SW Engineering CSC648/848 Fall 2020

Company Name: The Dream Team

Application Name: Public Health and Safety in California

Section 02

Team 6

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Milestone 1

09/22/2020

1. Executive Summary

2020 has been a rather historical year for many California residents. First facing the global pandemic, COVID-19 swept through the state infecting almost 700,000 residents and causing over 15,000 deaths. Then we have huge wildfires burning through hundreds of miles of our valued forest, destroying homes, property and most importantly infecting our air. It can be said that california is faced with a very difficult task and that is to keep everyone safe. Right now california and the residents need to stay informed of what is happening around them so team of 5 Seniors came together and formed a company that would address this problem by creating a web based application that would provide the residents and officials of California with useful information.This app would be centered the data from wildfires and COVID-19 , that could be pinned on a map containing all the counties in california. The application's data would be administered by higher ranking officials such as director of public health and Fire chief's in all 58 counties.The data that we will monitor for COVID-19 includes metrics in number of cases per 100k, deaths per 100k, spikes in cases, number of ICU cases and levels of danger (shelter in place) in each individual county or collective counties near the user.For monitoring data in wildfires we will focus on data such as air quality, area of burn, contamination, start date, active fires, and levels of evacuation.The application will have many functionality than just displayed data, (A) This site shall implement search by location (counties, zip code, city). (B) User's shall be able to filter through the data to see what they are most concerned about.(C) User's shall be able to interact with the map on the application to see a representation of the data. (D) User's could switch between seeing COVID-19 or Wildfire data. (E) The site will be able to receive trending news on specific california COVID cases or wildfires.(F) Be able to register users for an account that will have their personal location. (G) Be able to send them alerts when there is a unsafe level in wildfires or COVID-19 (evacuation levels or shelter in place orders).Our data administrators (health and fire officials) would be able to trigger an alert when there is a high level concern about certain counties or there are order of shelter in place or evacuation to registered users.Any misuse of the application would be ultimately monitored by a site administrator that would review any items or user's before going on the site live.

There are many news outlets and mobile applications on the market that are able to fulfill similar functionality that we aim to bring but with limited functionality and only one side of the data (COVID-19 or WildFires). The main appeal of our application would be a centralized bridge on both COVID-19 and Wild Fire data, user's would not have to sign up for individual services to keep up to date with what is happening around them.

The site functionalities and design on the application will be tailored towards the needs of a user while still making it very friendly and fast.

2. Personas and main use cases

With the magnitude and complexity of tracking the progression and potential risk of both the state wildfires and global pandemic, efficiency is paramount and in order to make this platform as effective as can be we must identify the most likely users and their needs. In short we will be identifying the personas and the main use cases for them and identify common personal responsibilities and power they hold in their communities to combat these life threatening obstacles to the people of California. We will be focusing on three personas and their main use cases as we believe the scope and overlap of what these personas would utilize our platform also would cover the functionality that would be desired and used by the average person maximizing the applicative uses for specialists and the average person.

George Pines

George is a scientific advisor who works with the California governor Gaavin Newsom. He specializes in infectious disease is mild tempered but not afraid to take drastic action when it comes to pandemics. His main responsibilities is to evaluate the spread of infectious diseases and formulate strategies to combat the spread and suggest them to the governor. One point of contention he has when it comes to new software tracking tools are the accuracy and reliability of the data recorded on platforms that allow access to anyone. These sometimes bring unqualified people reporting data that is inaccurate and muddies the overall picture of the fight against the disease.

Kelly Batswana

Kelly is an emergency coordinator for the fire departments of the greater Los Angeles area. She keeps track of local and state fires and how much of them are under control. She is reliable and can operate under pressure in complex situations as her job requires. She does this in order to manage the resources of the local stations in case a large blaze comes towards Los Angeles and determines if outside help from other departments and agencies is needed. One point of pain for Kelly was that in the past other platforms she has worked with to track fires were painfully slow and when dealing with fires that can change within the hour due to wind patterns or something outside her control the speed of reports are paramount.

Phillip Coers

Phillip is a retired electrician who lives in Oakland to be close to his family. He has had two heart surgeries and suffered from a severe case of pneumonia a few years back. He is a well meaning person who spends his time with his grandchildren. Due to

his medical past Phillip keeps track of flu season and any other infectious diseases in order to prepare a self quarantine as he does periodically to protect himself and with covid 19, hsi family. Phillips main point of contention when using past platforms to keep an eye on infections in his area was the ease of use. He was mainly concerned with his local community but the UI was often a nightmare in order to find his local community.

Use Cases

George Pines is preparing for his biweekly meeting with the governor and his advisory team in order to determine if any state wide changes need to be made for the Coronavirus guide lines. George will be using our platform to check the daily cases reported for each county and compare them to last weeks along with the graph that shows a trendline of active cases for the past three months. George can also check which counties active cases are on the decline and if there are counties with cases on the rise. After the meeting and having presented his suggestions based on the data from the past few weeks George takes the new suggestions to the guidelines and submits them to an administrator on the platform in order to update the FAQ page on the platform for those looking for information from the state government.

Kelly Batswana has been keeping track of the fires burning North and South of Los Angeles county and is about to go on a zoom call with the heads of the local departments. She will be collecting info from them on local fires and with the fires outside the county warns the department heads to prepare to battle these fires if they get closer to the county Line. Kelly also has set automatic alarms on the platform to alert her if the fires enter adjacent control and if the percentage controlled reported by those counties rises above 30%. Kelly is able to see the surrounding counties with fires and the percentage controlled long with an overlay of current weather projections and wind conditions. Kelly has an upcoming meeting with the Governor in order to determine if additional aid and funding will be needed and is determining this based on reporting on the platform.

Phillip Coers is trying to determine how he will handle the pandemic. He is keeping an eye on the total cases in the state and his county. He is concerned with how easily it spreads as there has been a lot of misinformation flying around so he checks the platforms FAQ page. He sees that people in his age group are especially susceptible and that cases locally are on the rise. Using this info he determines to stay with his daughter and her family to ride it out and before he leaves he uses the platform to find a local testing center to make sure he's ok before he goes to stay with them as they have young kids.

Don Swanson is the superintendent of the San Francisco school district and is trying to determine whether to continue distance learning into the next semester. He

checks the platform for any new guidelines from the state to follow and check the trend of the active cases in the state for the last month. He specifically looks for any info on infection rates by age group and sees that children while still able to become infected do so at a lower rate than adults. He sets a notification for any guidelines or state news that comes out and will check periodically up until the moment he makes the decision while considering the trend line and projected trend line from the start of the pandemic and a month forecast based on past infection cases.

3. List of Main data items and entities

USER - Informations about a registered user		
id	UUID / CUID	Auto generated by My SQL
firstname	String	User’s first name
lastname	String	User's last name
email	String	Unique user email address used for the login
password	String (encrypted)	Encrypted user password used for the login
phone	String	User's phone number
address	addressId	User’s address needed for relaying relevant and useful information

ADDRESS - Detailed location		
id	Int	Auto incremented by My SQL
county	countyId	Location’s county
zipcode	Int	Location’s zip code
city	String	Location’s city
street	String	Location’s street
number	Int	House number

COVID

id	Int	Auto incremented by My SQL
date	timestamps	Date of the metrics
cases	Int	Number of new cases at this date
deaths	Int	Number of deaths at this date
county	countyId	Metrics location
icu	Int	Number of ICU at this date
hosp	Int	Number of hospitalizations at this date

FIRE		
id	Int	Auto incremented by My SQL
startdate	timestamps	Start date of the fire
endate	timestamps	End date of the fire
aqi	Int	Air Quality Index
EvacuationLevel	Int	Emergency level
county	countyId	Fire location
area	Float	Area of burn (ha)
active	Boolean	Is the fire still active

COUNTY		
id	Int	Auto incremented by My SQL
population	Int	Total population of county
name	String	Name of County
area	Float	Total County area (ha)

4. Initial list of functional requirements

ID	FR01
Title	Search by county
Type	Functional requirement
Description	Search implementation shall be available to the user so that they can look through data
Examples	A user shall be able to search for data based on several key inputs.

ID	FR 02
Title	Data filter
Type	Functional requirement
Description	Users shall choose what data is shown in the map
Examples	“User1” wants to search in the map only by air quality so he selects the option of the air quality filter and in the map is only shown that type of data.

ID	FR 03
Title	Registration
Type	Functional requirement
Description	User’s shall register to the application to see the data of wildfires and COVID-19 Metrics
Examples	After user’s makes an account they can see all the data and access to other features

ID	FR 04
Title	Alerts

Type	Functional requirement
Description	Users shall get alert messages when it is time to shelter in place or evacuate due to a wildfire.
Examples	Ex1: There is a high spike of COVID-19 cases in your county and there is a shelter in place order taken. Our application will be able to send an alert regarding the shelter in place. Ex2: Wildfires are happening near your area, the application will be able to send you an alert for evacuation.

ID	FR 05
Title	Data Admin’s
Type	Functional requirement
Description	County directors or health and fire departments shall be able to enter metric numbers as COVID-19 number of cases per 100k, death per 100k and number of fires in the county with respective levels of evacuation (L1, L2, L3).
Examples	Data Admin can input all data information that they have available into our site of covid-19 and wildfires per county.

ID	FR 06
Title	Site Admins
Type	Functional requirement
Description	The site shall have admins who will be able to trigger the alerts according with state guidelines (either shelter in place or evacuation) They will be able to approve items before they go live on the site They can delete inappropriate items or user’s
Examples	Country order’s a shelter in place, site admin will be able to trigger a alert sent to all users that are registered for

	alerts Incorrect items are listed on the site, site admin shall be able to take them down User's are sending inappropriate information, site admin shall be able to delete user's

ID	FR 07
Title	Map interaction
Type	Functional requirements
Description	In the user interface we shall include a map that user's shall be able to interact with to have a better experience looking at data
Examples	The user shall select a county in the map and the information about the county will show in the screen

ID	FR 08
Title	Covid-Wildfire selection
Type	Functional requirement
Description	Application shall have the capability of being able to switch data from covid to wildfire, vice versa and have it accessible to the user.
Examples	The user shall select the option between Covid statistics or Wildfire statistics and it will change the interactive map and data.

ID	FR 09
Title	Covid Alerts
Type	Functional requirement
Description	The Site admin shall trigger the alerts to the users when there are more than 5k per 100k cases of covid

Examples	Sudden increase spike in covid cases, site admin sends out alerts to those who are registered within the same area of the spikes.

ID	FR 10
Title	Wildfire alerts
Type	Functional requirement
Description	The Site admin shall trigger the alerts to the users when the level of evacuation L3 is reported
Examples	Wildfires emerge, those who are in similar proximity receive an alert on the severity of the evacuation.

ID	FR 11
Title	Twitter news
Type	Functional requirement
Description	The page shall show the latest tweets from different accounts related to the Government of California.
Examples	@CAPublicHealth @CAgovernor

ID	FR 12
Title	County Covid data
Type	Functional requirement
Description	The page shall show the number of new cases per 100k, the new deaths per 100k, the accumulative cases, the accumulative deaths, number of hospitalization cases, number of ICU cases and the web of the county health department.
Examples	Once the user selects a county all the data must be shown

ID	FR 13
Title	County Wildfire data
Type	Functional requirement
Description	User's shall have current data and historical data that shows all the different levels of evacuations among all counties,
Examples	User's shall be able to access the earliest data available in a certain county

5. List of non-functional requirements

ID	NFR 01
Title	Login identification
Type	Non functional requirement
Description	All users that want to log in shall introduce a username or an email, and a password
Examples	A user that is already registered,wants to log in, the user has to identify correctly with the username or email and the password.

ID	NFR 02
Title	Email verification
Type	Non functional requirement
Description	Once the user is registered, to verify a proper email address from the public, the application may require email confirmation as they received an email from the system.
Examples	A user that has registered has to verify his email before the user can receive alerts and notifications

ID	NFR 03
Title	Non logged users
Type	Non functional requirement
Description	User’s can still get functionality of the site without having to sign in
Examples	Users that have not logged in can only access to the map data

ID	NFR 04
Title	Web compatibility and optimization
Type	Non functional requirement
Description	Application shall be optimized for standard desktop/laptop browsers e.g. must render correctly on the two latest versions of two major browsers
Examples	User’s can use any browser to access the application

ID	NFR 05
Title	Mobile devices compatibility
Type	Non functional requirement
Description	Selected application functions must render well on mobile devices
Examples	User’s shall be able to access the application from iphone and android phones with a similar experience to using it from a website

ID	NFR 06

Title	Availability
Type	Non functional requirement
Description	Site will be available to all, on a 24/7/365 basis
Examples	If user's want to use the application at 3am in the morning, they are able to do so.

ID	NFR 07
Title	Performance
Type	Non functional requirements
Description	The speed of the site shall be in a moderate to fast
Examples	User's shall not have to wait more than 5 seconds for a response time from the server

ID	NFR 08
Title	Data storage
Type	Non functional requirement
Description	All data shall be stored in MySQL database running inside a Docker container on the server
Examples	All the data in the application has to be stored in the server's database

ID	NFR 09
Title	Historical data
Type	Non-functional requirement
Description	User's shall have option to be able to look at the earliest data available on the application
Examples	User's can search for data from a year ago

ID	NFR 10
Title	Low system requirements (Hardware)
Type	Non Functional requirements
Description	User’s shall be able to use a underpowered device or a slow internet connection and still have reasonable response times from the application
Examples	Server Side rendering allows users to receive a static web page that is fast and lightweight

ID	NFR 11
Title	Security
Type	Non functional requirement
Description	The page shall use Let's Encrypt for SSL certificates to enable HTTPS
Examples	User’s shall not have to worry about signing into a vulnerable site without proper security measures

ID	NFR 12
Title	Usability
Type	Non Functional requirements
Description	Application shall be very easy to use and intuitive for everyone to use.
Examples	The application can be used by people of every age so it must be as easy and intuitive as possible so everybody has access to the data provided by the application.

ID	NFR 13

Title	SFSU Project
Type	Non Functional requirements
Description	The website shall prominently display the following exact text on all pages "SFSU Software Engineering Project CSC 648-848, Fall 2020. For Demonstration Only” at the top of the WWW page.
Examples	This must be displayed so it is not confused with a real application

ID	NFR 14
Title	Different language option
Type	Non functional requirement
Description	The page shall be developed in English but it can have an option for spanish speakers
Examples	Since in california there are a lot of spanish speakers the page must be in both languages

6. **Competitive Analysis**

PublicAlerts Wildfire
https://www.publicalerts.org/hazards/wildfire-2020

Text Alerts from SFgov
https://sf.gov/get-text-alerts-about-coronavirus

WildFire App
https://play.google.com/store/apps/details?id=io.wildfireapp.wildfire&hl=en_US
https://apps.apple.com/us/app/wildfire-local-breaking-news/id1046411483

Features	The Dream Team	Wildfire App	SFgov	PublicAlerts
Corona alerts	yes	yes	yes	no
fire alerts	yes	no	no	yes
Alerts for all of California	yes	yes	no	yes
Authentication of alert information	yes	no	yes	yes
Map Interaction	Stretch goal	no	no	yes
Twitter Integration	yes	no	no	no

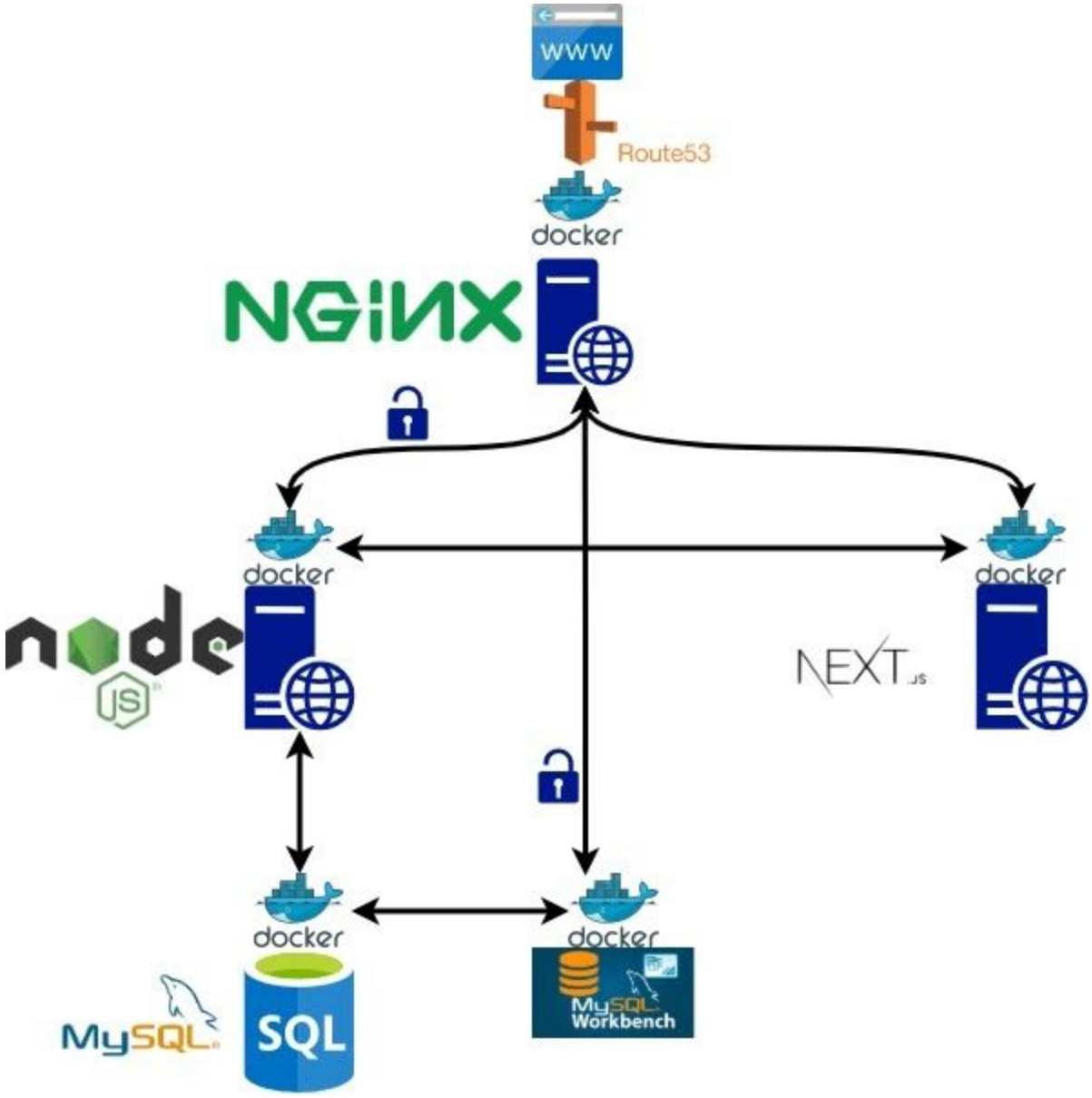
The main appeal of our site is that it is a one stop shop for wildfires as well as coronavirus without having to sign up for several programs. It is also full state with options for which area to receive alerts from so you can select several areas if you are worried about loved ones who may live in different parts of the country. The information will be straight from government officials instead of other citizens which can be less reliable and credible. Map interaction will also help with visualization of data, this feature is often separate from actual alert systems. Twitter integration is also a very important feature as Twitter is a very quick source for information right now.

7. High-level system architecture and technologies used

Our application uses a NEXT.js frontend, a Node.js backend, and a MySQL database as its primary layers. All software components are encapsulated within Docker containers for ease of access, ease of deployment, and enhanced security. This results in an application that can be easily scaled and redeployed. An entire software stack can be configured and deployed on AWS Fargate with a single command. The application is currently deployed on a single AWS EC2 instance running Amazon Linux 2, but the application setup would enable easily scaling up using technologies such as Docker Swarm. A full list of frameworks and software tools used is below:

- AWS EC2 instance for cloud deployment
- AWS Route53 domain mapping and DNS management
- Docker containers for major software components
- NGINX web server and load balancer running inside a Docker container
- Let's Encrypt for SSL certificates to enable HTTPS*
- NEXT.js frontend running inside a Docker container
- Node.js backend running inside a Docker container
- MySQL database running inside a Docker container
- MySQL Workbench for database administration, also inside a Docker container

A diagram of the application architecture is below.



Typical end user HTTP and HTTPS traffic is initially routed through Route53 to the NGINX container, where it is further routed to the NEXT.js frontend or the Node.js backend. Site administrators with proper authentication can also access the MySQL Workbench container through the NGINX container.

Requests involving database access proceed first through the Node.js backend, then to the MySQL container. County employees have expanded access to the backend to perform operations such as updating COVID counts or uploading fire data, but do not have site administrative access.

8. **Team and Roles**

Team Lead: Lauren Wong
Github Master: Duy Nguyen
Backend Lead : Nate Munger
Front End Lead: Yann Sainson

9. **Checklist for each item below:**
    - Team found a time slot to meet outside of the class
    - Github master chosen
    - Team decided and agreed together on using the listed SW tools and deployment server
    - Team Ready and able to use the chosen back and front end frameworks and those who need to learn are working on learning and practicing
    - Team Lead ensured that all team members read the final M1 and agree/ understand it before submission
    - Github organized as discussed in class (e.g master branch, development branch, folder for milestone documents etc.)