



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

School Of Computing

Faculty Of Engineering

SECP1513 – 06

TECHNOLOGY & INFORMATION SYSTEM

PROJECT 1 (PART 2)
Low Fidelity Prototype

Lecturer: DR NOR AZIZAH SA'ADON

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Group Members			
	Periyaa A/P Ramachandran	Muhammad Adam bin Yaacob	Kee Le Wei
	Group Leader		
Matric Number	A21EC0219	A21EC0060	A21EC0189

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Introduction

Nowadays, automatic pet feeder is one of the new trends as a new technology for feeding pets. It can help pet owners to take care of their pet's diet while they are not at home. Therefore, a project named 'Feeding Fido' is built to help pet owners manage their pet's diet.

Feeding Fido is an automatic pet feeder machine that is based on IoT technology and it will be controlled by pet owners by a mobile application through the internet. Feeding Fido will automatically dispense a predetermined amount of food and type of food into the bowl at a predetermined time.

This project is designed to solve the three main problems faced by most pet owners. Feeding Fido can make sure that each pet has a healthy and regular diet throughout the day even though their pet owner is not at home due to a tight schedule. Pet owners can predetermine the feeding time for their pets by using the mobile application. Furthermore, some pets face health problems like arthritis, canine parvovirus, diabetes mellitus, hip dysplasia, etc. and they need to change their previous diet such as decreasing the portion. Feeding Fido, it can make sure that each pet has a healthy amount of food by using a force sensor to detect the exact amount that should be in the bowl. Besides, there is no single food source that satisfies all the pet's nutritional requirements. To make sure that each pet has fulfilled the nutrient requirements, Feeding Fido provides different tanks to store different types of food.

On the other hand, besides ensuring the healthy diet of pets, pets also need to have healthy lifestyles. Therefore, a reminder clock is also designed in Feeding Fido. Pet owners can set a reminder time for a pet walk and visit veterinarians. Moreover, Feeding Fido also designed a diary feature in which pet owners can record their memories between themselves and their beloved pets by adding photos or notes.

Feeding Fido as an automatic pet feeder device allows pet owners to feed their beloved pets anywhere, anytime, even in a foreign country as long as both user and system are connected to internet connections. This project is beneficial for both pet owners and pets by automating the feed process but with less human interaction.

Empathize

These are few problems that we managed to discover during our research. We found that mostly animals are having digestion problem because of the timing for them to eat is different every day, the food portion is not suitable for one's pet and also the variety of food are too less causing the pets to starve because they've lost interest on the food variety.

Potential causes of anorexia

There are many different possible causes! They include:

Food

Check that the food hasn't gone off or has an odd smell to it. If food has been left out, or not stored in an airtight container then it will go rancid after a while.

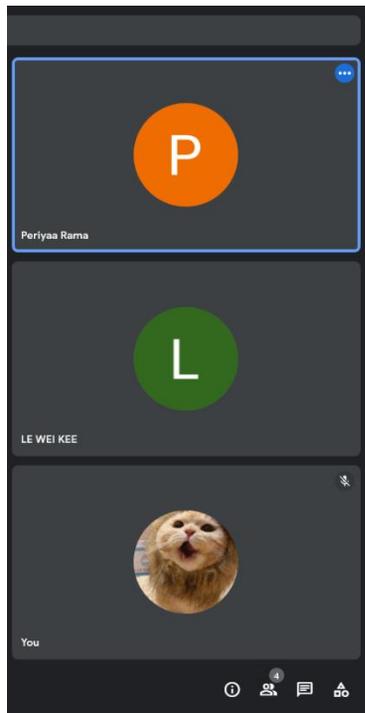
Reasons your dog won't eat

Just like in people, there are a variety of reasons dogs might refuse to eat. These include:

- **Pickiness or behavior issues.** Some dogs are just picky, or their refusal to eat may be caused by feeding them in situations where they aren't comfortable, such as around an **aggressive dog** or from a bowl at an uncomfortable height. Because a decreased appetite in dogs may be caused by illness, never assume that your dog is picky without investigating other possibilities first.

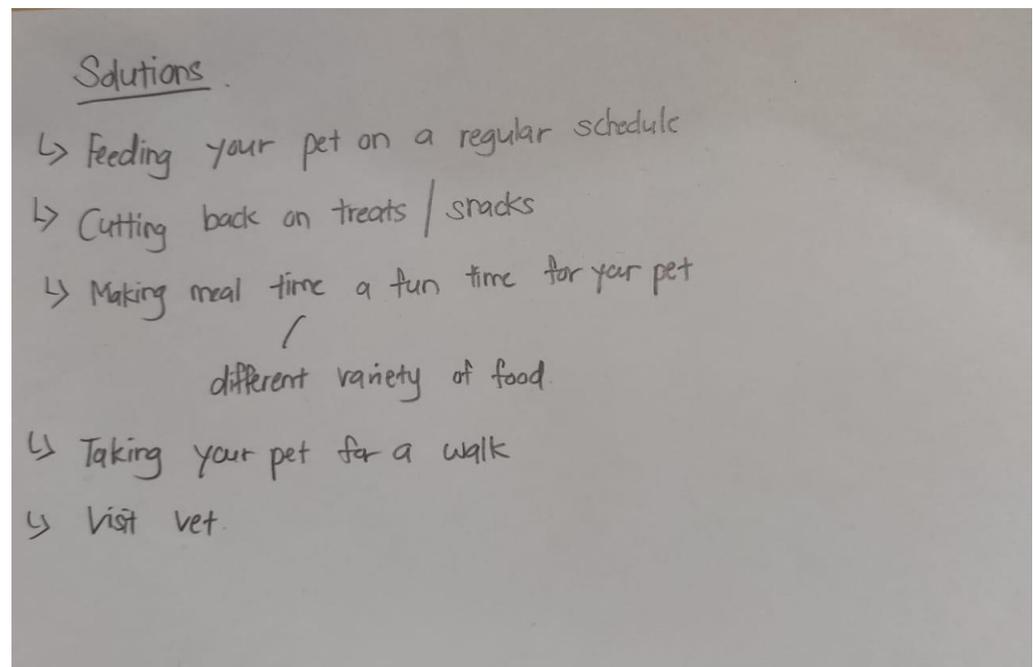
Define

This is a process that we already figured out our problem and we had few meetings to define a solution for the problem that is faced by people.



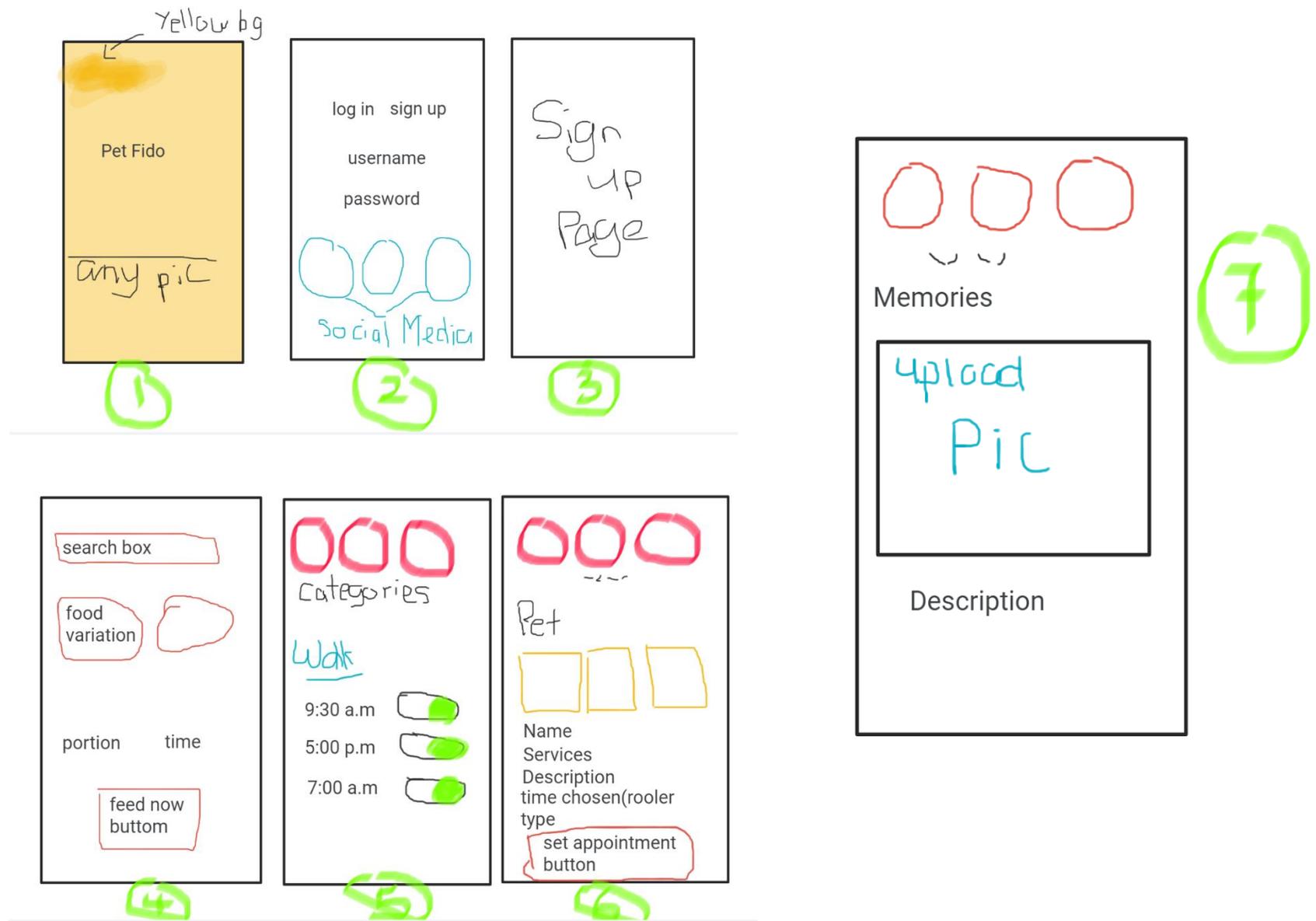
This picture represent that we had a meeting to find a solution and we discuss also about prototype designing and brainstorm few ideas.

This is the possibilities solution that we get to figure out. We then narrowed down to three solutions which are feeding your pe on time, taking them for a walk and also bringing them to visit vet.



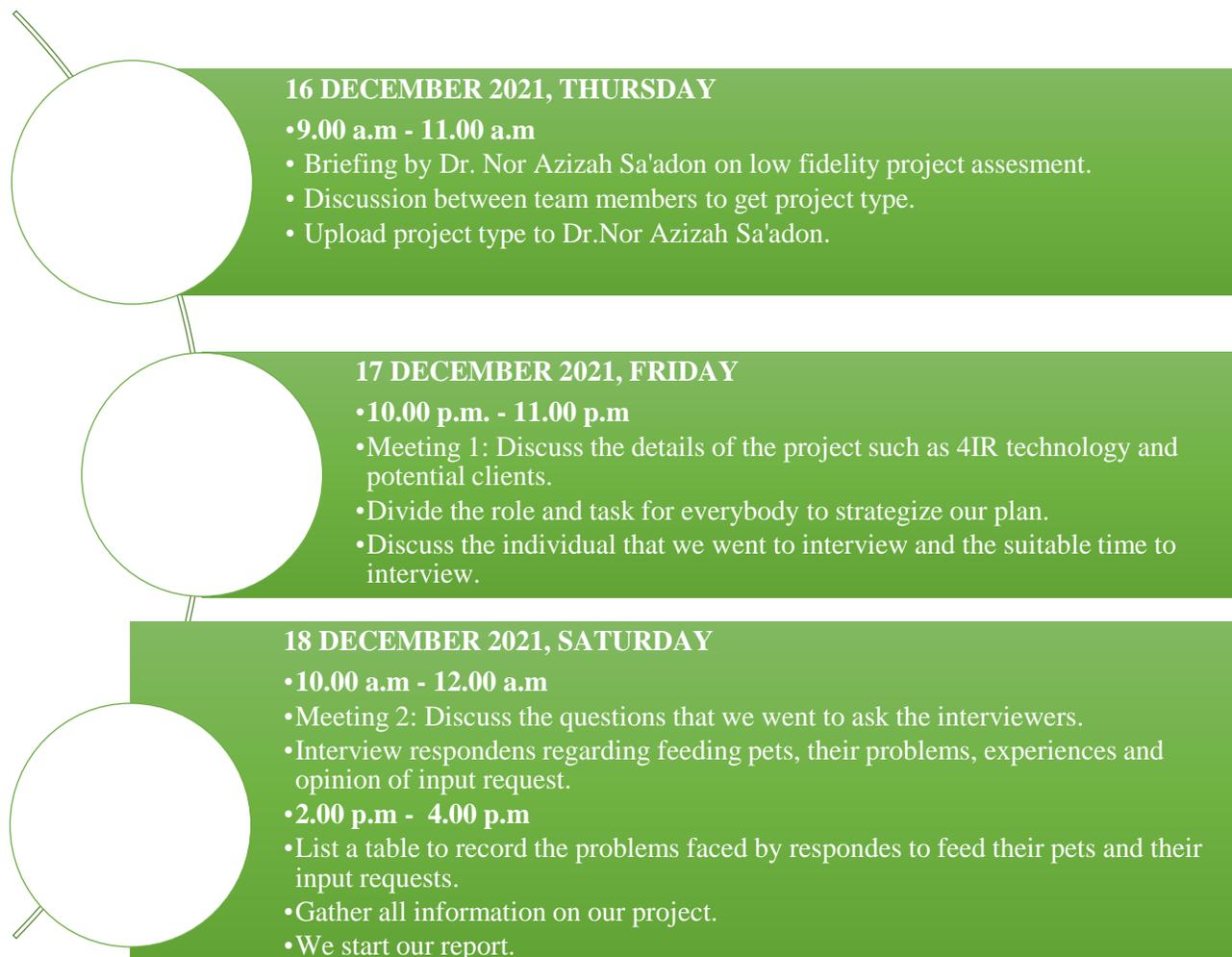
Ideate

In this process, we manage to brainstorm few ideas and discuss about the outcome of our prototype. We used jamboard to do a sketch so that we can have a measurement and correct position on the icons and functions.



Team Progress

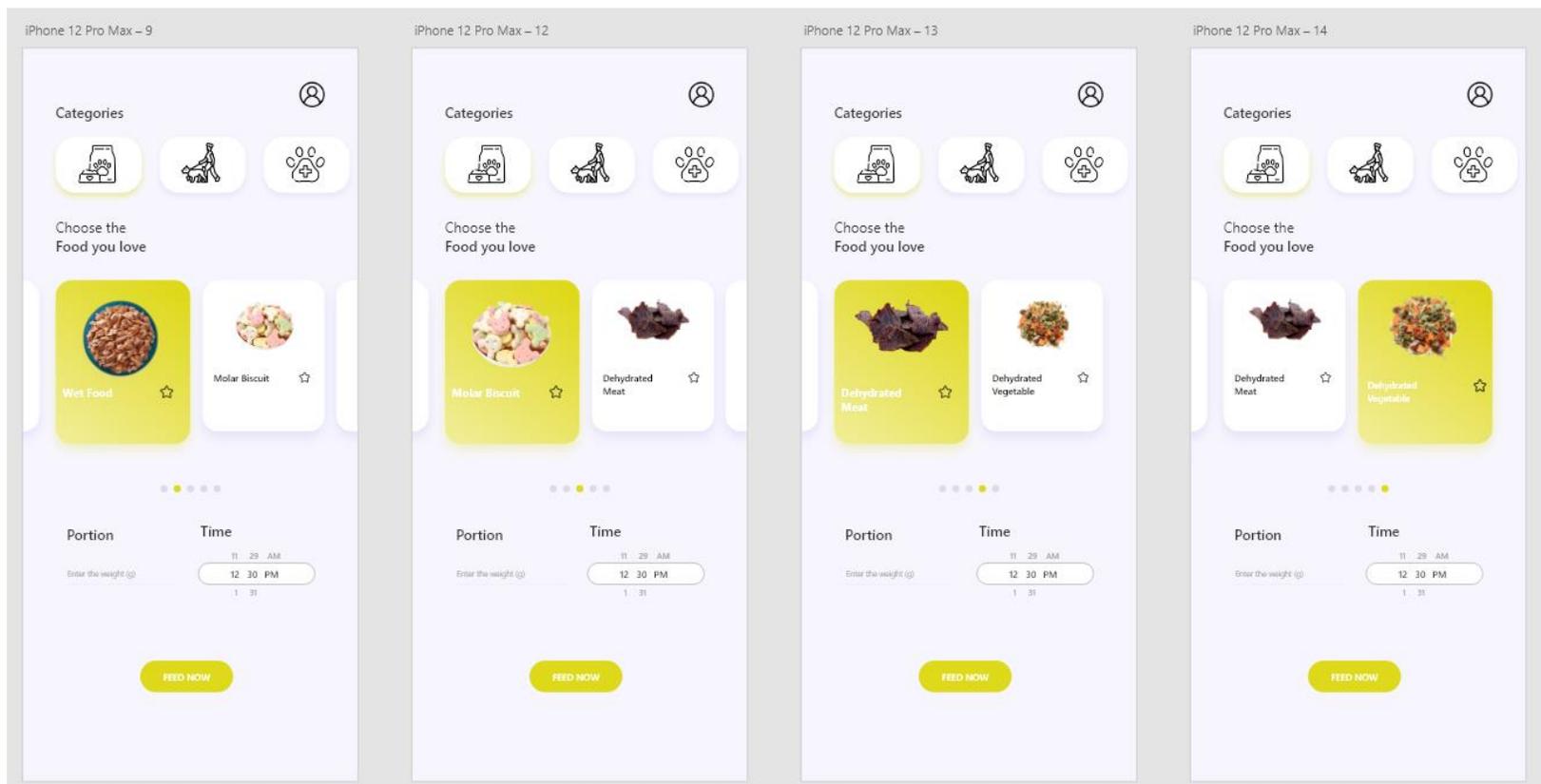
We keep track of our journey, progress and steps by writing a log journal. The detail steps and progress are written on the figure below.





Prototype

In this phase, we are supposed to create a prototype for the application that is planned. Our group decided to create an app call 'Pet Fido' which can help the pet owner to feed their pet without being in the home. Below is one of the prototypes in our application.



Test

This is an example of us trying to test our finalised prototype.



Adobe XD 2022-01-25 23-27-38.mp4

Testing 1



latest prototype.mp4

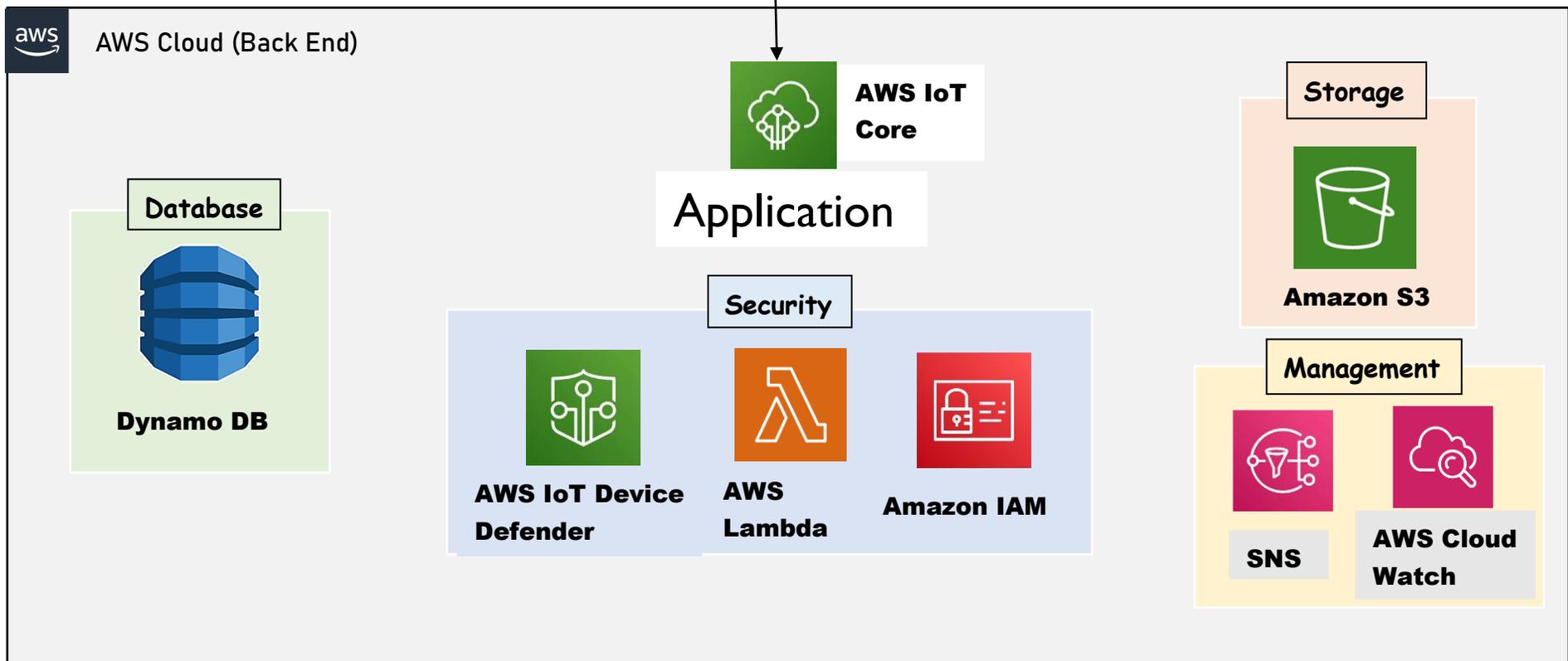
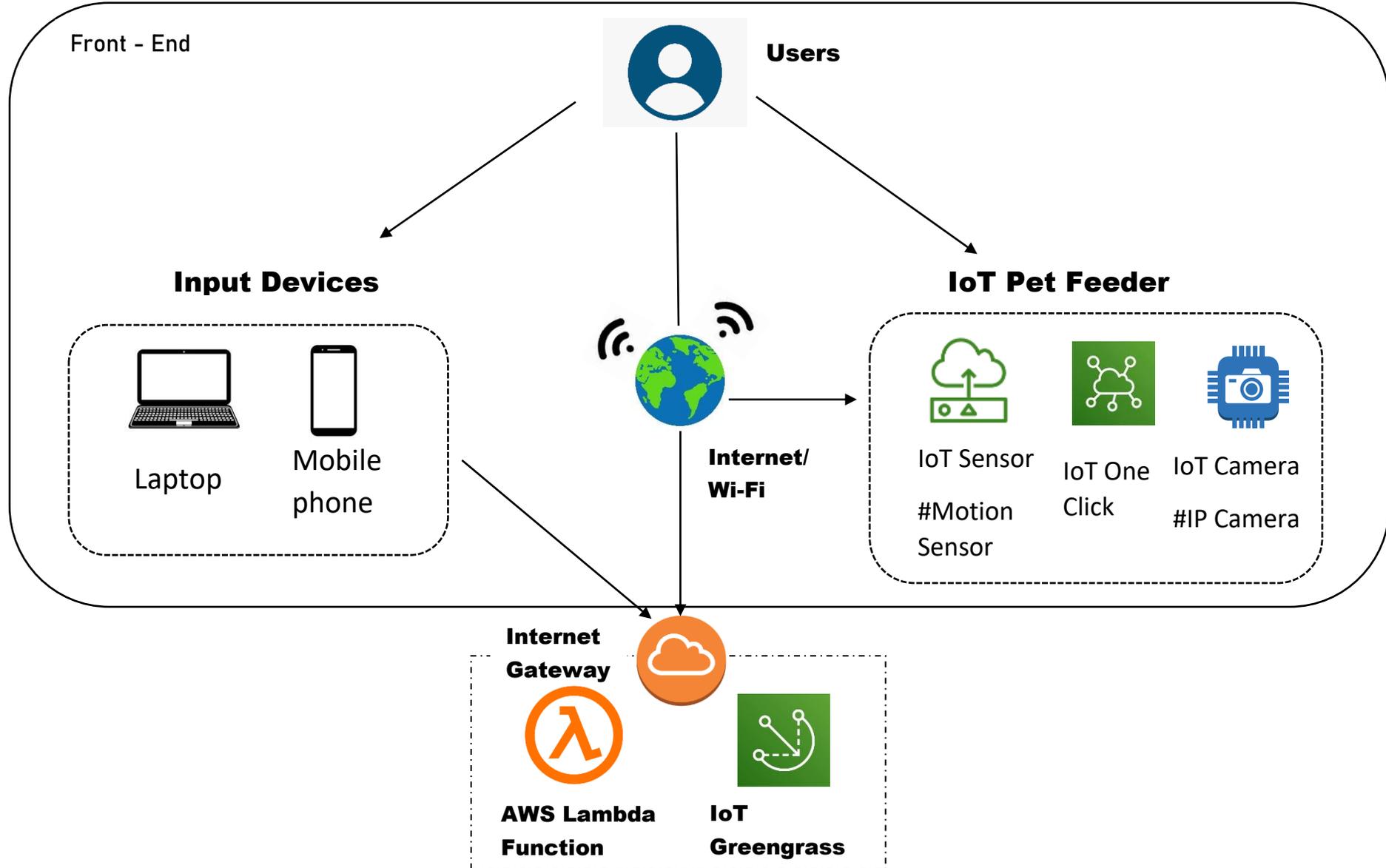
Testing 2

Problem and Solution

Despite their hectic schedules, almost every Malaysian family owns a pet. Nevertheless, nowadays, owning a pet is extremely difficult because many employers are extremely strict and pushy towards their employees, and they sometimes assign impossible KPIs to their employees.

The problem that pet owners face first and foremost is time constraints when feeding their pet, and the need to feed their pet every day becomes a burden on pet owners as they need to rush to work every morning and have many other priorities. Furthermore, pet owners are not always at home; they may be away for work, whether in the office or outstation, or they may be on vacation during the holidays but the cat must be fed even when they are not present. Besides, the next problem is financial. A lot of pet owners may consider sending their pet to nurseries when they go on a long vacation or work trip, but sending their pet to nurseries is very expensive and not many of them can afford to pay the bills. On top of that, pet owners also have difficulties monitoring their pet's diet as the pet keeps on meowing on insisting on wanting their food to be delivered.

As a solution to this problem, a new invention, "Feeding Fido" with the Internet of Things, has been developed. Rather than relying on neighbors or friends to feed their pet, or sending their pet to a nursery, pet owners can now feed their pet on their own at any time and from any location by simply clicking inside a smartphone app. This could be very useful for pet owners. Furthermore, IoT pet feeders may manage the amount of food distributed by entering the total grams of food desired, allowing pet owners to better monitor and control their pet's schedule. IoT pet feeders are also highly useful since they eliminate the need for the pet owner to manually feed their pet even when they are at home. If they are really busy and don't have much time to feed their pet, they can feed their pet while settling their work or preparing to travel to the office by clicking inside their smartphone app.



AWS Cloud Computing Architecture Design

The above diagram is our application AWS Cloud computing architecture. First of all, users will use their respective devices such as laptop or smartphone to enter our application. They can either enter through website or download it from app store. From there, they are allowed to choose few of our services which is pet feeding, pet walk, visit veterinarian and also creating memories with their pet. The information entered will then bring it to our internet gateway which connected our front-end and back end.

With the help of Internet/Wi-Fi, the owner can feed their pet even when they are not home by just inserting the time, food portion and the food variety which these informations will then be passed to our IoT Pet Feeder. We included IoT Sensor such as Motion sensor at the product and also a microchip in the collar of the pet, so that the lid of our product will open automatically when the pet is nearby by sensing their movement. This can avoid the food catches cold and causing sickness to the pet. We also put in IoT Click that can trigger the AWS Lambda functions from simple devices which can make the device to be managed easily. Finally at the product we also included IoT camera which is an Internet Protocol camera or also known as IP camera. This is a type of digital video camera that receives control data and sends image data via an IP network. These type of camera are commonly used for surveillance which only require local area network. The function of this camera installed at our product is because we can give the pet owner an assurance that their pet are having the meal on time and finishes it.

The input devices and internet from around the world will connect to our internet gateway. A gateway is like a computer which connects different networks and application together. We put in AWS Lambda Function in the gateway so that it can become a resource that will create a Lambda function. Other than that, we also added IoT Greengrass which makes it possible for us to build IoT devices and application. In a specific way, AWS IoT Greengrass actually provides cloud-based management for application that runs on devices. Moreover, IoT Greengrass can protect users data through the secure authentication and authorization of devices also protects all the data between local devices and the cloud. After internet gateway, it is connected to AWS IoT Core which enables devices to communicate with all other AWS services and each other. It will also help us easily and securely connect the devices to the cloud through our preferred communication protocol such as MQTT, HTTPS etc.

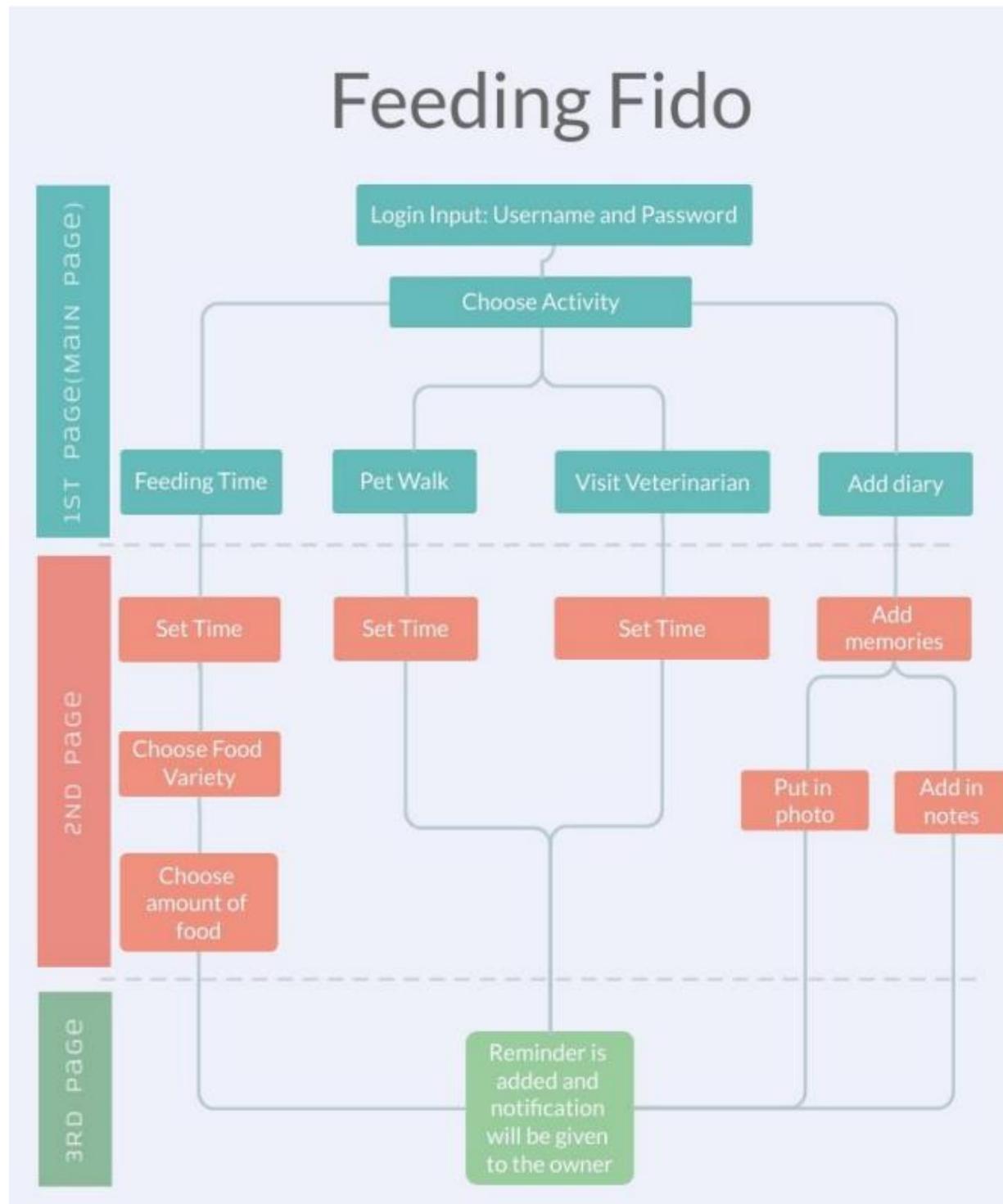
In AWS Cloud Back end, it is divided into four separate groups which are database, security, storage and management. In the database group, we included Dynamo DB to handle our throughput and storage requirements in a consistent and fast performance. We store few things in Dynamo DB such as time input, food variety, types of pet and memories that will be captured by the owner. Everything will be stored securely in database because we also created an on-demand backups recovery for our database service. Next is having a storage in our back-end which is Amazon S3 stands for Amazon Simple Storage Service. The data will be sent to Amazon S3 from wherever it lives in the cloud to have an analysis on our data to get insights.

Other than that, we also provide management service at the back-end which consist of SNS and AWS Cloud Watch. SNS also known as Amazon Simple Notification Service where it takes full control on managing the messaging services for both application-to-application(A2A) and application-to-person(A2P) communication. It makes sure that our messages are delivered in a strictly-well ordered manner and only been process once. Amazon SNS can send up to 10 messages in a single API request by using the message batching publisher system. On the othe hand, AWS Cloud Watch allows you to collect, access and send data all in a single platform from across all AWS resources or application.

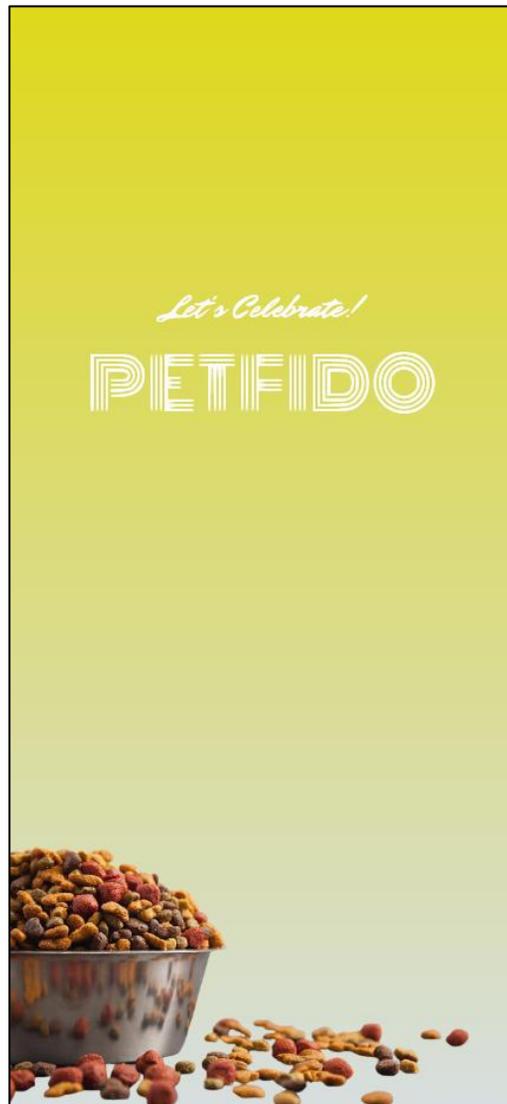
Finally, the most important part in the AWS Clous back-end which is security group. At first, we put in AWS IoT Device Defender which can helps you to manage IoT security. One of the benefit of this service is that it can detect immediately if there are gaps in our IoT configuration which can create a security risk, such as personal details being shared. AWS Lambda is one of the security services that we included in our application to ensure a better safety. This service is able to do automatic scability by adjusting with our capacity of server. Also it can minimize our cost because we only pay for what exactly we use and not more. Last but not least is Amazon IAM which is like a police officer in out back end service because it can specify who to and not to access which resources and services under few conditions. With IAM, we are able to manage our permission towards our systems to ensure least-privilege permissions.

Business Flow Diagram

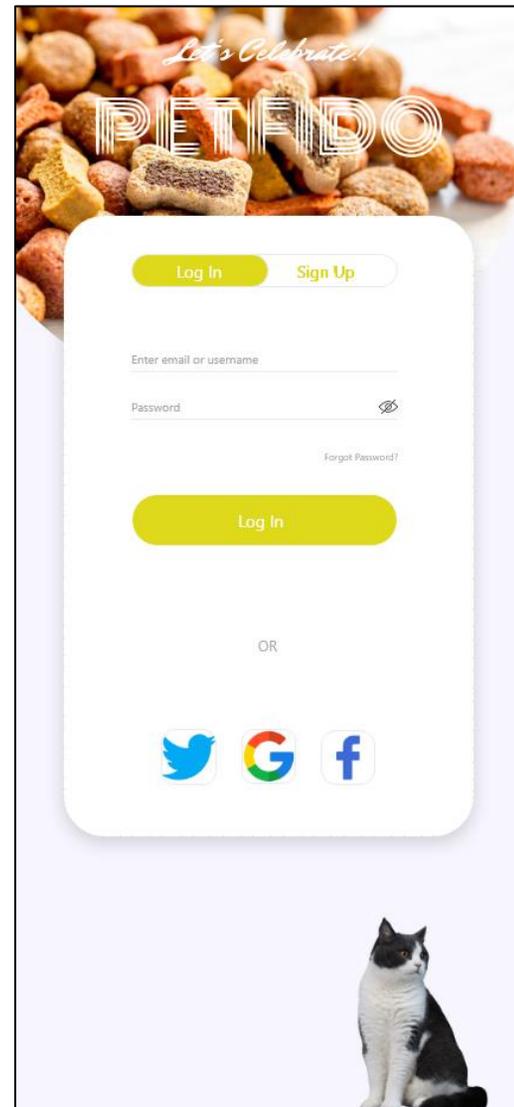
This is a flow diagram from a user view.



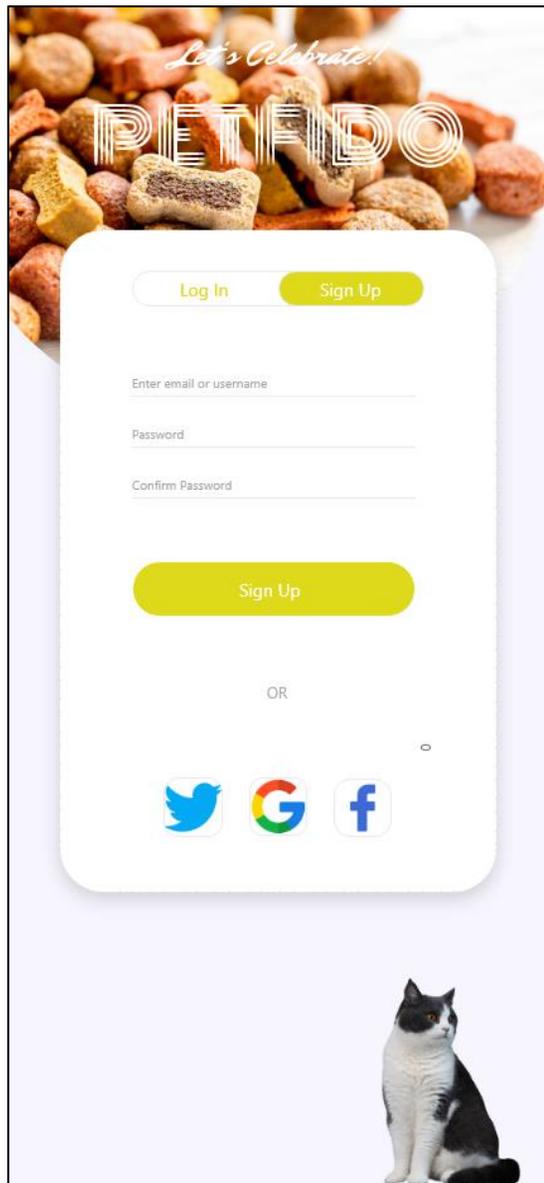
Low – Fidelity Prototype



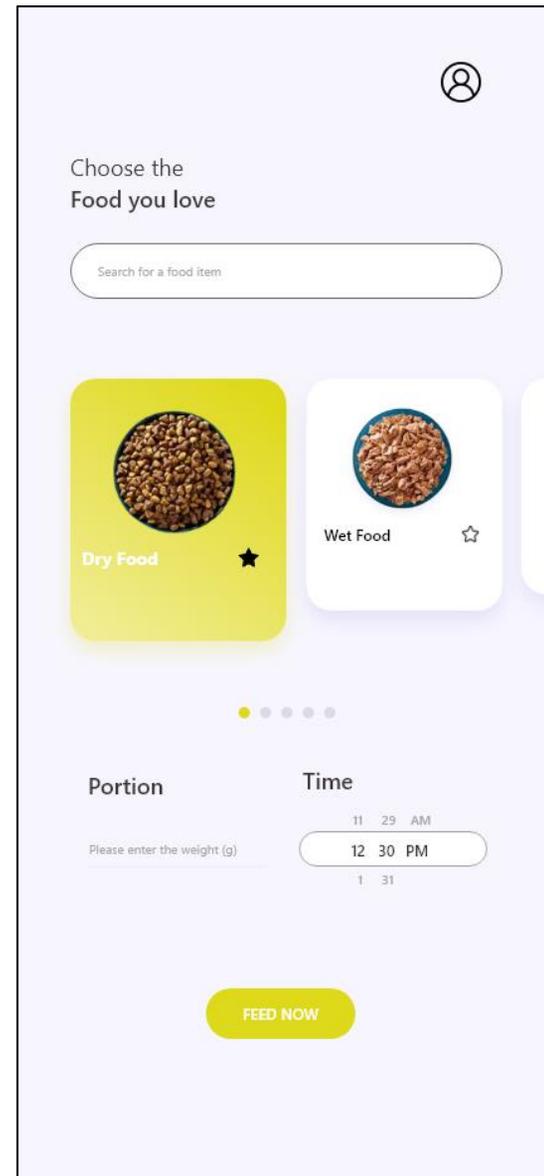
Main Page



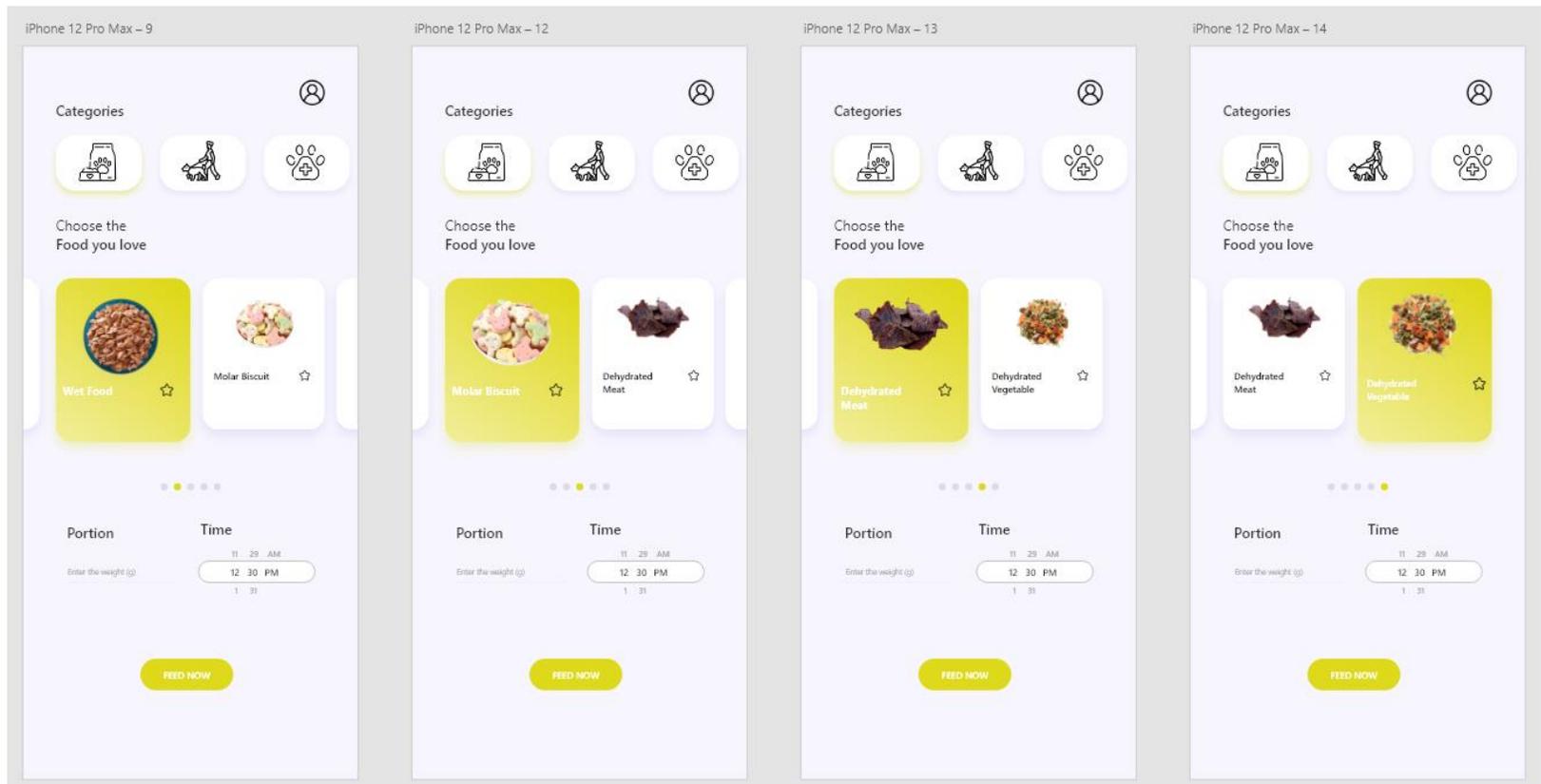
Log in Page



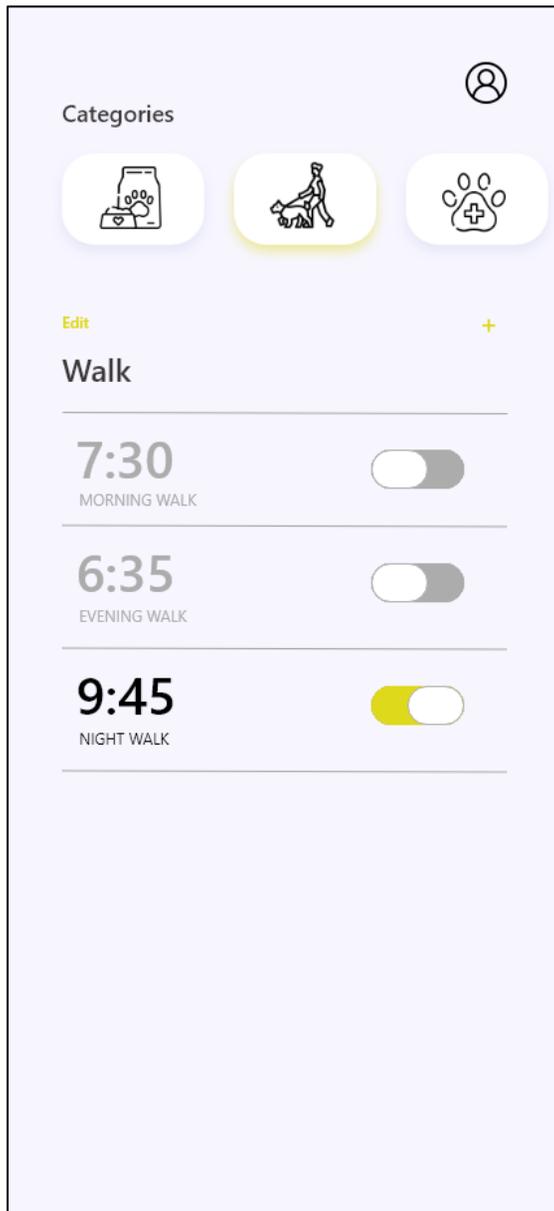
Sign Up Page



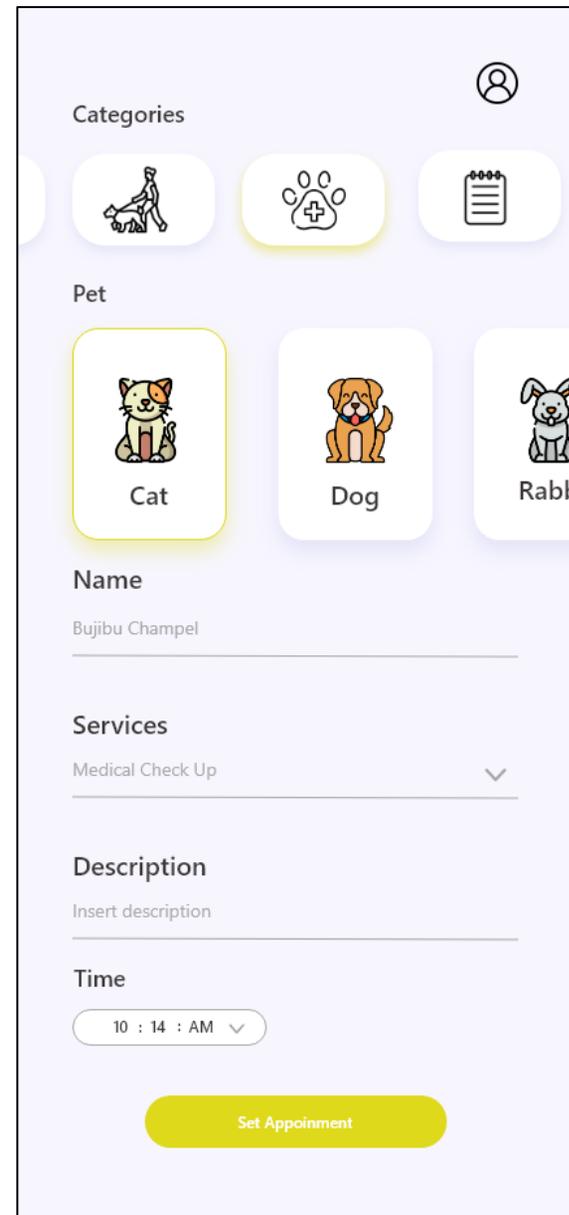
First Page



Selection in First Page



Second Page



Third Page



Final Page

Reflection

1) Periyaa A/P Ramachandran – A21EC0219

a. What have you learned and your motivation to complete this project?

As I worked on both parts of the project, I learned a lot from my teammates as well as from my experience. First of all, I learned more about AWS, of which I learned what AWS Cloud Computing Architecture is, and how to draw an AWS architecture diagram. Additionally, I have gained a lot of experience in building a better AWS architecture by finishing all the modules for the AWS website to earn my badge. While creating AWS architecture, I tend to know more about each service's function and differentiate it based on its categories such as management groups, security groups, storage groups, etc. In addition to that, I learned a lot about the Internet of Things (IoT) and 4IR, since the project developed by my team is based on both technologies. My senses kicked in and I realized that 4IR can help us solve our current problems. We can use the low fidelity project to create a good visualization and do prototypes in the future. With our existing base of knowledge, we would be able to create an app much more easily. Second, setting an achievable goal and catching up with team members motivated me to finish this project. Starting a project may seem easy, but it can be easier if we set realistic goals so that each member of the team is aware of their responsibilities and so the workload is distributed equally. In order to make sure everyone is on track, conduct a weekly update session to let them know our progress. We can also ask for feedback from each team member at this meeting to improve our work. By doing so, we will be able to produce a good report and project. I would like to emphasize that listening to music helped me a lot while working on this project since it relieved my stress and cleared my mind.

b. What issues and solutions are implemented to make the project a success?

There are a few obstacles for us to be successful with this project due to the fact that it is an online-based project. It will be difficult for us to discuss the project online since we are likely to have some misunderstandings. We will be able to discuss and check on each other's progress much easier when we are able to do it physically. However, we managed to find a solution for this and decided to do a weekly meeting to track our progress. In addition, since this is our first time learning about AWS and its services, we are having a hard time constructing the AWS architecture cloud computing diagram. Initially, it was a challenge since we had to go through each service to make sure it would fit perfectly with our application. The solution to this problem was to do a lot of research on AWS, read related websites, and use modules from AWS. We have been able to develop a successful cloud computing architecture thanks to this. Lastly, time management was an issue we encountered while doing the project. This is due to the fact that we had other assignments to do at the same time and their deadlines were close together. Also, this can have an adverse effect on our project's quality. Hence, we did a planner at the beginning of the project to ensure we were on track as well as to divide the work evenly between us. With a project planner, we are able to differentiate the priority of each assignment, which will help us manage our time effectively.

c. What is your direction after completing this project?

This project has allowed me to gain a great deal of knowledge. First, the knowledge I have about 4IR and the Internet of Things (IoT), really makes me want to know more about it. This is because I am eager to know what other problems or things can be solved using these two technologies. Since I learned that IoT can actually make one's life easier and save time, I hope to create more things in the future to help people. Furthermore, I researched the benefits that 4IR can provide us during this project and found that there are a lot of benefits it can offer. As an example, applying 4IR in health can enhance our quality of life. Applying 4IR in locations can increase the safety of our families and homes. In addition, applying 4IR in biometrics can save money. Besides that, the benefits that 4IR can bring to our lives also enable me to do more research on it so that I can create something in the future to help those who need it. Next, after completing this project as mentioned above I learned a lot about AWS. AWS was not even my concern at first and I was not aware that this service can actually create and do more things that are beyond my expectations. The modules that I finished in AWS to get a badge have also given me the motivation to do more modules or labs and also to attend events that are regarding AWS to become a more knowledgeable person. Finally, I can conclude that I get a positive direction after making a success in this project because I am able to have good time management.

d. What is the improvement necessary for you to improve your potential in the industry?

I find myself needing to do a lot of improvement, especially in my personal development skills in order for me to grow both personally and professionally in the industry later. First of all, I need to have an improvement in problem-solving skills so that I am able to handle more challenging or surprising situations. I tend to realize that people who are good problem solvers can stay calm while they encounter obstacles and challenges and also produce good quality work in the end. Secondly, I would also love to improve my organization skills as well as my ability in planning, schedule, and prioritize. I must know what projects or assignments to be prioritized because I'm having more than one to be handled at the same time. I believe if I can practice being a good organizer, I may be able to meet all my deadlines on time and also collaborate effectively with others. Third, the improvement that is necessary to be made for me is self-confidence. I am a person with a lack of confidence level in all the work I've done because I am afraid that I will not be able to meet others' expectations. I hope that I can build my confidence level because the positive energy can help motivate me especially in handling challenges and reaching my goals without any doubt. Finally, after finishing this project I really hope that I can become a better me in terms of physical and mental to be well prepared before entering to work industry.

2) Kee Le Wei - A21EC0189

a. What have you learned and your motivation to complete this project?

In this project, I have learned about how 4IR technologies can work with our needs to solve problems that we faced. I also realized that low fidelity prototype is helpful for early visualization of alternative design solutions and it is helpful for us to stimulate our innovation and improvement. It is the motivation to combine the knowledge that I have learned with 4IR technology in order to help pet owners and their beloved pets to improve their living standards and health.

b. What issues and solutions are implemented to make the project a success?

In this project, although we are faced with difficulties in discussion due to the pandemic situation but we still actively discuss throughout the whole project. We always work together and help each other when someone facing problems. The most importantly to make this project a success is everyone play a good role of team player and great leader.

c. What is your direction after completing this project?

After completed this project, I will continue learn deeply about the 4IR technologies and study how they combined together to fulfill our needs of daily life and improve our life standard. I hope I can participate myself and witness the greatness of 4IR technologies in the future and build a more convenient and prosperous world with elites from all walks of life.

d. What is the improvement necessary for you to improve your potential in the industry?

Besides of studying related course such as Technology and Information System, I will participate myself in some related activities such as industrial talk which can help me better match my knowledges with real examples. Moreover, I will find my opportunities to participate in some industrial workshop and try myself to develop projects that are related to industry such as Feeding Fido.

3) Muhammad Adam bin Yaacob – A21EC0060

a. What have you learned and your motivation to complete this project?

Throughout this project, I have learned a lot about app-designing, problem-solving, and cloud architectures. I also learn how the IoT gadget's operating mechanisms, particularly the IoT Pet Feeder, work. Furthermore, I learned that communication is essential in project work because not everyone on the team has the same understanding of the project. Besides, the motivation that drives me to complete this project is that all of the experience and knowledge I've gained will be useful in my future field of work

b. What issues and solutions are implemented to make the project a success?

The most difficult challenge we faced throughout this project was, of course, understanding the cloud architecture, which was unfamiliar to us. However, with the assistance of our lecturer, we were able to comprehend and complete the project. Besides, we also have an issue with communication since our communication is limited due to covid-19. However, we were able to engage with our team members and actively discuss and prepare for the project by using the WhatsApp group.

c. What is your direction after completing this project?

After completing this project, I plan to learn more about IoT and app design, which have caught my interest. I'd also like to learn more about how to program the IoT itself, as we only have a small grasp of the IoT Low-Fidelity Prototype in terms of programming. Thus, I'll need to attend a lot of workshops and construct a lot of programs and software to familiarise myself with a lot of errors, whether they're logic or syntax errors, so that I can come up with a lot of related solutions.

d. What is the improvement necessary for you to improve your potential in the industry?

I believe that I need to improve my creativity and uniqueness to fit in the industry, as there is a lot of competition in the industry nowadays. Furthermore, I need to work on my social skills and networking. Without great networking, even someone with amazing programming ability or who is very good in their field of work would not be able to get the position or job that they deserved