

Introduction to



Stacey Beard

based on slides by David Herrera

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

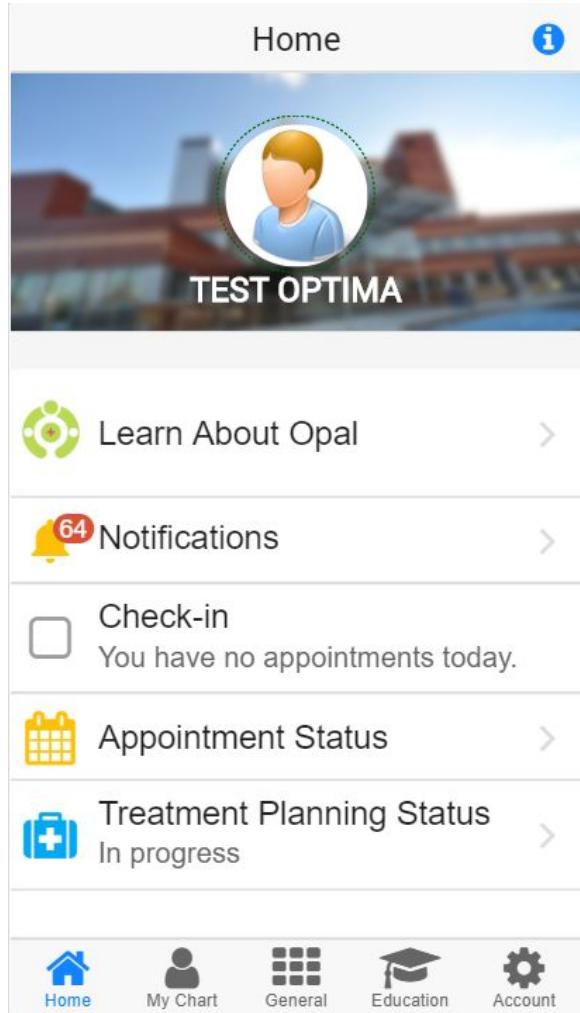
Opal is a mobile application that serves as a hub between the patient and their health.



- ❖ 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

The image shows the 'Appointments' screen for September 2018. It features a calendar grid where each day from Monday to Sunday is represented by a column. Green dots indicate scheduled appointments, and blue dots indicate confirmed ones. The 21st of September is highlighted with a blue border. Below the calendar, a list of appointments is shown for the 21st:

- 9:04 PM DRC Chemotherapy Chemotherapy Waiting Area DRC
- 9:06 PM Blood tests Blood Test Centre Reception DRC
- 9:08 PM Chemotherapy Chemotherapy Waiting Area DRC

A large blue box highlights the date 'Friday, September 21, 2018'. The bottom navigation bar is identical to the one on the home screen.

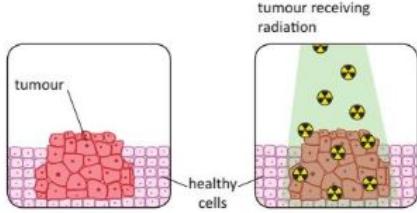
What does Opal offer?

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

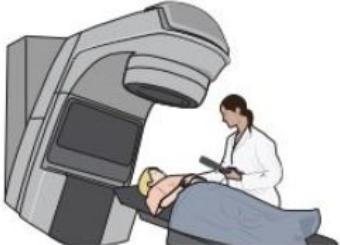
Back 1 / 13 More

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.



Home My Chart General Education Account

Back Albumin

(g/L) 1m 3m 6m 1y All



Test Information

Learn About Albumin

Recent Result 41 g/L

February 27, 2017

Highcharts.com



Opal Demo



Learn About Opal



Parking & Transport



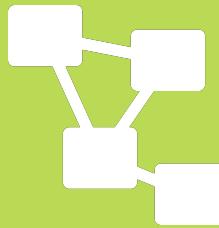
Patient Charter



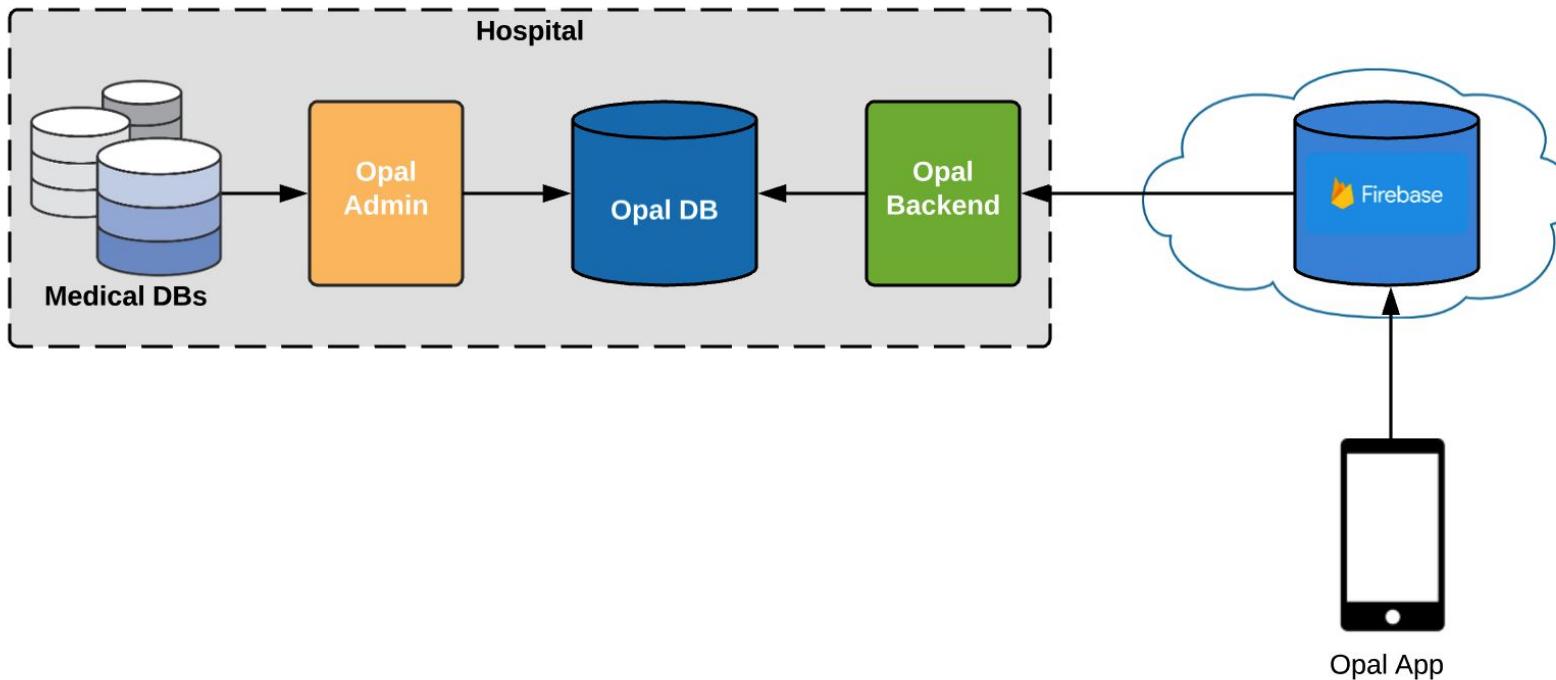
Technical / Legal

Sign In

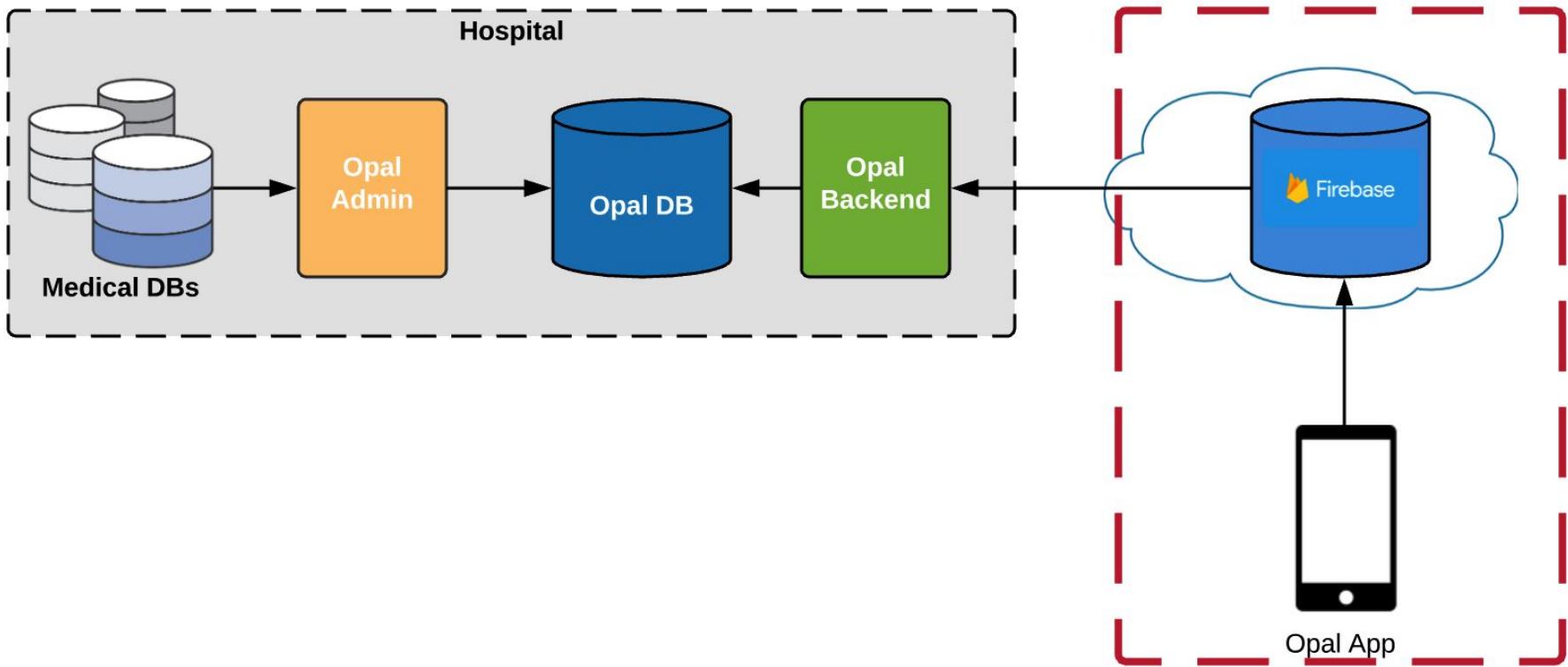
High-Level Architecture



Architecture High-Level

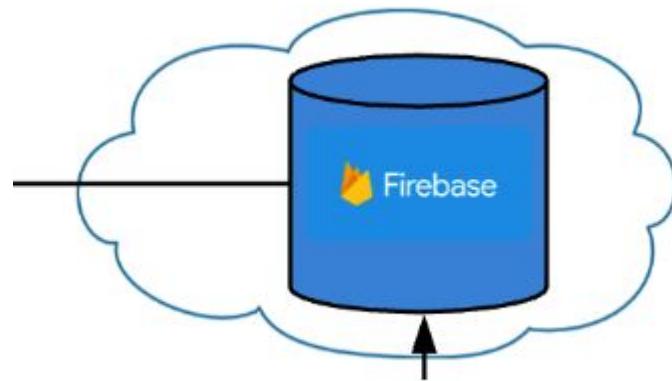


Architecture - Firebase and Opal App



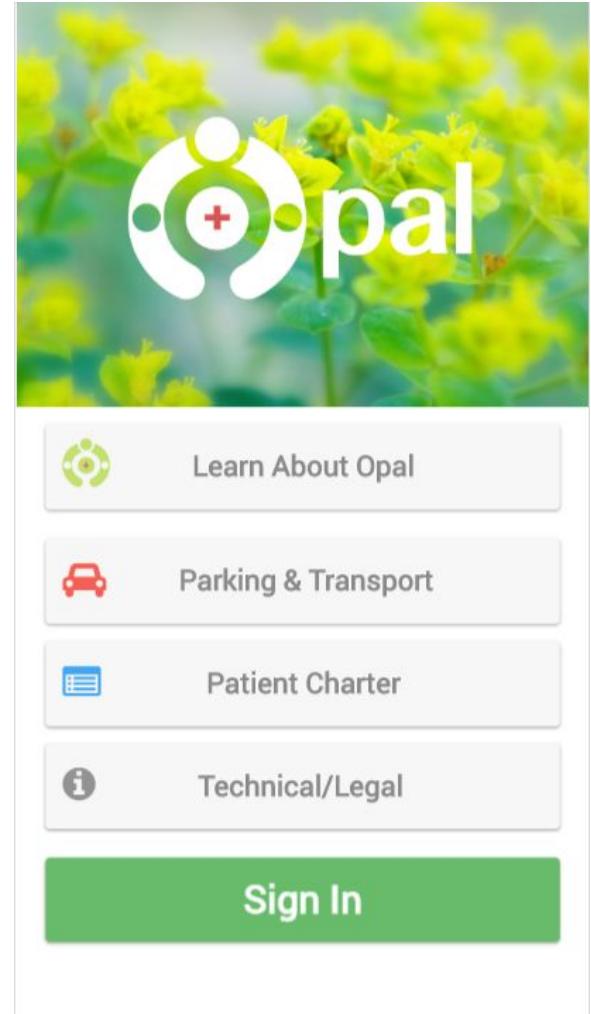
Architecture - Firebase

- ❖ 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.

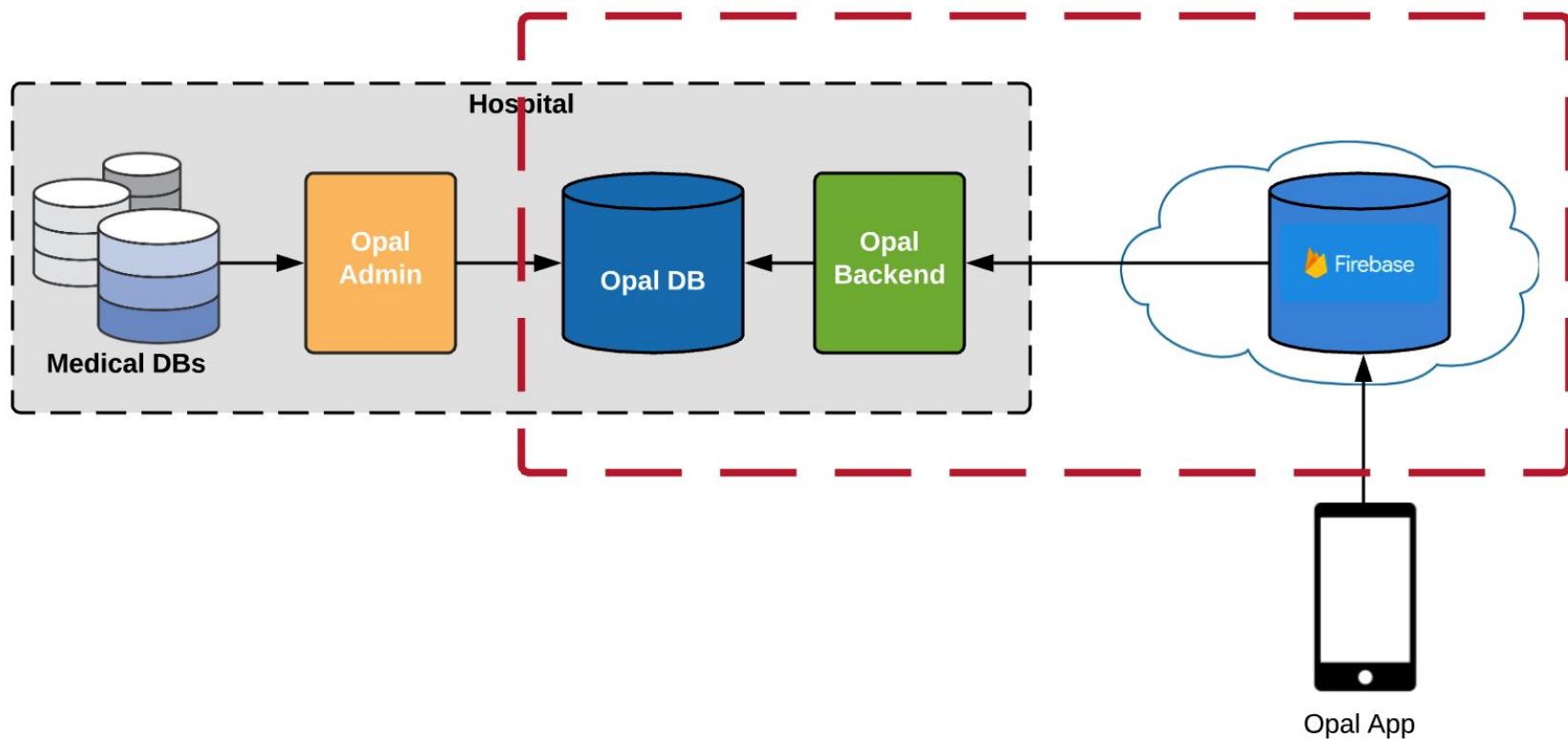


Architecture - Opal App

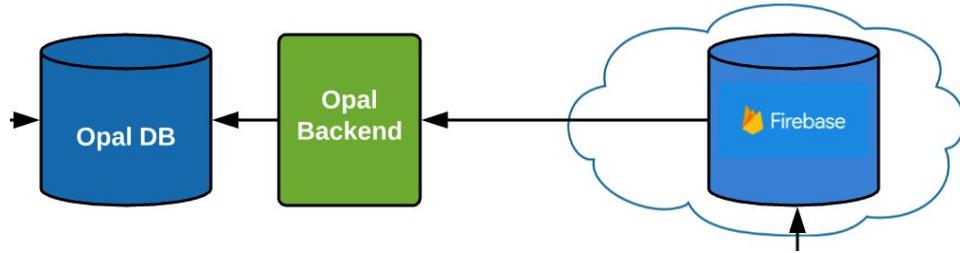
- ❖ Connects with the hospital through Firebase.
- ❖ Sends request to Firebase and waits for response.
- ❖ Sends information to the hospital from patient: i.e. feedback, questionnaire responses, etc.
- ❖ Updates patient of any event such as a new appointment, clinical document, message, etc.



Architecture - Opal Back-End

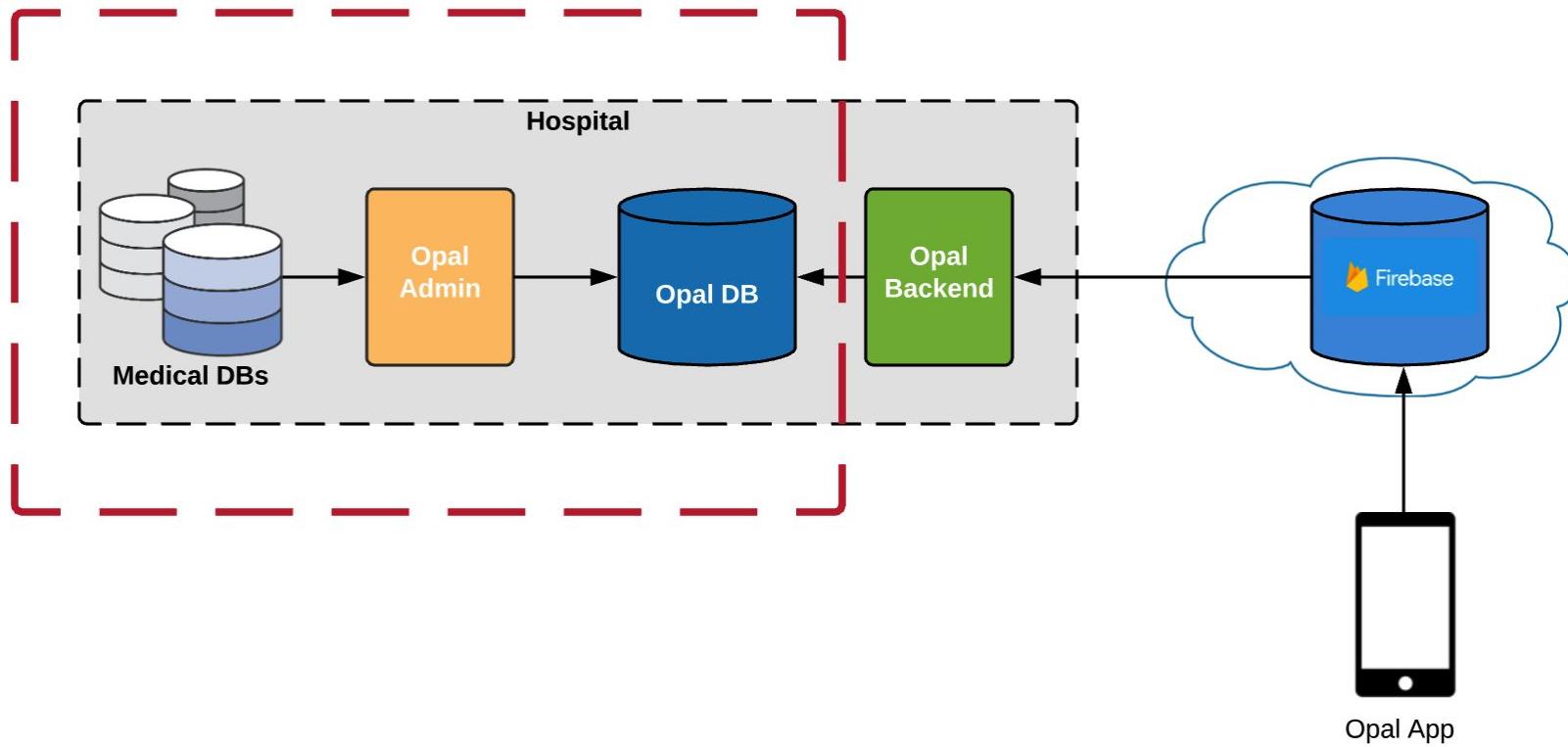


Architecture - Opal Back-End

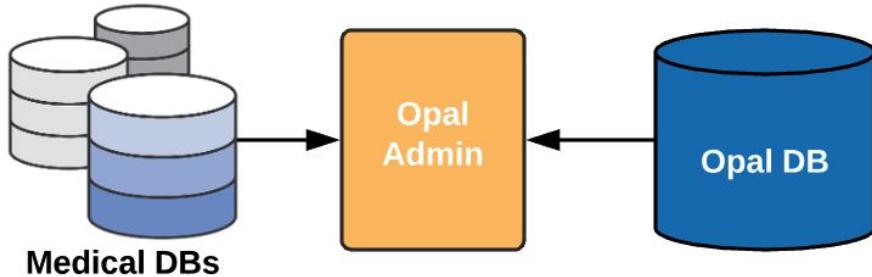


- ❖ Called "**the listener**".
- ❖ Listens to Firebase for patient requests and serves as a back-end for the app.
- ❖ Queries OpalDB to send data to the patient.
- ❖ Updates OpalDB with patient-provided information from the app.

Architecture - OpalAdmin

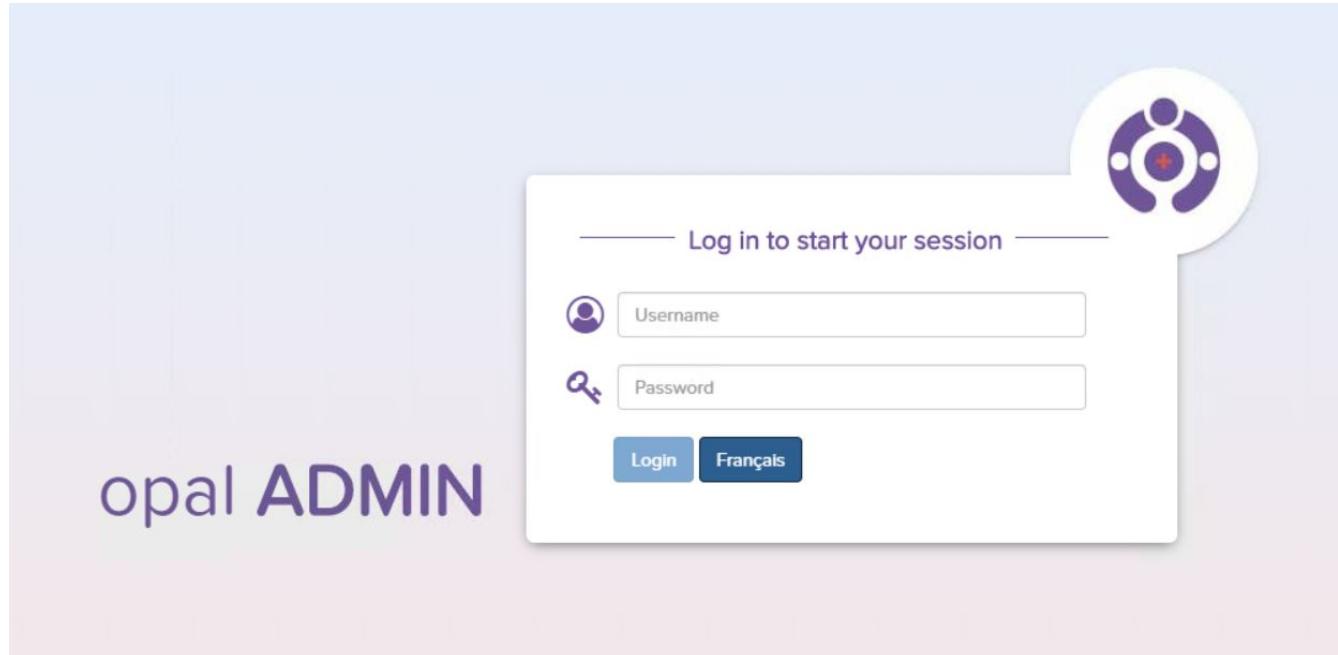


Architecture - OpalAdmin

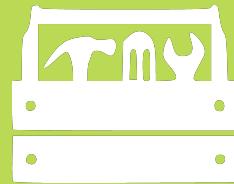


- ❖ Queries the hospital DBs to obtain most up-to-date information.
- ❖ Provides an interface to prepare personalized documents for the patients.
- ❖ Updates OpalDB periodically through a publishing interface (the "cron job").

OpalAdmin Demo



Technology Stack



Technology Stack - Opal Frontend

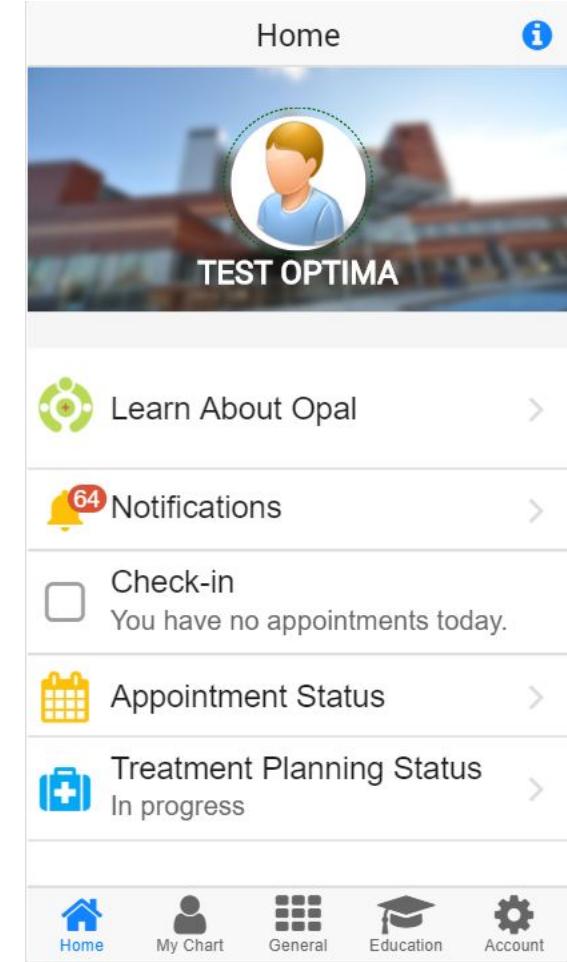


ANGULAR JS
by Google

 *Onsen UI*

The Onsen UI logo features a red stylized 'W' icon followed by the text "Onsen UI" in a large, red, italicized font.

APACHE
CORDOVA™



Technology Stack - Opal Frontend - AngularJS

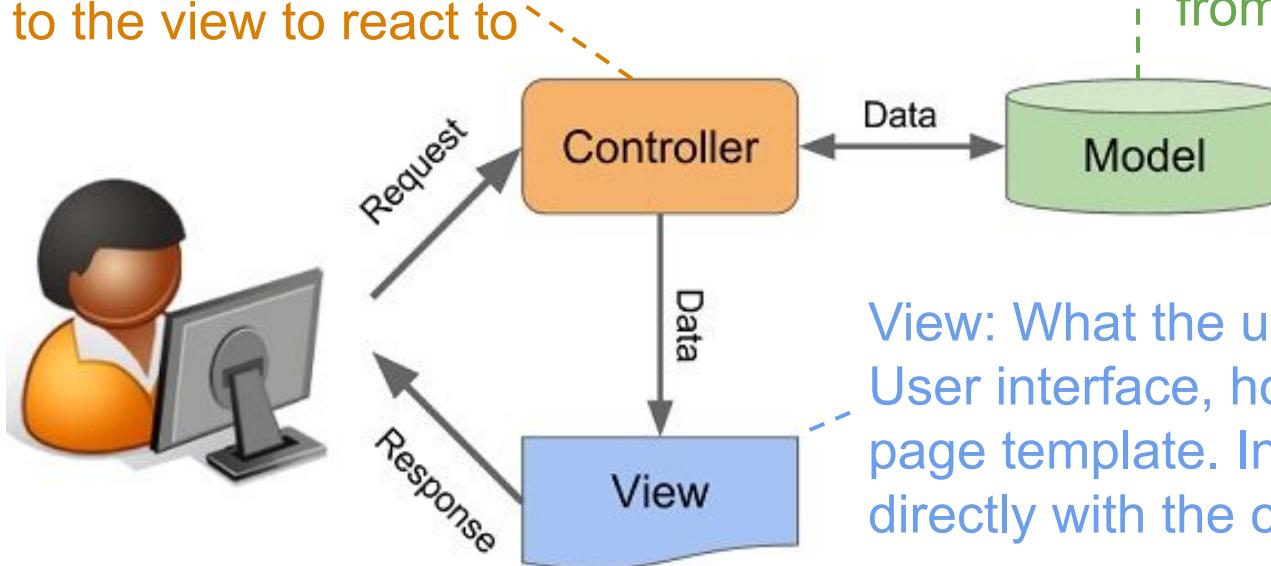
- ❖ **AngularJS**, JavaScript framework by Google developed in 2009.
- ❖ Revolutionized the way web apps were written via two-way binding.
- ❖ Introduced one-page applications.
- ❖ Built on top of the **MVC** design pattern.
- ❖ Current version of Angular is v9. AngularJS (v1) is still quite popular today.



Technology Stack - Opal Frontend - AngularJS

MVC: Model, View, Controller

Controller: Gets data through the model. Provides the view with data and listens to the view to react to changes.

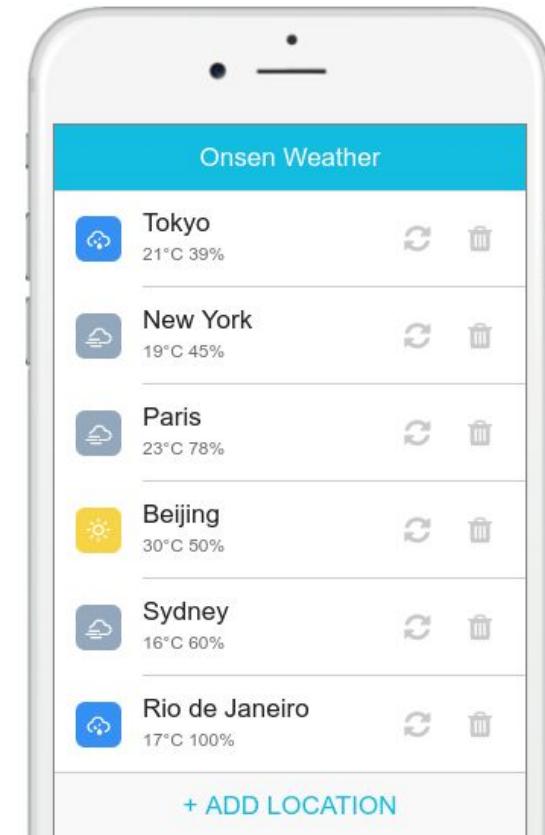
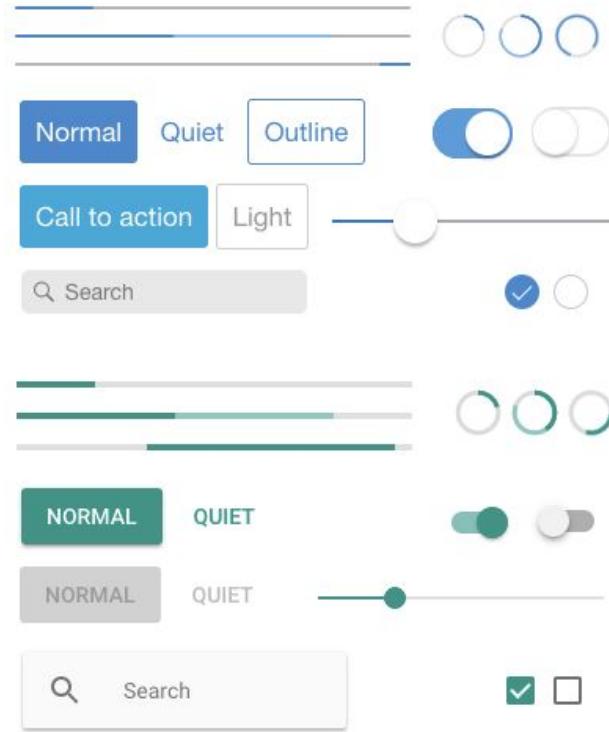


Model: Source of truth, maintains state and abstractions. Queries data from the DB.

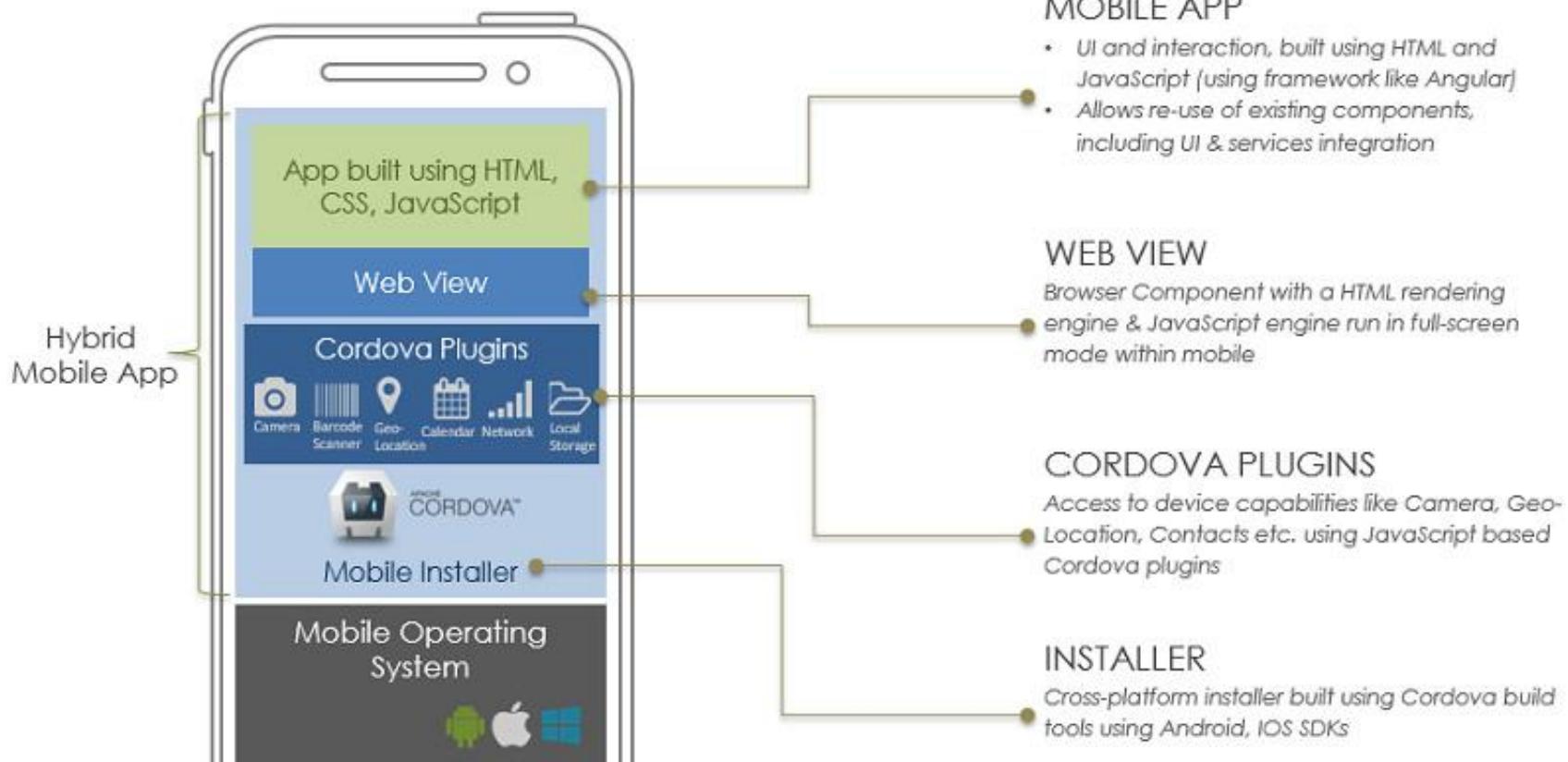
View: What the user sees. User interface, holds the page template. Interacts directly with the controller.

Technology Stack - Opal Frontend - OnsenUI

- ❖ Out-of-the-box components and styling for mobile web apps.
- ❖ We use version 1.



Technology Stack - Opal Frontend - Cordova



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](#) (free) or [Codecademy](#) (paid).
- ❖ The [Opal Teaching Github](#) (contains slides and practice assignments).
- ❖ Me (Stacey), for any questions. Send me an email at staceybeard10@gmail.com.

Languages and Frameworks

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

Javascript

- ❖ Go through a Javascript tutorial, for example on [W3Schools](#).
- ❖ 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 use 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](#) 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. Stashing is also very useful.

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.
- ❖ We'll start this installation later in the bootcamp.

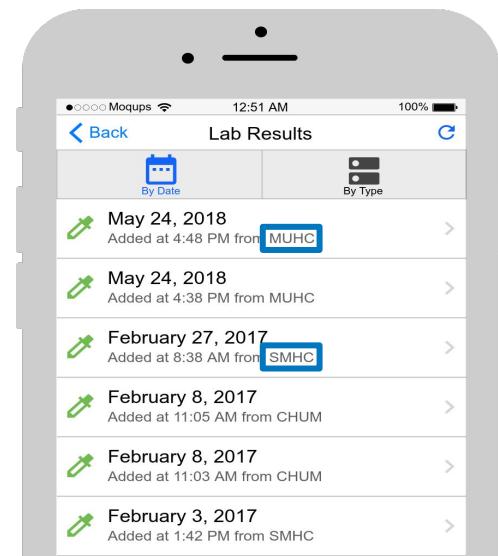
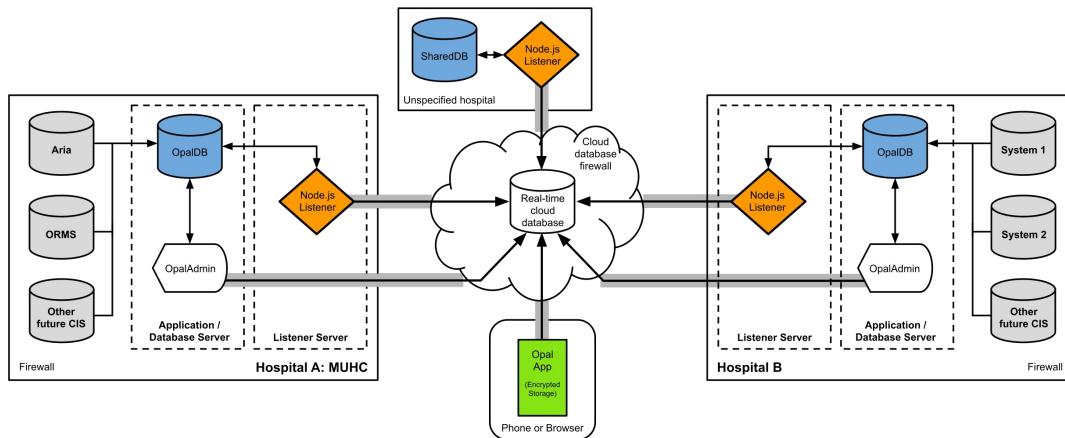
Projects



All-in-One

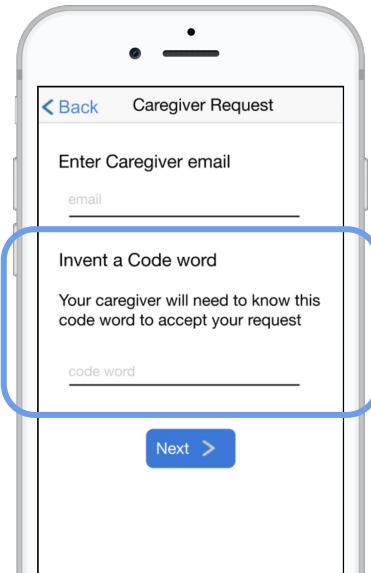
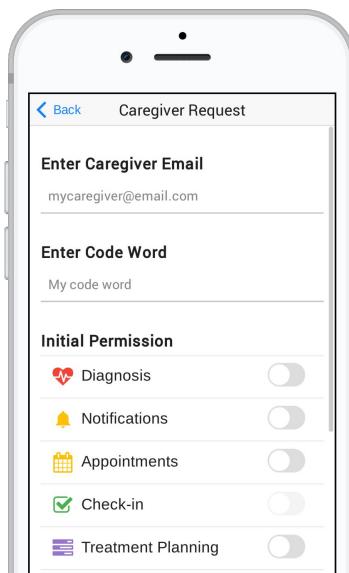
Retrieving your data...

- ❖ Goal: to make Opal compatible with multiple hospitals, and to offer patients all their data via a single login.



Caregiver

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



The Opal app home screen. At the top right are icons for battery level (61%), signal strength, and time (10:12 AM). The top bar includes a "Home" button and an information icon. Below this is a row of three circular profile icons: "Lisa Simpson" (yellow hair), "Test User" (neutral face), and "Marge Simpson" (blue hair). The main content area is titled "Opal". It features a "Learn About Opal" section with a green robot icon and a "Notifications" section with a yellow bell icon. A descriptive text box states: "Which of the following are you providing to the patient? If all are selected, all materials relevant to this patient will be shown." Three toggle switches under "Initial Permission" are highlighted with blue boxes: "Personal Care" (on), "Psychosocial Support" (on), and "Financial Support" (off). At the bottom are navigation icons for "General", "Education", and "Account".

Questionnaires

- ❖ Goal: to design and implement a comprehensive questionnaires system as a replacement for the basic legacy system.

Questionnaire List

- Breast Radiotherapy Symptom Questionnaire
- Opal Feedback Questionnaire
- Edmonton Symptom Assessment System
- Patient Acceptability
- Information about diagnosis and prognosis of cancer disease
- Patient Satisfaction Questionnaire

Last Answered On: 2018-07-11

Breast Radiotherapy Symptom Questionnaire

During the past week: Did you have any pain in your arm or shoulder?

During the past week: Did you have a swollen arm or hand?

During the past week: Was it difficult to raise your arm or to move it sideways?

During the past week: Have you had any pain in your radiated area?

During the past week: Have you had any swelling in your radiated area?

During the past week: Has your radiotherapy been oversensitive?

During the past week: Have you had any pain in your radiated area?

During the past week: Have you had any swelling in your radiated area?

During the past week: Has your radiated area been oversensitive?

During the past week: Have you had any pain in your radiated area?

During the past week: Have you had any swelling in your radiated area?

During the past week: Has your radiated area been oversensitive?

Patient: Scores, Charts, and Alerts



Feedback & Star Rating System



Opal Feedback Questionnaire

Would you recommend the Opal app to another cancer patient?

Yes No

Do you like this question? (Optional)

What do you like about this question? (Optional)

Questionnaire Rating

Rate this questionnaire and leave an optional comment!

★★★☆☆

This app is...

Do you prefer not to rate?

Rate It!

Multiple choice

Quality of Life

How close to my partner (or the person who is my main support)

Not at all A little Quite a bit Very much Prefer not to answer

Do you like this question? (Optional)

Slider

Quality of Life

How would you rate your overall health during the past week?

1 - Very Poor Value: 4 5 6 7 - Excellent

Do you like this question? (Optional)

Checkbox

Opal Feedback Questionnaire

Which feature of Opal do you find most useful when managing your care?

Calendaring of appointments Checking in for appointments Clinical notes Educational material Lab results My treating team contacts

The question that you have just asked is optional. Please come back to the question later to enter a valid answer.

Textbox

Opal Feedback Questionnaire

Please enter any comments you have about the Opal app. These can be general comments or specific suggestions about what could be added or improved.

Do you like this question? (Optional)



End of Opal Introduction

