Petpal: A mobile-based application to connect pet owners to pet service providers.

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An Information Systems Project Proposal Submitted to the School of Computing & Engineering Sciences in partial fulfilment of the requirements for the award of a Degree in Business Information Technology

Date of Submission: 24th August 2023

Declaration

I declare that this work has not been previously submitted and approved for the awardof a degree by this or any other University. To the best of my knowledge and belief, the research proposal contains no material previously published or written by another person except where due reference is made in the research proposal itself.

Students Signature:

Sign: Date: 24th August 2023

Sign: Date: 24th August 2023

Abstract

The pet industry, an ever-growing sector in the Kenyan economy constitutes pet-animal groomers, walkers, educators, health-care providers and more. This industry having been fueled by the COVID-19 pandemic, is growing fast notably due to the loneliness that the pandemic evoked brought on by the lockdowns and quarantines; causing Kenyans to seek out furry companions. Consequently, this has led to a growth in petCare economic opportunities. Services, especially pet-food and healthcare have never seen a higher demand. Complementary petCare services such as dog-walking and pet-grooming are typically carried out by informal actors whom often face significant roadblocks to maximizing their financial benefits. These actors who often live on the outskirts of Nairobi often travel long distances to provide petCare services. Costs for such people need to be minimized but often transportation costs are exceedingly eating into their ability to earn considerable profits. An urge to support this cause to enhance sustainability in the pet-animal industry has thus bloomed. This project seeks to critique and review current information systems that support this cause that claim to be enhancing petCare so as to inform the creation of a robust pet-support Information System. The objective is to seamlessly connect pet service providers to nearby pet owners. The system shall prioritize the distance one service provider has to travel to provide petCare services with a focus on dog-walkers and groomers. Think of it as 'Uber for Pets' so that by acknowledging user locations, the app can only suggest pet service providers that are closest to the service seeker, the pet owner. Ultimately, the application should grow into a safe platform that enhances the level of convenience of owning a pet. The Kenyan studies surrounding this industry have focused on healthcare and failed to address the daily and complementary activities, events and decisions surrounding pet care. Therefore, there is an appreciable gap left in Kenya where an unstructured way of operating daily pet care opertations leaves pets and petCare service providers vulnerable. This project shall be carried out using Scrum Agile Methodology to support teamwork, efficiency and efficacy within the limited time constraint.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

ADB	Android Debugging Bridge
AI	Artificial Intelligence
API	Application Programming Interface
CRUD	Create, Read, Update, Delete
DBMS	Database Management Systems
GUI	Graphical User Interface
IDE	Integrated Development Environment
IoT	Internet of Things
HTML	Hyper-Text Markup Language
KSPCA	Kenya Society for the Protection of Cruelty to Animals
OOAD	Object Oriented Analysis and Design
PSMS	Pet Shop Management System
PSP	PetCare Service Providers
SDK	Software Development Kit
UI	User Interface
UX	User Experience
XML	Extensible Markup Language

Chapter 1: Introduction

Background

Kenya has a large market brought on by a dense population, improving economy, and increasing rural-urban migration. It is this large market that has led to a thriving and diverse economy supporting pet-animal industry. A study has found a correlation between animal's standards of living and their rate of mortality (Mbindyo et al., 2017). Thus, the ease of access to pet services is a major promoter for health and welfare of our beloved pets. Pet grooming, sitting, walking and/or training; as well as veterinary services make up the pet industry. A study by Ombasa (Ombasa, 2017) found that dog breeding is an upcoming service that has exploded due to the growing middle class in Kenya. With over 5 million dogs in Kenya (*Who Let the Dogs out? Exploring the Spatial Ecology of Free-roaming Domestic Dogs in Western Kenya - Muinde*

- 2021 - Ecology and Evolution - Wiley Online Library, 2021), pet ownership has grown rapidly enhanced by the onset of the COVID-19 pandemic: "people had more free time, they were lonely, and they wanted animal companions." (Wanjohi, 2021). It has also been reported by the Kenyan Society for the Prevention of Cruelty to Animals (KSPCA) that an estimated 60% of shelter animals were being adopted every month in 2019 (Wanjohi, 2021). This proves that the pet industry was already booming even before the pandemic.

In Kenya, majority of pet service firms are based in regions on the outskirts of Nairobi, far from urban neighborhoods. Travel costs are thus, transferred to pet owners who consequently, must pay a hefty fee for a service. Research has corroborated this: on average a dog-walker fetches up to 1300/= per hour, per dog walked (Kahonge, 2022). This high cost serves as a dis-incentive to pet owners. "People need to learn", remarked a Kenyan, celebrity, pet owner during a personal conversation with this writer. It was established that too many pet owners inadequately care for their companion animals. This writer believes that lower rates for service in this industry could improve the situation.

the health and wellbeing of pets (Ghute, Deshpande, Sondvale, Bhalerao, & Deshmukh, 2022). Despite the challenges, the pet care industry provides an excellent opportunity for individuals who are passionate about pets and want to make a career out of passion. To increase economic opportunities, cost barriers to entry in this industry can be curbed by the meaningful pursuit of cost-cutting techniques leveraging on technology.

Problem Statement

It has been noted through personal experience that petCare service providers travel very long distances to provide daily petCare services to a detriment of their financial health.

Aim

To develop an information system to solve the problem of mismatched transactions within the pet-animal industry that are not based on proximity of service as identified in the problem statement. A mobile application to focus on developing a comprehensive database that acknowledges user locations and allow search functionality for users to find specific types of pet care services.

Specific Objectives

- To critique the current techniques that are used to find pet care services.
- To review existing information systems used within the pet-animal industry.
- To develop a mobile application that will facilitate proximity-based searching of pet care services.
- To test this information system.

Justification

By building a mobile application that reduces the cost of service provision and increased the ease at which to own a pet, a pet-animal industry environment that enables

sustainable transactions is promoted. The needs of pets can be a challenge to meet individually and thus, a community-based perspective enabled by technology is crucial in supporting all those involved (Figure 3 5 Pet Freedoms).

Scope

The aim of this project is to create seamless access to pet care services focusing on a proximity-based perspective to connecting pet owners and pet service providers. The application, strengthening seamless pet ownership and access to pet care services will focus on the regular and complementary pet-animal industry services of dog-walking and pet-grooming allowing the pet owners to request for pet care services from the comfort of their homes. The platform will be based on the Android architecture to increase the probability of accessibility by the majority of Nairobi-city-dwellers. The software shall strive to make use of a robust database management system to store i

Chapter 2: Literature Review

This chapter focuses on reviewing the work done in the pet industry; both in Kenya and outside of Kenya. It begins by exploring existing methods of accessing pet services before exploring the challenges that exist in these ways. By finally focusing on technological advancements used in the topic, it will highlight areas in which technology has enhanced the overall pet experience in the industry. Additionally, challenges that arose due to the integration of technology in this sector.

A description of current methods of accessing pet services

First and foremost, the internet has been permeating every aspect of our daily lives since its invention in1983 that is still fuelled by the rising demand for high standards of living (Soleh et al., 2017). The internet has especially impacted businesses in every sector of the economy.For many businesses, a common method of being discovered is through a rudimental Google Search whereby a keyword is input into the Google Search Engine like "Dog- walker Nairobi" and results lead you to the service.

Secondly, pet owners who adore their pets are a large community in every country, including Kenya. It is not unlikely that conversations had amongst people of the community lead to the discovery of pet services. Some owners call their pets their "children" and that is the reason the talk of pets comes up often in casual conversations among friends, family and acquaintances. With such high regard for their pets, recommendations made from fellow pet-owners are accepted on high authority. Word-of-mouth is a common way for business to get prospective clients especially with the rise of Social Media Influencers.

Thirdly, as the demand for pet products rise (Chen & Elshakankiri, 2020), foot traffic inside of pet stores also increase (March 05 2021, 2021) and pet stores are a good and reliable source of information when it pertains pet services. Consequently, a common

method of gaining access to pet services is through word-of-mouth from affiliate or partner businesses within the industry. Furthermore, also at veterinary clinics where noticeboards overflow with pinned-up posters advertising pet services. Pet owners will 'chance' upon pet services otherwise.

Challenges experienced with current methods of accessing pet services.

Many pet owners struggle with the current methods of accessing pet services. Moreover, with finding the support that they need when they need it. Taking care of a pet might be demanding and stressful and a conveniency goes a long way in caring for pets (Paygude et al., 2018).

1) Google Searches

The information on Google Searches is not 100% relevant all the time. Furthermore, there is no guarantee that all pet service providers are in the Google Search Engine database. Moreover, the internet is open to several users whereby some can have malicious intentions to provide misinformation (Kitala et al., 2000). Misdirection of pet owners is a common risk while using this method.

2) Recommendations from friends and family

Family and friends that live in far and wide areas of the town might not be the perfect match for our needs. That is, a pet service provider that serves a Runda- based friend will not be the right fit for a Kileleshwa-based customer. The access to these services via this method is therefore, untrustworthy.

3) Recommendations from pet service entities

This method of accessing pet services poses the same challenges as list itemno.2.

A Review of mobile-based pet services systems

OPet: Pet services

The OPet mobile application solved the problem by providing three services within it: OPet Shopping (customers shop on the platform); Opet Grooming (the platform provides access to grooming services); Opet Hotel (the platform provides access to pet's day-care services) (Soleh et al., 2017).

Peddy: Pet Sitter Robot

Care for companion animals that are frequently left at home alone during the day has become a problem as one-person households are on the rise, according to a Guru IoT representative. "Managing both their physical health and emotional aspects, such as loneliness, is crucial if you want to spend a long period living happily with companion pets." PEDDY, which has a smartphone embedded inside of it, enables pet owners to care for their animals wherever they are by enabling real-time communication with them via an application. It is a robot that cares for animals and allows them to spend time alone safely (Onag, 2019).

Mobile animal health expertise

With the advent of technology, a rule-based expert system enables the end-user to run new sorts of healthcare systems for continuously monitoring the health state of pets, such as harmful ingestions, and swallowed objects. Any disease attacks on pets can be avoided with the use of the pet mobile app. When there is an emergency, we can call the veterinarian by making an online appointment using this app. This app also assists in locating the closest animal hospital in the area. In this study, problems with pet health are addressed via cell phones (P. Kumar et. al., 2017.

Gaps in existing mobile-based pet service systems

Existing studies and literature have primarily focused on broader aspects of pet care such as health care, sociology, and nutrition. A noticeable research gap exists in the optimization of exercise and education services for the pets and especially, with a specific focus being Nairobi. This gap creates a need for an information system that bridges this gap by focusing on access to walking and training services. Additionally, these studies use small research samples such as 40 pet owners (for OPet application), but it ignores the majority of the population. In countries where income inequality is high, the attention has not been paid to leveraging of technology with a focus on alleviating economic strain.

A Review of possible technologies for development

There are several potential technologies to consider while creating a mobile-based system for gaining access to pet care services.

1. Utilizing a native mobile application platform, like Android enables a more efficient and seamless user interface.
2. Utilizing a HTML5 web application, which users can access directly from their browser, doing away with the requirement for them to download an additional app. This method has its benefits like increased accessibility options, but it limits the extent to which a user can customize the app.
3. Incorporating AI and machine learning algorithms could offer consumers customized pet care plans and useful advice.
4. Incorporating IoT to support and expand the pet care permeation and extent of tech-enabled systems is also viable as it increases Security.

Proposed System

To bridge the identified research gap, a mobile-based information system that integrates GPS is proposed. Out of this proposition, the following can be achieved:

- Proximity based matching: to minimize costs and travel time and to enhance convenient gaining of access to pet services, geolocation services can be used to connect service providers and pet owners within their vicinities.
- Rich database: with every sign up of service providers, pet owners get a wide variety to choose from. Conversely, service providers can increase their customer base.

Conceptual Framework

Petpal is a mobile based application that facilitates proximity-based searches and connects pet owners to pet services in a convenient way.
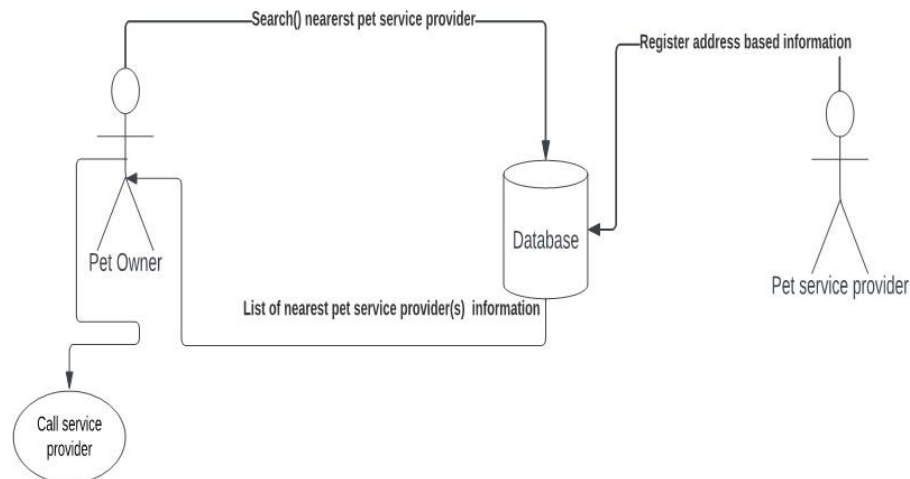
Figure 1: Conceptual Diagram

Chapter 3: System Development Methodology

This chapter focuses on the methodology to be used for the development of Petpal. A System Development Methodology refers to the structured approach used to develop an information system. The approach choses in The Agile development methodology specifically, Scrum for its potential to enhance efficiency effectiveness. Scrum employs an incremental and iterative software delivery method that maximizes the level of control towards risk (*Scrum Guide | Scrum Guides*, 2020). Given our constraints of time, Scrum would be the most suitable option. It enables developers to prioritize the most valuable features within the timeframe increasing probabilities of development success. Scrum also promotes effective communication and teamwork. Scrum should guarantee regular reviews and planning, efficient coordination during the collaboration.

System Development Methodology

Figure 2: Scrum Process

(pmadmin, 2021)

The system will be developed using the Agile software methodology, specifically Scrum. The use of the "Heart and Skeleton" approach enhances the capability to develop quality software through practices that enhance accountability (*DC-VOLARO-Training- Scrum-What_Is_Scrum.Pdf*, 2014). Each sprint or phase is focused on delivering priority- based

software functionalities, in a manner that enables the immediate use of the information system. Testing is done at the end.

Product Backlog

The Product Backlog refers to the list of requirements for the software. It includes all the necessary components that make up the whole information system.

Sprint Planning Meeting

This meeting provides guidance for each sprint so that, when developers are left unsupervised, the Scrum Master is assured a high probability of performance from the team. The list of requirements is re-arranged in order of highest-to-lowest priority during the first half of this meeting, and the sprint period is designed during the second half that includes task assigning to developers, setting timeframes, etc. This is unequivocally the most important stage of the development methodology.

Sprint Backlog

At this stage, different requirements are given timeframes during the sprint. It includesthe processes of a review and a retrospection.

The Daily Stand-Up

As and throughout the ongoing sprint, the development team holds a brief meeting to coordinate and schedule their daily tasks.

Finished Work

At the end and after testing, the team presents the software.

System Analysis

System Analysis refers to an empirical review of a proposed system. The process is aimed at exploring a system to identify its total functionality. The approach to system analysis that will be utilized for the proposed system is known as object-oriented analysis and design. It will acknowledge the different classes, objects and their relationships to establish a comprehensive view of the whole information system. Once this is done, the system is designed in a transparent way.

The production of reliable, maintainable, and extendable systems is made possible byhis approach that is organized and modular. Object-oriented analysis and design (OOAD) supports successful and efficient development by placing an emphasis on object-oriented concepts and iterative development (Dathan & Ramnath, 2015).

Functional Requirements

Functional requirements describe the specific functionalities, features, and behavior that a software must possess to fulfill the users' needs and achieve its intended purpose. Petpal will have the following:

1) Leverages data to effectively match users based on their neighborhoods.

2) Displays relevant search results.

3) Executes phone calls outside of the application.

4) Tracks user interactions.

5) Displays user interaction histories.

Non-Functional Requirements

Instead of concentrating on specific capabilities, non-functional requirements identifythe traits, attributes, and restrictions that describe how the system should operate and behave. Petpal will have the following:

1) High levels of availability.

2) An accurate Search functionality.

3) Intuitive User Experience (UX).

4) Light-weight software.

5) Seamless User Interface (UI).

System Development Tools and Techniques

To develop the proposed system, the writer and team will need the following essential tools and techniques:

Integrated Development Environment (IDE):

Android Studio: The official IDE for Android development. It provides a complete set of tools, including an emulator, code editor, debugging features, and UI design tools.

Programming Languages:

Kotlin: Android applications can be developed using Kotlin, a modern and officially supported language by Google for Android development.

Android SDK and APIs:

Android SDK: A collection of tools, libraries, and APIs provided by Google for developing Android applications.

Database and Backend:

Firebase Realtime Database: A cloud-based platform by Google that offers various services for app development, including real-time database storage, user authentication, and cloud functions.

User Interface (UI) Design:

XML Layouts: Android uses XML for defining the UI layouts. We will need to design XML layout files to create the user interface screens for your application.

Material Design: Following Google's Material Design guidelines will help ensure a

consistent and visually appealing UI. Use the Material Design components and principles to create a modern and user-friendly interface.

Version Control and Collaboration

GitHub: Online platform that provide hosting for Git repositories. It facilitates collaboration, issue tracking, and code review processes.

Documentation and Project Management:

Slack: Slack is a collaboration and communication platform designed to streamline workplace communication and enhance team collaboration. It's essentially a digital workspace that brings together various tools and features to facilitate real-time communication, file sharing, project management, and more.

System Testing Methods

Android Debug Bridge (ADB): A command-line tool that allows you to communicate with a connected Android device or emulator for debugging, installing, and testing the application.

Execution Domain

The system will have a mobile-based mode or domain of execution. It has been established through thorough research that mobile-based innovations are rapidly increasing productivity in the workplace, home and nation (*2022-Safaricom-Sustainability-Report.Pdf*, 2022.). Mobile Applications have been known to nurture community-based innovations and bring faster access to resources.

Proposed Modules and System Architecture

The proposed modules and system architecture includes the breakdown of different functional components (modules) and the overall architecture that defines how these modules interact and work together. It outlines the high-level organization and

relationships between different parts of the system to achieve the desired functionality. In the context of the proposed system, a brief explanation of the proposed modules and system architecture is outlined below:

User Interface (UI) Module: This module handles the presentation layer of the application, including the user interface screens, navigation, and user interactions to create a visually appealing and user-friendly interface for users to interact with the application.

Authentication Module: This module manages user authentication and authorization processes. It provides features like user registration, login, and logout to ensure secure access to the application.

Database Module: This module handles the storage and retrieval of data related to dog-walker information, user preferences, and any additional data required by the application. It interacts with a database system (such as Firebase Realtime Database) to store and retrieve data in a structured manner.

Search Module: This module enables users to search for nearby dog-walkers. It utilizes the 'address' data from the database module to fetch and filter relevant data.

Chapter 4: System Analysis and Design

This chapter highlights the system's architecture; including its main purpose and usages. It will also cover the approach used to gather the requirements for the system earlier mentioned in the previous chapter. A visual representation of the system is included and provided through systems designs. The design diagrams used were the use case diagram, database schema, class diagram and sequence diagram. The visualization of the application for the user is depicted via the wireframes.

Requirements gathering

This is a description of the means involved to collect and identify the various system requirements necessary for an effective Information System (functional and non-functional). The requirements gathering was quantitative in nature using observation techniques, documentation review, personal experience and interviews. Based on personal experience, interviews and observation, these methods proved effective to our requirements documentation; the results of which have been highlighted in the literature review section. This was essential in understanding the pros and improvements needed for the system. The users could provide additional information about the challenges while using the system in face-to-face interviews. The observation of service providers' locations gave first-hand information on the resources and considerations needed to provide users with their services in a business-savvy perspective helping to finalize the system requirements.

System Requirements

Functional requirements

ID	DESCRIPTION
FR1	The system should allow clients to find service providers matching their ideal location.
FR2	The system should allow clients to search for the type of pet care service they demand.
FR3	The system should enable the execution of phone calls to a chosen service

	provider.
FR4	The system should allow clients to view their call histories.
FR5	The system should be able to track call events.

Table 1: Functional Requirements

Non-functional requirements

ID	CATEGORY	DESCRIPTION
NFR1	Availability	The system should be easy to develop.
NFR2	Accuracy	The system should provide the correct information
NFR3	Intuitive	The system should be easy to use.
NFR4	Seamless	The system should be device friendly.

Table 2: Non-Functional Requirements

System Architecture

The architecture includes all the components that make up a system and how they interact all to deliver the correct functionality of the system. The architecture of a system across interactions is the main emphasis of an architecture-centric methodology. This makes that the final system is not a jumble of components that can be challenging to integrate, maintain, and improve (Alhir, 2003).

The system architecture for this project comprises of the Android mobile application and Firebase database. The database stores data input and accessible only to the system administrator. The application itself is accessible to the user and service provider.

Analysis

Use case

Simply put, use cases enable the definition of a series of actions that, when taken collectively, result in a system performing a beneficial function. Use cases clarify exactly when and under what conditions the series of activities takes place, which reduce
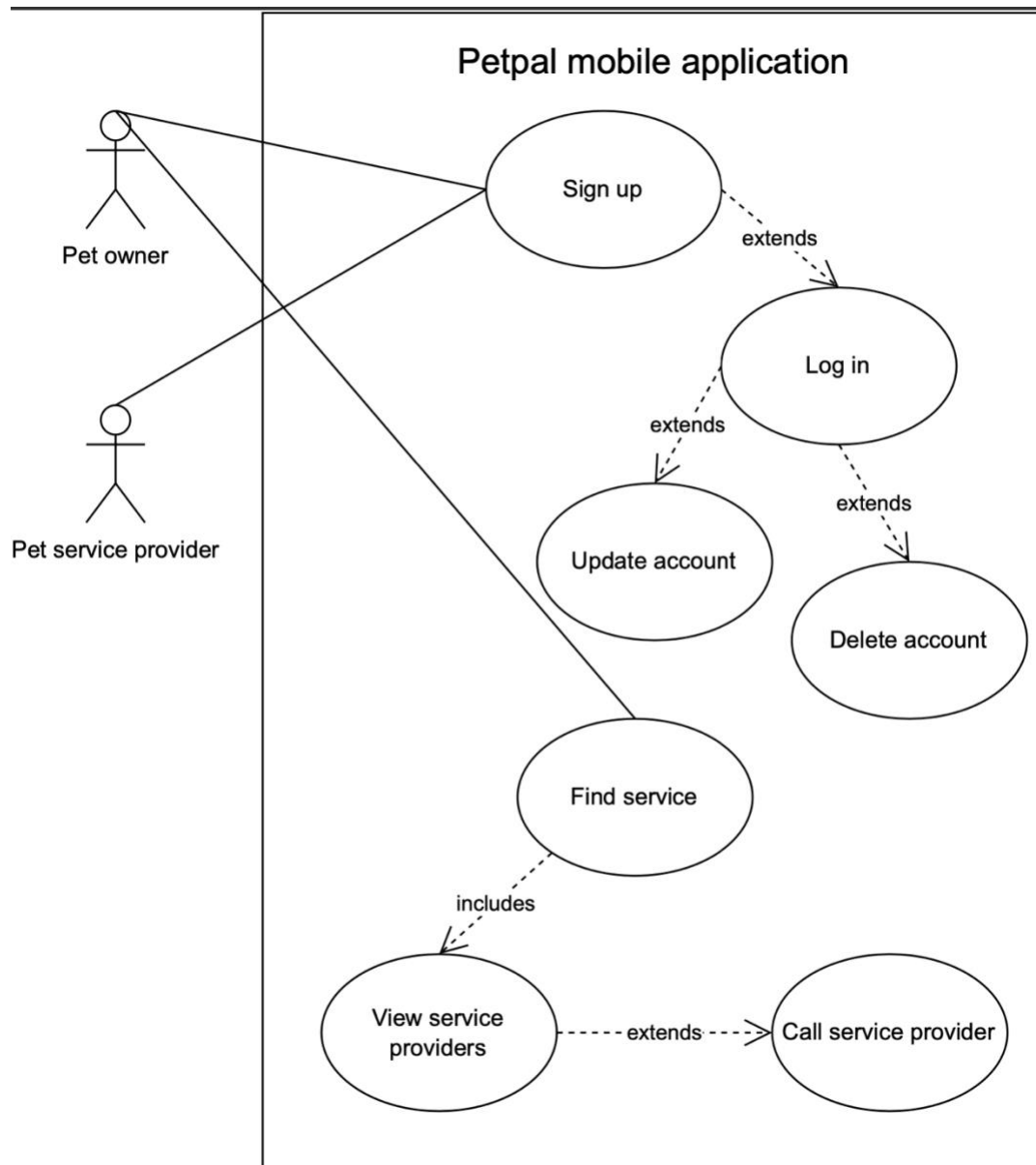
ambiguity in requirements (Kurt & Ian, 2003).

Figure 3: Use Case Diagram

System name	Petpal: A mobile-based application to connect pet owners to pet service providers.

Description	A mobile application that connects pet owners to service providers to get grooming & walking services
Primary actors	Pet owner Pet service provider Admin
Pre-condition	Domain: mobile-application connected to the internet Access: available to pet owners
Flow	Pet owner: The user should be able to sign up The user should be able to log in after authentication The user should be able to search for a service The user should be able to call the selected service provider Service Provider The service provider should be able to sign up The service provider should get a successful sign up message
Alternate routes	On incorrect login credentials the system should inform the user

Table 3: Use Case Diagram

Designs

A schema contains details on the database's structure, including the tables, attributes, and keys. The schema includes the following descriptors for data saved in the physical or virtual data storage:

1   Grouping individual stored data elements into more complex categories, like tables,

2   Associations between tables or classes, information about specific data items, such as their kinds, lengths, locations, and indexing,

3   Access and content restrictions, such as lists of users authorized to access or alter data items, value relationships between various data items, and acceptable values for data items (Satzinger, Jackson, & Burd, 2016).
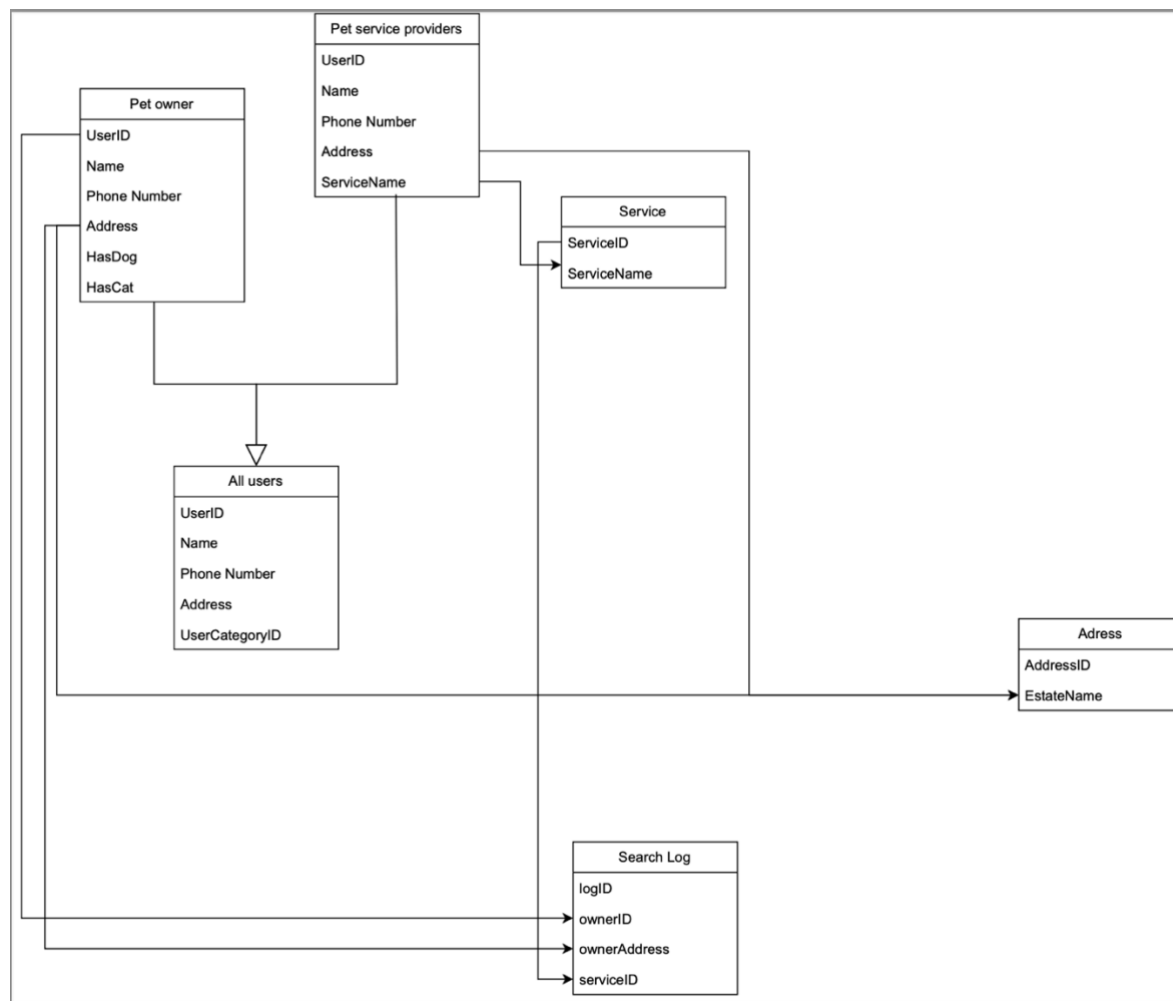

Figure 4: Database Schema

4.5.2 Class Diagram

One of the most basic forms of diagrams are class diagrams. The static relationships of your software, or how things are placed together, are captured in the diagrams. Software design decisions are made on a regular basis, such as which classes hold references to other classes, which classes inherit from other classes, and so forth. Class diagrams offer a means of encapsulating this system's "physical" structure (Pilone & Pitman, 2005).
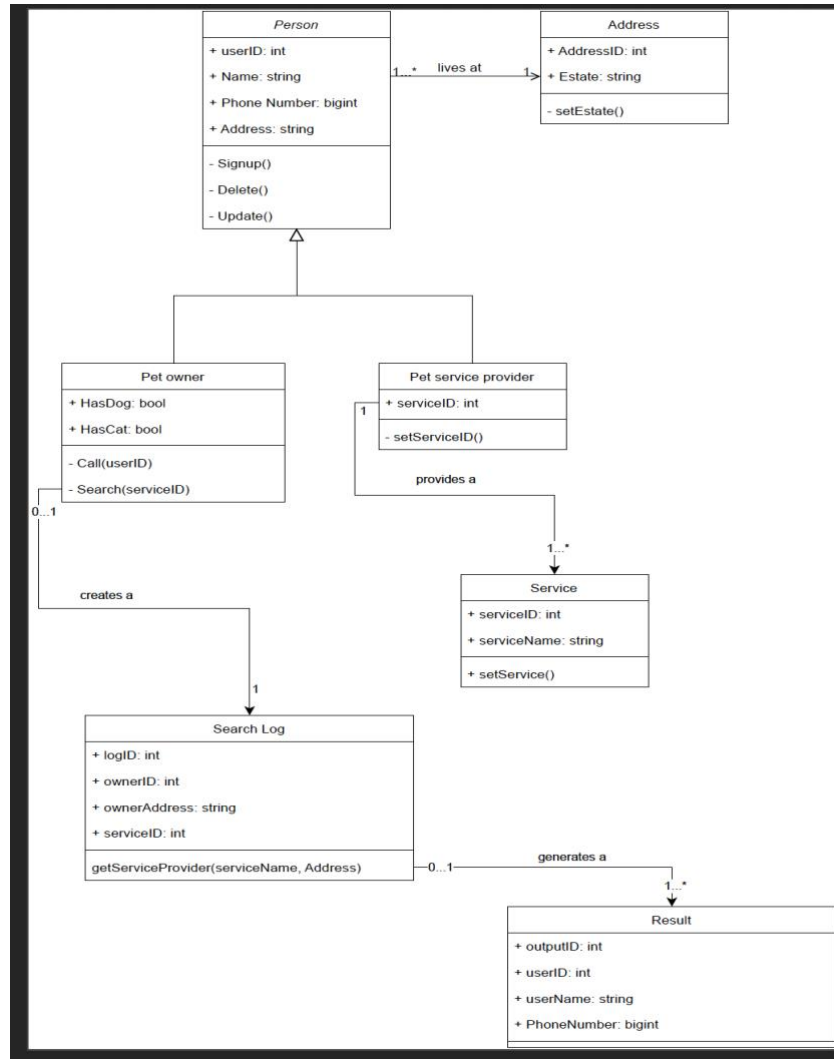

Figure 5: Class Diagram

4.5.3 Sequence Diagrams

A sequence diagram typically depicts one scenario's behavior. The figure displays several sample objects together with the messages that are sent between them during the use case. The arrangement of messages is shown in sequence diagrams by reading down the page, and each participant is represented by a lifeline that runs vertically across the page
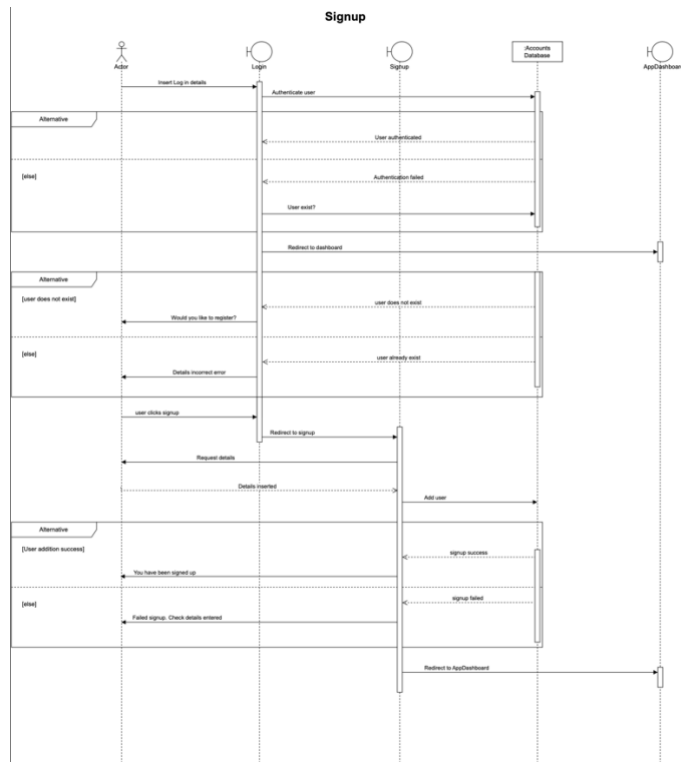
23

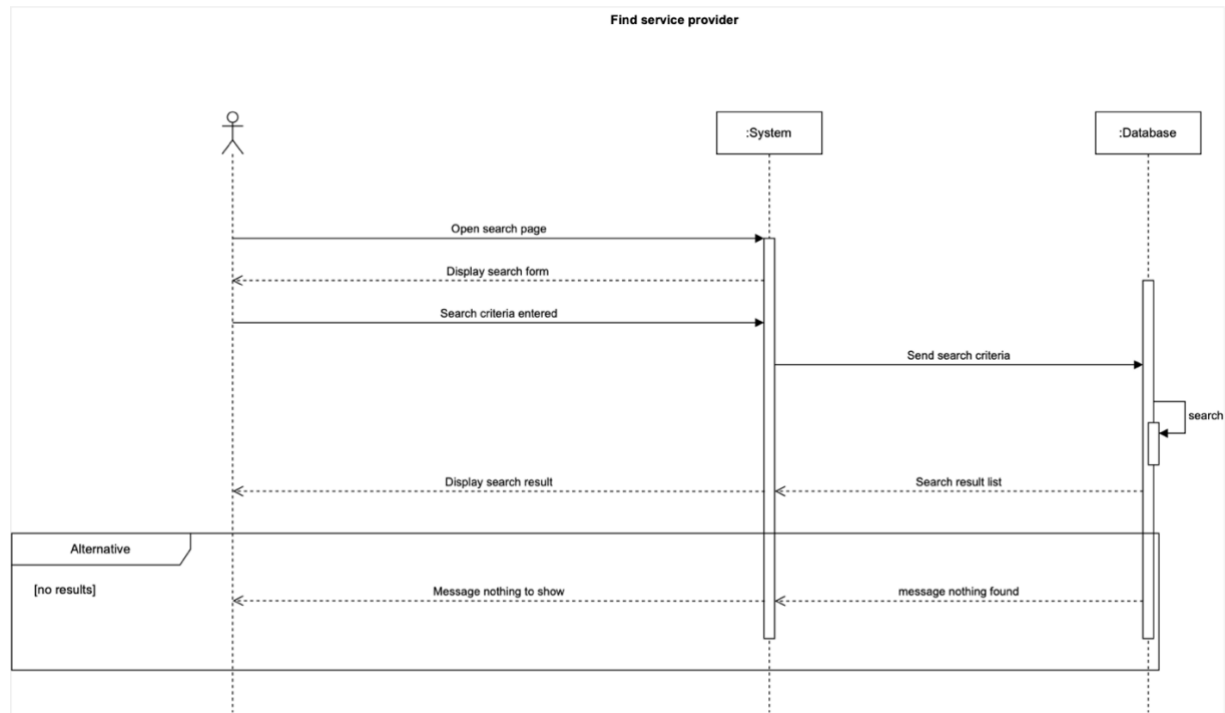(Alhir, 2003).

Figure 6: Signup sequence daigram

Figure 7: Find Service sequence diagram

4.5.4 Wireframes

A wireframe is a visual representation on a schematic. It outlines the design used in web design, graphic design, user interface design and product development. It serves as a basic blueprint that outlines the structure, layout and functionality of a system or product (Sutipitakwong & Jamsri, 2020).
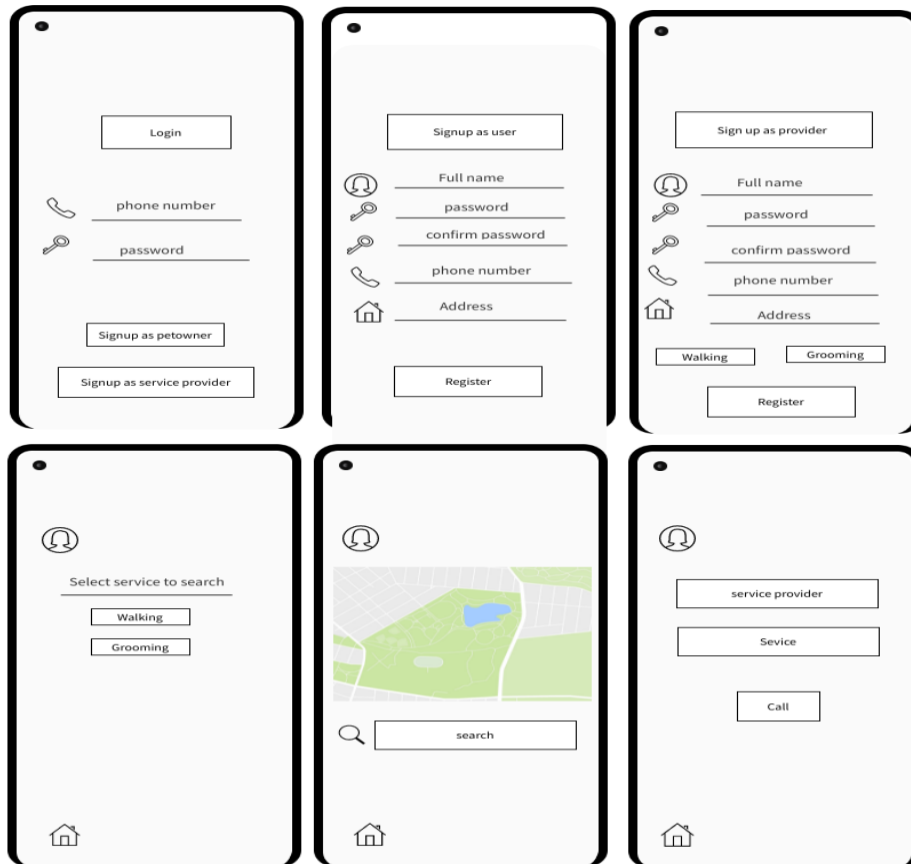

Figure 8: Wireframe Designs

Chapter 5: System implementation and testing

The goal of this chapter is to describe in greater detail the systems capabilities, purpose and usages. It will focus on the system development process that was aimed at detecting system failures in advance. Additionally, it describes how the system was tested to make sure that it met the necessary specifications to accomplish the overall goal.

System implementation

At the start of the system development, was the planning of different roles within the project including scheduling and organizing the various tasks that were involved in the development proves. Thereafter, there was an identification of the system's main actors which was established to be the Pet Owners themselves. Additionally, the database administrator would be responsible for maintaining the system as a whole. The different usages were as follows:

User log in page

Once the app has been opened by a pet owner, a brief splash screen will be shown having the name and the slogan of the application. After that, the log in module appears as shown in the figure below. In this module, the user can sign up and/or login. Once the user logs in, the system would request to use their location. During the requirements gathering process, it was noted that there needed to be a simple way to on-board service providers and therefore, theservice provider can register through this module as well by clicking on the 'sign up as service provider' button.
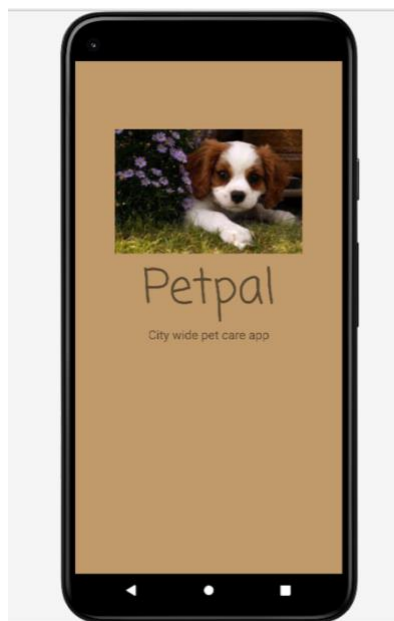
Figure 9: Splash screen

User sign up page

The first module needed was the sign up for the pet owners. The sign up would capture essential data: full name, user name, email, phone number and the password. This would enable easy tracking of the user and any changes needed for a specific user. Additionally, this data would populate the User Profile object.
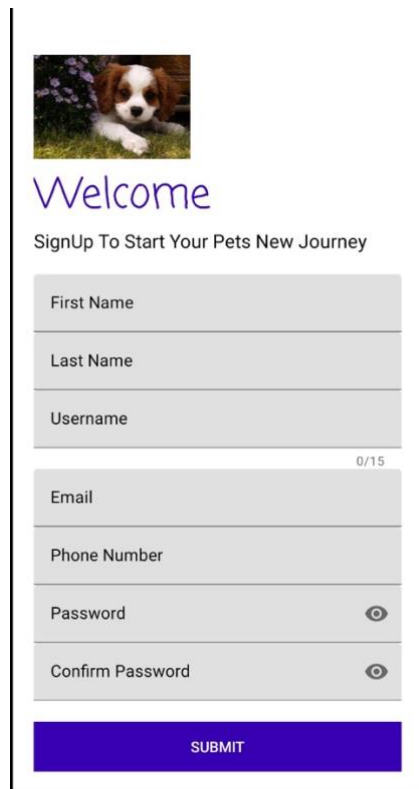

Figure 11: Pet Owner Signup UI

Service Provider sign up page

The system also needed to sign up service providers. A successful registration message would be sent to the service provider. The services providers only have a sign-up module because they need to be verified and authenticated through a series of various steps outside the application system. This was to ensure the safety of our primary clients and their pets. Thus, an additional non-functional requirement was identified to ensure safety and security for the users of our platform.

Figure 12: Service Provider Signup UI

Search pet care service and Home page

Once the user has been logged into the system, they are directed to the home page. In this page, there are two buttons that direct them to the categories of petCare services: dog walkers or groomers. Each of the options provides a list of the service providers based on their location. Below these buttons, is a list of our "Featured" service providers. All lists are clickable and a click on one of the service providers showed a view of their photo, name, brief description, phone number and a call button. Once the call button is clicked, the user is directed to the phone app where they can call the provider.
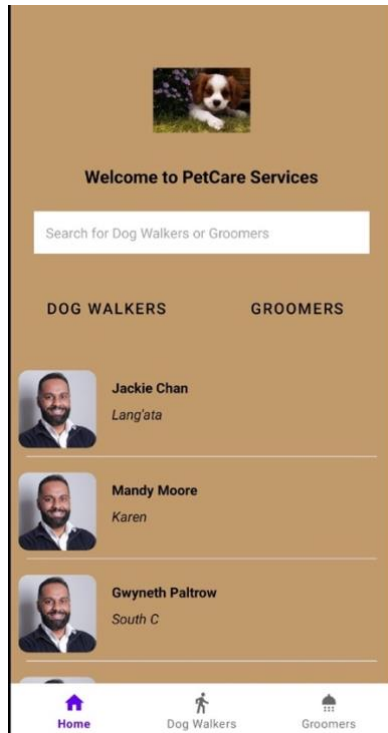
Figure 13: Home page
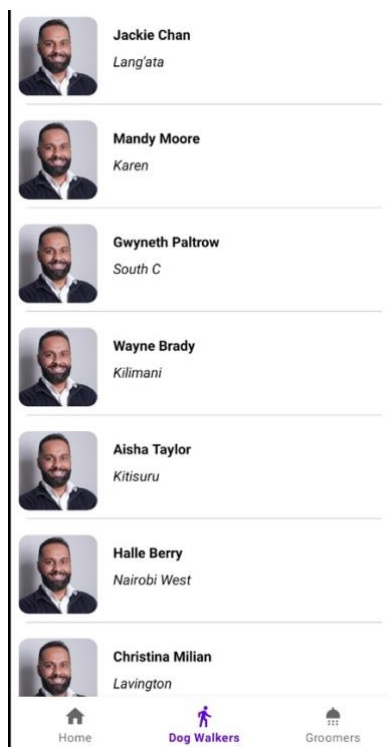
Figure 14: Walking page
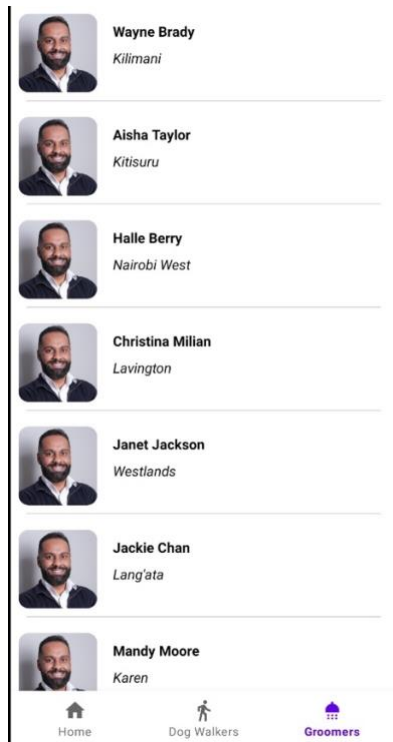
Figure 15: Grooming page
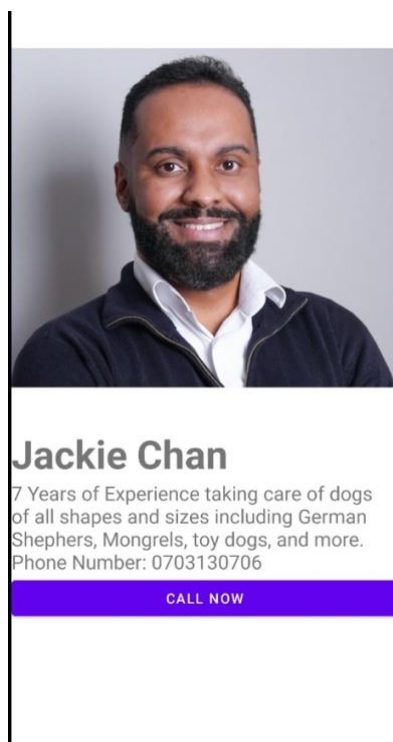
Figure 16: Contact Details page

System Installation

The system *was* downloaded onto a phone that has Android as the operating system. Installing the application developed in Android Studio involve*d* transferring the compiled Android Package Kit (APK) file to the android device using a Universal Serial Bus(USB) cable. Once the APK is on the device, users can navigate to their device's file manager, locate the APK and initiate the installation process by following the on-screen prompts.

System testing

Test Cases

To ascertain the functioning of the system, the following tests were carried out:

Test #	Requirement	Test Question	Test Data
1	User registration	Was the user able to register for the system?	Full name, email, phone number, user name
2	User authentication	Was the user able to log in?	Username & password
3	Service provider sign up	Was the service provider able to sign up?	Full name, phone number, service provided, location
4	Request for service	Was the user able to request for a service	User's location
5	Call service provider	Was the user able to call the service provider	Phone number

Table 4: Test Cases

Test Results

Test #	Requirement	Result	Status

1	User registration	Yes, user could register	Pass
2	User authentication	Yes, user was authenticated & logged in	*Fail*
3	Service provider sign up	Yes, the service provider could sign up	Pass
4	Request for service	Yes, the user could request for a service **based on the service provider's location**	*Pass*
5	Call service provider	The phone number appeared with other **unnecessary** digits	*Fail*

Table 5: Test Results

Chapter 6: Discussion, conclusion and recommendations

In this chapter, there will be a deeper dive into the environment of this system will be shown and what change it has managed to enable within the lives of petCare service seekers and providers; especially as the time constraint got exhausted. There will also be a description of where this system fell short. To improve on the ability to accomplish the system's set objectives this chapter will also provide recommendations for future re-works to improve the ease at which pet owners find the right petCare service provider.

First and foremost, an overview of how the system came together will be relayed, followed by the smaller activities, events and decisions that went into developing the system, Petapl. To conclude, the chapter will be breaking down what each system component brings to the table and showcase the achievements made so far in this project.

Discussion

As earlier mentioned, this section will entail an overview of the system in its entirety. The system was made to allow users to access the contact information of suitable petCare service providers that would be more likely to provide suitable services because they were located in areas of Nairobi that were nearby to them. PetCare service providers would also benefit by having a platform in which they could have greater reach. PetCare services include dog-walking, pet-grooming, veterinary services, etc but this application focused on the daily necessities of pets: exercise and hygiene. i.e. walking (for dogs) and grooming (for all pets). As an Information System provides insights into the behaviour, needs and objectives of its users and provides simple ways of doing things and making decisions, a user authentication module was implemented. All our users (pet owners and petCare service providers (PSP) could signup into the community. For pet owners, their profiles would be created immediately however, for PSPs, this was only the initial stage of their on-boarding process for offline, there would be a vetting process before they could be added onto the database and were able to be found by our pet owner customers.

At that final stage of the project, there was an unforseen shortcoming of using Firebase as the database management system of choice because the key functionalities of the service

was accessible exclusively through a subscription service. Due to the financial constraints surrounding this project, the user authentication module could not be completed and greatly impacted the system's ability to meet its objectives. Hence, the User Profiles were unestablished and the user authentication was left faulty.

In addition to that, in the end, the search algorithm was not implemented and was substituted with a simple list view being displayed to the user showing the PSPs under the different categories of pet care service. In that list, the PSP location was hard-coded (as it would be a fixed location predetermined by the PSP during on-boarding). The application was therefore relying on the natural humanistic intelligence to request a service from a service provider that was nearest to them.

Recommendations

User Authentication Module

Recommendations for this module would be:

1) Primarily use a combination of various database technologies to support the system's operations, including MySQL, PostgreSQL, and Apache Cassandra. MySQL and PostgreSQL are best used for structured data like user information and transactional purposes like search for service provider and call them, while Apache Cassandra is a NoSQL database known for its ability to handle large amounts of data and scale horizontally.

2) Separate the platforms between PSPs and pet owners. As pet owners signup onto Petpal, PSPs should signup on a different mobile application or visit Petpal's official website to begin the application process.

   a) PSPs need to submit required documentation, Petpal (company) should conduct a background check.

   b) PSPs need to create their profiles once the required documents are approved on the Petpal platform.

   c) Externally, PSPs need to undergo some training to help them understand how the app works, how to interact with pet owners, and the company policies. After completing the necessary steps and meeting all requirements, drivers receive approval from Petpal to start accepting service requests.

d) PSPs can set their availability as "online" or "offline" on the pap, indicating their readiness to accept service requests.

e) Earnings and payments should be integrated into their robust application which would be money paid into their linked bank accounts or e-wallets.

Search Module

Recommendations for this module would be:

1) Integrate GPS to identify user locations and display nearby service providers. Enable users to view and filter results based on proximity.

2) Show service provider locations on a map to assist users in identifying options nearby.

3) Enable users to schedule appointments with service providers.

4) Incorporate a messaging system (Real-time Messaging) for users to communicate with service providers.

5) Allow users to rate and review service providers based on their experiences.

6) Send push notifications for booking confirmations, appointment reminders, and new messages.

7) Provide comprehensive information about each service, including descriptions, prices, and inclusions.

In conclusion, this project *has* significant potential for enhancing pet service accessibility and efficiency within the Nairobi area. *The main purpose of this project was to connect pet owners with petCare service providers, a main objective that was accomplished successfully. However, the intricacies or steps towards achieving this was not as easy as it seemed at onset. The main information system was going to be enabled by the User Authentication module which worked in part but the PSP on-boarding process had a bit more work to be done. The unforeseen consideration of financial requirements of the DBMS chosen prived to be a roadblock.*
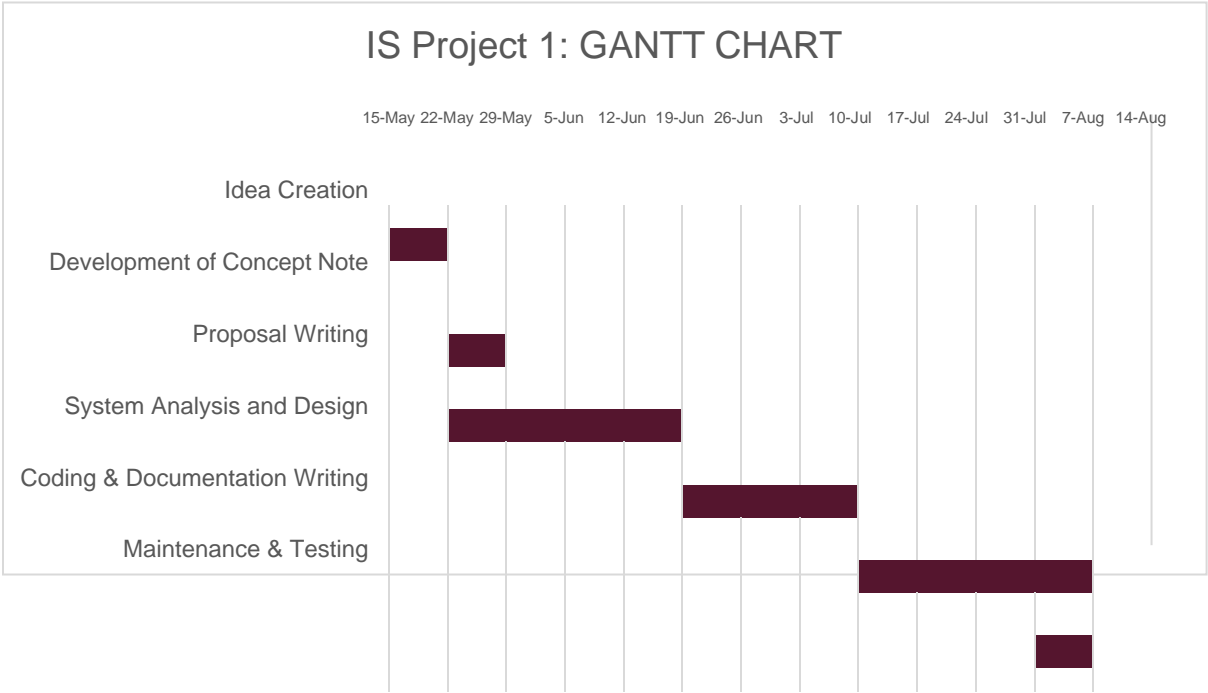
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Appendix A: Time Schedule

IS Project 1: GANTT CHART

Appendix B: The list of pet freedoms

5 Freedoms for Pets

FREEDOM FROM HUNGER AND THIRST
by ready access to fresh water and diet to maintain health and vigor.

FREEDOM FROM DISCOMFORT
by providing an appropriate environment including shelter and a comfortable resting area.

FREEDOM FROM PAIN, INJURY, OR DISEASE
by prevention or rapid diagnosis and treatment.

FREEDOM TO EXPRESS NORMAL BEHAVIOR
by providing sufficient space, proper facilities, and company of the animal's own kind.

FREEDOM FROM FEAR AND DISTRESS
by ensuring conditions and treatment which avoid mental suffering

Embracing the Five Freedoms supports the health and welfare of the animals in our care and provides adopters with the best possible insight into their personalities.

Figure 17: The 5 Freedoms of Pets