UTM
UNIVERSITI TEKNOLOGI MALAYSIA

FAKULTI SAINS SOSIAL DAN KEMANUSIAAN

Subject : Technology and Information Systems (SECP1513) – Project 2
Section : 01
Task: PROJECT - Low Fidelity Prototype
Due: Project 2 - 22 January (Saturday – 5 pm)

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Introduction

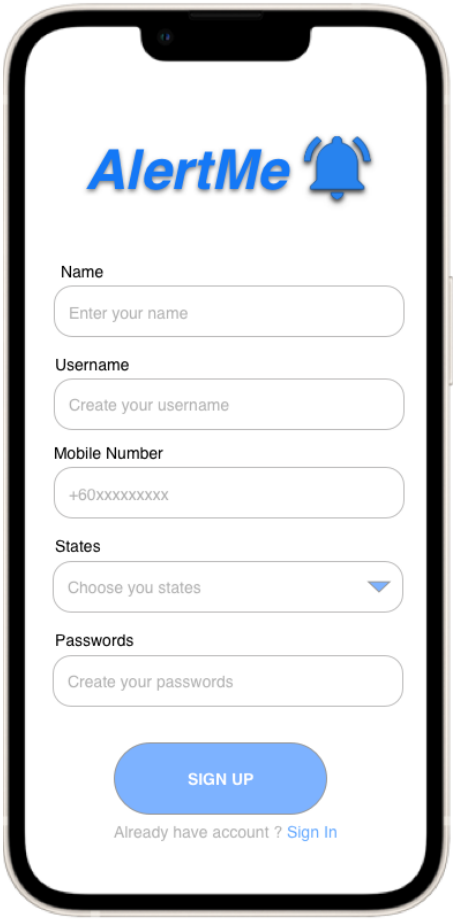
It has been proven that in order to get a handle on this covid 19 pandemic we must learn from previous viruses so that we can not only map the structure of the virus but also tell us how to contain and hence eliminate it. This is where AI comes into play as it can study the virus' history, transmission, and diagnostics from previous epidemics so that we are able to make a calculated next move in combating today's Covid-19 pandemic. AI also plays a crucial role to predict the evolution of the virus. This makes the AI technologies essential to the efficiency of Covid-19 crisis response. AI tools and technologies can be employed to support efforts of policy makers, the medical community, and society at large to manage every stage of the crisis and its aftermath: detection, prevention, response, recovery and to accelerate research. This is where our team will be introducing our application "AlertMe".

The main motivation behind creating "AlertMe" is to create an application with AI capabilities to analyse and predict the outbreak hotspots of the Covid-19 virus in addition to calculating the action that needed to be taken. By accumulating unprocessed data from the general public together with our own AI formula we are able to achieve the information needed to prevent more covid cases. By recognizing and predicting areas that are more likely to have an outbreak, it is much easier for the authorities to take early measures within the area and the general public to avoid that particular area.

Steps & Description

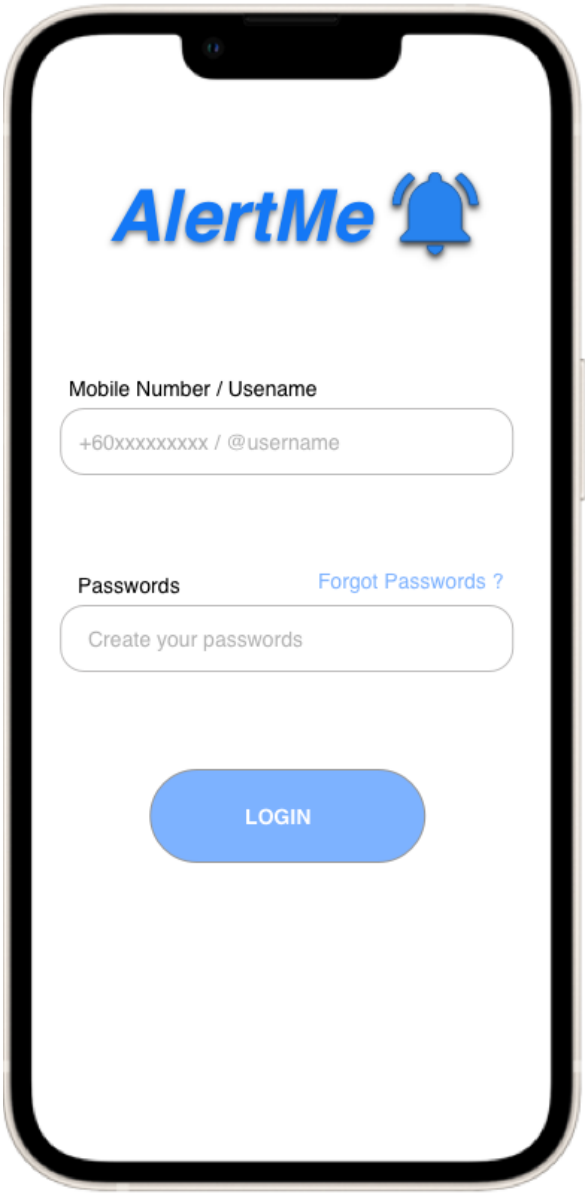
This AlertMe Low-Fidelity mockups consist of 12 modules and each module has its own functionality that will be described in detail later on in the report. This AlertMe application with the AI capabilities to analyse and predict the outbreak hotspots of the Covid-19 virus for the users we named as “Alertors” to use. In the app Alertors can get daily updates of the Covid-19 cases statistics,report the outbreak cases through this app so that the government employees who are monitoring the app can get notify about the outbreak ,get notified by our pop-up notification feature and get the most reliable recent announcements or informations update from KKM Malaysia, the Ministry of Health department themselves.

Sign up Page



The first thing that Alertors need to do after downloading the application through certified application distributors such as App Store and Google Play Store, signing up for an account is required. Here Alertors can fill in all of the individual informations required and the app will direct you to the second module.Log in Page

Login Page



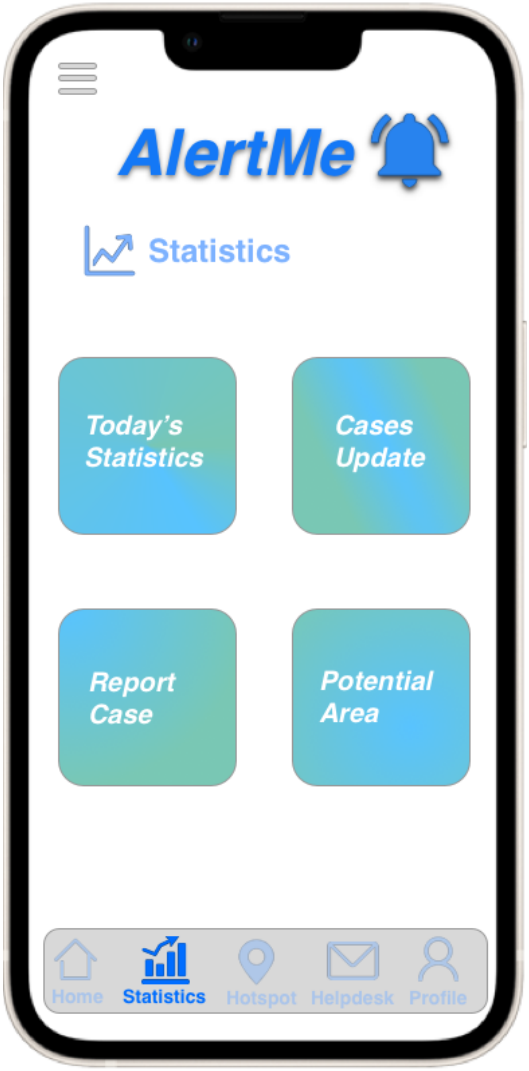
After the sign up ,a new account has been created hence Alertors have to re-enter the required information for instance Mobile Number/ Alertors Username and the passwords.

Home Page

When Alertors start logging in , a home page will appear. From the top, Alertors can see the recent announcements or information updates that KKM Malaysia has provided for the users to read so that they can get the most reliable up-to-date infos and they can even engage with the information updates using the **"share,like,Re-Alert"** features.

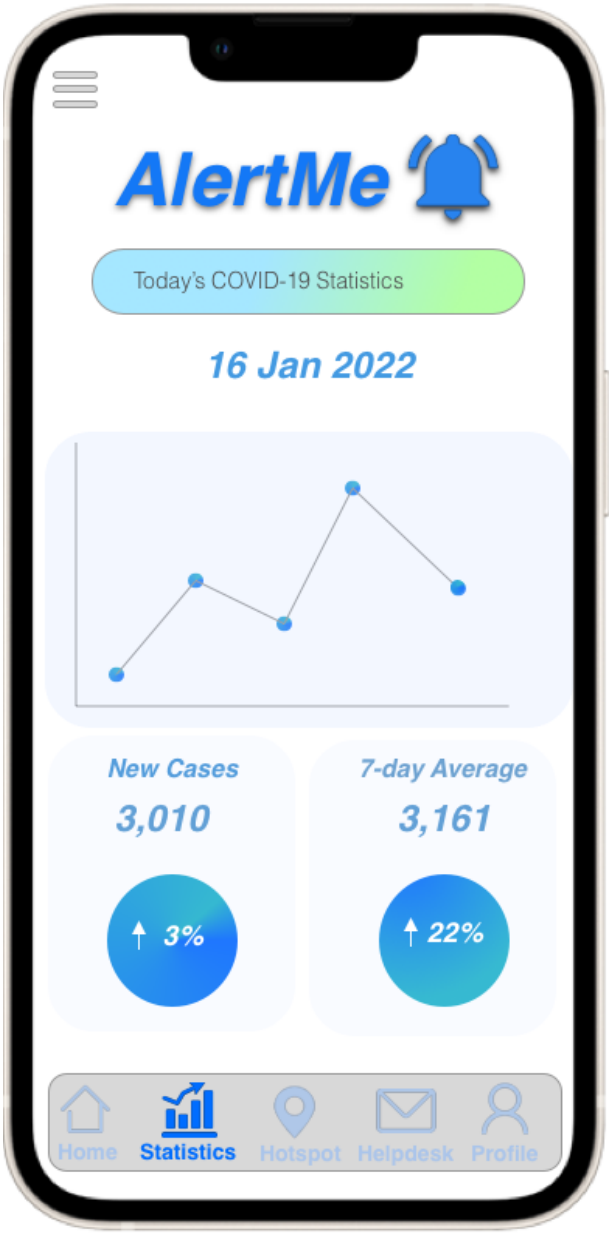
Down the information updates segment, there is a statistical graph to show the data regarding covid-19 cases from statistics of the day. The bottom part of the home page displays 5 different modules for Alertors to click on and it will direct them into each module.

Statistics Page



Next, in the statistics page interface, it's all about the statistics information that we can get from data analytics where we could provide Alertors with today's statistics info,cases update,a medium to report Covid-19 cases and the potential area. Alertors can choose either one of the 4 options and it will direct users into its respective modules.

Today’s statistics

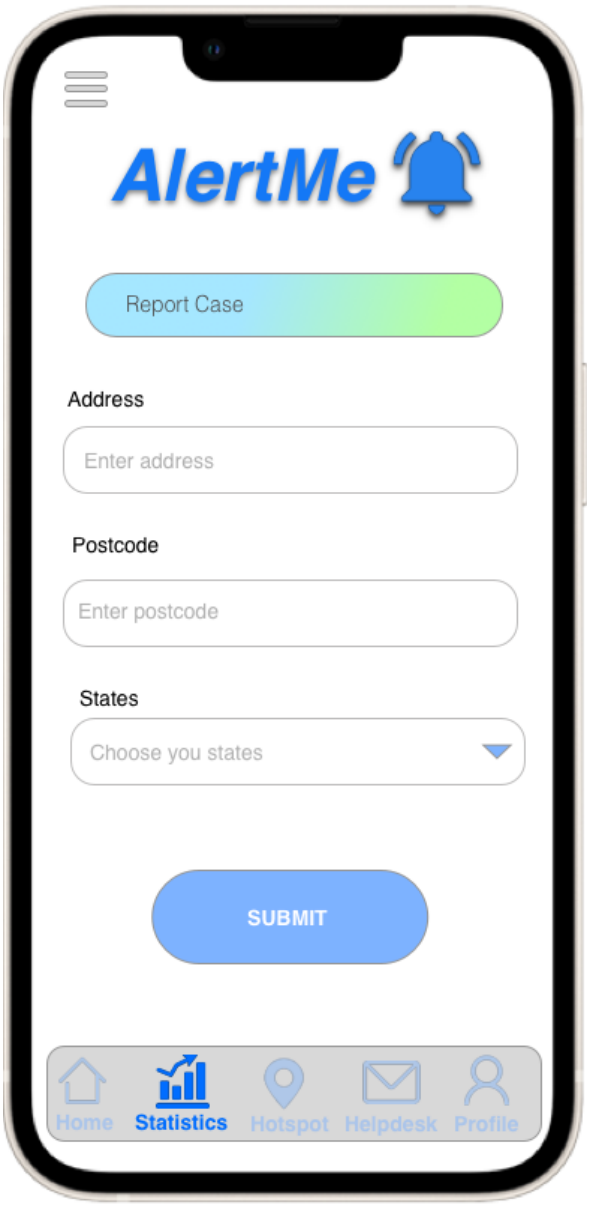


Here, the line graph of today’s covid statistics will be shown. Other than that, other useful information like the new cases and 7-day Average cases will be presented to the Alertors in both pie charts and number digits.

Cases Update

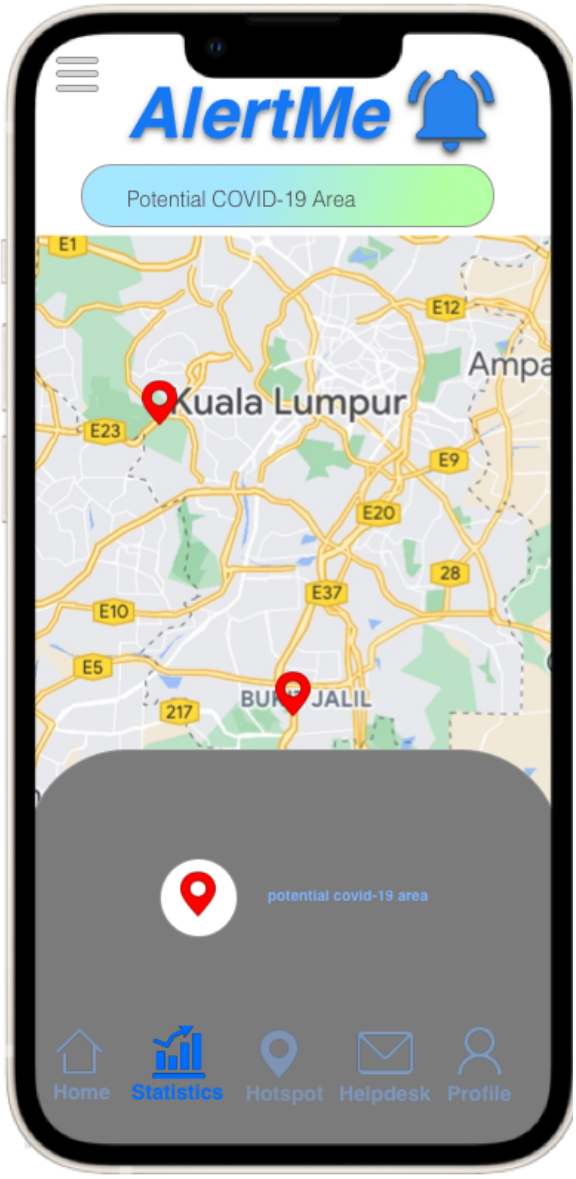
Meanwhile,if users enter the cases update section, a Malaysia map graph with the number of covid cases recorded in each state are shown . Right under the map graph, other repeated bar charts of the number of recorded cases for each state are shown . For the rightmost part, the R value and total number of confirmed cases will also be presented to Alertors.

Report Case



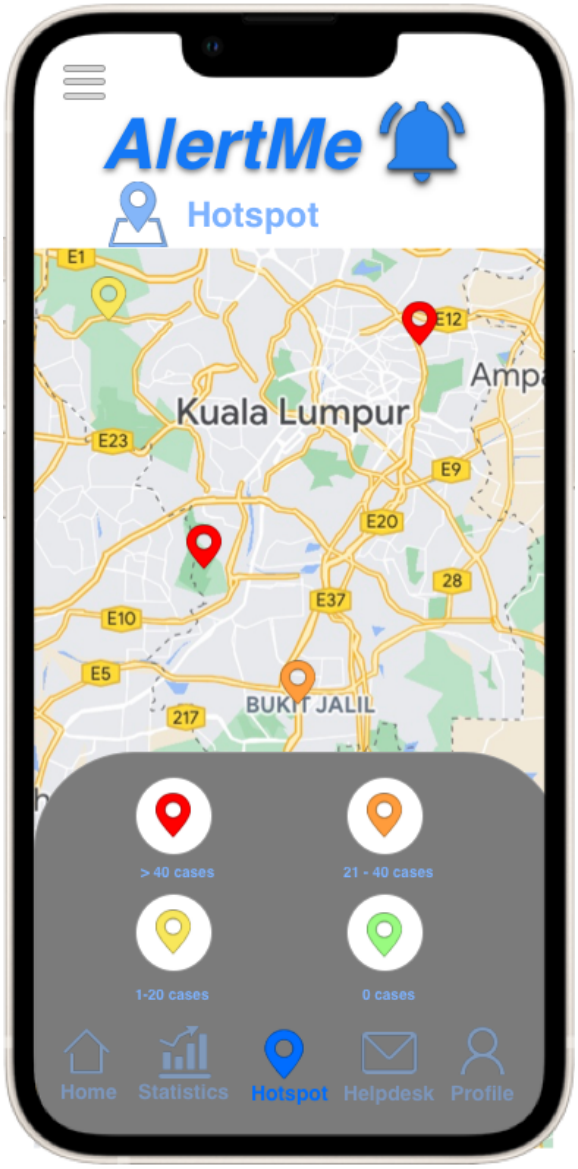
When Alertors want to report a case within their family members,neighbourhoods,in nearby area,this page is where Alertors can provide the informations needed for the report .This report will be distributed to the Ministry of health department to be taken into further action such as contacting the Alertor via their phone number that they've used to sign up for the AlertMe account.

Potential Covid-19 Area Page



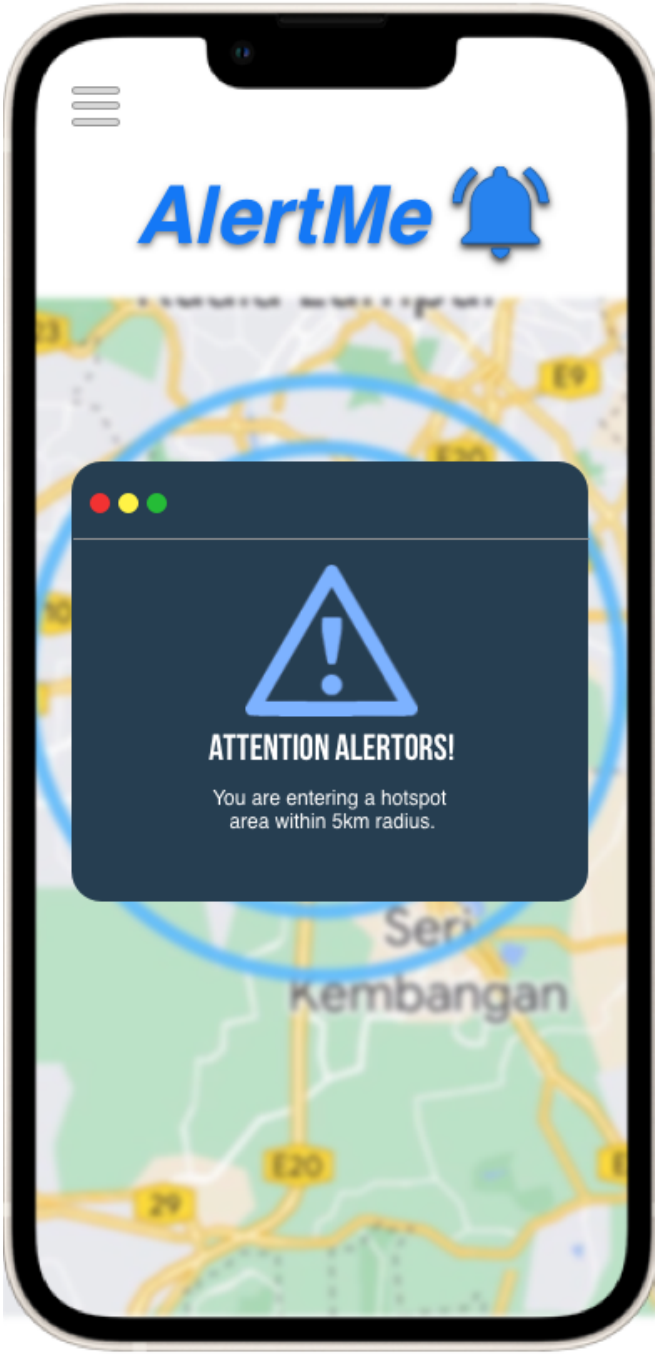
Here in this module,a GPS tracking system will be used to track Alertor's whereabouts so that it can show the potential high number of covid-19 cases area on the map but in this page there's no specific statistics informations will be provided which leads the users to click on the hotspot page that'll be discussed after this.

Hotspot Page



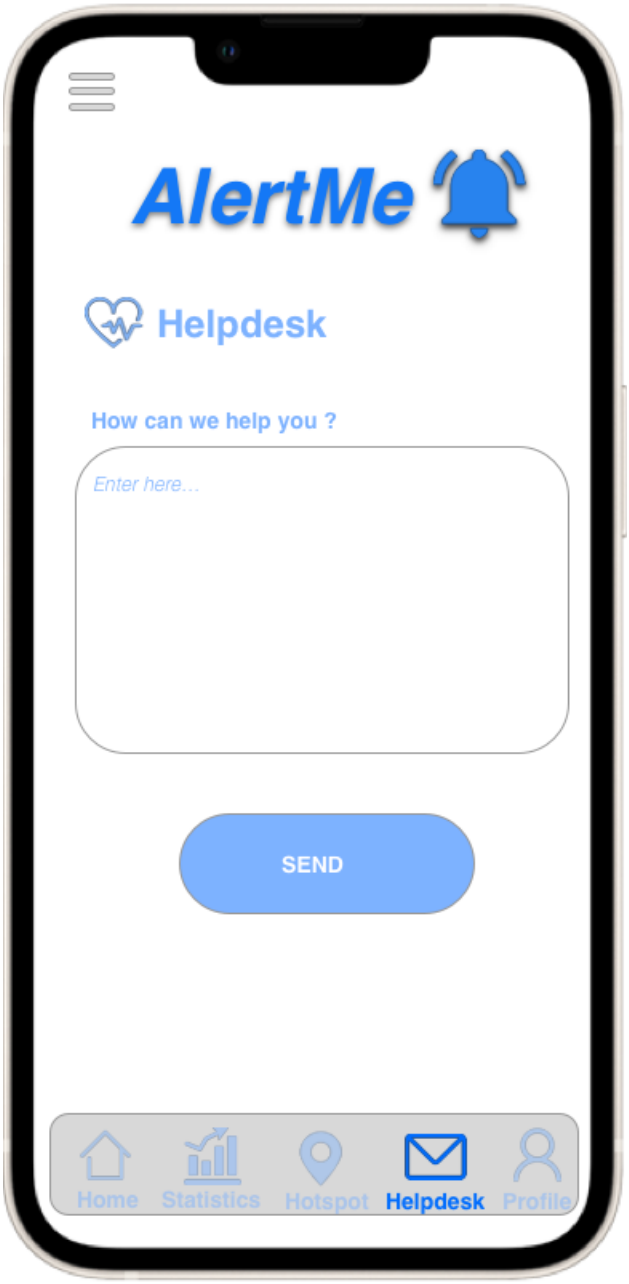
Previously, in the potential Covid-19 cases Area page,there's no specific statistics information provided . Hence, in this Hotspot Page, Alertors can see the reported number of covid-19 active cases in each specific location. As stated in the interface above, the colour notation of the location bookmark varies depending on the number of active cases reported.

Attention Notification



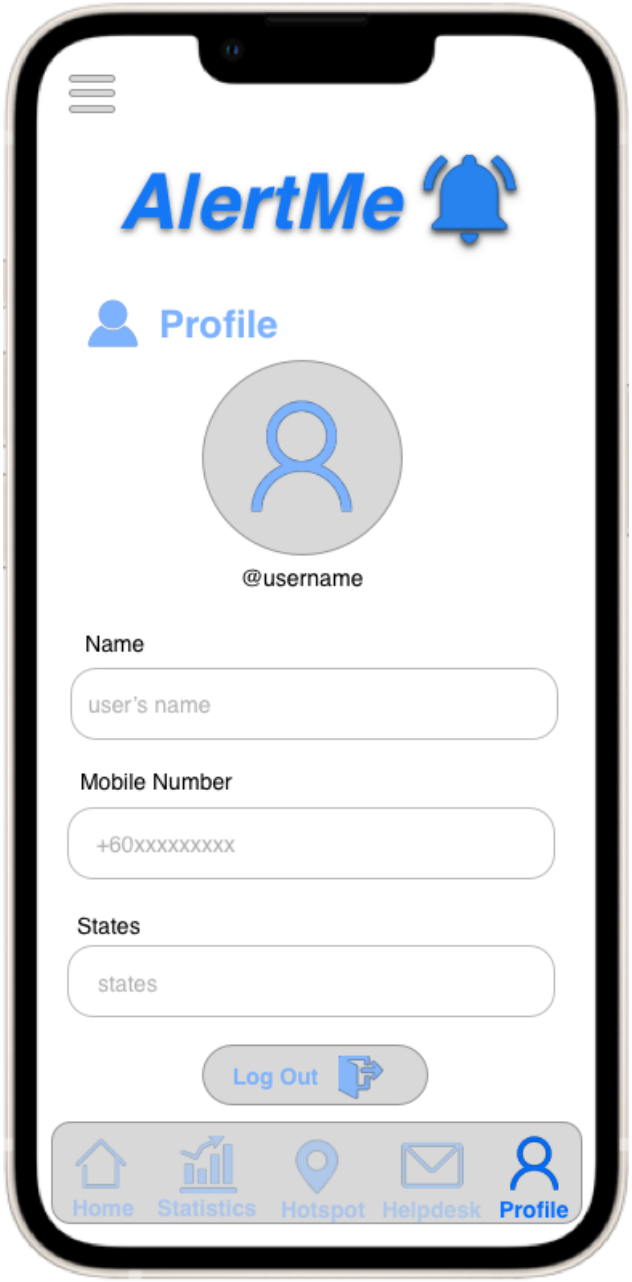
When Alertors are entering a hotspot area, the pop-up notification will be shown on the screen to alert the users that they are currently entering the hotspot within a 5km radius as precautions.

Helpdesk Page



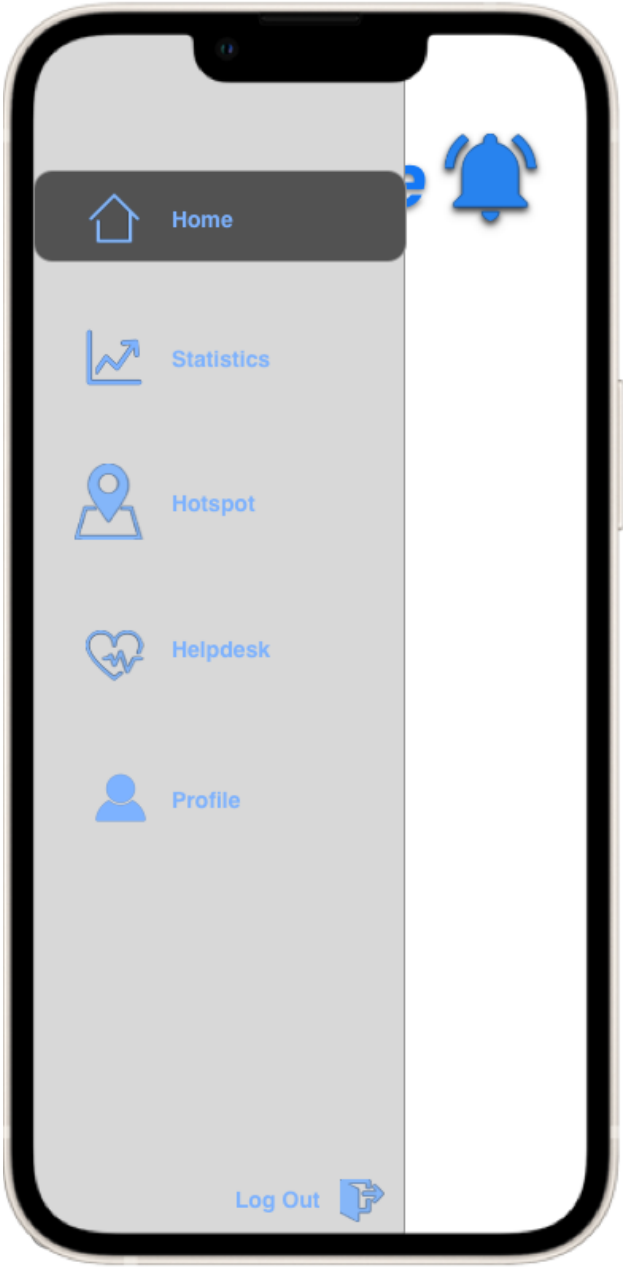
This page is important for every application where the users can request for any technical assistance from our Helpdesk in the provided text box. This help request will be sent to the government's help desk department to provide assistance and information for Alertors.

Profile Page



This section is very important for all Alertors as it will display their profile and personal information in one page which users can later edit or update their information when needed. In the bottom part of this page, there's a logout button option that users can click on when they no longer need the application.

More Tabs



Lastly, when users swipe the screen to the left, there will be a list of modules options for the user to click on and a logout option under the rightmost section which also gives the same functionality as the one that we have described before. It's an additional touch for the application interface for users to navigate through the application.

Problem, Solutions and Team Working

As our product uses AI capabilities for early detection of covid 19 hotspots we find it solving the issue of late prevention of covid 19 cases. This will help us tremendously in the struggle to control rapid covid 19 outbreaks. We as a team have successfully made an application that not only alerts you of potential outbreak hotspots but also provides useful and most importantly accurate information regarding updated cases, overall statistics and many more. Hence this will also combat the problem users have with misinformation which in the long run could prove to be very harmful. Moreover, all projects come with issues and problems that need to be solved before producing an end result and this project is no excuse.

Some of the problems that we have faced while in the process of developing this project are for example deciding the number of modules available and the plausibility of each module. This is because although the main function of the application is to predict possible covid 19 hotspots, there is other information worth publishing in our application. Hence surfaced the questions of how AWS architecture design could be utilized to produce some of the modules. After careful deliberations we as a team have decided on the five modules you now see in our mock ups. Modules such as Statistic and Hotspot were the result of the deliberations and the other modules were decided for the purpose of customer satisfaction and data collection.

Another example of a problem that we had to work through is discerning our application from the already existing MySejahtera application. We ran into this problem when describing the mock ups of our AlertMe and realized that the similarity is uncanny. This is because although the basic functionality is different some of the additional features may show some resemblance. To fix this issue we as a team cracked our heads and introduced two new features which are the Alert pop-up notification & the up-to-date information and announcements post from the Ministry of Health department. Alert pop-up notification will sound off whenever we enter a possible hotspot zone, hence making sure we understand the risk before proceeding while the up

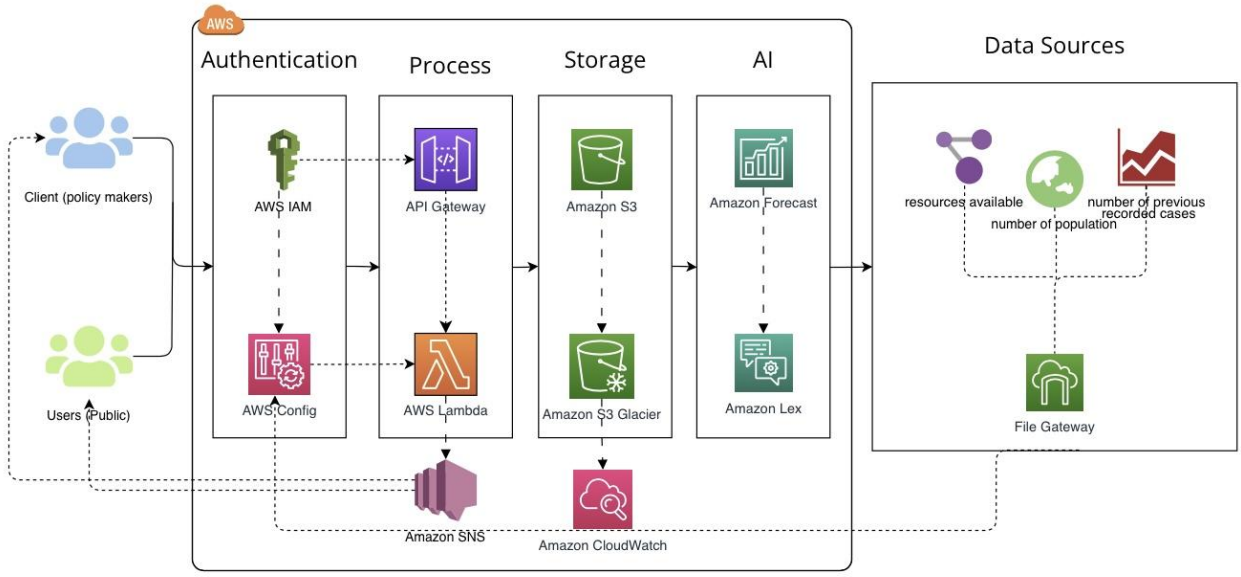
to date information and announcements will help the users keep current on the latest news and information regarding the covid 19 pandemic.

Lastly this project calls for its participants to have a great deal of knowledge about Cloud Architecture and the service provided by AWS and in the beginning of this project we have very little to no knowledge on the subject matter. This as a whole impacted our ability to complete the project. We then solve this problem by each of the teammates completing the 10 modules indicated in the AWS Academy to ensure that we have an adequate understanding of the Cloud Architecture and the service provided by AWS before attempting to do this project. All and all the knowledge gained was more than helpful to successfully produce this low fidelity project.

Our team did an amazing job developing this application as meticulously as possible. Although we have delegated specific tasks for each and every individual to do at their own time no feature or design was finalized until all members have approved it. Every issue and problem each of us faced when doing this project was brought up to the whole team so that we can together find the proper next course of action. We have had discussions after discussions to make sure the final project presented is the best. All and all we stand by our product and as a team we are stronger than ever.

AWS Architecture Design

Architecture planning design



Operational Excellence - Process

1. **API Gateway** - this service acts as the "front door" to access our data sources from resources available, number of previous recorded cases and also number of population. By using this service, after sources are updated, "AlertMe" application makes a REST API to call the endpoint which enables real-time communication. Moreover, this service handles all the tasks involved in accepting and processing up to hundreds or thousands of concurrent API calls, including traffic management and throttling monitoring.

2. **AWS Lambda** - when users or clients run our "AlertMe" application, API Gateway makes a REST API call to the endpoint, and then lambda is triggered. AWS Lambda runs code to post the updated version of the news and content from data sources, and it also can initiate notification to warn the policymakers on the next possible outbreak areas. Furthermore, AWS Lambda monitor and track contagion to trace the close contact. It will initiate notifications to tell users if they have

close contact with an infected person. Thus, these can reduce the number of cases and also early detection in order to flatten the curve.

3. **Amazon SNS** - by using this service, notifications are pushed after AWS Lambda initiates notification. Our “AlertMe " application will send notification directly to policymakers and the public by using Amazon SNS. Moreover, this service provides encrypted topics to protect the messages from any unauthorized access. The encryption uses a 256-bit AES-GCM algorithm.

Security - Authentication

1. **AWS IAM** - by using this service, we can ensure that only authorized and authenticated users are able to access our resources on the application and only in ways that we allowed the users to access. For example, the client or the policy maker can access the application and view the number of previous recorded cases and the number of population. Meanwhile, the public also can have their own accounts that need to be signed up before it is recorded in the database. Furthermore, users are also required to create strong passwords that consist of complexity level, avoiding re-use, and enforcing multi-factor authentication.

2. **AWS Config** - for better security and governance, AWS Config can manage resource inventory, configuration history and configuration change notifications. It is also easy as it will automatically check the configuration when we set the rules. Depending on the rules, AWS Config will evaluate resources. Each rule is associated with an AWS Lambda function that contains the evaluation logic for the rule. When AWS Config evaluates resources, it invokes the rule's AWS Lambda function. The function returns the compliance status of the evaluated resources. If a resource violates the condition of a rule, AWS Config flags the resource and the rule as noncompliant.

Reliability - Storage

1. **Amazon S3-** Developers can use Amazon S3 to handle the data processing at a large scale. Amazon S3's facilities are highly-scalable, secured and low latency data storage from the cloud enables developers to gather, store and retrieve data with ease from anywhere on the web. They need to choose a region, create a S3 bucket and start storing data. Developers don't need to worry about the data usage as the Amazon S3 can store and access as much data that is needed. It also creates multiple replicas of our data so that the data is never lost. Developers need to secure the data that they gained and the data should be available to them anytime in order to take any action regarding the problem of estimating the probability of infections in certain areas. So, Amazon S3 is suitable to store data as it gives reliable security and all-time availability.

2. **Amazon Simple Storage Service Glacier-** Developers can use Amazon S3 Glacier for data archiving and backup of cold data. Cold data is the files that are infrequently accessed but are kept in case they are needed later. So, developers can keep the data for a certain area which is not affected by the infection but can use it later on when they need it. The database backups can be moved from tape storage media to the cloud for long term Glacier storage. This will reduce the burden of managing archival data and backups. Mostly, this Glacier can help developers meet regulatory requirements by archiving affected people's record data securely and cost-effectively. Developers can group archives together into a vault, which helps organise data. Developers can configure a resource-based access policy to each vault, governing who can access a specific set of archives and attach notification policies to each vault.

Performance efficiency

1. **Amazon CloudWatch -** Performance of our resources is a vital aspect of this project. By using Amazon Cloudwatch, our DevOps engineers and developers can be provided with multiple insights to monitor our application. CloudWatch collects monitoring and operational data in the form of logs, metrics, and events. Developers can get a unified view of operational health and gain complete visibility of the AWS resources, applications, and services running on AWS and on-premises. Developers can use CloudWatch to detect anomalous behavior in the environments, set alarms, visualize logs and metrics side by side, take automated actions, troubleshoot issues,

and discover insights to keep our “AlertMe” applications running smoothly. Conclusively, Amazon CloudWatch is a very important service in order to maximize the optimization of our resources and “AlertMe” to work smoothly.

Artificial Intelligence

1. **Amazon Forecast-** Amazon Forecast automates much of the time-series forecasting process, enabling our “AlertMe” application to prepare our datasets and interpret predictions based on our data sources. By using this artificial intelligence service, it automates complex machine learning tasks by finding optimal combinations of machine learning algorithms from our data sources. This service also includes additional built-in datasets that are already feature engineered and do not require additional configuration. Thus, possible outbreak areas and new clusters can be detected early.

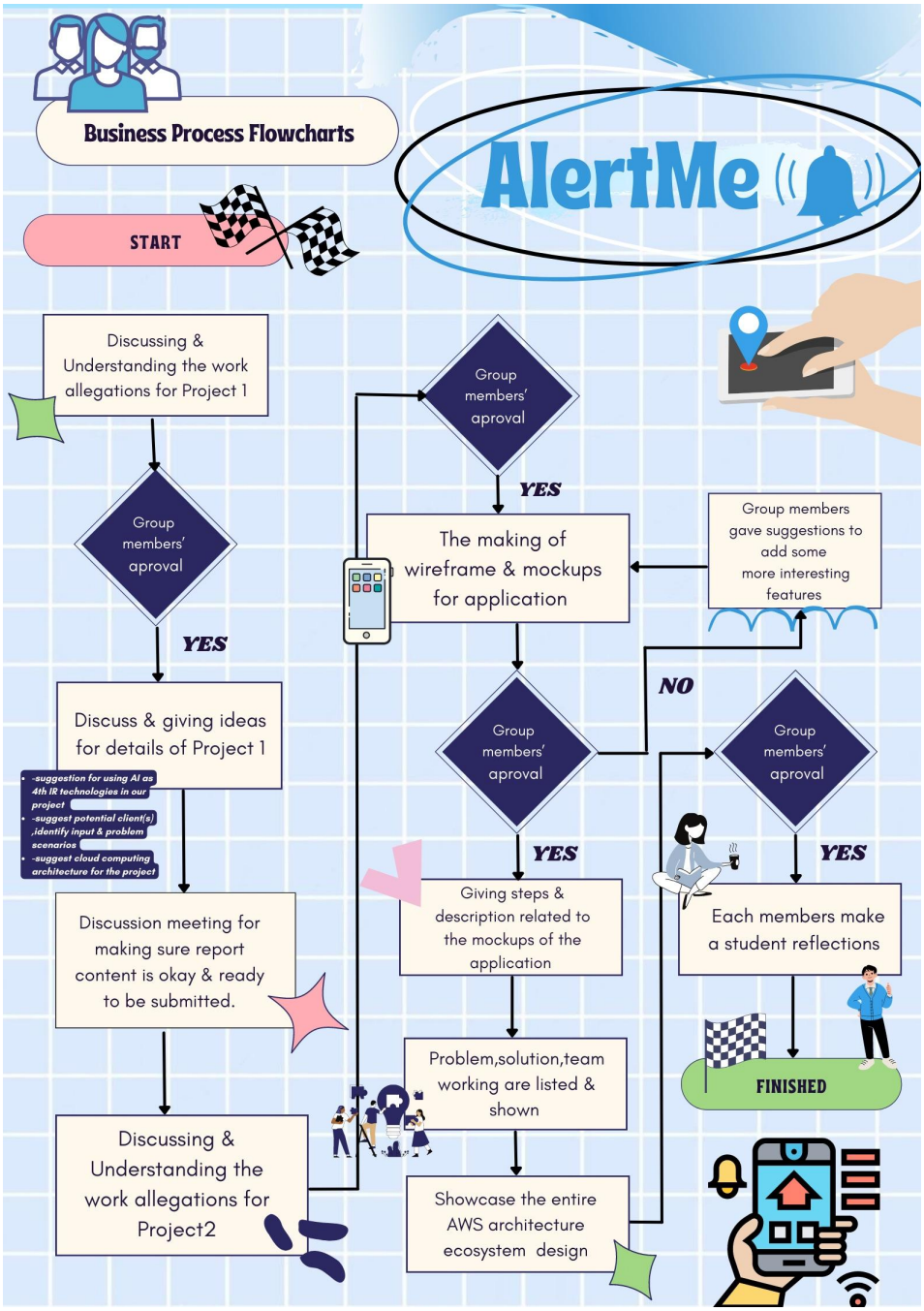
2. **Amazon Lex -** User interface is an important aspect in the development of AlertMe. By using Amazon Lex, we can build an AI based conversational interface for our application using text or voice. For example, we can provide chatbots by using Amazon Lex for us to boost the efficiency of our customer service. Amazon Lex requires no deep learning. To create a bot, we just specify the basic conversation flow in the Amazon Lex console. Amazon Lex manages the dialogue and dynamically adjusts the responses in the conversation. Other than that, we can also automate informational responses such as designing conversational solutions that provide responses to frequently asked questions. Conclusively, Amazon Lex plays an important role in order for AlertMe users to be more connected to the developers hence boosts the user experience aspect.

Cost Optimization

The services used to build this application are cost optimized because all the services above have the ability to run the systems at the lowest-price point. Cost optimization contains five design principles that all the services follow which are implementing cloud financial management, adopting a consumption model, measuring overall efficiency, stop spending money on undifferentiated heavy lifting and analyzing and attribute expenditure. Since the services are built based on these five design principles it is available at low cost.

Business Process Flow Diagram

[Click here for pdf version]



Reflection

TEAM MEMBER	REFLECTION
AFIQAH IZZATI BINTI AZZEROL EFFENDI (A21EC0004)	From this project, I have **gained a lot of knowledge especially on AWS Cloud Architecture and producing low fidelity prototypes**. Our project began with completing the AWS module itself, then we implemented what we have learned into the project. I also learned the benefits of using AWS in order to develop our own application. Moreover, I also learned **how to use software such as Sketch and InVision** to design our wireframe and mock-up of our application. Furthermore, I am motivated to complete this project as **all of my groupmate have given full commitment** upon completing this project. It eases our planning and designing as they are really good at suggesting ideas. During this project, there were several issues that we faced especially on the **AWS Cloud Architecture**. As I have completed my AWS earlier than my group mates, so I **started first and guided my group mates** to construct the Cloud Architecture. As there are many types of AWS, we need to **choose the best service for our application** in order for it to run smoothly. Moreover, as we are not at campus, I find it **hard to communicate between my team members**. Thus, Nerea **conducts several meetings** in order for us to discuss and clear things up. We also always **have discussions** on our Telegram group and have meetings through Google Meets. As I took the role of designing the application and creating AWS cloud architecture in both project 1 and project 2, I am looking forward to **developing my own application in the future**. I really enjoyed the journey of completing this project and I am going to **explore more on AWS**. I will try to implement AWS and hopefully I can make my own **application that will benefit and help my client and also the user.** In order to improve my potential in the industry, I need to improve my **critical thinking skills**. I think it is important to solve any problem in industry. Moreover, the pandemic has caused a paradigm shift in digitization, therefore, I think it is crucial to **familiarize myself with all the software and technology** as Industry 4.0 enhanced the world with new innovative industrial technologies. Furthermore, I believe it is also important to have **innovative and creative thinking** during this era as technology has created a great driving force in innovation. By being creative and innovative, it means we are also looking at other perspectives and finding the idea of new solutions which would be so useful in the industry.

TEAM MEMBER	REFLECTION
JELIZA JUSTINE A/P SEBASTIN (A21EC0034)	From this project, I have learned how to use Cloud Architecture. Creating the Cloud Architecture enhances the knowledge about it on producing low fidelity prototypes and the benefits of using Cloud Architecture. I have also learned about AWS concepts which were used in the project. We can clearly see and understand the AWS concepts when we implement it in our project. The main motivation to complete this project is to produce the final outcome which shows the relationship between 4th IR and AWS concepts which relates to our application and to increase our knowledge in creating the Cloud Architecture. The issues faced during the project was to decide the AWS concepts which relate to our main project. When I started the project, I couldn't identify which AWS would suit our application. The step I took to complete this is by completing the AWS modules and doing more research on the functions of AWS concepts so that I can choose the suitable AWS concept to implement in our application. From the project, I have learned the procedures to create a low fidelity prototype. This project gives a solid understanding of how the future application should be developed. I hope the knowledge will guide me to develop applications in the future. In order to improve my potential in the industry, I should improve my problem-solving skills. The ability to handle challenging situations is necessary to produce the best solution. When dealing with a problem we should assess our options to determine the best solution. Secondly, I should improve my communication skills. Communication skills will help to understand what others are saying and also convey our own ideas. With the skill, I can interact about the problems and solutions needed for it from others perspectives to produce a good outcome.

TEAM MEMBER	REFLECTION
QAISARA BT BADRUL HISHAM (A21EC0125)	I find this project very interesting because it gives us the opportunity to develop a product from scratch. The innovation and creativity it took to design and implement this project is my main motivation in completing it as it inspired me to test the boundaries of my imagination. From the efforts of doing this project I also gain valuable knowledge of Cloud Architecture and learn to implement it in this low fidelity project. After completing the modules in AWS Academy I can confidently say that I have gained adequate knowledge on the matter and understood its relations to this project. I believe that this knowledge will prove to be useful in the long run as I go deeper into this industry. I think one of the biggest issues that I faced while doing this project is to create a unique product from scratch. I feel like during discussion we often drift towards existing applications and for five people to agree on a main functionality on a product is tricky. But alas I think we succeeded in producing a product that is unique and innovative after hours of tirelessly discussing and modifying the original idea. Other issues that I seem to struggle with is understanding what the report calls for. The instruction given to write the report was somewhat vague and can be interpreted in many ways. It took great communication and explanation to truly understand the output that is required for this report. I personally have a fascination for the intricacies of Cloud Architecture, hence the natural next step would be to understand it on a deeper level. This is because I believe that this is the gateway to understanding and succeeding in this industry and will benefit me greatly in the long run. In the process of completing this project I have learned a lot of things regarding Cloud Architecture and AWS but I have also learned a lot about myself, more specifically about my own capabilities in successfully completing this project. I find that the thing that I needed to improve greatly on is my inability to communicate my disagreement to my team so that I could better understand their work. Other than that I need to be more intuitive and seek answers to my questions beyond the team. Yes of course in every project we will face problems and instruction that we don't understand so I should take initiative and look for answers in multiple platform and resources to gain a better understanding of what is needed for the project task to me.

TEAM MEMBER	REFLECTION
NEREA LANAI ANAK NEOL (A21EC0100)	From this project, I have gained the knowledge on **how to use Cloud Architecture and ways to implement it into our Low-Fidelity project**. I also **retrieved more information about the usage of the AWS** as well after completing all 10 modules of the AWS Academy short learning course. Hence, due to this knowledge my team and I could manage to come up with ideas on how to conduct these projects after thorough discussion with each other. Other than that, I also **learned how to use an external tool software** such as ***Sketch*** with the assistence of my team member,Afiqah who is also in charge of doing the wireframe and mockups of our application–AlertMe. Knowing how to use the software indeed made the making of detailed steps and descriptions of our app easier.Also, I feel deeply motivated to complete this project because all of my **members have given their best & fully committed themselves** to this project despite working under pressure and the hardships that we faced while doing the projects . Next,moving on to the issues and implications that I had faced during the project making was that **I found it hard to understand completely about the tasks that we have to do**, some team members also could not proceed with the project due to confusion about the tasks given in this project. Hence, we decided to make several meetings via Telegram and Google Meet platform to have a clear direction on how to conduct the tasks. We brainstormed ideas to come up with a suitable AWS architecture, our solutions to our problems made by clients and our application functionality. By doing that, I can fully understand my task in this project and then proceed with the project making. Besides, another factor that I was having issue with was **I could not check on or monitor other members' work progress due to the online distance learning constrictions**. Because of that, I would make sure to actively participate in our group chat discussion whenever my group members are having some problems. My direction after completing this project is I will **try to explore more to study anything that is related to Cloud architecture** because I feel like it is interesting to know how our application or website is being deployed in the cloud . What intrigues me more is about the application making especially on how an application developer starts their app making from sketches to wireframe,mock-ups,prototype and eventually the real readily used application. This curiosity of mine directs me to **want to be involved in making a cloud based application related to the Bioinformatics industry in the future.** In order to improve my potential in the industry, I should **be able to be more accurate with project planning and understand what needs to be done** so that I can lead the team to better success. The skills such as creating a blueprint that will guide the entire project from ideation to fruition, clarifying its scope, necessary resources, anticipated timeframe, communication strategy, are crucial for me to learn and

	improve. Besides,**the ability to think of something creative** ,something that could create a spark to others and implement it into the project is one of the things that I will improve in the near future since in this industry,new things keep on evolving and becoming a new revolution. Lastly, I **should improve my communication skills with other members**. Communication is when both parties can understand each other well and give feedback, this skill is very significant since it will affect the result of project outcome. Of course we don't want people to misunderstand the things that we try to convey because it will lead to project failure and affect the whole process of project making.

TEAM MEMBER	REFLECTION
AHMAD MIRZA ARMAND BIN SHAZRIL FARIZA (A21EC0006)	Along the course of completing this project, I have learned all the necessary skills and knowledge in order for me to prepare a functional low fidelity prototype. At first, I had very little knowledge towards Amazon Web Services therefore making it difficult for me to know what type of services will be required and necessary for our project, AlertMe. To solve this issue, I managed to complete all 10 modules in the AWS Academy. After completing all the modules, I have an adequate amount of knowledge about AWS, Cloud Architecture hence making the completion of this project to be much smoother and easier. Other than that, making a Low-Fidelity prototype of AlertMe was also a challenge because most of my team members including me never had the experience of preparing such tasks like this. Therefore, we had to do our research on Youtube, Google and many more to get the idea of how to prepare a lo-fi prototype of our project. Moving to the process, initially, the task of this project was quite difficult as me and my team were mostly confused. However after several meetings online via Google Meet, and discussions through our Telegram group, we have made it clear on what we need to do. This has ultimately made completing this task much more effective. I am happy and satisfied with all the co-operations and teamwork shown in our group. However, doing a group task while having online distance learning is not an easy task. Above all else, interactions between groupmates is one of the most important things while doing group work. This is obviously impossible to be done at this current state therefore making communicating within the group a lot harder. To resolve this issue, we made sure that everyone is actively participating during the discussion, completion etc. After completing this project, I genuinely feel so interested towards Cloud Architecture. Therefore I plan to constantly learn and explore more about cloud architecture even after the completion of this project. Conclusively, completing this task even though it was quite challenging, I learned so much not only about the technical parts but also about my general life skills and attributes. I came to realize there are a lot of things I need to improve such as my leadership skills, time management skills and most importantly my communication skills. All and all, this project has indeed improved a lot of things about me and my group

Video Project

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