SENG 3011 - Deliverable 4

“Weekly Cri Sesh”

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Introduction

Before 2020, the concepts of wearing a face mask everywhere you go, seeing state borders locking down, and being restricted to not seeing your family and friends indefinitely were unimaginable for most and even apocalyptic to some. Yet, after the year had passed, this was the world society had to live in due to the COVID-19 outbreak that infected the globe.

One of the leading voices in the battle to suppress and control COVID-19 is the World Health Organisation (WHO), which monitors potential disease outbreaks through its comprehensive database of reports from its members across the globe. As seen, the management of COVID-19's spread was poor, as some countries were confused or not listening to WHO advice. This improper management highly disadvantaged travellers as they constantly blocked from travelling overseas and misguided as to when it would be safe to travel.

This has shown a great need for travel assistance during these unprecedented times, which is why the team at "Weekly Cri Sesh" have developed a web application called "TravelSafe" for a target audience of any and all travellers. This application tackles many pressing issues of being unable to travel due to border closures, being unaware of risks when travelling to different locations, and being misguided by non-credible information when making travel plans. It utilises the data from the WHO along with other credible sources, to assist travellers as they navigate these unprecedented times.

Use Cases

Use Case List

The target audience for our web application is potential travellers. Given the current global situation, there are many uncertainties that potential travellers face, which our application helps resolve. These are summarised as follows:

1. **Potential travellers need to plan flights between their origin and destination.**
   Using our trip planning feature allows the user to gain access to a list of upcoming flights that they can choose from.

2. **Potential travellers need to plan where they can stay at their destination.**
   Through our interactive map visualisation of hotels at their destination, users can easily see the options available to them.

3. **Potential travellers need to be informed about the risks associated with their travel.**
   An overall summary of whether it is or isn't safe for them assures the user whether they are making the right choice when planning their trip.

4. **Potential travellers want to know more about outbreaks in potential destinations so they can make decisions on where to go.**
   An overall map of global outbreaks provides a quick overview and allows them to decide faster.

5. **Potential travellers want to conduct individual in-depth research to make their own decisions.**
   Our customisable search bar allows them to achieve this goal.

Requirements

The following epics, user stories and associated acceptance criteria express our functional requirements for our web app.

1. **As a potential traveller, I want to plan the details of my trip so that I can be prepared for my trip.**

   a. As a traveller, I want to find flights for my journey so that I can travel to my

destination.

GIVEN I am on the plan my trip form,
WHEN I input my origin and destination,
THEN I receive a list of flights, times and prices

b. As a traveller, I want to find hotels at my destination so that I can book somewhere to stay.

GIVEN I am on the plan my trip form,
WHEN I input my origin and destination,
THEN I can see a map of hotels at my destination

2. **As a potential traveller, I want to know about the risks of my trip so I can make informed decisions about my journey.**

a. As a user, I want to see qualitative risk evaluations on my flights so that I can decide which flight to take at a glance.

GIVEN I am on the plan my trip form,
WHEN I input my origin and destination,
THEN I receive a list of flights, times and prices
AND I receive a warning for each flight either as ‘Safe to travel’, ‘Advise against’ and ‘Do not travel’

b. As a user, I want to know when it is not safe to travel so I do not waste time trying to plan a dangerous trip.

GIVEN I am on the plan my trip form,
WHEN I input my origin and destination,
THEN I receive a modal informing me of my risk
AND I am shown a list of WHO articles that support the recommendation

c. As a user, I want a quantitative risk evaluation on my journey so that I can evaluate the risk of my journey in more detail.

GIVEN I am on the plan my trip form,
WHEN I input my origin and destination,
THEN I can see the quantitative risk rating of my trip.

3. **As a traveller, I want access to credible information about my journey so that I can make informed decisions about my journey.**

a. As a user, I want a visual representation of outbreaks around the world so I can quickly decide potential destinations.
   GIVEN I am on the interactive outbreak page,
   WHEN I load the page,
   THEN I can see a map with markers on all known outbreaks in the last year

b. As a user, I want to search for outbreaks based on disease using a reliable source so I can be informed about more dangerous disease outbreaks in the world.
   GIVEN I am on the interactive outbreak page,
   WHEN I enter a disease in the search form,
   THEN I can see a list of articles related to that disease in the last year

c. As a user, I want to search for outbreaks based on location using a reliable source so I am more informed about my destination.
   GIVEN I am on the interactive outbreak page,
   WHEN I enter a location in the search form,
   THEN I can see a list of articles in that location in the last year

d. As a user, I want to search for outbreaks within a certain time period so I can gain a better understanding and self-evaluate the risks based on time.
   GIVEN I am on the interactive outbreak page,
   WHEN I enter a time period in the search form,
   THEN I can see a list of articles in the given timeframe

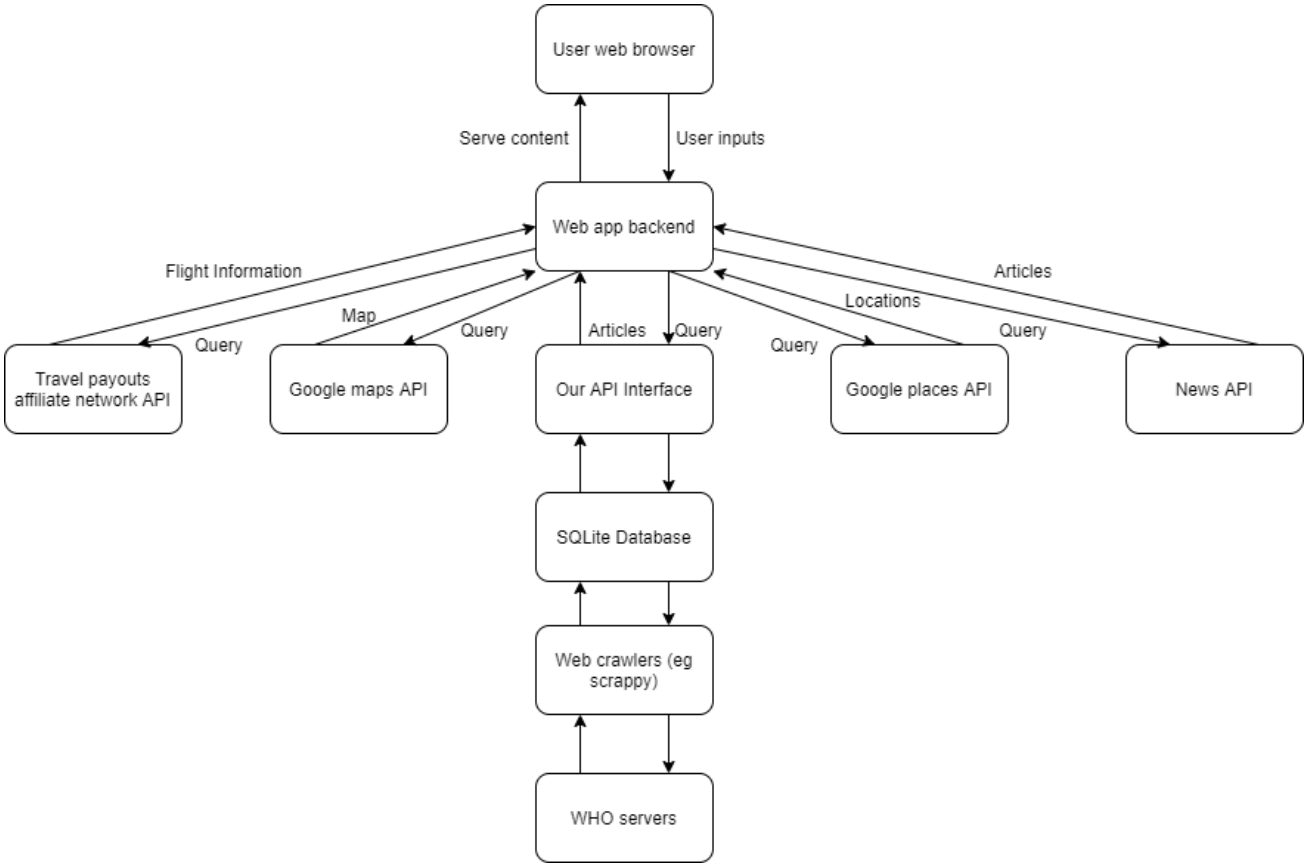
e. As a user, I want general information about outbreaks in the world so I can get a more rounded perspective on current affairs.
   GIVEN I am on the search form,
   WHEN I tick a checkbox,
   THEN I can see a list of articles from a variety of news sources.

System Design and Implementation

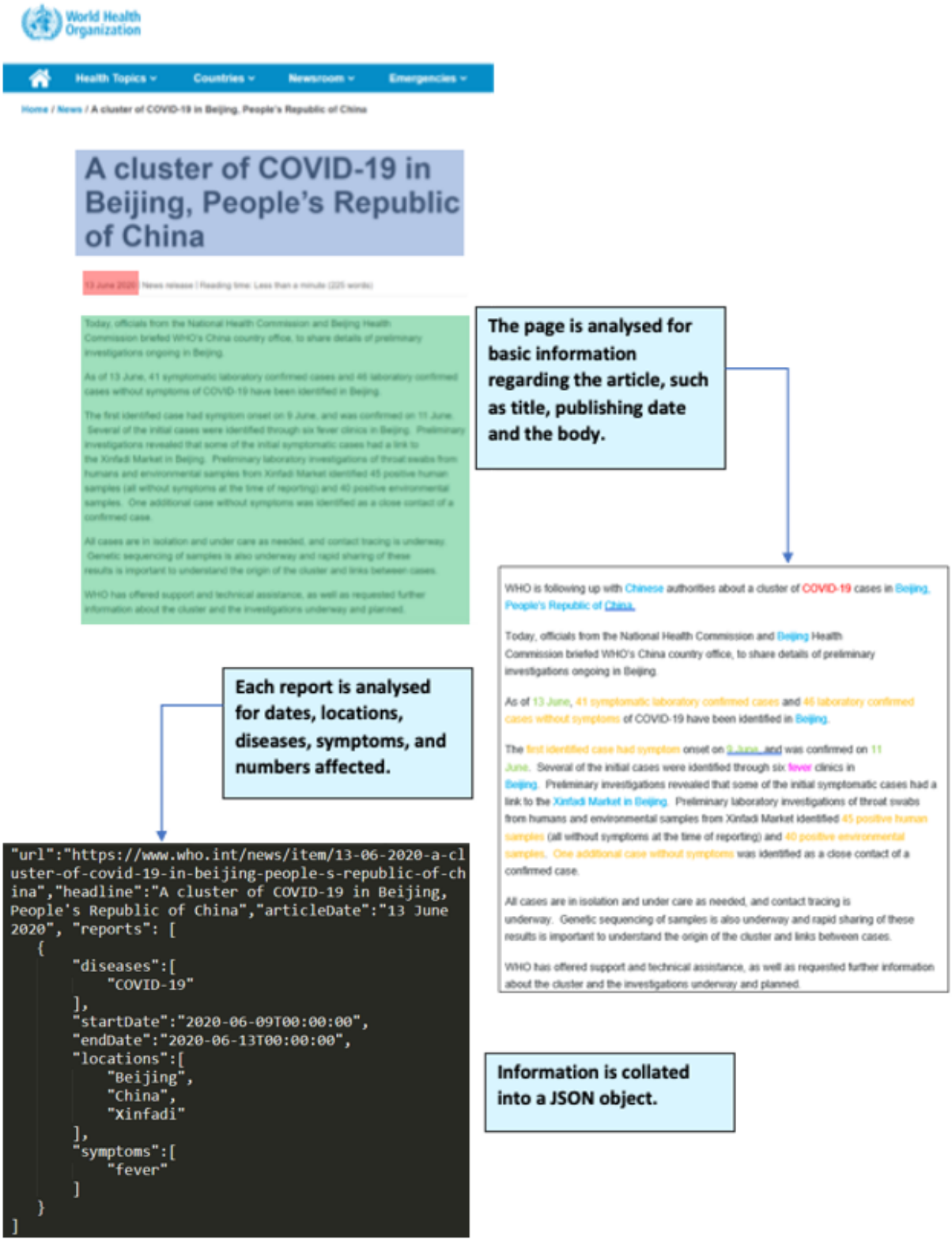
Final software architecture

The structure of Travel Safe involves a backend that processes user queries from the frontend and serves appropriate content by accessing our APIs. The backend comprises a simple python backend running with a flask server. This was used as our team has used python with a flask server before so were familiar with how it works. The frontend is made up of HTML and CSS for structure and styling,* with javascript used for functionality. Jinja is used for the backend to pass information back to the frontend.

Data travelled through the different levels of our service as shown below:



In creating our API, we utilised a web crawler and scraper that processes data as shown in the two diagrams below.


World Health Organization
Health Topics
Countries
Newsroom
Emergencies
Home / News / A cluster of COVID-19 in Beijing, People's Republic of China
A cluster of COVID-19 in Beijing, People's Republic of China
13 June 2020 News release | Reading time: Less than a minute (225 words)
Today, officials from the National Health Commission and Beijing Health Commission briefed WHO's China country office, to share details of preliminary investigations ongoing in Beijing.
As of 13 June, 41 symptomatic laboratory confirmed cases and 46 laboratory confirmed cases without symptoms of COVID-19 have been identified in Beijing.
The first identified case had symptom onset on 9 June, and was confirmed on 11 June. Several of the initial cases were identified through six fever clinics in Beijing. Preliminary investigations revealed that some of the initial symptomatic cases had a link to the Xinfadi Market in Beijing. Preliminary laboratory investigations of throat swabs from humans and environmental samples from Xinfadi Market identified 45 positive human samples (all without symptoms at the time of reporting) and 40 positive environmental samples. One additional case without symptoms was identified as a close contact of a confirmed case.
All cases are in isolation and under care as needed, and contact tracing is underway. Genetic sequencing of samples is also underway and rapid sharing of these results is important to understand the origin of the cluster and links between cases.
WHO has offered support and technical assistance, as well as requested further information about the cluster and the investigations underway and planned.
The page is analysed for basic information regarding the article, such as title, publishing date and the body.
WHO is following up with Chinese authorities about a cluster of COVID-19 cases in Beijing, People's Republic of China.
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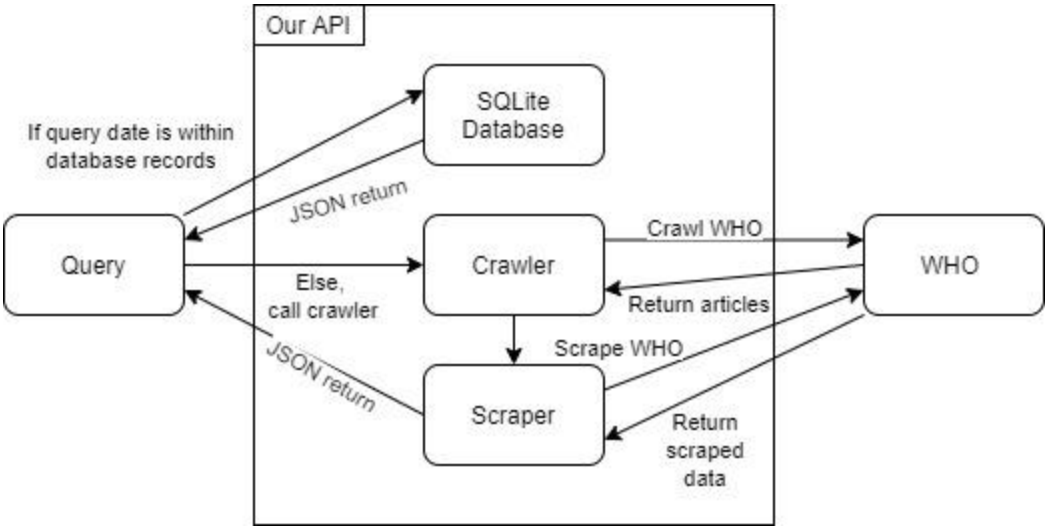
WHO has offered support and technical assistance, as well as requested further information about the cluster and the investigations underway and planned.
Each report is analysed for dates, locations, diseases, symptoms, and numbers affected.
"url":"https://www.who.int/news/item/13-06-2020-a-cluster-of-covid-19-in-beijing-people-s-republic-of-china","headline":"A cluster of COVID-19 in Beijing, People's Republic of China","articleDate":"13 June 2020", "reports": [
{
"diseases":[
"COVID-19"
],
"startDate":"2020-06-09T00:00:00",
"endDate":"2020-06-13T00:00:00",
"locations":[
"Beijing",
"China",
"Xinfadi"
],
"symptoms":[
"fever"
]
}
]
Information is collated into a JSON object.



APIs used

Travel Safe used a total of 5 APIs for the development of the application.

Firstly and most importantly to the running of the web application was **our own API** we developed. This API crawls the **World Health Organisation** (WHO) and scrapes outbreak data from articles. Each call returns the date, location, disease information and symptom information for the specific search query. The query can specify a location and disease but must specify a date range. Our application used a standard one month date range but the user is also able to specify the date range.

Additionally, we implemented the **Travel Payouts Affiliate Network API**. This API returns flight information for a specified query which includes the origin city, destination city and specified departure date. The API returns a JSON of flights including the flight number, departure date and time and the price of the flight in our case in Australian dollars. We also implemented the **Google Places API** to then populate a Google map of hotels in the destination city as entered by the user. We also implemented the **Google Maps API** which allowed us to populate the outbreak information received from our WHO scraper API on a map for a visual representation of global outbreaks. Finally, we implemented the **News API** to add a wider range of information regarding diseases in the specified search location. This API returns news articles that include information regarding the keyword search term.

The combination of all these APIs creates a well-rounded application that provides the user with a wide range of knowledge to safely plan their trip as well as creating an easy to use user interface.

Algorithms used

In our web application, we created an algorithm that used the data received from our WHO scraper API to assign a health risk score to the destination searched in our flight API request.

The algorithm gives each destination in the search a score out of a max of 13. This number is decided based on when the outbreak was dated. This is because an outbreak occurring 12 months ago is still riskier than an outbreak that occurred 13 months ago. If the outbreak occurred 12 months ago, it would receive a score of 1, 11 months ago it would receive a score of 2 and so on up to 13. That score is then scaled based on population density as high population density is a contributing factor to the speed at which an outbreak spreads and thus its riskiness. The algorithm uses a data set containing all of the population densities for each country. If the population density for the country is higher than the median population density of the world, the risk score is scaled up to a maximum of 25%. Conversely, if the population density is lower than the world median, the risk score is scaled down by a maximum of 25%. The algorithm is then able to adjust the risk level for each of the flights in the flight API search result. The risk score for each of those flights is recalculated based on the departure date of the flight. If the flight months in the future, the score will be lower based on the assumption that if there are no more outbreaks in the area from now until the flight departure, the risk of travel will be lower.

Below is a table indicating how the risk score is then transferred to our three-tier system shown below:

Risk Level	**Risk Score Range**
High Risk	Greater than 10
Mild Risk	Between zero and 10
Low Risk	Less than or equal to 0

Key benefits/achievements

Algorithm

Our in house algorithm takes the data from our WHO API and analyses using a population density data set to provide users with an easy to understand three-tier risk level system. This gives users a clear visual representation of how risky their destination is and with the included help button they can further see how each risk level will impact their travel plans.

Flight and Hotel Information

Flight and hotel information integration adds to our business objective of creating an all in one travel app. It works alongside our health data to provide users with a clear idea of both the outbreak and travel information at their requested destination. This provides users with more information than just health data. As a traveller, a safe trip is important but it is also important that flights and accommodation are also sorted. With this inclusion, our application becomes an all in one service rather than just a health data site.

Outbreak Centre

The interactive map in the outbreak centre is a great visual representation of the data received from the WHO API. It allows users to have knowledge about outbreak around the world at a glance and easily obtain more specific information about a country's outbreaks by following the easy to use map markers. The user can quickly access the WHO database from which the outbreak data was sourced to gain credible health information which is essential for planning travel.

Python/Flask

As with our API, python was our choice for the backend of our site. Python is an easy to use language that all the group members were very familiar with meaning there was little to no learning curve. Additionally, python has powerful web frameworks such as Flask making it a versatile and agile language for web development. There are also many online resources and libraries to assist us with creating a complex application with various useful features for our users.

Team Organization

Responsibilities

The below table displays the allocation of responsibilities over the term:

Task	Member				
	Maddy	**Nathan**	**Shabrina**	**Sisil**	**Sumeet**
Deliverable 1					
Design Details Q1					
Design Details Q2					
Design Details Q3					
Management information					
GitHub setup					
Stoplight.io setup					
Report compilation					
Deliverable 2					
Develop crawler					
Develop scraper					
API implementation (source code)					
API implementation (returning reports)					
API implementation (extracting info on WHO advice protocol)					
API deployment/ensuring					

online functionality					
Frontend development					
API specification in Stoplight.io					
API design documentation					
API test documentation					
API testing					
Deliverable 3					
Frontend development					
SQLite management					
Migrate API to the new source					
Search news					
Outbreaks near me tracker					
Map API					
Presentation script/slides					
Update documentation					
Deliverable 4					
Frontend development					
Flight finder					
Hotel finder					
Warning tracker					
Outbreak map					
Presentation script					
Report -					

Introduction/Formatting					
Report - Use cases/requirements					
Report - System design and implementation					
Report - Team organisation					
Ensure final GitHub is working					

Project Management

Our team used a variety of software tools to manage our project. Communication tools our team included are:

Tool	**Description of Usage**
Facebook Messenger	We created a group chat that allowed for asynchronous communication. This was particularly helpful as we all had different schedules and worked on the project at different times, so everyone in the group needed to be kept up to date on changes with the chat history.
Zoom	Zoom was used for our standups. It is the most convenient tool for synchronous communication as we did not need to meet up physically, but we could still discuss the project extensively in real-time.
Google Drive	In case a member cannot attend a meeting, we kept minutes of our meetings in our Drive so that they would not miss out on important information discussed. All reports and files were also stored here.
when2meet	We used this web app to easily determine when everyone was free for a standup.

Collaboration tools our team are using are:

Tool	Description of Usage
Google Drive / Google Docs	Sharing a Google Drive was easy as we only needed the link to our drive to access it. Google Docs is a user-friendly document collaboration tool that allowed us to view changes to our documents in real-time.
GitHub	We used GitHub as our version control system for all of our documentation and code. GitHub is widely used, and all of our group members are experienced with it. Because of its branching system, our team was able to work on multiple features simultaneously without interfering with each other's work.
Postman	We initially decided to use Stoplight.io because we appreciated how multiple users could be on the same project. However, we came across too many problems. Postman was easy to set up documentation, as well as automated tests, and this made collaborating easier.

Reflection

Major achievements

Our first major achievement was the creation of our algorithm to calculate risk levels when travelling to locations (as detailed in previous sections). It provided us with a feature unique to our system of the 'Warning Tracker'. It not only processes the data we created from our API but presents a useful feature that all of our target audience could use. This involved a lot of design meetings between team members, to create something feasible using the data WHO provided, that would also not hinder the processing time.

Also, our final web application allowed for a central service that satisfied a lot of the requirements the target audience would have for a travel assistance application. This required a lot of work, having 5 APIs integrated into the same service, with each having different processing methods for GET requests and displaying JSON data. With it, we were able to present 5 features instead which was more than we anticipated at the

beginning. This was exemplified in our final presentation as we received great feedback, with only minor improvements if we were to continue with the project.

Lastly, we also developed a database to store data from our API to increase the processing time of user requests. This cached all the information from the WHO as users made requests, storing data already searched for and minimising processing times overall.

Issues Faced

Throughout the project, we faced many issues in designing and when implementing the technical solution.

The first was that the initial database of WHO articles were not standardised with many having different URLs and body information, making information hard to scrape using a simple set of rules. To counteract this, two of our members went through all the elements of many web pages to see what elements would contain the data required. After this we used regular expressions to check for specific patterns in the element as often it would be placed at different positions within that segment - giving us the required data every time.

Another major issue occurred when the WHO database underwent a migration during April that broke our original scraper and crawler. This caused us to have an extra week worth of work as we had to review Deliverable 2. To manage this, we discussed the issues with our mentor and was able to receive a 1-week extension, ensuring we would be able to complete the project on time.

In addition, after Deliverable 3, we had to reassess our entire business model as we received a lot of constructive feedback that would help make our application more useful to a wider audience. Initially, our application only involved the *interactive map* and *outbreaks near me* feature that was targeted to those researching travel. Its primary business objective was to make travellers aware of outbreaks in areas they were travelling to.

Proceeding this feedback we underwent a complete redevelopment, modifying our target audience slightly to all travellers and changing our primary business objective to making travellers feel safe and secure as they travel. This introduced an additional 4

features and improved upon our current features to give travellers a more complete application that assisted them with a much more important goal.

Improvements

Which skills did we wish we had beforehand?

Before starting this project, we would have liked to have more knowledge or training on how to host an API. We spent a collective 18 hours over three different group members using three different API testing software and two different hosting sites to finally be able to host our API. This step was easily the most frustrating and time-consuming part of the entire project. Had we had more training on how to do this before the project, the development would have been a lot easier.

What would you do differently?

Overall, the development of our application was relatively smooth. As a group, we managed our time very well. We had regular meetings to update on progress and set new deadlines. This kept us on track and allowed us to meet deliverable deadlines relatively easily. If we were to redo this project, most importantly we would make sure that we did not have to re-write our API. Unfortunately, the original API we wrote scraped a WHO resource that was depreciating in April 2021. We were forced to rewrite the API now scraping the new resource which set us back considerably and forced us to request an extension for our deliverable 3 and 4 dates. This pushed our final demonstration and report due dates into STUVAC week which set us back in our other subjects.

If we had more time we would have liked to implement a login feature for our application. This would have allowed our users to log in to the web app and save their searches to allow them to more easily plan their trip. We also would implement another business API that allowed users to not only see hotels in the area but also other important travelling information such as transport options, restaurants, pharmacies, money exchange locations and things to do in the area.

If we were to continue the development of our application we would adjust the APIs we were using, specifically the flight API. Unfortunately, most of the flight information APIs are paid or require the web application to have a certain amount of traffic per month. If we were to continue the development, we would invest in a paid API that allows users to

book their flights within our application and also provided a broader range of flights to more destinations. Additionally, we would implement a business API that similarly allows the user to book hotels directly from our application. With these changes, we feel our application would be a true one-stop-shop for all travellers to be able to safely plan and book any type of trip they desire.