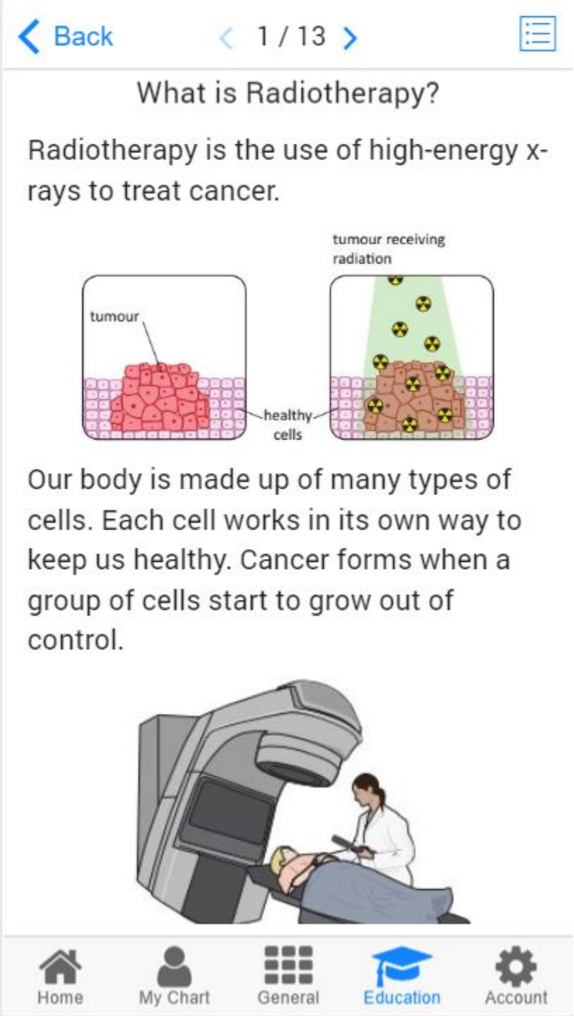
9:06 PM — Blood tests
Blood Test Centre Reception DRC

9:08 PM — Chemotherapy
Chemotherapy Waiting Area DRC

Friday, September 21, 2018

What does Opal offer?

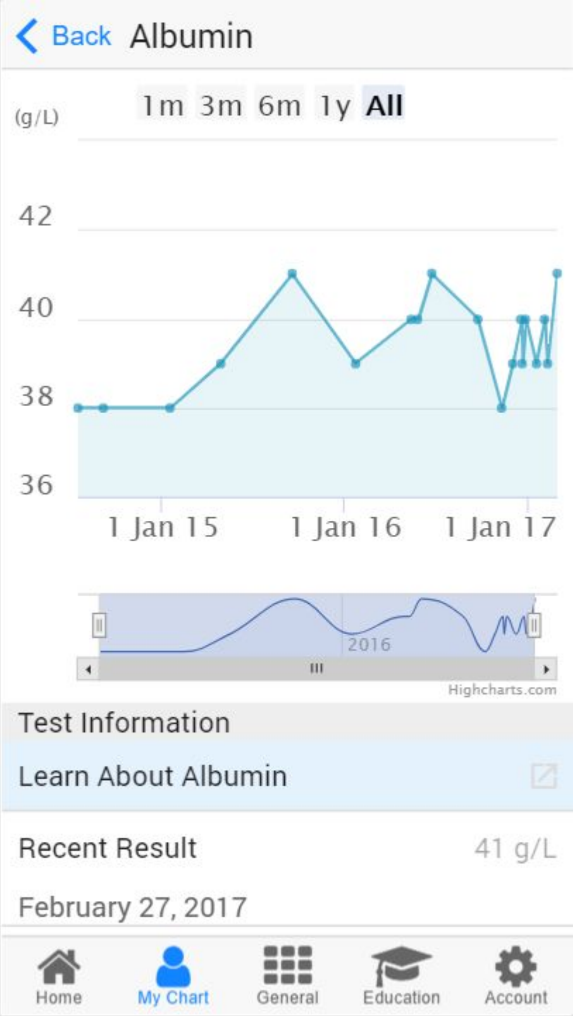
- Educational Material
- Notifications
- Questionnaires
- Test Results
- Treatment Planning Status
- Treatment Team Messages
- And more...



What is Radiotherapy?

Radiotherapy is the use of high-energy x-rays to treat cancer.

Our body is made up of many types of cells. Each cell works in its own way to keep us healthy. Cancer forms when a group of cells start to grow out of control.



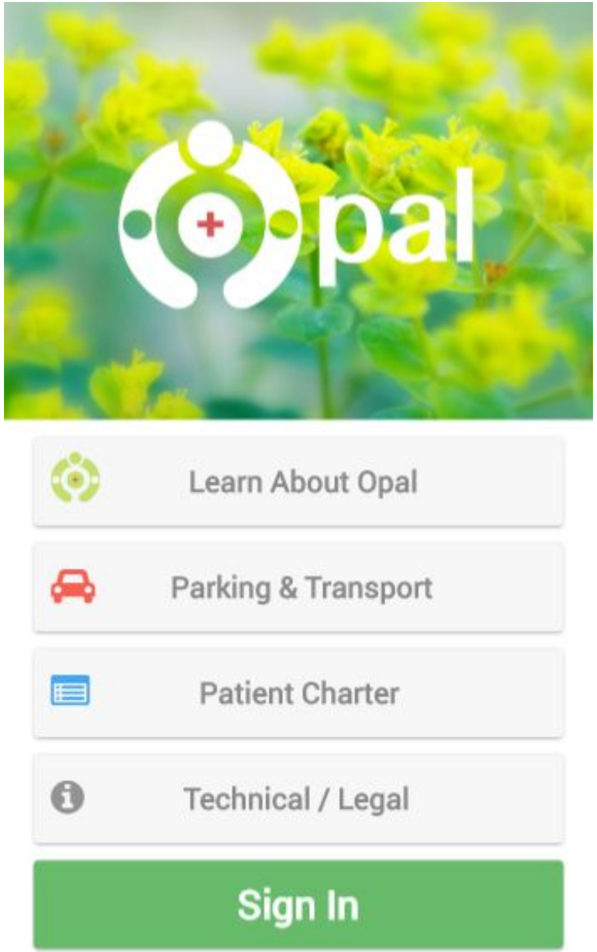
Test Information

Learn About Albumin

Recent Result 41 g/L

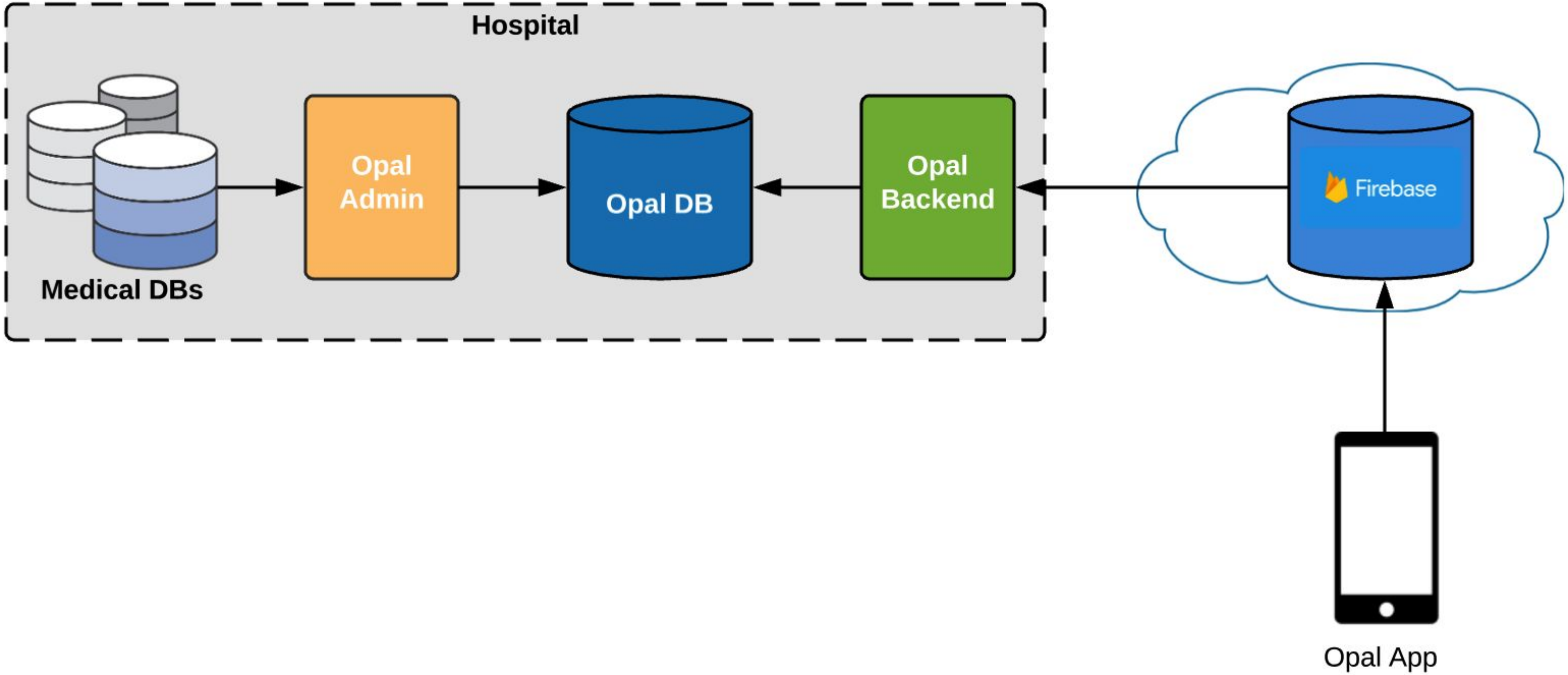
February 27, 2017

Opal Demo

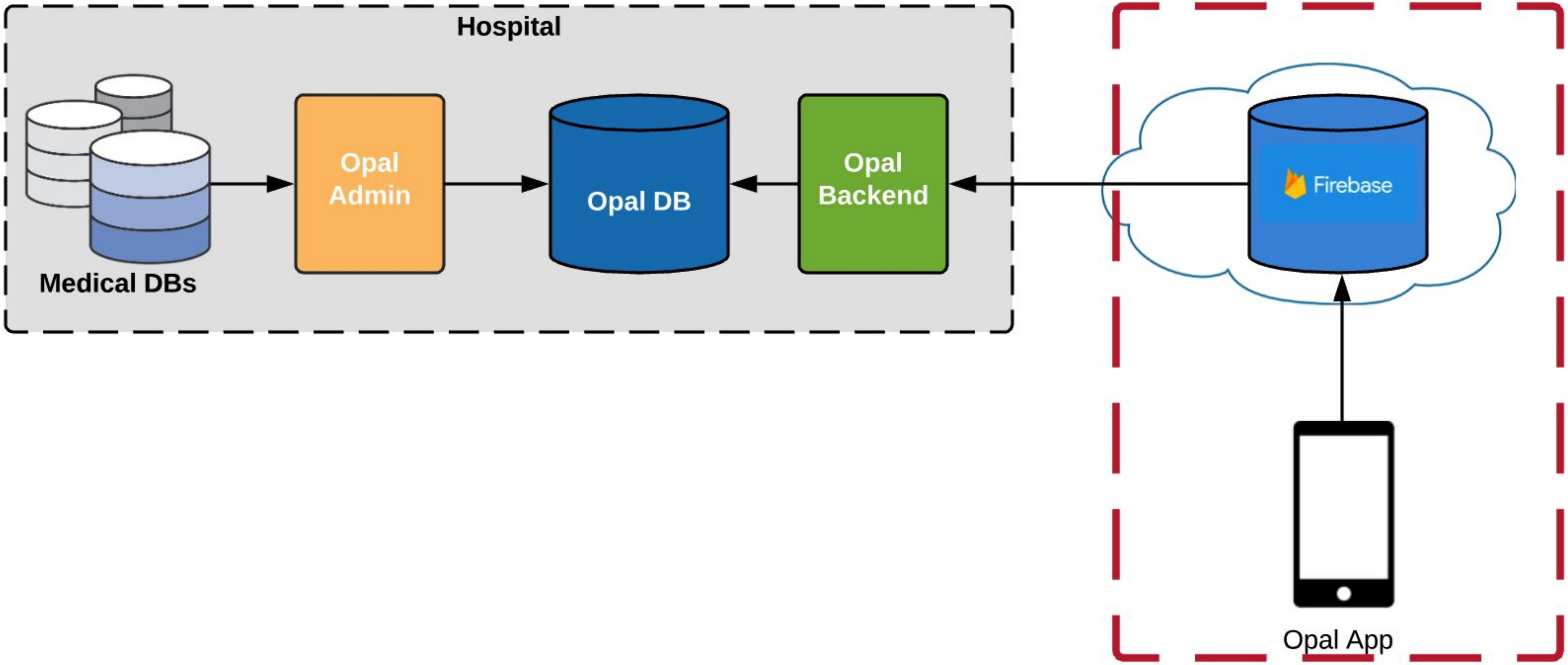

opal
Learn About Opal
Parking & Transport
Patient Charter
Technical / Legal
Sign In

High-Level Architecture

Architecture High-Level



Architecture - Firebase and Opal App

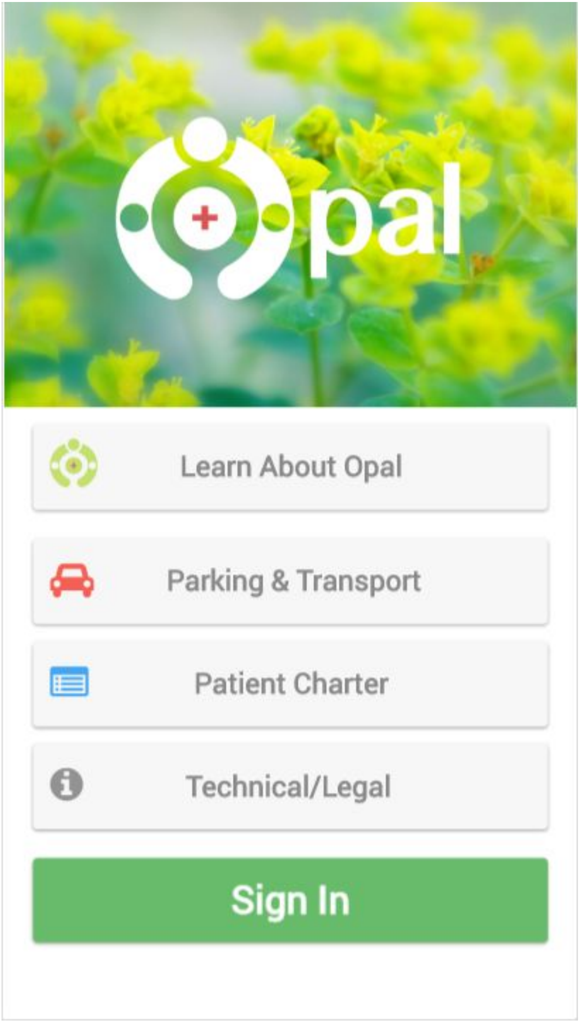


Architecture - Firebase

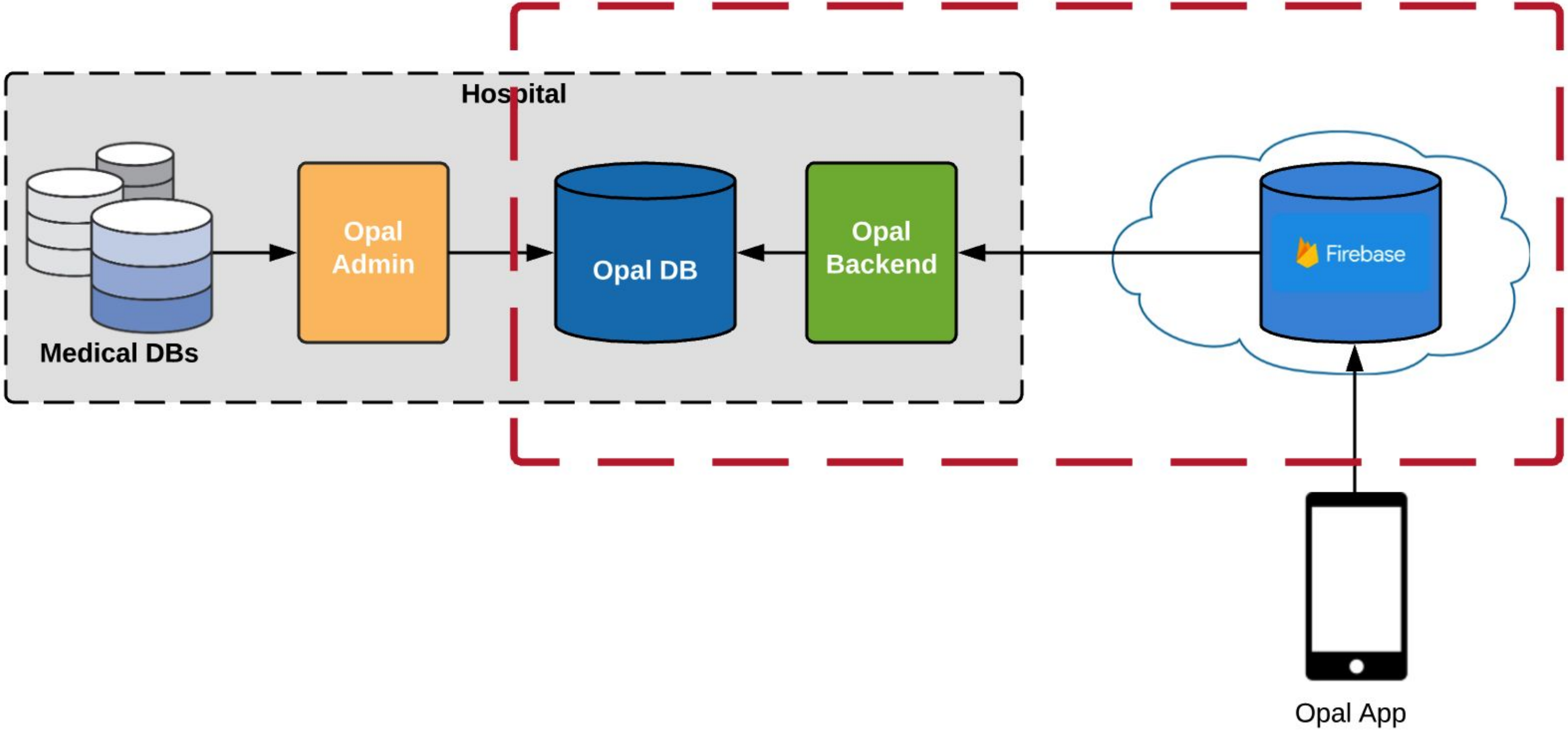
- Real-time Cloud Database owned by Google.
- Use for patient authentication.
- Provides a secure bridge between the hospital and the app.
- All data that goes into Firebase is encrypted.
- Acts as an end-point for both the app and Opal back-end.

Architecture - Opal App

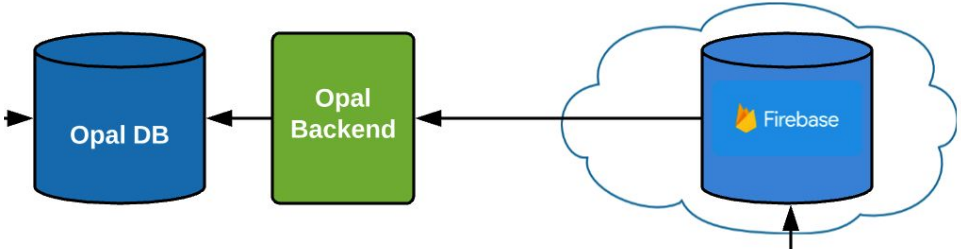
- Connects with the hospital through Firebase.
- Sends request to Firebase and waits for response.
- Sends information to the hospital from patient: i.e. feedback, questionnaire responses, etc.
- Updates patient of any event such as a new appointment, clinical document, message, etc.



Architecture - Opal Back-End

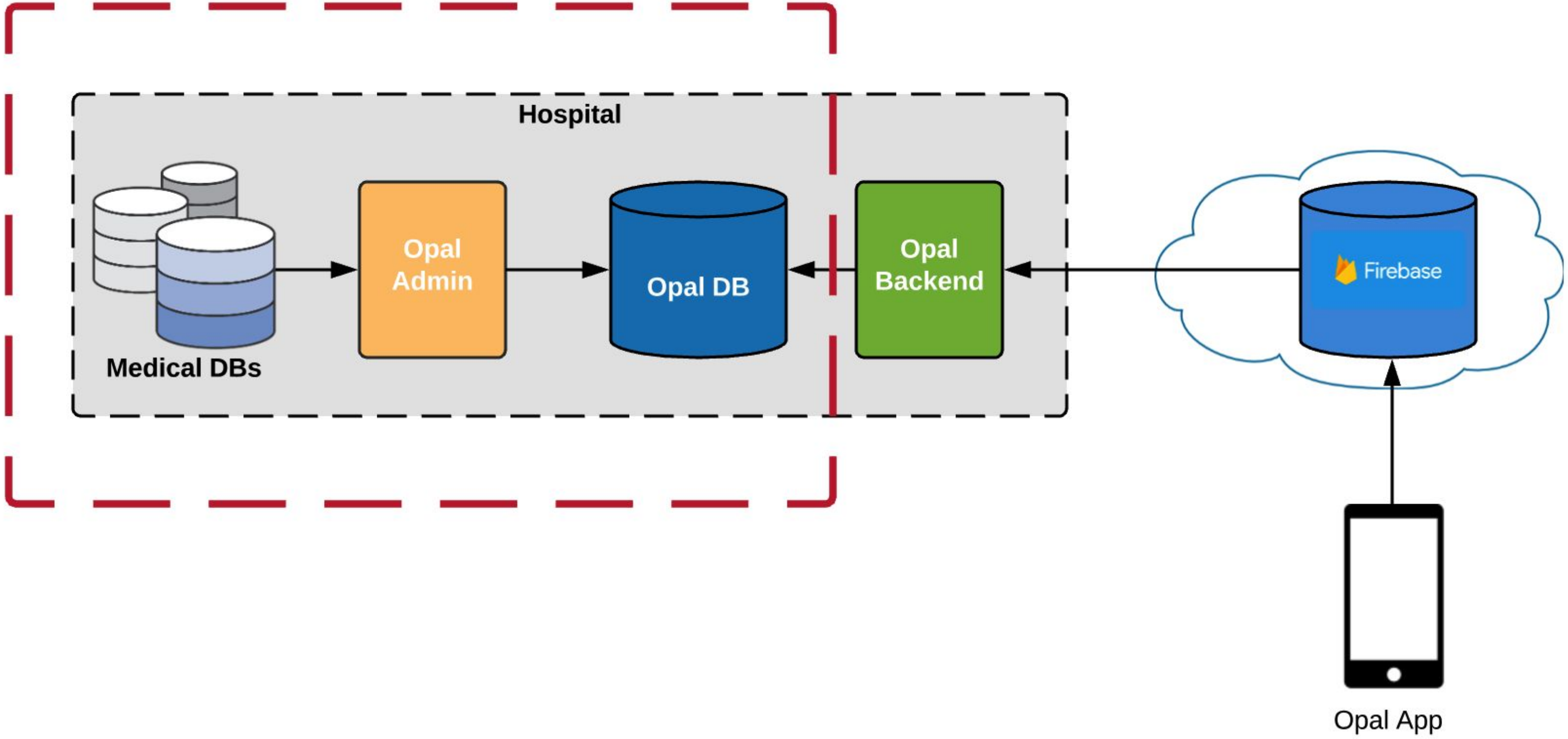


Architecture - Opal Back-End

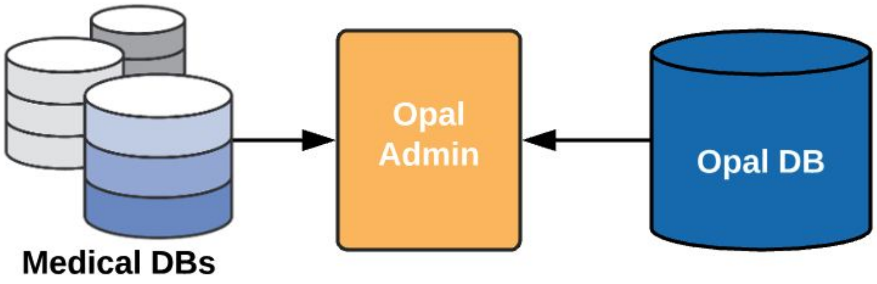


- Listens to Firebase for patient requests and serves as a back-end for the app.
- Queries OpalDB to send data to the patient.
- Updates OpalDB with patient-provided information from the app.

Architecture - OpalAdmin



Architecture - OpalAdmin



- Queries the hospital DBs to obtain most up-to-date information.
- Provides an interface to prepare personalized documents for the patients.
- Updates OpalDB periodically through a publishing interface.

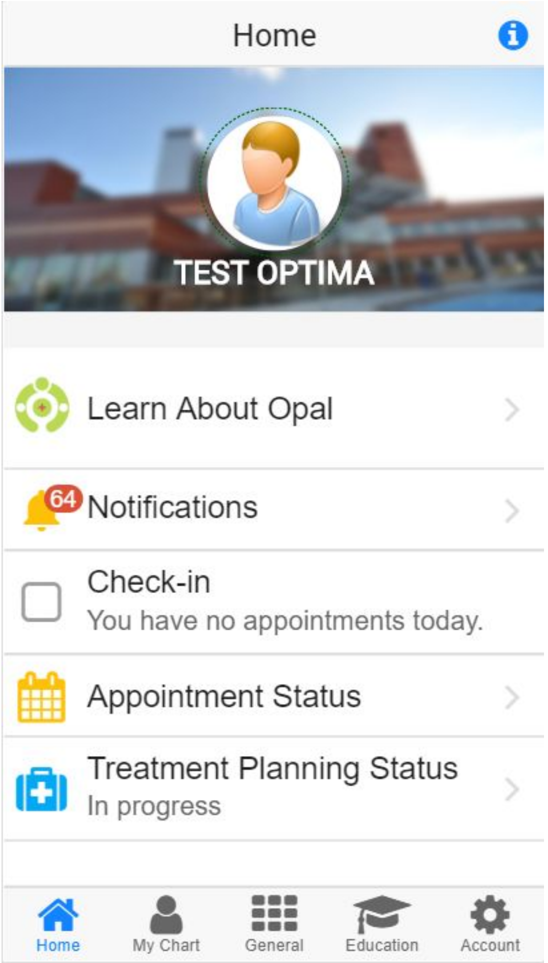
Technology Stack

Technology Stack - Opal Frontend

APACHE CORDOVA™

Onsen UI

ANGULARJS by Google



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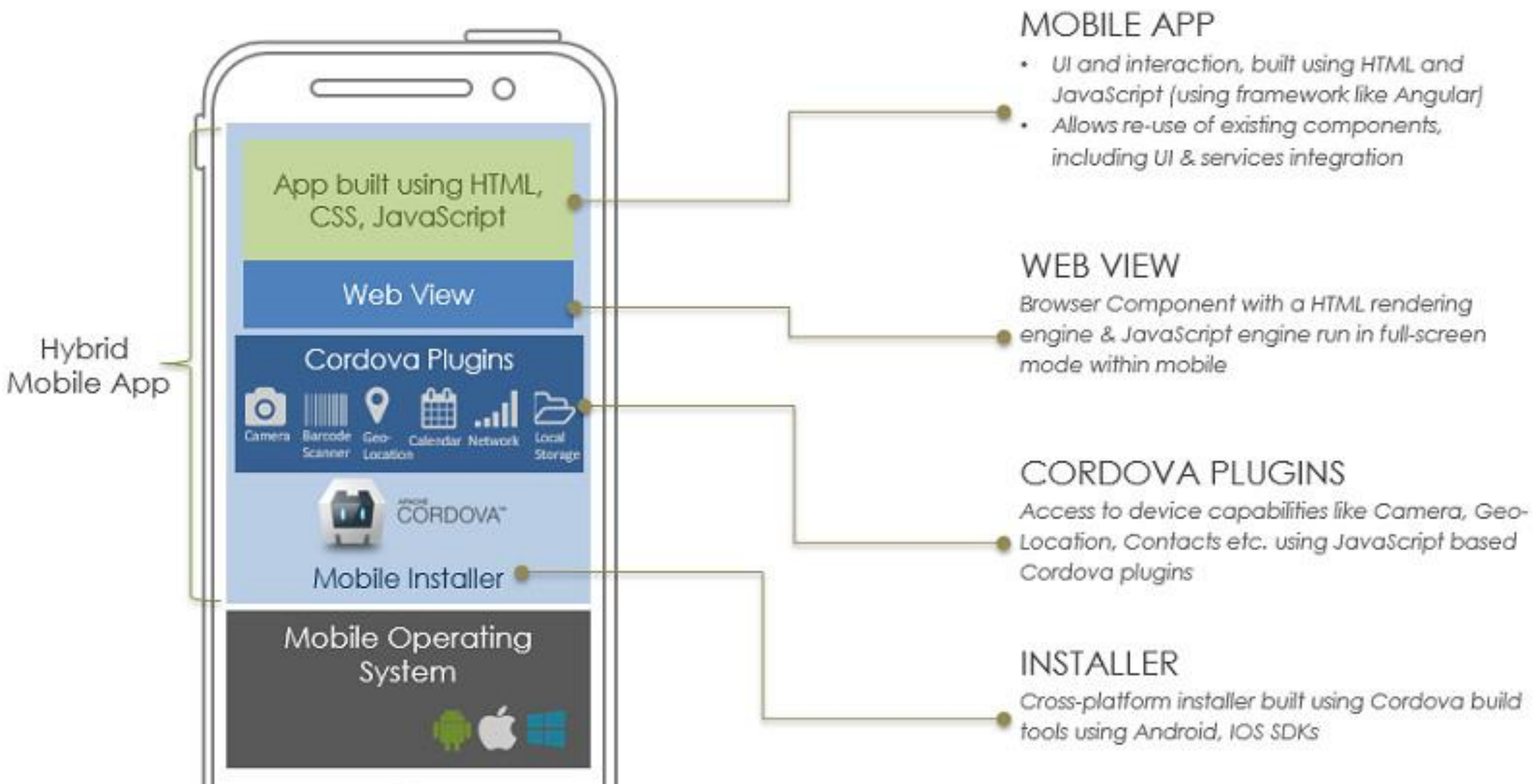
Technology Stack - Opal Frontend - Cordova



MOBILE APP

- *UI and interaction, built using HTML and JavaScript (using framework like Angular)*
- *Allows re-use of existing components, including UI & services integration*

WEB VIEW

Browser Component with a HTML rendering engine & JavaScript engine run in full-screen mode within mobile

CORDOVA PLUGINS

Access to device capabilities like Camera, Geo-Location, Contacts etc. using JavaScript based Cordova plugins

INSTALLER

Cross-platform installer built using Cordova build tools using Android, IOS SDKs

Technology Stack - Opal Frontend - AngularJS

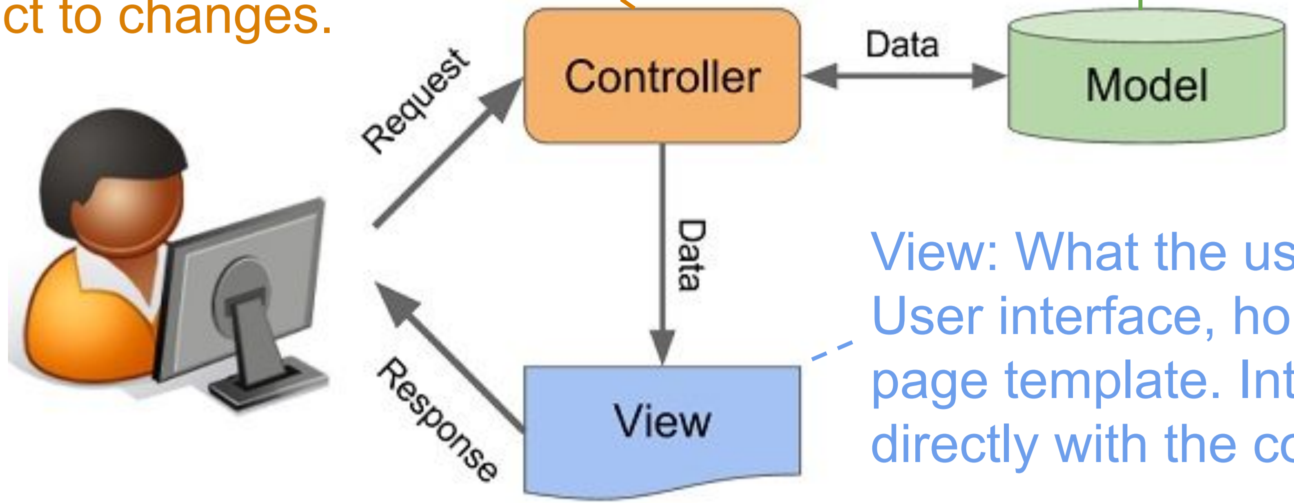
- **AngularJS,** JavaScript framework by Google.
- Revolutionized the way web apps were written via two-way binding.
- Introduced one-page applications.
- Built on top of the **MVC** design pattern.
- Current version is v6. AngularJS still quite popular today.

Technology Stack - Opal Frontend - AngularJS

MVC: Model, View, Controller

Controller: Queries the DB directly or through the model. Provides the view with data and listens to the view to react to changes.

Model: Source of truth, maintains state and abstractions. Queries data from the DB.



View: What the user sees. User interface, holds the page template. Interacts directly with the controller.

Technology Stack - Opal Backend

- OpalDB: **MySQL** database
- Opal listener:
  - **Node.js** (an asynchronous event driven JavaScript runtime designed to build scalable network applications)
  - **PM2** (a process manager for Node.js)

Learning Opal

Your Primary Resources

- A coding website such as W3Schools or Codecademy.
- The Opal Teaching Github (contains slides and practice assignments).
- The Opal Wiki.
- Me (Stacey), for any questions. Come see me in person or send me an email at staceybeard10@gmail.com.

Languages and Frameworks

- You will need to learn the following:
- Frontend
  - Javascript
  - **<u>AngularJS</u>**
  - (Beginner's) HTML and CSS
- Backend
  - Javascript (Node.JS)
  - (Beginner's) SQL

Javascript

- Go through a Javascript tutorial, for example on W3Schools or on Codecademy.
- Read this article introducing the idea of asynchronous javascript.
- Read this page introducing how callbacks work.

AngularJS

- AngularJS is based on Javascript. Once you feel confident enough using Javascript, you can move onto AngularJS, which is what Opal is built upon.
- W3Schools has a good AngularJS tutorial. Make sure to click on the 'Try it Yourself' sections.
- Once you are familiar with AngularJS, read the JohnPapa style guide. Angular code written in this style looks very different from what you will have learned from W3Schools, but it is **much** cleaner and better organized. You must follow this style guide when writing code in Opal.

HTML and CSS

- You will need to use HTML and CSS to understand and create the frontend views in the app.
- We are using components from OnsenUI (version 1—do not use a later version's components), so you will rarely need to build graphical elements from scratch.
- Use W3Schools or Codecademy to learn how to use basic CSS and HTML tags.

Node.js and SQL

- The Opal Backend listener uses Node.js, which is based on Javascript. If you know Javascript, you'll be able to understand the listener's code.
- An important part of the listener's job is to query the OpalDB, using SQL. You will need to understand basic SQL to write new queries. W3Schools has resources on SQL.

Git

- Opal uses git as its version control tool.
- If you aren't used to using git, look for a tutorial to follow. The best way to learn is hands-on; look for a tutorial with an applied component.
- You should be able to make well-commented commits, manage the use of different branches, and merge branches together.

Checklist

- □ Javascript
- □ AngularJS
- □ Git
- □ (Beginner's) HTML and CSS
- □ (Beginner's) SQL

During bootcamp week, you'll have individual time to learn these languages and frameworks.

Installation

Must have tools

- **IntelliJ WebStorm:**
  - Most complete IDE for Web Development
  - Testing framework integration, database integration
  - Managing tasks integration
  - Very intelligent IDE with lots of help with code hints
  - Free for students
- **Sourcetree or other Git GUI:**
  - Allows you to see visually the .git branch history and the repository status
  - Very important for code reviews to check your code before you push

Installation Steps

- To develop code for your project, you'll need to install a full local copy of Opal on your laptop.
- You'll receive an email with an installation file for an OpalDB containing one test patient.
- Follow the instructions in this document to install Opal: Opal Installation Guide.

OpalCare

Motivation

- Cancer patients often get support from family members, friends, neighbors, etc. We call these people "personal caregivers".
- Patients often share information with their caregivers.
- Patients share different information with each caregiver, because each relationship is different:
  - A patient might share only their appointment schedule with a neighbor who drives them to appointments.
  - A patient might want to share educational material with a family member who helps with everyday care.

Goal: to allow patients to share what they have access to in Opal with their caregivers, and to decide what to share with whom.

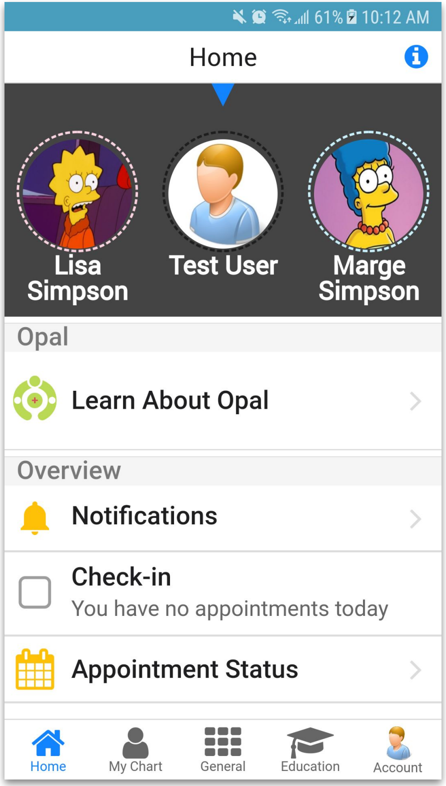
Work so far

Order	Semester	Contributors	Subject	Link
1	Winter 2017	Qi Chen	Original prototyping	https://github.com/Sable/hig/tree/master/Qi
2	Summer 2017	Michael M. Charbonneau & Zaid Yahya	Implementation	https://drive.google.com/open?id=1Sp5rrCx3QR5P88yknZWAIMMqFLyDBN0F
3	Winter 2018	Andy Huang	Ideas for Caregiver enhancements	https://github.com/Sable/hig/tree/master/Andy_Winter_2018
4	Summer 2018	Shihang Zhu	Reworking of UI & code to work with Opal refactoring	https://docs.google.com/document/d/1RmAWZ7c_6e6xqW_S1eHe3mKDIBVIS9XAjRh_Eku6RME/edit?usp=sharing
5	Fall 2018	Xuer Liang	Educational materials support & UI	https://docs.google.com/document/d/1xX6_CaBz-WVWIpQGBYQAKjKRf1Zm_KVebxyc4hLYChg/edit#bookmark=id.xnfq39cdffu7

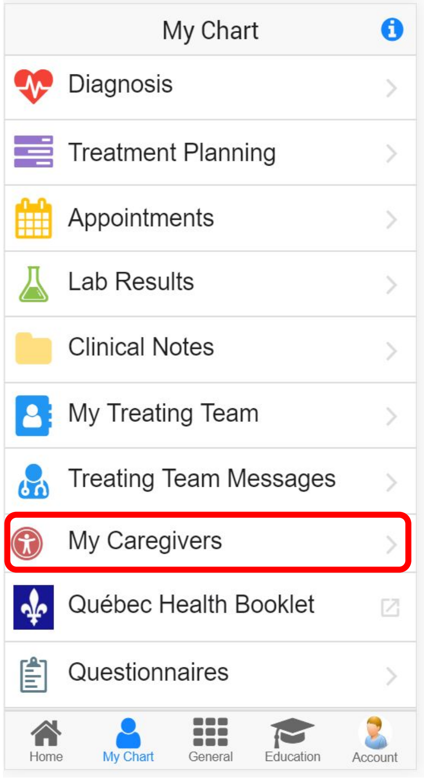
Work last term (Winter 2019)

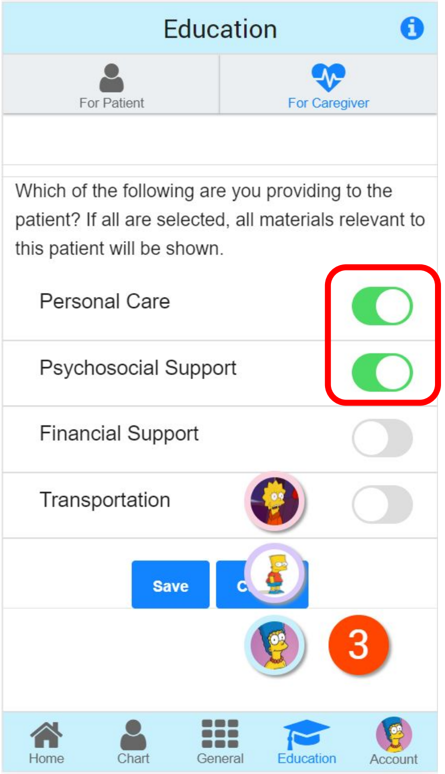
- Xuer Liang, Briana Cabral and Stacey Beard worked on:
  - Preparing the app to be tested with patients (fixing bugs, filling in missing functionality, building an app demo, etc.)
  - Designing different ways to get patient feedback on OpalCare (a waiting room questionnaire, in-app questionnaire, and in-person interviews)

Interface and Functionality



You have no appointments today





Which of the following are you providing to the patient? If all are selected, all materials relevant to this patient will be shown.

- Personal Care ●
- Psychosocial Support ●
- Financial Support ○
- Transportation ○

End of Opal Introduction