UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

TECHNOLOGY AND INFORMATION SYSTEMS (SECP1513)

PROJECT 2

TEAM MEMBERS :

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SUBMITTED TO :

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1. INTRODUCTION

In this day and age, we human beings are transforming almost everything in our lives into something more manageable and less complicated and as the years go on, we are able to comprehend more about Biology and Computer Science, this creates a subdiscipline of the two mentioned subjects into what we now know as Bioinformatics. Bioinformatics is a field of computational science that is particularly related to the analysis of sequences of biological molecules. In addition to that, it is especially useful in comparing genes and other sequences in proteins, including other sequences within an organism or between organisms. Many experts Bioinformaticians now use complex software programs for retrieving, sorting out, analyzing, predicting and storing DNA as well as protein sequence data. In today's modern era, we now have a unique way of using an already available software program which is called Cloud Computing. There are many Cloud Platforms available on the web for instance Amazon Web Service (AWS), Cloud Computing is especially important when developing or experimenting on a new project. AWS comes with a lot of benefits and supportive tools such as Amazon Simple Storage Service (Amazon S3) and Amazon Lambda, these two are great in order to get a jump start on projects especially Bioinformatics related projects. Amazon S3 is an object storage built to store and retrieve any amount of data from anywhere, meanwhile Amazon Lambda is a serverless compute service that runs code in response to events and automatically manages the underlying computer resources. AWS has more to offer other than these two mentioned and most of it has specific tools and details that could be functional to certain and specific projects. Therefore, AWS can easily be used for assisting any Bioinformatics project in order to simplify and enhance our lives from now on and it is important for students to learn Cloud Computing and get started on AWS so that it could be beneficial for them in their upcoming times.

2. DETAILED STEPS AND DESCRIPTIONS RELATED TO THE PROJECT

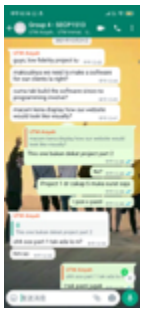
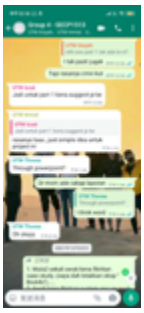
STEPS

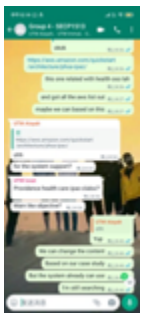
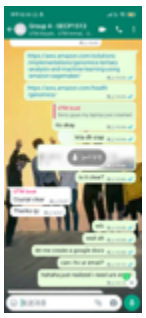
1. Think of a case study.
2. Figure out the system that we want to develop as well as the user of the system which are our clients. In our case, we wanted a system that can store data, help to diagnose diseases and dispense prescriptions in a short time. Our clients are hospitals.
3. Find out our client's problem and figure out the solution.
4. The solution has to be proposed in the form of a prototype.

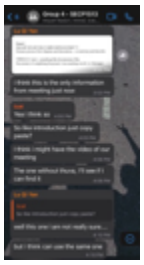
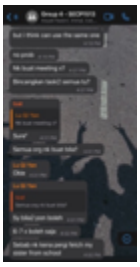
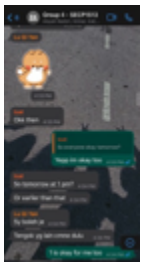
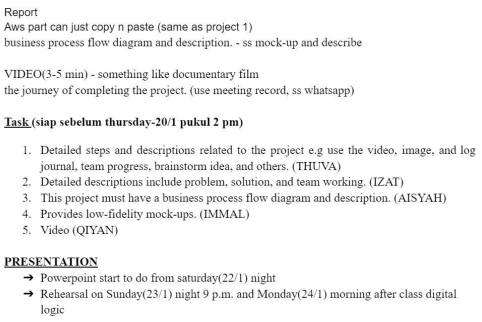
DESCRIPTIONS

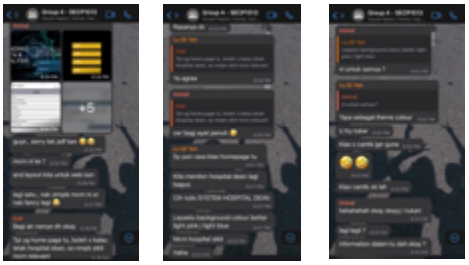
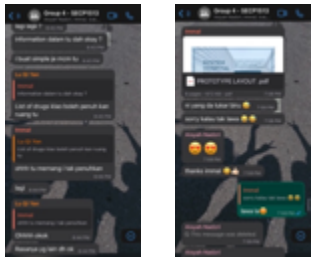
In this case, our team chose to use machine learning as our technology to solve the problem of our client. The reason we chose machine learning as our technology is because of cost efficiency, easy to use and no expertise required. Machine learning can store the data inserted by the user. Next, machine learning can predict and make decisions just by using all the data inserted, such as historical data. All the results given by machine learning are accurate because all the predictions are based on true data. It can help by saving time, money and human power as all the predictions can be done by machine learning. Thus, this shows that machine learning fits all the requirements which require a technology that can store data, help to diagnose the disease and dispense prescriptions in a short time.

JOURNAL OF TEAM PROGRESS

DATE	ACTIVITY
20 DECEMBER 2021	1. Dr.Azurah explained in detail about project 1 and project 2 by using the rubrics as well as the requirements of each project. 2. Team members analysed the requirements and rubrics in order to decide the theme. 3. Aisyah suggested genomic modelling. 4. Everyone researched genomic modelling.   5. Rough idea : ● Choose AI : helps in genomic modelling ● A system to produce personalized medicine ● Client : pharmaceutical companies ● Problem faced : do no have the ability to transfer patient's genome into digital data therefore, collab with our company ● Use AWS to support system development which helps in storing datas

21 DECEMBER 2021	1. Google Meet among teammates to discuss genomic modelling further. 2. Decided on machine learning as a technology that can help transfer all the patient's genome into data, help to store all the genomes and drugs data as well as dispense prescriptions faster than usual. 3. Distribution of tasks took place during the meeting: ● Izat – Introduction ● Qi Yan – Client Information ● Aisyah & Thuva – Architecture Planning ● Immal – Conclusion  
26 DECEMBER 2021	Completion of Project 1
17 JANUARY 2022	● We had a 20 minute group meeting with Dr to discuss Project 2. ● Discussion about introduction of Project 2 as well as the planning of a group meeting

	  
18 JANUARY 2022	• Group meeting at 1pm through google meet • Things discussed in the meeting : 1. Explanation of each task related to project 2 2. Question and answer session among team members regarding unclear topics 3. Distribution of tasks among team members 4. Task due date  Report Aws part can just copy n paste (same as project 1) business process flow diagram and description. - ss mock-up and describe VIDEO(3-5 min) - something like documentary film the journey of completing the project. (use meeting record, ss whatsapp) **Task (siap sebelum thursday-20/1 pukul 2 pm)** 1. Detailed steps and descriptions related to the project e.g use the video, image, and log journal, team progress, brainstorm idea, and others. (THUVA) 2. Detailed descriptions include problem, solution, and team working. (IZAT) 3. This project must have a business process flow diagram and description. (AISYAH) 4. Provides low-fidelity mock-ups. (IMMAL) 5. Video (QIYAN) **PRESENTATION** ➜ Powerpoint start to do from saturday(22/1) night ➜ Rehearsal on Sunday(23/1) night 9 p.m. and Monday(24/1) morning after class digital logic • Link of the recorded group meeting was shared among team members *Link of the meeting :* *https://www.youtube.com/watch?v=-z3O_tzAd5Y* • Discussion regarding layout of the mock-up

	• Decision between simple or fancy theme • Homepage layout • Colour theme • Information displayed • Necessary wording   • The first draft of the mock-up was sent in the group 
19 JANUARY 2022	Second and final mock-up was sent in the group
2O JANUARY 2022	Everyone submitted their respective tasks that would complete project 2

3. ARCHITECTURE PLANNING AND DESIGN

Firstly, we will be receiving the DNA sample from the client. The DNA sample contains all the genetic requirements for DNA sequencing to detect the gene mutation. The DNA sequencing can be done by using a DNA sequencer machine. The machine will then generate the raw data of DNA base sequence into bits representation, Adenine (A): 00, Cytosine (C): 01, Guanine (G): 10 & Thymine (T): 11 which computers can read. It will then proceed to make its sequence in a big data form. Thus, the double play of genomics and bioinformatics is necessary.

This is the part where Amazon Web Services (AWS) plays a role. Before we start, let us introduce the main AWS products that we will be using for this cloud architecture.

The following are the main AWS features & their functions to put in action:

AWS DataSync	It simplifies, automates, and accelerates copying large amounts of genomic and drugs data between on-premises storage systems to AWS S3.
AWS S3	It stores and retrieves any amount of genomic and drugs data from anywhere
AWS SageMaker	It helps in creating machine learning models (Drugs)
AWS Lambda	It runs your code (diagnose the genomic disease that the patients suffer from in a short time) on high availability compute infrastructure and performs all the administration of your compute resources

How can we apply AWS DataSync in this system? As we know, a sequenced DNA raw data is bulk and unstructured. AWS DataSync plays an important role in transferring bulk patient datas from on-premises data source to AWS S3 by simplifying and accelerating the copy of the terabytes of datas. It is beneficial as it helps the datas become more organized and storable by the AWS S3 for further processing.

How does AWS S3 work in this system? AWS S3 capables of storing any volume of data. The scale of size of data that can be stored is from a minimum of 0 byte to a maximum of 5 terabytes. In continuation, DNA sequence data is proved to be 135, 000, 000 bytes to 125 megabytes. Once

data is received by the AWS S3 from the AWS DataSync, all this data will be stored within the resources called “buckets”.

Four buckets mentioned & their functions:

Bulk patient data	Undivided data of a patient.
Partitioned data	Allows patient data to be managed and accessed separately based on each data. Partitioning improves scalability, reduces contention, and optimizes performance.
Output data	It generates graphical output, records the history of the genomic and drug datas the algorithm generates, or halts the algorithm based on the data at the current iteration.
Confirmed case	Prescripted patient's details of their infection.

How does AWS Lambda and AWS SageMaker work in this system? AWS Lambda updates the bucket source into a readable case for the user. In this case, the bucket of bulk patient data will be partitioned into an individual review case and saved into a partitioned data bucket. From the partitioned data bucket, AWS Lambda will process an input in a certain form required by the AWS SageMaker. It prepares datas to deploy machine learning by bringing a wide set of capabilities and these capabilities help build highly accurate drug models that improve overtime. It will then issue an user interface for the user to review the case. If the data is rejected or needed to be improved, it will be resent to the partitioned data bucket for AWS Lambda to process a new input so that the AWS SageMaker can make a new interface for the the user to review again for further refining but if it is otherwise, the output will be straight away processed by the AWS Lambda to be stored in confirmed case for reporting.

Clients now can use the datas for their drug production.

4. DETAILED DESCRIPTIONS INCLUDE PROBLEM, SOLUTIONS AND TEAM WORKING

DATE	PROBLEM	SOLUTION	TEAM WORKING	OTHER DETAILS
20 December 2021	We still have some troubles understanding the actual Project on what we are actually supposed to do.	Fortunately, one of our members, Aisyah has recorded the briefing, giving us a much more understanding on the Project.		Dr. Azurah, our Technology Information System Lecturer, has just finished the briefing about our Project for this specific course at around 4:00PM.
21 December 2021	There was some confusion among members on what goes and what does not on the first part of the project.	The confusion was slowly relaxed and we later figured out that the first part of the Project was just to roughly create a summary of our own created problem as well as the solution.	Some discussion and questioning was held.	

23 December 2021	Although this still does not fully solve our doubts and uncertainty, we are still hesitant to go on with our initial problem.	Luckily, Aisyah came up with a solution to our problem which she suggested as a problem regarding ‘companies do not have the ability to translate a patient's genome into digital data’ as our initial problem so we decided to directly message Dr. Azurah herself for closure.		Qi Yan shared with everyone some more detailed information about the project that she acquired from other groups.

24 December 2021	Dr. Azurah has replied and she said “I can see you need to define/specify a lot of things as ‘to produce personalized machines’ is not simple.Then, arise the problem of making sure everything was in check along with to avoid any skepticism among the members.	In the said meeting, we finally see eye to eye on our new problem which is ‘a company or corporation takes too much time to diagnose a certain illness’. Thus a google docs was created so that everyone can see each members’ progress including errors that may occur.	Hence, the idea was scratched and we went back to the board. We decided to go with something similar but less complicated as suggested by Dr. Azurah and we agreed to create a meeting on the night of that same day at around 9:15PM.	Qi Yan led the meeting as well as assigned tasks for each member.
27 December 2021			Everything was finalized and after each person did a last-minute check for grammatical and spelling errors, the first part of the	

			Project was finally submitted.	
18 January 2022	One of our members, Immal showed the images that will be used for the mock-up.	To improve the looks of the images.	Other members of the group are quick to give their opinion and suggestions	

5. BUSINESS PROCESS FLOW DIAGRAM & DESCRIPTION

Below is the business process flow diagram for the client. This system displays the list of patients, their medical report and their advised drugs prescription for the hospital to proceed to their next objective. As mentioned in the first part of this project regarding the architecture planning and design, we can consider all of the AWS features (all from collecting and simplifying patient's data to producing prescripted patient's details for their infection) have already been applied in order to create this system. This system consists of the last part of the architecture planning and design which is a confirmed case for reporting.

Diagram 1

Diagram 1 shows the homepage to the system. This system is called 'System Hospital Dean'. It stores numerous data of patient's genomic data with the analysed health conditions and drugs prescriptions in R Healthcare Centre. On this homepage here, we can see that there are two different buttons that can direct the users to enter to two different pages. The upper button is 'Patients List' and the lower button is 'Drugs List'. The use of these buttons will be explained in the next flow diagram.

Diagram 2

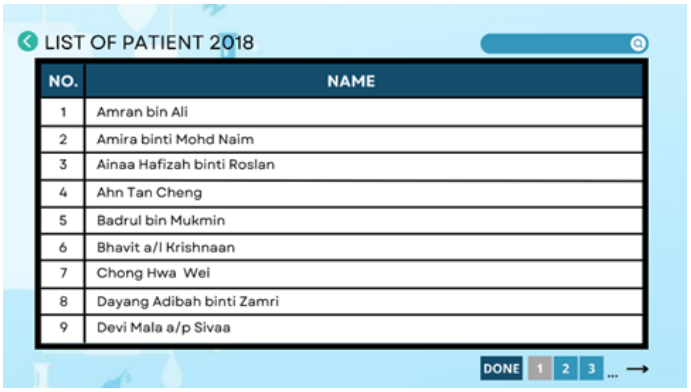


Diagram 3

Diagram 2 will appear when the user clicks the 'Patients List' button. It will initially order the user to select a year according to the user's preference before the system is able to put the list of patients of the year selected on view. Let's assume that the user clicks the year of 2018 to review the patients list. We can see here there are several numbers of patients on the first page and the user can click on any name to view the patient's medical report. However, our system provides a benefit for the user to fully utilize this system in which they can simply search up for a patient's name by using the search button provided at the right top of the page without having to look through the name list one by one.

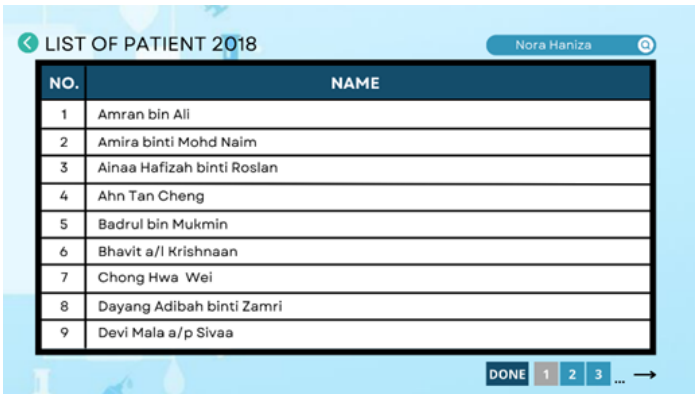


Diagram 4

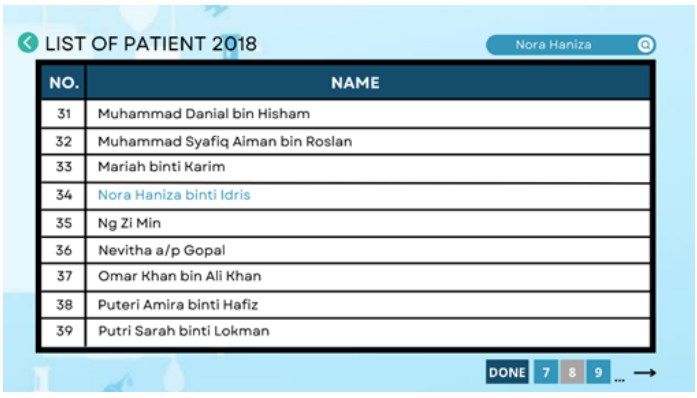


Diagram 5

Both diagram 4 and diagram 5 show us the example of a name searching. The user key in 'Nora Haniza' name appears on the eighth page. Therefore, this really shows us how convenient the searching button is, considering there are thousands of patients per year and to multiply that by 4 years, the search button should really be installed.

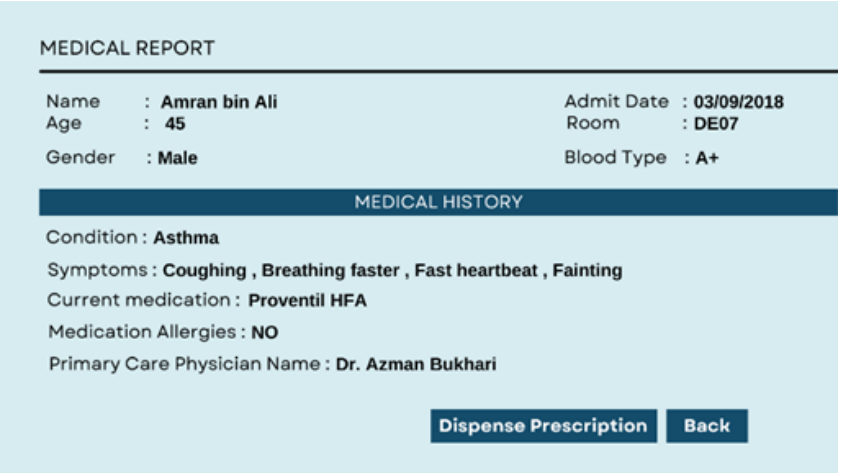


Diagram 6

Back to this list of patients in diagram 3, we will be taking one of the patients as an example to view the next page. Let's Say we click on Mr. Amran bin Ali, the system then will lead the user to observe Mr. Amran bin Ali' medical report as well as his medical history. As mentioned in the architecture planning and design of project part 1, if the patient's data is rejected or needed to be improved, it will be resent to the partitioned data bucket for AWS Lambda to process a new input so that the AWS SageMaker can make a new interface for us to review again for further refining but if it is otherwise, the output will be straight away processed by the AWS Lambda to be stored in confirmed case bucket for reporting. The medical report above is the final result for reporting and it is ready to be used by the client. The user can click on the 'Dispense Prescription' button to look through the advised drug for the client to produce a suitable medication for the patient to benefit from.

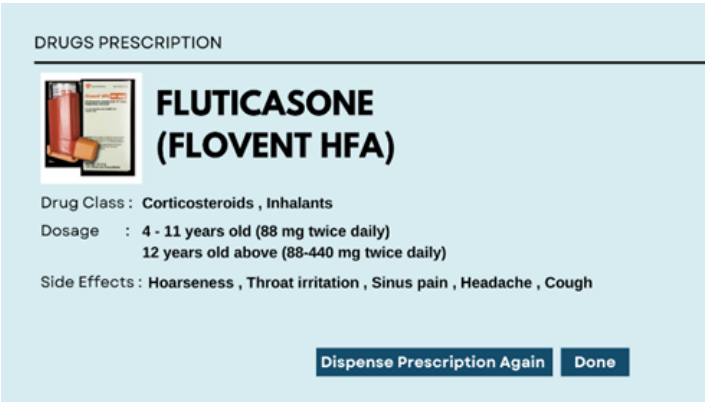


Diagram 7

Diagram 8

As the user has dispensed the prescription, the user can view on which drug to put on consideration according to the infection's suitability. If the client finds that the advised drug does not suit the patient, the client can click on 'Dispense Prescription Again' to review which drug is the most suitable one. 'Done' button can be pressed once the doctor obtains a drug that fits with the medical report.

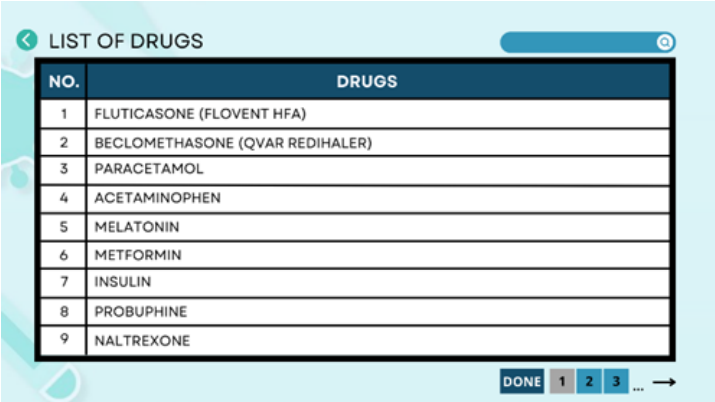


Diagram 9

A short time ago, we acknowledged the use of the 'Patients List' button and now we are going to focus on the 'Drugs List' button on the homepage which shows on diagram 1. A page of a list of drugs will be shown when the system user clicks on it.

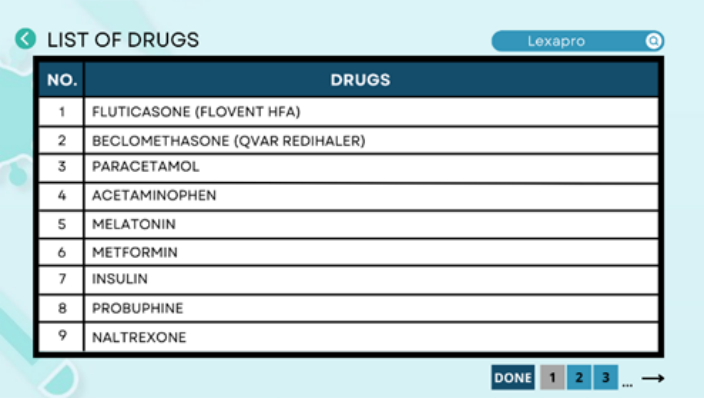


Diagram 10

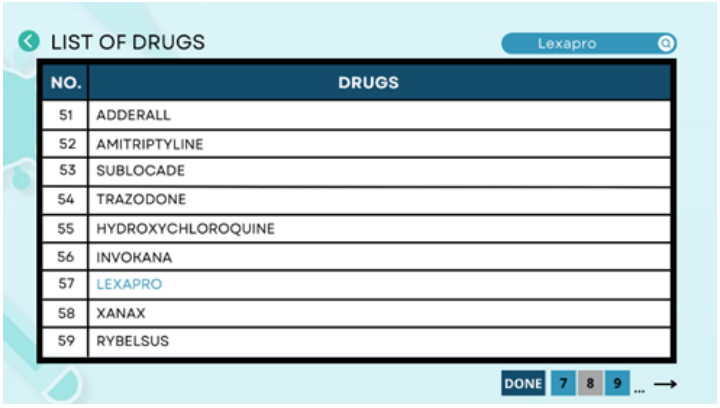


Diagram 11

Diagrams 10 and 11 display the page of the list of drugs. As mentioned at the initial part of this business process flow diagram & description, we know that this system provides a help for the user to entirely operate this system in which they can simply search up for a drug by using the search button provided at the right top of the page without having to look through the drugs list one at a time.

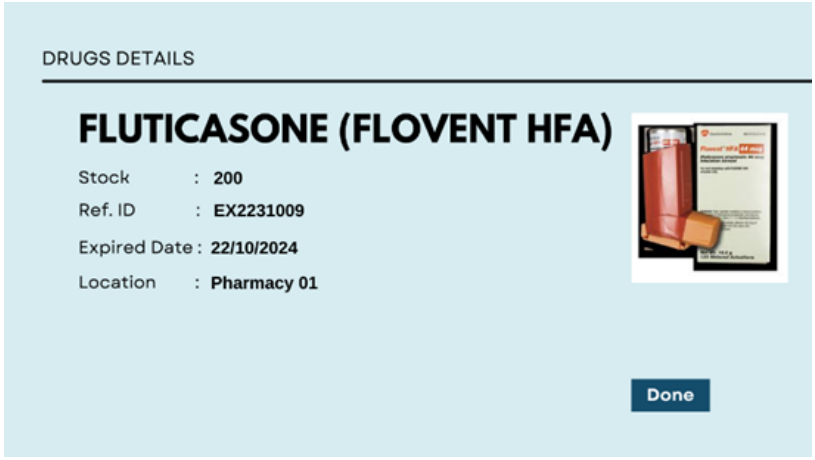


Diagram 12

For a quick simulation, we can choose one drug to get more familiarized with this 'Drugs List' feature. Diagram 12 will show the stock of the drugs, the reference ID, the expiry date along with the exact location of the drug so it will be much more convenient for the workers to discover it. Once the finding is settled, the user can click the 'Done' button and the user will automatically be sent to the homepage.

6. LOW-FIDELITY MOCK-UP

We created a low-fidelity mock-up using Marvelapp as Marvelapp is very easy to use.

Link mock-up : https://marvelapp.com/prototype/d6e32db

7. TEAM MEMBERS' REFLECTION

MUHAMMAD IZAT BIN MD KAMIL'S REFLECTION

During the completion of the project, I learned more about AWS, especially how helpful it is on designing and completing our project. It has way more benefits only to those who spend more but for us it is enough to get by our project. In addition to that, I also learned how to create a quick mockup using a web called Marvel and how easy it is to create a small vision into something big. Speaking of vision, my reason or rather motivation on completing this project is solely because I want to someday help those people who might be having the same problem and to assist them in any way possible together with supporting those who have a dream to create something for the good of the world. Initially, I did not think anything besides completing this project because that is my duty as a student but as we went ahead, I feel like it is also my duty as a student to create a better future for the next generations. Most issues occurred during this project is our initial confusion and lost just as we were given the project. It gets pretty frustrating and confusing rather quickly among members because we clearly do not know what to do or where to start. Despite that, we are not too fond of giving up or doing nothing and instead we actually created our maiden problem as well as the solution for the said problem. After our first breakthrough, we realized that teamwork is the most important entity in making this project a success, plus because of our breakthrough everything after seemed to be going exceedingly breezy and we only encountered slight issues, concerns and problems that we can solve swiftly. Nevertheless, we did however get most of our help from Dr. Azurah who is never tired of assisting us on this project regardless of our question whether it is within a scheduled meeting or not. I think my direction after all of this project including the first, second part and presentation has come to an end, I will continue to do my research regarding Bioinformatics projects and anything related to Computer Science to hopefully get a more understanding on the mentioned subjects along with its difficulty to extend my knowledge and to fathom how far my knowledge is in terms of Bioinformatics. To me, what is important for my life to come is communication and critical thinking. I have always struggled with communication ever since I was in primary school, oral speeches are what terrifies me the most and just the thought of it makes me have butterflies in my stomach. I think the most important thing when it comes to communicating is confidence and when I lack confidence, I lack communication skill hence why I think it is

particularly important for me to improve my communication so that I would not have any troubles in time to come. In addition to that, critical thinking is exceptionally and equally important in order to secure my future because I feel in order for something to be successful you must have the capability and ability to analysis available facts, evidence, observations, and arguments to form a judgment including the rational, skeptical, and unbiased analysis or evaluation of factual evidence. If one does not apply critical thinking in their workplace, the outcome is going to be slow and sometimes unsuccessful but however this is all based on my personal experience in my past thus why I think critical thinking is crucial to improve my potential in the industry.

NUR IMMAL HAYATI BINTI HASMI ANUAR'S REFLECTION

Reflecting back on the group work for this project, I feel that I have benefited drastically in terms of teamwork skills and have managed to accomplish many achievements as well as found that there were many improvements which could have been made. There was a lot of new knowledge that I gained by finishing this project. I get to know more about cloud computing and its function , the AWS system that we used in this project and more. With this new knowledge , I become more eager to dive into the world of technology in future.Despite all the benefits I got from this project , there are also many difficulties that my group members and I faced. One of the difficulties my group faced was time management and being able to gather all members of the group together, due to other commitments. However we soon managed to overcome this as we discovered in order to successfully complete the task we would have to put more effort in and work on our communication skills. Despite not being able to meet up as regularly as we liked due to this online learning , we decided to communicate via a WhatsApp group and Google Meet.This allowed flexibility and even worked in our favour as we were able to share interesting research we came across instantaneously.We also have the difficulty to understand the whole projects requirements. But , fortunately we got the chance to ask our lecturer regarding the projects and finally got a clear understanding about these projects.Many disagreements and differences in opinions arose when deciding on our main argument points. I feel that the difference in opinion only allowed the group to thoroughly analyse the task and create a rigorous argument.The biggest challenge I faced personally was managing my time and connection problem. As I did the project at home due to online learning , I had to divide my time for other commitments and sometimes I lost my internet connection while in our project meeting. I put all of my effort and take the responsibility to manage my time wisely and complete my task within the time. On the whole I am very content with the quality of the work which was produced by my group and I feel as a whole we worked harmoniously despite a lack of team leadership and time management issues. I feel that personally I have benefited significantly from this task as it has highlighted my strengths and weaknesses and has also prepared me on how to approach future group work.

LU QI YAN's REFLECTION

Throughout the project, I learnt how to create a low-fidelity prototype from scratch. I also get to know the difference between machine learning and AI. Both of these advanced technologies are very useful for humans. Machine learning is more cost-effective and more easy to use compared to AI. All of this is very interesting especially while doing research on the architecture and planning design. However, this project is also quite challenging for me and all the members in our group. Thus, my group members become one of my motivations to complete this project. All the group members are very supportive and at the same time they are really cooperative while completing the project. The process of completing this project is really nice as all the group members play their roles well. Secondly, my thirst for new knowledge also became my motivation to complete this project.

In my opinion, I think the greatest issue that we face is lack of experiences and knowledge on cloud computing architecture and bioinformatics. Thus, at first our group faced a big problem which was unable to decide our theme for this project. A lot of research was carried out by searching online and watching videos on youtube. By doing this, I gained more understanding about this project. Discussion among group members did help a lot to make the project a success. Meeting through WhatsApp and Google Meet is really useful to make sure all the group members can follow up and understand requirements for this project. Lastly, we successfully decided all the important criteria in this project through discussion and meeting so that the project was done on time.

I would like to learn more about AWS and cloud computing architecture. Since I get some experience on doing this low-fidelity prototype project, I want to learn about it in detail such as how to create other low-fidelity prototypes and how to solve others problems related to cloud computing architecture. Experiences gained by doing these can help me to enhance my knowledge in future.

For me, I think I still have a lot of flaws in the industry. Lack of experience and knowledge in this industry become my weakness. Therefore, I need to improve my skills by doing more research and training about this industry. Technology is always changing in this era,

so I should always keep alert about the changes in this industry. Attending more information sharing sessions, industry talk and doing more research can help me to improve my lackings. I should train myself so that I can have more attributes such as flexibility, creativity and skill. All of these can help me to solve different problems that I face in this industry.

AISYAH BINTI MOHD NADZRI'S REFLECTION

Considering the main idea of this low fidelity prototype project is the application of Amazon Web Services (AWS) on a system we proposed, I get to know how exactly AWS works. Although I do not get the chance to apply it physically, I am still able to grasp the rough concept of it. Then again, I also find that AWS cloud computing architecture is knowledgeable and interesting that I get myself to become fully engaged while getting myself familiarized with it. So that, as a result, I can give a full commitment to the assigned part of mine later on. Apart from that, with the help of my group members during the meeting as well as the exposure videos Dr. Azurah shared on telegram, I also was able to educate myself on creating low fidelity prototypes from a certain mock-up software. Also, I got myself more familiar with the Fourth Industrial Revolution, especially machine learning as it was the main technology we put to use in this project. Talking about what motivates me to complete this project, I could say that the thought of the team working itself plays a big role. Group assignments have always helped me extract the finest version of myself. I become extremely committed, disciplined and motivated knowing that I have several people involved in what I am doing at the moment, thus I am very much aware that I must keep my professionality and formality mode on. I am blessed to have such committed and thoughtful group members. On the other hand, not to mention Dr. Azurah A Samah who constantly checks on the progress of the group I am in, likewise gives a major impact for me to keep myself driven. As a mere human being, I always tend to forget things and daily reminders are the ones that keep me going. Next, there were a few issues we confronted before we were able to finish up this project. At first, we were confused on how to actually start this project. There was a mix of instructions and opinions that made us incapable of making the next step but my group members and I eventually voiced our own understandings regarding this project. We also did some research to get ourselves more acknowledged and closed to this project. We gathered our thoughts and solved them together. There was also a session of suggesting and accepting points of view. We held a few meetings, both in the WhatsApp group and Google Meet to have a better way of communication. In the end, we got to finish up this project in time. I could say my direction after completing this project is, I will become more involved in things related to the course I am studying right now which is Computer Science and Bioinformatics. I want to gradually improve my quality and knowledge in computational skills as I appreciate my learning progress in Computer Science as much as my passion and interest I have in studying

Biology. There are so many weaknesses of mine that need to be fixed and improved. Taking into consideration, this project is mainly focused on cloud computing and I do really need to look through and take in the exact way to adapt cloud computing in real life. Therefore, I hope I get to contribute some of my parts I have gained sooner or later to the world in the upcoming. Last but not least, to improve my potential in the industry, I personally hope I will be able to overcome my panic attack in the nearest time. I get easily panicked and I can see that affects my personal life, my professional skills or as a student myself, in general, most of the time. Panicking can drive down my potential as an employee or even as a student as it sometimes makes me absent-minded even when I have prepared myself earlier, hence I really think by overcoming my panic attack can help me boost my potential in the industry. As I mentioned earlier, considering I am now a student of Information Technology I also think that by polishing up my skills and knowledge in this computational field I can build up my potential in this industry even if it might be a long journey and consume time. It is all for the precious people I have in my life after all.

THUVAARITHA SIVARAJAH'S REFLECTION

From this project, I learned the importance of AWS in terms of cloud computing as well as its architecture and I finally understood what a low-fidelity prototype means. This is a huge achievement on my part considering it was something I had zero clue about when this project was first introduced. Additionally, I also learned how to create a mock-up using the marvel website and it was extremely interesting and something I personally never thought to be that simple. This project would not have been a success if it were not my teammates. I am eternally grateful to my teammates and for their constant motivation and teamwork throughout this project. Every single one of them was extremely patient and understanding when I was confused and always made sure everyone understood what was going on. It is because of my teammates that I can proudly say I know how to create a quick mock-up. We watched the video on how to create a mock-up through google meet together followed by a group discussion, which gave me a more in-depth understanding of this project and its requirements. Therefore, my teammates were without a doubt, my biggest motivation to complete this project. My other motivation to complete this project was the excitement to see the final mock-up, complete with all its details. There definitely was a lot of hard work put into completing this project , therefore giving us all a sense of satisfaction and pride when looking at the final product.

Personally, I think our biggest problem was the fact that most of us were very new to this cloud computing field and this whole course for that matter. This resulted in extra time being taken just to understand the requirements of the project as well what the project was as a whole. I still remember how we had zero clue on how to begin this project at the very start and I personally was extremely worried that I would not understand it till the very end because I thought it was beyond my capability. With that being said, we never gave up and continued to research until a theme was finalized. We then had multiple whatsapp discussions as well as google meets to discuss our project in detail and this helped immensely with our understanding and progress. Group discussions truly are the key to success when completing a project and no one can convince me otherwise.

Considering that I've already learned how to create a low fidelity prototype or a quick and simple mock-up, I would now like to learn how to create a more detailed and complex one. I

think this skill can be extremely useful and it would only make sense to use it to my benefit and work further from here instead of stopping now. I would also like to further my understanding on the whole concept of cloud computing as it is still relatively vague to me. I truly believe that this knowledge could be beneficial for me now as well as in the future and starting now, I would be able to gain more knowledge with time as compared to if i start later on.

I know for a fact that I still have a long way to go in this industry and many necessary improvements can and have to be made. I would first like to improve on my computational skills and increase my passion for it, as well as get a deeper understanding of my Bioinformatics course. I also need to improve on my cloud computing skills in terms of understanding, architecture and application in daily life. Major improvement needs to be done when it comes to coding because that is where I get so easily confused but I know I do need to practice more. I believe I also have to overcome my negative mindset that guides me to think I am not capable of something even before starting it. Reading the instructions of a project that include terms I am not familiar with creates a sort of mental block that tells me I would not be able to do it. However, that needs to change and I will definitely take the necessary measures to make sure my mindset is more optimistic and does not bring me down.

In short, I do have plenty of space for improvement and I will definitely work towards making them for the betterment of myself as well as the people around me. I would like to thank Dr.Azurah for giving me the chance to not only work on this great project but also learn new and important skills as well as my teammates for being nothing short of cooperative, supportive and hardworking. It has been a great pleasure working on this project and I am glad that it is now a success.

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