**City University of Seattle**

**CS 504 - Software Engineering Summer 2021**

**Independent Project 2**

**Vaccine Scheduler**

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**Introduction**

After the development of coronavirus vaccines was over, they got distributed widely and are not accessible to the population easily and for free. It made sense to select places like pharmacies near or in grocery stores as the vaccine distribution centers because people regularly visit them already. These pharmacies and grocery stores started putting up posters to let people know that they can get their vaccines there. There was also a need to create an online vaccine scheduler. This would allow people to reserve a time slot remotely, hence decreasing unvaccinated contact.

**Functional Requirements**

This system doesn’t have to be just for the coronavirus vaccine. Other vaccines can also be schedules via the vaccine scheduler. The vaccines offered can change depending on the region and date. The region can be requested from the user in the form of a zip code. The date can be accessed from the server time. Some common vaccines include COVID-19, Flu, Shingles, Tetanus, and Pneumonia.

The user will need to choose a location to get vaccinated. The zip code can be used to show the user closest vaccine locations.

The user will also need to choose what type of vaccine they want if they choose COVID-19. The current options are Pfizer, Moderna, and J&J.

The user can also filter vaccines by age eligibility. Only Pfizer vaccine is eligible for 12+ ages. Moderna and J&J vaccines are eligible for 18+ ages.

The application also needs to ask the user which dose of the vaccine to be administered. Moderna has a single dose option. Both Pfizer and Moderna have the two-dose option.

The user can also select to have an additional dose for Pfizer and Moderna vaccines. “It is designed for moderately to severely immunocompromised individuals and is for the Pfizer-BioNTech or Moderna vaccine. These should be given at least 28 days after the second dose of either vaccine was administered.” (News10. 2021).

The user will need to pick a data and time slot to reserve.

The application will then request the user to enter required and nonrequired information such as name, address, city, state, zip code, gender, date of birth, last 4 digits of SSN, ethnicity, race, contact phone, work.

**Non Functional Requirements**

The vaccine schedule reservation system needs to be accessible via the internet. A web application is going to give the system multi-platform accessibility. The same web applications can be accessed from different operating systems and from different types of devices such as phones, tablets, laptops, and desktops.

Privacy and security of the user data is critical. One part of securing the user data is securing the website from cyber attacks.

Most cyber-attacks are performed using the website itself. Inputting Javascript and SQL code in text fields are common and easy attacks. These types of attacks can be negated using input validation.

Parts of the program without input from the user tends to be more robust because the computer is going through its own code. So, as long as the developer used code to take care of the checked exceptions, and used exception handling to handle the unchecked exception, the parts of the program without user input tends to run fine. An example of this can be a program that calculates the sum of numbers from 1 to 100. As long as the programmer takes care of the data types, overflows, and exceptions, the program will run fine.

Inputs to a program tend to be one of the weak points of the program. Because the user can knowingly or unknowingly supply inputs that break the program. The user could enter the wrong type of data or a value outside the limits. The user could input a string with special characters that would be interpreted as Javascript or SQL code by the website. SQL injections could be used to request the entire table instead of just one entry. Javascript inputs can be used to send data of users to a remote malicious server. Invalid data can be used to break the backend server.

To secure the website from purposeful and accidental cyber attacks, escaping special characters and validating input are very important. These practices will force the user to enter valid values which will make the website more robust.

**Architecture**

MVC architecture is the most appropriate for this project. MVC will allow the creation of a dynamic website where the user can see dynamically generated pages and can submit data. The model part will be necessary to have persistent data. Separating Model, View, and Controller makes the web apps more maintainable. Modularization and loose coupling are always good in software engineering.

Since HTTP and HTML are both platform-independent standards, this architecture will help with the platform independence requirement. All browsers have the client-side capability to work with these standards. And since the dynamical generation of the views is done on the server-side, this will not cause compatibility issues on the client-side.

This architecture also allows the system to perform CRUD (Create, Read, Update, and Delete) operations. The user needs to be able to see the current data of unreserved time slots. And the user needs to be able to reserve that time slot.

One programming language with the capabilities and frameworks to support these requirements and architecture is Java. Java EE technologies such as Servlet and JSP can be used for an MVC, client-server, HTTP request-response architecture. Servlets can be used as the controller while the JSPs can be used as the view. JSPs are java code embedded in HTML pages. This allows for dynamically generated web pages. Lastly, MySql can be used for the Model.

Instead of Java EE technologies, Spring and Hibernate technologies of Java can be used for the same MVC, client-server, HTTP request-response architecture.

The server will require a Java web application container such as Tomcat for us to deploy our project.

**References**

News10. (2021). What’s the difference between a booster and an additional dose of the COVID vaccine?

https://www.news10.com/news/whats-the-difference-between-a-booster-and-an-additional-dose-of-the-covid-vaccine/