FACULTY OF ENGINEERING

SCHOOL OF COMPUTING

SEMESTER 1/20212022

SECP1513 – TECHNOLOGY INFORMATION SYSTEM

SECTION 08

PROJECT – PHASE 2 (PROJECT PROPOSAL)

[CALUSTRATE : PERIOD TRACKER]

LECTURERS: DR IZYAN IZZATI BINTI KAMSANI

GROUP NO: 2

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INTRODUCTION

A period track app qualifies women to track ovulation and menstrual cycles automatically, which means women do not need to track it manually using a calendar and set dates day-by-day. Instead, using features such as “smart calculate” or automated tracking to calculate the average of women’s menstrual cycle based on the history and automatically set the certain date of a month by inserting women’s usual menstrual cycle as data input. These applications are developed by the research and using predictions on women’s average cycle length, that is 28-days with ovulating phases which are possible to occur on day 14 and the fertile window between day 10 to 16. The development of period tracker applications complies with the objective of helping and easing out women as they face out period phases as well as act as a data keeper for health references, so they are able to track for pregnancy, medical issues related to menstruation, and any crucial signs of cancer-related to women’s body part.

The purpose of Calustrate is to help women track their period and the menstrual cycle, which is considered a great way to learn about their bodies. This application will give a reminder a day before the period to make sure the user can prepare themselves. This application consists of a system that predicts the date of the user's period, an AR instructor that helps you maintain your body’s health, a forum for discussion, a private diary that helps you express your feeling, and also a medical service that helps you to get a consultation from a specialist.

When first-time users enter Calustrate, they need to sign up first to create an account and put their personal information. The data will be stored in our database to make sure the information and privacy of the user will not be accidentally deleted. The user’s personal data will be kept safely in our database, and it will not leak or be shared with a third party. If the user already has an account, they just need to sign in as we already have their information, so the system will read the user input and will display the data that has been stored in our database. Calustrate is secure as we want to make a user-friendly system that helps users to easily browse our system.

The proposed system came with a feature called Self Care where the user can execute the certain activity in order to lessen period ache and improve health quality. Calustrate will recommend a suitable activity based on the user input so that the user could execute said tasks easily and safely. Furthermore, in order to make the activity more interactive, interesting, and accurate, the project adopted and used Augmented Reality (AR) technology.

A smartphone equipped with a camera module is capable of executing AR, the user can simply point toward an object, the system calculates and analyses, and finally adds some model overlays, with this technology, the user could execute said activities that are uniquely recommended for them with less hassle and more enjoyment.

Based on the user input, Calustrate can determine whether the menstruation is normal or abnormal. This implementation can be achieved by gathering enough data to be analysed by a medical expert. If the period is abnormal and has been showing severe symptoms, a proper medical expert will consult the patient via Voice over Internet Protocol (VoIP), and form a diagnosis. Next, the medical expert could recommend or give certain types of medicines that suit the patient. In some cases, some menstruation could demonstrate severe symptoms that could harm the patient, the medical expert could suggest the patient go to a hospital for more detailed checking. The safety of our users is guaranteed as they can properly consult with a medical expert and know more about their safety.

The creation of this app is mainly focused on women for prediction in their monthly next menstruation as one of the features in Calustrate provides daily cloud backup for users to save their private information and purposes saving and accessing data privacy from multiple devices in multiple locations based on their desires and preferences. Various features provided in Calustrate that has been described are aimed to provide the fullest in women's productivity and their well-being so women might easily find out the period tracker app like Calustrate that easy to access and user-friendly for long-term use as Calustrate will improvise based on current needs and user's feedback.

Feedback, on the other hand, is obtained from the user to review our app performance therefore we can fix any bugs and errors and able to achieve or develop into more functions than we currently own to increase the productivity of Calustrate, a period tracker app, as well as to determine decision-based on analysis to meet organizations' goal and objectives.

STEPS AND DESCRIPTION

2.1 Team Progress

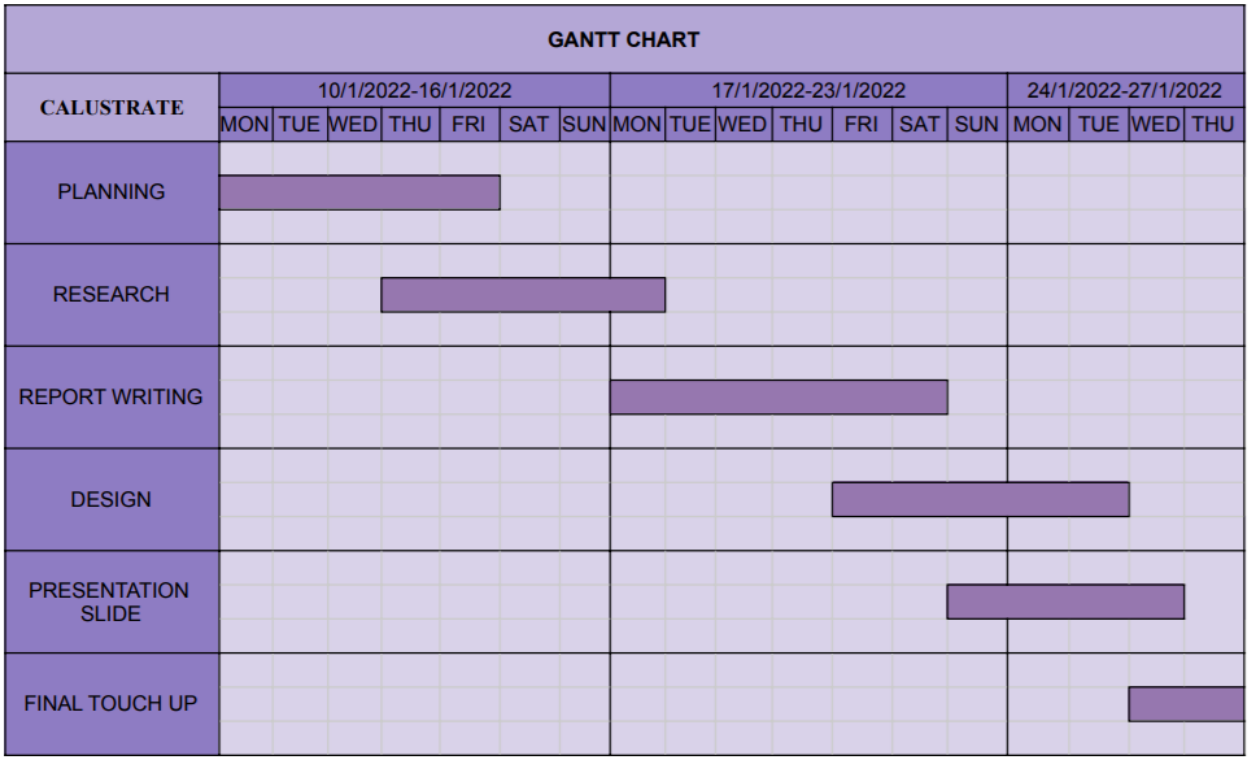


Table 1

Group Meeting Agenda			
Date: 10/1/22 Time: 2130 hrs		Who took the notes? Name: Auni	Who is leading the discussion? Name: Nurain Najwa
No.	Agenda Items What are the things discussed at the meeting?	What are the ideas discussed	What action needs to be taken? What do we need to bring?
1	Task distribution on every each of the member	Tasks given	Task has been distributed
2	Reconfirmation of several questions from Dr. Izyan		Asking Dr. Izyan on several questions regarding to Project 2
3			
4			

Group Meeting Agenda			
Date: 12/1/22 Time: 2200 hrs		Who took the notes? Name: all of the members	Who is leading the discussion? Name: Iqmal Aizat & Haziq Farhan
No.	Agenda Items What are the things discussed at the meeting?	What are the ideas discussed	What action needs to be taken? What do we need to bring?
1	Screen recording of the discussion progress	Screen record progress	Screen record features on PC
2			
3			
4			

Group Meeting Agenda		
Date: 15/1/22 Time: 2200 hrs	Who took the notes? Name: Haziq Farhan	Who is leading the discussion? Name: Haziq Farhan

No.	Agenda Items What are the things discussed at the meeting?	What are the ideas discussed	What action needs to be taken? What do we need to bring?
1	Discussing on AWS Architecture	AWS services used within	app.diagrams.net
2	Mindmapping and brainstorming of AWS Arch		app.cloudcraft.co
3			creately.com
4			

Group Meeting Agenda			
Date: 21/1/22 Time: 2100 hrs		Who took the notes? Name: all of the members	Who is leading the discussion? Name: all of the members
No.	Agenda Items What are the things discussed at the meeting?	What are the ideas discussed	What action needs to be taken? What do we need to bring?
1	Creating Business Program Flow Diagram	Flowchart of the process	https://app.moqups.com/
2	Describes of the Low Fidelity Mock-ups	Creating mock-ups	http://app.diagrams.net
3	Update on issues encountered and solution		
4			

Group Meeting Agenda			
Date: 23/1/22 Time: 1600 hrs		Who took the notes? Name: Everyone participate	Who is leading the discussion? Name: Everyone
No.	Agenda Items What are the things discussed at the meeting?	What are the ideas discussed	What action needs to be taken? What do we need to bring?
1	Designing presentation slides	Deciding on record personally	Using Canva for designing presentation slides
2	Video planning		Self-recording for every team member
3	AWS progress		
4			

Table 2

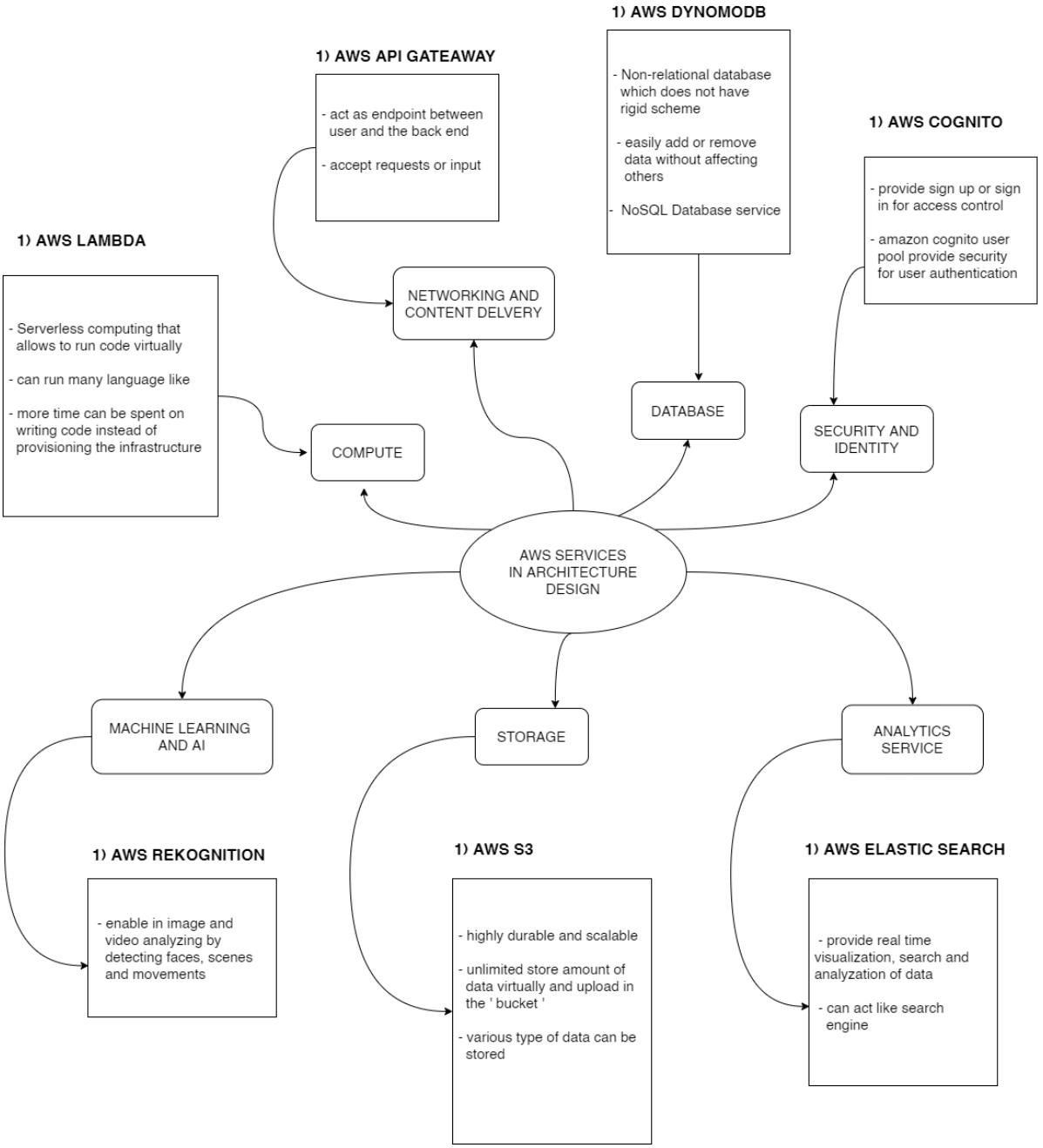


Diagram 1

Table 1 is a Gantt Chart which represents the progress of team members for our project 2 from the start until reaching the end, starting out from 10th of January until 27th of January, which we consider is as the final touch-up of our project. The project consists of teamwork from every member, which we have recorded every session on the below meeting agenda diagram (Table 2). Diagram 1 shows the brainstorming and ideas of our team members in a discussion of AWS Architecture Design as we have to list out what services will be provided inside Calustrate to deliver its service through application successfully.

2.2 Problem

Throughout the journey in developing Calustrate, some of the problems occurred which interrupted the whole concept based on the collection of ideas and target of the creator. Several of the problems started with the general outlook of women's menstruation cycle that varies with other different women. As we started to deploy in drafting of our period tracker app, we realized a simple yet major flaws inside which menstruation cycle that is differ from every each of the women and less likely bound to happen that every woman will encounter the very same day of period started. We are also questioning and debating on women's irregular menstrual cycle which could be beyond below average, which could interrupt the process and flow of the steps that will be provided for the user's ease of access and comfort. Therefore, further study and research is needed in order to fulfill the requirements needed in achieving the desired standard of applications.

An application display and graphic design in most applications with better and smooth transition and interface only provide for user's accessibility. However, another problem raised during our process of application implementation and launch is the screen size that is unable to match to other devices which use the size screen of standardized and required in smartphones or any devices. As such, Calustrate initially developed for smartphone users and compatible for IOS mobile OS therefore when it is about to access to Android OS, the graphic and resolution of display will get blurry or glitched or ran out of its format because of different preferences of mobile OS and its different compatibility that has to meet its requirement based on the OS needs and demands itself. We also have to consider its user interface (UI) as well which is unalike to one another due to the source of the OS despite both almost requiring the same preferences but with different size of dimension, thus this might be one of the challenges we are currently facing within Calustrate development.

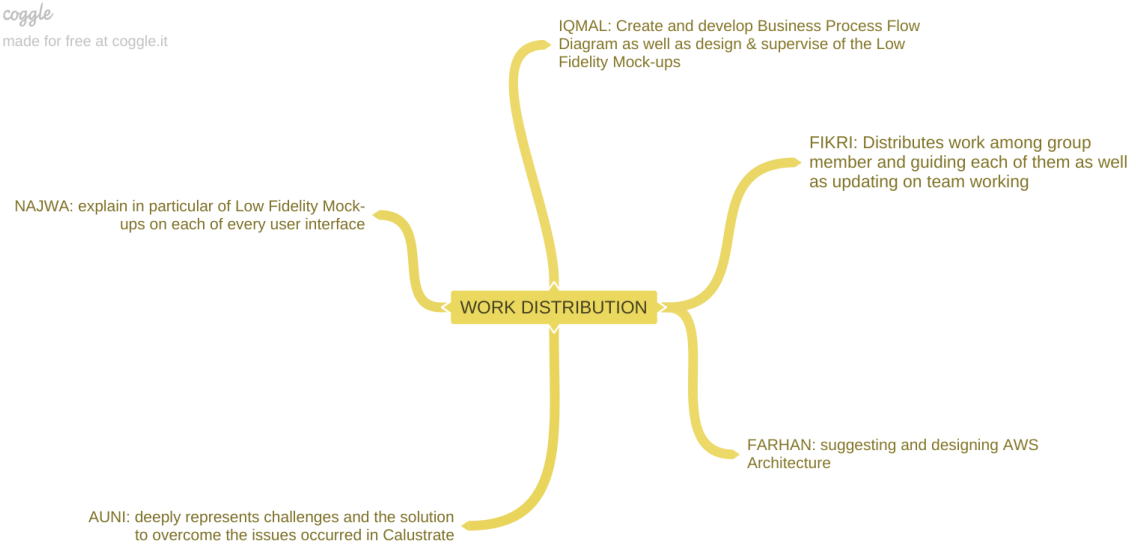
2.3 Solution

As in general knowledge, a woman's menstrual cycle lasts on average 28 days meanwhile the ovulation of the menstrual cycle occurs when an egg is released from the ovaries, specifically on day 14 of the cycle. On the other hand, menstruation, or bleeding, occurs on day 28 of the cycle. According to the enlargement of information, most of the women will encounter an average of less than 7 days of menstruation and counts as 28 days in total of menstrual cycle, which consists of menstruation, fertile or ovulation, follicular and luteal phases cover in one cycle. Therefore, we are able to conclude that every woman owns a menstrual cycle that differs from the other, however most have an average cycle. So, in order to make it easy for users, we will also provide a feature called smart calculate which calculates automatically the menses' date and prediction of when it will be over. This feature gives the benefit to both the user and developer to ease both of the workloads by setting it at default and with the proper algorithm and code for it to run smoothly. We will also use an average of women's menstrual cycles as our main reference, therefore users are able to detect their own menstrual cycle based on data input from auto generation and display as one of the features provided in our application.

As the screen size and compatibility becomes one of the challenges we have face, we, the developer came out with solution in which the developer has to customize for each of the OS that might take some time for it to be completely perfect for each of the OS require its specific needs, thus this will make some time for the development and for application launching. As for IOS, it provides a display of 896 pts of height and 414 pts width meanwhile Android mobile OS provides dimension up to 384 DP for smartphone measurement, therefore, conversion is needed between both of these mobile OS for standardization of sizes. Hence, Calustrate will undergo an updated version by progress so it will keep updated to the current preferences as well as expand its market to both Android and IOS version as well as available to all devices including websites. Initially, the team members or the developer of Calustrate are inexperienced in using Moqups application to develop the mock up for the project, so we learnt it by exploring and exposing Moqups with its feature such as templates for the diagram, icons, comments and the arrangements of mock interface for ease in presentation and mock application. There is also another feature provided in Moqups such as generating an application in default size based on what device we will present our application and we will use provided features to create and design each page for our application to make it based on our desire and fulfill the needed requirements.

We also discussed the mock up project altogether to solve the problem raised and finally we managed to produce an application that is capable of helping women to track their period, named it Calustrate. We also brainstormed on and about AWS Architecture Design to make sure all of the team members understand the flow of the current project and its ecosystem. We learned it by sharing our own ideas between each member and have agreed with the design.

2.4 Team Working

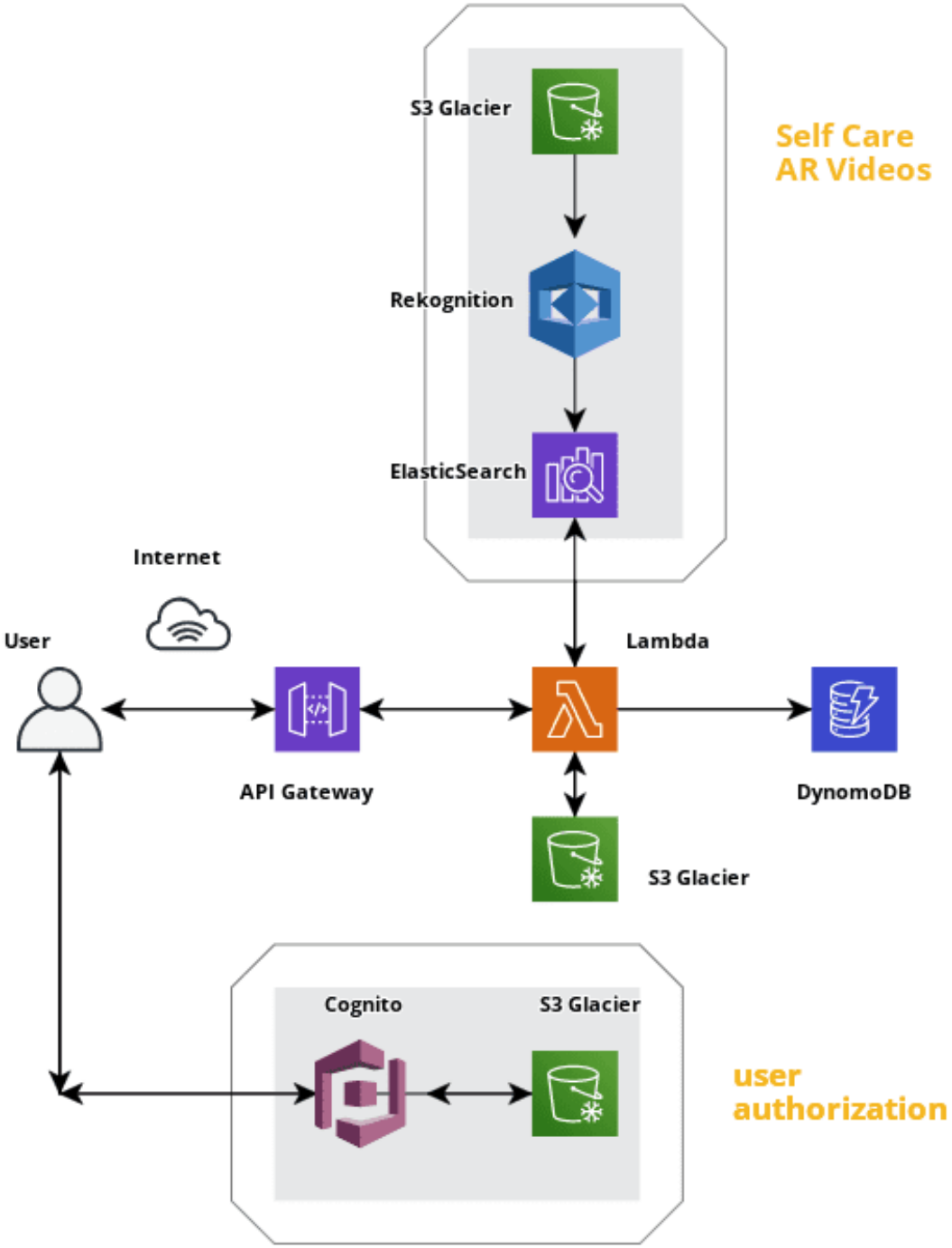


The team members consist of five, all of them have been distributed the tasks evenly according to their own specialty and interests. The mind map diagram above shows the work distribution in general though we, the team members, are helping out one another as far as we are capable of. Yet, all of the team members still open up for discussions to help one another in anticipating the progress of the project, like discussing AWS Architecture Design as we all thought it was the hardest one to handle for only one member by himself. Therefore, discussions were made by starting from brainstorming of all team members and individual research were made so data collection has been gathered to proceed in generating AWS Architecture Design to explain our application, Calustrate in its ecosystem.

Our team members are also making a discussion on designing presentation slides by using Canva as our main website for designs while dividing tasks for everyone's participation in making this project a success.

PROJECT DESCRIPTION

3.1 AWS Architecture Design



Our period tracker app, Calustrate displays the architecture design of the process of how the system works for the back-end, which consists of applications, database, server and security. The main purpose in creating a cloud computing security architecture diagram is for documentation purposes by combining several tools and services provided by AWS into one diagram that represents the whole system architecture of Calustrate. It consists of front-end and back-end users with other AWS cloud services providers such as Cognito, S3, API Gateway, Lambda, Rekognition and ElasticSearch.

Based on the diagram above, the front-end user which is client-side interfaces will interact with the back-end correspondingly. From the user, they will fill in details such as sign in that needs an email address and password to access. Users are also able to create an aliasing feature for sign up and sign in option. This data will refer to the Amazon Cognito User Pool that plays a role in managing and securing any authentication from millions of users that are connected to Calustrate. Amazon Cognito enables the server as an external identity provider which provides temporary security before accessing back-end resources and accessing more services. It is also able to connect with social identity providers such as Google, Facebook or Apple. By means, users are able to connect their identification access to Calustrate using other access from other social media too through Identity Pools.

Next, the data that has already been accessed will then be stored in AWS S3 Glacier Flexible Retrieval which acts as data keeper and storage, and stores the data as objects within buckets. By using AWS S3 Glacier Flexible Retrieval as the storage provider, it enables a long-term archive and restoration of digital preservation within hours at a low cost. This storage provider suits with Calustrate as this application only be accessible to a user only once a month for period tracker and does not hold any large media data for long-term storage. The characteristics provided for S3 is that it is highly durable, able to withstand damages and scalable, depending on our demand as S3 is able to shrink or expand its size to meet the changing demands. AWS S3 Glacier Flexible Retrieval acts out as a storage which stores codes from AWS Lambda virtually with unlimited amounts of data. Buckets, on the other hand, stores objects which consist of multiple files and metadata, which is based on Oxford Dictionary, it is a set of data that describes and gives information about other data. Inside the bucket, the customers are able to modify, create, delete and list out the objects as well as view the logs.

Objects or code of user's information are uploaded inside the bucket but not only that because storage consists of a large space that withholds documents, videos, database backups and many other data.

In this case, AWS S3 Glacier Flexible Retrieval stores user's information and connects to Amazon Cognito User Pool for user recognition. For that reason, as the user sends out data for recognition authentication and in a simple word, if the data matches out with user's, it will give the access to enter the signed application with the data of the user inside.

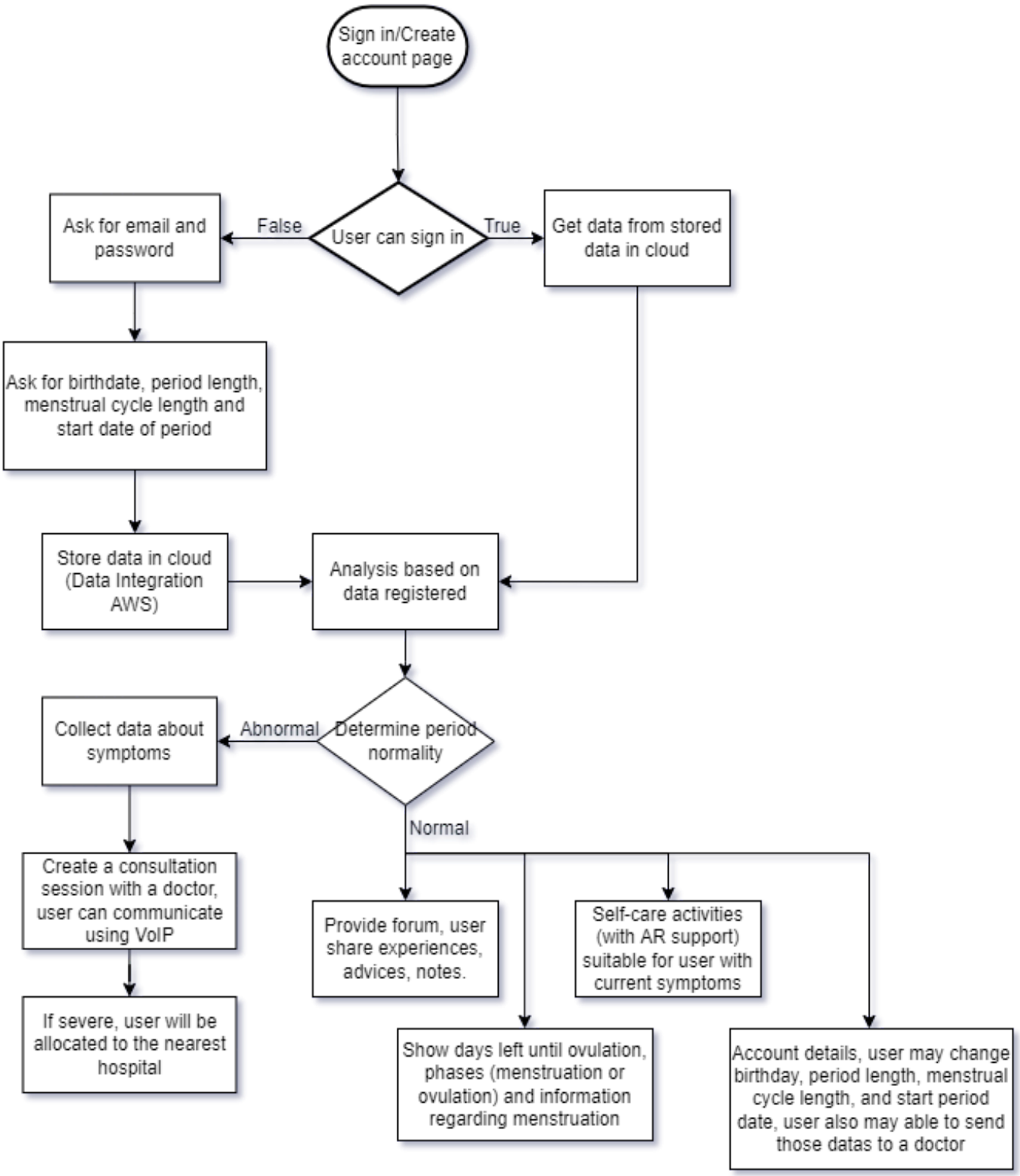
The interaction between user and the server, front-end and back-end is through Amazon API Gateway to the AWS Lambda function, which is known as front-end user endpoint. It provides a platform for data access, logic and functions from user to server. After receiving data information from the user in a form of code it then sends out this data to back-end services to manage tasks and to any other services provided. AWS Lambda will run the code with a highly available computing infrastructure to perform code execution as well as managing computing resources. AWS Lambda then interacts with other services required at that particular interval through API Gateway and vice versa. Besides, AWS Lambda acts as a serverless computing service which allows itself to run the code in the Cloud without reasoning from the server. Despite that it is serverless and code can be run in any language that is intended to run such as Python, Java and PowerShell by uploading the code and creating Lambda functions, AWS Lambda is also responsible for managing, securing and scaling the server for their customer, which is us. So, less time will be spent in operational management and more time could be contributed in writing code for Calustrate and any other development will be quicker to expand. Then, using AWS S3 Glacier Flexible Retrieval to store all the codes from AWS Lambda inside for a long-term use.

As Calustrate comes out with Augmented Reality feature displays in self-care which helps women as a virtual yoga practitioner through their yoga session which lasts for several minutes based on their types and sessions. On the top of the diagram of AWS Architecture Design is a group of processes and services provided only for AR features, starting with AWS S3 Glacier Flexible Retrieval which is used to store any data or code related to AR in Calustrate. Video uploaded from the developer of Calustrate will be stored in AWS S3 Glacier Flexible Retrieval so it will ensure its security and performance of data as it will then be published for user's provision.

API Gateway assists in interaction between user and back-end system so whenever the user wishes to watch the video, API Gateway will reach it and process the video download request. As the AR videos uploaded, AWS Rekognition acts as an intelligence service that analyzes and extracts motion-based like movements in a frame and recognizes objects to generate metadata. Then, the metadata generated are passed to the AWS ElasticSearch which provides analytic service and performs as a search engine for any user querying.

Lastly, the most crucial service implemented in cloud computing is the database. In order to provide better user experience and achieve an efficient load of users data management, AWS DynamoDB is the best option to be chosen. As our app name suggested, the main objective is to provide a smart menstrual cycle plan. Millions of users requests and information input like period length will be structurally organized by the DynamoDB. Furthermore, designed as a NoSQL database which provides non-relational databases, this AWS service enhances the app performance to generate the smart calendar. Users also can request for a summarized menstrual cycle data Also can be retrieved from the databaseAny addition and removal of data or attributes may not affect the dataset. With zero administration feature, this automated serverless service developed by AWS will operate and sustain the data and the cloud management. Back end developers can consume more time on provisioning the other cloud computing services.

3.2 Business Process Flow Diagram



Firstly, the user will be greeted with our welcome page, on the welcome page there will be multiple options where the user can choose. If the user already has an existing account, the user can simply log-in with their existing credentials, however if the user is new, they can register and need to input a few important pieces of information. For registration, the application will ask the user's email and password. The application will also ask the user to enter private information such as their birthday, period length, menstrual cycle length and start date of their last period, this is crucial as the data is needed in order for the application's analysis to work and output valuable information. Those data that has been entered by the user will be added into our database that is on the cloud. For users that have an existing account, users need to enter their email and password, the application will search for the entered credentials on the database.

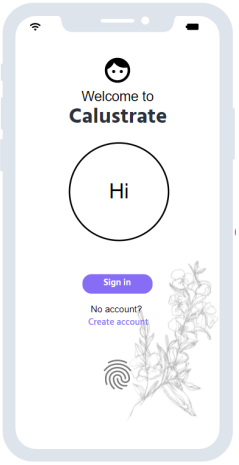
Once the user has successfully logged in or registered, the application will do an analysis to determine whether the period or menstruation that the user has experienced or experiencing is normal or abnormal. If our application has determined that the menstruation is abnormal, it will assist the user. On assisting, the application will collect data about the symptoms that the user will enter, an online consultation with a proper medical expert will be held, the user can talk directly with the medical expert by using VoIP technology. Based on the diagnosis, if the condition is severe, the application will allocate the user to the nearest hospital.

However if the period is normal, the user can experience other features that we have included on our application. Firstly the user will be directed to our calendar page, there the user can see more information such as their expected period date, and if the user is on their period, the application will show the current menstruation cycle/phase and if the user is pregnant, the menstruation cycle will stop counting and it will start a countdown until the delivery day. Furthermore, on the calendar page, the user can input their diary just by tapping on a date. Next, the user can access the application's forum, this is a place where other users are able to share their experience, such as symptoms, and many more. The user can also enter their own personal feelings onto the forum so that the other user can read it as well.

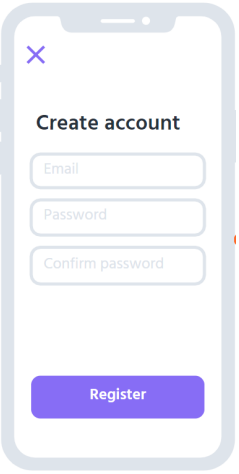
The application also offers a self-care page, where the user can do activities that are suited to their current symptoms. This can be achieved by doing analysis on the user's data. Self-care activities also came with AR support, so that the activities can be done in a more accurate manner. Finally, the user can take a look and update their account details, this

includes username, email, phone number, birthdate, period length, menstrual cycle length and starting period date. Furthermore, the user can choose to communicate with a medical expert if they would want to, and they could also log out from their current account, this will redirect the user to the welcome page.

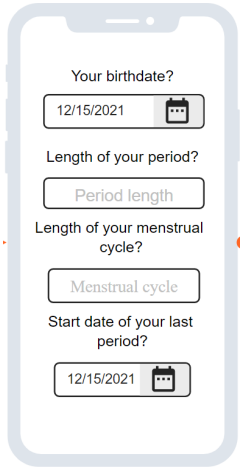
3.3 Low-Fidelity Mock-Ups



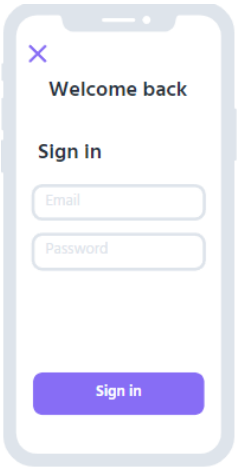
This is our main page, welcome to Calustrate. In this page, users need to log in into their respective account if they have registered before. Besides , this application has additional functions that use biometric technology which allow users to sign in using their fingerprint to access the application. This feature is only available if users have registered their fingerprint on their device for lock screen purposes so this application could use the same fingerprint data to access the account. If the user does not have an account, users have another option to create a new account to make sure they have a better experience in exploring the application.



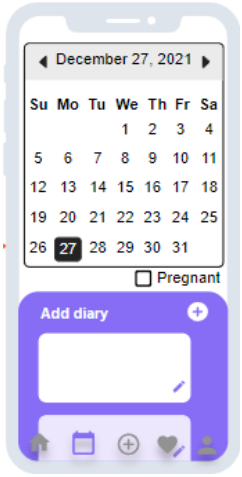
To create an account, users need to provide their email, password and reconfirm password. This is a necessary function to store the data so that users can always access their previous data that have been kept saved in our data memory. In view of the fact that this allows the application to store the data of a new account and to make sure the account that was just created is kept secure by providing the password. Reconfirming passwords is used to catch errors by requiring users to input their password again. While the confirm password area appears to be a good idea, it might actually reduce users' conversion rate.



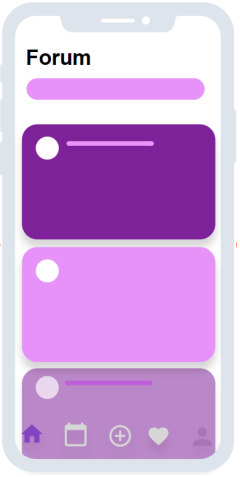
Then the user must fill in certain details such as preferred name, phone number, birth date, length of period (usually between 4-7 days for a normal person), length of menstrual cycle which is duration between two periods start date (usually 28-35 days for normal person) and start of the previous period cycle. This personal information helps in the data process, maximizing the effort and giving out best output. Example of data process given out for users is smart calculation feature that is able to calculate an average of period cycles of user yearly.



If a user already has an account, they just need to log in into an existing account. This application also allows users to stay signed in or log out when users have finished observing and interacting with the application. From the account, data can be received from cloud storage and the analysis process will take place based on the registered data to come out with a result such as period normality of the user. If it fails to find the information entered by the user, the application will warn the users whether the email or password entered is wrong. We will not tell the user which email or password, furthermore the application will give some time if the user manages to enter the wrong password 3 times consecutively. This is to increase time taken on any brute force attempts thus improving the application's security and safety.

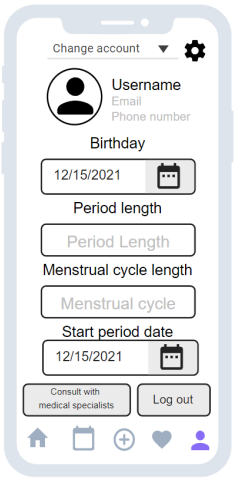


After signing in, the application will bring you to the Calendar feature and there will be a reminder that will show the user's expected date for menstruations. If the user is on her period, the reminder will pop out to show how many days the users have undergone bleeding phases. There is also a function that allows users to get information about her fertility and ovulation date through algorithms and calculations that are programmed within the app. Pregnancy mode is also available under the Calendar feature, in which the period cycle will stop and start a countdown until delivery day as the user clicks the button. On the same interface, at the lower part, there will be a diary or a journal. This feature is for users who want to express their feelings and condition on that particular day. Users can insert additional notes, symptoms, moods, medicine and there are also intercourse sections for record purpose. After the user has finished filling in their diary, the user can take a look at the previous diary by picking a date on Calendar.



Then the user can go to the home page to take a look at the forum that has been posted by another user. In this feature, it consists of a group of people sharing and discussing the same issues they have all faced. Users can click to view and comment if the users are interested to do so. Forums are helpful if users are unable to refer to a doctor or answers are nowhere to be found on websites. Users can click "next forum" or "previous forum" for casual reading and gain any extra knowledge about the user's own menstrual problem.

On another hand, the fourth feature (love icon) will be a feature that allows users to do some exercise by following the AR-instructor that has been programmed into the application. In this page, users can choose to do light workouts for women who are having their period but still want to do some exercises or for women who just want to do normal workouts. So we will provide some workout that is suitable for them and they just need to follow the AR virtual instructor step-by-step. On the same page, there will be a self examination for breast conducted by an AR virtual instructor for women who want to do self checking to make sure their body is always in top quality condition and detecting possible risk of breast cancer. Then, the third feature on this page is there will be a meditation part where users can do mind-body therapies to enhance the mind's interactions with bodily function, to induce relaxation and to improve overall health and well-being. This page is the interesting part in our application where users can maintain their body health even though they are pregnant or period.



Last feature is a profile part where users can change their profile setting and also contact our parties if any problem occurs during their access in our application. In this page, users will see their profile picture, name, birthday, email and phone number. Users can change it in the settings provided. Users also can change the account by adding another account to this application.

We also add some features using VoIP to make sure users are able to have consultation with medical specialists if they are having problems regarding their menstrual cycle or with their body health. However, we also provide a section for users to see frequent questions that have been asked by others, so they do not necessarily need to consult with a doctor if they have a period problem.

If a user wants to log out from this account, users can just click the logout button and it will bring you to the first page where the user needs to log in into the existing account.

Last but not least, if a user wants to exit the application without logging out, the data will be saved into our database and there will be a backup for the user's account if they accidentally delete the account. This application uses multifunction software that helps users browse anything about period matter. It will help to improve the user's health in order to obtain a healthy body although we age and our body is getting frail.

REFLECTION FROM PROJECT PROPOSAL

4.1 Reflection

Calustrate has given us a lot of new knowledge about the functioning of women's bodies especially on periods and the menstrual cycle. During completing this project, we have learned to implement Amazon Web Services (AWS) to make sure Calustrate could run successfully. The AWS Architecture Design to perform Calustrate has given us a new experience on Cloud Computing technology implementation in real-life. Other than that, we also learned how to conduct Low-Fidelity Mock-Ups by using Moqups application with an interesting and creative layout. All of the team members have been giving a great commitment to completing this project. This shows that a great team is born from great team members where everyone stands together by giving high performances and patience toward the project. The thing that motivated us to complete this project was our responsibility as human beings. The differences in gender could not be a reason for males not participating in improving females, we believe all humans around the world can do some innovation that can help other people. Thus, we highly believe that Calustratet is an innovative application system that can help women face their daily life.

There are some issues we found during completing this project. One of the issues we encountered is about designing the software, with no experience of designing an interface for software. Therefore, we found all the options available for us to make a design software for this project and finally we agreed to choose Moqups as our platform. We found that designing an interface there is easier, and it also supports multi-user interaction which propels the progress of the project even further. Others, the issue on this project was about the difficulty of doing research on health care topics which are women's periods and the menstrual cycle. The way we overcame the problem was, we spent a lot of time finding articles that have verification by authorities in health care.

Calustrate gave us direction after completing this project by making us think about the current problems that our community has in daily life. Therefore, this project helps us to be creative and innovative by implementing 4th Industrial Revolution technologies such as data analytics, cloud, and argument reality to help them. At the same time, our goal was to contribute to our country and society in the future. We also believe that technology will keep growing time by time so that we need to set our mind to keeping learning current knowledge of technology.

We believe to be fully prepared for the 4th Industrial Revolution, we need to adapt to the current technologies and systems that the world has. One of our team members said that he was lacking in terms of designing skills. When he was given a project, he tended to avoid focusing on the visual task compared to just taking on functionality. Therefore, he believes if he wants to improve his potential for the upcoming industry, he needs to be an all-rounder which he has been equipped with many skills including designing skill to make it user-friendly.