

Cooperative Education Report

PAWTY: Lost and Found Pet in Web Application Development

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ABSTRACT

The objective of this study project is to provide a channel regarding finding (lost and found) pets using the web application for which users could access and retrieve information easily. This project is a part of the pet lover platform named "Pawty," and developed by the startup business process. The project methodology comprises four (4) stages; studying and gathering the current trends concerning customer and market behavior and potential business trend, identifying pain points and customer insights, designing a business model canvas and building the product prototype.

This application is an online intermediate channel with the propose of announcement for lost and found pets. The application installed a cloud platform, cloud computing services hosted by Google. This project develops by interacting simultaneously between the web programming language and the cloud server using the RESTful API. The cloud server receives requests from the web application and then replies with an HTTP response. The cloud server also provides database and storage in order to collect and store the application data. With respect to key features of the web application, it provides authentication, login system, lost, and found listings page whereby the user could request and retrieve the information in relation to the pet reporting page. In connection herewith, it also provides the pet details page enable users to share and post on social media (i.e., Line, Facebook, or Twitter) including comment system to post opinions or information about the lost-and-found pets. In addition, the user could manage their posts by marking the post as found, which will be deleted from the lost and found the listing page but still appears on posts created by user page.

Keyword: Startup, Lost and Found Pet, Pet Lover Platform, Web Application, Cloud Computing

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CHAPTER 1

INTRODUCTION

1.1 Background

Presently, a pet is symbolic of love bonding to their owners. People are raising more pets due to loneliness and further treating their pets as one of the family members. With dedicated love and attention, pet owners are taking care of their pets by the best selections of every item. Apart from that, pet owners agree to pay much more to upgrade their pet's life quality or do whatever to fulfill their pet happiness, both physically and mentally.

The most hardiness of pet owners is that their pets' unhealthiness and disappearance. The disappearance problems are often found in the announcement on social media (i.e., Facebook, Twitter, Line) either pet owner reported himself or someone else noticed and posted on their channels. This problem also causes severe concerns to the lost pet (i.e., hungry, illness, accident, or injury) is associated with plenty of search channels from Facebook Fanpages, Facebook Groups, to Twitter hashtags. Consequently, the owner has to post lost-and-found announcements on every channel as possible. Further, there are certain obstacles i.e., the Authentication process of Facebook Fanpages or Facebook Groups, in which page administrators have to reassure the posts before publishing. These may cause delays and wastes of time. Also, the announcement platform may not have a search filter to match the needs of users in order to reduce spelling error on typing or results not matching the pet owners' requirement resulting in a decrease in pet returning to the owner.

Among other concerning issues, if the lost pet did not bring back to its owner, they would become negligent and stray. These may cause severe social problems for all of us in taking care of those stray animals.

This project is a part of the pet lover platform, which developed by the process of startup business implementation. The propose is to provide an intermediate online platform of announcement channels with respect to finding (lost and found) pets using web applications for which users could access and retrieve information easily. The pet owner, user, or visitors shall create their profile account by the information required i.e., lost pet's detail into the web application, etc. In terms of searching, when a user enters a query into the system, the search engine will access data according to the user's query and provides a list of results that best match, allowing the owner to have changes in finding their beloved pets.

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1.2 Objectives

1. To study and develop products by integrating the startup procedures.
2. To design a report collection system and finding lost pets on social media.
3. To develop the system using the Microservice concept.
4. To provide guidelines on data collection from social media and to develop the search application for lost pets with the most beneficial results.

1.3 Scope

1. To develop products by integrating the startup procedures.
2. To develop the web application for pet owners.
3. The Microservices uses to manage lost-found animal data.
4. To develop the search engine software, which has a filter mechanism to match users' queries.

1.4 Method

1. Research and analyze current trends and technologies, including customer insights, to identify pain points.
2. Analyze the value proposition and design business model canvas.
3. Design system architecture and database in order to manage lost-found pets data.
4. Design interface software and application programming.
5. Design and develop the web application.
6. Connect and combine various parts of the pet lover platform (Pawty).

1.5 Expected Outcomes

1. To provide the channel for lost and found pets.
2. To establish mechanisms for the users of a lost and found pet.
3. To enhance the ecosystem of pet lovers.
4. To increase chances of returning and finding the lost pets and avoid social problems-stray animals.

1.6 Table of Operation

Operating timelines are demonstrated in Table 1.1

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Table 1.1 Operating timelines

Topic	Month			
	August	September	October	November
1. Research and analyze current trends and technologies and find customer insights to analyze pain point.				
2. Analyze the value proposition and design business model canvas				
3. Design and develop the web application.				
4. Combine various parts in the pet lover platform (Pawty).				

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CHAPTER 2
LITERATURE REVIEW

2.1 Theoretical Background of Startup

2.1.1 Design Method

In creating the design stage, it required a comprehensive understanding of interdisciplinary, ranging from integrating ideas and customer insights, identifying and establishing for method, solution in the response of users' requirements, and current appropriation. Design Method comprises of three stages in development namely; Human-Centered Design, Ideation and Brainstorming, and Prototype and Implementation substantially as follows;

1. Human-Centered Design

At the very first and most important stage in this research is to identify and understand problems and the group target thoroughly. It, therefore, is an essential phase in determining directions for designing based on the requirement of the group target or the lost pet owner, as shown in Figure 2.1 below;

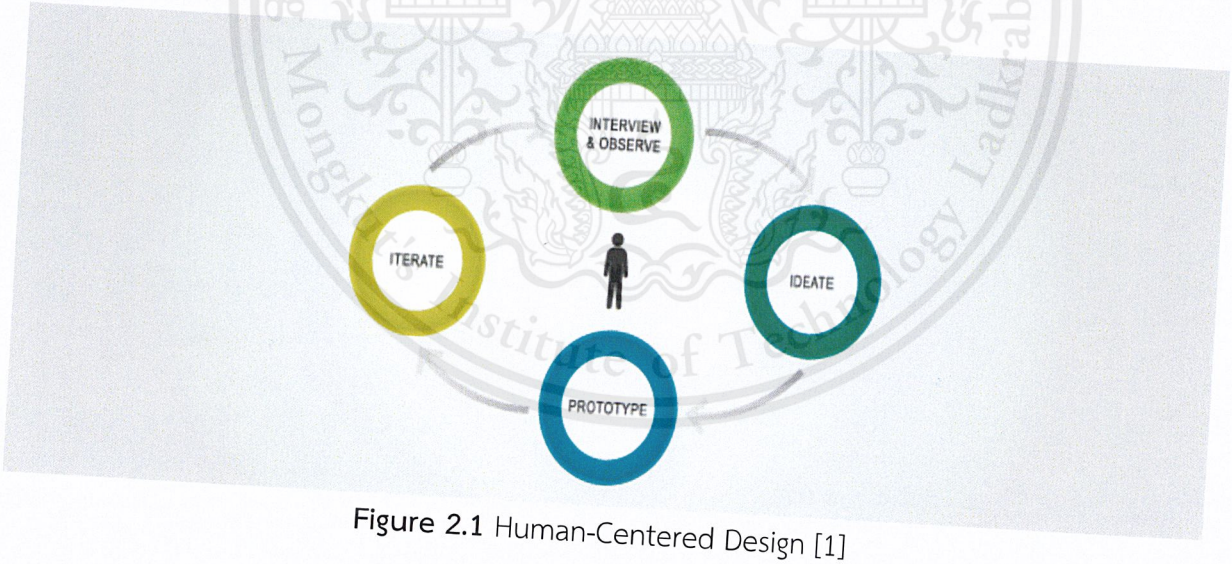


Figure 2.1 Human-Centered Design [1]

2. Ideation & Brainstorming

In this brainstorming stage, concepts and guidelines are a response answer to problem statement as prescribed in the Human-Centered Design step. It aimed at discovering ideas and

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potential solutions for solving problems as well as evaluating and determining which ideas are taken into considering at first phase of action or implementing at the resource available stage.

3. Prototype and Implementation

In creating a prototype, users could test and find answer solutions or potential prototypes. These will provide and establish solutions in the response of the group target' s requirement. In the event that the solution found is not a response in relation thereto, the initial idea stage should be reconsidered. Further, creating a prototype stage will create plenty of innovative ideas for business execution.

This research applies the Design Method to identify the pain point of the users and customer insights.

2.1.2 Lean Startup

"Startup success can be engineered by following the process, which means it can be learned, which means it can be taught."- Eric Ries [2]

Lean Startup is the creation of a startup by focusing on the consumers' value, process effectiveness, and resources management. In terms of lean Startup implementation, initially, it starts with understanding consumer insights in order to have cost management and business effectiveness. This method will reduce problems that many startups company facing i.e., resource optimization on product development.

In addition, Lean Startup provides a product development approach to creating and managing startups and get the desired product to customers' hands faster or "Minimum Viable Product (MVP)." At the initial step, to identify problems that need to be resolved and then develop MVP to start the learning process. The sooner the MVP is complete, and startups will operate flexibly.

A core component of Lean Startup methodology is the build-measure-learn feedback loop, as shown in Figure 2.2. The Build means to start building as soon as possible where the idea discovered; to develop a minimum viable product (MVP) by launching a product or service with certain or necessary features to the public. The important stage is the collection of information and comments from the user as soon as possible. After the product or service to the public, the next step is Measure by setting up and analyze indicators and taking users' feedback. Lastly, Learn means using the data that has been analyzed and summarized to enhance products and services development.

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This research applies the Lean Startup theory to develop service for pet lovers by building the product's prototype to get feedback from users.

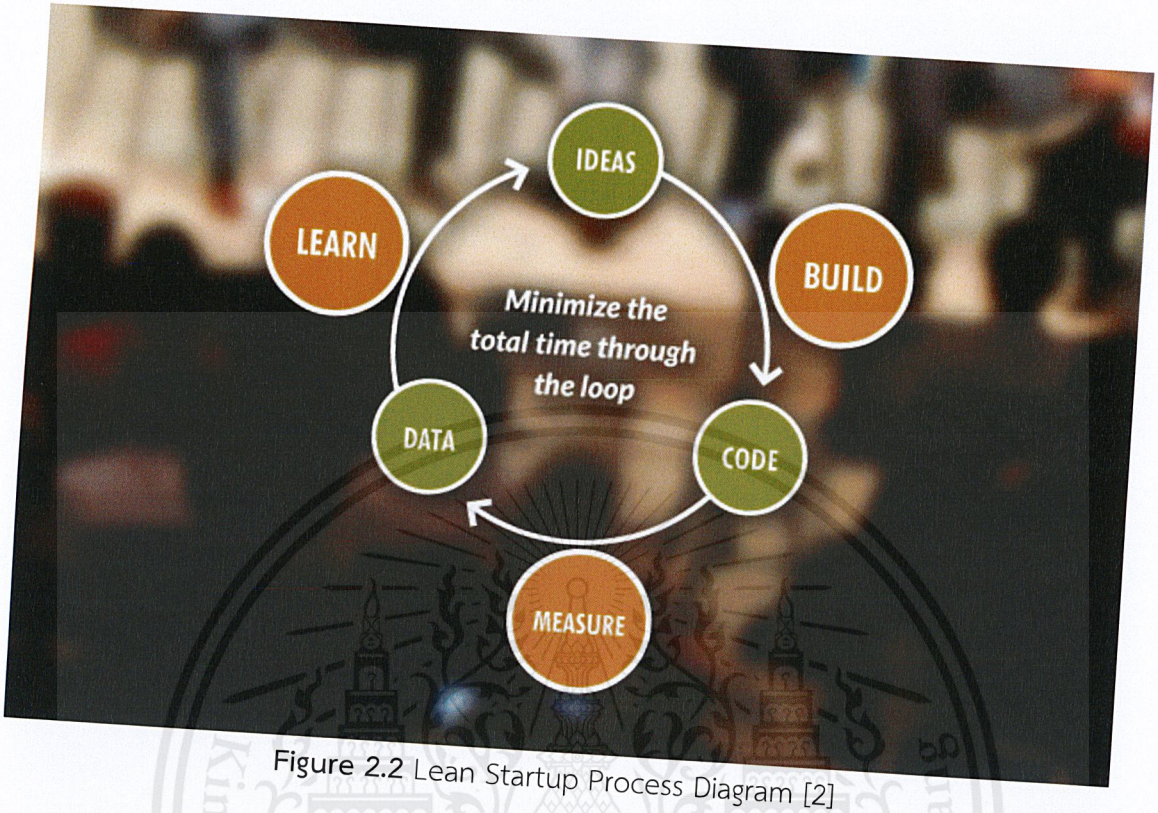


Figure 2.2 Lean Startup Process Diagram [2]

2.2 Theoretical Background of System Architecture Design

2.2.1 Microservice

Microservice is an architecture design of software that structures an application as a collection of services, as shown in the example of the microservice architecture in Figure 2.3.

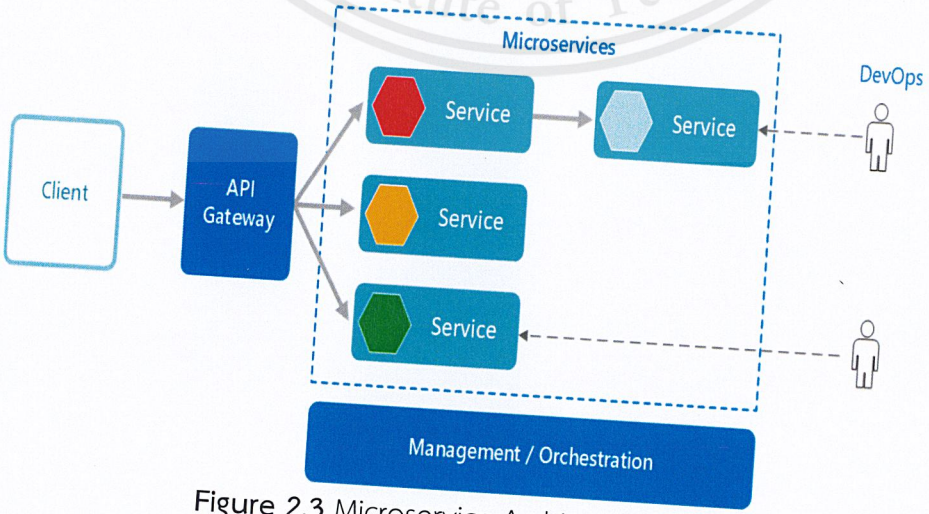


Figure 2.3 Microservice Architecture [3]

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Microservice is a service that is; highly maintainable and testable, independently deployable, organized around business capabilities, and owned by a small team. Given independently deployable technology, each service can install with different programming languages, operates on the server or virtual machine (VM) independently, and communicate mainly through the HTTP protocol.

2.2.2 RESTful API

REST (Representational State Transfer) is a software architecture that uses Web Protocol technology for creating Web Service [4]. API (Application Programming Interface) is a program developed for the service interface of the application. Further, RESTful API is one mechanism to build the web service by using stateless principles. The RESTful API structured with the REST architecture, as shown in Figure 2.4, a system for requests and access resources on the web using predefined instructions. The system responses depending on REST with the Hypertext Transfer Protocol (HTTP). The server will send the request to the specified URI and return the response as a payload in HTML, XML, JSON, or other formats. The RESTful comprises of Client's requests to resource and server. The response uses and deploys with many programming languages with HTTPMethod such as:

1. GET is the request for information from the resource.
2. POST is creating new information in the resource.
3. PUT is an update of existing information or creates a new resource.
4. DELETE is the deletion of existing data in the resource.

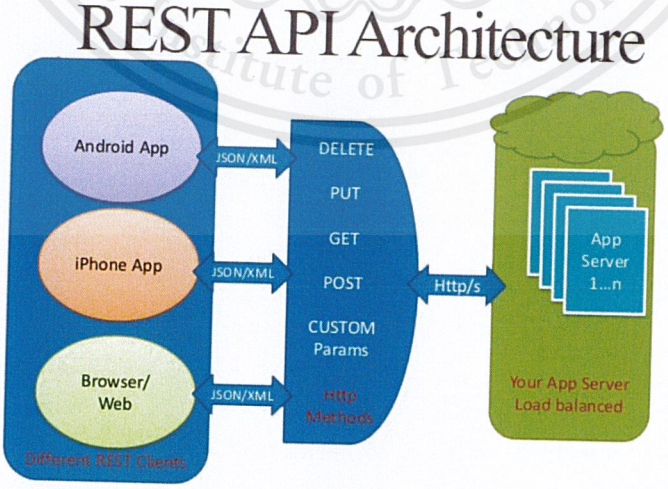


Figure 2.4 REST API Architecture [4]

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2.2.3 Cloud Computing

Cloud computing is a method of providing a set of shared computing resources that includes applications, computing, storage, networking, development, and deployment platforms as well as business processes, as shown in Figure 2.5. It provides services to users by any device through accessing from any location and any time. Also, cloud computing enhances effectiveness regarding installation and maintenance, time minimizing and the cost optimizing of computer systems and networks.



Figure 2.5 Cloud Computing [5]

Cloud computing consists of three (3) Cloud Service Models [6] as follows:

- SaaS (Software as a service) is a form of service that interfacing with software or applications. Users could use and access through the service provider's platform (i.e., Google Documents, Office365, Gmail, etc.) without program installation.
- PaaS (Platform as a service) is a form of the platform designed for application developers (i.e., Google Cloud Platform services, Azure DB and Amazon RDS, etc.
- IaaS (Infrastructure as a Service) is a form of infrastructure, storage, and network computing services, for example, service providers (i.e., Azure, AWS, Netway Cloud, etc.

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2.2.4 Object Relational Mapping (ORM)

Object Relational Mapping (ORM) is primarily a method for modeling and querying an information system at the conceptual level and converting data between incompatible type systems using object-oriented programming languages, as shown in Figure 2.6, which explain explicitly how ORM operates. For converting, ORM is not required to interfere with SQL (SELECT, INSERT, UPDATE, DELETE) but uses the framework to manage the conversion from programming language to SQL or database.

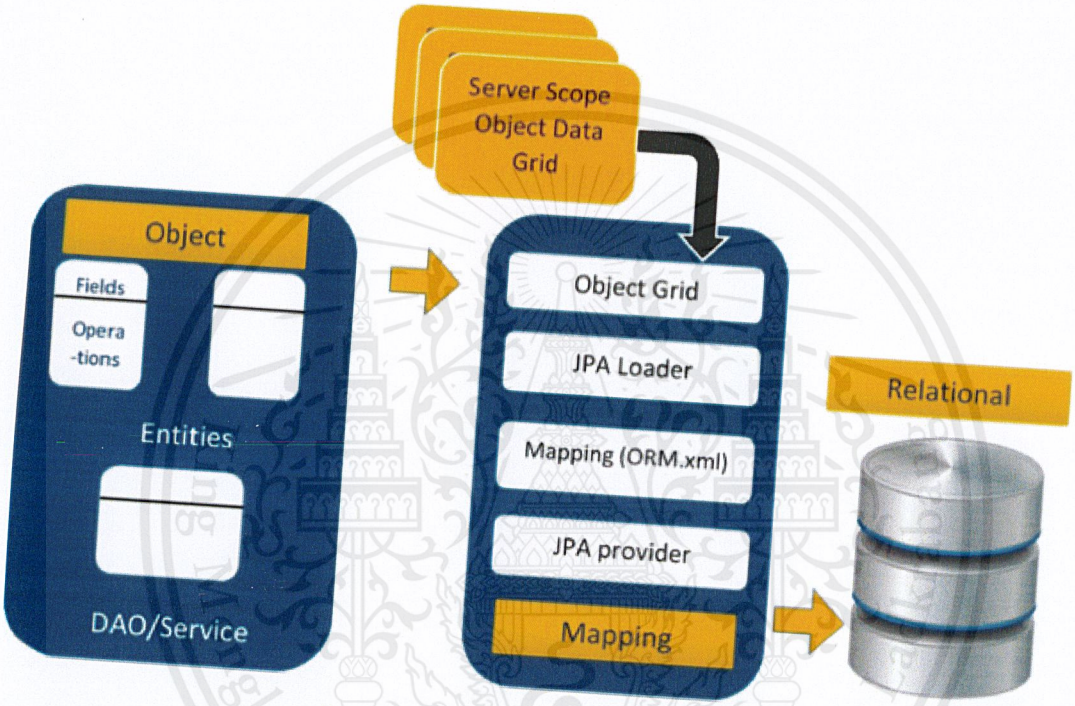


Figure 2.6 ORM Architecture [7]

The key components of ORM consist of below;

1. An intermediary in performing for data conversion between objects and relevant data.
2. Basic command of SQL statements such as Select, Update, Delete, Insert.
3. Supporting for queries in various formats for system developers.

2.3 Technology Related of System Architecture Design

2.3.1 Flask

Flask is a Web Framework for developing web applications in Python- a code library enable developer when building reliable, scalable, and maintainable web applications by

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providing reusable code or extensions for common operations. For example, a simple code to build a web application that displays "Hello World!" is shown in Figure 2.8. It is a microframework as it does not require particular tools or libraries and databases. Table 2.1 shows a comparison of Flask's advantages and disadvantages.

```
from flask import Flask
app = Flask(__name__)
@app.route("/")
def hello():
    return "Hello World!"
if __name__ == "__main__":
    app.run()
```

Figure 2.7 A simple code to build web application that displays "Hello World!" [9]

Table 2.1 Flask Advantages and Disadvantages [10]

Flask Advantages	Flask Disadvantages
Highly flexible	Not friendly with async
Minimalist without losing power.	Limited support and documentation
Easy to learn and use.	Minimal features.
The routing URL is secure.	
The core is small and easily extended	

2.3.2 SQLAlchemy

SQLAlchemy is a Python library to create an interface with related databases such as Oracle, DB2, MySQL, PostgreSQL, or SQLite. It functions as preventing the database interfering with other program code and preventing the database connection via SQL applicable for the database brand.

The SQLAlchemy is a comprehensive set of tools cooperating with databases and Python. It has several distinct areas of functionality from other tools of SQL / ORM [13], which are rooted in a so-called complementarity-oriented approach; instead of hiding SQL and object-oriented relationships behind the automation walls as shown SQLAlchemy Architecture in Figure 2.10. The whole process will be revealed entirely within a set of transparent and

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assembled tools. The library performs automatable and repeatedly while the developers could control the database and create SQL.

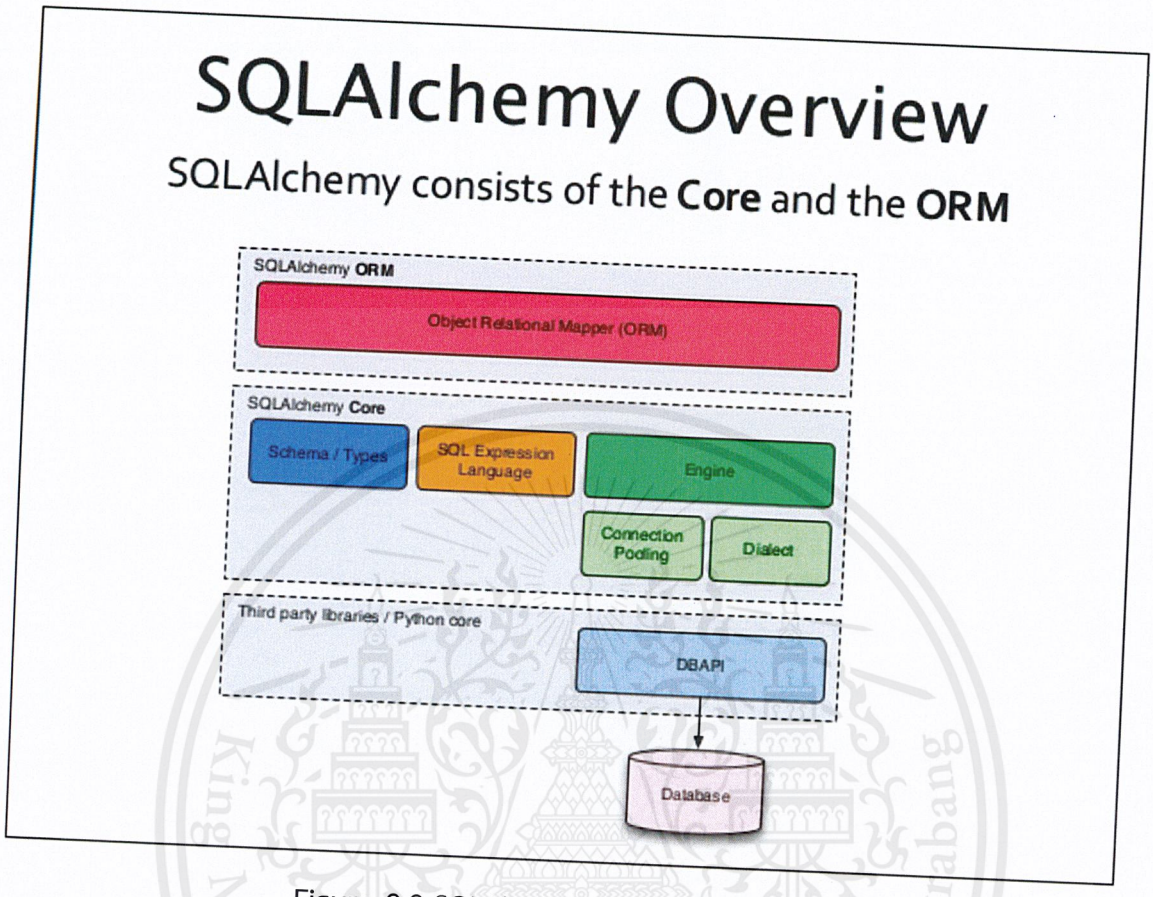


Figure 2.8 SQLAlchemy Architecture [12]

2.3.3 MySQL

MySQL is open-source software for Database Management System; developed by MySQL AB, its primary services are data collection by using SQL statements for data storage. MySQL has to functions with other programming tools in creating an operating system. For example, Web Server to provide Server-Side Script scripting languages such as PHP, aps.net, JSP, etc. Application Program i.e., Visual Basic, Internet, Java, C sharp, etc. This software is designed for performing with many operating systems. MySQL classified as RDBMS: Relational Database Management System. Table 2.2 shown the simple SQL statements, in creating a database and table and inserting the information into the table.

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Table 2.2 Common SQL statements

SQL statements	Example Command	Description
CREATE DATABASE	CREATE DATABASE example;	Create a database, named " example "
CREATE TABLE	CREATE TABLE users (name VARCHAR(100), last_name VARCHAR(100));	Create a table named "users" and assigned the " name " and " last_name " columns the data type VARCHAR which is a string that can vary in width and also set a max length of 100.
INSERT INTO	INSERT INTO users (name, last_name) VALUES ("Grace", "WSA");	Insert a record in table users

2.3.4 Google Cloud Platform (GCP)

Google Cloud Platform (GCP) is a cloud web service platform developed by Google. It performs efficiently the functioning of analyzing and manage data for business operations. The advantages of GCP are, for instance, performing without its hardware, having a 24-hour system administrator, and the cost-saving according to the actual usage. In addition to GCP, there are many separate services provided i.e., Compute Engine, Storage & Databases, SQL, Big Data, API Platform and Ecosystems, Machine Learning, Identity & Security, etc.

This project applies GCP services as follow:

- Compute Engine to specify users' requests, manage all the servers of the system, including creating the RESTful API to communicate the web service.
- RESTful online file storage for storing and accessing data of the picture URL.
- MySQL- Cloud SQL database using a cloud computing platform to collect and access all data in the system.
- App Engine - a fully managed and standalone & scalable service to host the web application.

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2.3.5 Firebase

Firebase is a platform in performing management of the backend or server-side, building mobile applications efficiently and minimizing the time and cost-saving of server-side or data analysis. There are many standalone platform services [16] to provide application development and improvement i.e., Cloud Firestore, Authentication, and Hosting, for the term of performance monitoring, i.e., Crashlytics and for fostering business growth i.e., Google Analytics, Remote Config, Cloud Messaging, etc.

This project applies Firebase services as follow:

- Firebase Authentication [17] is a service managing all the backend of the website; registration, sign-in, reset the password, etc. SDK is applicable for Android or iOS provided for a variety of sign-in through social networks, users' email, and passwords, or anonymous. Firebase enables the application to manage the project's authentication with FirebaseUI, an open-source JavaScript library for the web that provides a natural customizable UI.
- Firebase Hosting [18] is hosting for the single-page web application and landing page website on Google Cloud App Engine. It also provides Secure Socket Layer (SSL), a data encryption technology to increase the security of data transmission. Firebase is functioning as a host website and provides quick access for users.

2.4 Technologies for Web Application Development

2.4.1 Vue.js

Vue.js is Frontend JavaScript Framework for application interface development using a Component-based approach, as shown in Figure 2.15 design structure and interfaces. It performs as a view controller in MVC (Model View Controller) and a single-page application.

Originally, Vue.js deploys Hypertext Markup Language (HTML) to develop the browsers on a web page and Cascading Style Sheets (CSS) using for designing other objects on the webpage. Further, JavaScript language is one of those languages in creating interaction between the webpage objects and users. JavaScriptSyntaxExtension (JSX) is an extension that allows developers to use JavaScript easier and more convenient [21].

Vue.js consists of a Virtual Document Object Model [22] as shown in Vue.js Lifecycle Diagram in Figure 2.16 which functions as to structure a virtual tree 3D, which is a copy of a real tree, meaning that instead of going to fix it in the real tree, it will fix in the real tree

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instead. This virtual tree stored in memory, which can find and fix faster than the real tree stored on the browser. When finished in all virtual trees, it will compare virtual trees and real trees to edit only the different parts into the real tree without having to search for nodes in the real tree again.

2.4.2 Vuetify

Vuetify is the component library or Material Design Component Framework in adjusting the user interface of web applications associated with Vue.js. Vuetify operates depending on the Material Design specification, a visual language that contains principles of design with the innovation of technology and science. In addition, Vuetify provides more than 82 of components with full accessibility and Server-Side Rendering support. The developer could control the layout of their application in complied with the specification of window size [23]. After installing Vuetify on the Vue.js application, it will display the initial design as Figure 2.18 and the simple code design as Figure 2.19.

Vuetify also supports Responsive Web Design; website design techniques that adjust window size or screen resolution to fit display window of all devices i.e., computers, notebooks, mobile phones, or tablets. It uses a 12-point grid system to layout an application's content creating by CSS Flexbox Layout Module, a system that was dividing items in the responsive layout. [24]

2.4.3 Disqus

Disqus is a community network platform in performing comments and posts for users. In connection with comment and post, a user has to login with their ID of Social Network (i.e., Facebook, twitter, google, OpenID, or Yahoo to comment or post. It is one of the most interfacing techniques that increase interaction between creators, publishers, and commenters. It has uplifting process information collection and storage on its server. The Disqus' design is shown in Figure 2.21.

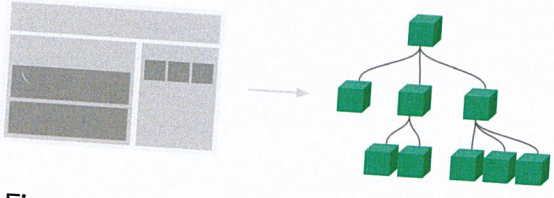


Figure 2.9 Component-based Design [20]

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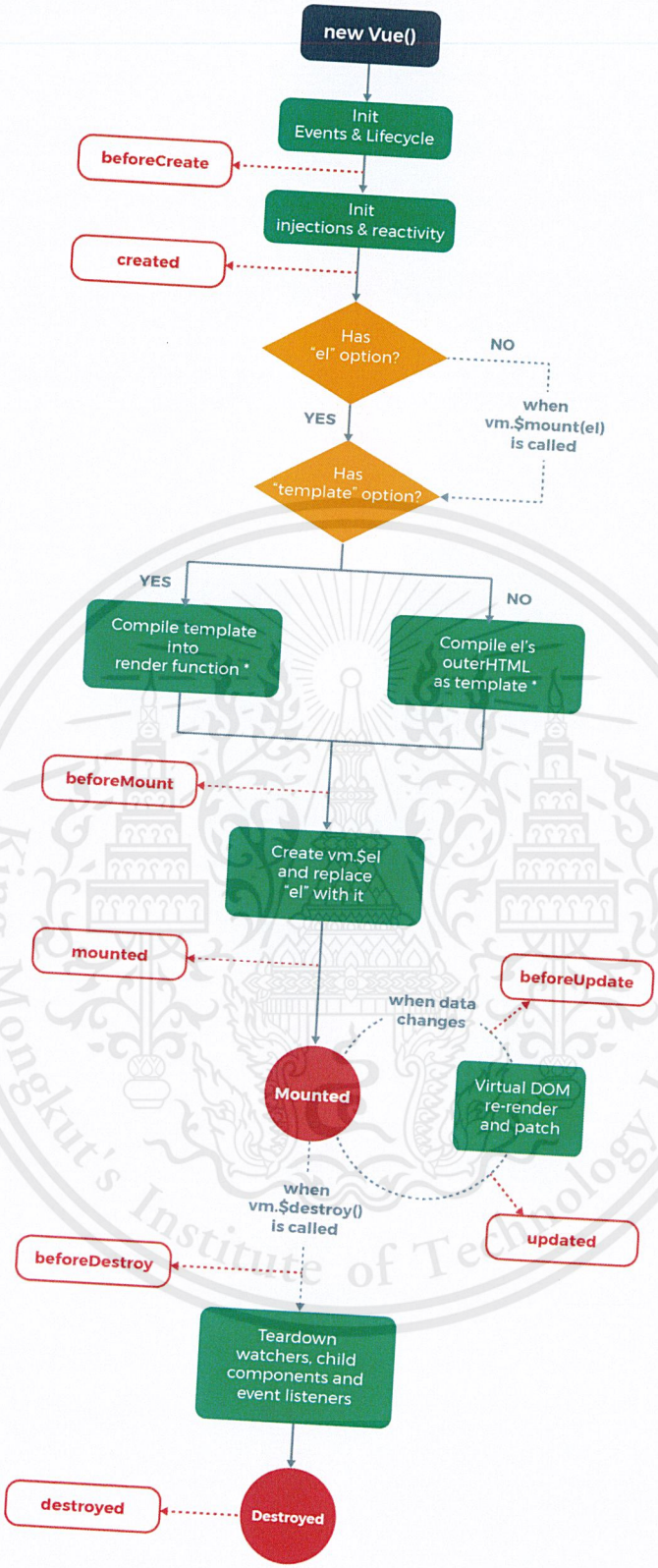


Figure 2.10 Lifecycle Diagram in Vue.js [22]

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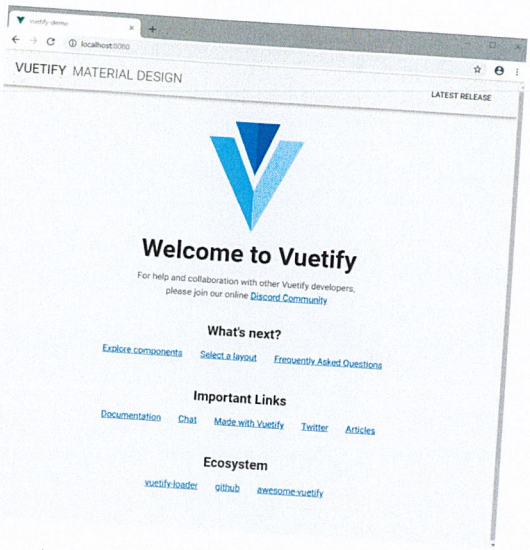


Figure 2.11 Example of the web application created by Vuetify [25]

```
<template>
  <v-app>
    <v-toolbar app dark class="indigo">
      <v-toolbar-title class="headline text-uppercase">
        <span>Vuetify  </span>
        <span class="font-weight-light">MATERIAL DESIGN</span>
      </v-toolbar-title>
      <v-spacer></v-spacer>
      <v-btn
        flat
        href="https://github.com/vuetifyjs/vuetify/releases/latest"
        target="_blank"
      >
        <span class="mr-2">Latest Release</span>
      </v-btn>
    </v-toolbar>
    <v-content>
      <HelloWorld />
    </v-content>
  </v-app>
</template>
```

Figure 2.12 A simple code to build the web application created by Vuetify [25]

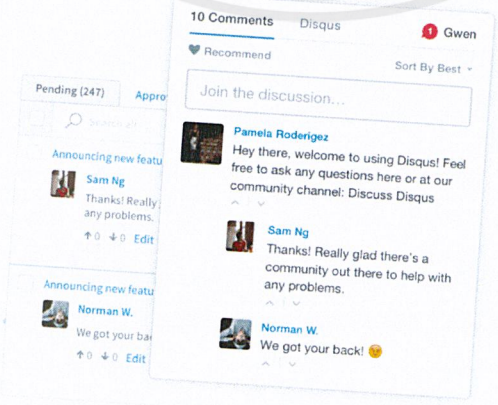


Figure 2.13 Disqus' design [26]

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CHAPTER 3

METHODOLOGY

3.1 Current Trend Research

A Startup or star-up is a project initiated by an entrepreneur to seek, effectively develop, and validate a scalable business model, particularly to financing more on investment. In Thailand, startup investment growth is continually increasing. According to the Thailand ecosystem report of 2018, there were 35 teams of the Thailand startup awarding a total of US 36.30 million with a view to funding. The startup highlight projects in 2018 are associated with digital, whether the mobile application, various platform or the web application [27].

In addition, K SME (KASIKORNBANK SME); a study in the current trend of business and revenue growth [28] provided a summary regarding "Pet Parent" that the pet market circumstance in Thailand is growing significantly as shown in figure 3.1 driven by an increasing demand and spending for pet since people have been changing their lifestyle of modern living and extended family to nuclear family. The industry revenue of pets business is more than THB 30,000 million. 45% of the total revenue of pets business or equivalent to THB 14,600 million is pet feeding, 32% from health care business, pet hospital and clinic, 23% from pet clothing, and 23% for other related pet business.

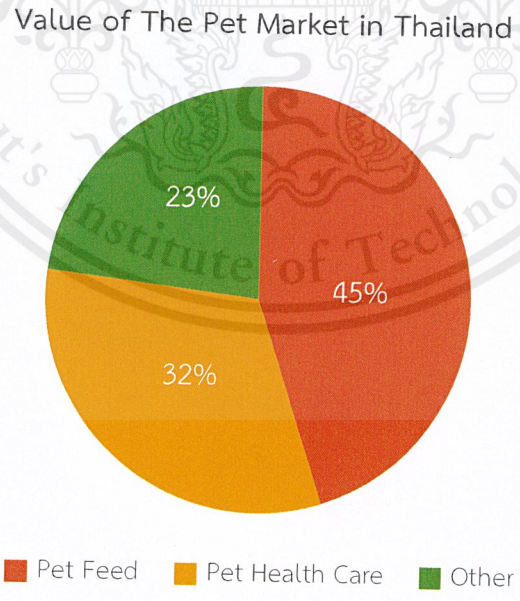


Figure 3.1 Chart of value of pet market in Thailand from K SME [28]

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Key five factors in the growth of Thailand pet market (K SME) [29] are as follow;

1. Aging Population

The most substantial social transformation is the increase in the aging population. According to the World Health Organization (WHO), the number of senior populations aged 60 years or older is 13% overall population. The aging population in the world, which is projected to grow to approximately 1.4 billion people in 2030 and 2 billion in 2050 and can reach 3.1 billion in 2100.

2. Dual Income, No Kids (D.I.N.K)

Dual income with no kid (DINK) is a household in which there are two incomes, and no children (either both partners are working, or one has two incomes), LGBT (Lesbian Gay Transgendered Bisexual), millennial or Generation Y, who was born during 1980-2003). In 2010, the number of the birth rate of women of Generation Y was 1.6 people decreasing from 2 people as comparing to 1997 [31]. Those groups of the population do not have kids resulting in finding other activities to fulfill a sense of family sharing or pets.

3. Pet Humanization

Consumers are increasingly treating their pets as part of the family, due to the ongoing humanization trend. Thai consumers have shifted from being pet lovers to "pet parents," driven by young adults who consider owning a pet akin to having a child.

4. Pet Health Care improved

The pet health care and medicine are enhancing due to an increasing number of pets— Pet owners dedicated to taking care of their pets with the best selection and quality. This reason is an influential factor in the number of students in veterinary medicine and pet hospital in order to support for health care business.

5. Friendly Pet Community

Due to the linkage of pets and their owner is becoming more boundary comparing to the past years resulting in an increase of pet-related business and services ranging from grooming and boarding services, pet hotels and resorts, public services for the pet; parks to 24-hour boarding service.

In summary, after current trend research completion, it is found that "pets" are now becoming part of the human being due to influent factors, taking care of their pets equally to their friend or their family member, pets health care, and medical improvement, etc. In terms

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of economic dimension, there shall be taken into consideration of business startup project or investment.

3.2 Pain Points and Customer Insight

After selecting the trend of interest, which is the pet market trend, the next thing to do is to find out what are the problems of pets. In the first step, the developers have discussed and gathered ideas together then concluded issues for pets as follows.

1. Pet disappearance

   The pet disappearance issue is the most painful of the pet owner. The hardiness is lost, and found pet is there are many channels on social media provided for pet search i.e., Facebook Fanpage, Facebook Group, or Twitter as well as announcement procedures are also inconvenient for the users. In addition, the announcement platform may not have a search filter to match the needs of users in order to reduce spelling error on typing or results not matching the pet owners' requirement resulting in a decrease in pet returning to the owner.

2. Pet Identity

   Presently, the pet identification provided only in the pet hospital for pet registration requiring for the pet owner to disclose i.e., as a pet name, age, weight, owner address, phone number. When pet information or details are required for the execution of lost and found or whatever, this might have a potential impact on the owner, community, etc.

3. Pet Cares and Treats

   Caring for one's life is not only just about love. There are plenty of responsibilities regarding pet feeding and caring i.e., food feeding, cleaning, taking the pet to the veterinary for checking up, or for unhealthy conditions. This hardiness might be a root cause of any unfavorable circumstance to the pet owner.

4. Safety

   Pet owners are bounding tightly with their pets as comparing to the part resulting in an increase of number of pet service providing businesses, restaurants, resorts, hotels, or public services (i.e.) a park which allows pets including pet hotel businesses (i.e., pet taking care service which provide grooming and boarding for 24 hours).

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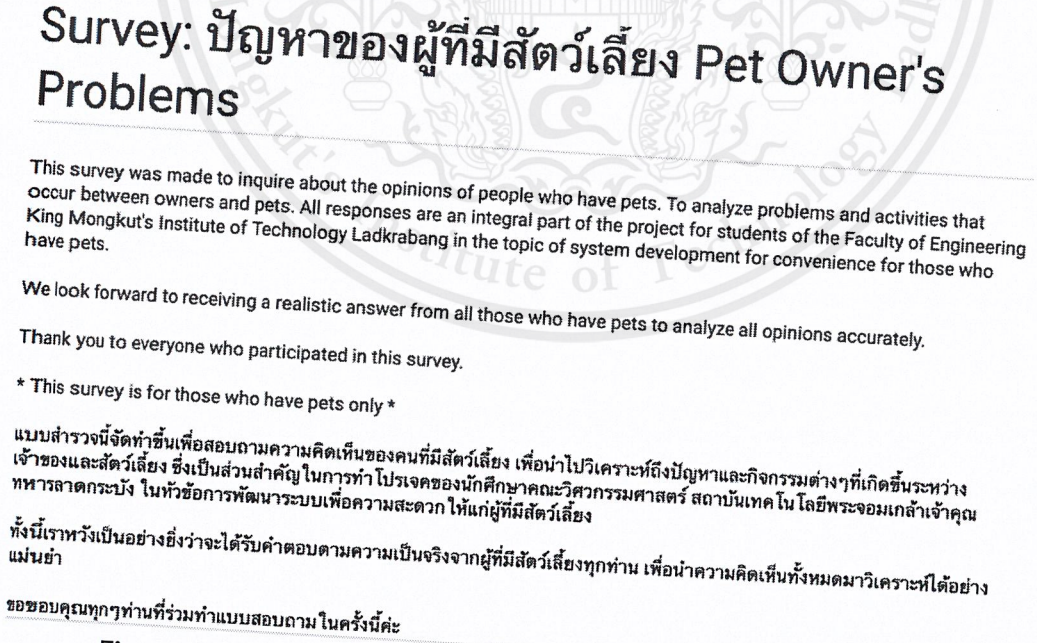
5. Medical records

Medical records are not compatible with retrieving and accessing as because it is for an authorized person in terms of usage and access.

6. Stray Animals

Thailand is considered as home to a high number of stray cats and dogs, supporting the need for and presence of many animal shelters in the country. While Thai consumers are fond of domestic animals such as cats and dogs, many are unable to own one as a pet due to a number of constraints such as small living space, disapproval from parents or housemates, lack of time for proper exercise, particularly for dogs, and a lack of resources which would allow them to offer adequate care. This results in plenty of resource investments that the government has to provide in order to cope with this situation.

Further, the second step is questionnaire formulation with respect to identifying the problems from pet owners in order to collect first-hand information by using Google Form; the survey called "Pet Owner 's Problem." and disclosed the survey via social media (i.e., Facebook, Twitter, Instagram, Line). The questionnaire comprises of 2 sections as multiple choice question is shown in Figure 3.2.



Survey: ปัญหาของผู้ที่มีสัตว์เลี้ยง Pet Owner's Problems

This survey was made to inquire about the opinions of people who have pets. To analyze problems and activities that occur between owners and pets. All responses are an integral part of the project for students of the Faculty of Engineering King Mongkut's Institute of Technology Ladkrabang in the topic of system development for convenience for those who have pets.

We look forward to receiving a realistic answer from all those who have pets to analyze all opinions accurately.

Thank you to everyone who participated in this survey.

* This survey is for those who have pets only *

แบบสำรวจนี้จัดทำขึ้นเพื่อสอบถามความคิดเห็นของคนที่มีสัตว์เลี้ยง เพื่อนำไปวิเคราะห์ถึงปัญหาและกิจกรรมต่างๆที่เกิดขึ้นระหว่างเจ้าของและสัตว์เลี้ยง ซึ่งเป็นส่วนสำคัญในการทำโปรเจคของนักศึกษาคณะวิศวกรรมศาสตร์ สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง ในหัวข้อการพัฒนาระบบเพื่อความสะดวกให้แก่ผู้ที่มีสัตว์เลี้ยง

ทั้งนี้เราหวังเป็นอย่างยิ่งว่าจะได้รับคำตอบตามความเป็นจริงจากผู้ที่มีสัตว์เลี้ยงทุกท่าน เพื่อนำความคิดเห็นทั้งหมดมาวิเคราะห์ได้อย่างแม่นยำ

ขอขอบคุณทุกๆท่านที่ร่วมทำแบบสอบถามในครั้งนี้ค่ะ

Figure 3.2 Open-ended Question “Pet Owner's Problem” [32]

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Open-Ended Question is a mechanism to collect qualitative data in a questionnaire where the respondent can answer in a free form with little to no restrictions. The Open-Ended is shown in Figure 3.3. In summary, there were a total of 157 questionnaire respondents by pet owners. Fifty-one percent of respondents were from those of 85 persons in the 18 to 25-year-old comprising group of first jobbers and higher education, 43.4 percent of 68 persons in over 26-year-old who is a group of first jobbers to middle-aged and 2.5 percent of under 18-year-old group.

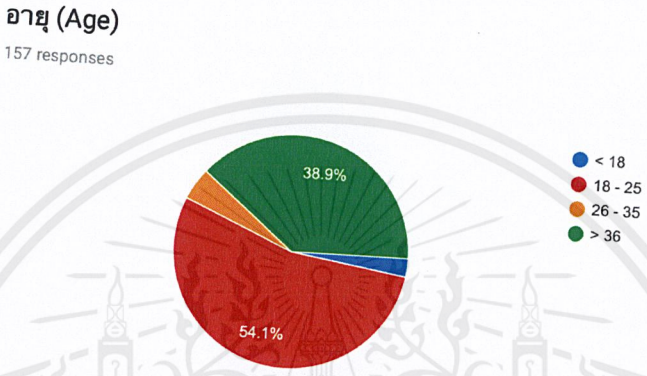


Figure 3.3 Open-ended Question "Pet Owner's Problem": Question - Age [32]

The open-ended questions are designed for gathering information regarding grooming and boarding, including health care for pets. For instance, "What kind of system that uses for pet caring and boarding? The most answers are "Close feeding system"- a housing that contained feeding or boarding area adaption, as shown in Figure 3.4. The answers response in relation to is shown in Figure 3.5, with 64.3% of 101 respondents. In addition, "Open system." means that pets are feeding or boarding with no specified area; there were 53 persons or accounted for 33.8% and other answers of 1.8%.

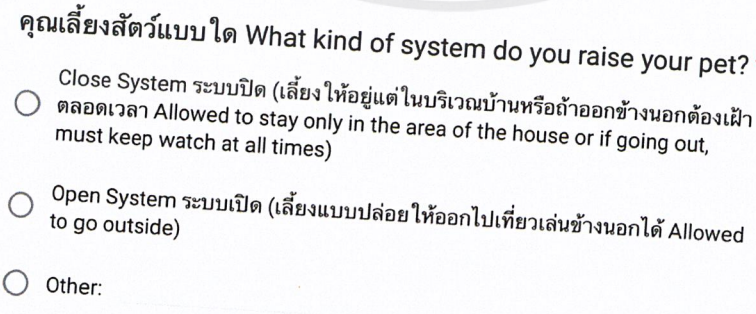


Figure 3.4 Open-ended Question "Pet Owner's Problem": Question - What kind of system do you raise your pets? [32]

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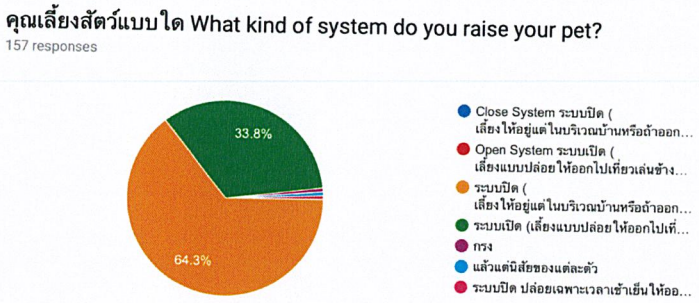


Figure 3.5 Open-ended Question "Pet Owner's Problem": Response of Question - What kind of system do you raise your pets? [32]

In addition, the question survey also consists of "What problems have you had in raising?" as shown in Figure 3.6 for which the responsive choices are divided for each group of problem circumstance as time limitation constraint, lost pet, pet healthcare condition, pet grooming n and boarding services, etc. The answers are shown in Figure 3.7; most of the respondent answers is time limitation constraint for 134 persons or 85.4%. The following are the pet healthcare condition; 114 persons accounting for 72.6%, lost pet, pet grooming and boarding service, and others are 26.1%, 24.8%, and 14.5%, respectively.

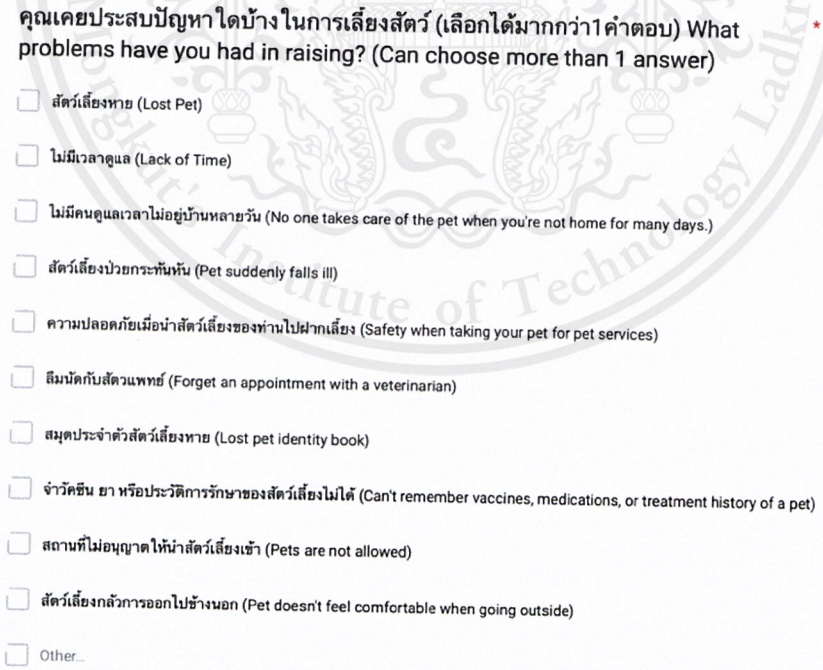


Figure 3.6 Open-ended Question "Pet Owner's Problem": Question - What problems have you had in raising? [32]

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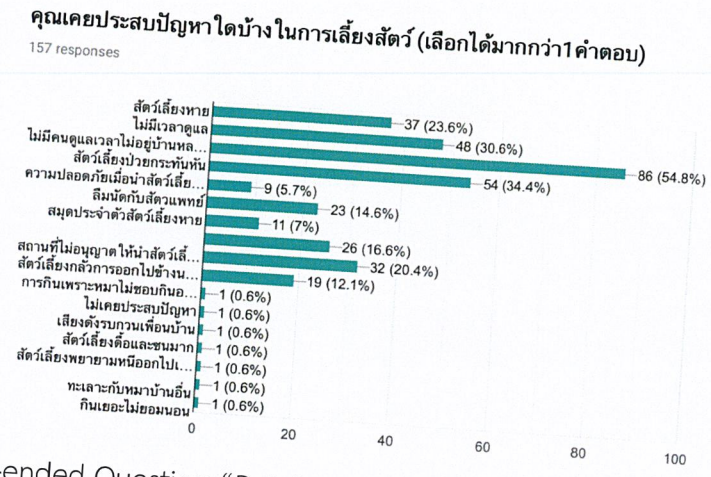


Figure 3.7 Open-ended Question "Pet Owner's Problem": Response of Question – What problems have you had in raising? [32]

In connection therewith, the third stage is to analyze product proposition as classified into two group characteristics of pet owners and pet service providers. As pet owners have been facing service usages concerning per service provides (i.e., pet hospital), this stage will enhance and collect innovative solutions in response to pain points therein.

Figure 3.8 shows the value proposition tool. On the left side, the customer's desires comprise of customer jobs, pains, and gains. On the right side is the answer for responding to customer desires, which are gain creators, pain relievers, and products and services. From the brainstorming stage, it separated into two types as the pet owner and pet service and gathered as follows:

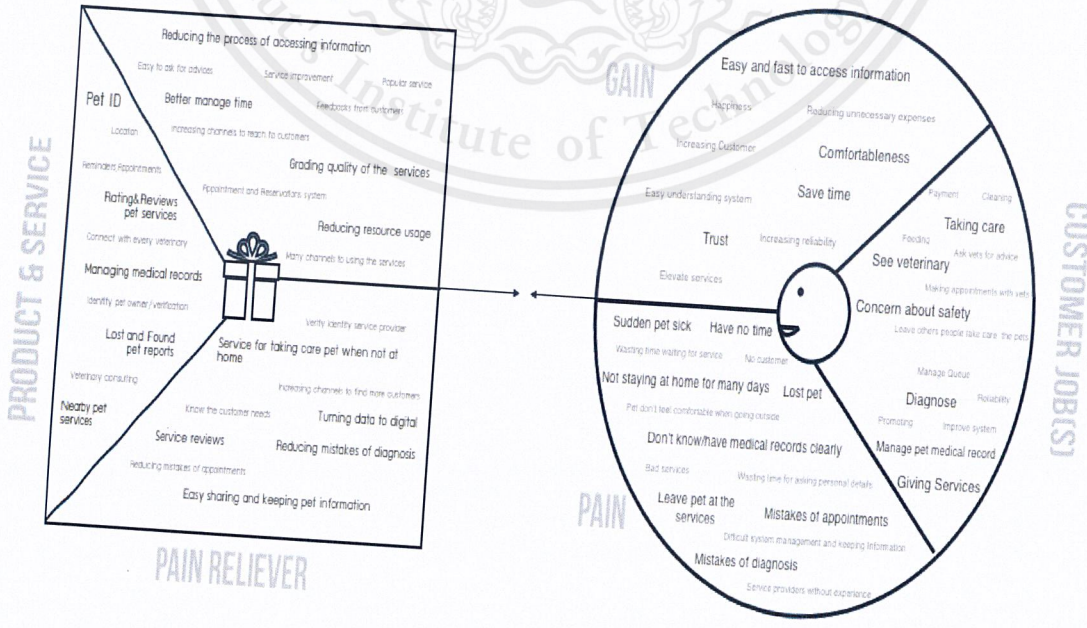


Figure 3.8 Value Proposition Canvas

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- Customer Jobs

  What customers are responsible for completing the work.

Pet owner

- Taking care pets
- See veterinary
- Concern about safety
- Spending
- Cleaning
- Feeding
- Asking for advice
- Making appointments with veterinary
- Leave other people take care the pets

Pet service

- Diagnose
- Manage pet medical record
- Giving services
- Manage queue
- Building reliability
- Promoting
- System improvement

- Gains

  What makes customers happy and exceed their expectations.

Pet owner

- Easy and fast to access information
- Comfortableness
- Save time
- Trust
- Happiness

Pet service

- Easy and fast to access information
- Reducing unnecessary expenses
- Save time
- Increasing customer

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- Easy understanding system
- Increasing reliability
- Elevate services

- Pains

What annoys or troubling customers and prevented them from getting their jobs done.

Pet owner

- Pet sick
- Lack of time
- Not staying at home for many days
- Lost pet
- Don't know medical records
- Wasting time waiting for service
- Pet doesn't feel comfortable when going outside
- Mistakes of appointments
- Difficult system management and keeping Information
- Bad services
- Service providers without experience

Pet service

- Mistakes of diagnosis
- Don't have medical records
- Difficult system management and keeping Information
- Leave pet at the services
- Wasting time for asking personal details
- No customer
- Mistakes of appointments

- Gain creators

What can help the customer to fulfill their gain.

Pet owner

- Easy to ask for advices
- Better manage time
- Grading quality of the services
- Many channels to using the services
- Appointment and Reservations system

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- Reducing the process of accessing information

Pet service

- Service improvement
- Popular service
- Increasing channels to reach to customers
- Reducing the process of accessing information
- Better manage time
- Feedbacks from customers
- Reducing resource usage

- Pain relievers

What can help the customer to relieve their pain.

Pet owner

- Service for taking care pet
- Verify Identity service provider
- Turning data to digital
- Service reviews
- Easy sharing and keeping pet information
- Real time consultation
- Reducing mistakes of appointments

Pet service

- Know the customer needs
- Reducing mistakes of diagnosis
- Easy access the pet information
- Verify Identity pet owner
- Reducing mistakes of appointments
- Increasing channels to find more customers

- Products and services
  - Pet ID
  - Managing medical records
  - Rating and reviews pet services
  - Lost and Found pet reports

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After brainstorming completion, the most painful point is Pet sick, and other found are follow;

1. Pet sick
2. Difficult system management and keeping Information
3. Lost Pet
4. Not staying at home many days
5. Don't know medical records
6. Bad services
7. Service providers without experience
8. Pet doesn't feel comfortable when going outside
9. Mistakes of appointments.

Furthermore, the most pains of the pet services in descending order as follows:

1. Mistakes of diagnosis
2. No customer
3. Don't have medical records
4. Abandoned pets at the pet services
5. Difficult system management and keeping Information
6. Wasting time for asking personal details
7. Mistakes of appointments

In establishing a mechanism in solving those issues, Pawty will be an intermediary between pet owner and pet service providers. This platform could enable and utilize Pet ID, medical records, pet verification, and medical record retrieving with a view to enhancing information system management. With respect to the solution of time limitation constraint, pet service providers shall have more their services i.e., a searching channel for lost and found pets.

This paper is responsible for the "Lost and Found Pet Report." which contains listing and reporting lost and found pet information, including the user authentication in the platform.

3.3 Business Model Canvas Design

After conducting an analysis of problems and the value proposition, the next step is to design the business model canvas (BMC) with a view to establishing business strategies,

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applications divide user access into three parts which are the pet owners, the witnesses, and the normal users.

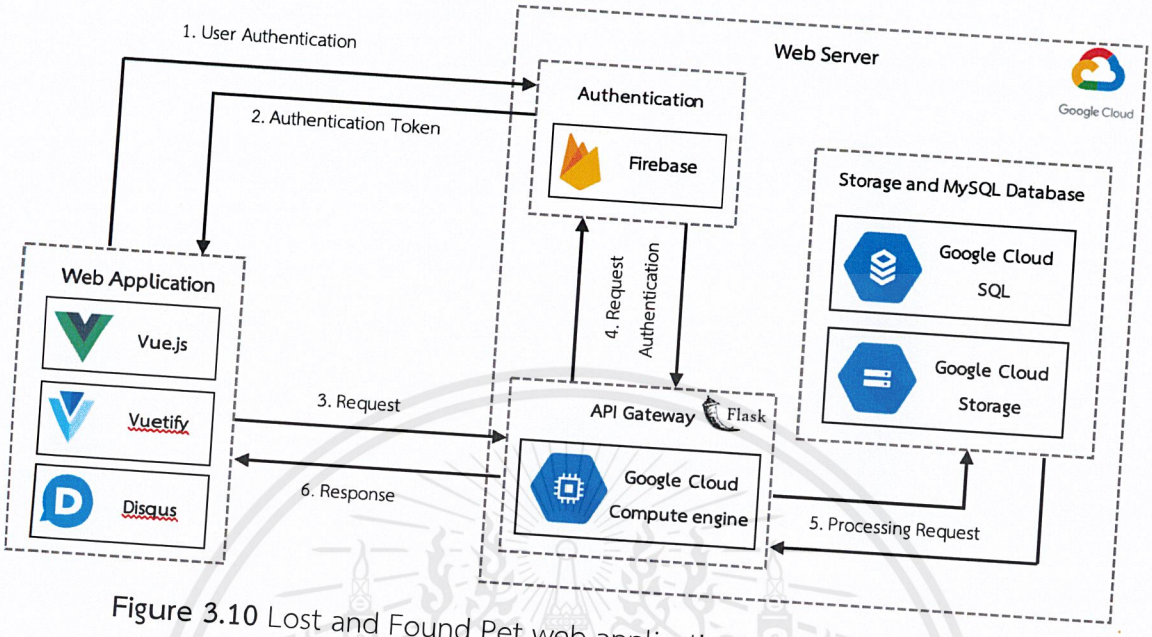


Figure 3.10 Lost and Found Pet web application system architecture

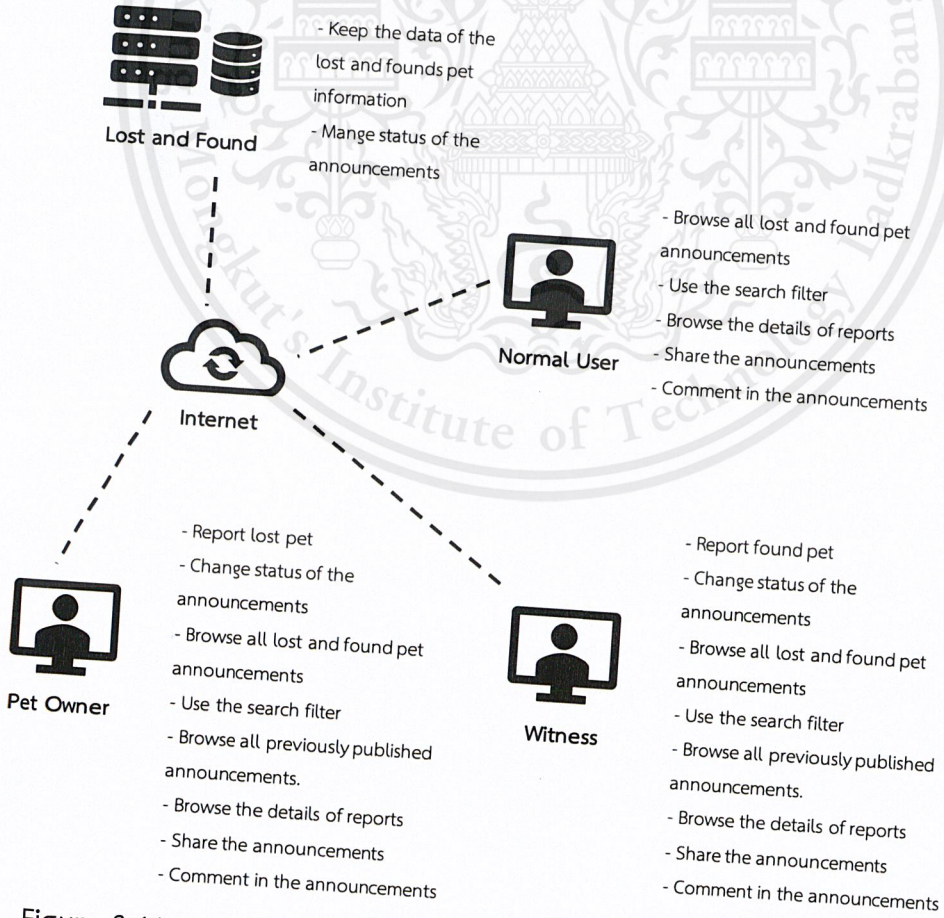


Figure 3.11 Lost and Found Pet web application service architecture

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3.4.3 Use Case Diagram and Sequence Diagram

Figure 3.12 shows the use case diagram in the system. The pet owner and the witness are required to sign in for user authentication. After user authentication, users could access lost and found pet details, share posts to social media i.e., Line, Facebook, and Twitter, comment in replying to the post. Disqus is applied to manage the comment system and updating the status of all posts that created. Further, users could adjust their privacy by choosing to see only posts them created. The different function between the pet owner and witness is the addition of pet information to the system. The pet owner could only add lost pet information and the witness for found pet information.

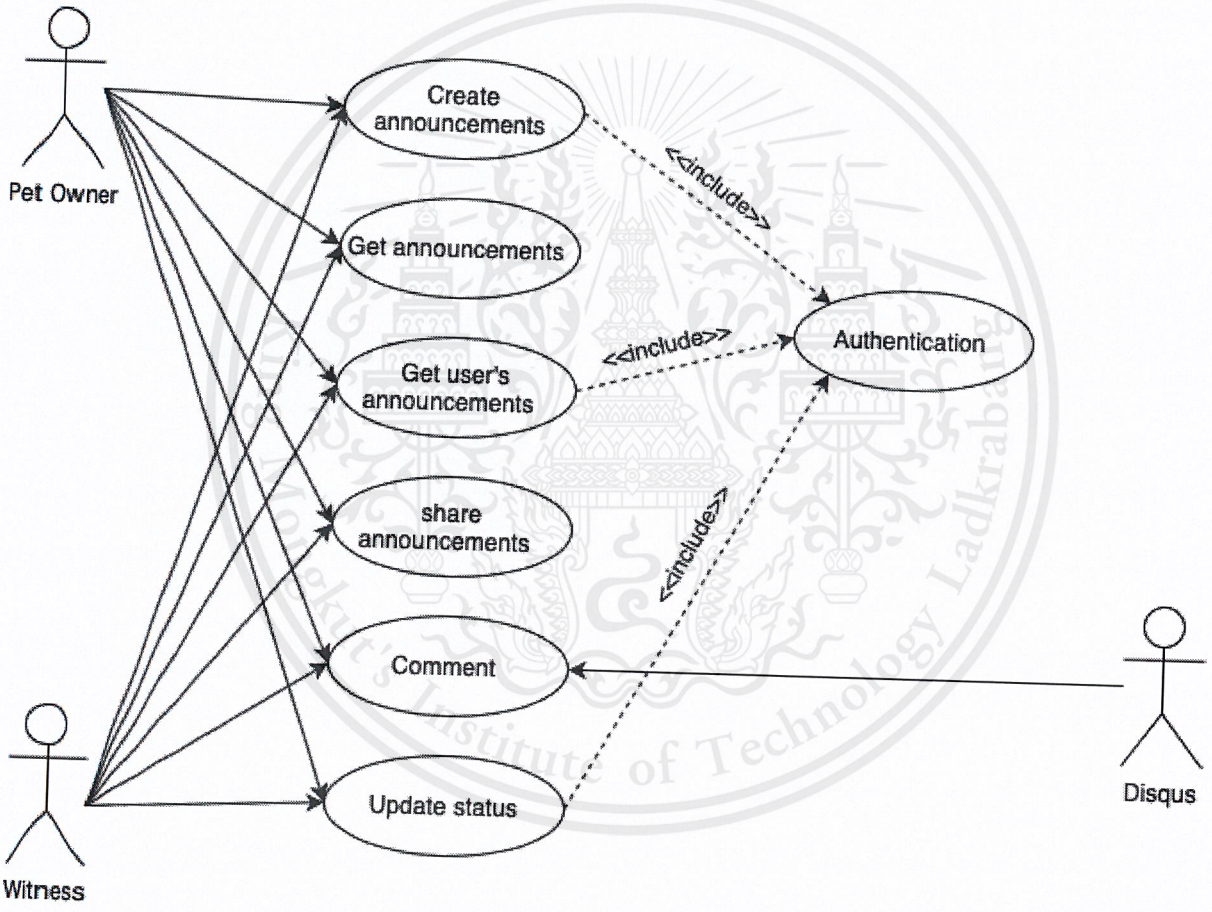


Figure 3.12 Use Case Diagram of the system

The web application is required a user authentication system to know the customer for identifying users and content access and limitation. Firebase is applied in order to function user authentication as shown Firebase Authentication sequence diagram in Figure 3.13;

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FirebaseUI will create the sign-in window for login with Google Account, Facebook Account, and Email Account. After log in to the system, Firebase will create secure JSON Web Tokens (JWTs) to authenticate users or devices in accessing Cloud Storage and Cloud Database.

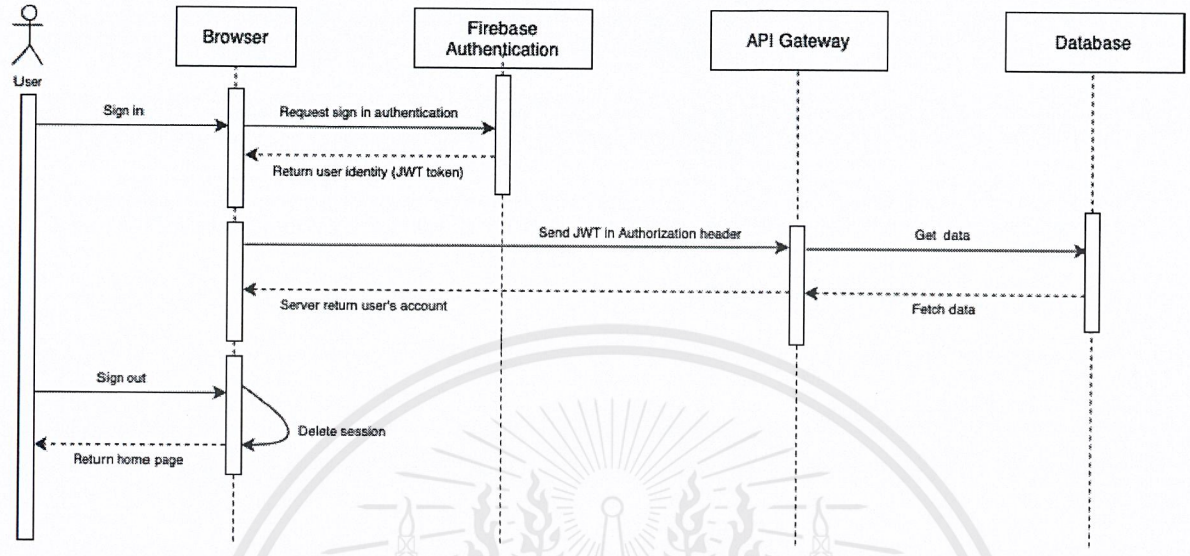


Figure 3.13 Firebase Authentication Sequence Diagram

From Figure 3.13, after the first request, the user logs in to the system, Firebase Authentication, will create JWT and return it to the browser by keeping to Local storage. The function of the Localstorage is to keep key or value pairs in a web browser; the objects stored in the Localstorage are kept with no expiration date and not be deleted when the browser closed. The browser requests the user's account from the server by sending JWT in the authorization header system to verify the signature and decrypt data. If there is no incorrectness detected, the server will respond to the user's account to the browser. Further, after log out, the browser will delete the authentication session and return the home page to the user.

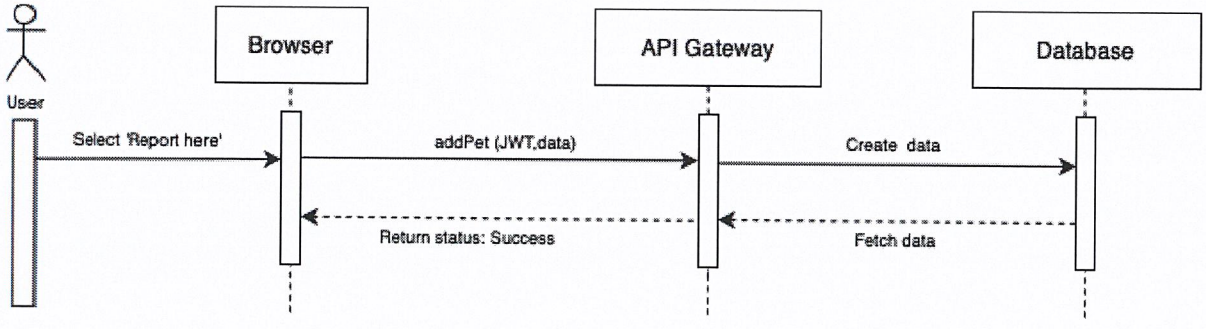


Figure 3.14 Creating an announcement Sequence Diagram

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From Figure 3.14, after clicking the “Report Here” button on the PAWTY home page, an announcement will be created, the browser will deliver data with the same set of JWT obtained from the Firebase Authentication to the server. If there is no incorrectness detected, the server will create data. The database fetches data back to the server, and then the server will return success status to the browser.

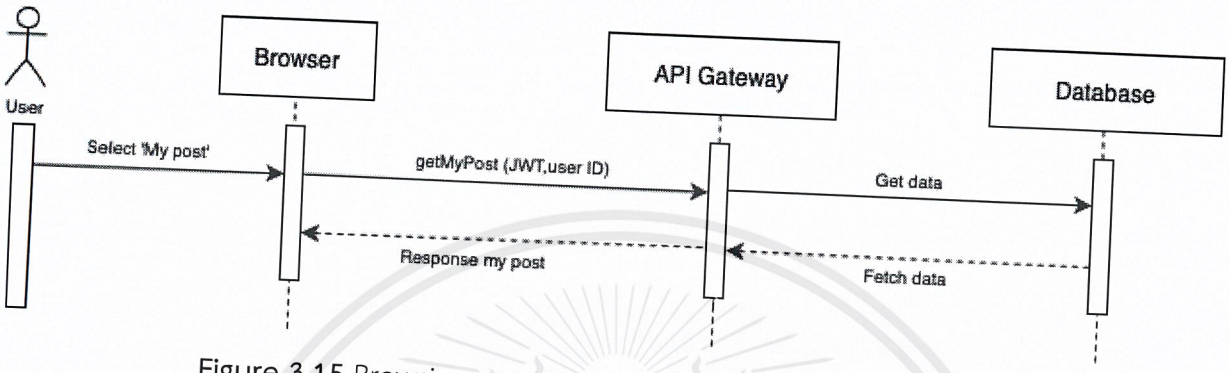


Figure 3.15 Browsing user announcements Sequence Diagram

From Figure 3.15, by clicking the “My post” button on the PAWTY home page, the browser will request and deliver the JWT token and user ID obtained from Firebase Authentication to the system. If there is no incorrectness detected, the server will deliver data to the browser.

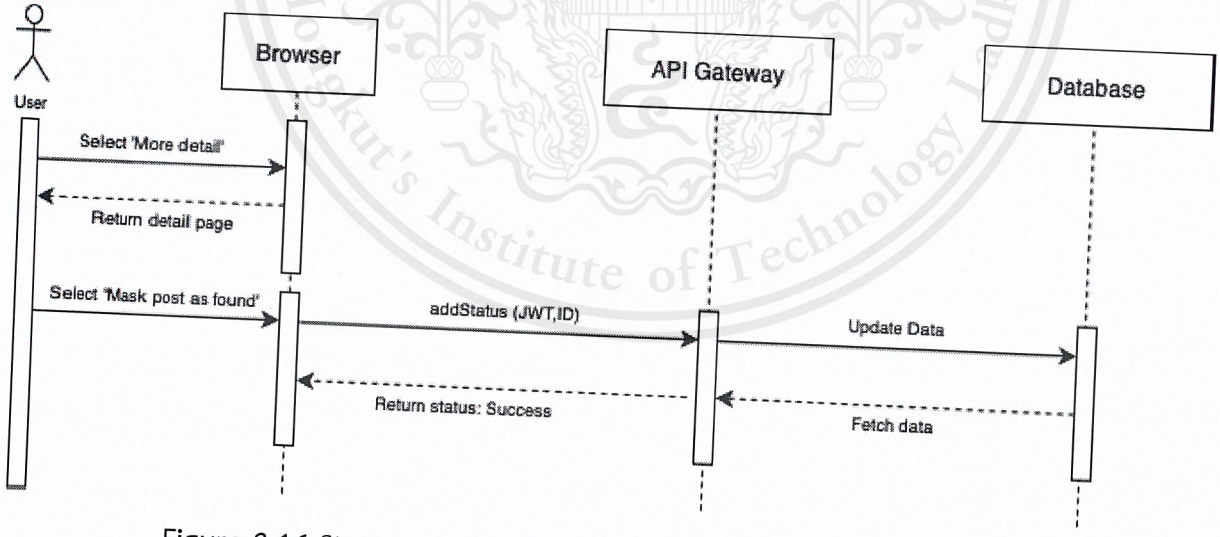


Figure 3.16 Status update of an announcement Sequence Diagram

From Figure 3.16, After clicking the "More detail" button on the PAWTY home page, the browser replying with detail of an announcement to the user. By clicking the "Mask post as found" button, the status of the announcement will be changed to "Found." The browser will

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request and reply to the server with the authentication and the status changeท status in the database. The database fetches data back to the server then the server will return success status to the browser.

This project also provides a feature for the user for those who are not registered in announcements, as shown in Figure 3.17, comment system, as shown in Figure 3.18 and Sharing an announcement, as shown in Figure 3.19.

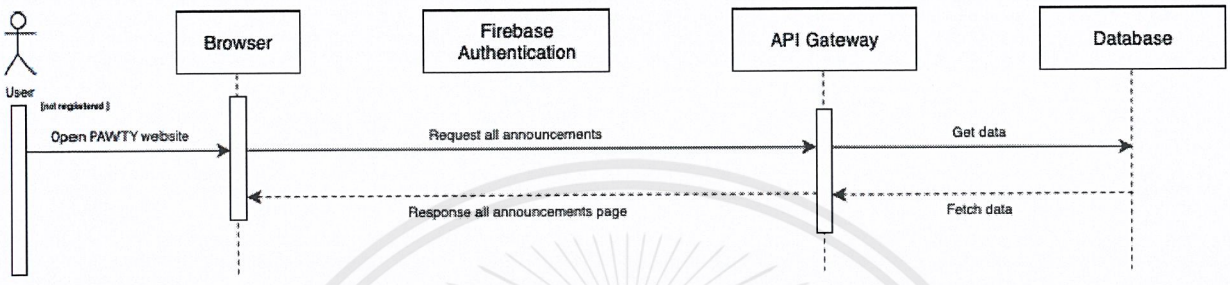


Figure 3.17 Browsing all announcements Sequence Diagram

Figure 3.17, when the user gets to the PAWTY website, the browser requests all announcements in the system from the server. The server receives data from the database and returns to the browser.

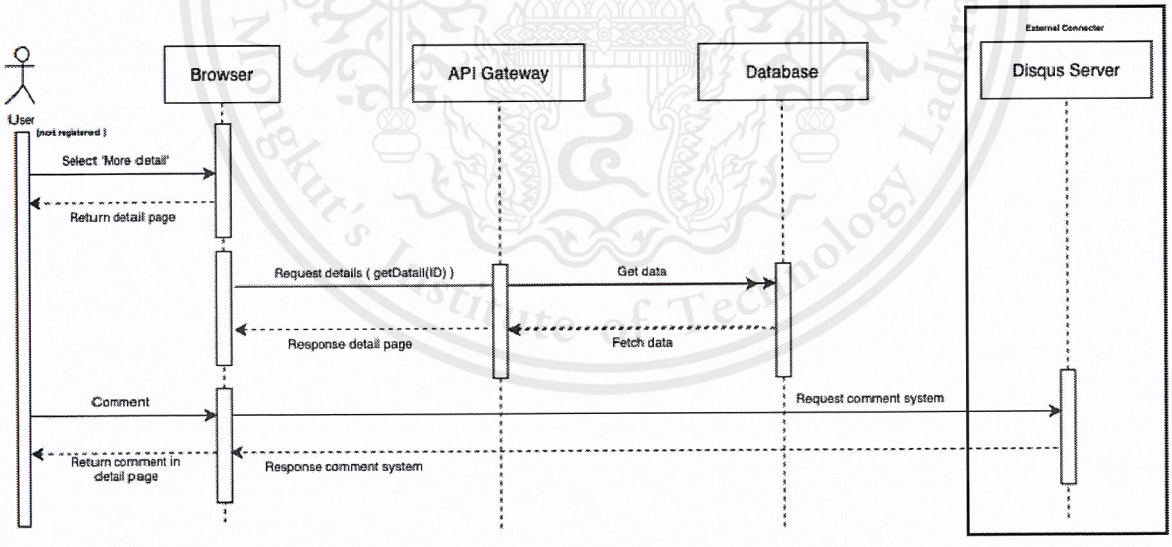


Figure 3.18 Comment system Sequence Diagram

Figure 3.18, after clicking on the "More detail" button on the of the PAWTY home page, the browser will display an announcement detail for the user. The user comments on the

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detail page and the browser requests the comment system: Disqus; then, it will reply comment system to the browser. The browser shows the comment on the detail page.

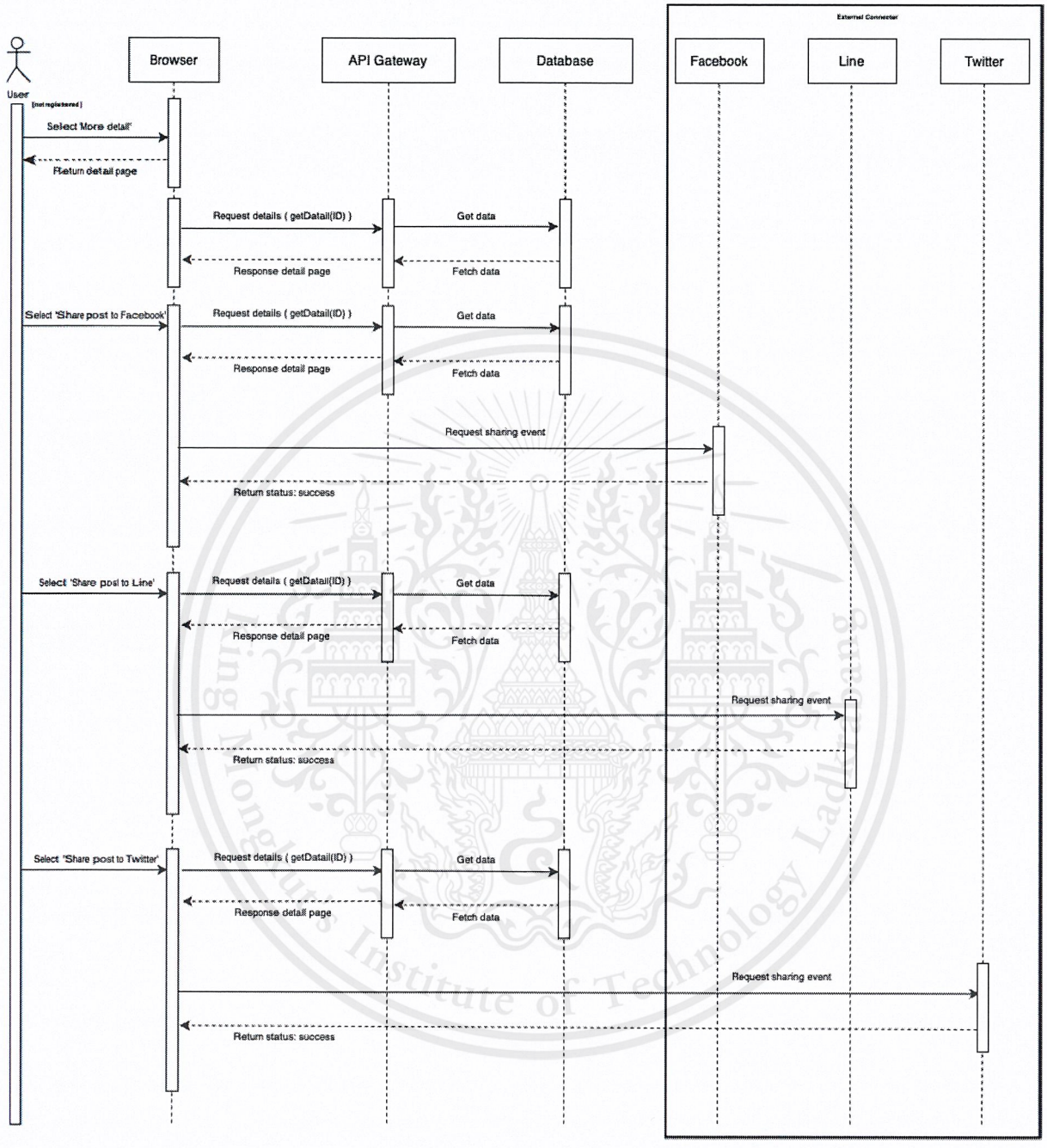


Figure 3.19 Sharing an announcement Sequence Diagram

From Figure 3.19, the "More detail" button on the of the PAWTY home page, it will display a browser of an announcement detail interfacing with the user and the "Share" button for sharing an announcement via social media i.e., Facebook, Line, and Twitter.

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3.4.4 API Gateway Section

API Gateway is an essential intermediator for communication between clients and services. It is the Single Point of Contract, which manages requests in the service and creates a single entry point to expose the endpoint of different APIs by revealing with only one parameter and allowing the requests accessing the service pass context path. Table 3.1 illustrates the Lost and Found Pet APIs.

Table 3.1 Lost and Found Pet APIs

APIs	Description	Input	Output
api/lost-found-pets	Used to browse all lost and found pets information.	-	Listing all lost and found pets information.
api/add-pets	Used to add lost and found pets information into the system	Lost and found pet information	Status success: Post uploaded
api/pet-detail/<pet_id>	Used to browse lost and found pet information from pet id.	The pet id	Lost and found pet information of pet_id.
api/my_post/<uid>	Used to browse all lost and found pets information which created by the user from the user's ID (uid) derived from Firebase	The user's ID (uid)	Lost and found pet information which created by the user.
api/found-pet/< pet_id >	Used to update post status	The pet id and the post status	Status success: Ok

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3.4.5 Database Section

Figure 3.20: ER Diagram (Entity Relationship Diagram) on PostOwner table; it functions as a user's data-keeping of the announcements. On the LostFoundPet side, it keeps announcements data created by owners and witnesses. This project applied and managed with Disqus, an external system for comment in the application.

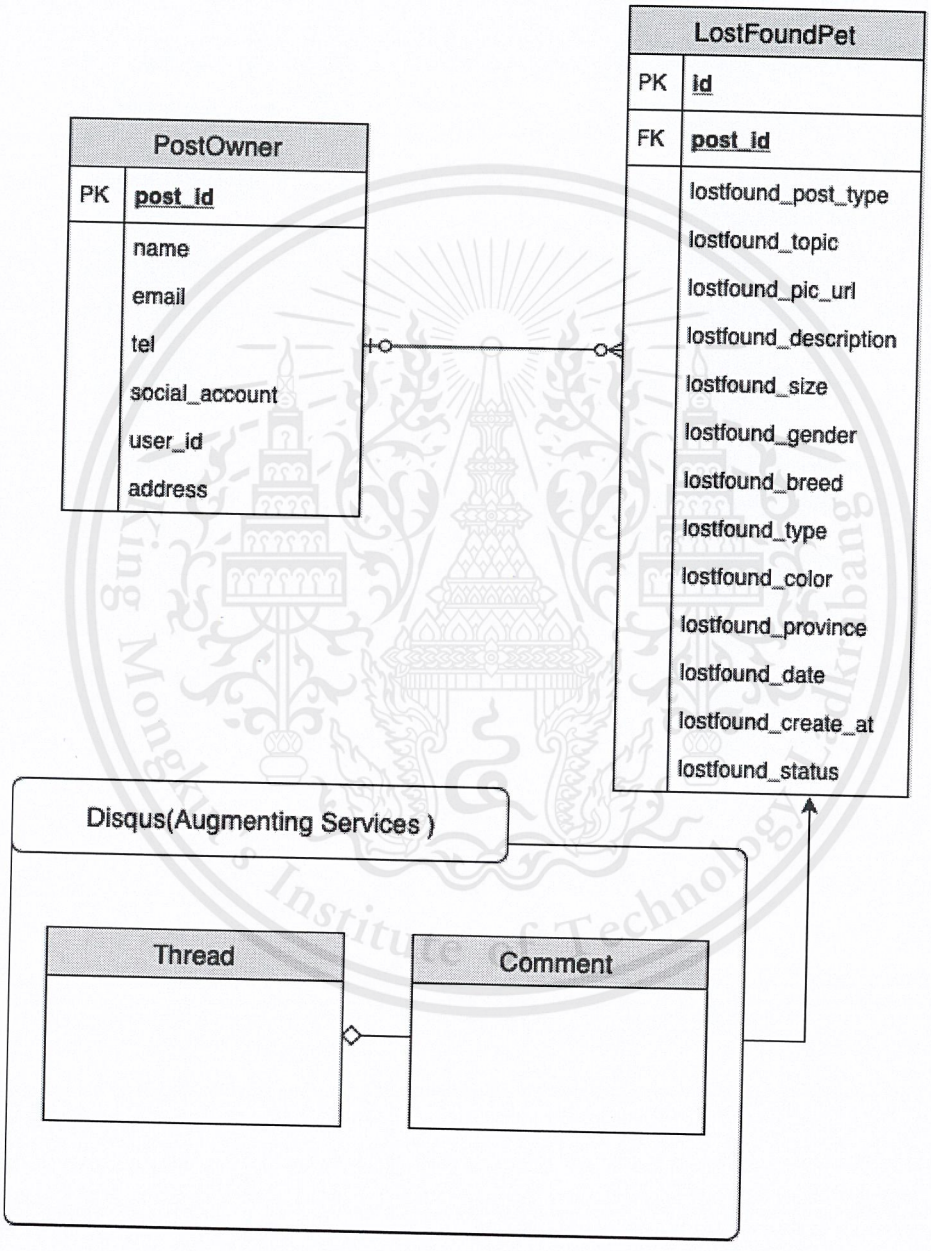


Figure 3.20 ER Diagram (Entity Relationship Diagram) of the system

In term of data and storage managing, this project applied with Cloud SQL; MySQL as detail as following:

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Table 3.2 demonstrates Database Table of PostOwner for data storage of the user who creates the announcements in the system.

Table 3.2 Database Table of PostOwner

Field Name	Data Type	Description	Example
post_id	Int	Announcement ID	1
name	Varchar	Name of the user who create the announcements	Grace
email	Varchar	E-mail of the user who create the announcements	g@hotmail.com
tel	Varchar	Phone number the user who create the announcements	0999999999
social_account	Varchar	Social account such as Facebook Account, Line or Twitter the user who create the announcements	Line: grace
user_uid	Varchar	User's ID derived from Firebase of the user who create the announcements	MTfyMGgY23Pi5GnZ6LJ XILUv2Pt2
address	Varchar	Address the user who create the announcements	Moo 6

Table 3.3 demonstrates Database Table LostPet which uses to store the data of the lost pet which added by the pet owner.

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Table 3.3 Database Table of LostFoundPet

Field Name	Data Type	Description	Example
id	Int	Lost pet ID	1
post_id	Int (FOREIGN KEY)	Announcement ID	1
lostfound _posttype	Varchar	Announcement type (Lost or Found)	Lost
lostfound _topic	Varchar	Topic of the announcement	Help me! My cat lost
lostfound _pic_url	Varchar	Picture URL derived from uploading the pictures to keep on Cloud Storage	https://storage.cloud.google.com/pawty-cie/011e4f77911f45b29b5d02d87b3d008a?authuser=1&folder&organizationId
lostfound_description	Varchar	Description of the announcement	My cat's name is Brownie. If you found her, pls contact me.
lostfound _size	Integer	Lost pet size	2
lostfound _gender	Varchar	Lost pet gender	Female
lostfound _breed	Varchar	Lost/ pet breed	Thai
lostfound _type	Varchar	Lost pet type	Cat
lostfound _color	Varchar	Lost pet type	Brown
lostfound _province	Varchar	Lost pet province	Bangkok
lostfound _date	timestamp	Lost date	2019-12-15 00:00:00
lostfound _created_at	timestamp	Post creation date	2019-12-15 13:21:13
lostfound _status	Boolean	post's status to specify that this announcement has already found the owner or not	False

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CHAPTER 4

RESULT

4.1 Feedback of Web Application

In terms of actual usage of the web application, the web page administrators will act as an intermediator of web page i.e., Facebook for finding missing pets and pet owners as shown the lists in Figure 4.2 information and samples collecting from first-hand sources. According to the below figure, there is 3 page of lost and found information and one of the admin page. The feedback from the admin to the lost and found pet web application is shown in Figure 4.1. It provided uplift advantages because this project could increase the number of founding and returning pets to the owners easily and quickly. Furthermore, the admin suggests adding more in the search filter to providing options i.e., pet breed, pet species, pet color, the alley that pet disappear, lost area, and the color of the collar of the lost pet.

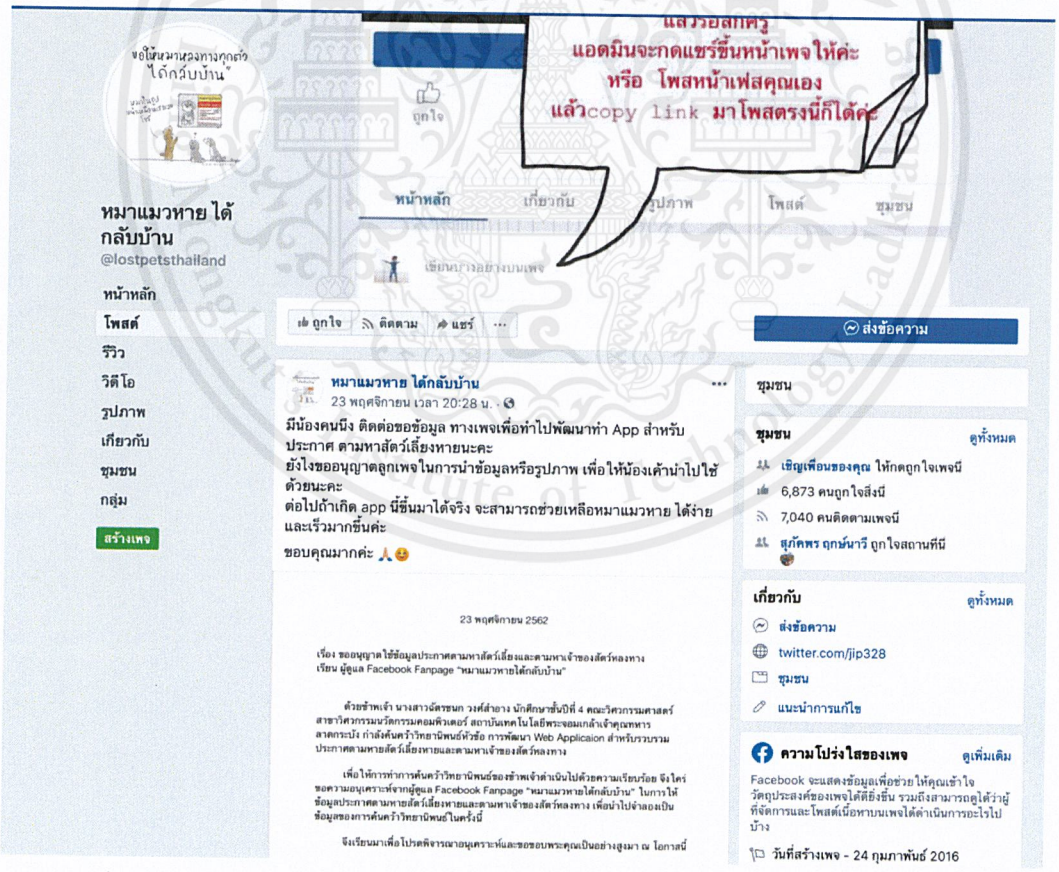


Figure 4.1 Responses to support information from admin of Facebook Fanpage "หมาแมวหายได้กลับบ้าน" [33]

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Figure 4.2 List of Facebook Fanpages and Facebook Group who provide information support [33], [34], [35], [36], and [37]

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4.2 Display Section of Web Application

This section describes the entire display of the operation on the web application.

4.2.1 Sign in window

Sign in window is shown in Figure 4.3. On this page, the web application will request users to sign in using Google Account, Facebook account, or E-mail for creating a data account usage and in terms of other functions of the system i.e., creating lost/found pet reports, browsing the user's report, and managing the user's report. After sign-in, the page will display the home page of the web application.

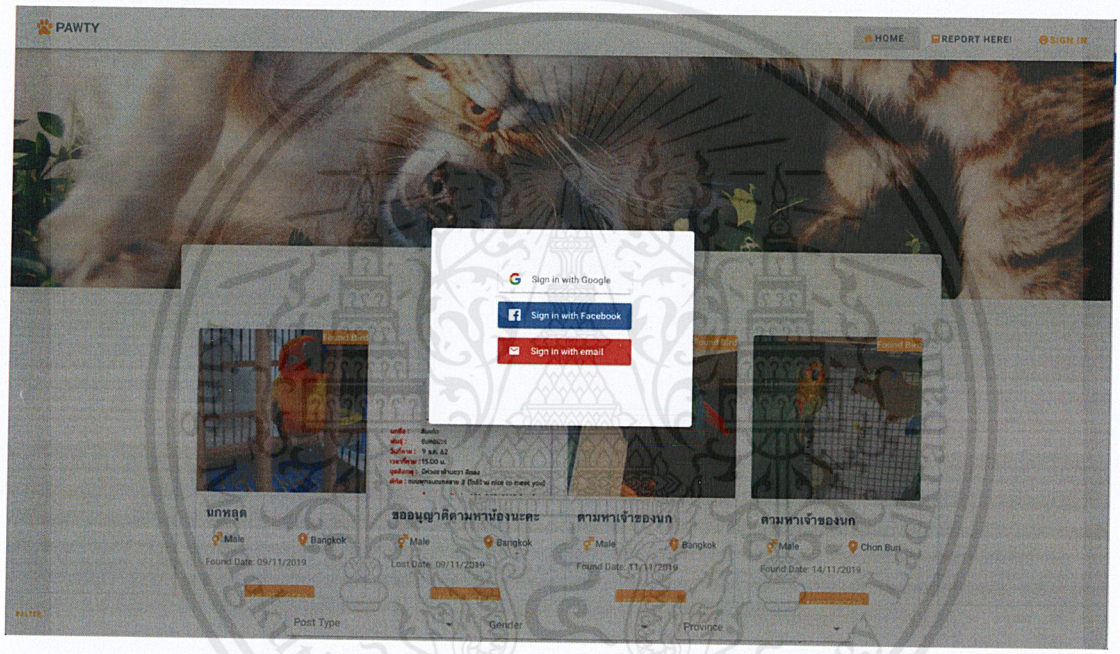


Figure 4.3 Sign in Pop-Up Window

4.2.2 Home Page

The home page is shown in Figure 4.4. This page is the overall picture of a web page application that contains all lists of lost and found pets by retrieving data from the cloud server through RESTful API. The lists are kept in card format by displaying certain pet information i.e., picture, report type, report topic, pet gender, lost/found province, and lost/found date. The user is required to login in order to authentication and access.

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Figure 4.4 Home Page shows all lists of lost and found pet and sample data from the supported Facebook Fanpages and Facebook Groups.

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4.2.3 Filter Results

The home page also provides the filter function to specify searches for exact matches to the user needs. There are three types of the filter which are filter by post type, as shown in Figure 4.5, pet gender, as shown in Figure 4.6, and lost or found province as shown in Figure 4.7.

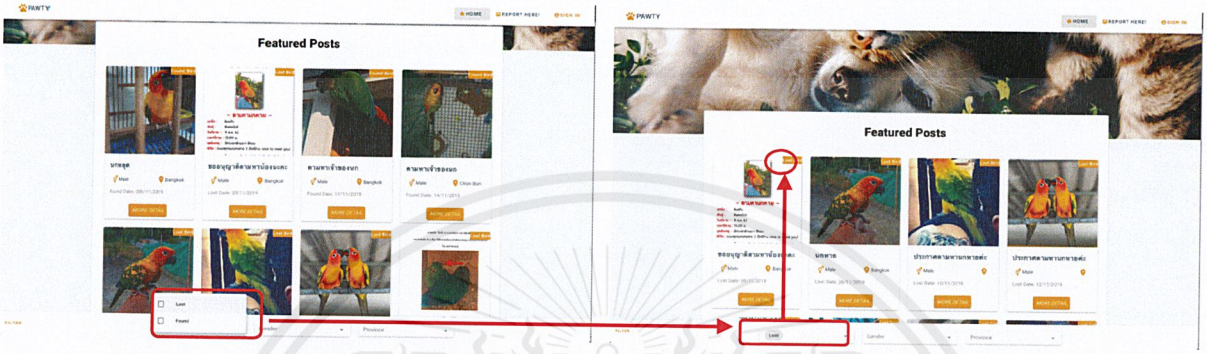


Figure 4.5 Filter Post Type result of the lost Pet



Figure 4.6 Filter Pet Gender result of the male pet

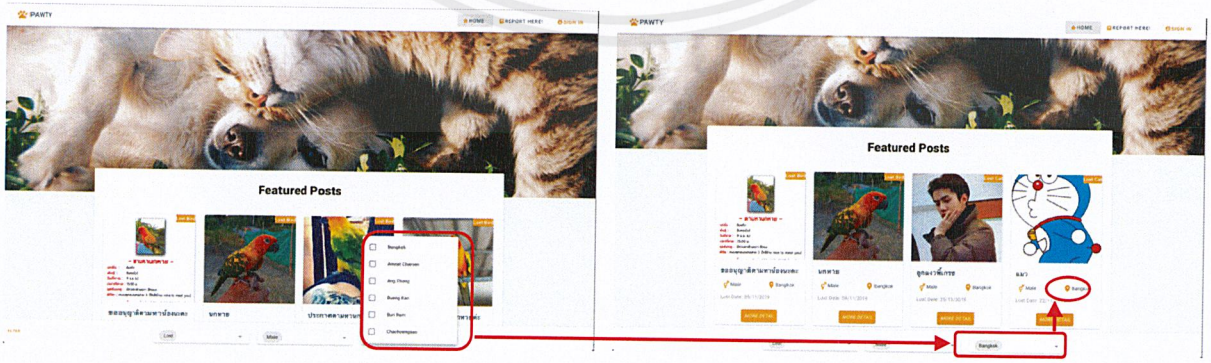


Figure 4.7 Filter Lost or Found Province result of the Bangkok

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4.2.4 Report Page

When choosing the menu "REPORT HERE!" this page will allow the users to fill in the details of the pet for the announcement, as shown in Figure 4.9. If all fields are correct, the system will post the information to the cloud server to keep in the database with RESTful API and return new post displaying on the home page, as shown in Figure 4.10. On the other hand, if specific fields are not correct, the alert popup will notify the users to recheck the information. This page requires the users to sign in before creating the report, as shown in Figure 4.8, to verify the user authentication access for posting, and authorize users to manage their posts.

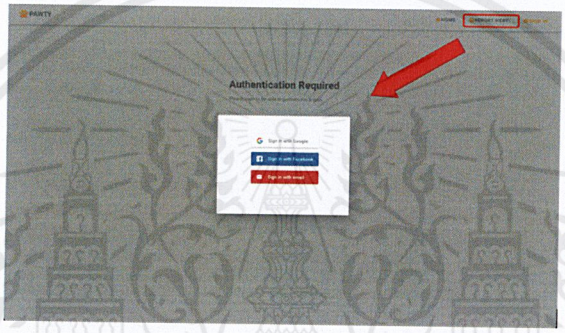


Figure 4.8 Authentication required before creating the announcement

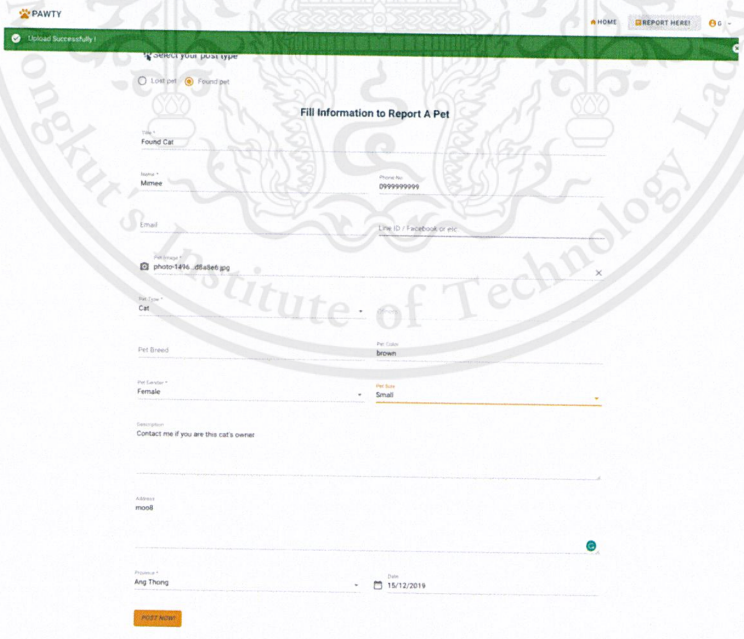


Figure 4.9 Report Page and successful notification showing when data entry and posting to the server is successful

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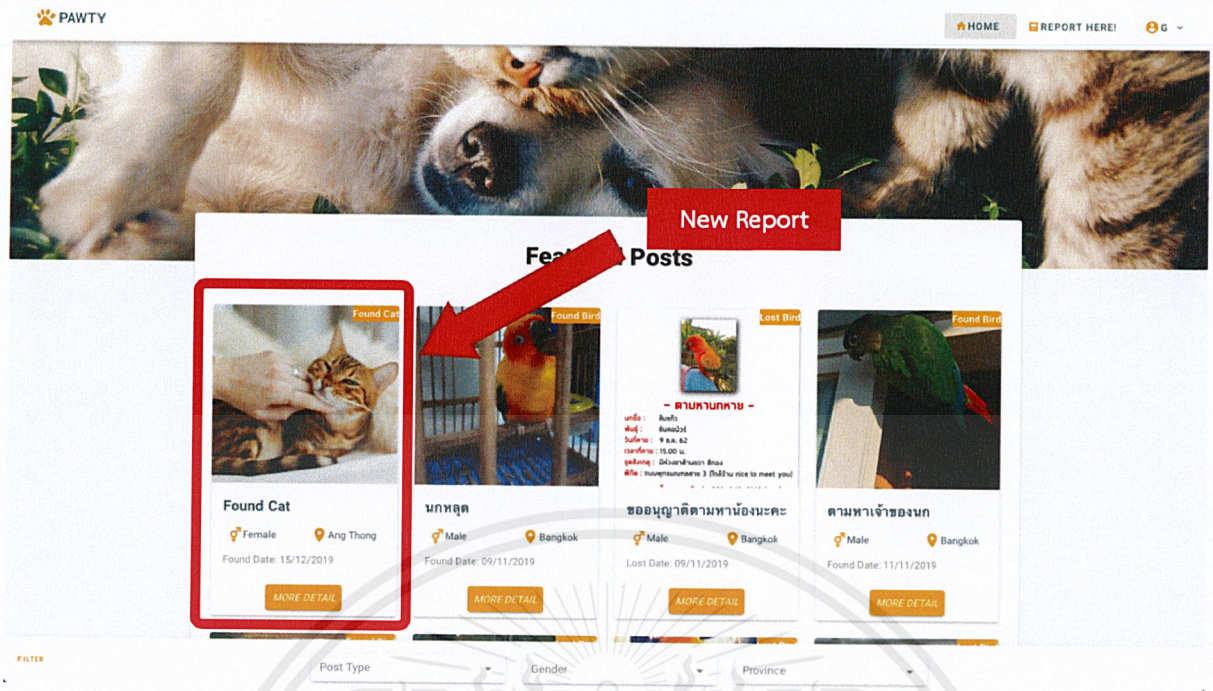


Figure 4.10 New report on the home page

4.2.5 Details Page

On the home page, "MORE DETAIL" on the information card will display the details of the announcement, as shown in Figure 4.11. The users could share posts to social media i.e., Facebook, Line, and Twitter. This section page will publish the lost pet announcement and will increase the number of pets returning, as shown in Figure 4.12. Besides, it also provides comment function for adding a comment from other users, as shown in Figure 4.13. If the users are the owner of the reports, they could manage their posts i.e., for deleting the posts from the home page by click on the "MASK POST AS FOUND" button. The application will change the status of the post to be "FOUND" as shown in Figure 4.14 which mean this post already found its owner then, the system will update the status in the database on the cloud server with RESTful API, but the post still appearing on My Post Page.

4.2.6 My Post Page

My Post page is shown in Figure 4.15. This page collects all announcements created by users. If users delete reports from the home page, it still appears on this page, and the post status displayed as "FOUND" on the information card. The users could find the details of the report but could not edit, share, or comment on that post.

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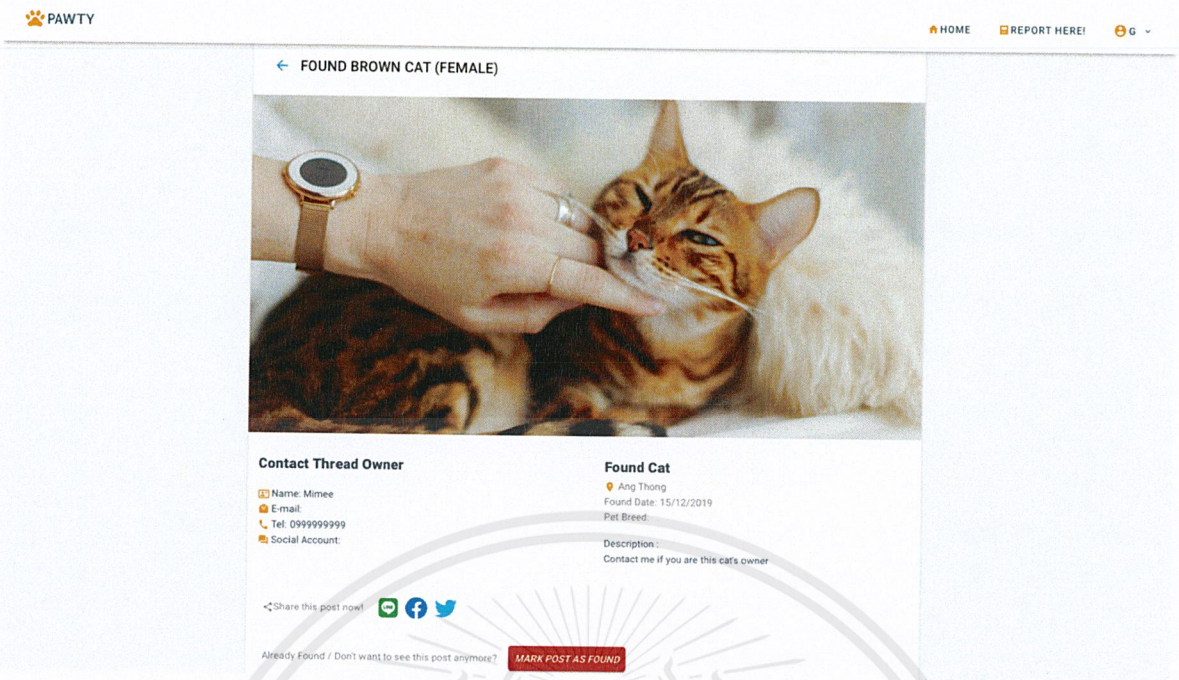


Figure 4.11 Announcement Detail Page



Figure 4.12 Post Sharing on Facebook

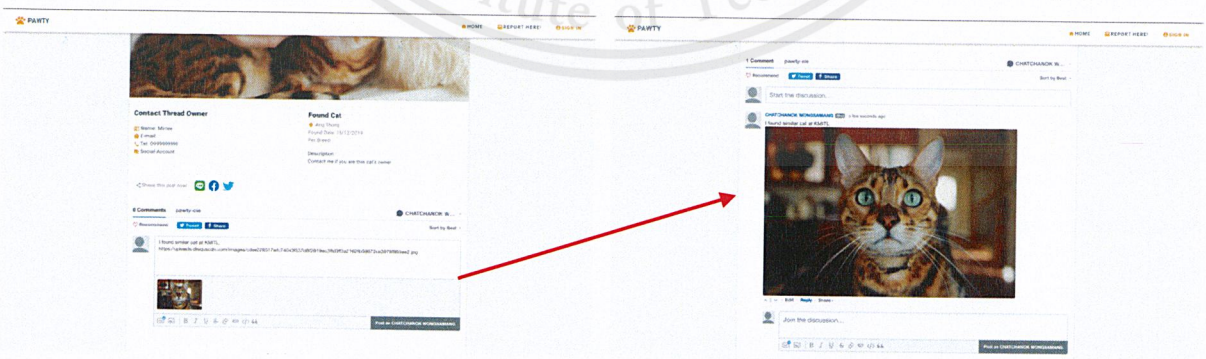


Figure 4.13 Comment under announcement

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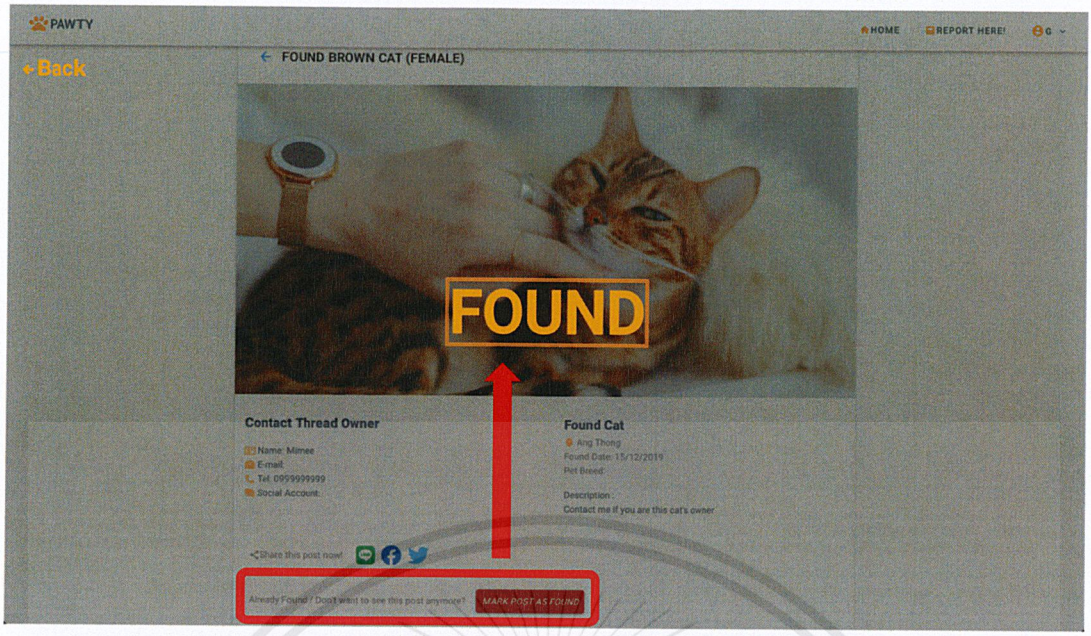


Figure 4.14 Changing the status of the announcement to be "FOUND"



Figure 4.15 My Post Page shows all announcements Created by the Users

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CHAPTER 5

SUMMARY

The purpose of this thesis is to develop the product by integrating techniques of the startup business. This project aimed to discover mechanisms and platforms for pet lovers in the response of customer's requirements; lost and found pets. This study report provides for the development of the web application with respect to collecting announcements of missing pets. The key objective is to design a web application that functions as an intermediate channel of announcement center from social media in one place and to facilitate pet owners in searching their lost pets.

In addition, this project received positive feedback from Facebook Fanpage's administrator as the project will be useful for those to find lost pets. The administrator also said that finding lost pets on Facebook is very complicated, with no filter system resulting in users have to fill missing search randomly, or no found searching result due to misspelling or typing. This project will provide and establish the standard for announcing.

In summary, it is found that this project result could enhance users to find lost animals efficiently, increase the number of returning pets. Further, it also uplifts those paint points and several constraints, a high number of stray cats and dogs, supporting the need for and presence of many animal shelters in the country, lack of time for proper exercise.

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APPENDIX

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APPENDIX A

Use Case Description of the System

The Use Case shows the structure of the system, the sub-operations system, and the various functions of the system. Including showing the relationship between users and the system, which can explain as follows:

Table A-1 Use Case Sign in to the System.

ID	Use Case
Title	Sign in to the System.
Description	Sign in to the System for unlocking various functions.
Actor(s)	Users.
Pre-conditions	The users signed in.
Post-conditions	Firebase generate Id token for the users.
Main success scenario	The users can use service includes creating announcements and manage their posts.

Table A-2 Use Case Showing Announcements.

ID	Use Case
Title	Showing Announcements.
Description	Showing all announcements created.
Actor(s)	Users.
Pre-conditions	The users access the lost and found pet web site.
Post-conditions	Show all announcements.
Main success scenario	The users can browse all announcement and also see more detail of the selected post.

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Table A-3 Use Case Creating Announcements.

ID	Use Case
Title	Creating Announcements.
Description	Creating an announcement to report information for the lost pets or information for pets that have been found.
Actor(s)	Users.
Pre-conditions	The users already sign in and received Id Token.
Post-conditions	The information of lost or found pets will send to keep in the database.
Main success scenario	The users create the report, then click the "POST" button to upload the information, and successful notification will show after data entry and posting to the server is successful.

Table A-4 Use Case Browsing the User's Post.

ID	Use Case
Title	Browsing the User's Post.
Description	Showing all announcements created by the users.
Actor(s)	Users.
Pre-conditions	The users already sign in and received Id Token.
Post-conditions	Show all reports that the user has created.
Main success scenario	The users can browse all announcement has created and also see more detail of the selected post includes the post including reports that have changed status.

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Table A-5 Use Case Updating Post's Status.

ID	Use Case
Title	Updating Post's Status.
Description	Update post status if this post already found owner.
Actor(s)	Users.
Pre-conditions	The users already sign in and received Id Token.
Post-conditions	Update status of the post to the server.
Main success scenario	The users can manage their posts by deleting their posts from the home page by click on the "MASK POST AS FOUND" button.

Table A-6 Use Case Sharing Announcements.

ID	Use Case
Title	Sharing Announcements.
Description	Share the posts to social media.
Actor(s)	Users.
Pre-conditions	The users access the post's detail of the selected post.
Post-conditions	Show more detail of the selected posts and sharing button.
Main success scenario	The users can share the announcement to the social media such as Facebook, Line, Twitter.

Table A-7 Use Case Comment on the Post.

ID	Use Case
Title	Comment on the Post.
Description	Comment on the Post.
Actor(s)	Users.
Pre-conditions	The users access the post's detail of the selected post.
Post-conditions	Show more detail of the selected posts and comment box under the details.
Main success scenario	The users can comment on the post by text, picture, GIF, and other.

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