

MEDICATION VISUALIZER: DESIGN

INITIAL STEPS AND PLANNING

Business Case

Problem Meaningful presentation of medical data

End Users Hospital staff (doctors, pharmacist, nurses, medical technicians)

Usage Manage, administer, and dispense medication to the patients effectively.

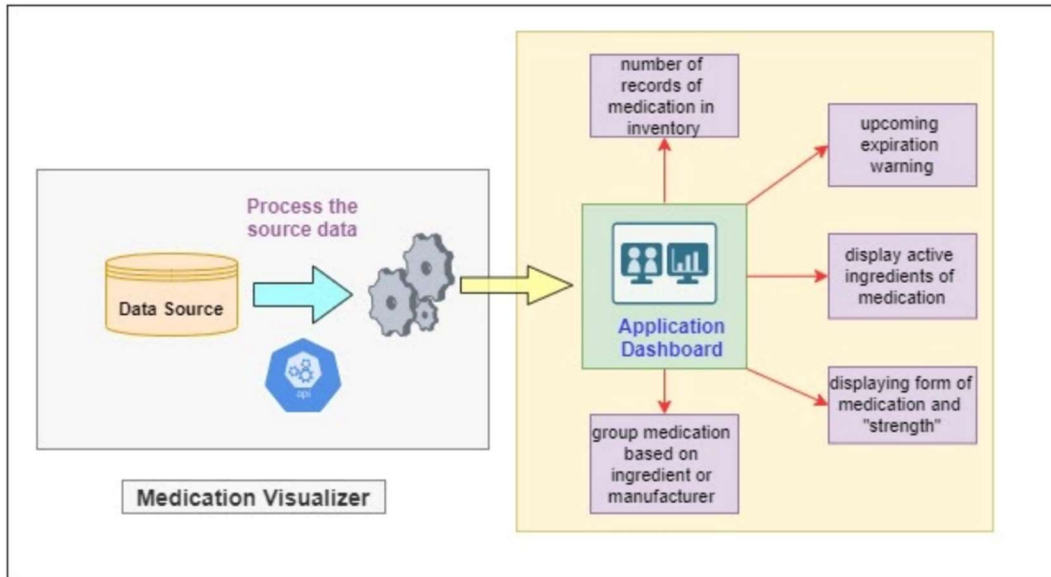
Solution dashboard with different views or visualizations to show relevant aspects of medication data.

- The problem we wanted to solve had to be solidified as well as the people who would be using the application.
- We then established the form that our solution would take.

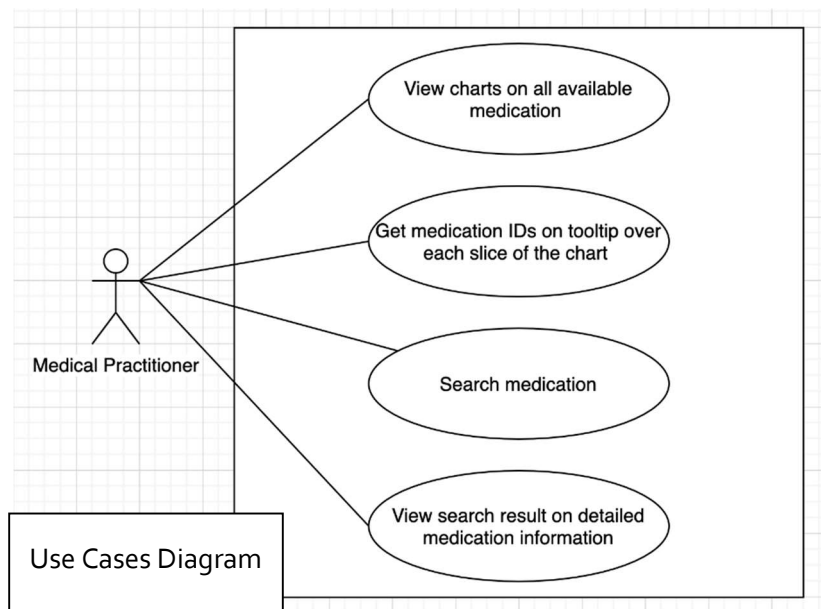
Team Member	Role
Uday Bag	UX, Developer
Patrick Chen	Developer
Marco Colasito	Developer
Dasom Eom	Project Manager, Developer
Rory McGurty	UX, Quality Assurance/Quality Control

- In order to divide up the workload amongst the team members, we took up roles based on our individual skillsets and experiences.

Architectural Diagram



- We established early on that we would need to pull data from an external source, such as FHIR.
- Data would be processed by a backend before being displayed on the application's dashboard.



The different use case scenarios had to be established before attempting to create the front-end.

These scenarios would dictate the different components we would need to develop.

The User Interface

1. Search Field
2. Radio Buttons - select either "Drug Name" or "RxCUI" before searching
3. Num of Records
4. Active Ingredient
5. Brand Names (can use to update search)
6. Dosage Forms (can use to update search)
7. Expiration Table - A user can select a patient or patients using a checkbox and view their records

The image shows a web application titled "Medication Visualizer". It features a search bar at the top with the text "Alprazolam" and a "Search" button. Below the search bar are two radio buttons: "Drug Name" (selected) and "RxCUI". To the left of the main content area, there are four sections: "Active Ingredient" (Alprazolam), "Brand Names" (Niravam, Xanax), "Dosage Form" (24 HR Xanax 0.5 MG Extended Oral Tablet, 24 HR Xanax 1 MG Extended Release Oral Tablet, 24 HR Xanax 2 MG Extended Oral Tablet, 24 HR Xanax 3 MG Extended Release Oral Tablet, 24 HR Xanax 2 MG Extended Oral Tablet, 24 HR Xanax 3 MG Extended Release Oral Tablet, 24 HR Xanax 2 MG Extended Oral Tablet), and "Expiration Table". The "Expiration Table" is a table with columns for "PatientId" and "Expiration Date". It contains 8 rows of data. A "View Patient(s)" button is located at the bottom right of the table. The "Records: 5281" text is located at the top left of the main content area.

- With the use of Balsamiq, we drafted a prototype for the user interface to illustrate the types of possible components we would need as well as their relation to the back-end.

UPDATED PROTOTYPE

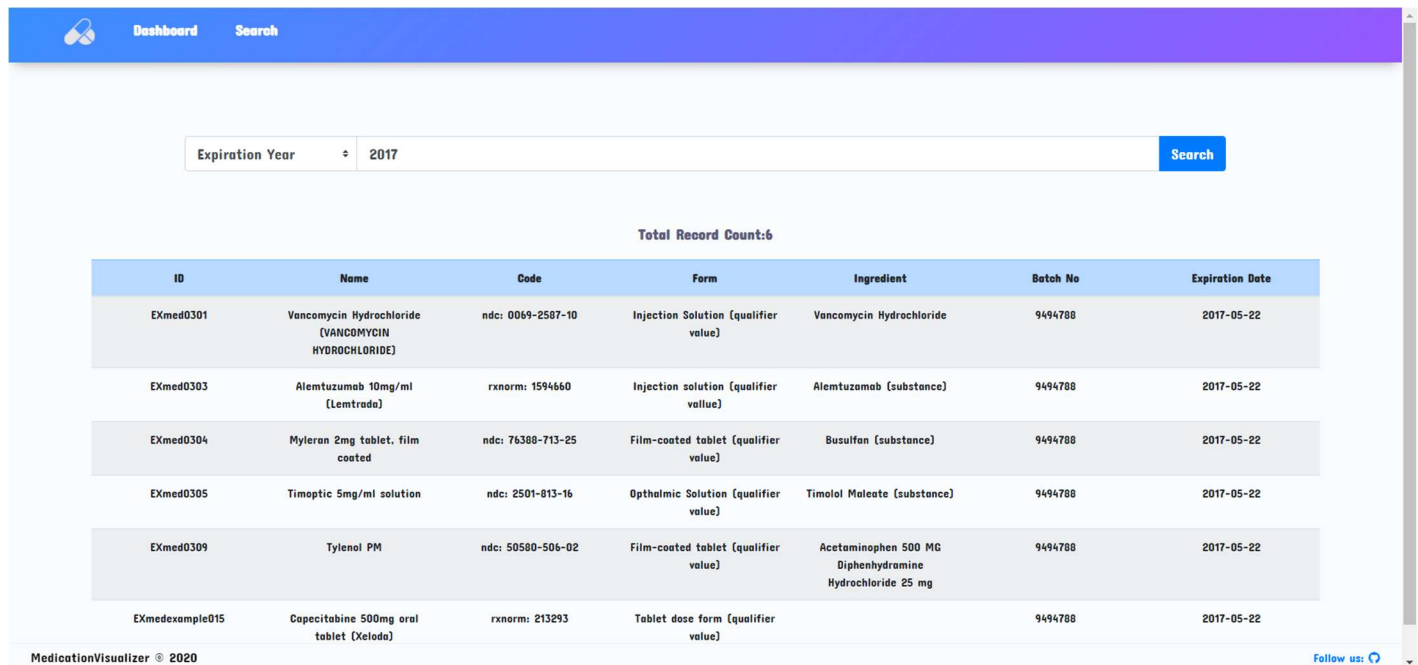
Updated User Interface with Visualization

1. Search Field
2. Search Button
3. Num of Records
4. A table of relevant medications
5. Visualization of the relevant info in pie chart/ bar chart



- After giving more thought and consideration to the end user and overall appearance of the application, we opted for a simple “search and display” page.
- The user would type a medication in the search field at the top, and the table/charts below would change to reflect the results of the query.

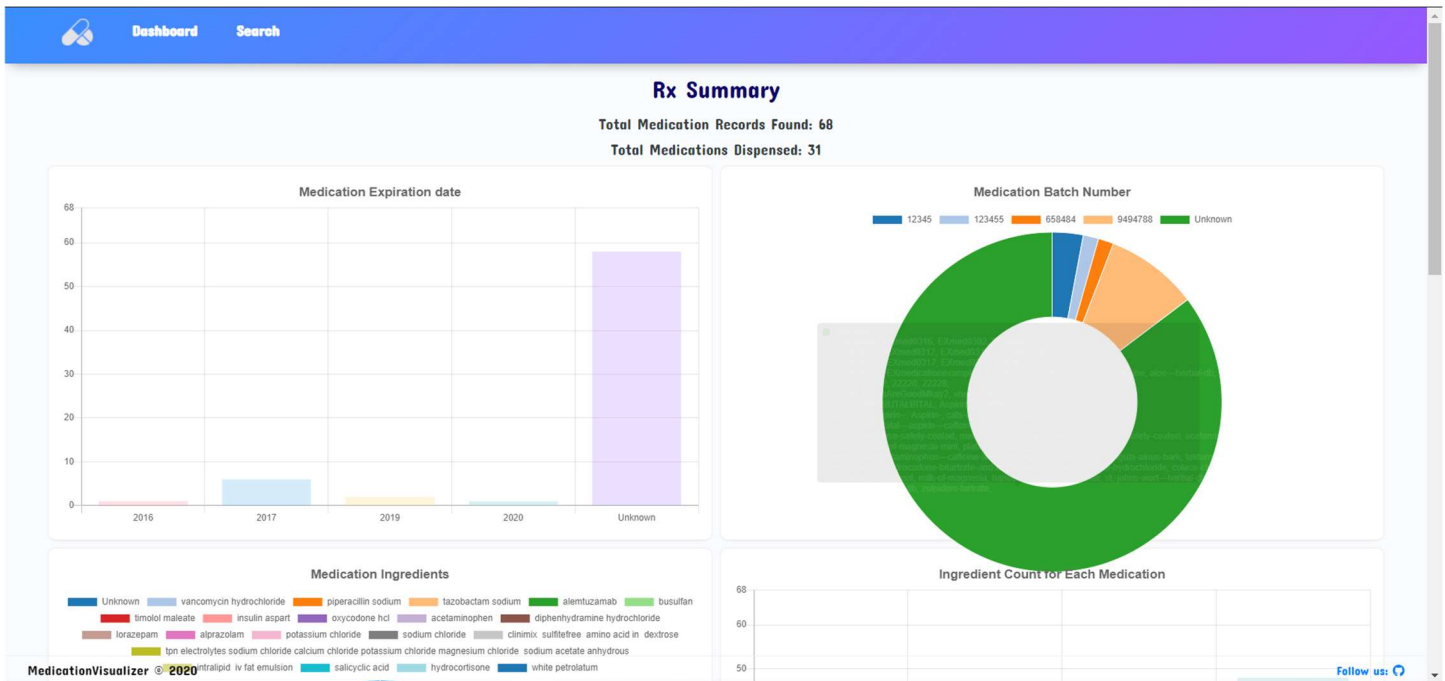
FINAL PRODUCT AND BACK-END REVISION



The screenshot shows the 'MedicationVisualizer' application interface. At the top, there is a navigation bar with 'Dashboard' and 'Search' links. Below this, a search filter is set to 'Expiration Year' with the value '2017'. A 'Search' button is located to the right of the filter. Below the search bar, the text 'Total Record Count:6' is displayed. The main content area contains a table with 7 columns: ID, Name, Code, Form, Ingredient, Batch No, and Expiration Date. The table lists 6 records for the year 2017. At the bottom left, the text 'MedicationVisualizer © 2020' is visible, and at the bottom right, there is a 'Follow us:' link with social media icons.

ID	Name	Code	Form	Ingredient	Batch No	Expiration Date
EXmed0301	Vancomycin Hydrochloride (VANCOMYCIN HYDROCHLORIDE)	ndc: 0069-2507-10	Injection Solution (qualifier value)	Vancomycin Hydrochloride	9494788	2017-05-22
EXmed0303	Alentuzumab 10mg/ml (Lemtrada)	rxnorm: 1594660	Injection solution (qualifier value)	Alentuzumab (substance)	9494788	2017-05-22
EXmed0304	Myleran 2mg tablet, film coated	ndc: 76388-713-25	Film-coated tablet (qualifier value)	Busulfan (substance)	9494788	2017-05-22
EXmed0305	Timoptic 5mg/ml solution	ndc: 2501-813-16	Ophthalmic Solution (qualifier value)	Timolol Maleate (substance)	9494788	2017-05-22
EXmed0309	Tylenol PM	ndc: 50580-506-02	Film-coated tablet (qualifier value)	Acetaminophen 500 MG Diphenhydramine Hydrochloride 25 mg	9494788	2017-05-22
EXmedexample015	Capecitabine 500mg oral tablet (Xeloda)	rxnorm: 213293	Tablet dose form (qualifier value)		9494788	2017-05-22

- To simplify the visual presentation of the search page, we separated the graph and chart presentations of the data from the results table.
- The user can now choose what to search by, given these options:
 - ID
 - Code System
 - Code
 - Ingredient
 - Form
 - Expiration Year
 - Batch #



- On the new Dashboard page, we display a summarization of all available medications in the database. Each chart/graph provides a visualization of a certain attribute of the medications.
- Additionally, due to the size of the initial FHIR database, we opted for the R4 server due to its smaller size. This allows our pages to load faster, but for future work, we would redesign the fetching of the data to have a better runtime.