Project Activity #5 Report
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ENSE 374: Software Engineering Management
Dr. T. Maciag
Dec. 8, 2020

Covid BusinessPro

Abstract

In the midst of a global pandemic, COVID-19 is threatening Regina businesses and employees alike. Our project, Covid BusinessPro, is marketed towards Regina businesses. The Covid BusinessPro web application aims to provide services to business enterprises in the city of Regina that assist with the COVID-19 pandemic. In order to achieve this goal, we decided to provide a system that can track employee symptoms and provide contact tracing, notifying Human Resources when an employee has 3-4 symptoms (level 1) and more than 5 symptoms (level 2). In this stage, we have formed the minimum viable product (hereafter referred to as MVP) of our project, which provides the minimum basic functionality to allow the business to be alerted of employees' symptoms and locations for contact tracing. The goals of our project have been achieved through our MVP. In order to complete our MVP, we separated our application into four functionalities/pages. We have a login/logout and registration system to protect personal data using hash key encryption. In this page, we also distinguish two types of accounts. One of them is designed for Human Resources to monitor and manage all of the employees in the company. The other is an individual account which belongs to employees. We also provide a privacy policy agreement for both employees and HR, in order to inform them that all of the data entered is being monitored and to inform them of what they are responsible for to protect their data. For individuals, each employee needs to complete surveys on the questionnaire page, after logging in to their account. In this page, users are required to log their locations and their health status each day. Therefore, our application can trace the health trend and locations of every employee. The employee's profile page allows users and HR to review their entered data (symptoms and locations), this data is also displayed on a bar chart to reflect the past week. The graphical analysis illustrates the trend of the employee's health status. As HR, they, after logging in, are redirected to the main page which provides links to review every employees' health status (individual employee profile pages). An employee will be added into the alert table located at the center of the main page with their name, department, and alert levels presented by red background color (alert 2) and yellow (alert 1), after employees finish their questionnaires.

Introduction

COVID-19 is a novel coronavirus that is currently affecting cities around the world. Our group has come together to develop and promote an app targeted towards Regina businesses and their employees. Our app will provide alerts to businesses at the immediate sign of employee symptoms of COVID-19. Because our app alerts businesses at a level 1 (3 to 4 symptoms) or a level 2 (5+ symptoms) the generated data enables businesses to contact trace quicker and also understand where an employee has been (within the building) at the earliest onset of symptoms. This allows businesses to efficiently deep clean affected areas and efficiently manage employees. Employees data will be visible to Human Resources and not to other members of the business organization, therefore protecting private medical information. In this report we, The Apple Dongles, will outline our project's exploration and goals, the process of creating our application, project feedback and its impact on project decisions, and final key user interactions.

Exploration

In developing the 'why', or the reason for our project, and 'what' our project will carry out, keeping in mind all constraints, The Apple Dongles analyzed two applications. Firstly, we looked at the

government of Canada's covid contact tracing application. We tried to understand what has already been executed, in terms of information provided, and how it was done, with the goal of determining what makes what makes our project idea different. The second application we looked at was the Saskatchewan government website, which also provided information and statistics for the province, including information of Regina businesses affected. We wanted to provide alternatives to people who didn't want to share their phone's gps data, so what we wanted to provide was a different way of obtaining that information voluntarily. In addition to contact tracing we thought of ways beyond that step that we could introduce, in order to prevent the spread of the virus. One idea we thought of that would set our app apart was a way for early detection. What has been common in the news is that Regina businesses are having to shut down and do contact tracing, as well as deep cleaning, before they were able to re-open. Our goals then focused on providing a resource for businesses in Regina to use in order to help slow the spread of the virus, by means of early detection, and contact tracing. Initially, we wanted to be able to provide all the relevant information related to COVID-19 in one place such as other businesses affected in the area by ways of a Map API. We looked at Mapbox, Covid tracking data API, as well as other COVID-19 API projects on github. However, this would later be removed from our project.

Process

The Apple Dongles began the process of developing our application through our planning stages. We analyzed the business needs of our application in correspondence with the current pandemic taking place within Regina, Saskatchewan. After noting the business needs of our application, as stated above, The Apple Dongles concluded that the ease of use and benefits of this application outweighed any costs, as noted in our Business Case document, such as: Users entering invalid information to log in/register, neglecting the agreement, or a delay in the transmission of information.

In order to support the needs of our local businesses, our objectives were met by providing a system that can track employee symptoms and assist with contact tracing, as outlined in our Project Charter. Our Project Charter provides that users will take a questionnaire concerning their symptoms and the areas of the building or departments the employee has recently visited. An immediate alert will be sent to human resources with alert level 1 (3 to 4 symptoms) or alert level 2 (5+ symptoms). Due to professor and student comments on our application, the Apple Dongles have added hash encryption to protect users data and will follow all PIPEDA and HIPAA guidelines. We have completed our project within the permitted time frame by noting, in our Project Charter, the dates of all milestones related to the development of our application. The Apple Dongles have considered potential risks relative to the execution of our app, which include: employees entering and answering COVID-19 related questions honestly and divulging the places they've been to within the organization, and safely managing employee data. Scope risk of completing all MVP within a reasonable amount of time was also considered in order to complete all project goals objectives. The sponsor of our application is Dr. T. Maciag, University of Regina software engineering professor. All members of The Apple Dongles have taken on the management and development of our application, therefore, the project managers consist of Zhuo Chen, Bernadette Veninata, Alish Kadiwal, and Abraham Mugerwa. Key project stakeholders with the Covid BusinessPro app are: Jane Doe, Human Resources Manager, and John Smith, CEO.

Project stakeholders interested in our Covid BusinessPro web application were detailed in our Stakeholder Analysis and Stakeholder Management documentation. They include: John Smith, CEO of ABC Company. Smith has been responsible for more than 500 employees at his head office in Regina, Saskatchewan, and he agreed to contract with the Apple Dongles upon completion of development. His level of power over the application is high, as he is a large contributor to our application. The Apple Dongles met with Smith periodically, as his level of interest in the development of the application is low, and his level of support is neutral, to update him on the development of the application and the needs of ABC company. Jane Doe is the Human Resources Manager at ABC company. Mr. Smith asked her to coordinate with the Apple Dongles on how to limit the spread of the virus to employees, utilizing our

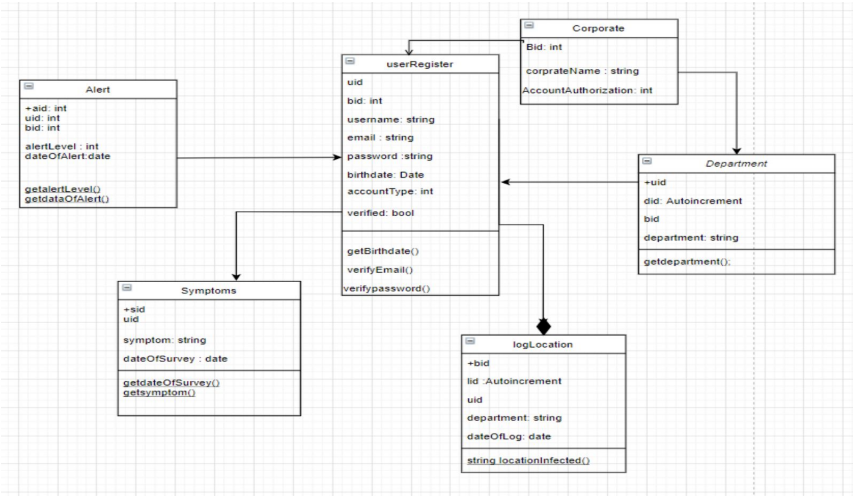
application. Her level of power is high, however, her level of interest is low and her level of support is neutral as Doe has concerns about using an app to track employee data. During the duration of the app's development, The Apple Dongles participated in daily scrums with Doe to ensure she is aware of how we plan to implement our application with the use of the employee data and how we will strive towards privacy amongst employees. Dr. T. Maciag is our project sponsor. He is a professor at the University of Regina with a strong knowledge of software systems and development. Dr. T. Maciag has a high level of power and interest in our application. Therefore, we met for weekly scrums to ensure we are on the right track in terms of software practices and development strategies, and to get approval on the direction we are taking. Dr. T. Maciag has a high level of support in the development of our application, as we provided him with MVP's bi-monthly to receive necessary feedback. Stakeholders also consisted of project managers, therefore our level of power, interest and support were high, and communication between all members took place daily, with weekly meetings.

Roles and responsibilities were given to each project manager, and recorded in our Project Roles and Responsibilities document, in order for successful completion of the application. The roles and responsibilities were altered throughout the development of our application in order to complete all functionalities within the given timeframe. The login page, created by Alish Kadiwal, prompts the user to enter their valid business email address, and a valid password. On submit, a successful login will take employees to the questionnaire page, and human resources to the main page. An unsuccessful login will redirect back to the login page. The registration page, also created by Alish Kadiwal, allows users to register an account as a human resource manager or a regular employee, with corresponding information depending on what account type you choose (explained further in our final outcome), encrypted via hash key protocols. On submit, a successful registration will take employees to the questionnaire page and human resources to the main page. An unsuccessful registration will redirect back to the login page. Users will be asked to accept a privacy policy upon registration. The responsibility of the questionnaire page was given to Bernadette Veninata, with the functionalities of a checklist of symptoms and departments within the business. The employee can select which departments they have been to that day, and an alert will be sent to HR when an employee selects 3 to 4, or 5+ symptoms. The responsibility of the main page - which consists of an alert table of employee exposures, with the level of symptoms identifiable by colour, and a departments list to display employees by departments - was initially given to Zhuo Chen. However, given the timeframe to complete our application, it was assisted by Bernadette Veninata. Due to further time constraints, the user profile page was developed by all project managers to speed up the process. It consists of a dated log of employee's symptoms and a dated log of locations within the business the employee has been to over the past week. The number of symptoms per week is displayed on a graph on the user profile page. Information will only be accessible by the user and HR, and will not be visible to colleagues.

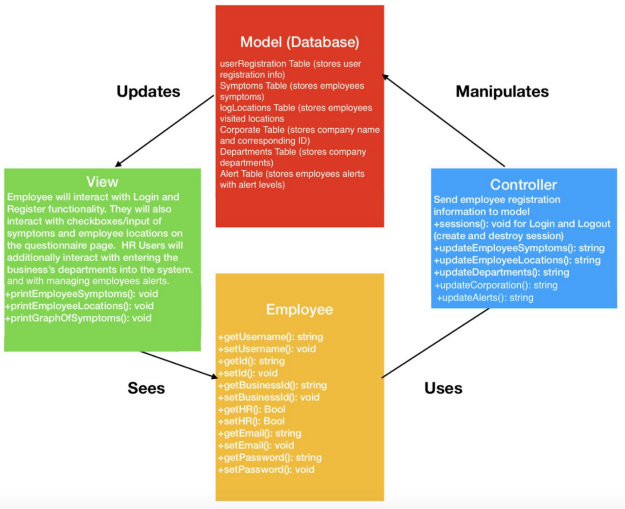
To carry out our project goals and objectives within the given timeframe, our project scope was considered. The main functionalities of our application consists of: A login/sign up page, a database, a questionnaire page, a main page and a user profile page, as described in our Project Scope statement. The log in and sign up were previously going to take place on separate pages however, by the final project, were accessible on the same page through tabs. Hash key encryption protocols were chosen against MD5 encryption. Previously an access/authentication code was going to be provided to both HR and employees, however by the final project only HR would provide an authentication code to employees. Weak passwords are now regarded as acceptable, as they will be encrypted. Redirection of pages from login and registration was changed for ease of use. Instead of redirecting to the user profile, HR will be redirected to their main page (alerts page), and employees will be redirected to the questionnaire page so they can take the survey directly after logging in. The navigation bar has been updated to reflect the change in page redirection. Previously, the symptoms would be stored in the database as mild, moderate or severe. This was changed to reflect all symptoms equally, and instead take into regard the level of symptoms such as 3 to 4 (level 1) or 5+ (level 2). To account for scope creep, and as suggested by

professor and student feedback, a data feed and live map of affected areas within Regina to be listed on the main page was removed. An alert functionality was used, to notify HR of the most recent employees showing level 1 or level 2 symptoms of COVID-19, with the addition of a departments table to keep track of all employees within the business.

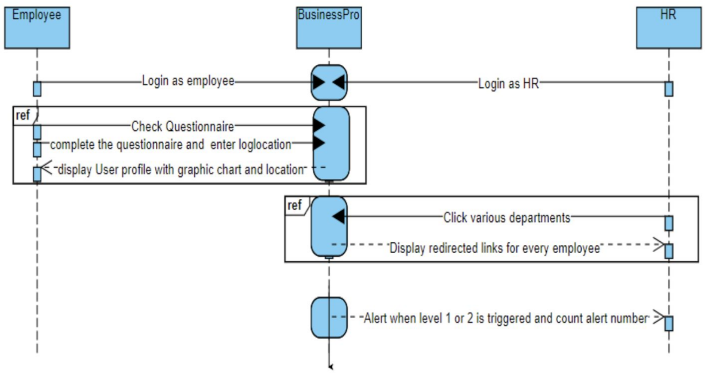
Class Diagram:



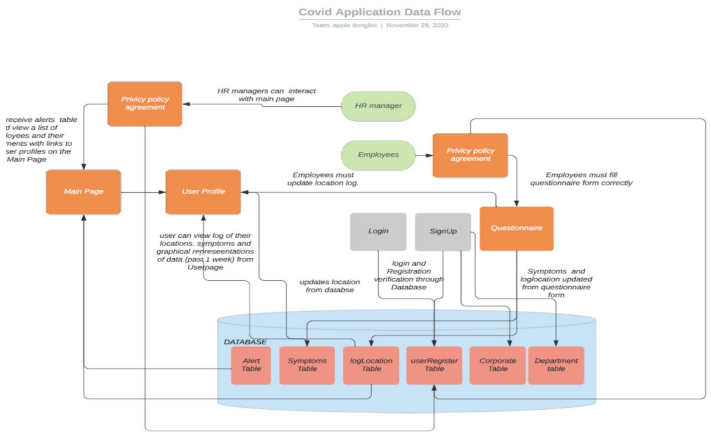
Model View Controller:



Sequence Diagram:



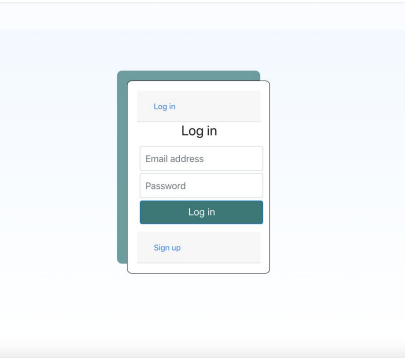
Data Flow Diagram:

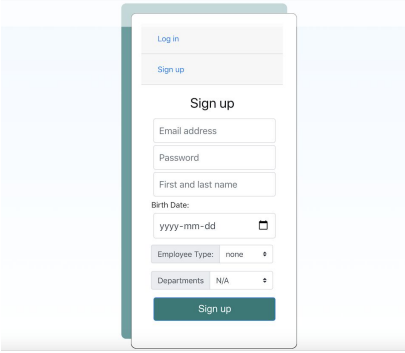


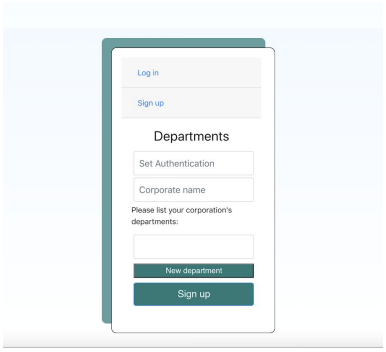
Diagrams were then produced to determine the set up of our model (database), view, and controller (classes), as well as the sequence of events in our application. At the conclusion of our development, our mySQL database consisted of 6 tables: A userRegistration table that stores registration information. A Symptoms table, that stores a dated record of employees symptoms. A logLocations table which stores a dated log of employees visited locations. A Corporate table, which stores the company name and corresponding ID. A Departments table that stores company departments. And, an Alert table, that stores employees alerts with alert levels. The relationship between these tables are shown in our class diagram. We then mapped out the pages necessary to display this information: The login and sign up pages, the privacy policy agreement, the main page, the user profile page, and the questionnaire page. As well as their relationships to each other, and to the database as shown in the Data Flow diagram. A sequence diagram was created to show the sequence of events by an employee, through our application, to human resources. As shown above, in our sequence diagram, an employee will log in, complete their

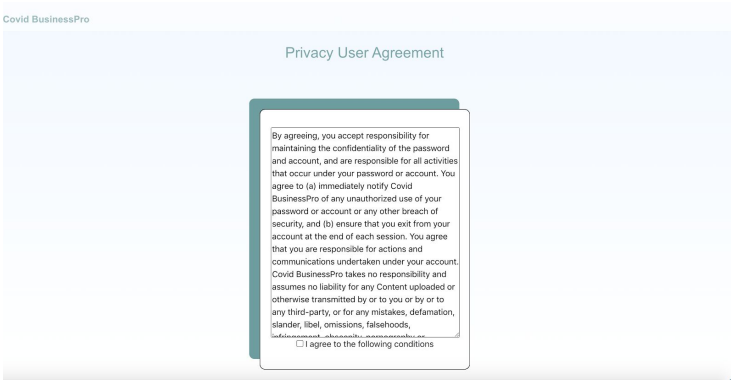
questionnaire. This information will then be displayed on their profile. HR will be able to view employees by their corresponding departments, and receive an alert if an employee has triggered a level 1 or level 2 alert.

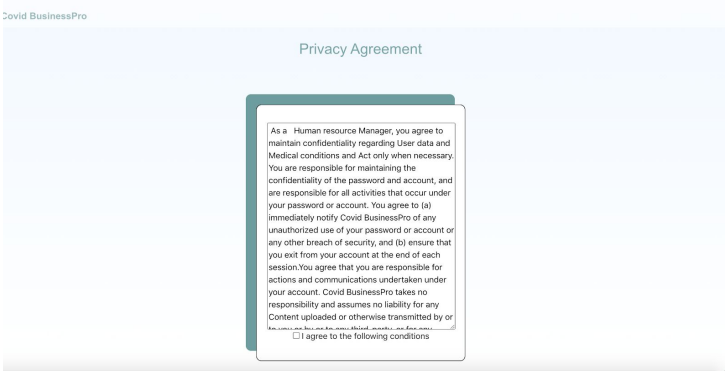
Final Outcome and Key User Interactions



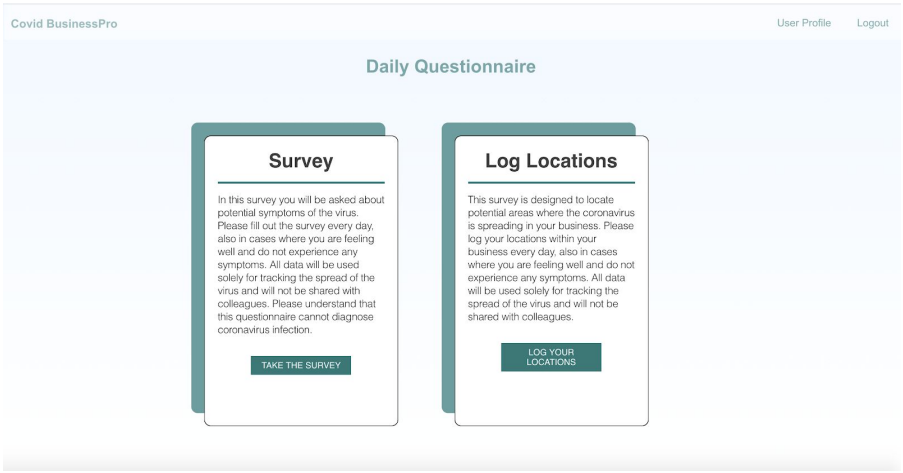


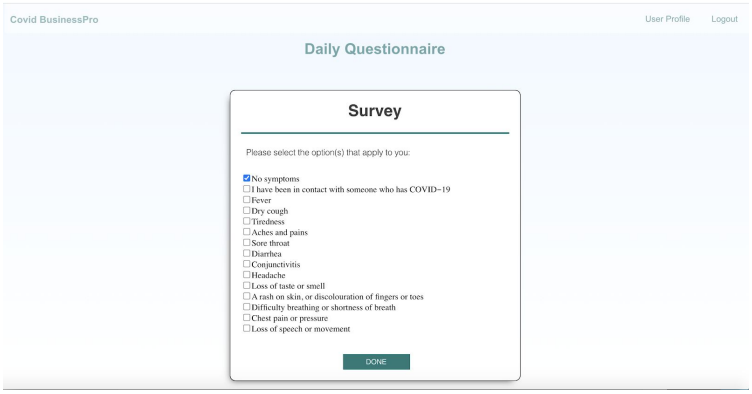


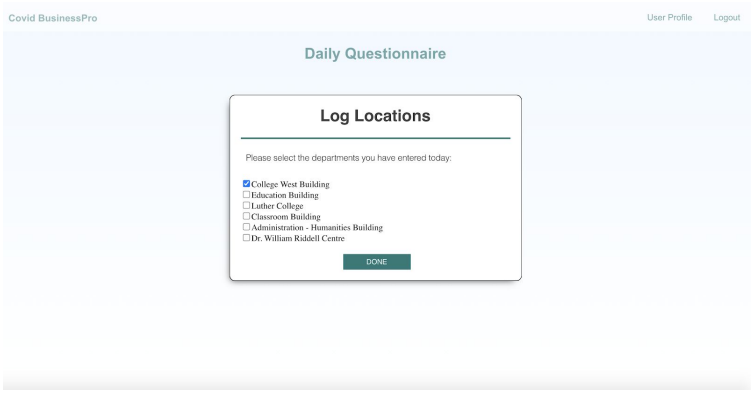




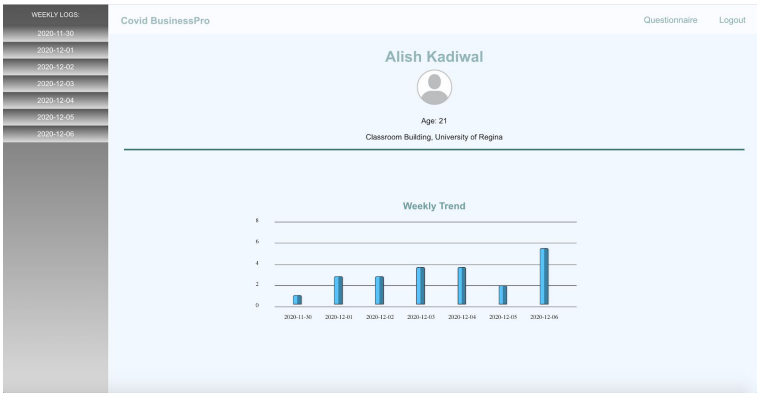
Sign up and login is an important part of our application. We have added functionality for both employees and Human Resources managers on the same page. We applied an accordion style to our login and signup form. To login into the profile, the user must enter the correct business email and password and if login is successful, it will create a session. We have changed a few things from our previous design. The sign up form was too long and all input fields were not required for users. In our later meetings we decided to use tabs to view the sign up or log in section so that it's convenient for users and easy to follow. On to the next phase of our design, we decided that it would be easier for users to select applicable input like departments instead of typing them. We used JavaScript to check and verify the data and manipulate the fields (such as fields for business departments and authentication as entered by HR) so that they are displayed to users. We used Ajax programming and displayed the departments that are registered by HR based on authentication code and email address entered. All the data stored from sign up page is stored with utmost cation and keeping in mind the user safety and following all essential protocols. Hash key encryption was used to protect users data. User privacy agreement is displayed once when the user registers for a new account. Users must comply with our terms in order to use the application. The user agreement states the information regarding the user honesty, protocols and data protection. When users agree to our terms they can proceed to the next corresponding page.

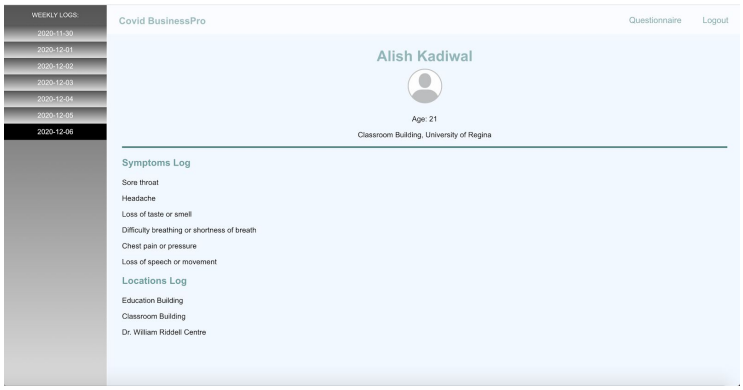




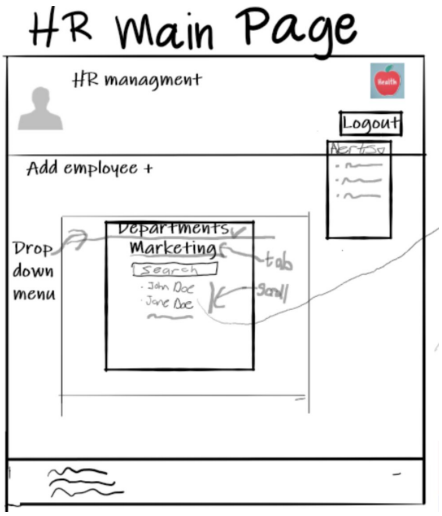


Once logged in, employees will be asked to complete their daily questionnaire. This page consists of two surveys: A survey to log the employee's corresponding COVID-19 symptoms, and a survey to log the employees locations for that day. This information is stored in our systems database and reflected on the employee's profile page. An immediate alert is sent to Human Resources' main page with alert level 1, if 3 to 4 symptoms are checked off, or alert level 2 if 5+ symptoms are checked off, for that day. If a user selects that they have been in contact with someone who has COVID-19, a level 2 alert will be sent to human resources. If an employee experiences more symptoms throughout the day, they may take the survey again. This gives employees the ability to add new symptoms to their log without overriding any previously entered symptoms. Therefore, once symptoms have been checked off for that day they are stored in our system, and cannot be removed or tampered with - only added to. For example, if an employee selects that they have a 'Dry cough', and retakes the questionnaire on that same day and selects that they are experiencing 'Tiredness', they will be listed as having two symptoms - both tiredness and a dry cough. Data is utilized on a day-to-day basis. This means that each day when an employee takes the questionnaire, the count of employee symptoms will restart for that day. Therefore, the alerts sent to Human Resources will be up-to-date. For example, if an employee has 5+ symptoms and triggers a level 2 alert on day 1, they may only have 4 symptoms and trigger a level 1 alert on day 2.

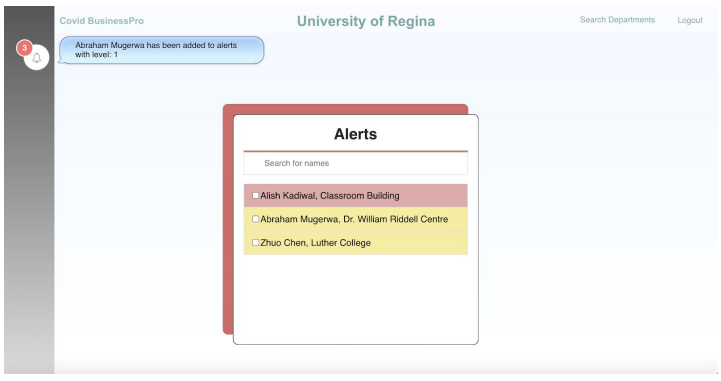


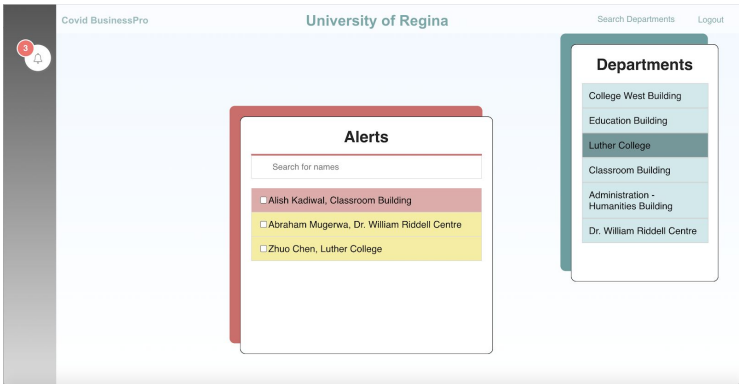


The user profile page provides current, up to date information for the logged in employee. Here they can see their name, age and department in the center of the view. This is also helpful for Human Resources who can also view this page, and once accessed, can easily see who's profile they are viewing. On the left panel of this page, you can view information of previous questionnaire logs for up to one week. A user can click on the date they wish to see information on and it will dynamically show their answers to the questionnaires sorted by the symptoms they logged, and then the locations logged within the business, for that day. For a quick glance, a user can also view their weekly trend on the center of the screen, which shows a graph of their symptoms logged over the past week. This graph will change according to how many symptoms you've recorded in your questionnaire in a range from 0 to 8.



After a few milestones of our project, we decided to change the main page. In the lo-fi sketch, we placed the department table at the center of the page and hid the alert table in the background as a secondary functionality. However, based on professor's feedback and our MVP, the goal of the page is to alert HR by using an alert table, not just showing the departments list. Therefore, we decided to set the alert table as the primary functionality of the page and the department list in a dropdown. The departments list allows HR to view employees, by department, as a link to their individual user profile pages. HR can also access the profile pages of users who have triggered an alert directly (by clicking on their name). In the final version of our project, we also added an alert notification function on the left side of the main page, which displays the number of people who are added into the alert table and people who most recently triggered an alert with their name and alert level, shown for 5 seconds. Employees who have alert level 2 (red color) always are placed above people with level 1 (yellow), in order to emphasize severity.





Conclusion

The knowledge we gained from this project, as a group, and individually was beneficial. When we first began the project, we were not aware of the golden circle, and what makes a software product great. We had a broad scope or idea of our goals and deliverables, however, we still had to work on the aspect of how to bring all of our ideas to fruition. We had a sense of responsibility and accountability as individuals, but lacked the knowledge of how to plan and execute our ideas efficiently as a team. As soon as we gained the skills learned throughout the course, necessary to effectively plan and communicate, we were able to successfully accomplish our goals. The more we came together and collaborated as a group, the more we were able to explore different methods and techniques to solve our issues. Individually, the primary focus is always on programming. One of the first lessons we took away from this experience was, however, that without documentation, when we move forward as a team this could become a treacherous path. Therefore, it was crucial that we iron out, together, any potential options, hurdles, and strategies that may be crucial to our project, during the planning stages of development.

Going forward, there are many things that we've learned during this project that we can take with us in the future. Before this project, we were unfamiliar with the method of Agile and minimum viable products. Life cycle processes like Agile, and the method of minimum viable products, helped with initial planning and execution stages. During the duration of our project, we learned about documentations and its necessity. Documentation such as the Project Charter, Project Scope analysis, and Roles and Responsibilities document, helped us to not lose sight of our primary focus. As a result of working together on this project, we gained a firm understanding of programming concepts and what it takes to be a pragmatic programmer. In the future, before working on a project, we will now know how to carry out the planning stages and make sure that what we are building carries the most value for our users. Revisiting many concepts, time and time again, is what makes our project a MVP. The constant upgrading and refining of our project made our project iterative. The more we collaborated as a team, the more we enjoyed gaining a crucial office-like experience and knowledge on how to make progress without compromising or over burdening one person.

Considering the entire experience, our team is most proud of our newfound ability to code for others and not just for ourselves. Our application was created with our users in mind, and how to best fulfill the needs of those that will use our application. Specifically, we are proud of our ability to create real-time alerts and notifications for human resources, when an employee is showing symptoms of COVID-19, without them ever having to refresh their pages. In order to carry out our future MVP's - which consist of displaying a live map to show affected areas within the city, and a news feed of recent related COVID-19 news - we would like more help with API's and guidance on how to dynamically source information from other sites so that we can provide our users with up to date information.