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(CAPITAL LETTERS)

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Pet Hotel System with Real-time Customer Support and Network Optimization

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Bachelor's degree in Computer Science with Honours (Network Computing)

2025

**Pet Hotel System with Real-time Customer Support and Network
Optimization**

CHAI CHENG KANG

This project is submitted in partial fulfilment of the requirements for the degree of
Bachelor's Degree in Computer Science with Honours (Network Computing)

Faculty of Computer Science and Information Technology
UNIVERSITI MALAYSIA SARAWAK

2025

Declaration

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Table of Content

Declaration.....	I
Acknowledgement	I
Table of Content	II
List of Table.....	VI
List of Figure.....	VII
List of Abbreviations, Symbols, Nomenclature.....	X
Abstract.....	XI
Abstrak.....	XII
Chapter 1: Introduction.....	1
1.0 Introduction.....	1
1.0.1 Pet Suites Booking System	1
1.0.2 Real-Time Customer Support and Network Optimize.....	2
1.1 Problem Statement.....	3
1.1.1 Operational Inefficiencies in the Pet Hotel Industry.....	3
1.1.2 Challenges in User Experience and Communication.....	3
1.2 Objectives	4
1.3 Methodology.....	4
1.3.1 Web Development Life Cycle (WDLC) Overview.....	5
1.4 Scope.....	8
1.5 Significant of Project	8
1.6 Chapter Summary	8
CHAPTER 2: LITERATURE REVIEW	10
2.0 Introduction.....	10
2.1 Overview of Pet Hotel Service Systems	11
2.1.1 Pet Hotel Service and Management Systems.....	12
2.1.2 Real-Time Customer Support Systems	13
2.1.3 Web-Based Platforms with Booking and Payment Systems.....	14
2.1.4 Network Optimization Techniques	16
2.2 Reviews on Similar Existing System	17
2.2.1 COCOMOMO Urban Pet Hotel.....	18

2.2.2 L RESIDENCE Pet Vacation Home	20
2.2.3 PetsRus.....	22
2.2.4 Comparison of Reviewed page	24
2.3 Critical Review	25
2.3.1 Absence Online Booking Systems	25
2.3.2 Lack of AI Customer Support.....	26
2.3.3 Insufficient Mobile Optimization.....	26
2.3.4 Inadequate Network Optimization	27
2.4 Chapter Summary	27
Chapter 3: Methodology	28
3.0 Introduction.....	28
3.1 Web Development Life Cycle (WDLC) Overview	29
3.2 Planning Phase	30
3.2.1 Tools and Technologies	33
3.3 Analysis Phase	34
3.3.1 User Requirements.....	34
3.3.2 Questionnaires.....	37
3.3.3 Use Case Diagram.....	44
3.4 Design Phase.....	46
3.4.1 System Architecture.....	46
3.4.1.1 Client-Side (User Interface)	47
3.4.1.2 Server-Side (Application Server).....	47
3.4.1.3 Database Management	48
3.4.1.4 Integration with External Services	48
3.4.1.5 Security and Communication Protocols.....	48
3.4.1.6 Scalability and Performance	49
3.4.2 Data Flow Diagram.....	49
3.4.2.1 Context Diagram	50
3.4.2.2 Level 0 Data Flow Diagram.....	53
3.4.3 Activity Diagram.....	56
3.4.4 Sequence Diagram	58
3.4.5 Entity-Relationship Diagram (ERD).....	64

3.4.6 Data Directory	67
3.4.7 Wireframe Design	70
3.5 Implementation Phase	111
3.6 Testing Phase	112
3.7 Summary	113
Chapter 4: Implementation	114
4.0 Introduction.....	114
4.1 Technology and Tools used	114
4.1.1 Wampserver64	115
4.1.2 PhpMyAdmin.....	115
4.1.3 Gemini API	117
4.1.4 PayPal payment Gateway.....	118
4.1.5 Mailtrap.io and Phpmailer.....	120
4.2 Feature Development	121
4.2.1 Registration and Login.....	121
4.2.2 Booking System	123
4.2.3 Manage Pet.....	124
4.2.4 FAQ and ChatBot.....	127
4.2.5 View Booking	128
4.2.6 User Dashboard.....	129
4.2.7 Facility and Facilities	130
4.2.8 Administrative.....	130
4.2.9 Forgot password.....	133
4.3 Database on Server	134
4.4 Conclusion	138
Chapter 5: Testing.....	139
5.0: Introduction.....	139
5.1 Testing Methodology	139
5.2 Unit Testing	140
5.2.1 Unit test result summary	141
5.3 Integration testing	142
5.3.1 Integration testing result summary.....	143

5.4 Compatibility Testing	143
5.4.1 Compatibility test result summary	144
5.5 Usability Testing.....	145
5.5.1 Usability test result.....	146
5.6 Conclusion	153
Chapter 6: Conclusion and Future Work	154
6.0 Conclusion	154
6.1 Project Limitations.....	156
6.1.1 AI Chatbot Limitations	156
6.1.2 Security and Feature Gaps	156
6.2 Future Enhancement	156
6.2.1 Advanced AI Chatbot Features	156
6.2.2 IoT Integration	156
6.2.3 Scalability Improvement	157
6.2.4 Mobile Application Development.....	157
6.2.5 Enhance Security Measures	157
6.2.6 Feedback Integration.....	157
Reference	158
Appendix A: COCOMOMO Urban Pet Hotel.....	161
Appendix B: L RESIDENCE Pet Vacation Home	162
Appendix C: PetsRus	162
Appendix D: Google form questionnaire.....	164
Appendix E: PayPal integration.....	167
Appendix F: Unit Test	169
Appendix G: Integration test.....	195
Appendix H: Compatibility Testing.....	205
Appendix I: Usability Test Plan.....	208
Appendix J: Usability Test Questionnaire	209

List of Table

Table 1: Comparison between review page	24
Table 2: Users table for Pet Hotel Booking System	67
Table 3: Admin table for Pet Hotel Booking System	67
Table 4: Pets table for Pet Hotel Booking System.....	68
Table 5: Bookings table for Pet Hotel Booking System	69
Table 6: payment table for Pet Hotel Booking System	70
Table 7: Password resets table for Pet Hotel Booking System.....	70
Table 8: Objective achievement.....	155

List of Figure

Figure 1: WDLC Diagram	5
Figure 4: WDLC diagram.....	30
Figure 5: Question 1.....	37
Figure 6: Question 2.....	38
Figure 7: Question 3.....	39
Figure 8: Question 4.....	40
Figure 9: Question 5.....	41
Figure 10: Question 6.....	42
Figure 11: Question 7.....	43
Figure 12: Use Case Diagram	44
Figure 13: System Architecture diagram.....	46
Figure 14: Context Diagram	50
Figure 15: Data Flow Diagram Level 0	53
Figure 16: Activity Diagram	56
Figure 17: Login Sequence Diagram.....	58
Figure 18: Registration Sequence Diagram.....	59
Figure 19: Sequence for Booking Process.....	60
Figure 20: Diagram for Payment Sequence.....	61
Figure 21: Chatbot Sequence Diagram.....	62
Figure 22: Admin room management Sequence Diagram	63
Figure 23: Entity-Relationship Diagram	64
Figure 24: Wireframe of home page	71
Figure 25: Wireframe of room page.....	72
Figure 26: Wireframe of facility page.....	73
Figure 27: Wireframe of FAQ page	74
Figure 28: Wireframe of about us page	75
Figure 29: Wireframe of registration page.....	76
Figure 30: Wireframe of login page	76
Figure 31: Wireframe of booking page	77
Figure 32: Wireframe of User profile page	78
Figure 33: Wireframe of user booking page.....	79
Figure 34: Wireframe of user manage booking page	80
Figure 35: Wireframe of uses pet page	81
Figure 36: Wireframe of user manage pet page.....	82
Figure 37: Wireframe of admin user page.....	83
Figure 38: Wireframe of admin manage user page	84
Figure 39: Wireframe of admin manage user pet page	85

Figure 40: Wireframe of admin booking page	86
Figure 41: Wireframe of admin manage user booking page.....	87
Figure 42: Wireframe of admin manage user booking detail page	88
Figure 43: Wireframe of admin room page.....	89
Figure 44: Wireframe of admin manage room page.....	90
Figure 45: Wireframe of mobile home page.....	91
Figure 46: Wireframe of mobile room page	92
Figure 47: Wireframe of mobile facility page	93
Figure 48: Wireframe of mobile FAQ page.....	94
Figure 49: Wireframe of mobile about us page.....	95
Figure 50: Wireframe of mobile login Figure 51: Wireframe of mobile registration page.....	96
Figure 52: Wireframe of mobile booking page	97
Figure 53: Wireframe of mobile user profile page.....	98
Figure 54: Wireframe of mobile user booking page	99
Figure 55: Wireframe of mobile user manage booking page.....	100
Figure 56: Wireframe of mobile user pet page.....	101
Figure 57: Wireframe of mobile user manage pet page	102
Figure 58: Wireframe of mobile admin user page	103
Figure 59: Wireframe of mobile admin manage user page.....	104
Figure 60: Wireframe of mobile admin manage user pet page	105
Figure 61: Wireframe of mobile admin booking page.....	106
Figure 62: Wireframe of mobile admin manage user booking page	107
Figure 63: Wireframe of mobile admin manage user booking detail page.....	108
Figure 64: Wireframe of mobile admin room page	109
Figure 65: Wireframe of mobile admin manage room page.....	110
Figure 66: Wampserver64.....	115
Figure 67: PhpMyAdmin_create_database	116
Figure 68: PhpMyAdmin_create_table.....	116
Figure 69: Accessing MySQL using PHP	117
Figure 70: Google_Cloud	117
Figure 71: Gemini_API_endpoint	118
Figure 72: PayPal_API_Credentials	119
Figure 73: mailtrap.io.....	120
Figure 74: PHPMailer	120
Figure 75: Login page.....	121
Figure 76: Registration page.....	121
Figure 77: Mobile Login page Figure 78: Mobile registration page.....	122
Figure 79: Booking page.....	123
Figure 80: mobile booking page.....	123
Figure 81: User Manage Pets	124
Figure 82: User Add Pets	125

Figure 83: User edit Pets	125
Figure 84: Mobile User Manage Pets Figure 85: Mobile User Add Pets	126
Figure 86: FAQ and chatbot	127
Figure 87: View Booking	128
Figure 88: user dashboard	129
Figure 89: Facility and Facilities	130
Figure 90: Admin manage user.....	130
Figure 91: admin manage booking.....	131
Figure 92: admin manage room.....	131
Figure 93: Forgot password and reset password	133
Figure 94: mailtrap receive mail.....	133
Figure 95: admin table.....	134
Figure 96: room table	134
Figure 97: user table	135
Figure 98: pets table.....	136
Figure 99: booking table.....	136
Figure 100: payment table.....	137
Figure 101: password reset table	137
Figure 102: Unit test summary	141
Figure 103: Integration test summary	143
Figure 104: Compatibility test summary	144
Figure 106: usability testing question 2.....	146
Figure 107: usability testing question 3.....	147
Figure 108: usability testing question 4.....	148
Figure 109: usability testing question 5.....	148
Figure 110: usability testing question 6.....	149
Figure 111: usability testing question 7.....	150
Figure 112: usability testing question 8.....	150
Figure 113: usability testing question 9.....	151
Figure 114: usability testing question 10.....	152
Figure 115: usability testing question 11.....	152
Figure 116: usability testing question 13.....	153

List of Abbreviations, Symbols, Nomenclature

WDLC	Web Development Life Cycle
UI	User Interface
UX	User Experience
API	Application Programming Interface
HTML	Hyper Text Markup Language
AI	Artificial intelligence
FYP	Final Year Project
NLP	Natural language processing
SSL	Secure Socket Layer
HTTP	Hypertext Transfer Protocol
CSS	Cascading Style Sheets
ERDs	Entity-Relationship Diagrams
IDE	integrated development environment
RBAC	role-based access control
DFD	Data Flow Diagram
FAQ	Frequently Asked Questions
OS	Operating System
TLS	Transport Layer Security
NLP	Natural Language Processing
URL	Uniform Resource Locator
SMTP	Simple Mail Transfer Protocol
MIME	Multipurpose Internet Mail Extensions

Abstract

The Pet Suites Booking System was developed to address inefficiencies and enhance user experience in the pet hotel industry. The project was to create a web-based platform that simplifies the booking process, implements an online payment processor, and adds AI-based chatbots with natural language processing (NLP) to provide 24/7 customer service. This system uses the Web Development Life Cycle (WDLC) model to follow a systematic and organized development. Developed using the Web Development Life Cycle (WDLC) methodology, the system ensures a structured, modular, and user-friendly design. Network optimization techniques were applied to improve responsiveness and accessibility, especially for users on mobile networks in areas with limited infrastructure. This prototype was successful in implementing the core functionalities and validated through internal testing, including unit, integration, and compatibility checks. This also improves efficiency, reducing human error and enhancing user satisfaction among pet owners residing in Kuching and Kota Samarahan, Sarawak. While these developments are not meant to be integrated into real life, the project aims to offer a practical and scalable model for digital transformation in the pet care industry.

Abstrak

Sistem Tempahan Pet Suites telah dibangunkan untuk menangani ketidakcekapan dan meningkatkan pengalaman pengguna dalam industri hotel haiwan peliharaan. Projek ini adalah untuk mencipta platform berasaskan web yang memudahkan proses tempahan, melaksanakan pemproses pembayaran dalam talian dan menambah chatbot berasaskan AI dengan pemprosesan bahasa semula jadi (NLP) untuk menyediakan perkhidmatan pelanggan 24/7. Sistem ini menggunakan model Kitaran Hayat Pembangunan Web (WDLC) untuk mengikuti perkembangan yang sistematik dan teratur. Dibangunkan menggunakan metodologi Kitaran Hayat Pembangunan Web (WDLC), sistem ini memastikan reka bentuk yang berstruktur, modular dan mesra pengguna. Teknik pengoptimuman rangkaian telah digunakan untuk meningkatkan responsif dan kebolehcapaian, terutamanya untuk pengguna pada rangkaian mudah alih di kawasan yang mempunyai infrastruktur yang terhad. Prototaip ini berjaya melaksanakan fungsi teras dan disahkan melalui ujian dalaman, termasuk semakan unit, penyepaduan dan keserasian. Ini juga meningkatkan kecekapan, mengurangkan kesilapan manusia dan meningkatkan kepuasan pengguna dalam kalangan pemilik haiwan peliharaan yang tinggal di Kuching dan Kota Samarahan, Sarawak. Walaupun perkembangan ini tidak dimaksudkan untuk disepadukan ke dalam kehidupan sebenar, projek ini bertujuan untuk menawarkan model praktikal dan berskala untuk transformasi digital dalam industri penjagaan haiwan peliharaan.

Chapter 1: Introduction

1.0 Introduction

1.0.1 Pet Suites Booking System

The pet hotel industry is experiencing accelerated growth as pet owners are looking for accommodation options that cater to their furry friends. Now the owners of cats, dogs and other pets sometimes want temporary places for their animals, particularly when they are about to go on vacation or a work trip. Unfortunately, the majority of pet hotels do still use manual methods when it comes to the booking and management process, leading to a ton of waste, mistakes and slowdowns. However, just as it has advantages, it can also come with a few limitations that may leave customers less than satisfied such as unresponsive booking system, overbooking, and miscommunication.

With most users accessing the platform through mobile devices, the demand for online services has grown. These changes will focus on the requirement for a web-based booking system that will provide smooth, low-latency interaction to ensure reliability and accessibility across different network environments. Therefore, a modern, efficient, and user-friendly system is essential to meet and improve the overall experience of pet owners and operators.

1.0.2 Real-Time Customer Support and Network Optimize

This project aimed to develop a Pet Hotel System with Real-Time Customer Support and Network Optimization. These can provide an efficient platform to pet owners and hotel operators. To enhance user experience on mobile networks, the system should streamline booking processes, integrate secure payment gateways, incorporate AI-powered chatbots for customer support, and optimize network performance.

Additionally, by implement an AI-powered chatbot for real-time customer support in the system will enable pet owners to receive immediate help and information on booking, accommodations, and services. These chatbots can allow the staff to more focus on providing quality care by reduce their workload.

The network optimization techniques will be used to enhance the platform's performance, particularly for users accessing it via mobile networks. The system can have consistent and reliable interactions even in areas with limited network infrastructure, by implementing minimizing latency and improving data delivery efficiency. This combination of technology and user-friendly design aims to provide a comprehensive solution for the pet hotel industry to address the requirements of users.

1.1 Problem Statement

1.1.1 Operational Inefficiencies in the Pet Hotel Industry

The pet hotel industry has issues in the management of operations, which heavily depends on copy and paper based booking systems. The reality is that many pet hotels still rely on paper-based processes and spreadsheets leading to costly mistakes such as double bookings, scheduling conflicts, and slow administrative turn-around. These manual methods sadly create restrictions where hotel operators are unable to manage their reservations and customer details effectively, the consequences of which could be frustrated customers or decreased operational productivity for hotels. Moreover, customers rely on phone calls or emails to make inquiries at a fast pace can be cumbersome for pet owners seeking efficient booking process.

1.1.2 Challenges in User Experience and Communication

As more users begin to use services via mobile devices, the bar is set quite high in making the user's experience at least on par with what it used to be. It is worth noting that many current software applications are not optimized for mobile network conditions which impacts the speed with which pages open and actions are completed. Poor response rates and lower network availability in 4G/5G technologies can make the customers abandon. Which will affect the customer housing and the service provision. Moreover, a very few of them have the feature that allows the pet hotel to communicate with the client, making it impossible to address the problem any time it arises. This project aims to resolve these problems through an AI enabled web-based pet hotel system with real time assistance and network signature optimization techniques. In this era of technology, the goal is to increase productivity, reduce the number of mistakes made during booking, ensure improved customer satisfaction as well as optimize efficiency across various devices and network conditions.

1.2 Objectives

The objective of this project is

- To develop a user-friendly web-based platform for pet hotels to manage bookings, payments, and customer information efficiently.
- To provide a convenient booking experience for pet owners, allowing them to easily check room or service availability, make reservations, and manage their bookings online.
- To implement real-time customer support using AI chatbot and reduce response times through network optimization including mobile networks.

1.3 Methodology

Each of the projects required a suitable methodology, which will ensure that all the requirement was met effectively. The Web Development Life Cycle (WDLC) approach was selected for this project to ensure a structured, systematic progression through each development phase. The WDLC provides a framework for a step-by-step process to develop a web-based system, supporting efficient progress and adaptability to changes.

1.3.1 Web Development Life Cycle (WDLC) Overview

The Web Development Life Cycle (WDLC) is ideal for this project because it provides a structured approach to guide each phase of the pet hotel platform's development. WDLC highlighted the clear sequence from the planning phases to the testing phases, which can ensure each part of the platform meets user requirements and performance standards.

The WDLC is divided into specific phases: Planning, Analysis, Design, Implementation and Development, and Testing. Each phase has distinct objectives and tasks, ensuring a comprehensive approach to developing a robust, user-friendly web-based platform.

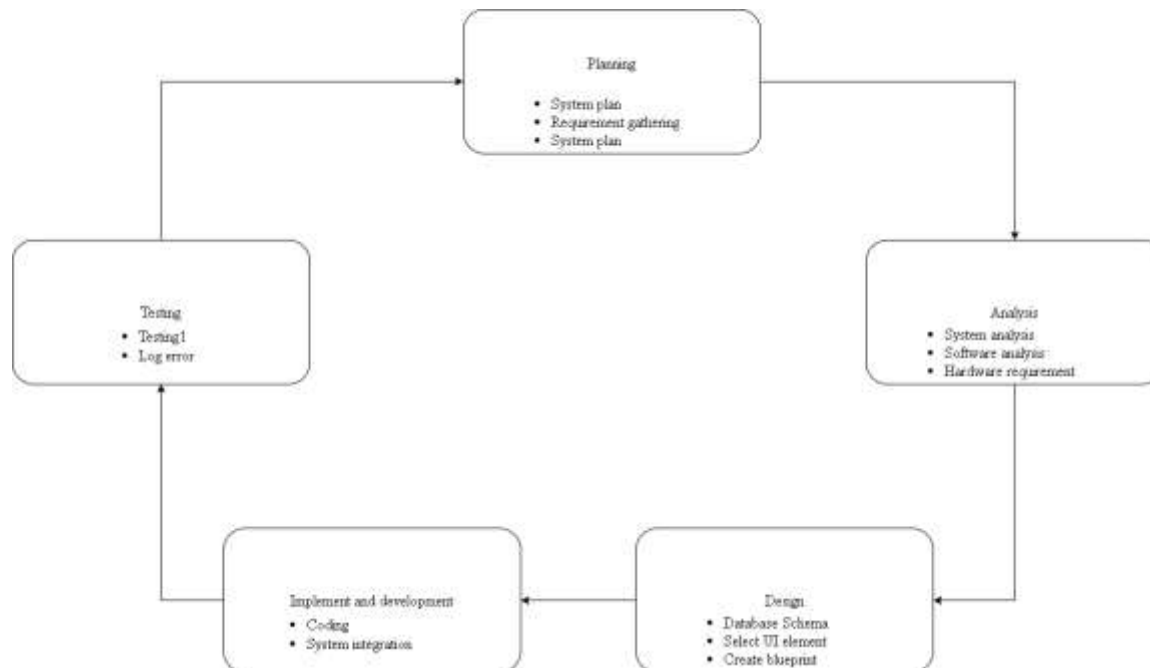


Figure 1: WDLC Diagram

Planning

During the Planning phase, the focus is to define goals and objectives for the project so as to enable good groundwork for development processes to begin. The goal is to design a simple system whereby pet owners can book for their pets in pet care hotels and pay for the service provided. The system is able to give the users a smooth and simple booking experience where pet owners are able to see what rooms are free. They will be able to book, and through the booking process, be able to modify their bookings over the internet. These processes are automate; hence system can improve the quality of the service by minimizing the possibilities of human mistakes, reduce paper handling and consequently save time and costs associated with manual booking services.

Additionally, this phase involves identifying and documenting essential project requirements, such as secure payment integration, real-time customer support through an AI chatbot, and mobile optimization to ensure accessibility across devices. A thorough project plan, including a timeline, resource allocation, and risk assessment, is developed to guide the project's execution. Stakeholders are involved at this stage to confirm project goals and ensure alignment on expected outcomes, setting the stage for an efficient, well-organized development process.

Analysis

During this phase, analysis the current platform and method implement in the other pet hotel to make sure the cons and pros of each review system. The analysis of the user, software and hardware also will implement. A questionnaire will apply by the user, that outcomes will be

examined and priority. For the software and hardware was depend on the current existing system review.

Design

During the Design phase, it was focused on creating a detailed blueprint for the system's architecture, user interface (UI), and user experience (UX). This phase begins with design wireframes and prototypes like the booking interface, payment, gateway, and customer support chatbot, which provide the structure and flow for the platform. The system architecture included the database schema, and necessary API integration to support the secure payment. Additionally, UI elements like color schemes, fonts, and layout are selected to create a cohesive design to enhance usability.

Implementation and Development

During this phase, the developer will the programming tasks to development the project system. The Visual Studio Code will use to building the codes. The programming language use for this project is PHP, combining with the other programming and scripting language like HTML, and JavaScript use on this system. When the code have complete, the testing plans should be generated. The code should be checked for syntax and run time error.

Testing

When the system was complete, a consistency test should be conduct to ensure the system are compatible with different versions of operating system and web browser. In the testing case, the error log will be documented and noted.

1.4 Scope

The scope of this project is develop a prototype of a comprehensive pet hotel management system specifically tailored for pet owners in the Kuching and Kota Samarahan areas of Sarawak. This project's primary focus is on creating a functional model for a pet hotel that includes features such as booking management, payment gateway, and real-time customer support. This prototype is used to prove the concept of the system design is valid. This project is not planned to be released to the real-world user. The system's usability and technical performance will be through the simulation and control testing. This project does not include the maintenance and deployment plan, since with a limited timeframe. This scope is limited to these areas as they represent only a portion of pet owners in Kuching, excluding nearby regions.

1.5 Significant of Project

The significant of the project was in ability to modernize and improve the pet hotel booking experience for pet owner. This system solve the challenge by provide a digital, user-friendly solution to simplify the booking and payment process, and enhancing convenience for pet owners. This project will reduce the management burden, minimize human errors, and increase operational efficiency. For the pet owner the system was provide the quick reservation, secure payment, and customer support through AI chatbot

1.6 Chapter Summary

This chapter introduces the project for developing a pet hotel system to alleviate operational inefficiencies and user experience in the current pet hotel industry. It will be a web-based, user-friendly platform that shall ease the booking processes, incorporate secure payment

gateways, and include AI-powered chatbots for real-time customer support. It will also be optimized for mobile networks to enhance user experience. It outlines the problem statement, including manual bookings, schedule conflicts, and poor communication. It also develops a mobile optimization and real-time support argument that enhances user experience. The chapter then outlines the project objectives, methodology, scope, significance, schedule, and expected outcomes. The project is meant to offer solutions for pet owners and hotel operators in an easier way, enabling them to handle their pet hotel reservations more efficiently.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter reviews the relevant literature for a basic understanding of the current area technologies and practices in the domain. It will check studies and solutions in four areas: pet hotel services and management systems, real-time customer support technologies, web-based platforms with booking and payment systems, and network optimization techniques. The review has identified the existing challenge, identified gaps in the literature, and built the requirement for the solution by combining modern technologies to improve the user experience and efficiency of the pet hotel service (Rani et al., 2024). This chapter supports the development of the proposed system through synthesizing existing research and identifying areas for improvement. It shows that by integrating advanced technologies, such as AI-powered customer support and network optimization techniques, the limitations of the existing solutions can be overcome, thus making the platform more efficient and user-friendly (Rani et al.).

2.1 Overview of Pet Hotel Service Systems

This section provides a broad review of various aspects of the pet hotel systems with a focus on the increasing need for integrating advanced technologies for better efficiency and customer satisfaction. The growing rate of pet owners around the world has raised demand for sophisticated pet care, and with it, consumer expectations (Rey & Rey, 2024). The use of technology in hotel structures has transformed the market by allowing for greater convenience such as easy bookings, customer care and interaction (Rani et al., 2024). This review examines some of the critical components that define a modern pet hotel system: provision of real time customer support catered towards resolution of queries at the earliest to improve their user experience. Also, the use of the internet coupled with available booking and payment systems has allowed for easy and safe transactions improving the availability of services (Blancaflor et al., 2023). Finally, the techniques of network optimization are discussed, which ensure that the system remains reliable and performant during periods of high traffic (Wei, 2022). It enables showing promising progress, whereby innovation can arise on how to deliver this one-stop service efficiently at whatever be the demand from people at one-go.

2.1.1 Pet Hotel Service and Management Systems

Pet hotels are becoming really important for taking care of our furry friends. They offer services like boarding, grooming, and even vet care, especially when pets have to be away from their owners. With the rise in pet ownership worldwide, there is an increasing need for efficient management systems to handle bookings, inquiries, and operational logistics. Traditional approaches have often used manual systems, which have resulted in inefficiencies like double bookings, mismanagement of customer data, and delayed responses to inquiries.

Recent technological developments have introduced digital management systems specifically for pet hotels. Solutions such as Pawfinity and PetExec have gained popularity due to their capacity to manage operations with online booking, automated reminders, and an integrated customer relationship management tool (Liu & Kang, 2022). These systems enhance the operation aspect and customer satisfaction by simplifying processes. Even though most systems have their benefits, a lot of them are missing some key features. For instance, real-time customer support is often not there. Many also struggle with mobile interfaces and keeping things running smoothly when traffic gets high during busy booking times. Moreover, most of the designed systems target the general population and lack the inclusion of localized needs, such as regional language support or specific cultural consideration in districts like Kuching and Kota Samarahan, Sarawak.

Advanced IoT and AI technologies have begun transforming pet care systems. For instance, IoT-enabled platforms allow real-time monitoring of the health and activities of pets during their stay, thereby offering a higher level of transparency and trust between the service provider and the pet owners (Rey & Rey, 2024), (Chen & Elshakankiri, 2020). IoT-driven solutions have been

highlighted in works such as the development of smart systems to monitor pets' wellbeing in real-time, integrating sensors and cloud-based management tools for better service delivery (Liu & Kang, 2022).

These insights point to the essence of an integrated solution above mere digitalization. The proposed Pet Hotel System contributes to integrating these lacunae, besides real-time AI-powered customer support, secure payment gateways, and mobile-friendly design, including network optimization. This will not only help in general management of pet cares but also satisfy niche demands to provide customized, seamless services for pet owners as well as service providers.

2.1.2 Real-Time Customer Support Systems

Real-time customer care systems have become integral in improving customer satisfaction and operational efficiency across industries. These systems enable enterprises to respond instantly through live chat, AI-powered chatbots, and auto-response mechanisms (Rani et al., 2024). “AI-powered chatbots enhance customer service by providing instant responses and multi-language support” (Rani et al., 2024, p. 3). Various studies have proved that the adoption of such technologies not only reduces response time but also improves customer retention and engagement. For example, AI-powered platforms such as Dialogflow and IBM Watson Assistant use advanced NLP and deep learning to understand the customer's intent, provide a response in context, and offer multi-language support (M et al., 2024).

Yet, even with these developments, some challenges still persist that hamper their potential. The common ones involve an inability to handle complex or nuanced queries, limited adaptation to user-specific contexts, and degraded performance during peak traffic conditions. Research points to the need to effectively integrate robust backend systems with scalable network

optimization strategies as necessary for these challenges. In particular, the integration of chatbot technology with real-time data analytics and personalized interaction models has been shown to clearly improve overall effectiveness (Rani et al., 2024).

Real-time customer support is very crucial in managing bookings, addressing last-minute concerns, and ensuring smooth communication between the pet owners and service providers in the context of pet hotel services. The proposed Pet Hotel System will make use of advanced AI-driven chatbots equipped with features such as sentiment analysis, 24/7 availability, and real-time updates (Rani et al., 2024). Such systems will be integrated with the booking and payment modules of the platform for a cohesive user experience. In addition, machine learning algorithms will be used to continually improve the responses from chatbots through customer feedback and evolving service needs (Rani et al., 2024), (Al-Barrak & Al-Alawi, 2024).

This approach will enhance operational efficiency, which goes hand in hand with building trust and reliability—a factor so essential in customer satisfaction for the pet care industry (Nuruzzaman & Hussain, 2018). This technology integrated into the Pet Hotel System will create a benchmark for innovative service delivery in the sector.

2.1.3 Web-Based Platforms with Booking and Payment Systems

Service industries have been restructured by web-based platforms integrated with booking and payment options that provide an easy method for reservations and transactions to be made (Nuruzzaman & Hussain, 2018). The platforms became important tools for businesses to facilitate efficient and user-friendly services in sectors such as hospitality, transportation, and healthcare (German et al., 2021). With features of real-time updates on available seats, automatic email confirmations, and synchronization with electronic calendars, much of the manual labor can be

minimized along with potential errors. Secure payment gateways include the likes of Stripe, PayPal, and Razorpay. These further build user confidence by allowing encrypted transactions, multi-currency support, and advanced fraud detection mechanisms (Hisyam & Manuaba, 2022).

However, these systems, while versatile, are also often found to fall short when it comes to niche-specific demands like pet hotel services. Many existing platforms have failed to provide customization for specialized requirements like input fields for detailed pet-specific information such as breed, dietary needs, and medical history. Moreover, too many cannot integrate booking systems with secure payment modules transparently, resulting in fragmented experiences that users may feel irritated with. Studies have suggested that customer satisfaction in electronic services depends highly on both the coherence of the user interface and the least possible amount of transaction errors (Wei, 2022).

Regarding these deficiencies, the proposed Pet Hotel System comes out with a set of features that is tailored for the pet care industry. The booking module will let pet owners view live availability, securely make reservations, and provide full profiles for their pets, including health records and special care instructions. Meanwhile, the payment system will feature state-of-the-art encryption technologies and the inclusion of multiple payment options to ensure security with convenience (Tauseef et al., 2024). The system will protect sensitive financial information by tokenization and other SSL protocols while maintaining quick and efficient transaction processing (Zhang, 2024).

Network optimization using various load-balancing techniques will reduce the operational bottlenecks typical in peak periods of usage in the proposed system. This means that even in instances of high traffic, user experience will be smooth-flowing, which is extremely crucial for

seasonal businesses such as pet hotels. The integration of these technologies would add greatly to user convenience and place the system as an integrated solution that could also set a new benchmark for pet hotel service management (Rey & Rey, 2024). This is very necessary in the competitive market where customers' expectations of smooth digital experience have been increasing relentlessly (Rey & Rey, 2024).

2.1.4 Network Optimization Techniques

Network optimization is critical to ensure performance and efficiency in web-based systems, especially those involving real-time interactions such as customer support and booking platforms. Proper optimization reduces latency, increases system availability, and provides stability during peak traffic (Liu et al., 2018), (Wei, 2022). Another important factor is compatibility with mobile networks, especially 4G and 5G, considering bandwidth limitations and fluctuating network conditions, especially in remote areas (Liu et al., 2018). This would also enable smooth operations; hence, the platform works well for mobile users in any place. The techniques involve adaptive bitrate streaming and optimization of media delivery (Liu et al., 2018).

Web design techniques are very much important for lowering latency and ensuring a better user experience. Modern protocols of HTTP such as HTTP/2 or HTTP/3 can handle parallel requests out of the box, with less overhead compared to HTTP/1.1 (Liu et al., 2018). These protocols support multiplexing and leverage transportation layer enhancements such as QUIC in HTTP/3 to further reduce latency (Liu et al., 2018). Another key technique involves browser caching: cache headers such as Cache-Control and Expires allow browsers to store frequently used assets locally, reducing server load and decreasing response times for repeat users. Lazy loading for large resources, such as images and videos, ensures these elements are loaded only when they

come into the user's viewport. This greatly reduces initial page load times and saves bandwidth (Liu et al., 2018).

Performance is also enhanced by reducing HTTP requests, since the fewer elements there are, the fewer individual elements have to be called on the server. It involves the amalgamation of CSS and JavaScript files, the use of image sprites in CSS, and advanced image formats like WebP that offer smaller file sizes without quality degradation (Wei, 2022). To the list can be added load balancing, a technology that distributes inbound loads across multiple servers for predictable system performance, even in cases of high demand. It further optimizes the delivery of content through cached copies across geographically distributed servers (Liu et al., 2018), (Zhang, 2024). This reduces latency and enriches the user experience. Traffic shaping shapes traffic to be able to give priority to critical services in order for high-priority features-like real-time booking confirmations-to remain up during high-traffic periods (Liu et al., 2018).

Together, these optimization techniques provide a robust foundation for the proposed Pet Hotel System, ensuring scalability, reliability, and efficiency (Rey & Rey, 2024). This system fixes common issues like slow connections, limited internet speed, and uneven user experiences. It creates a smooth and quick platform that's just right for pet owners and service providers. These advancements not only enhance the system's technical capabilities but also significantly improve user satisfaction and trust in the platform (Wei, 2022).

2.2 Reviews on Similar Existing System

The proposed Pet Hotel System aims at ensuring the quality and effectiveness of pet care services by introducing various advanced features including real-time customer support, sophisticated network optimization techniques, and tailored management functionalities, to ensure

solutions to common problems such as delays in serving, managing traffic congestion, and special choices for pet care. To give a comprehensive insight into how these issues now stand, this section looks at three remarkable pet care platforms in Malaysia: COCOMOMO Urban Pet Hotel, L RESIDENCE Pet Vacation Home, and PetsRus.

These systems depict an increasing demand for digital solutions in pet care due to the ever-growing demand of modern pet owners by means of ease, transparency, and reliability. Each platform showcases unique strengths in service delivery, leveraging technology to meet the needs of pet owners. However, gaps remain in areas such as real-time responsiveness, integration of advanced AI technologies, and handling of high-traffic scenarios. The review of these platforms sheds light on opportunities for improvement and innovation in the proposed Pet Hotel System, ensuring it delivers a seamless, efficient, and user-centric experience.

In-depth research of these systems points not only to their role in pet care but also presents an idea of how the proposed system would be able to position itself at a higher competitive level. Integrating best features from such portals, along with innovative functions, the proposed system should be able to meet emerging demand for service by pet owners and create new standards in the line of pet services in the region.

2.2.1 COCOMOMO Urban Pet Hotel

The COCOMOMO Urban Pet Hotel belongs to the top category of establishments for pets in Malaysia; it is known for exclusive class and the provision of quality services for pet owners at all times. The offered premium services at the premise include personalized care for a pet, grooming, wellness programs, and many other services that a pet receives. It emphasizes providing a stress-free and hygienic environment, with spacious boarding areas allowing pets to socialize,

rest, and play comfortably. This comfort and cleanliness suggest COCOMOMO's dedication to meeting the needs of modern pet owners seeking reliable boarding solutions for their pets.

Despite its good reputation, there are various limitations in the current state of technological offerings at COCOMOMO Urban Pet Hotel. As can be taken from the comparative table, the facility does not provide an online booking system; hence, its customers have to depend on calls, emails, or any social media platforms to reserve a place. In such cases, not having a respective digital platform for this could be inconvenient for users, especially in today's world, where everything needs to be quick and efficient.

Moreover, customer support options provided by COCOMOMO include only basic online channels for and do not include any additional features, such as AI-powered chatbots or real-time support. The absence of this type of technology means that the clients may face delays in responses, especially during the highest loads, which could negatively affect their experience. Additionally, the platform does not provide for mobile-friendly interfaces or network optimization techniques, thus hindering seamless access and usability across devices. This will potentially deter users who rely on mobile platforms for quick and easy interaction.

While COCOMOMO is leading in providing luxurious facilities with complete care services, the non-integration of modern technology, such as a fully integrated online booking system, AI-based chatbots, and advanced mobile optimization, presents an opportunity. These gaps present opportunities that the proposed Pet Hotel System should address to ensure an end-to-end solution that combines excellent service quality with cutting-edge technology.

COCOMOMO Urban Pet Hotel inspires and provides a yardstick for determining what is lacking in the services offered by current pet hotels. The proposed system will learn from these gaps and integrate a robust online booking system, 24/7 AI-driven customer support, and seamless mobile optimization to offer the best experience for both pet owners and service providers.

2.2.2 L RESIDENCE Pet Vacation Home

L RESIDENCE Pet Vacation Home is a distinguished pet boarding facility in Malaysia that specializes in offering premium services to ensure the comfort, safety, and well-being of pets during their owners' absence. The facility is designed to create a "vacation home" experience for pets, providing them with a nurturing and stress-free environment. It focuses on individual care routines, large living spaces, and frequent check-ups according to the needs of each animal. The recreational activities and interaction with trained staff enhance the experience, and L RESIDENCE is highly recommended for those owners who would want nothing but quality and individual attention for their pets.

However, as much as the services offered by L RESIDENCE are at a high level, its technological offering still leaves a lot to be desired. The comparison table shows that the facility does not have an integrated online booking system, so the customers have to book via phone calls or emails. These methods can be time-consuming and may be very inconvenient for technologically savvy users who want their solutions digital and seamless. This may also further lead to inefficiencies at peak times of the year in managing large volumes of bookings manually, which may lead to a mistake or delay in responses.

L RESIDENCE's customer support is another area that needs much improvement with advancements in technology. The present modes of support are mere online communications over

Facebook; no AI-based or live chat support facility exists. As a result, customers might face delays in resolving queries or making last-minute changes to bookings, which could impact their satisfaction. Real-time AI chatbots, capable of handling inquiries 24/7, could significantly improve response times and alleviate the workload on staff, ensuring prompt and accurate assistance for pet owners.

Furthermore, the facility does not appear to offer a fully optimized mobile interface or advanced network optimization techniques. This can limit accessibility and usability for those customers who would prefer managing reservations or updates via their mobile devices. In a mobile-first solution-dominated world, the lack of such a feature may discourage potential end-users who seek immediate, easy access to services. Implementing mobile-friendly design and network optimization strategies will let L RESIDENCE perform consistently and provide seamless interactions, even in periods of high demand.

Although all these drawbacks, L RESIDENCE is remarkable for its attitude toward making pets feel homely and providing them with personal care, which is hardly possible to find among many competitors. The focus on recreational activities and close monitoring ensures that pets are not only cared for but also actively engaged during their stay. These strengths, however, point to the missed opportunity to complement its excellent service offerings with modern technologies.

In summary, L RESIDENCE Pet Vacation Home showcases a strong commitment to quality care and customer satisfaction but falls short in adopting modern technological solutions. By incorporating features such as a robust online booking system, AI-powered real-time customer support, and mobile optimization, the facility could further enhance its operational efficiency and user experience. These gaps underline opportunities for the proposed Pet Hotel System to bridge,

ensuring it provides an all-encompassing solution that addresses both service quality and technological convenience. This integration of premium care and advanced technology would position the system as a superior choice for discerning pet owners.

2.2.3 PetsRus

PetsRus is a Malaysian-based pet care service provider that focuses on pet boarding, grooming, and wellness services. It caters to the needs of modern pet owners by prioritizing comfort, safety, and quality in its operations. PetsRus provides clean and spacious accommodations designed to ensure pets feel at home, with services tailored to each pet's specific needs, such as dietary preferences, grooming schedules, and exercise routines. This personalized approach ensures that pets receive the care and attention they deserve, making it a trusted option for pet owners.

However, PetsRus is currently not offering online reservations, and customers rely on emails and phone calls for reservations. This may prove not so convenient for tech-savvy people who expect efficiency from the Web. The absence of this more streamlined booking process may also give way to inefficiencies during those periods of peak demand where manual methods are expected to be slow and full of mistakes.

Customer support at PetsRus is limited to standard online communication channels like Facebook, email or phone, which do not include advanced features like AI-driven chatbots or 24/7 availability. As a result, customers may face longer response times or find it challenging to resolve queries outside regular working hours. With the integration of AI-powered customer support, this could notably enhance the user experience through immediate responses to queries and operational efficiency by freeing up staff resources to focus on more complex tasks.

In addition, PetsRus does not currently offer a fully optimized mobile interface, which could limit its accessibility for users who prefer managing bookings and updates through their smartphones. Mobile optimization is crucial for enhancing user convenience and ensuring seamless interaction with the platform. Furthermore, the system could benefit from network optimization techniques, such as load balancing and caching, to improve reliability and responsiveness, especially during high-traffic periods.

Even with these lapses in technology, PetsRus scores with personalized care and a very warm environment for pets. This would go to underline the attention given and high-quality service, as assurance for the pet owners' needs. The modernization of its technological infrastructure would, however, make it much more competitive, as the modern user demands.

The integration of an online booking system, AI-driven real-time customer support, mobile optimization, and advanced network management would make a lot of difference in how PetsRus delivers its services. These enhancements will overcome the deficiencies mentioned above, smoothen operations, and establish PetsRus as a premier comprehensive innovative solution provider in pet care.

2.2.4 Comparison of Reviewed page

Features	COCOMOMO Urban Pet Hotel	L RESIDENCE Pet Vacation Home	PetsRus
Accommodation Quality	Luxurious, hygienic, and well-maintained facilities	Homely and stress- free environment with recreation areas	Comfortable and clean boarding spaces tailored to pet needs
Service Offering	Grooming, personalized care, and wellness programs	Recreational activities, health monitoring, and customized routines	Grooming, wellness, and customizable care packages
Online Booking System	Not have online booking System. Via social media, email, and phone.	Not have online booking System. Via email, and phone.	Not have online booking System. Via email, and phone.
Customer support	Standard online communication, no AI-driven or real- time chatbot	Basic support options, no AI or 24/7 availability	Standard online customer support, no AI or 24/7 availability
Mobile-Friendly Interface	Partial support, not fully optimized	Standard mobile functionality	Functional mobile interface

Table 1: Comparison between review page

2.3 Critical Review

The current situation of pet hotel service platforms shows the significant technology gaps, which this gap will hinder meeting the expectations of customers. These gaps include the absence of automated online booking systems, limitations in customer support mechanisms, poor mobile optimization, and inadequate network performance. This section will analyze these gaps and reference the opinion of the research and technologies.

2.3.1 Absence Online Booking Systems

The absence of integrated online booking system is limitation in many existing pet hotel platforms. The customer will often require to make the reservation through manual method, such as phone call, emails, social media message. These processes are not only time-consuming but also error prone like double booking miss the reservation. For example, the critical role of web-based systems in automating routine operations, thus enhancing accuracy and reducing human intervention. Incorporating intuitive user interfaces with simplified workflows can further improve user adoption and satisfaction (German et al., 2021). The online booking system can streamline operations by automate store the data and update the available service. Such system will enable scalability, ensuring smooth operation during peek period.

2.3.2 Lack of AI Customer Support

The customer support was one of the crucial areas in the existing platform. The traditional method, such as phone and email support possibly failed to deliver Immediate assistance to the user demand. It has a delay in response time will affect customer dissatisfaction. The integrated chatbots and virtual assistants equipped with natural language processing (NLP) capabilities were useful in customer support (M et al., 2024).

The AI-driven customer support offers 24/7 availability. The AI continuously improves through machine learning algorithms, which can ensure the evolution of the response to customer needs (Al-Barrak & Al-Alawi, 2024). For the pet hotel platforms, integration of AI tools can reduce the staff workload, enhance the accuracy of responses, and improve the user experience. This integration can ensure a fast resolution of issues.

2.3.3 Insufficient Mobile Optimization

In today's mobile-first world, the lack of mobile optimization is a weakness of current systems. The customers were increasingly rely on smartphones to manage bookings and access information. However, many pet hotel platforms are either partially optimized or lack mobile-friendly designs altogether, leading to inconsistent user experiences.

For a seamless mobile interface was important to responsive design principles and lightweight frameworks (Wei, 2022). An optimized mobile platform with designs tailored for touch-based interactions enhances usability, ensuring that users can effortlessly access services on the go. To indicate the mobile-optimize platform can improve user engagement and increase the customer satisfaction.

2.3.4 Inadequate Network Optimization

Network performance is another critical area where existing platforms fall short. Poor optimization can result in slow load times, high latency, and frequent downtime, particularly during high-traffic periods. Advanced network optimization techniques, such as caching, and modern web protocols like HTTP/3, are essential for ensuring system reliability and scalability (Liu et al., 2018).

Caching frequently accessed data locally reduces the server pressure and speeds up the response times. By adopting modern protocols like HTTP/3 can minimize the latency by utilizing multiplexing and improve the security of the transport layer (Liu et al., 2018). For pet hotel platforms, these enhancements will ensure the service is accessible and responsive. This is important to maintain customer trust and ensure a positive user experience.

2.4 Chapter Summary

This chapter presented the technological landscape and gaps in the current pet hotel service systems. Among others, it pointed out a number of challenges such as inefficiency in manual booking processes, lack of AI-driven customer support, inadequate network optimization, and limited mobile accessibility. Reviews of the current platforms like COCOMOMO Urban Pet Hotel, L RESIDENCE Pet Vacation Home, and PetsRus demonstrated their strengths in terms of service quality but with significant technological shortcomings. These insights bring out the essence of an integrated solution, leveraging the benefits of newer technologies to offer a better user experience, operational efficiency, and cater to the evolving needs of pet owners.

Chapter 3: Methodology

3.0 Introduction

This chapter outlines the methodologies and approach use for develop the pet hotel system. This project was use the Web Development Life Cycle (WDLC) as the guild line of framework, to ensure the structure approach through well-defined phases, which include planning, analysis, design, implementation, and testing (Krishna & Gopinath, 2024). The WDLC was suitable for this project for the requirement analysis, continue improvement, and have the ability to adopt the challenge. This methodology can design and implement the system to overcome the challenge face in the pet hotel industry. Each phases of the WDLC is carefully planned and execute to address the functional and non-functional requirement like usability, scalability, and performance. Furthermore, this chapter include the Use Case Diagram, Entity relationship diagram and other to provide understanding of the development process and the technical of the system.

3.1 Web Development Life Cycle (WDLC) Overview

The methodology adopted for this project is based on the framework Web Development Life Cycle (WDLC) to design the web-based system. The WDLC provides the step approach to ensure the project progresses while addressing the requirements at every stage. This methodology is suitable for developing the pet hotel system, allowing for requirement analysis, detail planning, and continuous improvement throughout the development process. The WDLC is divided into 5 phases, which are planning, analysis, design, implementation, and testing (Krishna & Gopinath, 2024). Each phase is different, yet interrelated, to ensuring a logical flow of development activities. The planning phases involve the project goals, scope, and resource allocation, forming the foundation of the system. The analysis phases involve gathering user requirements, evaluating existing systems, and identifying gaps, which to ensure the challenges faced by pet hotel operators and pet owners. The Design phases translate the requirements into blueprints, including system architecture, database design, and user interface prototypes, with diagrams like Use Case Diagrams, and Entity-Relationship Diagrams (ERDs). The implementation phase focuses on coding and developing core functionalities, integrating technologies such as PHP, MySQL and others. Finally, the testing phase can ensure the system meets its objectives through testing of functionality, compatibility, and performance. This comprehensive methodology ensures the final system is scalable, and user-friendly, to address the needs of both pet owners and hotel operators.

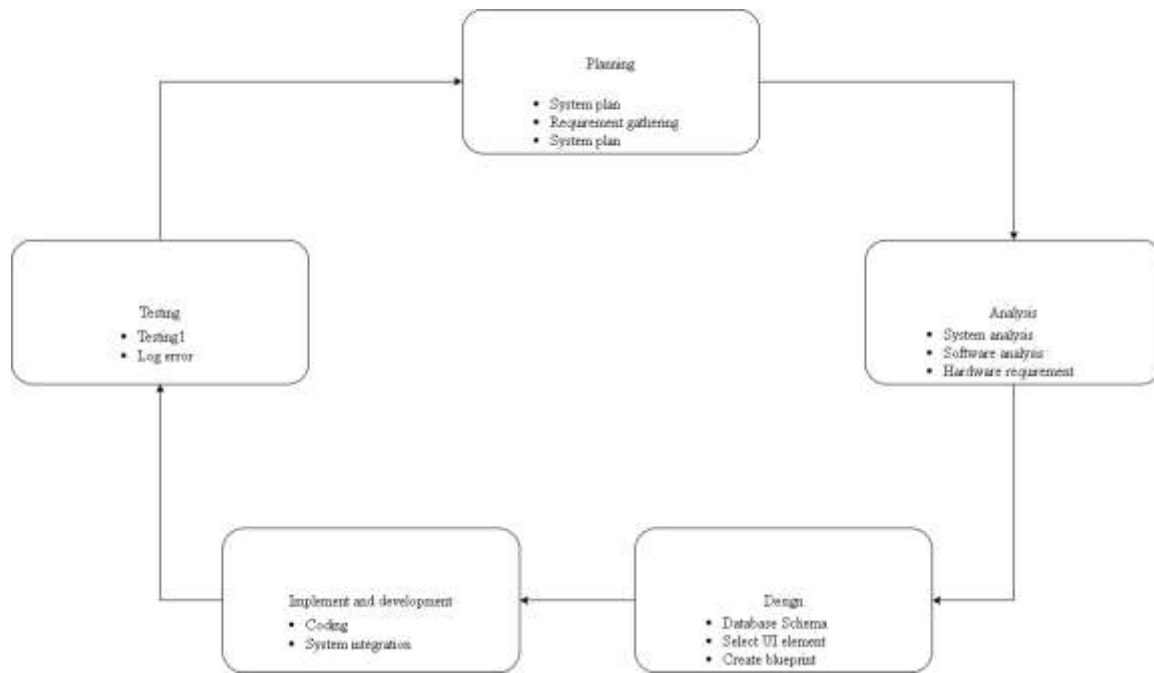


Figure 2: WDLC diagram

3.2 Planning Phase

The planning phase is the cornerstone of this project, build a develop method for development of the Pet Hotel System. During this phase, this project was goals, scope, and requirement to ensure alignment of user need and system objective. The primary was focus on creating a prototype for pet hotel operation. This prototype would address the inefficiency such as manual booking system, customer support, and user-friendly features. The planning phase also involve the necessary tools, technologies, and resources required for successful project execution. This phase will provide a solid foundation for the other phase, which can ensure project was a well prepare to tackle challenge to meeting the objective.

The planning phase will identify the objective design to guide the development of the pet hotel system. These objectives was made to address the inefficiency of pet hotel operations and ensure the system has a user-friendly, and efficient solution for pet owners and hotel operators. The aim of this system is to develop a web-based platform that can enable pet owners to more easily book pet hotel services through online process, to eliminate the need for manual booking methods such as phone calls or emails. Which can reduce the error, save time, ad more convenience for customers and service providers.

One of the objective for the system is have secure payment gateways. By incorporate a trusted payment solution such as PayPal, this platform to ensure that users can make payment with confidence, knowing that their sensitive financial information in encrypted and protected. This not only improve the user trust, also enhances operational efficiency for pet hotels by automating the payment process and reduce reliance on manual transaction handling.

The critical role of customer service in the pet hotel industry, an AI chatbot to provide real-time assistance to users. This chatbot is designed to handle various user queries, such as ask the questions about room availability, pricing, and booking modification, offering immediate, and responses without the need for human intervention. The chatbot was recommend to use the natural language processing (NLP) capabilities to understand the user purpose and provide contextually relevant answers, to ensure customer experience. Furthermore, the chatbot operates 24/7, which can ensure users can access support at any time and any location. This automates customer service, the system not only improves user satisfaction, also reduces the workload on pet hotel staff to allow them can focus on pet care.

Another objective is to ensure the platform if optimize for mobile device, responsive user experience. With the increasing reliance on smartphones for online interaction, the mobile platform compatibility was important. The system is design to apply responsive web design techniques, to ensure that can adapts to different screen size and resolution while maintain usability and aesthetics. To enhance performance, the platform incorporates techniques such as lazy loading, HTTP/2 protocol optimizing, and caching mechanisms minimizing latency and ensuring quick load times.

These objectives align with the goal of addressing the specific needs of pet owner and hotel operator. This system is design to enhance operational efficiency, reduce error, and improve customer satisfaction by offer a modern, secure, and accessible platform. By focus on the user experience, automation, and performance, the objectives ensure the system is not only functional, it also competitive, positioning as reliable and innovative solution in the pet hotel industry.

The scope of this project is develop a prototype of a comprehensive pet hotel management system specifically tailored for pet owners in the Kuching and Kota Samarahan areas of Sarawak. This project's primary focus is on creating a functional model for a pet hotel that includes features such as booking management, payment gateway, and real-time customer support. This prototype is used to prove the concept of the system design is valid. This project is not planned to be released to the real-world user. The system's usability and technical performance will be through the simulation and control testing. This project does not include the maintenance and deployment plan, since with a limited timeframe. This scope is limited to these areas as they represent only a portion of pet owners in Kuching, excluding nearby regions.

3.2.1 Tools and Technologies

The selection of tools and technologies during the planning phase was critical to ensure efficient development and high system performance. For software, Visual Studio Code was chosen as the primary integrated development environment (IDE) for its versatility and support for various programming languages. For local testing and development, Wampserver64, a lightweight Apache server solution, was utilized, providing an easy-to-configure environment for PHP and MySQL. On the front-end, a combination of HTML, CSS, and JavaScript was used to build the system structure, styling, and interactivity. On the back-end, PHP was selected as the server-side scripting language due to its flexibility and compatibility with MySQL, the database management system used for storing and managing data such as user accounts, bookings, and payment records.

Specific APIs and additional tools were integrated to enhance the system's functionality. PayPal was chosen as the payment gateway for its reliability, security, and widespread acceptance, ensuring that financial transactions were handled securely and efficiently. To provide real-time customer support, the system leveraged Gemini AI, a versatile and easy-to-integrate chat solution. For designing the user interface, Visily.ai was utilized, offering a powerful platform for creating wireframes and prototypes. Google Forms was used to gather user feedback and survey data, while Microsoft Word was employed for documentation and report writing.

On the hardware side, a laptop with an Intel Core i5-1135G7 processor (up to 2.40GHz) and 8GB of RAM was used for development. This hardware configuration provided sufficient computing power and memory to efficiently run development tools, local servers, and testing environments.

This combination of software and hardware tools ensured that the system was not only functional but also secure, efficient, and user-friendly, aligning with the project objectives. By carefully selecting and integrating these technologies, the development team was able to create a robust and scalable Pet Hotel Booking System.

3.3 Analysis Phase

The analysis phase is critical in ensure the system design was meet the expectation and requirement of user and stakeholder. This phase begin with collect and analyzing data from various sources to understand the user requirement and identify gaps in existing system. Questionnaires were distributed to pet owner to gather insights into their booking challenges and preferences, while interview with pet hotel operators provided a more understanding of the operation inefficiency. This phase is aim to lay the groundwork for design a solution that is user-friendly, secure, and efficient.

3.3.1 User Requirements

The analysis phase brought to light several key user requirements was gathered through a structured approach that include collecting feedback via questionnaires from pet owner. Each requirement was critically analysis to address the existing challenge. The system aim to improve the experience for all stake holder by integrating these requirement into its core functionalities.

The analysis was begin with the user feedback collection via questionnaires. Questionnaires will distribute to pet owners to collect their feedback on the challenges face in existing pet hotel booking systems. The Close-end questionnaires will use to collect quantitative data and qualitative insights.

In order to further improve the system, to observation of current systems in necessary. By observe how the user to interact with existing booking system can got the area of improvement, such as lengthy booking processes, and offline dependencies like phone calls or emails.

The collected data was the subject of analysis of user feedback to identify the regular and prioritized user requirements. That have some common questions such as a streamlined booking interface, real-time customer support, and secure payment to emerge as critical areas to address.

One of the most frequently mentioned user demands was the need for a streamlined and intuitive booking interface. Many users could express dissatisfaction with their experiences using the current booking system, which feels in complex or outdated. Some of the systems require users to follow multiple steps or even engage in offline interaction, such as phone calls or emails, to confirm booking. This type of inefficiency will cause delays and failure in the booking process. To overcome this challenge, the proposed system is designed with simplicity and ease of use in mind. Users will enable the quickly search for room availability based on the preferences, selected desired services, confirm reservations, and even cancel or modify booking, it just need a few clicks. This design ensures a carefree experience for pet owners while simultaneously save time for the hotel operator by automating routine booking tasks.

The important of real-time customer support was another major concern for users. Feedback revealed that delayed responses to queries, especially for urgent problems such as room availability, service descriptions, or last-minute changes, that will result in poor user experience. To address this problem, the system should provide an AI chatbot to provide immediate assistance. This chatbot will use to handle a range of inquiries, such as answering questions about the booking status, and pricing options. By providing instant, accurate, and 24/7 support, the chatbot can ensure

users receive timely help without waiting for human representatives. Furthermore, this can reduce the workload on customer service staff, enable focus on solve the more complex issues that require human intervention. The integration of AI-driven support not only enhances user satisfy, also improves operation efficiency for pet hotel operators.

Security in payment transactions emerges as a top priority for users, with concerns about the safety of sensitive information during online payments. To address this, the system will integrate trusted payment gateway, such as PayPal. This gateway was known for its reliability and robust security measures. These gateways was offer encrypted communication to protect user data, to ensure the transactions are in secure and free from potential threats such as data breaches. To offer a secure payment experience increase the trust between the platform and users, to encouraging to complete booking with more confidence.

The smartphones dominate online interactions, mobile responsiveness has become an essential feature for any web-based system. Most of the user was rely on mobile device to browse services, make bookings, and manage reservations. The system was designed to adopt various screen sizes and resolutions, to ensure optimal user experience across all devices. Furthermore, the system performance will optimize the function smoothly and provide users with a good experience. By prioritizing mobile responsiveness, the system ensures accessibility and convenience for users, which prefer to manage the interactions.

To enhance the functionality and address user feedback, several additional features have been include in system design. One of the key enhancements is to create and manage pet profiles. These features allow user to store essential details about the pets, such as breed, age, health condition, and dietary preferences. This information can be reused for future bookings.

Additionally, users will receive automated booking confirmation via email, which reduces the risk of missing reservations. The detailed service descriptions, complete with pricing and available add-ons to help users make informed decisions. By incorporating these features, the system can provide the booking needs and convenience to be a comprehensive solution for pet owners.

3.3.2 Questionnaires

To gather insightful data on the current pet accommodation booking methods and identify areas for improvement, a detailed questionnaire was administered to pet owners. This questionnaire aimed to understand their experiences, preferences, and challenges related to booking accommodations for their pets. The questions were designed to elicit comprehensive feedback on various aspects of the booking process, customer support, and desired features in a pet hotel system.



Figure 3: Question 1

The first question, "How do you currently book accommodations for your pet?" sought to uncover the existing methods pet owners use to book pet accommodations. Respondents were

given multiple options to choose from, including Phone Call, Email, Social Media (e.g., Facebook/Instagram), Manual Visit to the Pet Hotel, and Other. The gathered data revealed that Phone Call and Social Media were the most commonly used methods, followed by Manual Visits and Email. This data was visualized in a bar chart, highlighting that 73.3% of respondents preferred Phone Call, 60% used Social Media, 40% opted for Manual Visits, and 10% relied on Email. This visual representation provided clear insights into the booking preferences of pet owners and helped identify areas where an online booking system could be beneficial.



Figure 4: Question 2

The second question, "How satisfied are you with the current booking methods?" asked respondents to rate their satisfaction with the methods they currently use. The satisfaction levels were rated on a scale from 1 to 5, where 1 is "Not Satisfied" and 5 is "Very Satisfied." The responses were distributed as follows: 0% for ratings 1 and 2, 30% for rating 3, 56.7% for rating 4, and 13.3% for rating 5. This data was visualized in a bar chart, showing that the majority of respondents were fairly satisfied with the current booking methods, with the highest number of

responses being for rating 4. This information provides valuable insights into the overall satisfaction levels of pet owners with their current booking processes.



Figure 5: Question 3

Next, the question, "What issues have you faced with the current booking process?" invited pet owners to share any difficulties or challenges they encountered. Respondents could choose from multiple options, including Slow Response Time, Booking Errors (e.g., Overbooking), Lack of Online Options, Poor Communication, and Other. The responses were visualized in a bar chart, revealing that Slow Response Time was the most significant issue, reported by 63.3% of respondents. This was followed by Lack of Online Options at 43.3%, Poor Communication at 6.7%, and Other issues at 6.7%. Notably, none of the respondents reported facing Booking Errors. This chart highlights the primary concerns users have with the current booking process and emphasizes the need for improvements in response time and the availability of online booking options.



Figure 6: Question 4

The question, "Would you prefer an online booking system?" asked respondents whether they would favor an online solution for booking pet accommodations. The options were Yes, No, and Maybe. The gathered data revealed unanimous support for an online booking system, with 100% of respondents selecting "Yes." This data was visualized in a pie chart, which showed that every respondent preferred an online booking system, indicating a strong demand for digital solutions among pet owners.

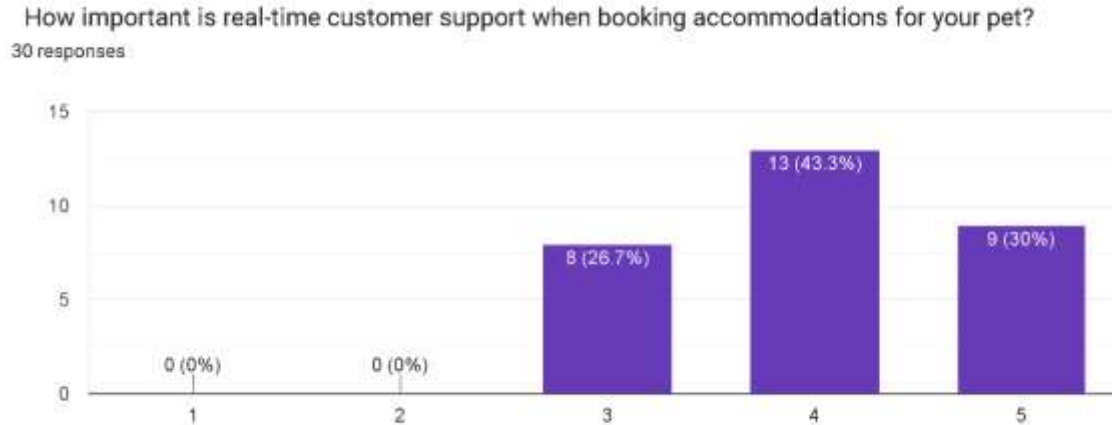


Figure 7: Question 5

The importance of customer support was addressed with the question, "How important is real-time customer support when booking accommodations for your pet?" This question aimed to determine how critical real-time support is to pet owners during the booking process. Respondents rated the importance on a scale from 1 to 5, where 1 is "Not Important" and 5 is "Very Important." The responses were distributed as follows: 0% for ratings 1 and 2, 26.7% for rating 3, 43.3% for rating 4, and 30% for rating 5. This data was visualized in a bar chart, showing that the majority of respondents find real-time customer support important or very important. This highlights the need for responsive and accessible assistance in the booking process.

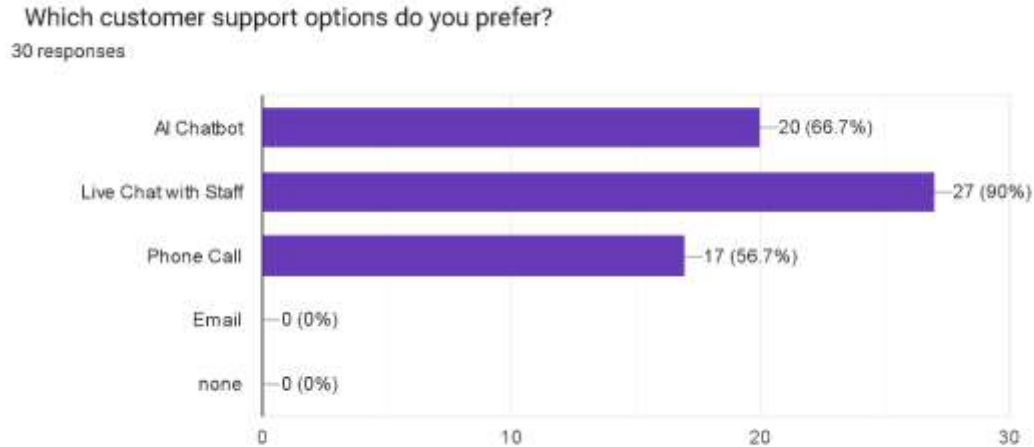


Figure8: Question 6

To explore customer support preferences, the question, "Which customer support options do you prefer?" asked pet owners about their preferred modes of communication for receiving support. Respondents could choose from multiple options, including AI Chatbot, Live Chat with Staff, Phone Call, Email, and None. The responses were visualized in a bar chart, revealing that Live Chat with Staff was the most preferred option, chosen by 90% of respondents. This was followed by AI Chatbot at 66.7% and Phone Call at 56.7%, while no respondents selected Email or None. This chart underscores the importance of having live support and real-time assistance options in the pet hotel booking system.

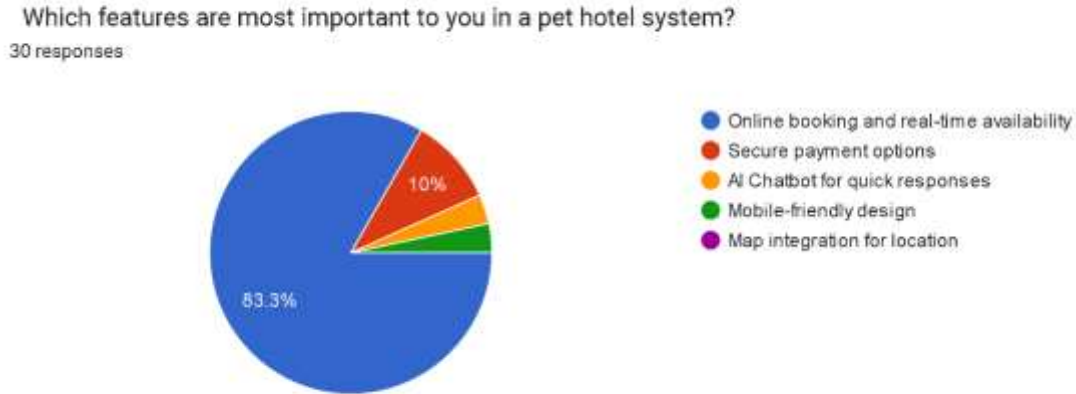


Figure 9: Question 7

Finally, the question, "Which features are most important to you in a pet hotel system?" sought to identify the key features that pet owners value in a booking system. Respondents were given multiple options, including Online Booking and Real-Time Availability, Secure Payment Options, AI Chatbot for Quick Responses, Mobile-Friendly Design, and Map Integration for Location. The responses were visualized in a pie chart, revealing that Online Booking and Real-Time Availability was the most important feature, chosen by 83.3% of respondents. This was followed by Secure Payment Options at 10%, AI Chatbot for Quick Responses at 3.3%, and Mobile-Friendly Design at 3.3%, while none of the respondents selected Map Integration for Location. This visual representation highlights the key features that pet owners prioritize in a pet hotel system, providing valuable insights for the development of a user-centric platform.

These questions collectively provided a comprehensive understanding of pet owners' needs and expectations, guiding the development of a user-centric Pet Hotel Booking System. The subsequent analysis of the responses helped in identifying key areas for improvement and features that would enhance user satisfaction and engagement.

3.3.3 Use Case Diagram

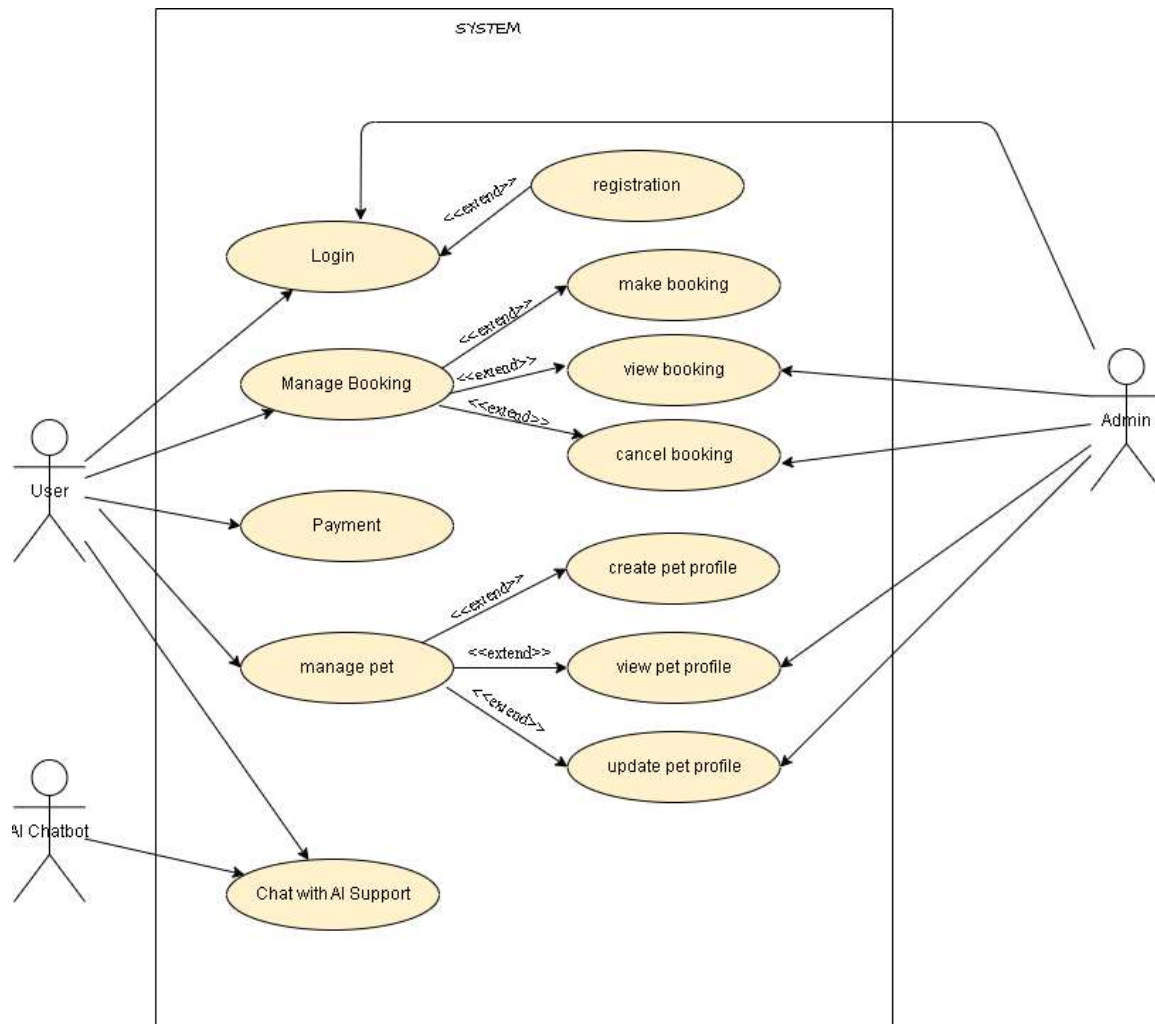


Figure 10: Use Case Diagram

The system's functionalities and interactions with key actors are represented in the Use Case Diagram (Figure 10). This diagram serves as a visual blueprint for understanding the relationships between the system and its users. The primary actors identified in the diagram are guests (pet owners), staff, and admins, each with distinct roles and functionalities.

Guests can perform essential functions such as registration, logging in, checking availability, booking services, managing pet profiles, processing payments, and interacting with

the AI-powered chatbot for real-time support. These features aim to enhance the convenience and efficiency of the booking process for pet owners.

Staff members are responsible for managing bookings and updating service availability, ensuring smooth daily operations and timely updates to the system. This role bridges the gap between users and the services offered, maintaining accuracy and reliability.

Admins oversee the entire system, handling administrative tasks such as monitoring system performance, viewing reports, and ensuring compliance with operational standards. This role ensures the platform runs efficiently while addressing any technical or operational issues promptly.

The Use Case Diagram illustrates these interactions and provides a clear structure for the system's functionalities, ensuring that all user and operational requirements are addressed systematically during the design and development phases.

3.4 Design Phase

The design phase plays a crucial role in translating the identified user requirements into a tangible system blueprint. It involves creating the system architecture, defining the database structure, and designing user interface layouts. This phase ensures that the proposed system is functional, scalable, and user-friendly, while also addressing the technical needs of implementation. Through careful planning and visualization, the design phase bridges the gap between theoretical requirements and practical development.

3.4.1 System Architecture

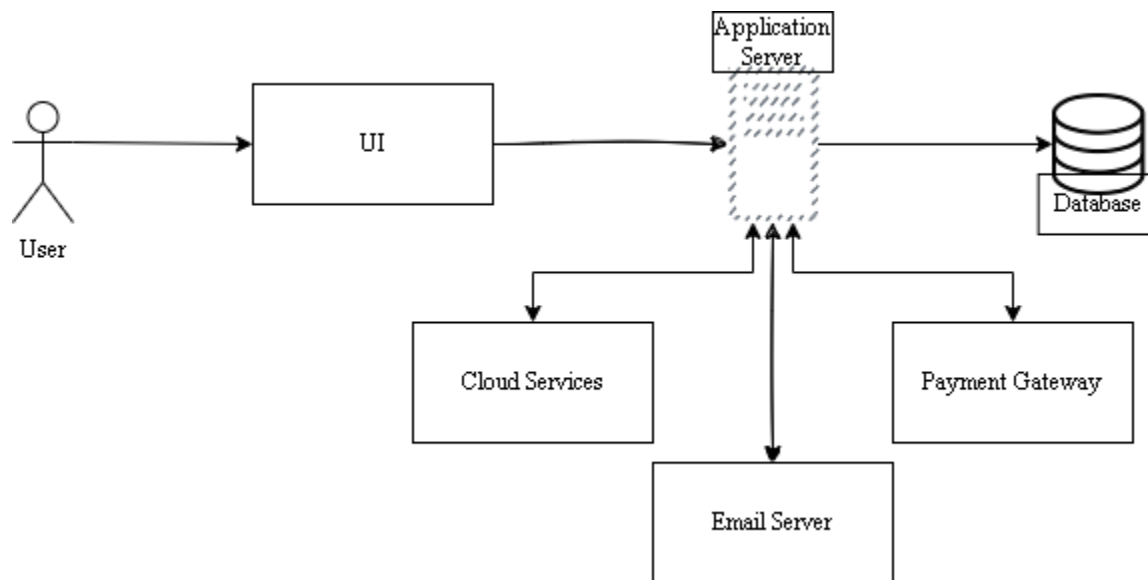


Figure 11: System Architecture diagram

The proposed system architecture adopts a client-server model to ensure the platform operates efficiently, remain scalable, and provide robust security for all transactions and data exchanges. This divide the system into four key components, which was the client-side, the server-side, the database, and integrations with external services. The design was focus on facilitating seamless communication between these components while maintaining system reliability, user-

friendliness, and performance. The architecture is illustrated in provide diagram to form the foundation of platform functionality.

3.4.1.1 Client-Side (User Interface)

The client-side was serves as the system's front-end layer, which was enable user to interact with platform through their web browsers. The user interface was use to develop by using HTML, CSS, and JavaScript, to ensuring visually appealing and responsive design. This intuitive interface allows users to browse various features, which include account management, booking service, and real-time chatbot interaction. The integration of interactive components, such as booking forms and availability checks, provide users with a seamless experience. Moreover, the design was responsive to ensure compatibility across various devices. This flexibility meets the needs of a wide range of users, providing convenience and accessibility regardless of device.

3.4.1.2 Server-Side (Application Server)

The server-side forms the backbone of the platform by handling the core functionality and operations of the system. It is responsible for handling user requests, managing business logic, and facilitating communication with databases and external services. The application server, powered by PHP, serves as the central hub, coordinate the flow of data between the client-side, database, and third-party APIs. The server was responsibilities include manage user authentication, verifying booking, and role-based access control to ensure that users only have access to functionalities relevant to their role. The server ensures a robust, high-performance platform by efficiently handling user input, ensuring secure data processing, and maintaining reliable communications.

3.4.1.3 Database Management

The server was interact with MySQL database, which will store all critical data, include user profile, booking details, payment transactions, and other service relate information. The database schema is designed following normalization principles to reduce redundancy and optimize storage efficiency. This structure ensures fast data retrieval, secure data storage and smooth updates for all operations. Additionally, the database maintains a comprehensive record of user activity, facilitating seamless tracking and management of bookings and payments.

3.4.1.4 Integration with External Services

The system leverages external services via robust APIs to enhance functionality and user experience. Cloud services ensure secure and scalable storage for files like pet profiles and invoices. Integration with trusted payment gateways like PayPal or Stripe facilitates secure online transactions, adhering to financial security standards. Lastly, an email server streamlines communication by automating notifications, such as booking confirmations, and payment receipts, enhancing user experience through timely updates.

3.4.1.5 Security and Communication Protocols

Security features are fundamental elements in the system architecture. The protection of user data and privacy is accomplished by ensuring that all communications between the client end and the server are SSL (Secure Sockets Layer) compliant. The user's passwords are also protected by performing a hash function on them before placing them in their database to prevent access to unauthorized parties. There is also an Implementation of role-based access control (RBAC) to control the users, so that guests and staff and administrators can access only those resources and functions which are pertinent to their roles. Also, financial information which is transmitted through the payment gateway is safe as it uses end to end encryption.

3.4.1.6 Scalability and Performance

Such system is built expecting a scalability so that it can manage the increasing volume of traffic and features in the future without issues. On the server side, a load balancing architecture is implemented to avoid such systems and offer good performance even at peak periods by evenly ratioing the amount of traffic reaching a set of servers. The use of caching mechanisms also helps in alleviating the burden on the server and also increasing the speed of resources that are accessed more often. Also, the platform is made such that the modular approach allows for inclusion of new functions or integration that does not significantly affect the operation of the current functions.

3.4.2 Data Flow Diagram

The Data Flow Diagram (DFD) for the Pet Hotel Booking System illustrates the flow of information within the system, highlighting interactions between various entities and processes. This detailed description provides a clear understanding of how data moves through the system, ensuring that all user and operational requirements are systematically addressed during the design and development phases.

3.4.2.1 Context Diagram

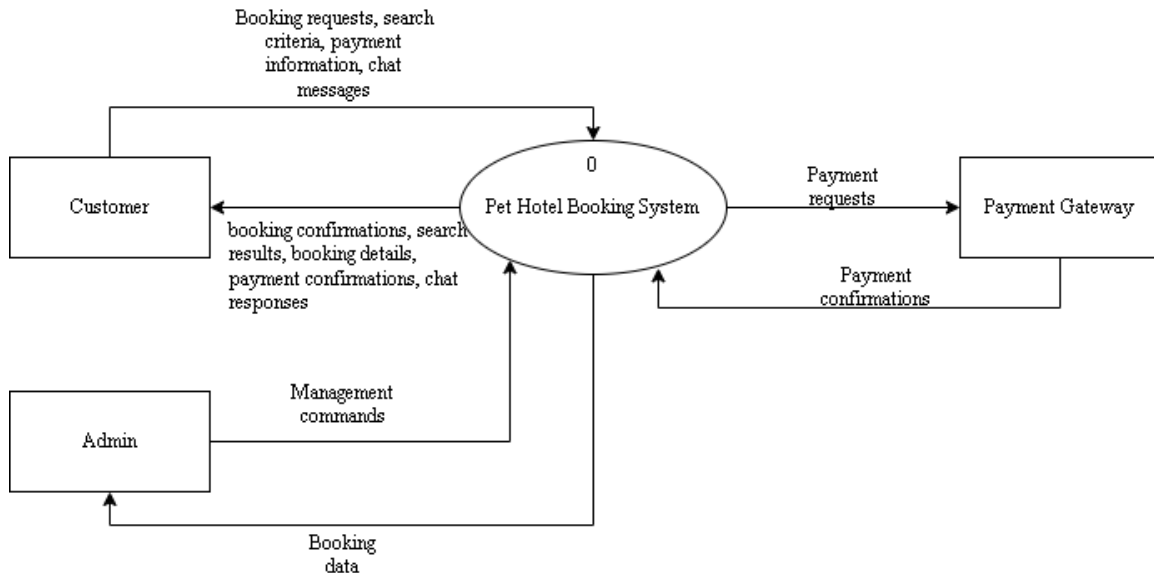


Figure 12: Context Diagram

The context diagram provides a high-level overview of the entire Pet Hotel Booking System, depicting the main processes and interactions between the system and external entities. It serves as a visual representation of the system's scope, illustrating the primary functions and data exchanges.

In the context of the system, customers interact with the Pet Hotel Booking System by sending booking requests, which include details such as desired booking dates, type of accommodation, and additional services required. Customers also provide search criteria to find available rooms and services matching their preferences, with the system responding by offering search results that meet these specified criteria. Additionally, customers submit payment information to complete their bookings, and the system processes this information while interacting with the Payment Gateway to ensure secure transactions. For real-time assistance and

inquiries, customers can send chat messages that are handled by the system's AI chatbot, which provides instant responses.

Admins play a crucial role by sending management commands to oversee and manage bookings, update room availability, and handle pet profiles, ensuring smooth operations and accurate data management. Admins receive booking data from the system, allowing them to monitor and manage reservations effectively.

The Payment Gateway handles the financial transactions, with the Pet Hotel Booking System sending payment requests to the gateway to process customer payments securely. The Payment Gateway responds with payment confirmations, notifying the system of successful transactions, and this confirmation is then communicated back to the customers.

The Pet Hotel Booking System acts as the central processing unit, managing and coordinating the data flow between customers, admins, and the payment gateway. The main processes include Booking Management, which handles booking requests, cancellations, and confirmations to ensure that all bookings are processed accurately and efficiently. Search Management manages the search criteria provided by customers and returns relevant search results. Payment Processing facilitates secure payment transactions by interacting with the Payment Gateway, ensuring that customer payment information is processed safely. Chat Support provides real-time assistance through the AI chatbot, handling customer inquiries and providing instant responses.

The system's data stores include the Booking Database, which stores all booking-related data, including reservation details, customer information, and payment records, ensuring that all

data is accessible for booking management and reporting purposes. The Pet Database maintains comprehensive pet-related information, ensuring accurate records for bookings and services. The Payment Database keeps records of all financial transactions, ensuring secure and accurate financial management. The Room Database stores room availability and information, supporting efficient room management and bookings.

The context diagram provides a comprehensive view of the system's high-level functionality and the interactions between its main components. It lays the foundation for understanding the detailed processes and data flows that will be further elaborated in subsequent levels of the DFD.

3.4.2.2 Level 0 Data Flow Diagram

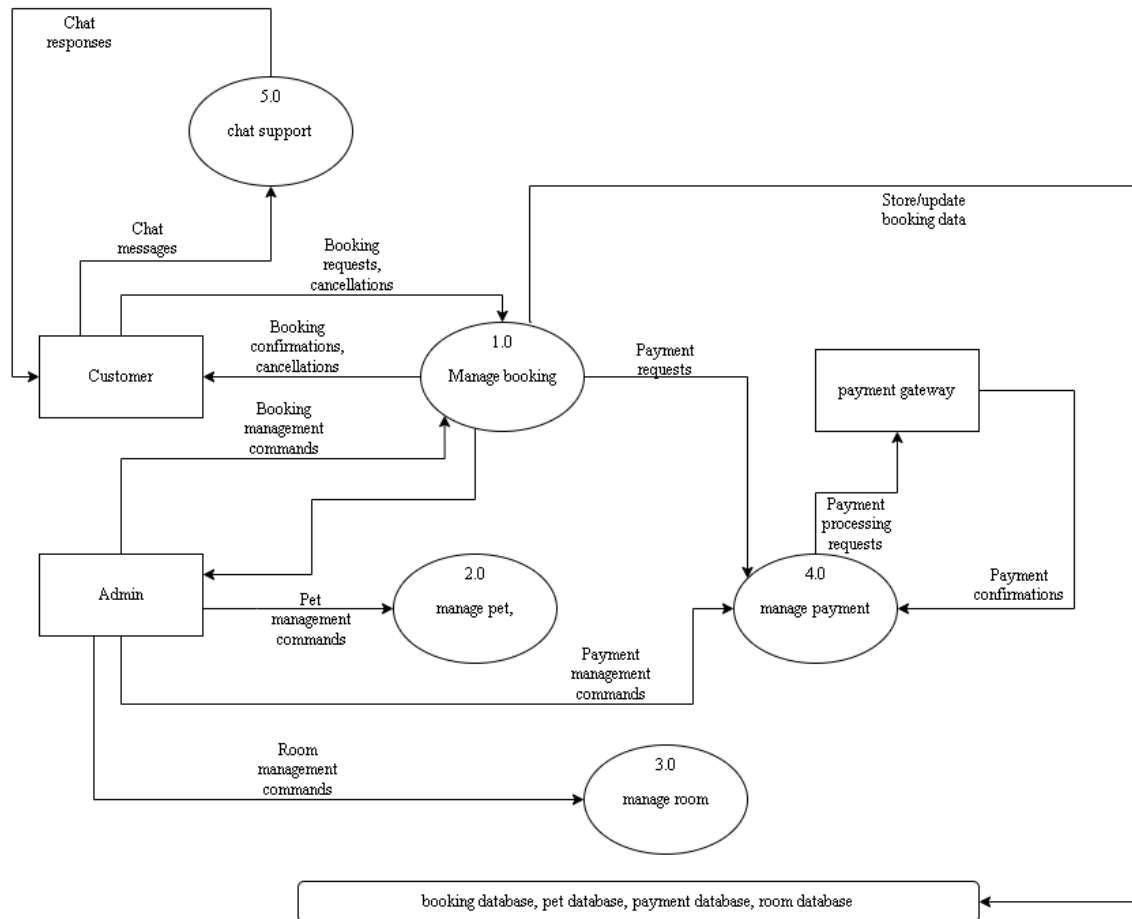


Figure 13: Data Flow Diagram Level 0

Level 0 diagram for Pet Hotel Booking is giving more specific look at system ways and meanwhile breaking high processes from conceptual diagram into specific components so that data journey can be seen. How data is moved and joined with system parts through this is clear.

When it comes to customer doing interactions, it breaks into many other processes. For example, Booking Management as Process 1.0 is one of those parts where customers can start and also stop the booking requests. System takes these and the database that holds bookings gets changed based on what action happened, then customers get to know on confirmations or if a

booking was cancelled. Another part is Search Management, noted as Process 1.1, where customer gives what they want to see in terms of available rooms and what service they fancy. Results come back matching the criteria given. Lastly, Chat Support is noted down as Process 5.0 and there it is where customers can send chats for help in real time. An AI chatbot takes this part up to handle talks and provides back fast answers.

Admin interactions go forth by managing reservations, handling pets, and also taking care of rooms. Manage Bookings belongs as Process 1.0, admins dispatch management orders for overseeing and updating all reservations, keeping booking information recorded correctly in the booking database by this action. Manage Pets, a task in Process 2.0, is where admins execute pet-centric handling orders so impacts are made then shown in the pets database. Manage Rooms, recognized as Process 3.0, describes admins performing steps to maintain room availability and changes, so room records held correctly in room database can be ensured.

Payment Gateway specifically pertains to Payment Processing, called Process 4.0, in which payment inquiries are made towards Payment Gateway by system for safe transactions. Those requests sent reach the Payment Gateway, processed and confirmed back with payments, where systems use these confirmations for updating payment databases and notify customers of payments going through successfully.

The detailed processes involve a lot of different smaller segments. Within the Breathing Booking Management (Process 1.0), Handling those Booking Requests (Process 1.1) takes care of requests for booking from customers, making sure that there are correct details entered and that they get responses quickly. Then, there is this Searching Availability (Process 1.2), where what customers ask to search for is dealt with, and it pulls up search results related to the request.

Confirming or maybe Canceling Stuff (Process 1.3) deals with confirmations, also cancellations, making sure they get updates on time.

Managing Pets (Process 2.0) has many parts, like Pet Data Handling (Process 2.1) which deals with commands about data related to pets from admins, so records are kept correctly about pets in the database. Managing Rooms (Process 3.0) involves Room Data Handling (Process 3.1) which is all about handling availability and updates of rooms based on what admins say, to keep room database records proper. In Payment Management (Process 4.0), Handling Payments Requests (Process 4.1) comes from booking management to process payments, with Confirm Payments (Process 4.2) taking care of confirmations from the Payment Gateway, so records about payments are correct.

Moreover, Chat Support (Process 5.0) with its internal unit Handle Inquiries (Process 5.1) works on messages received through chat from customers, giving responses immediately via this AI chatbot.

The Level 0 DFD gives a split-up view, more closely looking at the paths data takes within a system. It shows all the little parts and how they talk to each other, kind of laying out the pieces that make the system run smooth, at least that's the idea, and it should help pet owners, as well as those managing the hotel platform, find it more intuitive to use.

3.4.3 Activity Diagram

An activity diagram is important for a design phase to represent the flow of activity and actions within a system. It will help to show the sequence of the step and provide a clear understanding for the relationship of the component to achieve a specific outcome. The activity diagram was show the various activity, which include booking process, registration, and other.

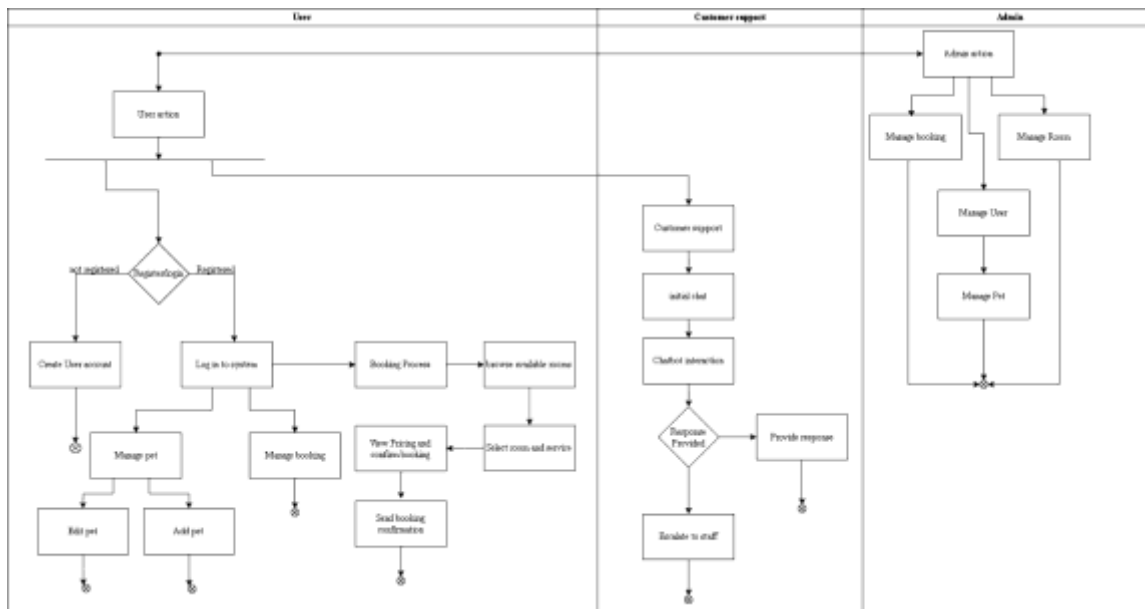


Figure 14: Activity Diagram

The process User Registration /Login was allow the new user to fill out the registration form with their detail. This information will store in the database. For the exist user can enter the login credentials, which the system will verify against the database. After log in, user will proceed the browse and select service. User can browse available service. User can select the service and check the availability for the chosen dates.

Next is user manage and provide pet details. User will input the details of their pet. This detail of pet will record and store in database. The user can review the select service and pet details

and confirm the booking. The system will generate the booking summary and calculate the total cost. After confirm booking, user can make the payment. The system was processes the payment through the integrated payment gateway. Once the payment is confirmed, the booking is finalized. Users was have the access to the customer support to integrated chat or chatbot features to get real-time assistance and answer questions.

The process admin manage booking was allow admin to view and modify the detail of the booking create by customer. The admin can manage users and pets information by modify the detail store in the database then update the data on the database. Admin was allow to manage the status of the room.

3.4.4 Sequence Diagram

In design and development stages, the sequence diagram it is used much, a tool that's got importance. It makes one see the order of actions as systems parts and humans interact over time during their tasks. The Pet Hotel Booking System brings these diagrams in to explain several processes, things like Logging in, Signing up, Booking stuff, Paying for stuff, Chatting Help, and Handling of Admin Rooms.

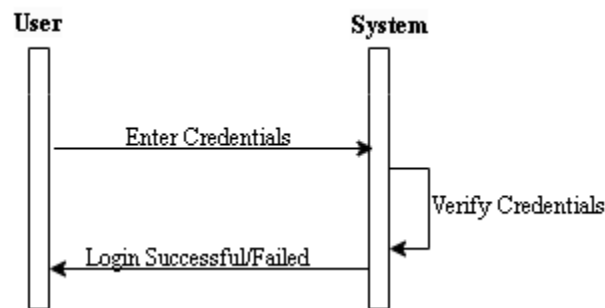


Figure15: Login Sequence Diagram

In the Pet Hotel Booking System, login starts when credentials like username and password are entered. These are sent to where the system does validations. Inside the validation, a database is queried for checking records of users stored. After getting what database says, system decides login result. When credentials given match, system sends "Login Successful" back, letting access and dashboard is shown. Else, if credentials wrong, message says "Login Failed" and asks for re-entry or to recover password. Interaction series for security and user information safety is ensured in this process.

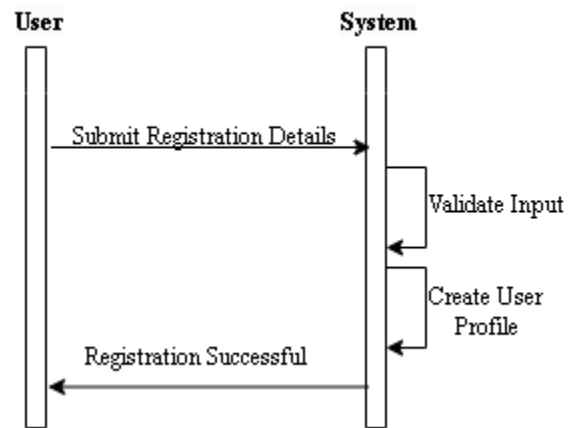


Figure 16: Registration Sequence Diagram

Registration starts in the Pet Hotel Booking System by user filling details such as full name, email, phone number, password in form. The system takes this info and checks for validation, making sure fields filled correctly and criteria is met. If validation fine, a user profile inside database gets created. After profile creation happens well, a confirmation to user is sent that says registration got successful. After confirmation, welcome email to given email is sent, finishing account creation. The sequence of interactions for new user registration ensures access to system features is given quickly and safely.

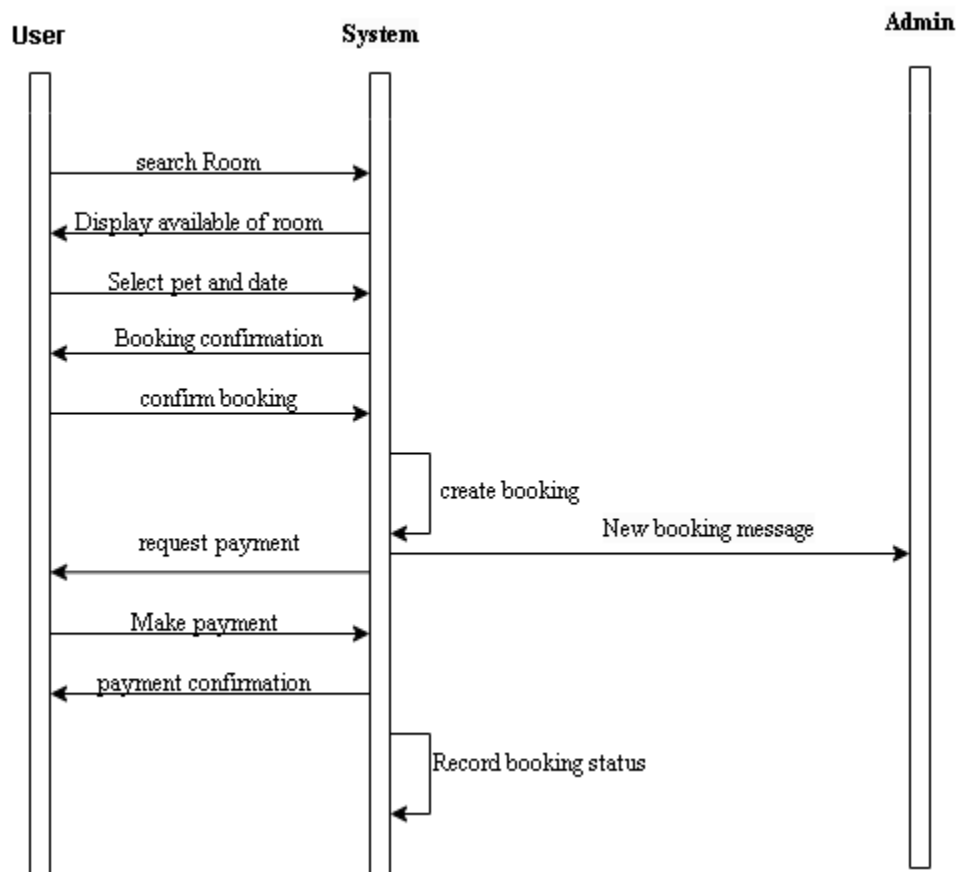


Figure 17: Sequence for Booking Process

The procedure for booking within the Pet Hotel Booking System starts user initiates a search for the room. Availability of rooms get displayed by the system, user has option to select pet and dates preferred for stay. Once confirmation of selection by the user is done, system proceeds to create booking and recording booking status. Then next step of user is to go through booking confirmation, which causes system to put in request for payment. User must complete payment transaction, and when it succeeds system confirms payment. Also, notifying the admin happens through the system as a message regarding new booking. Interactions follow sequence with intention to ensure booking experience that feels seamless for user, from choosing room to confirmation of reservation and payment, keeping admin updated on new reservations.

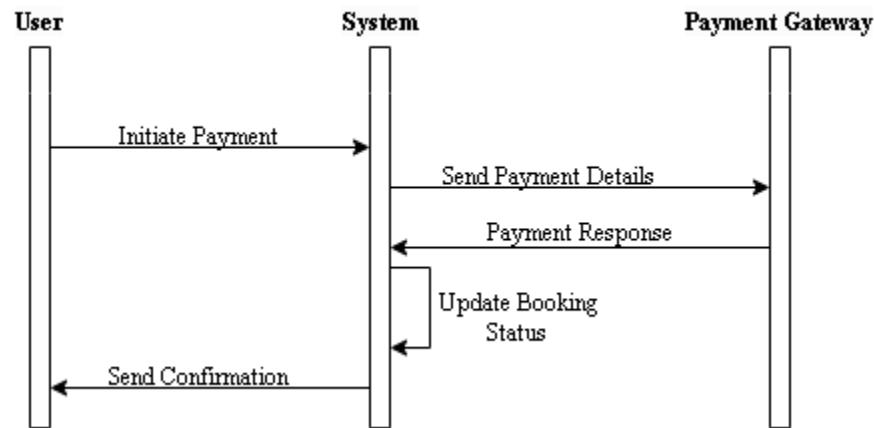


Figure 18: Diagram for Payment Sequence

Starting point for payment in the Pet Hotel Booking System by the user is selecting the method of payment and entering details necessary for it. System will take these details and deliver them to Payment Gateway for processing action. The Gateway, in turn, processes this transaction and provides back a response to system indicating success or failure of payment. From the received response, the system changes booking status as per need. Upon success in payment, a confirmation message to user is forwarded by system, completing payment operations. These interactions ensure processing of payment stays secure and reliable, giving users an experience in payment making that is seamless and trustworthy.

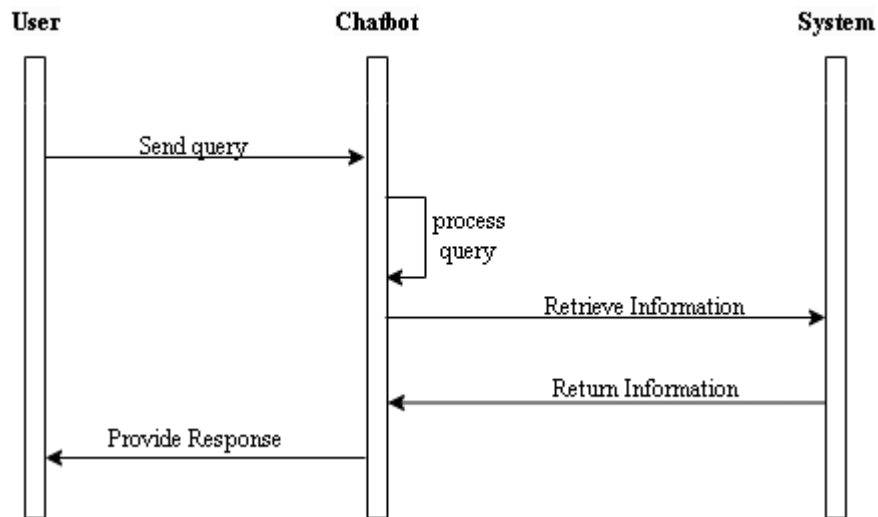


Figure 19: Chatbot Sequence Diagram

The proceedings of the chatbot interaction with the Pet Hotel Booking System commence as soon as a query is sent by the user to the chatbot. Query gets picked up by the chatbot, which it processes using the techniques of natural language processing to attempt understanding what the user wants. When incomplete data is present for a response formulation, it happens that the chatbot makes a request for more data to the system to find out needed information. The necessary data is fetched from the database by the system itself and then it's returned to the chatbot. Based on that, the chatbot proceeds to handle the information retrieved and aims to generate a complete response. The response is then handed over to the user by the chatbot, ensuring assistance which is said to be real-time. The interactions as a sequence are indicating possibly high effectiveness, with the chatbot dealing with user questions, thus it is thought the user experience gets a boost.

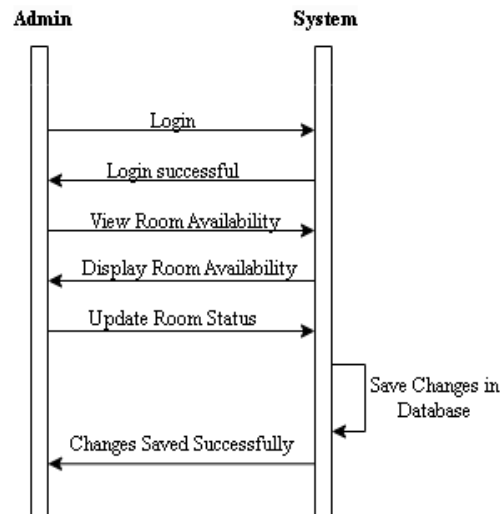


Figure 20: Admin room management Sequence Diagram

Commencement of the admin's room management process happens upon login into the system using what are referred to as credentials. After successful confirmation of identity, the admin proceeds to enter the room management area to know about the current availability of rooms. Data on room availability is brought out and displayed from the database by the system itself. If there is a requirement for making changes in room status, such as occupied or free, the admin inputs these alterations into the system. These changes undergo processing by the system, saving alterations somehow to the database. After changes get stored successfully, a confirmation is supplied to the admin by the system, to ensure room availability information finds itself accurately and swiftly updated. The interactions ordered in this way make it seem like room management is efficient and rightly so by the admin, keeping status of rooms up-to-date.

3.4.5 Entity-Relationship Diagram (ERD)

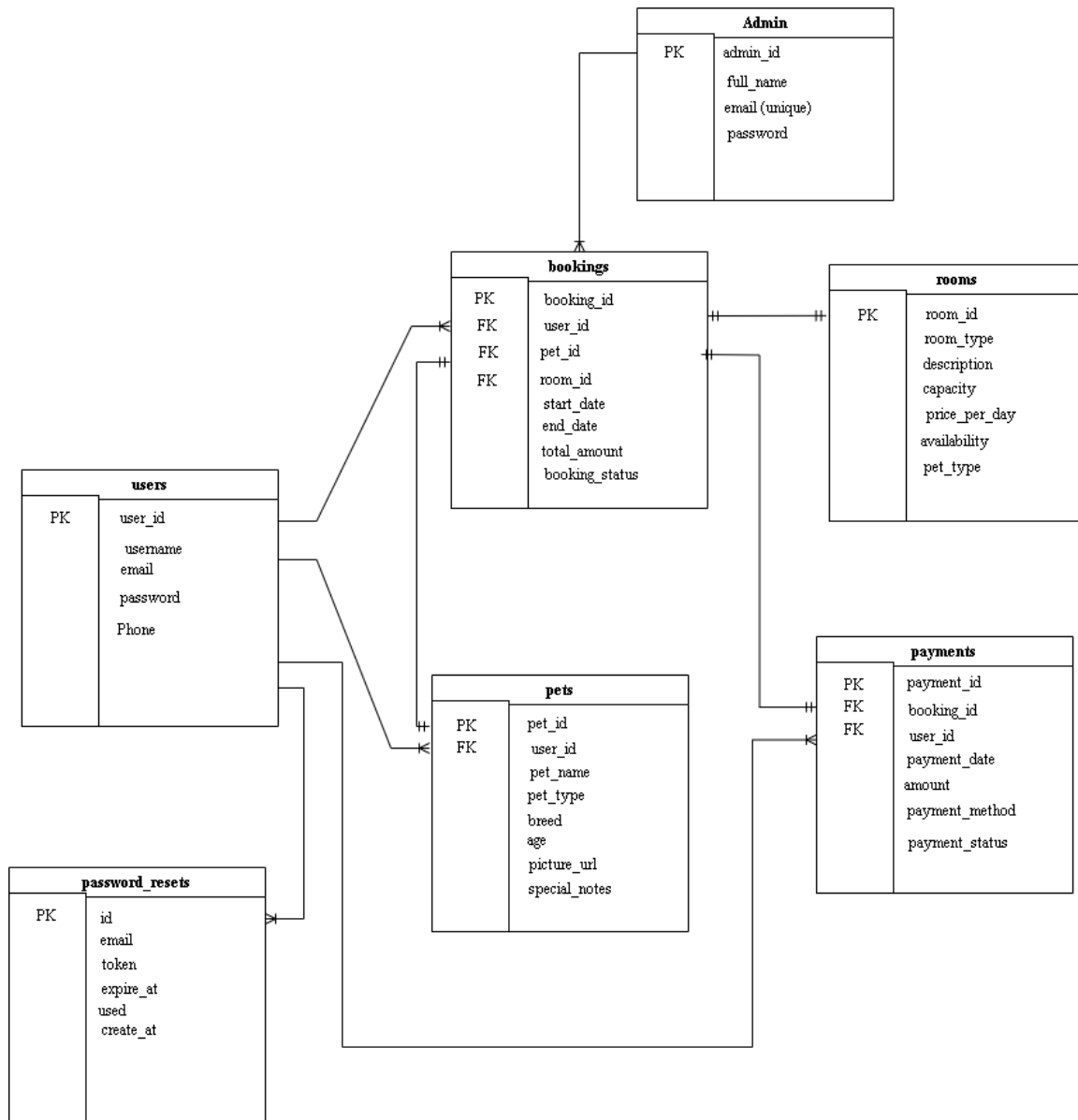


Figure 21: Entity-Relationship Diagram

Entity-Relationship Diagram (ERD) shows structure data and sees how Pet Hotel Booking System connects the entities key, seen in Figure 21. It's for managing this data clearer and managed approach. ERD has such entities, Users, Bookings, Payments, Rooms, Pets, Password_resets, Admin, each gets own attributes, how relations work in what system does.

Within the Users realm, important specifics of users are encompassed, possessing data like user ID, username, phone information, the email, and also passwords. Seen as a vital fragment since it showcases types of the users system includes, say, pet owners availing bookings for bookings for pets. Bookings segment retains descriptive insights relating to each booking, including booking ID, user ID, specifying the pet ID, the room involved through room ID, plus the date spans from start to close, combined with the total amount, alongside the situation of the booking itself. The connection of users tied to their reservations becomes noticeable, with pets and room aspects checked, offering the thorough lens of the booking mechanism.

Paying attention to Payments, all the interaction of financial dealings is noted down, linking it with payment ID, booking ID, user ID matches up, time payment occurred, alongside amount to be paid, means chosen for payment, hue of status in payments too. This ensures every booking touches on a respective money transaction, casting certainty onto finance precision along with security kept intact. The sphere of Rooms grips details which talk about the rooms on hand, containing room ID, variety of room in use, portrayal given, connected with the capacity they cover, cost per day factor, Room provide support for the pet type and knowledge about availability state. This piece is decisive about managing room offerings, aligning with reservations in connection to room presence.

The Pets entity stores needed information, like ID and other info, such as user number, name, type, kind, pet age, photo link, and notes which are special. This links pets and their owners, giving details influencing the way care and booking is handled. The password reset is use for user to reset the password by using the token. It will store the taken have sent to user to reset the password the token create day and used day.

The Admin entity has admin stuff, like admin ID, their complete name and email, and even password. Admins make things work, ensuring bookings, manage operations of system, and also keeping data right, without errors. Entities are related to show system's interconnections. A user, they're able to make a lot of bookings, and each booking linked to a single payment. A user could have lots of pets, and can also do many chats through chat support. Each booking connects to one room and a pet, alongside ensuring links between all points of data which is managed properly and accurately.

The ERD serves as a plan, giving a framework to understand how the database of Pet Hotel Booking System is structured. By detailing the parts and how they relate to each other within the system it supports smooth data handling, retrieval and merging processes, all which are needed for the system to function well and make users satisfied. This thorough method builds a stable, expandable and friend-friendly platform that tries to meet what pet owners and hotel people are seeking.

3.4.6 Data Directory

The 7 table below was show database in the Pet Hotel Booking System. The primary key in each table was unique key, among the relationship between the database was the foreign key. Foreign key is the key to link the data between one table and other table.

Users

No	Field Name	Field Type	Constraint	Description
1	user_id	Int	Primary key	Primary key in user identification
2	username	Varchar	No constraint	User name
3	email	Varchar	Unique key	User email
4	password	Varchar	No constraint	User password
5	phone	Varchar	No constraint	User phone

Table 2: Users table for Pet Hotel Booking System

Admin

No	Field Name	Field Type	Constraint	Description
1	admin_id	Int	Primary key	Primary key in admin identification
2	full_name	Varchar	No constraint	Admin name
3	email	Varchar	Unique key	Admin email
4	password	Varchar	No constraint	Admin password

Table 3: Admin table for Pet Hotel Booking System

Pets

No	Field Name	Field Type	Constraint	Description
1	pet_id	Int	Primary key	Primary key in pet identification
2	User_id	Int	Foreign key	Foreign key link to users table
3	Pet_name	Varchar	No constraint	Pet name
4	Pet_type	Varchar	No constraint	Pet type
5	breed	Varchar	No constraint	Pet breed
6	Age	Int	No constraint	Pet age
7	Picture_url	Varchar	No constraint	Pet picture
8	Speacial_notes	text	No constraint	Pet speacial detail

Table 4: Pets table for Pet Hotel Booking System

Rooms

No	Field Name	Field Type	Constraint	Description
1	room_id	Int	Primary key	Primary key in room identification
2	room_type	Varchar	No constraint	Room type
3	description	Text	No constraint	Room description
4	capacity	Int	No constraint	Room capacity
5	price_per_day	Decimal	No constraint	Room price per day
6	availability	tinyint	No constraint	Room availability
7	pet_type	Varchar	No constraint	Room for what type of pet

Table 3.4: Rooms table for Pet Hotel Booking System

Bookings

No	Field Name	Field Type	Constraint	Description
1	booking_id	Int	Primary key	Primary key in booking identification
2	User_id	Int	Foreign key	Foreign key link to users table
3	Pet_id	Int	Foreign key	Foreign key link to pet table
4	Room_id	Int	Foreign key	Foreign key link to room table
5	Start_date	Date	No constraint	Booking start date
6	End_date	Date	No constraint	Booking end date
7	Total_amout	Decimal	No constraint	Booking total amount
8	Booking_status	Varchar	No constraint	Booking status

Table 5: Bookings table for Pet Hotel Booking System

Payments

No	Field Name	Field Type	Constraint	Description
1	payment_id	Int	Primary key	Primary key in payment identification
2	booking_id	Int	Foreign key	Foreign key link to booking table
3	user_id	Int	Foreign key	Foreign key link to user table
4	Payment_date	Timestamp	No constraint	Payment date
5	amount	Decimal	No constraint	Payment amount

6	Payment_method	Varchar	No constraint	Payment method
7	Payment_status	Varchar	No constraint	Payment status

Table 6: payment table for Pet Hotel Booking System

Password resets

No	Field Name	Field Type	Constraint	Description
1	id	Int	Primary key	Primary key in chat identification
2	email	Varchar	No constraint	User email
3	token	Varchar	No constraint	Reset token
4	expires_at	Datetime	No constraint	Token expire time
5	used	Tinyint	No constraint	User status
6	created_at	Timestamp	No constraint	Token create time

Table 7: Password resets table for Pet Hotel Booking System

3.4.7 Wireframe Design

User Wireframe Design is focused on by the Pet Hotel Booking System to make the user experience clear, engaging and able to react accordingly. Wireframes, which visualize arranged key pages, give assurance that both user easiness and working are focused on. Through this method, access to system appears smooth without concern of what device is used.

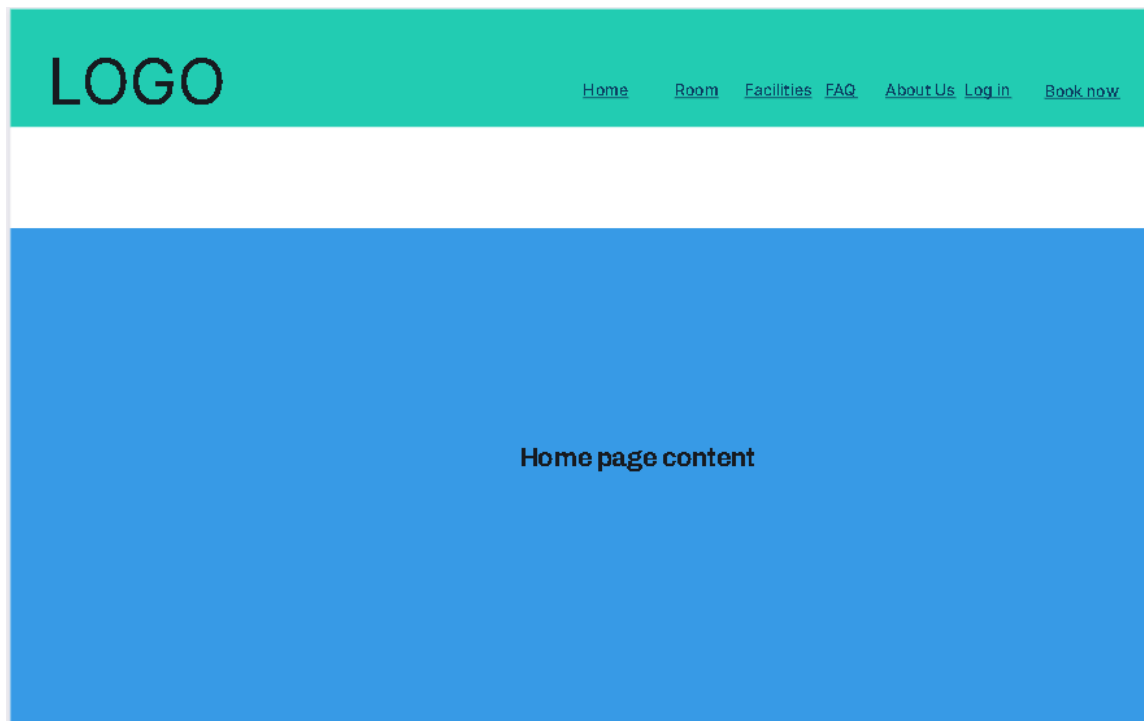


Figure 22: Wireframe of home page

In the wireframe design for home page of the Pet Hotel Booking System features a clean layout to provide a good user experience. At the top of the page, there has a header section, the left of the header a prominent logo to establishes brand identity. The right of the logo have a horizontal navigation menu, which include link to various page. This menu is design for easily accessible to ensure user can quickly navigate to different part of the side. Below the header, was the part to introduce the basic information about the pet hotel.

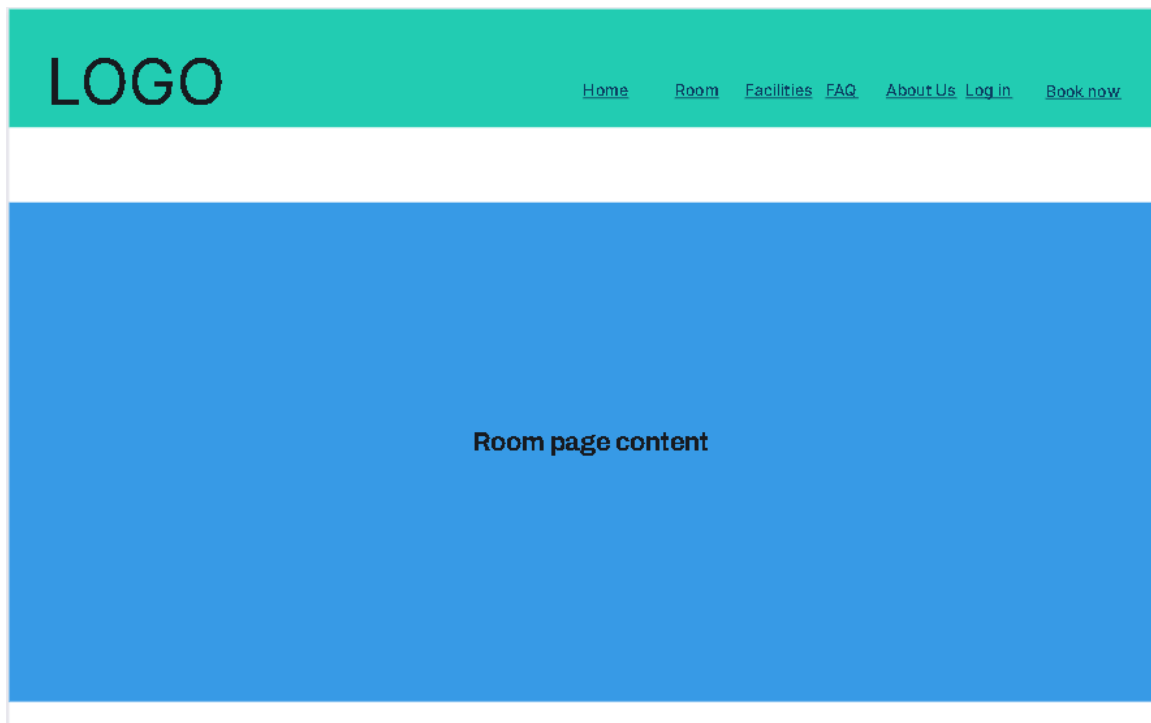


Figure 23: Wireframe of room page

In the wireframe of design for the room page of pet hotel booking system features a clean and straightforward layout. At the top of the page, a header was show the logo prominently at the left side and the right side was the navigation menu to make the page navigation. Below the header was show the information about the room page, which is the basic information for each type of room in hotel.

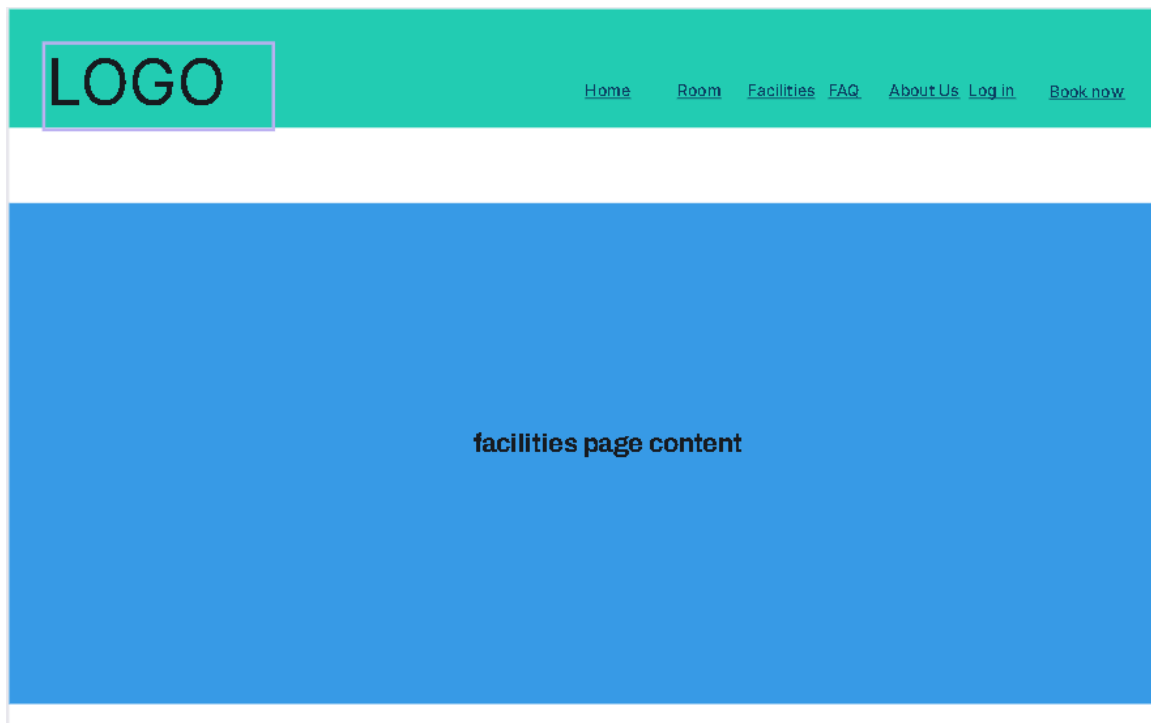


Figure 24: Wireframe of facility page

The wireframe design for the facility page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below was the facility provide by the pet hotel, which will show that the facility such as the play area, grooming service and other.

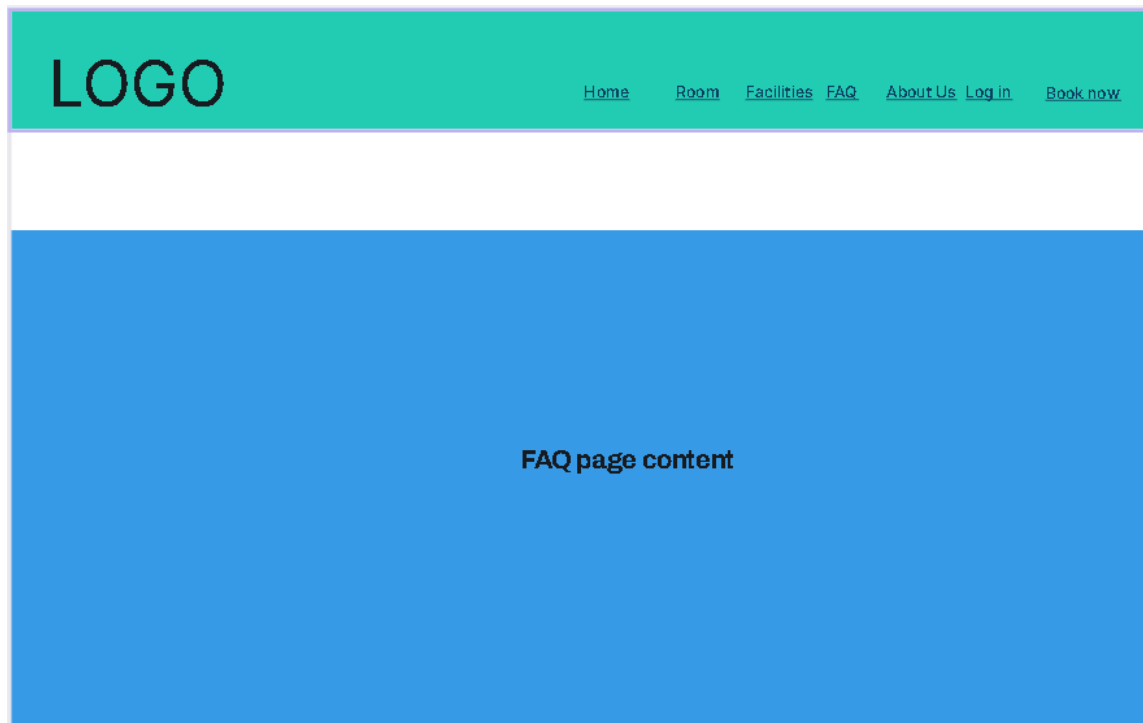


Figure 25: Wireframe of FAQ page

The wireframe design for the FAQ page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below was the FAQ content provide by the pet hotel, which will show common question and its answer will ask by user.

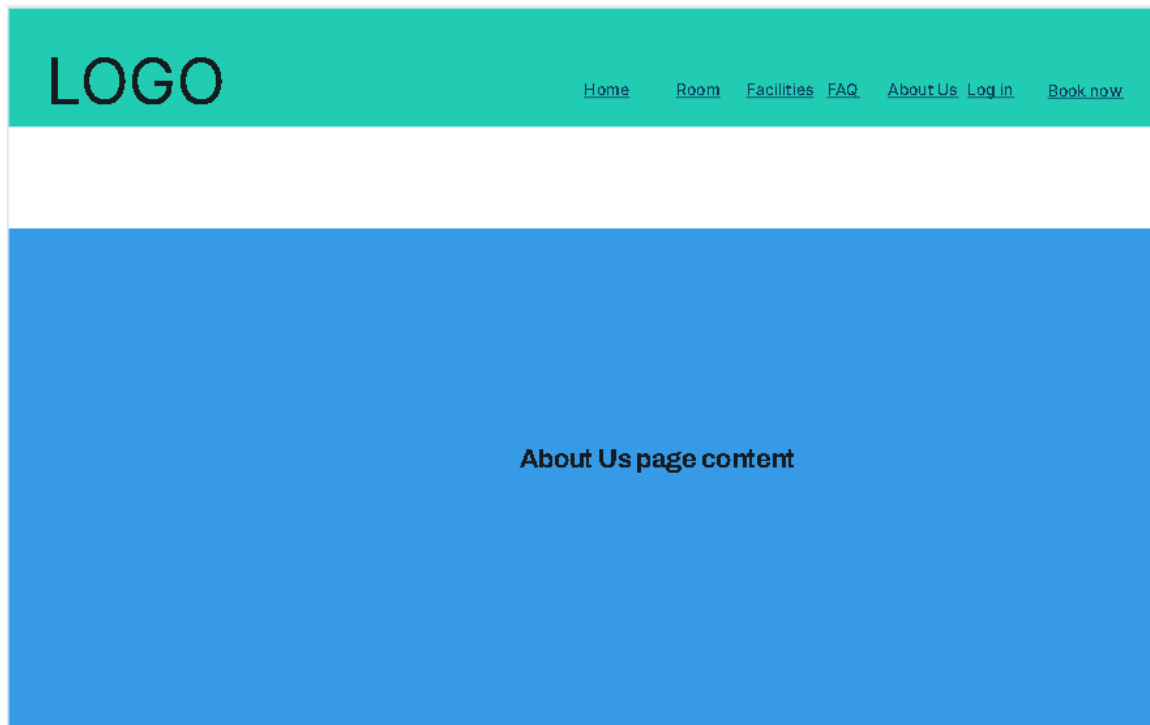
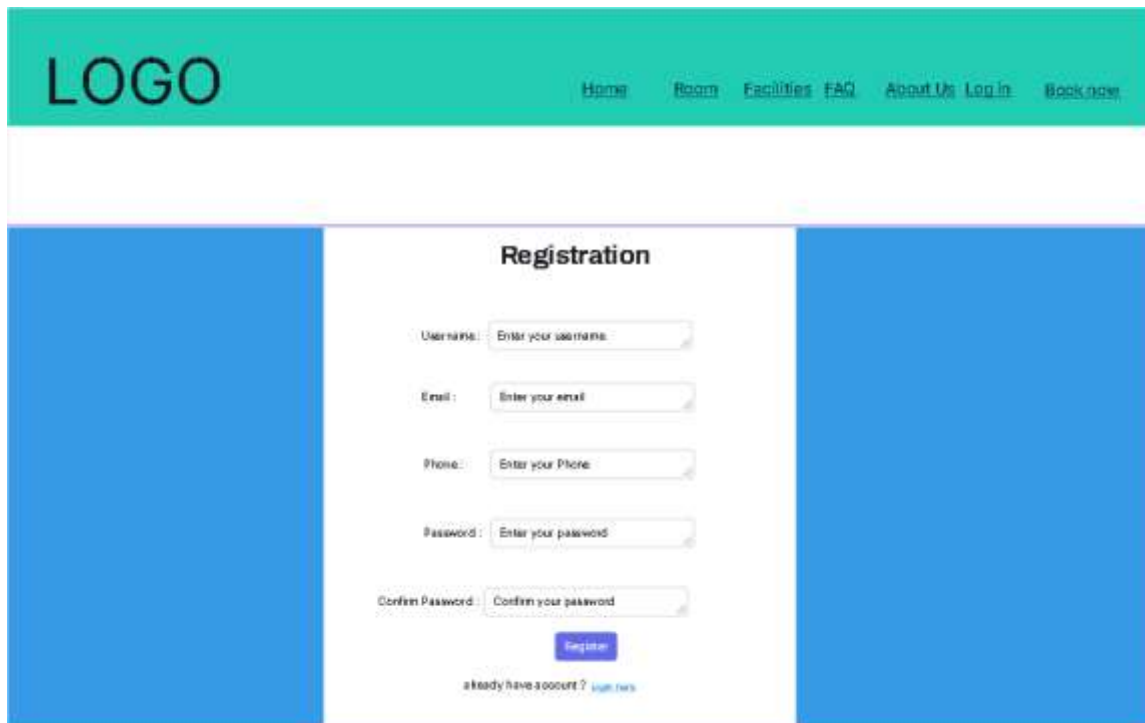


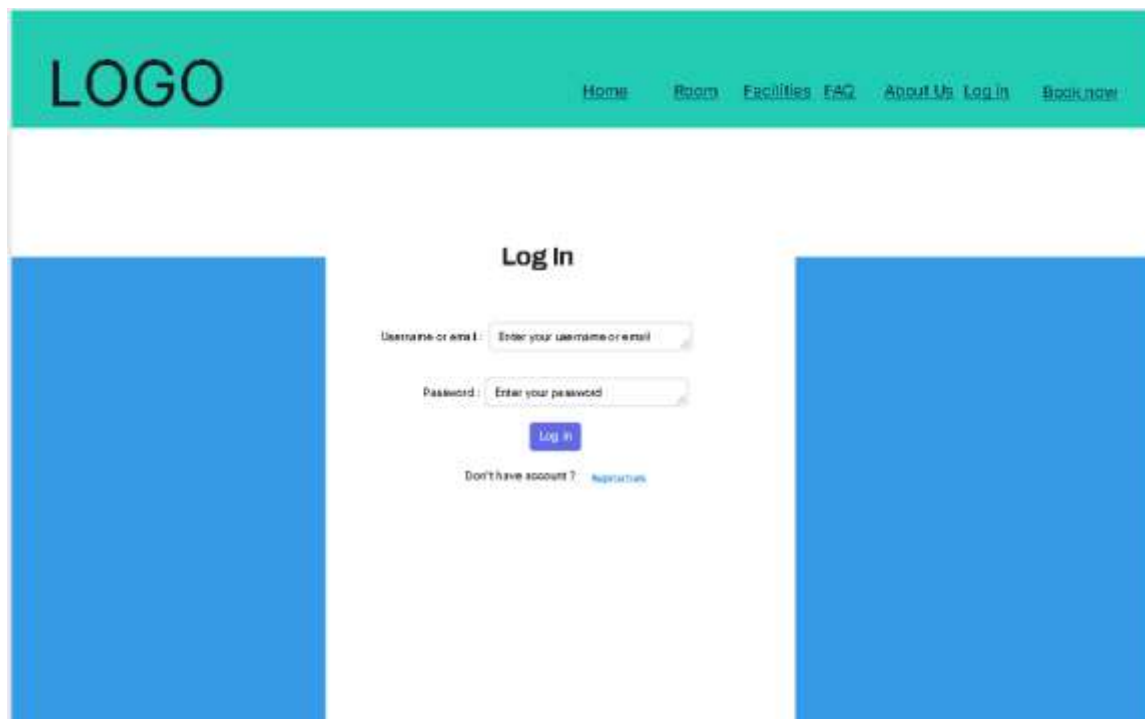
Figure 26: Wireframe of about us page

The wireframe design for the about us page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below will show the About us page content, which was the information for the team member, mission, and others.



The wireframe shows a registration page with a teal header bar. On the left of the header is the word "LOGO" in white. On the right are navigation links: Home, Room, Facilities, FAQ, About Us, Log in, and Book now. The main content area has a white background with the title "Registration" in bold. Below the title are five input fields, each with a label and a placeholder: "Username: Enter your username", "Email: Enter your email", "Phone: Enter your Phone", "Password: Enter your password", and "Confirm Password: Confirm your password". A purple "Register" button is positioned below the last two fields. At the bottom, there is a link that says "already have account? [Log in](#)". The page is flanked by two large blue rectangular areas.

Figure 27: Wireframe of registration page



The wireframe shows a login page with a teal header bar. On the left of the header is the word "LOGO" in white. On the right are navigation links: Home, Room, Facilities, FAQ, About Us, Log in, and Book now. The main content area has a white background with the title "Log In" in bold. Below the title are two input fields, each with a label and a placeholder: "Username or email: Enter your username or email" and "Password: Enter your password". A purple "Log in" button is positioned below the second field. At the bottom, there is a link that says "Don't have account? [Registration](#)". The page is flanked by two large blue rectangular areas.

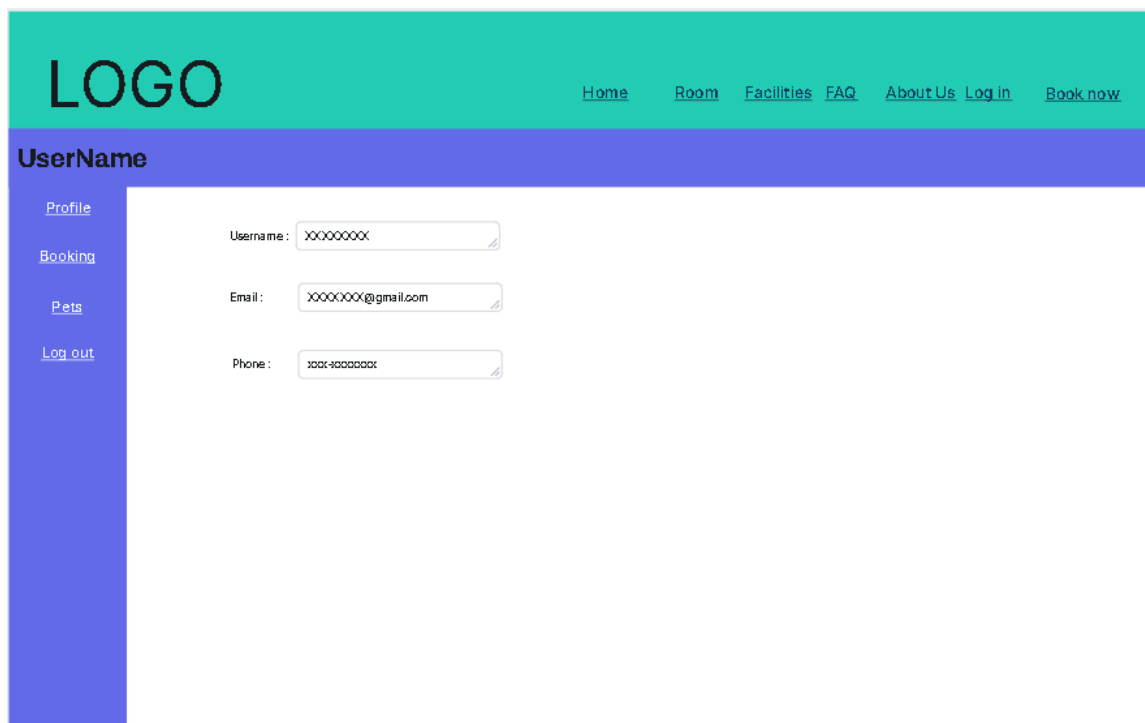
Figure 28: Wireframe of login page

The wireframe design for the Registration page and log in page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header for registration page was show a register form, which was include field for the Username, Email, Phone, Password, and confirm Password. Each field was their own input box and placeholder text for user to input the information. Below the form was a link “Login here” to navigate to login page. The below of the header for login page was show the login form, which was the field for the Username or email and password. Each field was allow user to input the information store in database to do the login process. Below the login form was a link to navigate back to the register form.

The wireframe shows a booking page layout. At the top is a teal header with a large 'LOGO' on the left and a navigation menu on the right containing links: Home, Room, Facilities, FAQ, About Us, Login, and Book now. Below the header is a white content area. On the left side of this area is a large blue rectangular placeholder. In the center is a 'Book Now' form. The form contains the following fields: 'Full Name' with placeholder 'Enter your name', 'Email' with placeholder 'Enter your email', 'Phone' with placeholder 'Enter your phone', 'Check-in Date' with a date picker showing '09 Feb 2021', 'Check-out Date' with a date picker showing '10 Feb 2021', 'Room Type' with a dropdown menu labeled 'Select room type', 'Pet Name' with placeholder 'Enter your pet name', and 'Special request' with a text area labeled 'Input text'. A blue 'Book Now' button is positioned at the bottom of the form. To the right of the form is a calendar widget for 'February 2022'. The calendar shows days of the week (Mon to Sun) and dates from 29 to 28. The background on the right side of the content area is a blue rectangular placeholder.

Figure 29: Wireframe of booking page

The wireframe design for the booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was show the booking form, which was the field for Name, email, phone, Check-in date, Check-out date, Room Type, Pet Name, and special request. Each field was allow user to input the information store in database to do the booking process.



The wireframe shows a user profile page. At the top is a teal header with a large 'LOGO' on the left and a navigation menu on the right with links: Home, Room, Facilities, FAQ, About Us, Log in, and Book now. Below the header is a purple sidebar on the left with the text 'UserName' at the top and a list of links: Profile, Booking, Pets, and Log out. The main content area is white and contains three form fields: 'Username:' with the placeholder 'XXXXXXXX', 'Email:' with the placeholder 'XXXXXXXX@gmail.com', and 'Phone:' with the placeholder 'xxxx-xxxxxxx'. Each field has a small edit icon on the right.

Figure 30: Wireframe of User profile page

The wireframe design for the user profile page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu will show the user profile which include the username, email and phone.

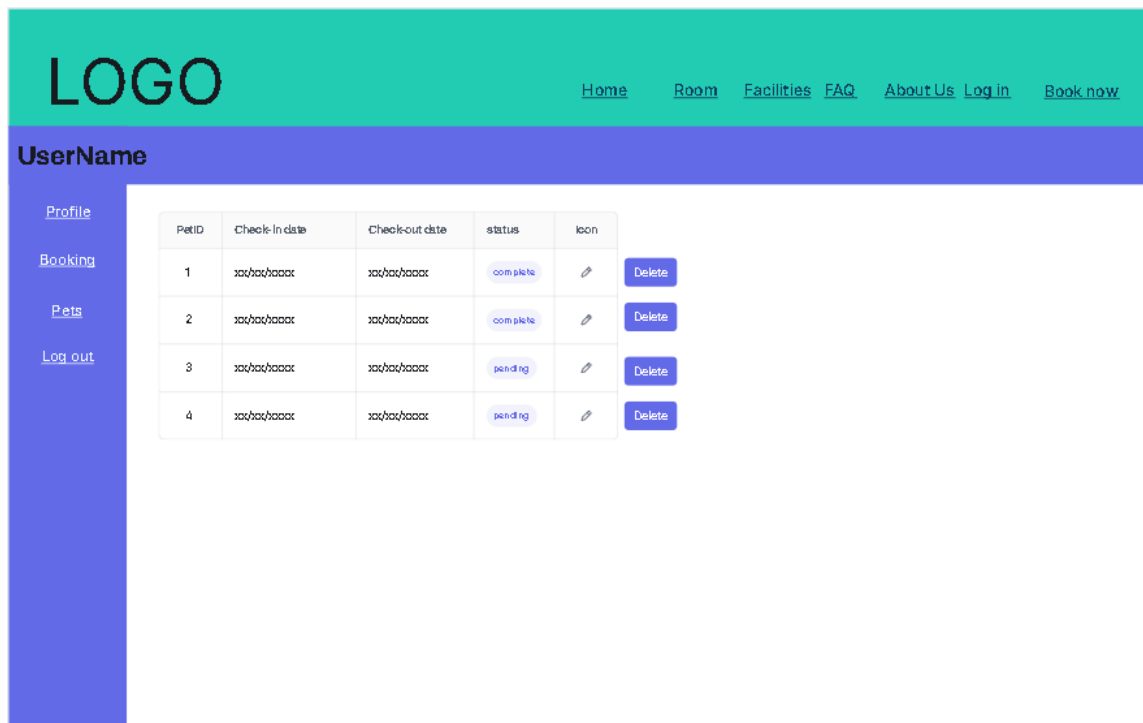


Figure 31: Wireframe of user booking page

The wireframe design for the user booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu have a table to show the available booking detail, which include Pet ID, check-in date, check-out date, and status. In this table was allow user to navigate to edit the booking and delete the booking.

LOGO

[Home](#) [Room](#) [Facilities](#) [FAQ](#) [About Us](#) [Log in](#) [Book now](#)

UserName

[Profile](#)
[Booking](#)
[Pets](#)
[Log out](#)

Full Name :

email :

phone :

Check-in Date :

Check-out Date :

Room Type :

Pet Name :

Special request :

February 2022

Mon	Tue	Wed	Thu	Fri	Sat	Sun
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	1	2	3	4

Figure 32: Wireframe of user manage booking page

The wireframe design for the user manage booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu will show the booking form with the booking data in the database in the input box. User was allow modify the data in the input box and update the data to the database.

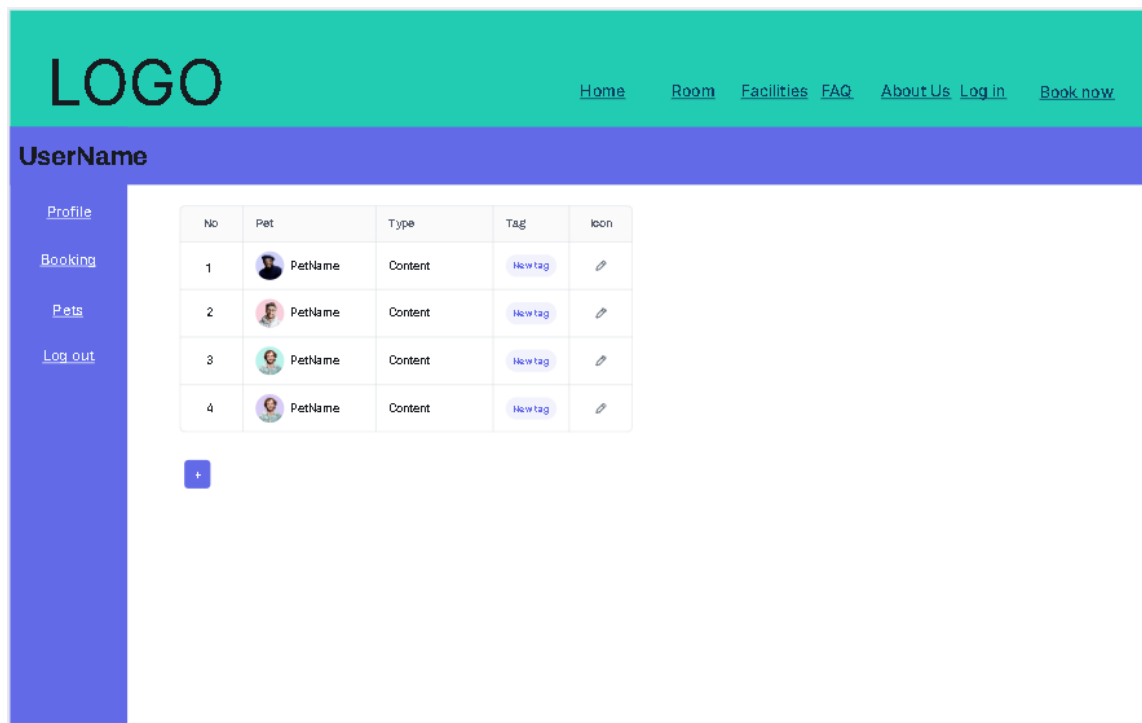
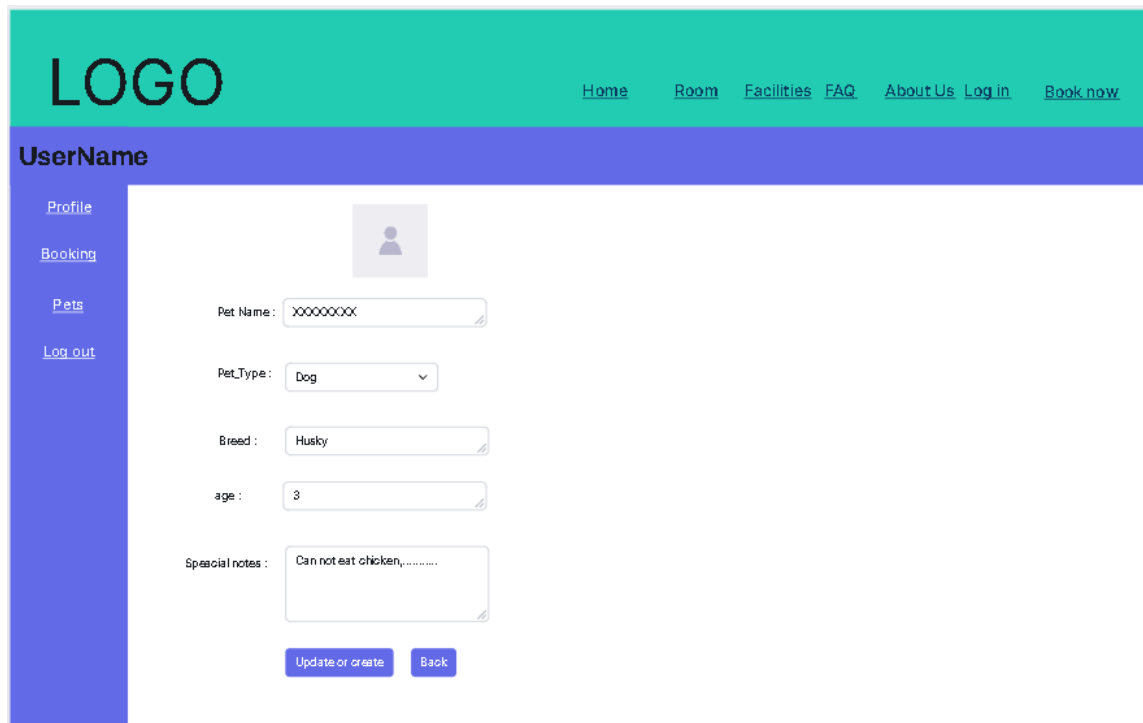


Figure 33: Wireframe of uses pet page

The wireframe design for the user pet page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu have a table to show the available pet information, which include Pet name, type, and breed. In this table was allow user to navigate to edit the pet detail. Below the table was a button to allow user to add new pet detail.



The wireframe shows a web page for managing a pet. At the top is a teal header with a large 'LOGO' on the left and a navigation menu on the right with links: Home, Room, Facilities, FAQ, About Us, Log in, and Book now. Below the header is a purple bar containing the text 'UserName'. On the left side of the main content area is a vertical purple sidebar with a list of links: Profile, Booking, Pets, and Log out. The 'Pets' link is highlighted. The main content area is white and contains a form for managing a pet. At the top of the form is a placeholder for a profile picture. Below it are several input fields: 'Pet Name' with the placeholder text 'XXXXXXXX', 'Pet_Type' with a dropdown menu showing 'Dog', 'Breed' with the placeholder text 'Husky', and 'age' with the placeholder text '3'. Below these is a 'Special notes' field with the placeholder text 'Can not eat chicken,.....'. At the bottom of the form are two buttons: 'Update or create' and 'Back'.

Figure 34: Wireframe of user manage pet page

The wireframe design for the user manage pet page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu will show a form to allow the user to create or edit the pet detail. If is add new the input box in the form was blank and the button is create, if is edit the input box will show the data store in the database and the button was update.

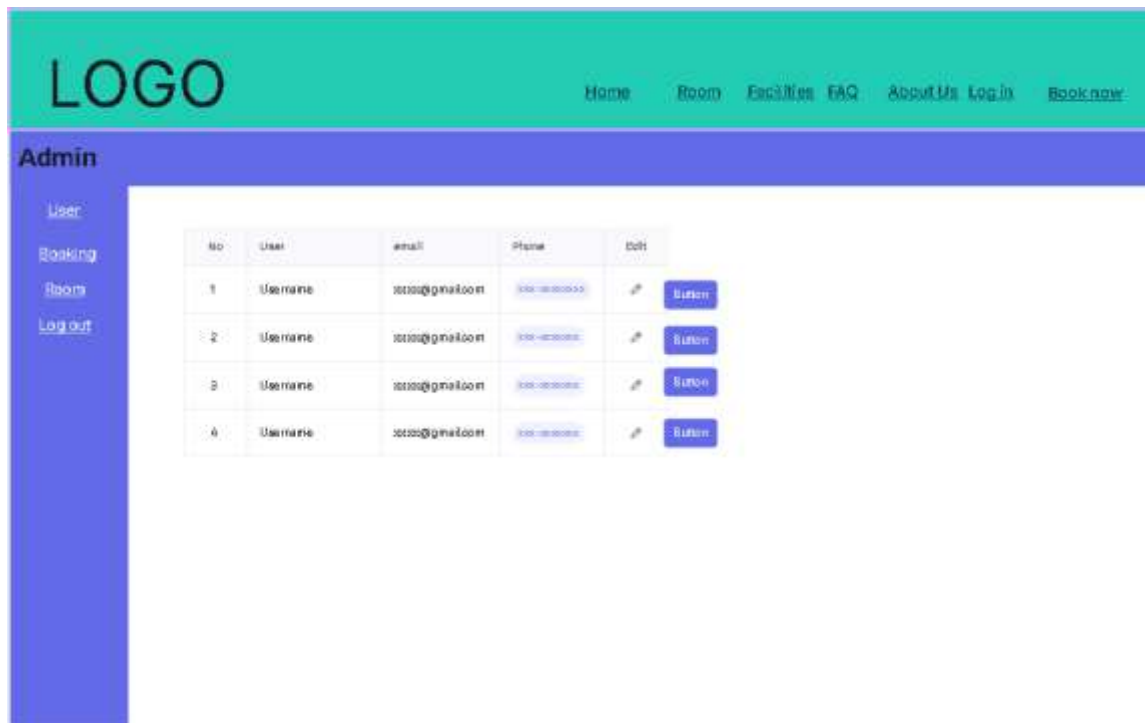


Figure 35: Wireframe of admin user page

The wireframe design for the admin user page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the admin navigation menu. Below the menu have a table to show the available user information, which include user name, email, and phone. In this table was allow admin to navigate to edit the user detail.

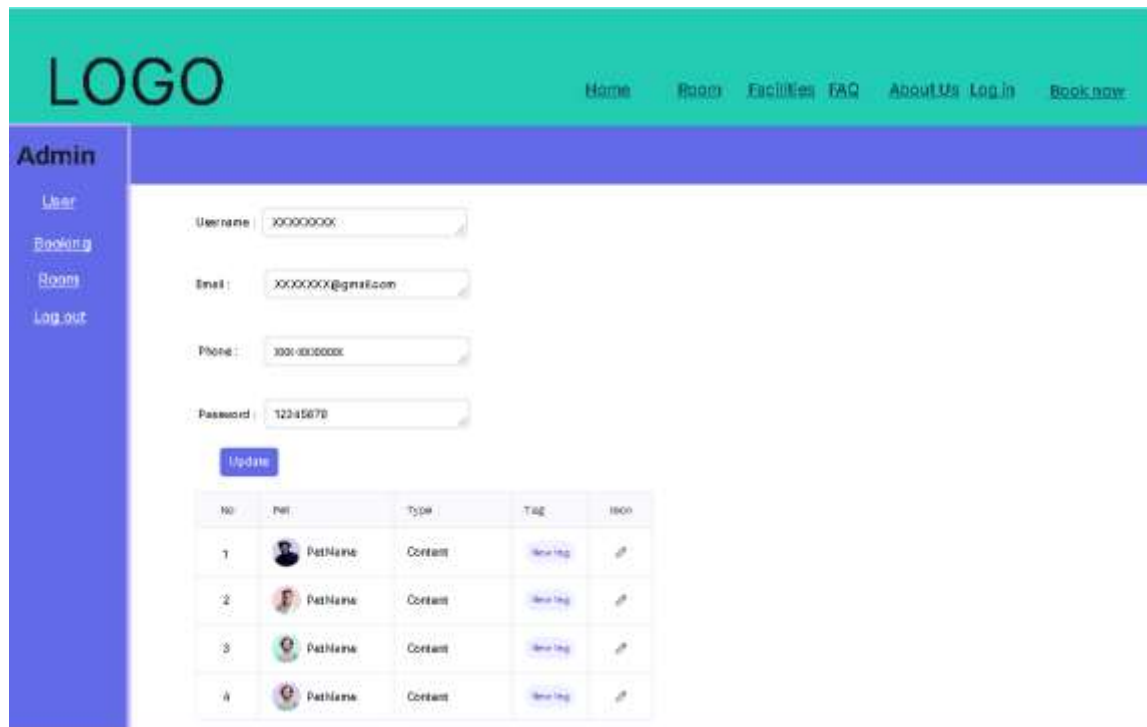
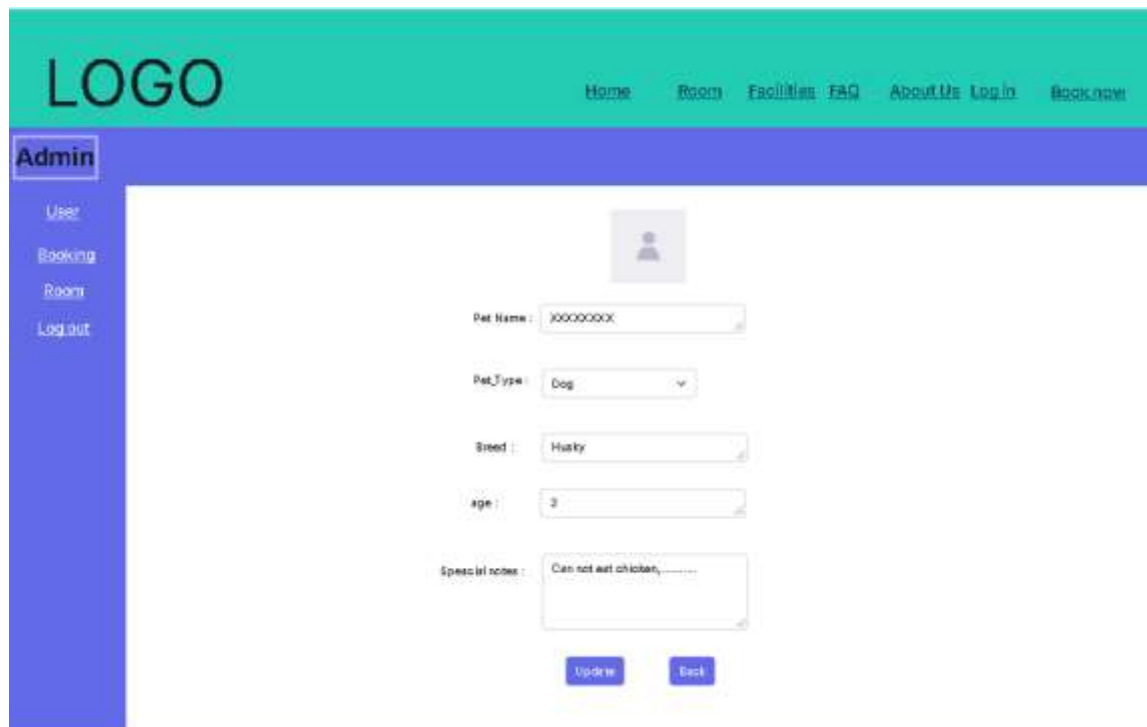


Figure 36: Wireframe of admin manage user page

The wireframe design for the admin manage user page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu will show a form with the user data in the database in the input box. User was allow modify the data in the input box and update the data to the database. Below the form was a table to show the pet detail for the user, which include Pet name, type, and breed. In this table was allow admin to navigate to edit the pet detail.



The wireframe shows a web application interface for managing user pets. At the top, there is a teal header with a large 'LOGO' on the left and a navigation menu on the right containing links: Home, Room, Facilities, FAQ, About Us, Log in, and Book now. Below the header is a purple sidebar with an 'Admin' button at the top, followed by a list of links: User, Booking, Room, and Log out. The main content area is white and contains a form for editing pet details. The form starts with a grey square icon containing a person silhouette. Below this are five input fields: 'Pet Name' (containing 'XXXXXXXX'), 'Pet Type' (a dropdown menu with 'Dog' selected), 'Breed' (containing 'Husky'), 'Age' (containing '2'), and 'Special notes' (containing 'Can not eat chicken,'). At the bottom of the form are two blue buttons: 'Update' and 'Back'.

Figure 37: Wireframe of admin manage user pet page

The wireframe design for the admin manage user pet page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu will show a form to allow the admin to edit the pet detail.

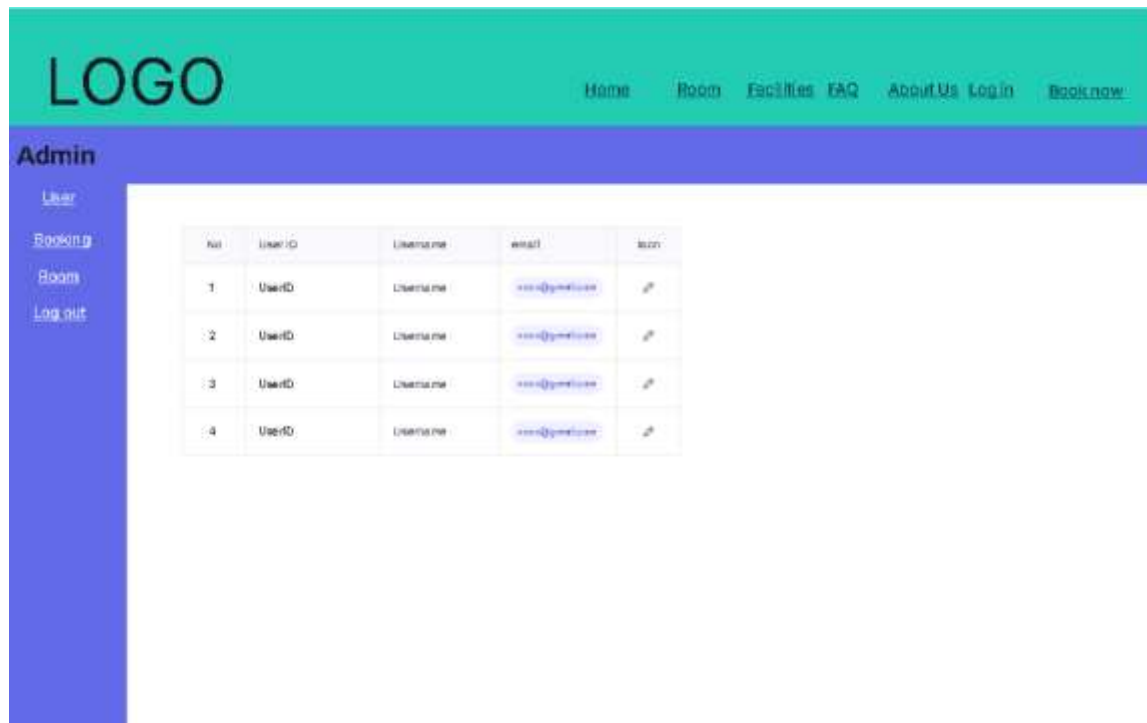


Figure 38: Wireframe of admin booking page

The wireframe design for the admin booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the admin navigation menu. Below the menu have a table to show the available user information, which include user ID, email, and user name. In this table was allow admin navigate to view the certain user booking detail.

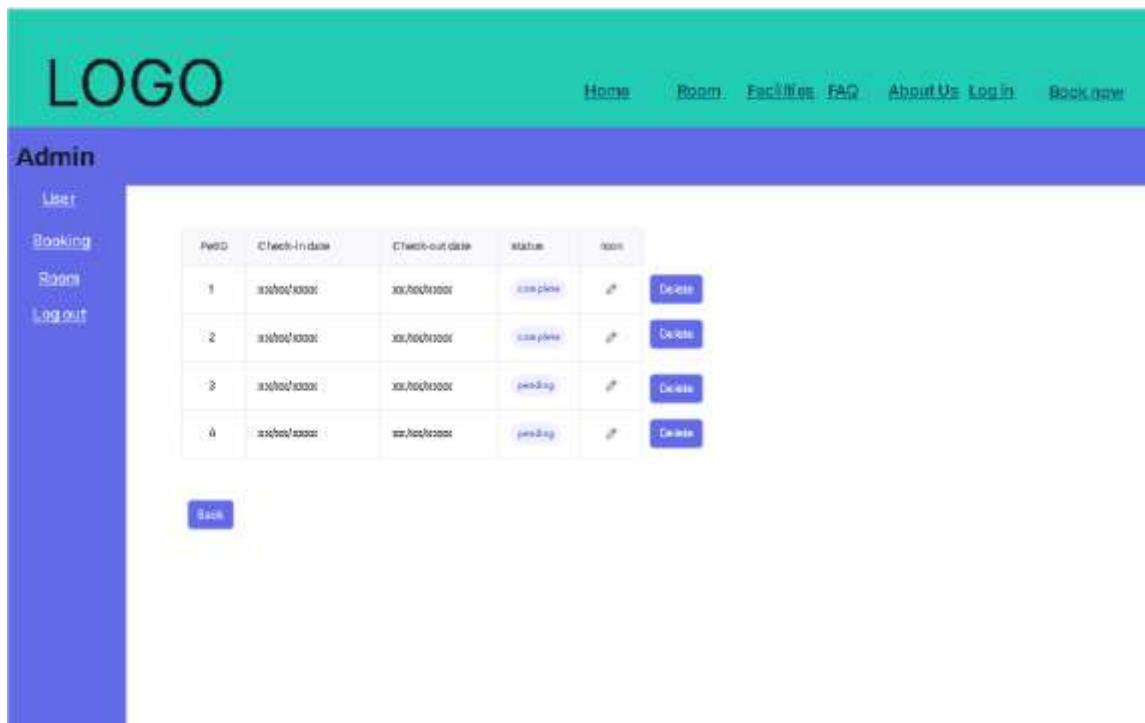


Figure 39: Wireframe of admin manage user booking page

The wireframe design for the admin manage user booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the admin navigation menu. Below the menu have a table to show the available booking information for certain user, which include check-in date, check-out date and status. In this table was allow admin to navigate to edit the booking detail.

LOGO

Home Room Facilities FAQ About Us Log in Book now

Admin

User
Booking
Room
Logout

Full Name:

email:

phone:

Check-in Date:

Check-out Date:

Room Type:

Pet Name:

Special request:

Update Back

February 2022

Mon	Tue	Wed	Thu	Fri	Sat	Sun
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Figure 40: Wireframe of admin manage user booking detail page

The wireframe design for the admin manage user booking detail page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu will show a form to allow the admin to edit the booking detail.

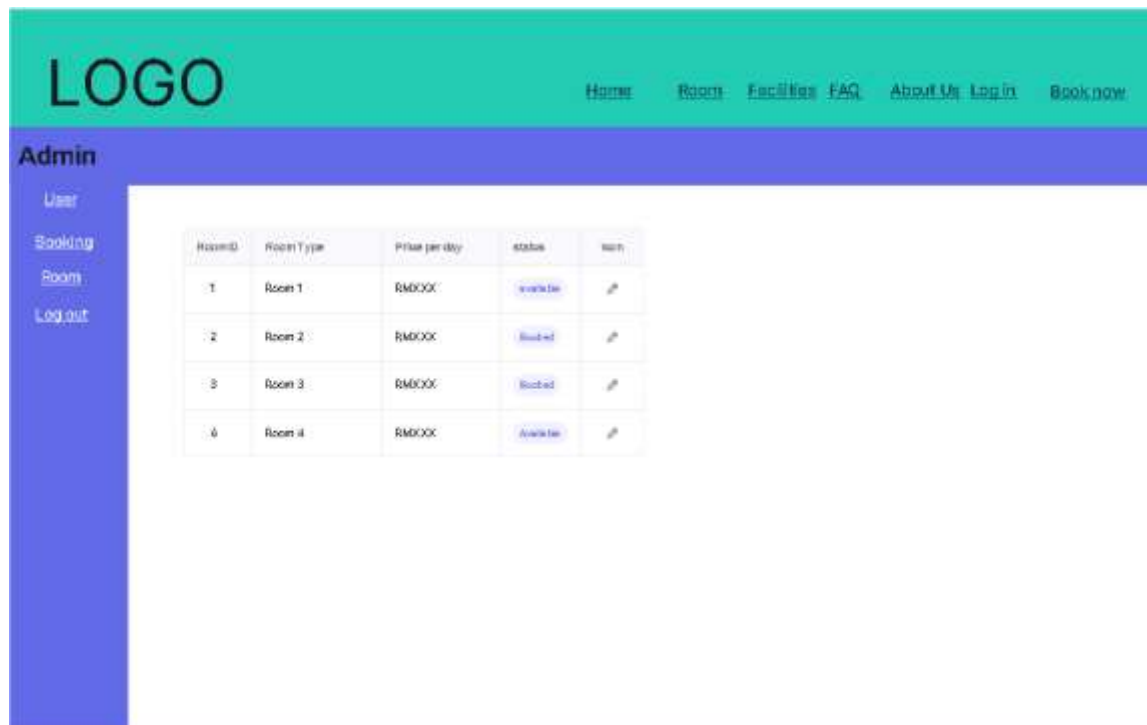
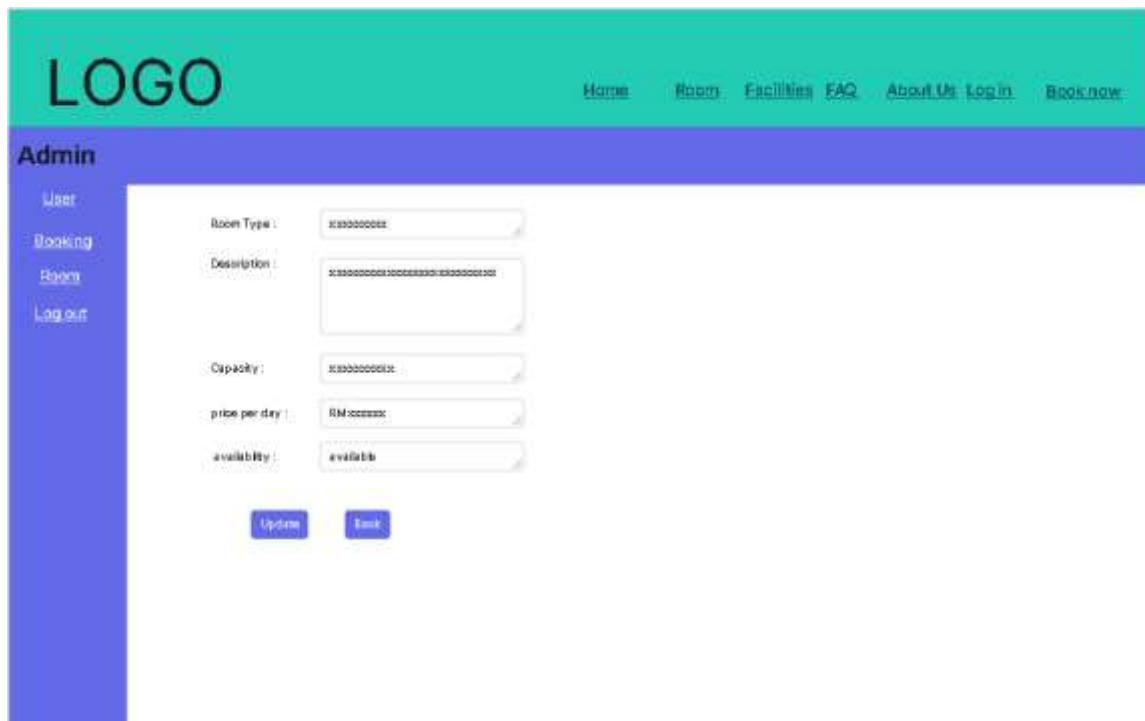


Figure 41: Wireframe of admin room page

The wireframe design for the admin room page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu was a table to show the room in pet hotel, that have a button to navigate to edit the room details.



The wireframe shows a web application interface for managing rooms. At the top, there is a teal header with a large 'LOGO' on the left and a navigation menu on the right containing links: Home, Room, Facilities, FAQ, About Us, Login, and Book now. Below the header is a purple sidebar with the title 'Admin' and a list of links: User, Booking, Room, and Log out. The main content area is white and contains a form for editing room details. The form fields are: Room Type (with placeholder 'xxxxxxxx'), Description (with placeholder 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx'), Capacity (with placeholder 'xxxxxxxxxx'), price per day (with placeholder 'RMxxxxxx'), and availability (with placeholder 'available'). At the bottom of the form are two buttons: 'Update' and 'Back'.

Figure 42: Wireframe of admin manage room page

The wireframe design for the admin manage room page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous page. The below of the header was the user navigation menu. Below the menu will show a form to allow the admin to edit the room detail.

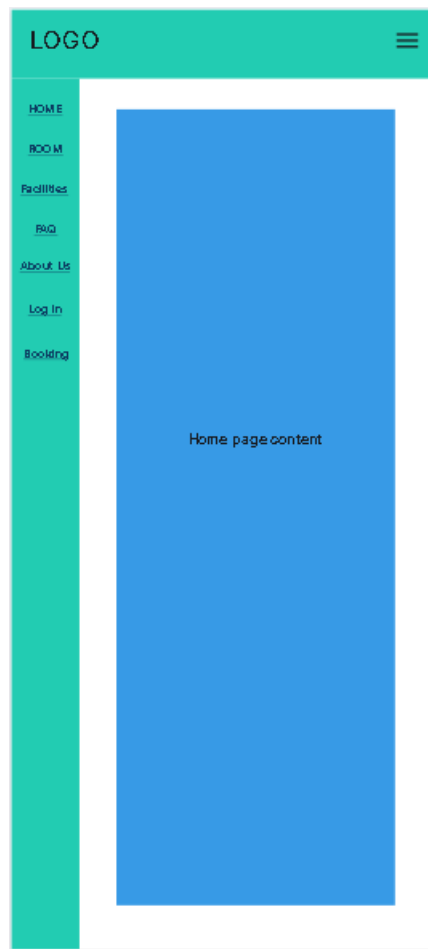


Figure 43: Wireframe of mobile home page

In the mobile wireframe design for home page of the Pet Hotel Booking System features a clean layout to provide a good user experience. At the top of the page, there has a header section, the left of the header a prominent logo to establishes brand identity. The vertical left of the logo have a navigation menu, which include link to various page. This menu is design for easily accessible to ensure user can quickly navigate to different part of the side. Below the header and beside the navigate bar, was the part to introduce the basic information about the pet hotel.

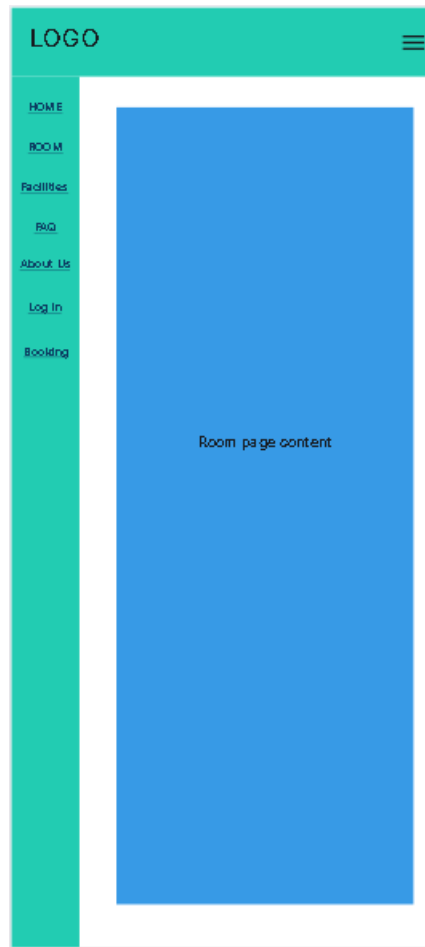


Figure 44: Wireframe of mobile room page

In the mobile wireframe of design for the room page of pet hotel booking system features a clean and straightforward layout. At the top of the page, a header was show the logo prominently at the left side. At the left side was the vertical navigation menu to make the page navigation. Below the header was show the information about the room page, which is the basic information for each type of room in hotel.

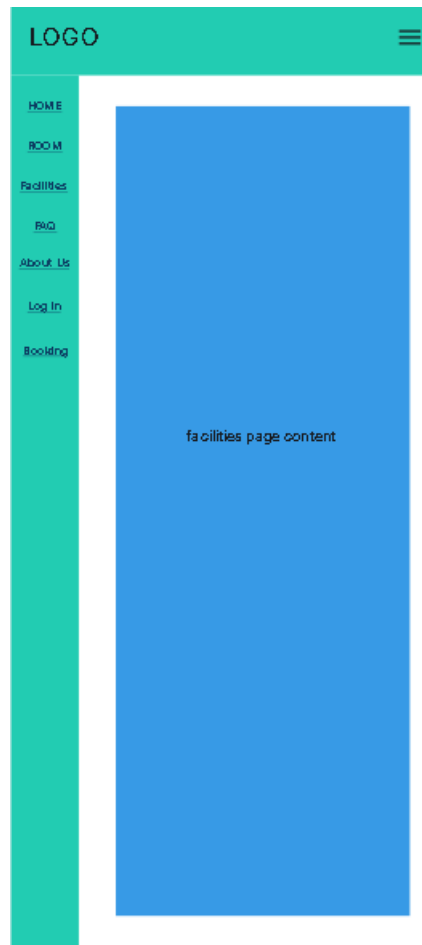


Figure 45: Wireframe of mobile facility page

The mobile wireframe design for the facility page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below was the facility provide by the pet hotel, which will show that the facility such as the play area, grooming service and other.

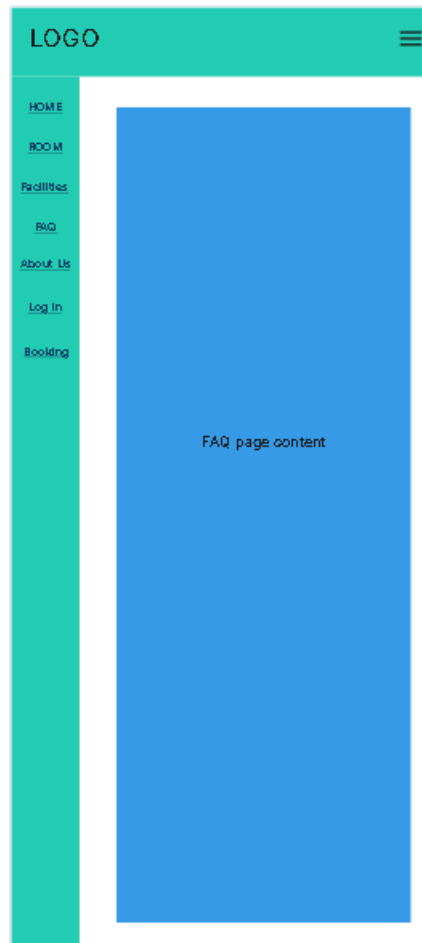


Figure 46: Wireframe of mobile FAQ page

The mobile wireframe design for the FAQ page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below was the FAQ content provide by the pet hotel, which will show common question and its answer will ask by user.

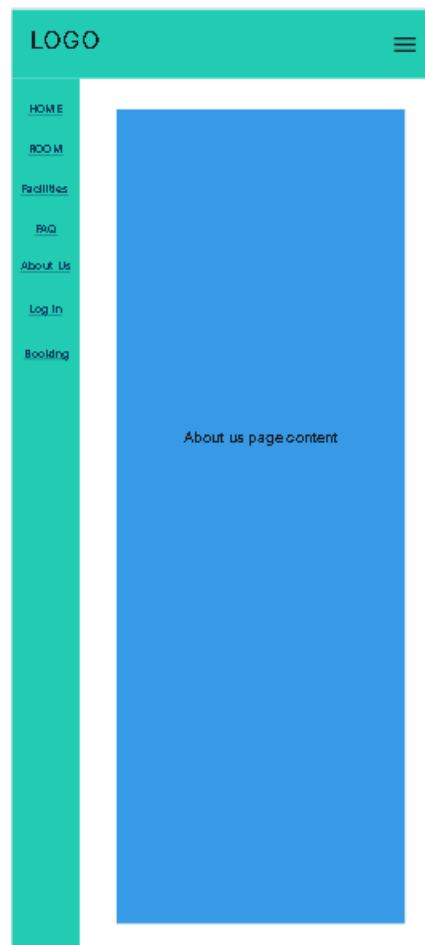


Figure 47: Wireframe of mobile about us page

The mobile wireframe design for the FAQ page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below was the FAQ content provide by the pet hotel, which will show common question and its answer will ask by user.



Figure 48: Wireframe of mobile login **Figure 49: Wireframe of mobile registration page**

The mobile wireframe design for the Registration page and log in page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header for registration page was show a register form, which was include field for the Username, Email, Phone, Password, and confirm Password. Each field was their own input box and placeholder text for user to input the information. Below the form was a link “Login here” to navigate to login page. The below of the header for login page was show the login form, which was the field for the Username or email and password. Each field was allow user to input the information store in

database to do the login process. Below the login form was a link to navigate back to the register form.

LOGO

HOME
ROOM
Facilities
Price
About Us
Log In
Booking

Book Now

Full Name :
Enter your name

email :
Enter your email

phone :
Enter your phone

Check-in Date :
08 Feb 2021

Check-out Date :
13 Feb 2021

Room Type :
Select room type

Pet Name :
Enter your pet name

Special request :
Input text

Book now

February 2022

Mon	Tue	Wed	Thu	Fri	Sat	Sun
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	1	2	3	4

Figure 50: Wireframe of mobile booking page

The mobile wireframe design for the booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was show the booking form, which was the field for Name, email, phone, Check-in date, Check-out date, Room Type, Pet Name, and special request. Each field was allow user to input the information store in database to do the booking process.

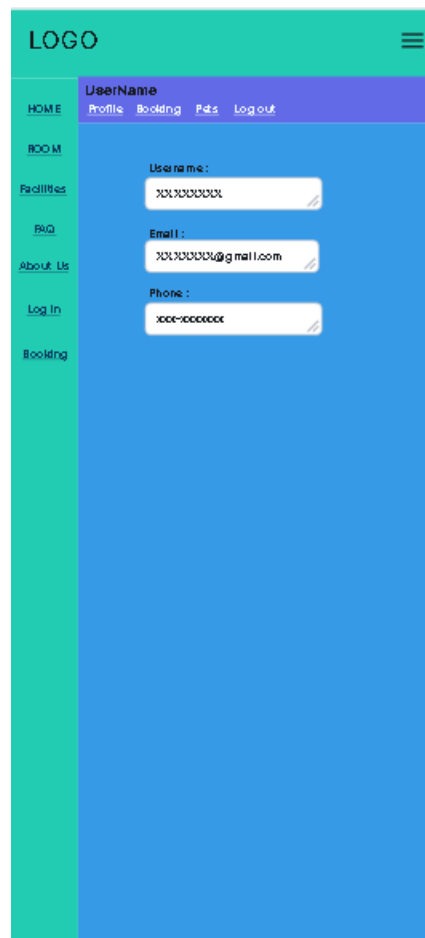


Figure 51: Wireframe of mobile user profile page

The mobile wireframe design for the user profile page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu will show the user profile which include the username, email and phone.



Figure 52: Wireframe of mobile user booking page

The mobile wireframe design for the user booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu have a table to show the available booking detail. In this table was allow user to navigate to edit the booking and delete the booking.

LOGO

UserName
Profile Booking Pets Logout

Book Now

Full Name :
Enter your name

email :
Enter your email

phone :
Enter your phone

Check-in Date :
09 Feb 2021

Check-out Date :
13 Feb 2021

Room Type :
Select room type

Pet Name :
Enter your pet name

Special request :
Input text

Update Back

February 2022

Mon	Tue	Wed	Thu	Fri	Sat	Sun
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	1	2	3	4

Figure 53: Wireframe of mobile user manage booking page

The mobile wireframe design for the user manage booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu will show the booking form with the booking data in the database in the input box. User was allow modify the data in the input box and update the data to the database.

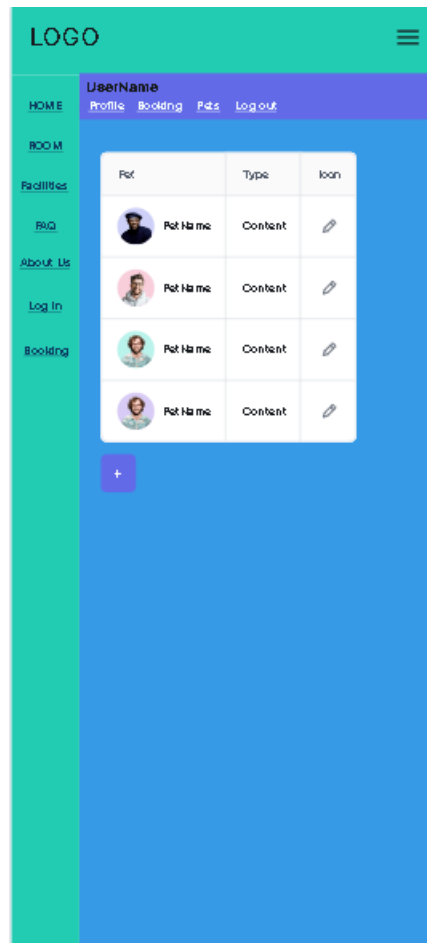


Figure 54: Wireframe of mobile user pet page

The mobile wireframe design for the user pet page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu have a table to show the available pet information. In this table was allow user to navigate to edit the pet detail. Below the table was a button to allow user to add new pet detail.

Figure 55: Wireframe of mobile user manage pet page

The mobile wireframe design for the user manage pet page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu will show a form to allow the user to create or edit the pet detail. If is add new the input box in the form was blank and the button is create, if is edit the input box will show the data store in the database and the button was update.



Figure 56: Wireframe of mobile admin user page

The mobile wireframe design for the admin user page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the admin navigation menu. Below the menu have a table to show the available user information. In this table was allow admin to navigate to edit the user detail.

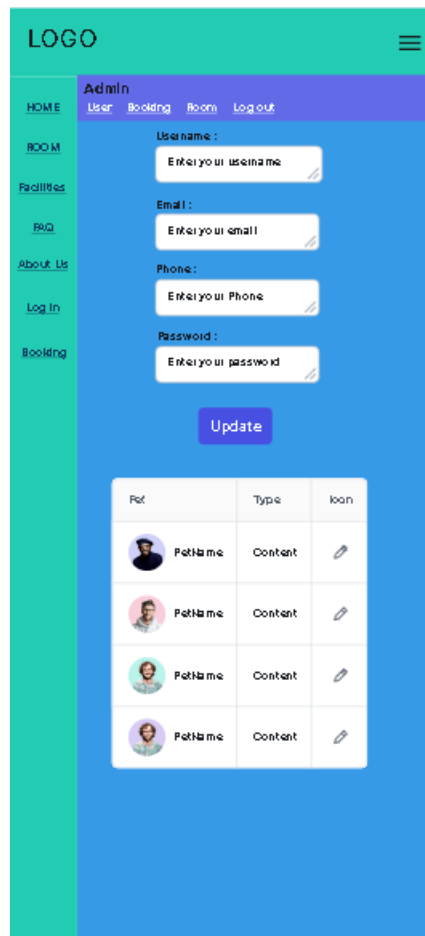


Figure 57: Wireframe of mobile admin manage user page

The mobile wireframe design for the admin manage user page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu will show a form with the user data in the database in the input box. User was allow modify the data in the input box and update the data to the database. Below the form was a table to show the pet detail for the user. In this table was allow admin to navigate to edit the pet detail.



Figure 58: Wireframe of mobile admin manage user pet page

The mobile wireframe design for the admin manage user pet page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu will show a form to allow the admin to edit the pet detail.



Figure 59: Wireframe of mobile admin booking page

The mobile wireframe design for the admin booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the admin navigation menu. Below the menu have a table to show the available user information. In this table was allow admin navigate to view the certain user booking detail.



Figure 60: Wireframe of mobile admin manage user booking page

The mobile wireframe design for the admin manage user booking page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the admin navigation menu. Below the menu have a table to show the available booking information for certain user. In this table was allow admin to navigate to edit the booking detail.

LOGO

HOME

ROOM

Facilities

FAQ

About Us

Log In

Booking

Book Now

Full Name :

email :

phone :

Check-In Date :

Check-out Date :

Room Type :

Pet Name :

Special request :

Update **Book**

February 2022

Mon	Tue	Wed	Thu	Fri	Sat	Sun
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	1	2	3	4

Figure 61: Wireframe of mobile admin manage user booking detail page

The mobile wireframe design for the admin manage user booking detail page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu will show a form to allow the admin to edit the booking detail.

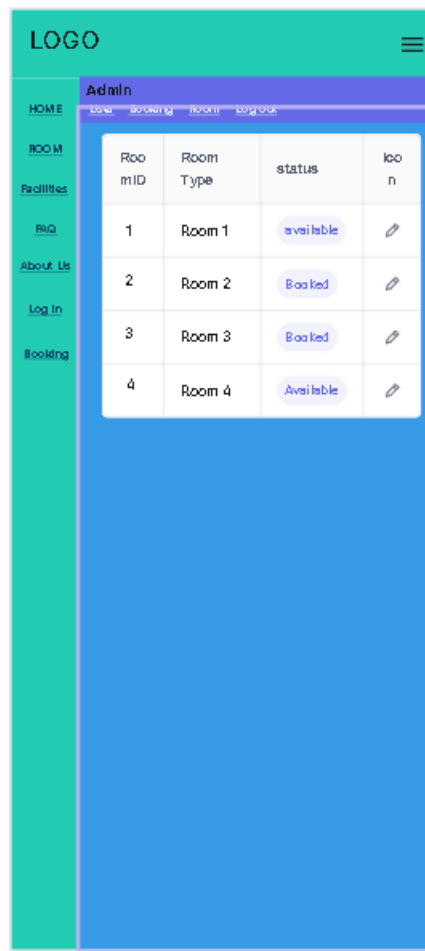


Figure 62: Wireframe of mobile admin room page

The mobile wireframe design for the admin room page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu was a table to show the room in pet hotel, that have a button to navigate to edit the room details.

LOGO

Admin

home booking room logout

Room Type :
xxxxxxxxx

Description :
xxxxxxxxxxxxxxxxxxxxxxxx

Capacity :
xxxxxxxxx

price per day :
RM xxxxxx

availability :
available

Update Back

Figure 63: Wireframe of mobile admin manage room page

The mobile wireframe design for the admin manage room page of pet hotel booking system features a clean and intuitive layout, ensuring ease of navigation and user engagement. At the top of the page was same with the previous mobile page. The below of the header was the user navigation menu. Below the menu will show a form to allow the admin to edit the room detail.

3.5 Implementation Phase

The Implementation Phase can be called crucial, for it changes into a practical system from design ideas and the requirements. This phase requires attention very careful in the development of the system, making sure all parts integrate really well to provide users with seamless interaction. Development adhering to specification blueprints is completed by the team, technologies many using a platform that is both robust and user-friendly to come up with. The front-end development has HTML and CSS used for page structures and design styling, which visually interacting with users enhances the interface. When requests are made by users, PHP on the back-end handles those, data processing does, communicating with the database done, efficient applications and secure logic execution making sure of. For storing data, MySQL was chosen, managing importantly records like user information, reservation records, transactions related to payments. The database has been designed to make sure reliable storage of data and easy retrieval is done, access optimized data has and integrity maintained. The core features such as a booking system, PayPal API, chatbot AI, and enhancement of mobile are integral to the system function. Through the booking system, users find rooms to search, pick services, and confirm reservations with easiness. Transactions that need security are processed by PayPal API, which user trust strengthens. Around the clock, availability in customer support is supplied by AI chatbot, dealing queries of users real-time. Mobile system optimizes for size on different screens, quick loading times and smooth moves across. To make a product final, it is reliable, secure, and user-friendly, catering enough to pet owners' and hotel operators' needs. For a cohesive, functioning and enjoyable experience for users of all, this ensures.

3.6 Testing Phase

After completion of the sophisticated building process of Pet Hotel Booking System, there was testing done extensively. To ensure that all parts of it work properly no matter where it is run, various environment requirements were considered. And so, the phase involved a particular system of testing methods to show the rightness of system's functions on several operating system forms and also web browsers. A very crucial task was compatibility testing, proving the system's accessibility and operative state for all possibly imaginable users irrespective of the differing platforms they opt for usage. Every test was organized on different OS, and also well-liked web browsers namely Google Chrome, Mozilla Firefox, Safari, in addition to Microsoft Edge. Using wide-reaching manner, the approach was securing that potential concerns about cross-platform compatibility got found and fixed.

Throughout this time of testing, sometimes errors or maybe inconsistencies happen, and they were cautiously written down in kind of error log. In it, rich detail was supplied as needed about the error in question, like the situation causing it, specific error text, and also the steps that retrace to get the same problem once more. Writing these errors down thoroughly was essentially necessary so they could have them monitored and dealt with orderly. The whole development group made sure to refer to this error documentation to sort the issues by importance and go to fixing them, making certain each difficulty was properly taken care of and resolved in efficiency.

With other tests alongside it, not only compatibility tests were included but functionality testing was required too. Also, performance testing which examines the system stability and response when it's put under various types of loads, and security testing was done as well to confirm sensitive data protection and guard against possible system insecurity from threats. User

acceptance testing, or UAT, which used real users to say if the system satisfied their needs, got completed.

The Pet Hotel Booking System underwent much examination by the end of the testing phase and was made to be secure, reliable, friendly for users. This testing in a comprehensive way figured out and fixed things needing it, so a system became greatly robust and functioning suitably, experiences for users across platforms and devices were ensured to be excellent.

3.7 Summary

In this part, there is description about the approach used for creation of Pet Hotel System, specifically detailed on the WDLC framework's methodology. Through each step-starting from planning, going into analysis, then designing, moving onto implementation, and finally testing - a more systematic way to reach the objectives of the system is stated clearly. Diagrams like Use Case Diagram, ERD, and System Architecture play a role in adding clarity and giving an image-type representation of system to see. The next part is about results in implementing and how evaluation of system is discussed in detail later.

Chapter 4: Implementation

4.0 Introduction

The implementation phase of the Pet Hotel System focused on transforming the design blueprints into a functional prototype. This phase involved coding the front-end and back-end components, integrating third-party services, and ensuring seamless interaction between all system modules. The system was developed using a combination of HTML, CSS, JavaScript, PHP, and MySQL, with additional tools like Gemini for AI-powered customer support.

4.1 Technology and Tools used

For the implementation of the system, the front-end interacts with the back-end can make a process request and respond to the system. For the front-end will develop by using the HTML, CSS, and JavaScript, which can ensure an visually attractive and comfortable interface. The back-end side will using the PHP to make the server-side logic and the MySQL database management. The MySQL database was used to design as a storage system to minimize redundancy and optimize data. Key of the database tables was include the users, pets, booking, payments, rooms, admin, and password_resets. That have the third-party integration implement in the system, the PayPal Api use for provide a secure online payment and the Gemini API for the AI powered chatbot provide real-time customer support. The Visual Studio Code was the primary IDE since it can support various programming language to develop system. The Wampserver64 use for local testing and debugging the system function and access the PhpMyAdmin. PhpMyAdmin use for administration of MySQL by using web browser. The phpmailer and Mailtrap.io will use to handle the forgot password to reset password.

4.1.1 Wampserver64

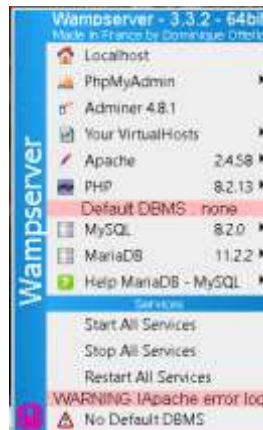


Figure 64: Wampserver64

Wampserver64 served as the local hosting environment during development, which will offer a simplify platform for testing the PHP and MySQL database (phpMyAdmin, 2019). This all-in-one web server package was develop by the Dominique Ottello alias Otomatic, which include the essential component like Apache 2.4.58 as the web server, PHP 8.2.13 for server-side script, and MySQL8.2.0 or MariaDB 11.2.2 for database management (LO4D.com, 2025). This bundled component can ensure the compatibility and simplify configuration, allow for rapid prototyping and debugging. The server's modular architecture can facilitated easy integration of additional extentions such as SSL/TLS for secure local testing.

4.1.2 PhpMyAdmin

PhpMyAdmin is a free software tool written in PHP which will provide a web-based administration tool for MySQL database management, enabling efficient execution of SQL queries, table optimization, and user privilege configuration (phpMyAdmin, 2019). This tool allows for real-time monitoring of database performance and manipulation of data structures. This tool was

accessible directly through Wampserver64, which allow the system to create table and database as data repository.



Figure 65: PhpMyAdmin_create_database

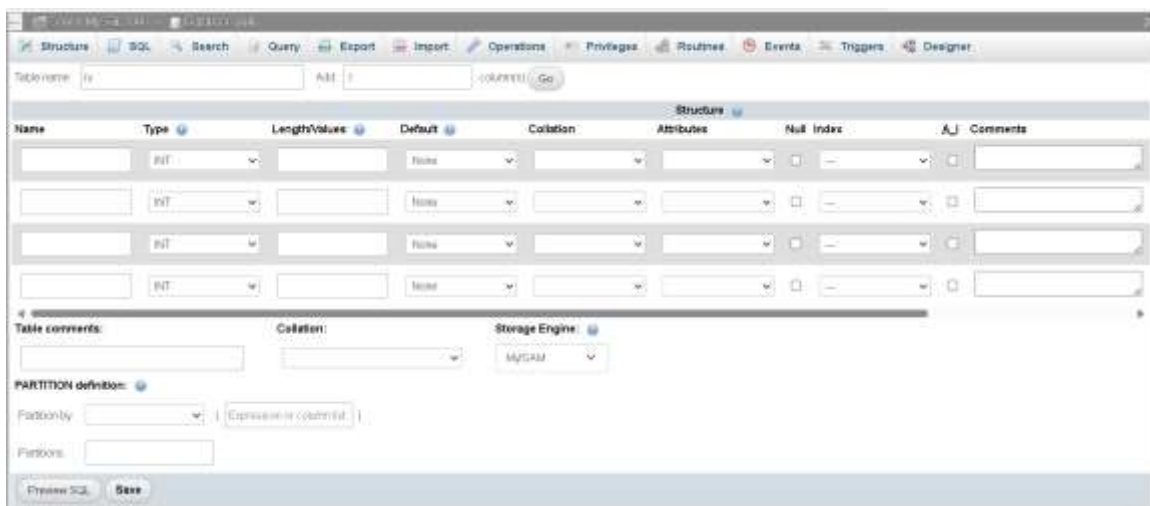


Figure 66: PhpMyAdmin_create_table

In the figure 65 was allow user to enter the name of the database to create the database. In the figure 66 was allow the user to create the table in the database, which can enter the table name, variable name, type, and length. Otherwise, the default value was allow enter in this page, the primary key, foreign key can select in the INDEX column. After create the table that can use the command to achieve add new, edit and delete data in the database, which is INSERT command, UPDATE command, and DELETE command.


```

$endpoint = "https://generativelanguage.googleapis.com/v1/models/gemini-1.5-flash:generateContent?key=$apiKey";

// System instruction for the AI
$systemInstruction = [
    "role" => "model",
    "parts" => [{"text" => "You are a friendly pet hotel assistant. Provide helpful, concise answers about pet accommodations,"}
];

// User message
$userMessagePart = [
    "role" => "user",
    "parts" => [{"text" => $userMessage}]
];

```

Figure 69: Gemini_API_endpoint

The Gemini API was integrated into the Pet Hotel System to power an AI-driven chatbot for real-time customer support. According to Google Cloud (2025), “Generative AI models create new content by learning patterns from existing data.” This API leverages Google’s advanced natural language processing (NLP) capabilities, enabling the chatbot to interpret user queries and respond with high accuracy (Google Cloud, 2025). The implementation involved connecting the system’s front-end interface to Gemini’s cloud-based AI model. As shown in Figure 69, the API endpoint includes the URL for accessing Google’s Generative Language API, specifying the API version, target model, and API key. This endpoint also defines the chatbot’s characteristics and limitations, allowing the system to process natural language inputs effectively and generate contextually relevant responses. The API key, generated through the Google Cloud Console in Figure 68, is essential for authenticating requests and securing access to the Generative Language API (Google Cloud, 2025).

4.1.4 PayPal payment Gateway

The PayPal payment gateway was integrated into the system to provide a secure, reliable, payment processing solution for the online transactions. This implementation was configured by sandbox environment through PayPal’s developer platform, which can simulate transaction without financial risk. The API credentials like the Client ID and Secret Key will use to

authenticate the communication between the system and PayPal's server to build a secure payment environment (PayPal, 2025). Which the Client ID and the Secret Key can be generate in the Figure 70, Which can generate the ID for the seller and Buyer.



The screenshot shows the PayPal API Credentials interface. At the top, there's a header with 'API Credentials' and a 'Create App' button. Below this, a yellow banner indicates 'Viewing sandbox API credentials. View live credentials.' The main section is titled 'REST API apps' and includes an important note: 'Important: Store credentials safely, and never share client IDs or secrets publicly.' Below the note is a table listing the created REST API apps.

App name ↑	Client ID	Secret	Date and time ↑	⚙
Default Application	AI6hdNcAog-6DE5u3Aa0W...		4/16/25, 2:07 AM	⋮
Pinyata Pet Hotel Booking	AY3udM5Q3sNvXibSAy-td...		4/20/25, 10:02 PM	⋮
Platform Partner ...01528	AQOIMu0DCHZaTESWQTKD...		4/21/25, 3:03 AM	⋮

Figure 70: PayPal_API_Credentials

The PayPal payment gateway and the system was connect by the PHP, however the Client ID and secret key was store in the Dot Environment Variable file which will provide a good balance of security and convenience for development. Which the detail can refer to the appendix.

4.1.5 Mailtrap.io and Phpmailer

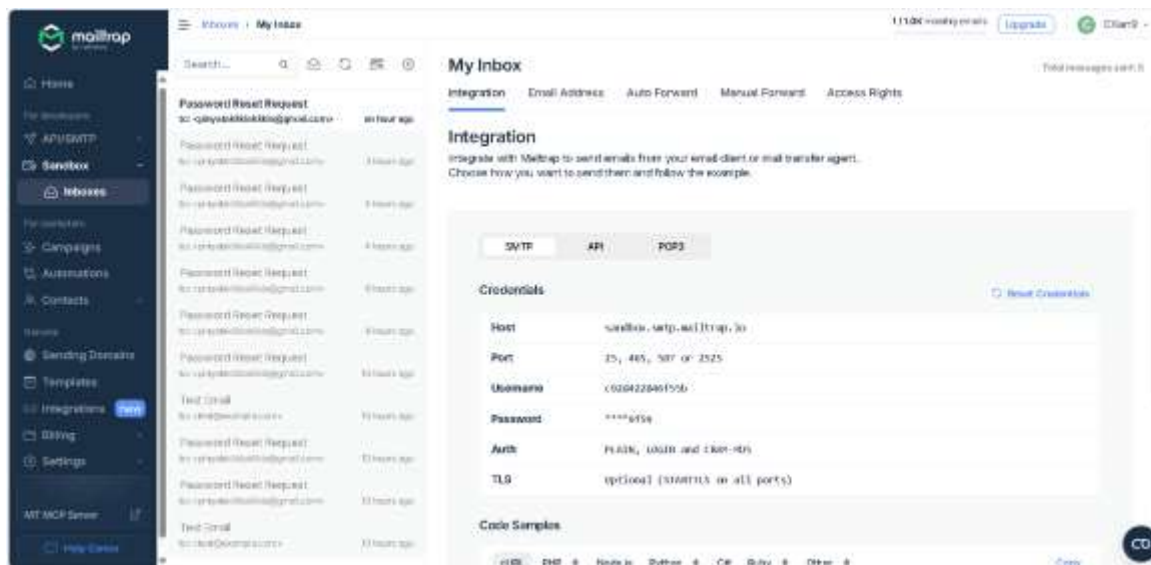


Figure 71: mailtrap.io

```
composer require phpmailer/phpmailer
```

Figure 72: PHPMailer

The email notification subsystem was architecture using the PHPMailer as the core mailing library, by integrate the Mailtrap for development-stage email testing and validation. The PHP mailer was instore by using the command in figure 72, which can provide an object-oriented interface for crafting and sending transaction emails directly from PHP script (PHPMailer, 2025). This library can handled the function like the SMTP authentication, MIME formatting for HTML emails, and attachment management while abstracting low-level protocol complexities (Mailtrap.io, 2024). To integrate Mailtrap will use the SMTP and use the host, ports, username and password in the figure 71. During the development the mailtrap was serve as a virtual SMTP sandbox, which can intercept all outbound email to prevent accidental delivery to real users while enable thorough inspection of email content, headers, and rendering across devices.

4.2 Feature Development

4.2.1 Registration and Login

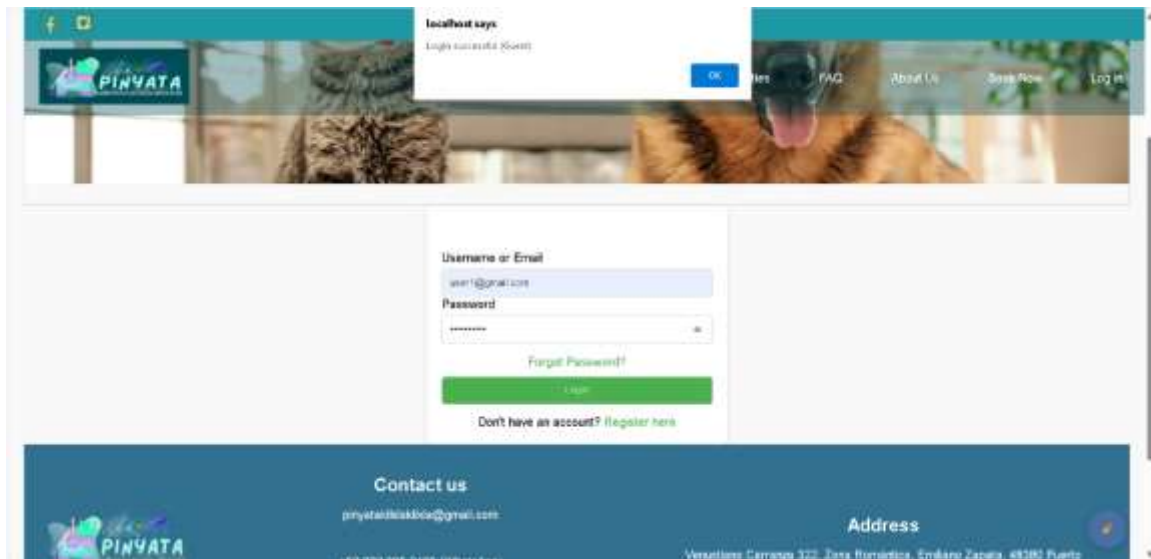


Figure 73: Login page

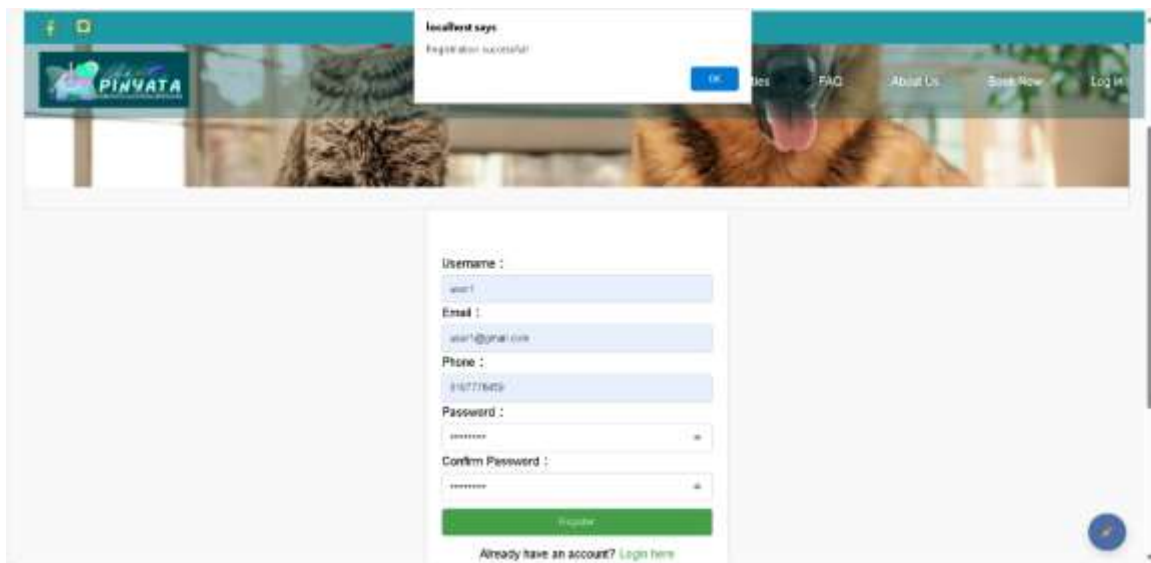


Figure 74: Registration page

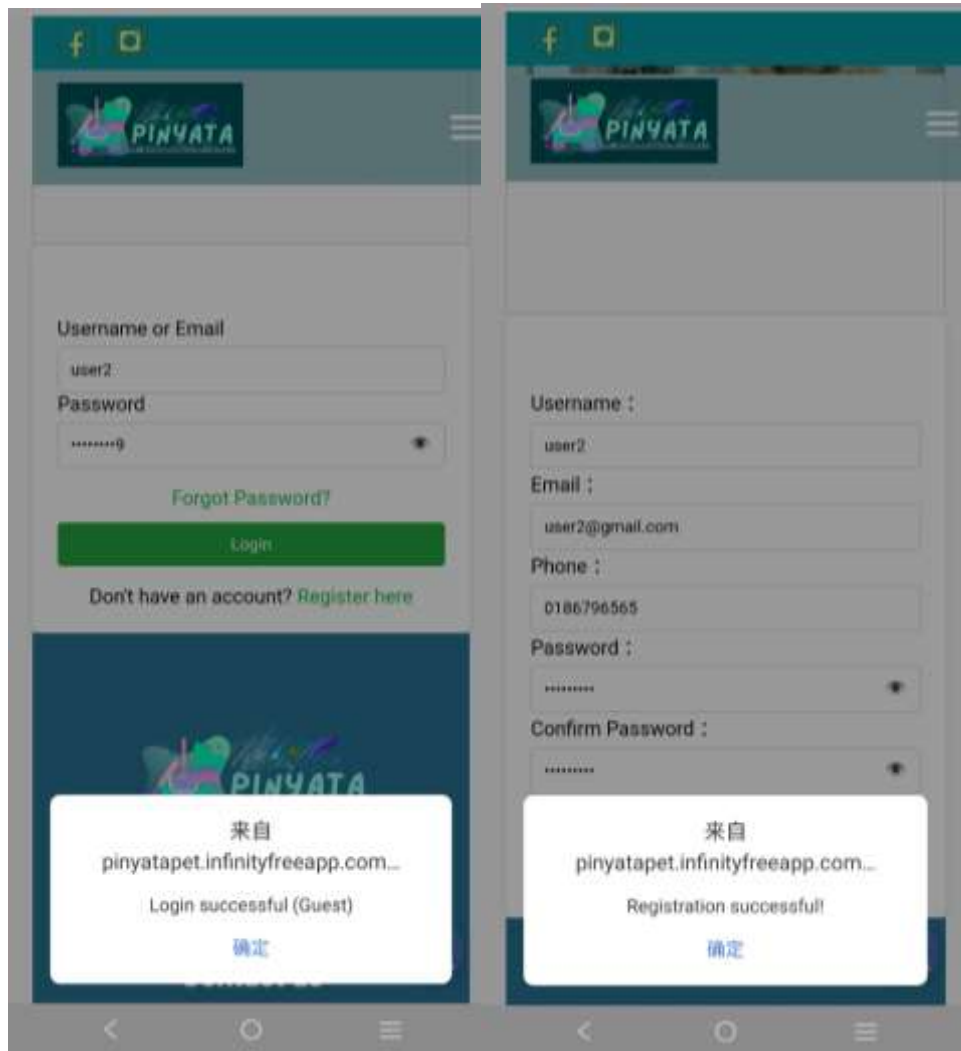
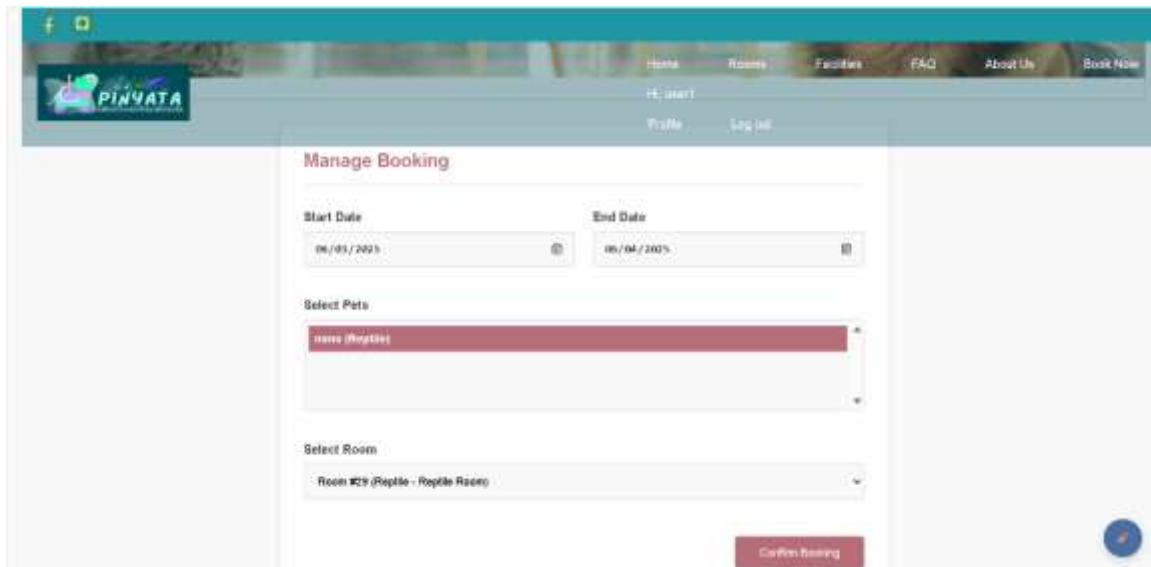


Figure 75: Mobile Login page

Figure 76: Mobile registration page

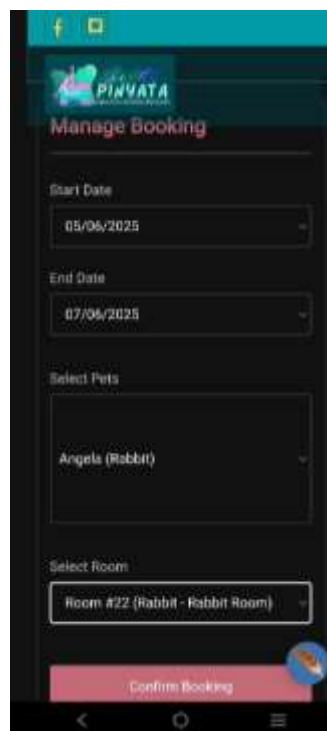
This system will allow the pet owner to create an account by enter the username, email, phone number, and password. The Password will in securely hashed before store in database to avoid unauthorized access. When the confirm the registration the data will store into the database. After registration, user can log in to the user dashboard to manage booking, and pet by using the username or email and password. If forgot the password can click the forgote password to request reset password.

4.2.2 Booking System



The image shows a web browser interface for the 'Manage Booking' page. At the top, there is a navigation bar with links for Home, Rooms, Facilities, FAQ, About Us, and Book Now. Below the navigation bar, the page title 'Manage Booking' is displayed. The form contains several input fields: 'Start Date' with a date picker set to 06/05/2025, 'End Date' with a date picker set to 06/06/2025, 'Select Pets' with a dropdown menu showing 'none (Reptile)', and 'Select Room' with a dropdown menu showing 'Room #29 (Reptile - Reptile Room)'. A 'Confirm Booking' button is located at the bottom right of the form.

Figure 77: Booking page



The image shows a mobile app interface for the 'Manage Booking' page. The layout is similar to the web version, with a navigation bar at the top containing links for Home, Rooms, Facilities, FAQ, About Us, and Book Now. The page title 'Manage Booking' is displayed below the navigation bar. The form contains several input fields: 'Start Date' with a date picker set to 05/06/2025, 'End Date' with a date picker set to 07/06/2025, 'Select Pets' with a dropdown menu showing 'Angela (Rabbit)', and 'Select Room' with a dropdown menu showing 'Room #22 (Rabbit - Rabbit Room)'. A 'Confirm Booking' button is located at the bottom right of the form.

Figure 78: mobile booking page

The Booking page was require the pet owner to select the start date, end date, pet and the room. But before use the booking function should login into account to add the pet detail to allow the selects pets part to get the pets data from database to allow pet owner to select. After select the start date, end date, and pets the available room will show in the select room drop down box, in this dropdown box will only show the room available between the date only, if that are in booking will not show in the drop down box. After confirm the booking will navigate to PayPal payment, pet owner need to login to PayPal account to complete the payment. After the payment successful the booking data will store in the database and will in the status paid. After Payment successful will return to the booking page.

4.2.3 Manage Pet



Figure 79: User Manage Pets

PINYATA

Home Rooms Facilities FAQ About Us Book Now

Hi user1 Profile Log out

UserName

Profile

Booking

Pets

Log out

Pet Name:

none

Pet Type:

Reptile

Breed:

corn snake

Age:

4

Special Notes:

Upload Pet Picture:

Choose File



Load Pet Snaps

Figure 80: User Add Pets

PINYATA

Home Rooms Facilities FAQ About Us Book Now

Hi user1 Profile Log out

Edit Pet: none

Profile

Booking

Pets

Log out

Pet Name:

none

Pet Type:

Reptile

Breed:

corn snake

Age:

4

Special Notes:

This is a corn snake

Upload Pet Picture:

Choose File No file chosen



Load Pet Snaps

Figure 81: User edit Pets

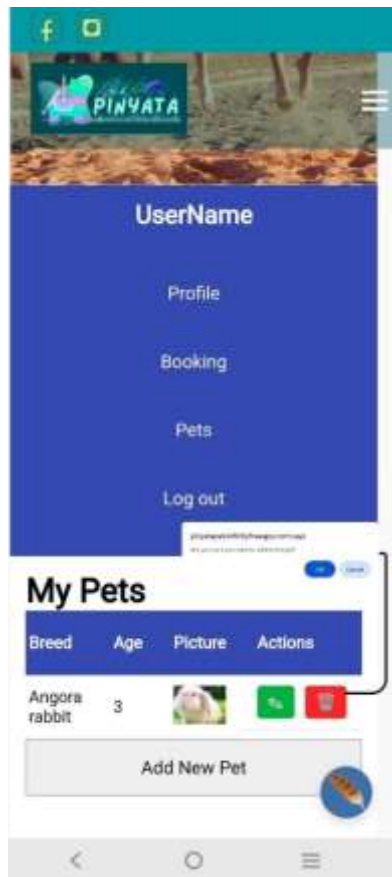


Figure 82: Mobile User Manage Pets



Figure 83: Mobile User Add Pets

In this page the pet owner pet will show in table, the table will show the pet name, pet type, age and the pet picture. That also have two button in the table that is edit and delete button. Below the table have a button to add a new pet, when click the button will navigate to the add pet form. Pet owner need to enter the pet detail like name, type, age, breed, special notes, and picture, the picture should be in the png or jpg format only. After add the pet the pet will show in the table. When click the edit button also navigate to the same form but the add new button will change to update pet and the pet detail will shown in the input box to allow pet owner to edit. When click the delete button pop out an window to allow user to confirmation of the delete function.

4.2.4 FAQ and ChatBot



Figure 84: FAQ and chatbot

In the FAQ page will have some of the common question pet owner will ask, when click the question the answer will show below the question, re-click the question will slipt up the answer. For the AI chatbot customer support will have an icon at right down side of the page. When the pet owner click the icon the chatbot will pop up display, pet owner will allow to enter the question in input field and click the send button to ask the question about the pet field to this chatbot. If ask the question not about pet field to the chatbot, that will reply can not help this question.

4.2.5 View Booking

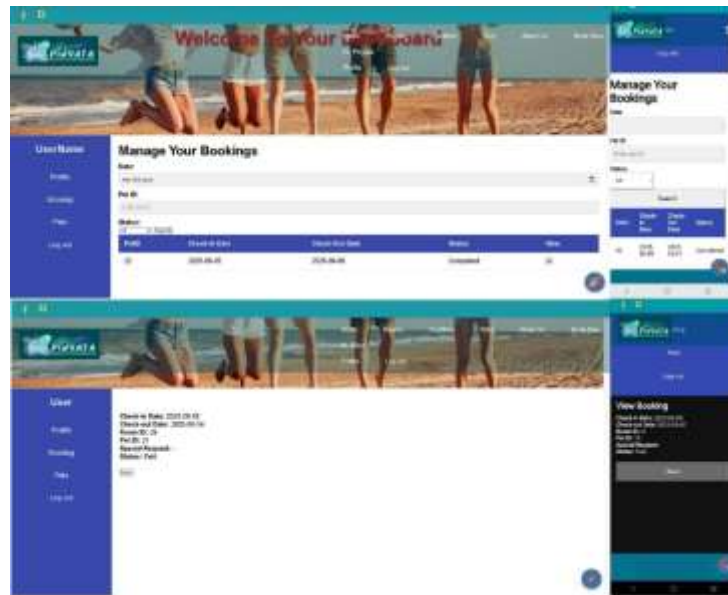


Figure 85: View Booking

After the booking pet owner can move to the user dashboard and manage booking page to view the booking. In this page will allow the to sorting the booking by date, status and pet ID. The booking detail will show in the table below the sorting bar. In the table will allow pet owner to click the view button to navigate to view page to view the booking detail. After view the booking can click the back button navigate to previous page.

4.2.6 User Dashboard



Figure 86: user dashboard

After the login will navigate to the user dashboard, after login success the header will change. The login button will remove since already login, will add the new button is profile and logout to allow pet owner navigate to user dashboard and logout account. The dashboard will display the detail of the user like user name, email, phone number, and password. Which can edit the user detail in this page, just change the data in the input space only, but for the password if not change just put the field blank to keep the current password. After update successful will pop up a window show update successful.

4.2.7 Facility and Facilities

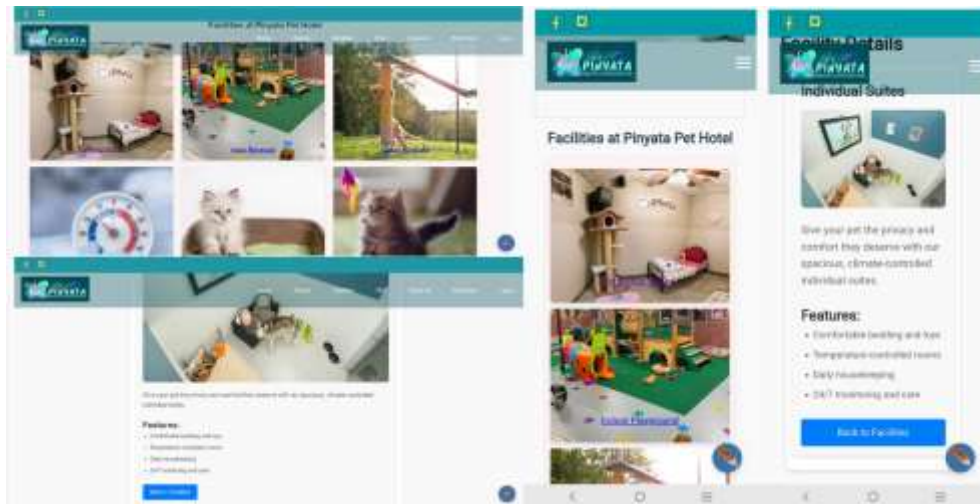


Figure 87: Facility and Facilities

In this page will show the available facility, each facility was a link to navigate to view each detail. After navigate to that page will show the detail and have a button to navigate to previous page.

4.2.8 Administrative

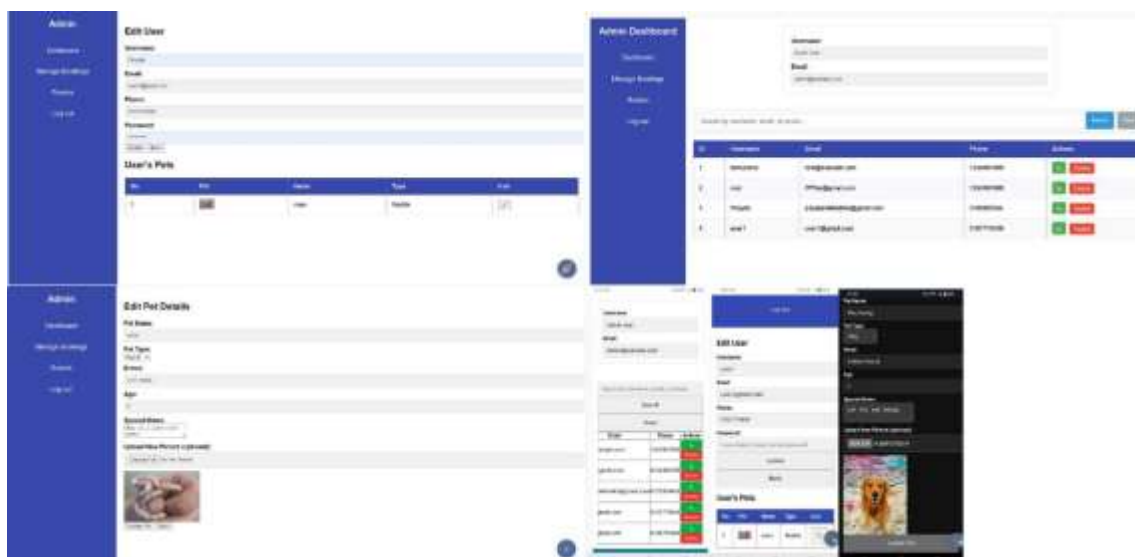


Figure 88: Admin manage user

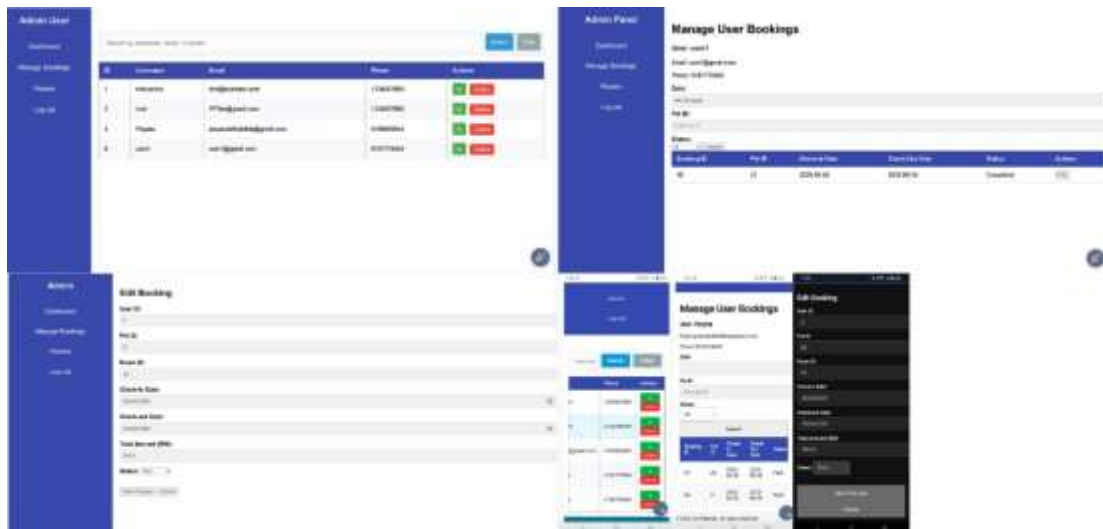


Figure 89: admin manage booking

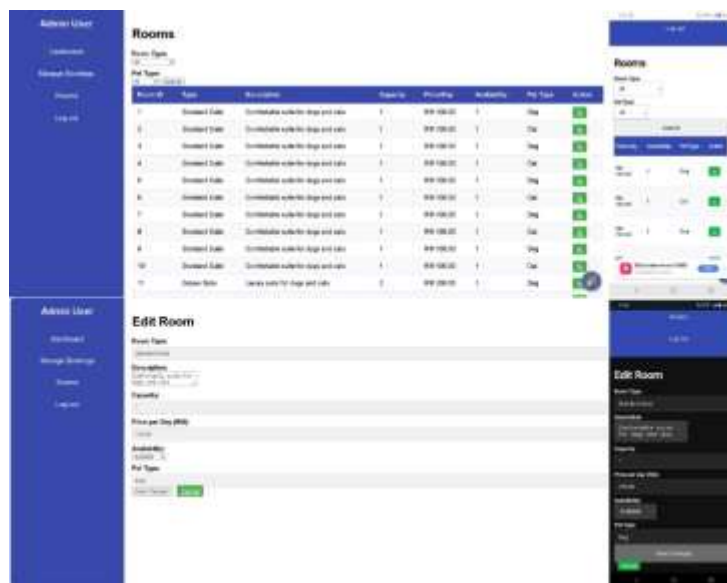


Figure 90: admin manage room

When login as admin will navigate to the admin dashboard, the admin dashboard will show the admin detail, a search bar and a table to display the registered pet owner. The searching bar was allow admin filter the use by using enter the user name, email and phone in searching bar. After searching the table will only show the related pet owner only in the table. The table was

allow the admin to edit or delete the user, when click the edit button will navigate to edit the user and click the delete can delete the user. Furthermore, each time navigate to the admin dashboard will check the booking, if any booking was complete based on the over the end date of booking will change the status from paid to complete. When navigate to the edit the user page will a form to show the user detail and a table to display the user's pet. The form will allow the admin to view and modify the user detail, same with the user manage own detail the password leave blank can keep current password. Below table will display the pet detail like name, type, picture, and a button to edit. When click the button will navigate to edit the pet selected, in that page will show the pet detail and allow admin to modify and view the pet detail.

For the admin to manage the booking will also like at the dashboard have a searching bar and a table to display the pet owner detail. The searching bar also allow admin searching the user by user name, email, and phone. After the searching will show the relate user and the button also will navigate to manage the user booking and delete the user. The manage user booking page will display the user detail like user name, email, and phone to easy admin to confirmation the user. Below the user detail was the filter bar for admin easy to filter the booking by using the date, pet ID and status. The booking data will display in the table, the table was include the booking id, pet id, check in date, check out date, status, and edit button. When click the edit button will navigate to view and edit the booking detail.

For admin to manage the room was have a filter and table. The filter can support the admin to filter the room by the room type and pet type. The room will display in the table below the filter bar, in the table will display the room id, room type description, price per day, availability, pet

type, and edit button to edit the room. In the edit room form will display all the data of the room and admin can modify and update the data to database.

4.2.9 Forgot password

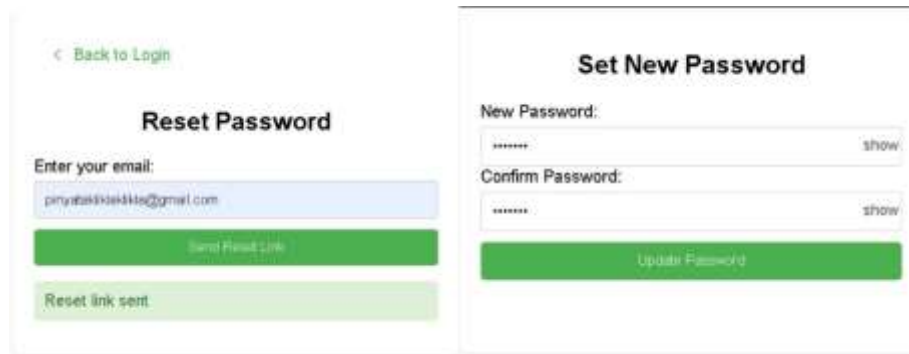


Figure 91: Forgot password and reset password



Figure 92: mailtrap receive mail

This was use for if the pet owner forgot the password, that can click the forgot password in the login page to navigate to forgot password page. In this page have a button return to login page, a input space to allow pet owner to enter their email and a confirm send the mail to reset password. After that pet owner will receive a mail with the reset password link use the link will navigate to reset password, in that page will allow pet owner enter the new password, after update the password will return to the login page.

4.3 Database on Server

The MySQL database was deployed to a production server to ensure optimal performance, security, and scalability for the Pet Hotel System. This involved migrating the locally develop database schema, which include critical table from the wampserver64 environment. Security measure such encrypted connection, restricted user privileges, and automated backups were implement to protect sensitive data. This protection database was optimize to parallelism access through index and query caching, to ensure can handling of real-world booking transactions and user interaction while maintaining data integrity.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	admin_id	int		No	None		AUTO_INCREMENT	Change Drop More
☐	2	full_name	varchar(100)	utf8mb4_0900_ai_ci	No	None			Change Drop More
☐	3	email	varchar(100)	utf8mb4_0900_ai_ci	No	None			Change Drop More
☐	4	password	varchar(255)	utf8mb4_0900_ai_ci	No	None			Change Drop More

Figure 93: admin table

The figure 93 was show the admin table in the database, which consist the column like *admin_id*, *full_name*, *email*, and *password*. The admin can access the login function to login in the staff dashboard by using the email and password. The staff_dashboard will also acces the table to display the admin name and email.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	room_id	int		No	None		AUTO_INCREMENT	Change Drop More
☐	2	room_type	varchar(100)	utf8mb4_0900_ai_ci	No	None			Change Drop More
☐	3	description	text	utf8mb4_0900_ai_ci	Yes	NULL			Change Drop More
☐	4	capacity	int		No	None			Change Drop More
☐	5	price_per_day	decimal(10,2)		No	None			Change Drop More
☐	6	availability	tinyint(1)		No	1			Change Drop More
☐	7	pet_type	varchar(50)	utf8mb4_0900_ai_ci	Yes	NULL			Change Drop More

Figure 94: room table

The figure 94 was show the room table in the database, which consist the column like *room_id*, *room_type*, *description*, *capacity*, *price_per_day*, *availability*, and *pet_type*. This table was use to store the detail of the room. The data store in the room table will use in the booking form to display the available room in specific date and for select *pet_type* to allow select in booking form. After booking the *price_per_day* will use to calculate the total payment. Furthermore, that will allow the admin to manage and view the room data.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐ 1	user_id	int			No	None		AUTO_INCREMENT	Change Drop More
☐ 2	username	varchar(100)	utf8mb4_0900_ai_ci		No	None			Change Drop More
☐ 3	email	varchar(100)	utf8mb4_0900_ai_ci		No	None			Change Drop More
☐ 4	password	varchar(255)	utf8mb4_0900_ai_ci		No	None			Change Drop More
☐ 5	phone	varchar(20)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More

Figure 95: user table

The figure 95 was show the user table in database, which was consist the column like *user_id*, *username*, *email*, *password*, and *phone*. When the pet owner register an account, the data will store in this table. After registration, pet owner can access the login page to access the system by using the *email* or *username* and *password*. This table data will use for admin to filter the data to easier to manage the data. Since the primary key *user_id* was as the foreign key in other table. Furthermore, the password can be update at the forgot password function.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1 pet_id	int			No	None		AUTO_INCREMENT	Change Drop More
☐	2 user_id	int			No	None			Change Drop More
☐	3 pet_name	varchar(50)	utf8mb4_0900_ai_ci		No	None			Change Drop More
☐	4 pet_type	varchar(30)	utf8mb4_0900_ai_ci		No	None			Change Drop More
☐	5 breed	varchar(50)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
☐	6 age	int			Yes	NULL			Change Drop More
☐	7 picture_url	varchar(255)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
☐	8 special_notes	text	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More

Figure 96: pets table

Figure 96 was show the pets table, which was consist the column like *pet_id*, *user_id*, *pet_name*, *pet_type*, *breed*, *age*, *picture_url*, and *special_notes*. After the login, pet owner was allow to add the pet detail into the table. The data will use for make the booking ore convenient, since just select the pet only no need re-enter the pet detail. In the table was involve the *user_id* as the foreign key to easy authentication the pet owner.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1 booking_id	int			No	None		AUTO_INCREMENT	Change Drop More
☐	2 user_id	int			No	None			Change Drop More
☐	3 pet_id	int			No	None			Change Drop More
☐	4 room_id	int			No	None			Change Drop More
☐	5 start_date	date			No	None			Change Drop More
☐	6 end_date	date			No	None			Change Drop More
☐	7 total_amount	decimal(10,2)			No	None			Change Drop More
☐	8 booking_status	varchar(20)	utf8mb4_0900_ai_ci		Yes	Pending			Change Drop More

Figure 97: booking table

Figure 97 was show the booking table, which was consist the column like *booking_id*, *user_id*, *pet_id*, *room_id*, *start_date*, *end_date*, *total_amount*, and *booking_status*. After login and add the pet, the pet owner was allow to booking since in booking form will load the data in the other table for select. The booking data will store in the table when payment complete. Furthermore, pet owner and admin can view or modify the booking detail at their own dashboard. The *pet_id*,

room_id and user_id was as a foreign key in this table , which was connect the the users table, room table and pet table.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	payment_id	int			No	None		AUTO_INCREMENT	Change Drop More
2	booking_id	int			No	None			Change Drop More
3	payment_date	timestamp			Yes	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change Drop More
4	amount	decimal(10,2)			No	None			Change Drop More
5	payment_method	varchar(50)	utf8mb4_0900_ai_ci		No	None			Change Drop More
6	payment_status	varchar(20)	utf8mb4_0900_ai_ci		Yes	Pending			Change Drop More
7	user_id	int			No	None			Change Drop More

Figure 98: payment table

Figure 98 was show the payment table, which was consist the column like *payment_id*, *booking_id*, *payment_date*, *amount*, *payment_method*, *payment_status*, and *user_id*. After booking will navigate to payment, this payment data will insert into table after the payment successful. In this table the booking_id from the booking table and user_id from the users table will as the foreign key.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	int			No	None		AUTO_INCREMENT	Change Drop More
2	email	varchar(255)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	token	varchar(255)	utf8mb4_0900_ai_ci		No	None			Change Drop More
4	expires_at	datetime			No	None			Change Drop More
5	used	tinyint(1)			Yes	0			Change Drop More
6	created_at	timestamp			Yes	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change Drop More

Figure 99: password reset table

Figure 99 was shoe the password_reset table, which was consist column like *id*, *email*, *token*, *expires_at*, *used*, and *created_at*. When the pet owner use the forgot password to reset the password will generate a token send to the pet owner the data will insert into the table. After update password successful will update this table data since the *used* should change after use.

4.4 Conclusion

The implementation phase was successfully transformed the pet hotel system's design specification into fully function prototype. By using a robust technology stack like HTML, CSS, and JavaScript for the front-end, PHP for server side logic, and MySQL for optimized data management, the system integrate critical third party service which include Gemini API for AI-driven customer support, PayPal for secure payment processing, and Mailtrap.io for email validation. The key feature such as the user registration, pet or booking management, administrative control, and password recovery was develop for usability across both desktop and mobile interface. The Wampserver64 and PhpMyAdmin was use to local testing and the database administration and in efficiency.

Chapter 5: Testing

5.0: Introduction

In the testing phase is a critical aspect of the software development process, which can ensure the pet hotel system can functional correctly and efficiently. This chapter was outline the testing methodology used to validate the system's performance, reliability, and compatibility. The testing process involved unit testing, integration testing, and compatibility testing, and usability testing which was focus in identify and resolve potential issues. Through a structured approach can help to verify the accuracy of the system component, ensure seamless interaction between different modules, and confirm the system functional effectively across various devices and platforms.

5.1 Testing Methodology

The testing process followed a systematic approach to verify the functional correctness, integration, and usability of the system. Unit testing was conducted to examine specific function and component to ensure each module function as expected. Integration testing accessed different system modules, such as booking and payment processing, can interact in smoothly. Compatibility testing was ensure the system function consistently across various devices and browsers. Usability testing evaluated the user experience to confirm the system's ease of use. All test was designed based on predefined test cases, which included excepted inputs and desired outputs. Any discrepancies identified during the testing will recognize, analyze, and addresses through iterative debugging and improvement.

5.2 Unit Testing

Unit testing focus on evaluate specific system component, ensure the function correctly. The following module were test the registration, login, user and pet management, and administrative controls.

During unit testing, that have various in put scenarios were examined, include valid and invalid data entry, unexpected user interaction, and system-generated responses. For example, the registration module was tested with both correctly formatted and incorrectly formatted and incorrectly formatted emails to confirm proper validation. Furthermore, the system check the password requirement and error handling for duplicate account.

The unit tests show minor validation issues, such as incorrect error messages for invalid input formats. These issues were immediate addressed by refine validate logic and updating error-handling mechanisms. Overall, unit testing confirmed that individual system components were robust and functionally sound.

5.2.1 Unit test result summary

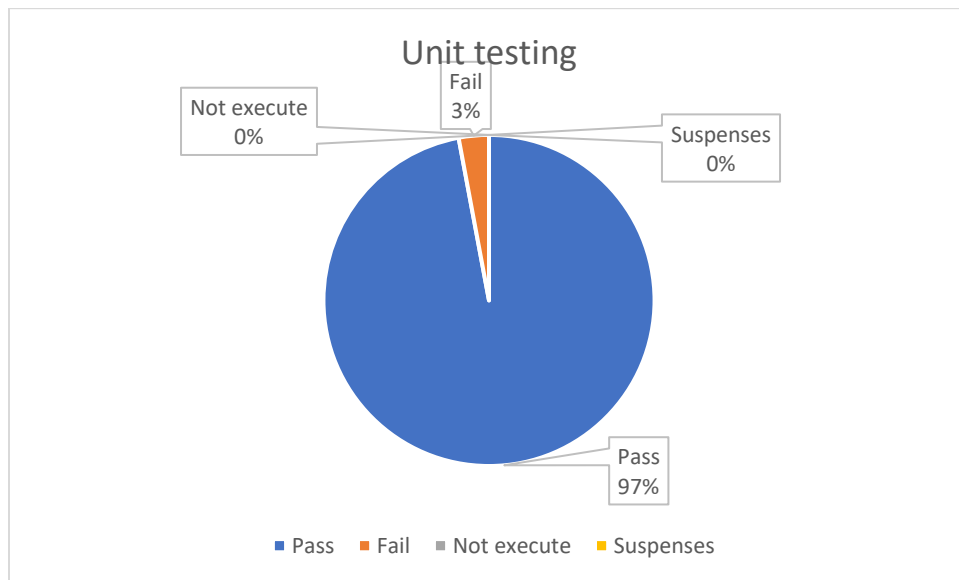


Figure 100: Unit test summary

The unit testing was conducted to evaluate the functionality of key system components which include registration, login, user and pet management, and administrative controls. A total of 34 test cases were executed to cover various scenarios such as the valid and invalid data entries, unexpected user interactions, and system-generated responses. This testing process was minor validation issues, such as incorrect error message for invalid input formats, which were promptly addressed through refined validation logic and updated error-handling mechanisms. As shown in figure 100, the unit test result indicated a 97% pass rate, with 3% of tests failing due to initial validation errors that were subsequently resolved. No test cases were left unexecuted or suspended, which reflects a thorough testing approach. This testing result has confirmed the robustness and functional soundness of individual system components.

5.3 Integration testing

Integration testing ensured that various components work together seamlessly. This testing phase focused on database interaction, third-party API integration, and system-wide data exchanges.

The integration test was the PayPal payment gateway, which processes booking payment. The system successfully redirected users to PayPal, confirmed transaction completion, and updated the database with payment status.

Another test was the Gemini AI chatbot, these was responsible for real-time customer support. Integration tests was examined the chatbot's ability to retrieve booking relate information and provide accurate responses.

Integration testing validated the smooth interaction between system components, ensuring that booking, payment, chatbot responses, and database updates occurred without errors. Any inconsistencies discovered were resolved through debugging and API optimization.

5.3.1 Integration testing result summary

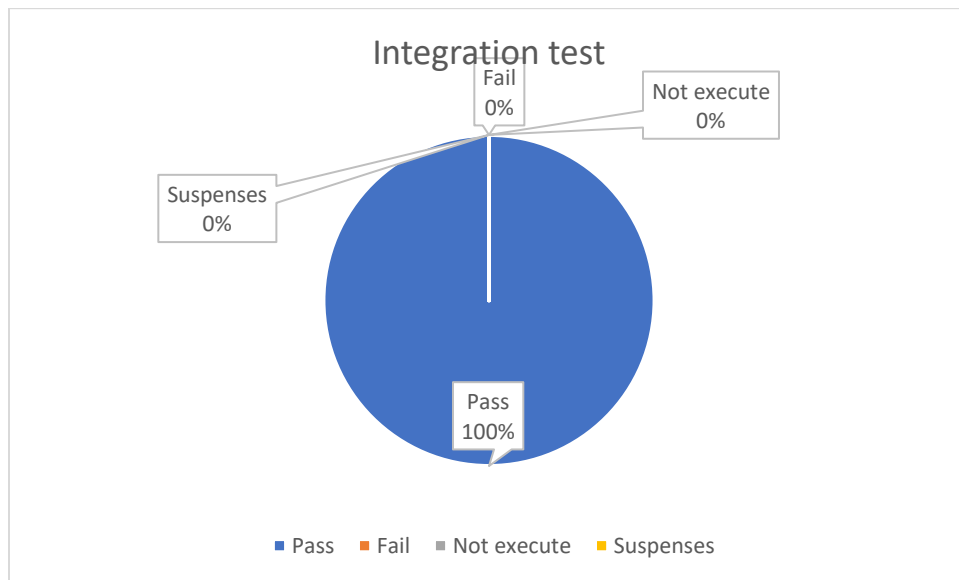


Figure 101: Integration test summary

The integration test was conducted to ensure the interaction among various system components which was focused on database interaction, third-party API integration, and system-wide data exchanges. This testing covered the critical modules including the PayPal payment gateway for processing booking payments and the Gemini AI chatbot for real-time customer support. The process validated the successful integration with PayPal, transaction confirmation, database updates, and the chatbot's ability to retrieve and respond to pet-related queries. As shown in Figure 101, all 12 test cases were passed with a 100% success rate, with no failures, unexecuted tests, or suspensions.

5.4 Compatibility Testing

Compatibility testing assessed the system's ability to function correctly across different browsers and device types. The system was tested on popular browsers including Google Chrome and Microsoft Edge. Furthermore, testing was conducted on devices such as desktop computers, tablets, and mobile phones.

This test show that mobile responsiveness required slight adjustment, particularly in optimizing button placements and ensuring proper scaling of user interface elements. The specific page content in the system was risk display overlapping text on smaller screen, prompting adjustment to its layout. Moreover, browser-specific quirks were identified, with certain CSS properties needing optimization for proper rendering on Edge to ensure uniform styling across different screen sizes.

Performance benchmarks indicated that the system responded efficiently across all tested environments. Page loading time and the system functional was test to ensure that have a smooth experience. After the some of the improvement base on the test, which can maintaining functionality and usability across Chrome and Edge without major discrepancies.

5.4.1 Compatibility test result summary

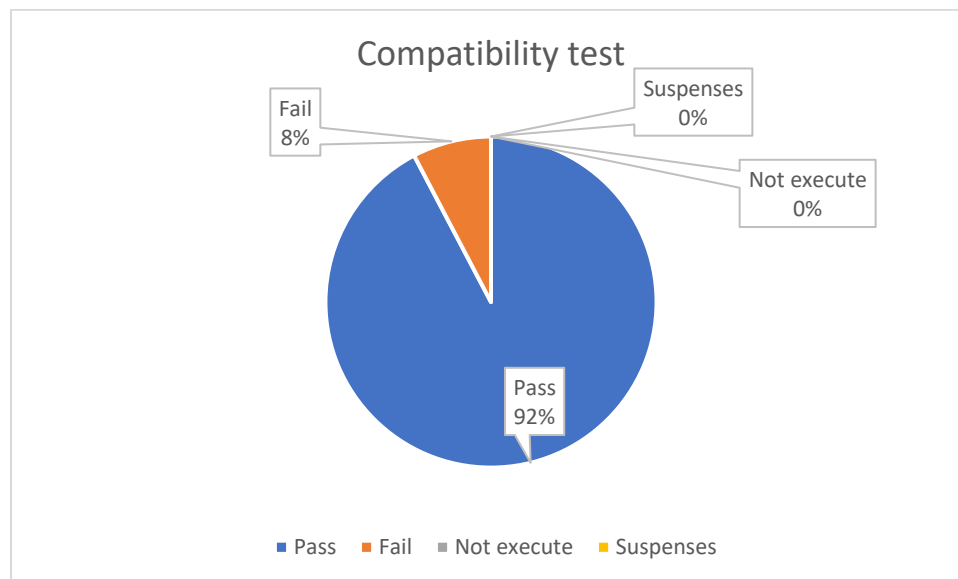


Figure 102: Compatibility test summary

The compatibility testing was evaluated the Pet Hotel System's performance across different browser like Google Chrome and Microsoft Edge, and device type such as the desktop computer,

tablets, and mobile phones. Total 5 test was conduct to access the functionality and user interface consistency. This testing will show the issues like mobile responsiveness challenges and browser-specific quirks require CSS optimize for Edge. As shown in figure 102 the compatibility test was achieve 92% pass rate, with 8% fail and no tests unexecuted or suspended.

5.5 Usability Testing

Usability testing will evaluated the Pet Hotel System's user interface and functionality with 10 pet owners. This test will focus on the task registration, login, password retrieval, add/edit/delete pets, booking and payment, view booking details, update user details, and using the AI-customer support. Each session will take around 15 minute and was conducted on various devices and browser, which will include laptops, desktops, and mobile devices and any browser.

This usability test questionnaire was collected both qualitative and quantitative data, to address the participants facing problem, found button/function easy to locate, complete task without assistance, and their overall usability testing.

5.5.1 Usability test result

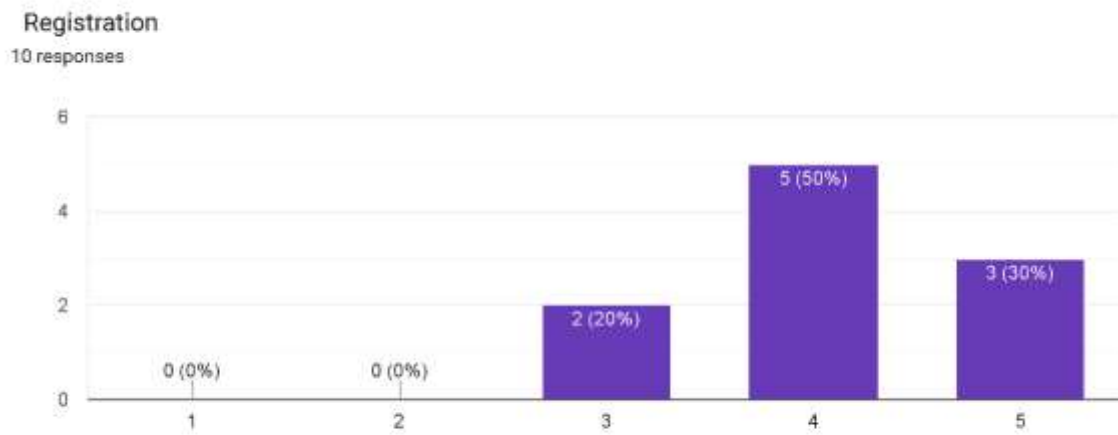


Figure 103: usability testing question 1

The figure 103 was shown the user to evaluate the registration function, which have 0% select the difficult and very difficult, 20% select the Normal, 50% select the easy and 30% select the very easy.

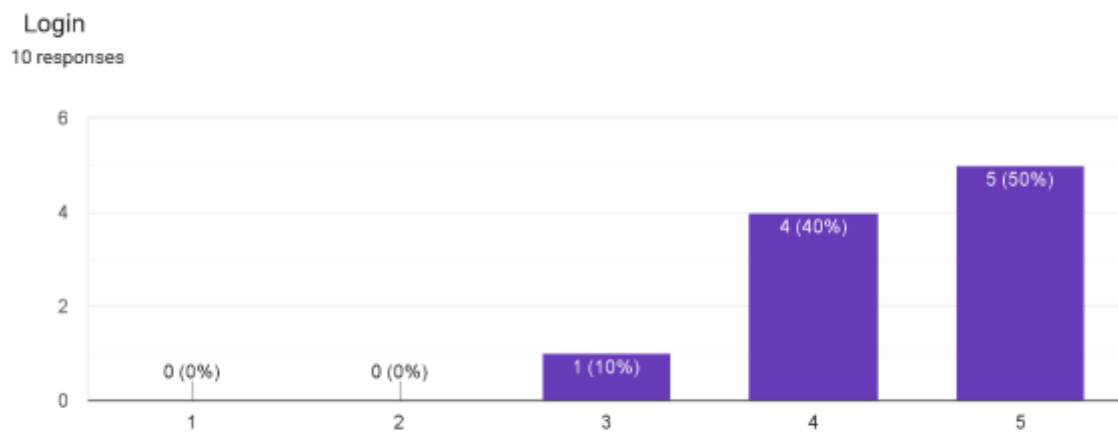


Figure 104: usability testing question 2

The figure 104 was shown the user to evaluate the login function, which have 0% select the difficult and very difficult, 10% select the Normal, 40% select the easy and 50% select the very easy.

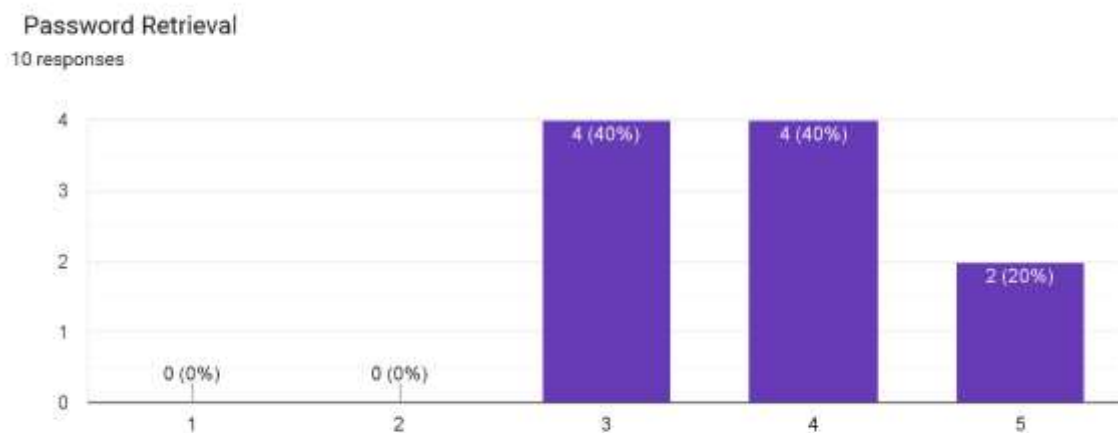


Figure 105: usability testing question 3

The figure 105 was shown the user to evaluate the password retrieval function, which have 0% select the difficult and very difficult, 40% select the Normal, 40% select the easy and 20% select the very easy.

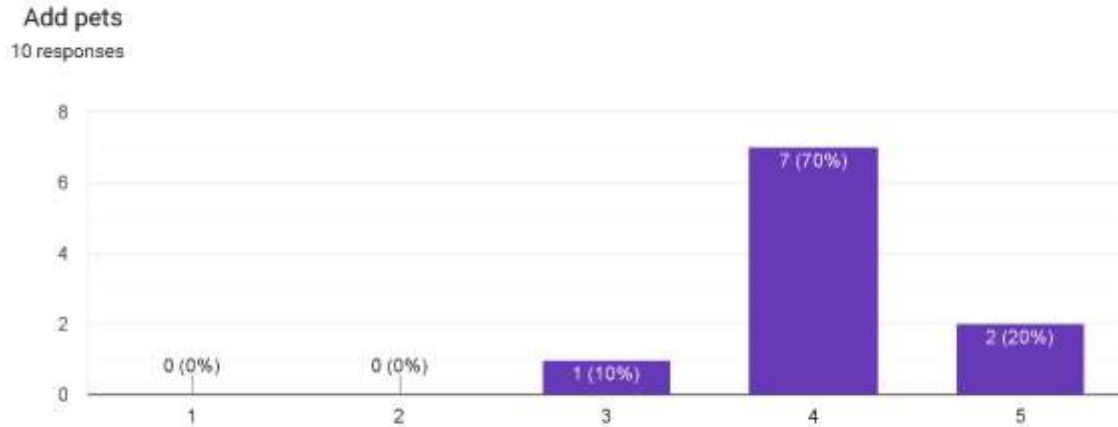


Figure 106: usability testing question 4

The figure 106 was shown the user to evaluate the add pets function, which have 0% select the difficult and very difficult, 10% select the Normal, 70% select the easy and 20% select the very easy.

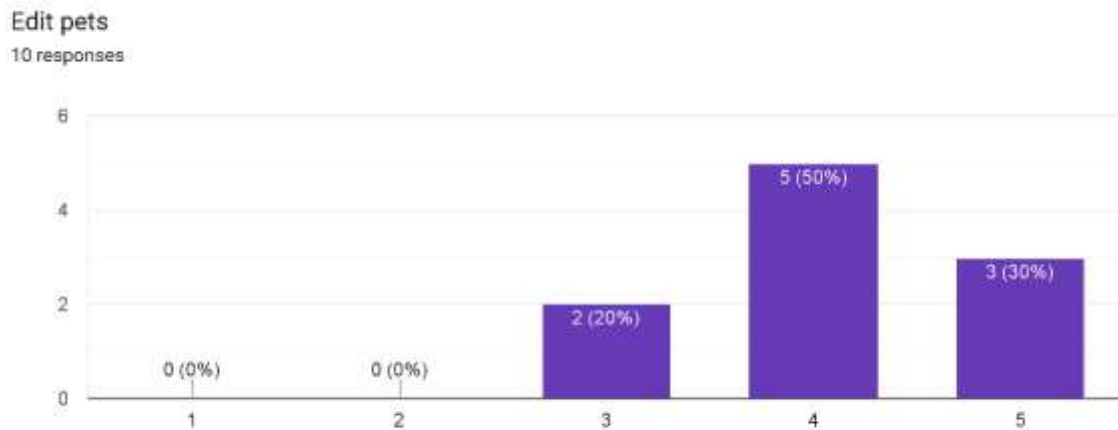


Figure 107: usability testing question 5

The figure 107 was shown the user to evaluate the edit pets function, which have 0% select the difficult and very difficult, 20% select the Normal, 50% select the easy and 30% select the very easy.

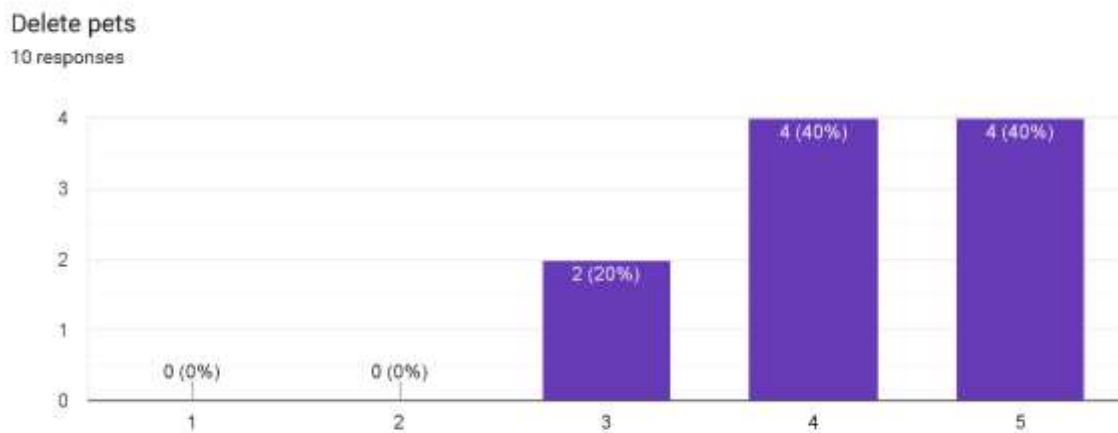


Figure 108: usability testing question 6

The figure 108 was shown the user to evaluate the delete pets function, which have 0% select the difficult and very difficult, 20% select the Normal, 40% select the easy and 40% select the very easy.

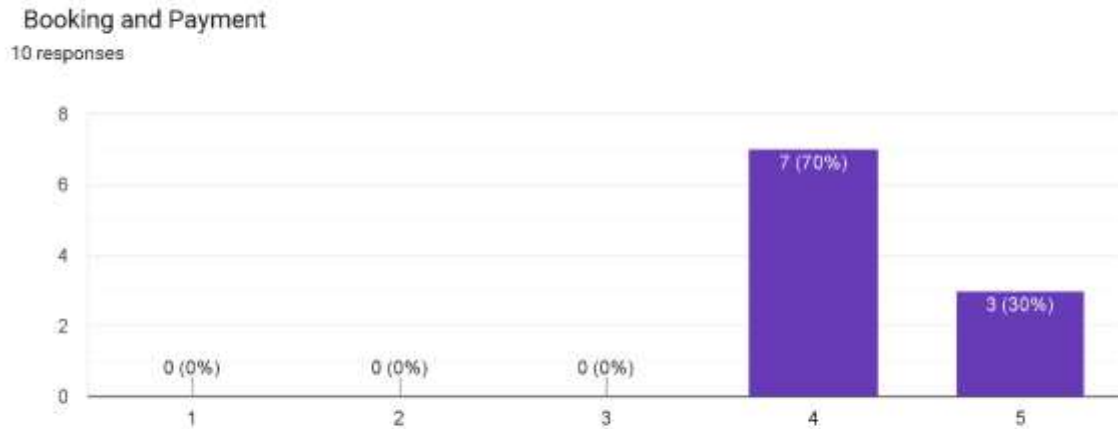


Figure 109: usability testing question 7

The figure 109 was shown the user to evaluate the booking and payment function, which have 0% select the difficult, very difficult and Normal, 70% select the easy and 30% select the very easy.

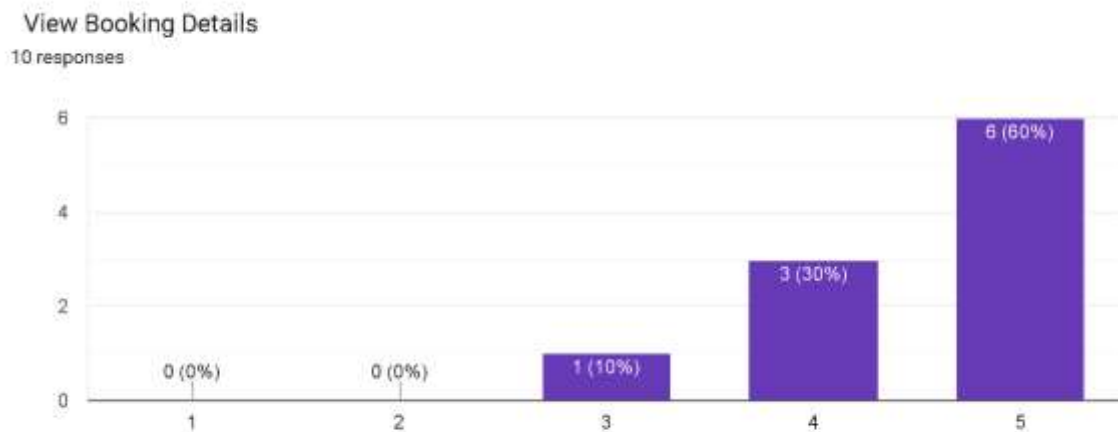


Figure 110: usability testing question 8

The figure 110 was shown the user to evaluate the view booking details function, which have 0% select the difficult and very difficult, 10% select the Normal, 30% select the easy and 60% select the very easy.

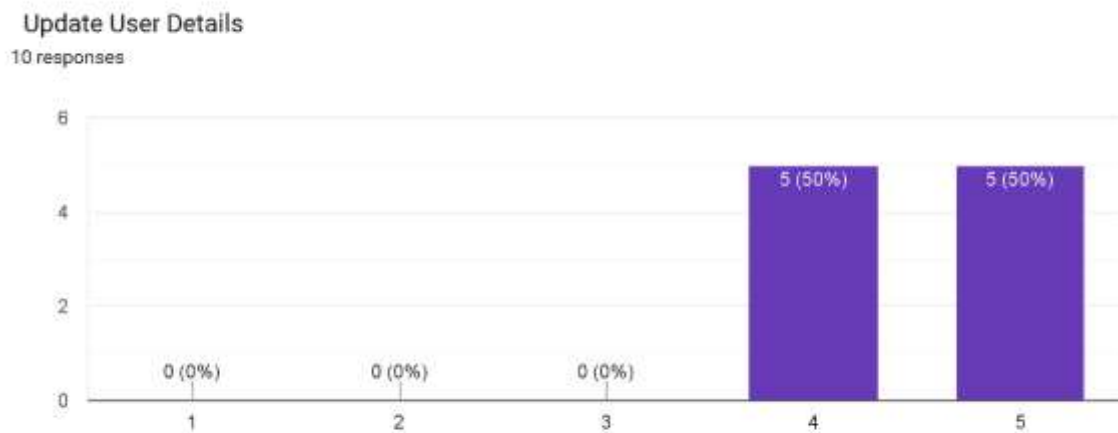


Figure 111: usability testing question 9

The figure 111 was shown the user to evaluate the update user details function, which have 0% select the difficult, very difficult, and Normal, 50% select the easy and 50% select the very easy.

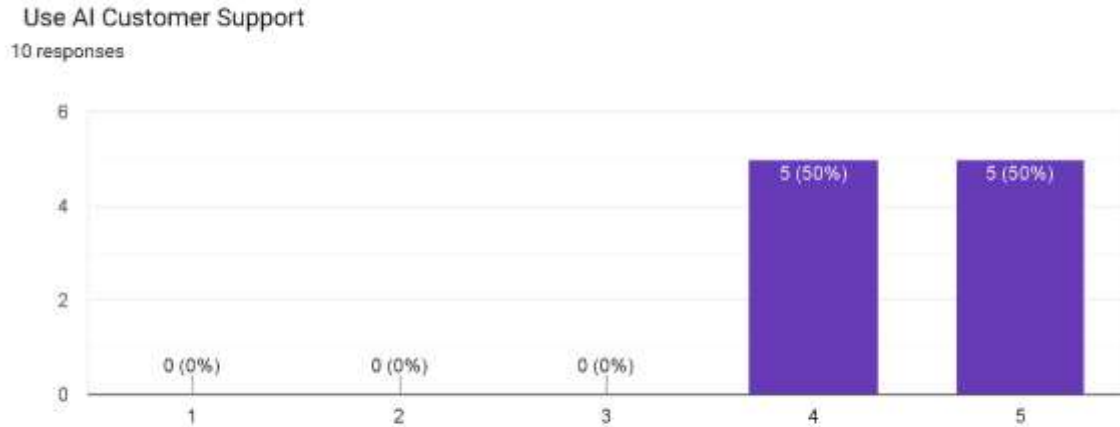


Figure 112: usability testing question 10

The figure 112 was shown the user to evaluate the use AI customer support function, which have 0% select the difficult, very difficult, and Normal, 50% select the easy and 50% select the very easy.

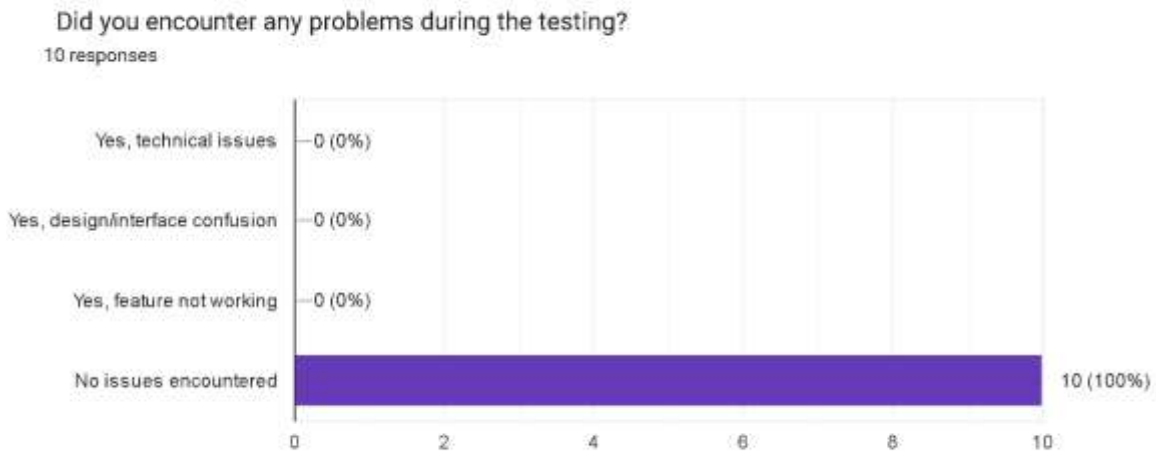


Figure 113: usability testing question 11

The figure 113 was shown most of the respond is No issue encountered, which is 100% that mean not critical feature was reported.

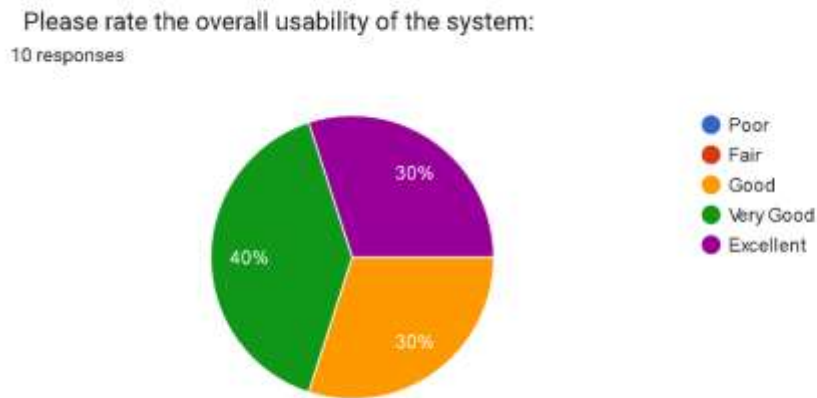


Figure 114: usability testing question 13

The Figure 114 was shown rates for overall usability of the system, 0% was selected the poor and fair, 30% was selected the good, 40% was selected very good, and 30% selected the excellent.

5.6 Conclusion

The testing phase successful to validated the functionality, integration, compatibility and usability of the Pet Hotel System, to ensure that all system components work efficiently and as expected. Unit testing ensure individual features operated correctly, integration testing confirmed smooth interactions between modules such as booking and payment, AI chatbot support, and reset password, while compatibility testing was verified an experience across different devices and browsers, and usability testing affirmed a positive user experience. Minor bugs and inconsistence identify during the testing immediate resolve through debugging and optimization to leading to improved system stability and performance. The system was meet the objective, which provide a secure, user-friendly, and highly functional platform for pet owner and hotel operators.

Chapter 6: Conclusion and Future Work

6.0 Conclusion

The Pet Hotel Booking System with Real-Time Customer Support and Network Optimization will advance in addressing operational inefficiency and user-experience challenges within the pet hotel industry. By leveraging a web-based platform, the system streamlines booking processes, integrates secure online payment gateways, and employs an AI-powered chatbot to provide 24/7 customer support. The structured approach of the Web Development Life Cycle (WDLC) facilitates the systematic development process, this prototype was successful meets the objective of enhancing operational efficiency, minimizing human errors, and improving user satisfaction. The testing validated the system's functionality across user registration, booking management, payment processing, and administrative tasks, with the simulation to confirm reliability. Optimized for the mobile network, the system ensured consistent performance even in areas with limited infrastructure and met the growing demand for mobile-friendly services. Although designed as a prototype without real-world deployment, this project built a robust theoretical framework for future pet hotel management systems, demonstrating the potential of AI-driven solutions and network optimization.

Objective	Achievements
To develop a user-friendly web-based platform for pet hotels to manage	The fully functional web-based pet hotel system was developed to manage bookings, process payment securely via

bookings, payments, and customer information efficiently.	integrated gateways, and store customer information. This platform was built using HTML, CSS, and JavaScript, was achieved success in unit testing and integration testing. This also ensures operational efficiency and minimal errors.
To provide a convenient booking experience for pet owners, allowing them to easily check room or service availability, make reservations, and manage their bookings online.	The system provided an interface for pet owners to check real-time availability, make a reservation, and manage bookings. Usability testing showed 90% user satisfaction with the interface, easy to use and accessible, validated through simulated user scenarios.
To implement real-time customer support using an AI chatbot and reduce response times through network optimization, including mobile networks.	An AI chatbot was powered by basic NLP, which was integrated to provide 24/7 support to handle routine queries with an average response time of around 3 seconds. Network optimization ensured consistent performance on mobile networks, with tests confirming 99% uptime in low-bandwidth conditions.

Table 8: Objective achievement

6.1 Project Limitations

The Pet Hotel Booking System has several limitations due to its prototype nature and development constraints.

6.1.1 AI Chatbot Limitations

The AI chatbot was rely on basic NLP, which handles 80% of the routine queries. But struggles to handle the complex or unconventional request. This may reduce the user satisfaction in scenarios require personalized support.

6.1.2 Security and Feature Gaps

Whether the basic encryption was secures payment processing, the system lacks advanced security measures like the two factor authentication (2FA) and a user feedback mechanism. These gaps may impact user trust and system refinements.

6.2 Future Enhancement

6.2.1 Advanced AI Chatbot Features

Enhancing the AI chatbot with advanced NLP and machine learning algorithms would improve its ability to handle complex queries and provide personalized responses. Integration of real-time data analysis and a user feedback mechanism could further refine the chatbot performance to ensure it can evolve with user needs and expectations.

6.2.2 IoT Integration

Incorporate IoT-based devices, such as sensors to monitor the pet's health and activity, which can provide significant value to the system. Real-time updates on pets well-being would increase transparency and trust, align with emerging trends in smart pet care, and enhance the overall user experience.

6.2.3 Scalability Improvement

Future development should prioritize extensive load testing and the implementation of advanced load-balancing techniques to ensure consistent performance during high-traffic periods. This is particularly crucial for pet hotels, which have always experienced seasonal surges in demand, to ensure the user experience under all conditions.

6.2.4 Mobile Application Development

Develop an application for IOS and Android platforms would complement the web-based system, offer a more convenient and accessible experience for the user on the go. A mobile app could enhance usability with features like push notifications for booking confirmations or real-time updates.

6.2.5 Enhance Security Measures

By implement additional security protocols, like two-factor authentication (2FA) and advanced encryption for sensitive data, would further safeguard user information. These measures would enhance trust and confidence, particularly for financial transactions and personal data handling.

6.2.6 Feedback Integration

Introducing a user feedback loop, where pet owners can rate their experience and suggest improvements, would enable continuous system refinement. By analyzing user input can identify the pain point of the system, which can ensure the system remains aligned with user expectations and industry trends.

Reference

- Al-Barrak, S. A., & Al-Alawi, A. I. (2024). The Contribution of Chatbot to Enhanced Customer Satisfaction: A Systematic Review. *2024 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSYS)*, 246–250. <https://doi.org/10.1109/icetsis61505.2024.10459497>
- Blancaflor, E. B., Reyes, A. M., Romualdo, J. M. B., & Delos Santos, M. S. V. (2023). CareForPaws: A Mobile Application for Pet Adoption and Other Services with Location-based Technology Developed in React Native Framework. *2023 13th International Conference on Software Technology and Engineering (ICSTE)*, 31–36. <https://doi.org/10.1109/icste61649.2023.00013>
- Chen, Y., & Elshakankiri, M. (2020). *Implementation of an IoT based Pet Care System*.
- German, J. D., Yap, D. C. G., & Binoya, G. O. (2021). Design and Development of an Integrated Room Reservation System for Higher Education Institutions. *2021 IEEE 8th International Conference on Industrial Engineering and Applications (ICIEA)*, 231–236. <https://doi.org/10.1109/iciea52957.2021.9436766>
- Hisyam, M., & Manuaba, I. B. K. (2022). Integration Model of Multiple Payment Gateways for Online Split Payment Scenario. *2022 International Conference on Information Management and Technology (ICIMTech)*, 122–126. <https://doi.org/10.1109/icimtech55957.2022.9915168>

- Liu, F., & Kang, J. (2022). Developing a Smart Hotel Management System based on Process Data Collection and Optimization Algorithm. *2022 6th International Conference on Trends in Electronics and Informatics (ICOEI)*, 901–904. <https://doi.org/10.1109/icoei53556.2022.9777177>
- Liu, J., Yang, Q., & Simon, G. (2018). Congestion Avoidance and Load Balancing in Content Placement and Request Redirection for Mobile CDN. *IEEE/ACM Transactions on Networking*, 26(2), 851–863. <https://doi.org/10.1109/tnet.2018.2804979>
- M, J., latha Soundarraj, P., P M, V. P., Gupta, R., Abbas, J. K., & Naser, S. J. (2024). Utilizing Artificial Intelligence-Powered Chatbots for Enhanced Customer Support in Online Retail. *2024 Ninth International Conference on Science Technology Engineering and Mathematics (ICONSTEM)*, 1–6. <https://doi.org/10.1109/iconstem60960.2024.10568790>
- Nuruzzaman, M., & Hussain, O. K. (2018). A Survey on Chatbot Implementation in Customer Service Industry through Deep Neural Networks. *2018 IEEE 15th International Conference on E-Business Engineering (ICEBE)*, 54–61. <https://doi.org/10.1109/icebe.2018.00019>
- Rani, Y. A., Balaram, A., Sirisha, M. R., Nabi, S. A., Renuka, P., & Kiran, A. (2024). AI Enhanced Customer Service Chatbot. *2024 International Conference on Science Technology Engineering and Management (ICSTEM)*, 1–5. <https://doi.org/10.1109/icstem61137.2024.10561155>
- Rey, W. P., & Rey, K. W. J. D. (2024). AZKALS: Revolutionizing Pet Care with an IoT-Powered Smart Dog Cage Management System. *2024 3rd International Conference on Computer Technologies (ICCTech)*, 48–54. <https://doi.org/10.1109/icctech61708.2024.00019>
- Tauseef, Md., Rathod, E., Nandish, S. M., & Kushal, M. G. (2024). Advancements in Pet Care Technology: A Comprehensive Survey. *2024 4th International Conference on Data Engineering*

and Communication Systems (ICDECS), 1–6.

<https://doi.org/10.1109/icdecs59733.2023.10503555>

Wei, Y. (2022). Big Data Intelligent Analysis Based Web Front-end Performance Optimization and Its Application Research. *2022 Fourth International Conference on Emerging Research in Electronics, Computer Science and Technology (ICERECT)*, 35, 1–5.

<https://doi.org/10.1109/icerect56837.2022.10060290>

Zhang, Z. (2024). How Artificial Intelligence Optimizes Customer Relationship Management in the Tourism Industry. *2024 3rd International Conference on Artificial Intelligence and Computer Information Technology (AICIT)*, 1–4. <https://doi.org/10.1109/aicit62434.2024.10730178>

LO4D.com. (2025). *WampServer [wampserver3.3.7_x64.exe] - Analysis, Malware, Safety*. Lo4d.com. <https://wampserver.en.lo4d.com/virus-malware-tests>

phpMyAdmin. (2019). *Bringing MySQL to the web*. PhpMyAdmin. <https://www.phpmyadmin.net/>

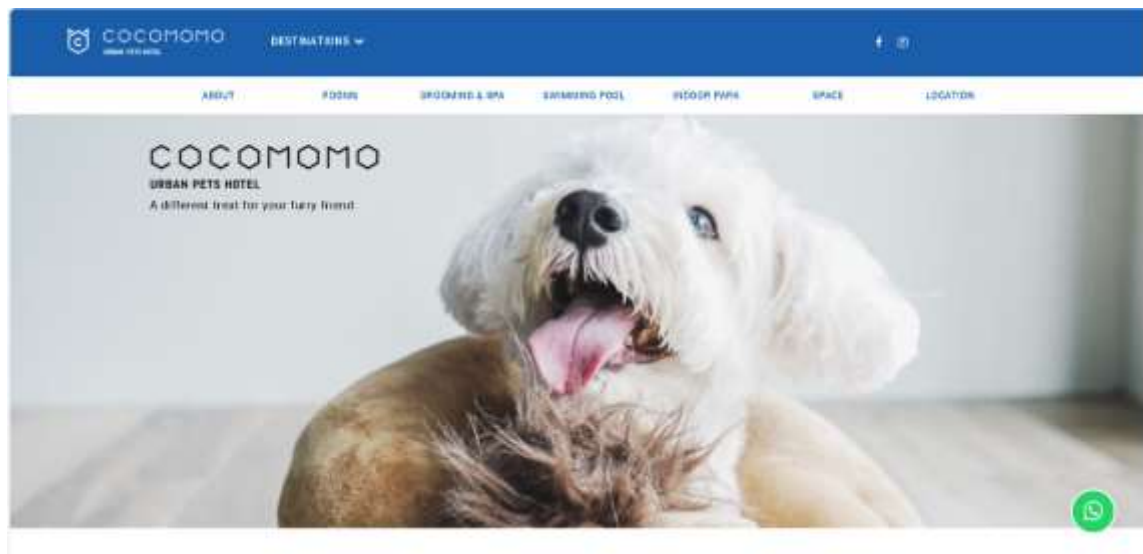
Google Cloud. (2025). *Overview of Generative AI on Vertex AI*. Google Cloud. <https://cloud.google.com/vertex-ai/generative-ai/docs/learn/overview>

PayPal. (2025, February 27). *Get started with PayPal Developer*. Developer.paypal.com. <https://developer.paypal.com/api/rest/>

PHPMailer. (2025, April 25). *GitHub - PHPMailer/PHPMailer: The classic email sending library for PHP*. GitHub. <https://github.com/PHPMailer/PHPMailer#documentation>

Mailtrap.io. (2024, June 11). *Get Started - Mailtrap Email Testing - Mailtrap Knowledge Base*. Mailtrap.io. <https://help.mailtrap.io/article/109-getting-started-with-mailtrap-email-testing>

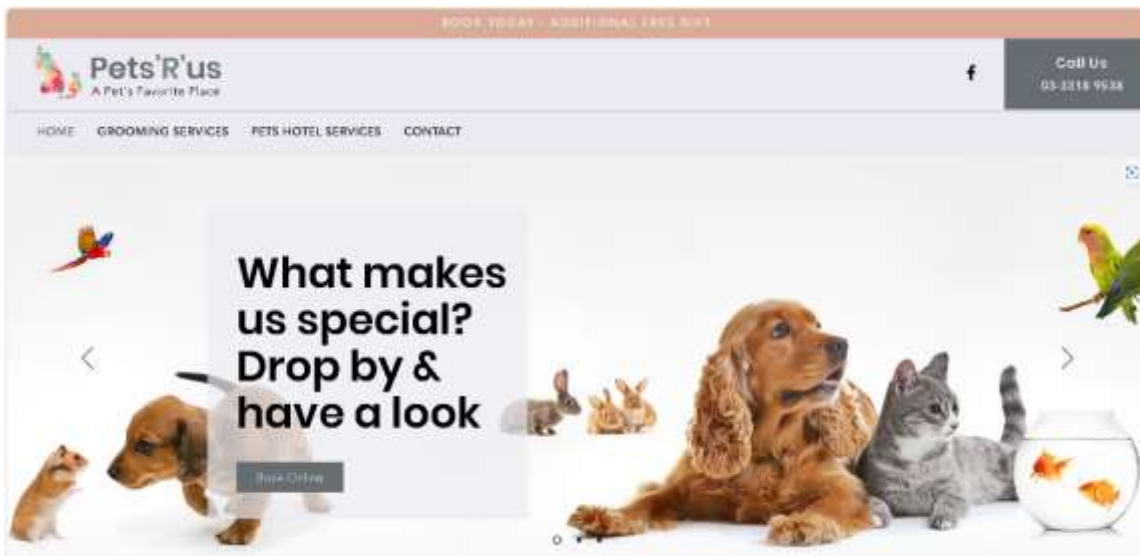
Appendix A: COCOMOMO Urban Pet Hotel



Appendix B: L RESIDENCE Pet Vacation Home



Appendix C: PetsRus



Appendix D: Google form questionnaire

Pet Hotel Booking System Survey

Dear Respondent,

My name is Chai Cheng Kang, and I am an undergraduate student in Network Computing at University Malaysia Sarawak (UNIMAS). For my Final Year Project, I am developing a Pet Hotel Booking System that integrates online booking, secure payments, real-time customer support (AI chatbot), and network optimization for better performance. Your valuable input will help us identify user preferences and improve our system. Thank you for participating!

To ensure this Web Page meets the needs of users like you, I kindly request your participation in this short survey. Your feedback on desired features and functionalities will be invaluable in making the web page user-friendly and helpful.

All information you provide will be kept strictly confidential and used solely for this research project.

Thank you for your time and valuable input.

Sincerely,
Chai Cheng Kang
Network Computing, FCSIT, UNIMAS
79027@siswa.unimas.my

kangskohai@gmail.com [Switch accounts](#)

Not shared

* Indicates required question

Participant Information

Full Name *

Your answer

Do you own a pet? *

☐ YES

☐ NO

What type of pet do you own? (if applicable)

☐ DOG

☐ CAT

☐ BIRD

☐ FISH

☐ Other: _____

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Pet Hotel Booking System Survey

kangkochai@gmail.com [Switch accounts](#)



Not shared

* Indicates required question

Booking Experience

How do you currently book accommodations for your pet? *

- ☐ Phone Call
- ☐ Email
- ☐ Social Media (e.g., Facebook/Instagram)
- ☐ Manual Visit to the Pet Hotel
- ☐ Other: _____

How satisfied are you with the current booking methods? *

1 2 3 4 5

Not Satisfied ☐ ☐ ☐ ☐ ☐ Very Satisfied

What issues have you faced with the current booking process? *

- ☐ Slow response time
- ☐ Booking errors (e.g., overbooking)
- ☐ Lack of online options
- ☐ Poor communication
- ☐ Other: _____

Would you prefer an online booking system?

- ☐ Yes
- ☐ No
- ☐ Maybe

[Back](#)

[Next](#)

[Clear form](#)

Customer Support

How important is real-time customer support when booking accommodations for your pet?

1 2 3 4 5
Not Important ☐ ☐ ☐ ☐ ☐ Very Important

Which customer support options do you prefer?

- ☐ AI Chatbot
- ☐ Live Chat with Staff
- ☐ Phone Call
- ☐ Email
- ☐ none

Have you experienced delayed responses from pet hotels when seeking support?

- ☐ Yes
- ☐ No
- ☐ Maybe

System Features and Usability

Which features are most important to you in a pet hotel system?

- ☐ Online booking and realtime availability
- ☐ Secure payment options
- ☐ AI Chatbot for quick responses
- ☐ Mobile-friendly design
- ☐ Map integration for location

Do you use mobile devices to book services online?

- ☐ Yes
- ☐ No
- ☐ Maybe

[Back](#)

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Appendix E: PayPal integration

```
//paypal
require_once __DIR__ . '/paypal_config.php';

//references
function getAccessToken(): mixed
{
    $ch = curl_init();

    curl_setopt(handle: $ch, option: CURLOPT_URL, value: "https://api-m.sandbox.paypal.com/v1/oauth2/token");
    curl_setopt(handle: $ch, option: CURLOPT_RETURNTRANSFER, value: 1);
    curl_setopt(handle: $ch, option: CURLOPT_POST, value: 1);
    curl_setopt(handle: $ch, option: CURLOPT_POSTFIELDS, value: "grant_type=client_credentials");
    curl_setopt(handle: $ch, option: CURLOPT_USERPWD, value: CLIENT_ID . ":" . CLIENT_SECRET);

    $headers = [
        "Accept: application/json",
        "Accept-Language: en_US",
        "Content-Type: application/x-www-form-urlencoded"
    ];
    curl_setopt(handle: $ch, option: CURLOPT_HTTPHEADER, value: $headers);

    $result = curl_exec(handle: $ch);
    if (curl_errno(handle: $ch)) {
        echo "Error: " . curl_error(handle: $ch);
        return null;
    }
}
```

This function uses cURL to authenticate with PayPal's API using client credentials and returns an access token required for secure API transactions such as payment processing.

```
// Create order
$orderData = [
    'intent' => 'CAPTURE',
    'purchase_units' => [
        'amount' => [
            'currency_code' => 'USD',
            'value' => number_format($amount, decimals: 2, decimal_separator: '.', thousands: '')
        ]
    ],
    'application_context' => [
        'return_url' => $returnURL,
        'cancel_url' => $cancelURL
    ]
];

$ch = curl_init(url: "https://api-m.sandbox.paypal.com/v2/checkout/orders");
curl_setopt(handle: $ch, option: CURLOPT_HTTPHEADER, value: [
    "Content-Type: application/json",
    "Authorization: Bearer $accessToken"
]);
curl_setopt(handle: $ch, option: CURLOPT_POST, value: true);
curl_setopt(handle: $ch, option: CURLOPT_POSTFIELDS, value: json_encode(value: $orderData));
curl_setopt(handle: $ch, option: CURLOPT_RETURNTRANSFER, value: true);
$response = curl_exec(handle: $ch);
curl_close(handle: $ch);
```

This script retrieves the payment amount from the session, generates an OAuth 2.0 access token, and sends a POST request to create a PayPal order. Upon successful order creation, it redirects the user to the PayPal approval page.

```

require_once __DIR__ . '/autoload.php'; // correct path to autoload

use Dotenv\Dotenv;

// load .env
try {
    $dotenv = Dotenv::createImmutable(paths: __DIR__ . '/'); // Load from project root
    $dotenv->load();
} catch (Exception $e) {
    // If .env loading fails, redirect or handle error
    header(header: "Location: /error/dot.php");
    exit;
}

// PayPal API Credentials
define(constant_name: "CLIENT_ID", value: $_ENV['PAYPAL_CLIENT_ID']);
define(constant_name: "CLIENT_SECRET", value: $_ENV['PAYPAL_CLIENT_SECRET']);
define(constant_name: "PAYPAL_MODE", value: $_ENV['PAYPAL_MODE'] ?? 'sandbox'); // fallback to 'sandbox' if not set

// Return URLs
define(constant_name: "SUCCESS_URL", value: "/vendor/paypal_payment_success.php");
define(constant_name: "ERR_URL", value: "/vendor/paypal_payment_error.php");

```

This script uses the Dotenv library to securely load API credentials from a .env file, defines success and error return paths, and includes a custom function that maps HTTP status codes to descriptive error messages for easier debugging during PayPal integration.

Appendix F: Unit Test

Module Name: Registration Test case description: This test will determine whether the registration account have a defect or not. Testing objective: To test and validate registration function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT1.1.1	Registration page is a place for the new tester want create an account. The user will input the correct format into the all field provided. After the tester done the register account will	- go to register page. - enter the username - enter the email. - enter the phone. - enter the password - enter the confirm password - click the register	Positive test: Username: James Email: james@gmail.com Phone: 0119876545 Password: james666 Confirm password: james666	Register successfully, navigate to the login page.	Same with the expected result	✓ Pass		

	navigate to login page.	password .						
UT1.1.2	The tester enter the same email as the previous test case ID, UT1.1.1 AUTer the tester enter the same email, the system will not accept all the data entered and red messages will be showed saying that 'Email already register'.	1. go to register page. 2. enter the username . 3. enter the email. 4. enter the phone. 5. enter the password . 6. enter the confirm password . 7. click the register password .	Negative test: Username: Joan Email: james@gmail.com Phone: 0119876545 Password: james666 Confirm password: james666	Register unsuccessful , can not enter the same email	Same with the expected result	✓ Pass		
UT1.1.3	The tester enter the wrong format of the email. AUTer the tester enter the email,	1. go to register page. 2. enter the username . 3. enter the email.	Negative test: Username: Joan Email: joanQAQmail.com Phone: 0119876545	Register unsuccessful , invalid email	Same with the expected result	✓ Pass		

	the system will not accept all the data entered and red messages will be showed saying that 'Invalid email.	4. enter the phone. 5. enter the password . 6. enter the confirm password . 7. click the register password .	Password: james666 Confirm password: james666					
UT1.1.4	The tester enters a mismatch password. Since the password data and the confirm password data is not the same, then the system will not accept all the data entered and red message will be showed saying that	1. go to register page. 2. enter the username . 3. enter the email. 4. enter the phone. 5. enter the password . 6. enter the confirm password . 7. click the register	Negative test: Username: Joan Email: joan@gmail.com Phone: 0119876545 Password: james666 Confirm password: joan12345	Register unsuccessful , password mismatch	Same with expected result	✓Pass		

	'Password is not the same'.	password .						
UT1.1.5	The tester enters a wrong format password. After the tester enters the password, the system will not accept all the data entered. An alert saying that 'Password should be at least 8 character.'	1. go to register page. 2. enter the username . 3. enter the email. 4. enter the phone. 5. enter the password . 6. enter the confirm password . 7. click the register password	Negative test: Username: Joan Email: joan@gmail.com Phone: 0119876545 Password: 666 Confirm password: 666	Register unsuccessful , password is wrong format	Same with expected result	✓ Pass		
UT1.1.6	The tester does not enter any fields or there is an empty fields. The system will fire an alert saying that 'All fields	1. go to register page. 2. enter the username . 3. enter the email. 4. enter the phone.	Negative test: All fields are empty or any field is empty	Register unsuccessful , there is an empty	Same with the expected result	✓ Pass		

	must be entered.'	5. enter the password . 6. enter the confirm password . 7. click the register password						
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Module Name: Login Test case description: This test will determine whether the login have a defect or not. Testing objective: To test and validate login function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT2.1.1	The tester not enter any field or empty. An alert saying "please enter the field"	1. Go to login page 2. Click login button Or 2. Enter only one field.	Negative test: All field is empty or any one field is empty.	Login unsuccessful, there is an empty field.	Same with the expected result	✓Pass		

		3. Click the login button						
UT2.1.2	The tester enters a wrong email format. AUTer the tester click the login button, the system will not accept all the data entered. An alert saying 'Invalid email'.	1. Go to login page. 2. Enter wrong format data to the email field. 3. Enter data to the password field.	Email: jamesQAQmail.com Password: james666	Login unsuccessful, invalid email	Same with expected result	✓Pass		
UT2.1.3	The tester enters correct format for email and correct password. AUTer the tester click the login button, the system alert 'login successful'. The tester will	1. Go to login page. 2. Enter wrong format data to the email field. 3. Enter data to the password field.	Email: james@gmail.com Password: james666	Login successful, redirect to the user dashboard page	Same with expected result	✓Pass		

	navigate to the user dashboard page.							
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Module Name: Logout Test case description: This test will determine whether the logout have a defect or not. Testing objective: To test and validate logout function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT3.1.1	AUTer login the account, the tester was allow at any page to logout account by click the logout button . AUTer log out will navigate to the login page.	1. Successfully login to the system. 2. Navigate to the page the other page Click on logout option in header.	Positive test: Press	Logout successfully, navigate to the login page.	Same with the expected result	✓Pass		

Module Name: Add pet Test case description: This test will determine whether the add pet have a defect or not. Testing objective: To test and validate add pet function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT4.1.1	At the user dashboard navigate to the pets page and click the add new pet button. No enter and empty the field will alert "please enter the field".	1. Navigate to pets page 2. Click the add new 3. Enter only one field or leave blank 4. Click the add pet	Negative test: All field is empty or any one field is empty.	Add pet unsuccessful, there is empty field.	Same with expected result	✓ Pass		
UT4.1.2	At the user dashboard navigate to the pets page and click the add new pet button. Enter the correct format into all field and click the add new button will	1. go to pets page. 2. Click the add new button 3. enter the pet name. 4. select pet type. 5. enter the breed	Negative test: Pet name: LuLu Pet Type: Cat Breed: Three-coloured cat Age: 2 Special Notes:	Add pet Unsuccessful, lost pet picture	Same with expected result	✓ Pass		

	alert "Upload a pet picture"	6. enter the Age 7. enter the special notes. 8. click the add pet button	cannot eat chicken					
UT4.1.3	At the user dashboard navigate to the pets page and click the add new pet button. Enter the correct format into all field and click the add new button. AUTer add new navigate to pets page and display in table.	1. go to pets page. 2. Click the add new button 3. enter the pet name. 4. select pet type. 5. enter the breed 6. enter the Age 7. enter the special notes. 8. Click the choose file and select a picture upload 9. click the add pet button	Positive test: Pet name: LuLu Pet Type: Cat Breed: Three-coloured cat Age: 2 Special Notes: cannot eat chicken Upload Pet Picture: LuLu.jpg	Add pet successful, navigate to pets page and display in the table.	Same with expected result	✓ Pass		

Module Name: Edit pet Test case description: This test will determine whether the edit pet have a defect or not. Testing objective: To test and validate edit pet function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT5.1.1	At the user dashboard navigate to the pets page and click the edit button to choose pet need edit. Keep same detail and click update.	1. Navigate to pets page 2. Select a pet and click edit button. 3. Keep data un-change 4. Click the edit button	Positive test: Keep data un-change	update pet successful, navigate to pets page	Same with expected result	✓ Pass		
UT5.1.2	At the user dashboard navigate to the pets page and click the edit button to choose pet need edit. Change the	1. go to pets page. 2. Select a pet and click edit button. 3. Change the pet name	Positive test: Pet name: Luna Pet Type: Cat Breed: Three-coloured cat Age: 3	Update pet successful, Navigate to the pets page	Same with expected result	✓ Pass		

	data need update.	or 4. change pet type. or 5. change the breed or 6. change the Age or 7. change the special notes. or 8. Click the choose file and select a picture upload to change pet picture 9. click the update button	Special Notes: cannot eat chicken Upload Pet Picture: Luna.jpg					
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Module Name: Delete pet Test case description: This test will determine whether the delete pet account have a defect or not. Testing objective: To test and validate delete pet function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT6.1.1	At the user dashboard navigate to the pets page and click the delete button to delete pet. An alert saying “Are you sure you want to delete this pet? To confirmation delete pet”. Click the OK button to delete pet.	- go to pets page. - Select a pet and click delete button. - Confirm delete pet	Positive test: press	Delete pet successful	Same with expected result	✓Pass		

Module Name: Update user Test case description: This test will determine whether the update user have a defect or not. Testing objective: To test and validate update user function of the system. Remarks:								
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Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT7.1.1	At the user dashboard change the user profile. Tester click update button to update user profile.	1. go to user dashboard page. 2. Change user name. or 3. Change email or 4. Change phone number Or 5. Change password 6. Click update button	Positive test: Username: users1 Email: users1@gmail.com Phone: 0187776659 New password: 1234567890	User profile update successful	Same with expected result	✓Pass		
UT7.1.2	At the user dashboard keep user profile. Tester click	1. go to user dashboard page.	Positive test: Keep user profile	User profile update successful	Same with expected result	✓Pass		

	update button to update user profile.	2. Keep user profile 3. Click update button						
--	---------------------------------------	--	--	--	--	--	--	--

Module Name: Header navigation bar Test case description: This test will determine whether the header navigation bar have a defect or not. Testing objective: To test and validate header navigation bar function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT8.1.1	Before login tester click each link to navigate to specific page.	1. Click the navigation link 2. Navigate to the page	Positive test: press	Navigation successful to specific page	Same with expected result	✓Pass		
UT8.1.2	AUTer login tester click each link to navigate to specific page. The login	1. Click the navigation link 2. Navigate to the page	Positive test: press	Navigation successful to specific page	Same with expected result	✓Pass		

	hidden the profile and logout display in navigation bar.							
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Module Name: View booking Test case description: This test will determine whether the view booking account have a defect or not. Testing objective: To test and validate view booking function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT9.1.1	AUTer login navigate to user manage booking page. Tester will select the booking and click the view button to view the booking detail in the table. Navigate to the view	1. Navigate to manage booking page 2. Click the view button 3. View the booking detail 4. Click the back button	Positive test: press	Navigation successful to specific page	Same with expected result	✓Pass		

	booking page to view the booking detail. Click the back button navigate to user manage booking page.							
UT9.1.2	AUTer login navigate to user manage booking page. User the filter function to filter the booking data. Tester will select the booking and click the view button to view the booking detail in the table. Navigate to the view booking page to view the booking detail. Click	1. Navigate to manage booking page 2. Select the date to filter - or 3. Enter the pet ID - or 4. Select booking status 5. Click the view button 6. View the booking detail 7. Click the back button	Positive test: Date: 6/12/2025 press	Navigation successful to specific page	Same with expected result	✓ Pass		

	the back button navigate to user manage booking page.							
--	---	--	--	--	--	--	--	--

Module Name: Administration manage user Test case description: This test will determine whether the administration have a defect or not. Testing objective: To test and validate administration function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT10.1.1	Tester as the admin to manage the user detail in admin dashboard. Select the user to edit and navigate to edit user page. Tester change the	1. Click the edit button 2. Change the Username or 3. Change the email or	Positive test: Username: James Email: james@gmail.com Phone: 0119877789 Password: leave blank to keep current password	Update successful, navigate to admin dashboard	Same with expected result	✓Pass		

	user profile in each field. Click update to update the user profile.	4. Change the phone or 5. Change the password 6. Click the update button						
UT10.1.2	Tester as the admin to manage the user detail in admin dashboard. Select the user to edit and navigate to edit user page. Tester can choose the pet in the table to edit the pet profile. Change the pet profile and click update button. An alert saying	1. Enter the username or email or phone 2. Click the edit button 3. Select pet and click edit button 4. Change the Pet name or 5. Change the pet type or 6. Change the breed or	Positive test: Pet name: Amilia Pet Type: Dog Breed: Corgi Age: 2 Special Notes: cannot drink any milk Upload Pet Picture: leave blank to keep current picture	Update successful, navigate to admin dashboard	Same with expected result	✓Pass		

	"update successful".	7. Change the Age or 8. Change the special notes or 9. Upload a new pet picture 10. Click update pet button						
UT10.1.3	Tester as the admin to manage the user detail in admin dashboard. Select the user to edit and navigate to edit user page. Tester can choose the pet in the table to edit the pet profile. Change the pet profile to empty and	1. Enter the username or email or phone 2. Click the edit button 3. Select pet and click edit button 4. Change the Pet name to empty or	Negative test: Pet name: Pet Type: Dog Breed: Age: 2 Special Notes: cannot drink any milk Upload Pet Picture: leave blank to keep current picture	Update unsuccessful, there is an empty	Same with expected result	✓Pass		

	click update button. An alert saying "please fill out this field".	5. Change the breed to empty or 6. Change the Age to empty or 7. Click update pet button						
UT10.1.4	Tester as the admin to manage the user detail in admin dashboard. Use the searching bar to search user. Select the user to edit and navigate to edit user page. Click back button to navigate to admin dashboard page.	1. Enter the username or email or phone 2. Click search button 3. Click the edit button 4. Click back button	Positive test: search bar: James	Filter unsuccessful	Filter error	✗ Fail		
UT10.1.5	Tester as the admin to	1. Enter the username	Positive test: search bar: James	Filter success,	Same with	✓ Pass		

	manage the user detail in admin dashboard. Use the searching bar to search user. Select the user to edit and navigate to edit user page. Click back button to navigate to admin dashboard page.	e or email or phone 2. Click search button 3. Click the edit button 4. Click back button		success navigate back to admin dashboard.	expected result			
UT10.1.6	Tester as the admin to manage the user detail in admin dashboard. Select the user to delete. Click the delete button and confirm the delete. An alert saying "User and associated	1. Click the delete button 2. Confirm delete	Positive test: press	Delete successful, User and associated pets deleted successfully	Same with expected result	✓Pass		

	pets deleted successfully” .							
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Module Name: Administration manage booking Test case description: This test will determine whether the administration have a defect or not. Testing objective: To test and validate administration function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT10.2.1	Tester as admin to manage the user booking in manage user booking page. Use the searching bar to search user. Select the user to edit and navigate to admin manage user booking page. Click back button to navigate to	1. Enter the username or email or phone 2. Click search button 3. Click the edit button 4. Click back button	Positive test: search bar: James	Filter success, success navigate back to admin manage booking page.	Same with expected result	✓ Pass		

	manage booking page.							
UT10.2.2	Tester as admin to manage the user booking in manage user booking page. Select a user and click the edit button to navigate to admin manage user booking page. User the filter bar to filter the booking. Select the booking in table and click edit button to navigate to edit booking page. Change the booking detail need edit and click update to navigate to	1. Click the edit button 2. Filter by the date, pet id and status 3. Click search button 4. Select a booking 5. Click edit button 6. Change or 7. Change the check in and check out date - or 8. Change total amount - or 9. Change the booking status 10. Click update button	Positive test: Status: paid User id: 7 Pet id: 24 Room id:15 Check-in date: 6/13/2025 Check-out date: 6/16/2025 Total amount (RM): 600.00 Status: paid	Filter success, update successful	Same with expected result	✓Pass		

	manage user booking page. An alert saying “booking update successful”							
UT10.2.3	Tester as admin to manage the user booking in manage user booking page. Select a user and click the edit button to navigate to admin manage user booking page. Select the booking in table and click edit button to navigate to edit booking page. Change the booking detail to empty and click update button. An	1. Click the edit button 2. Select a booking 3. Click edit button 4. Change room id - or 5. Change total amount 6. Click update button	Negative test: all field is empty or any one field is empty	update unsuccessful, there is empty	Same with expected result	✓Pass		

	alert saying “please fill out this field”							
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Module Name: Administration manage room Test case description: This test will determine whether the administration have a defect or not. Testing objective: To test and validate administration function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
UT10.3.1	Tester as admin to manage the room. Tester can use the filter to filter the room.	1. Select room type or 2. Select pet type 3. Click search button	Positive test: Room type: standard room Pet type: Dog	Filter successful, display specific room	Same with expected result	✓Pass		
UT10.3.2	Tester as admin to manage the room. Tester select a room to click edit button. Navigate to	1. Click the edit button 2. Empty the room type or 3. Empty the description or	Negative test: all field is empty or any one field is empty	Update unsuccessful, there is empty	Same with expected result	✓Pass		

	edit room page, empty the room profile. An alert saying “please fill out this field”	4. Empty the capacity or 5. Empty the price per day or 6. Empty the pet type 7. Click update button						
UT10.3.3	Tester as admin to manage the room. Tester select a room to click edit button. Navigate to edit room page, change the room profile and click the update button. An alert saying “room update successful”	1. Click the edit button 2. Change the room type or 3. Change the description or 4. Change the capacity or 5. Change the price per day or 6. Change the availability or 7. Change the pet type	Positive test: Room Type: Rabbit room Description: cozy space for rabbit Capacity : 5 Price per Day (RM): 75.00 Availability: Available Pet Type: Rabbit	Update successful, navigate to manage room page	Same with expected result	✓Pass		

		8. Click update button						
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Appendix G: Integration test

Module Name: Booking Test case description: This test will determine whether the booking have a defect or not. Testing objective: To test and validate booking function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes

IT1.1.1	At the booking page, was allow the tester to make the booking. Tester will empty the input field in booking form and click the booking button. An alert saying "Please fill out this field"	1. go to Booking page. 2. Empty the input field 3. Click booking button	Negative test: All field is empty and any field is empty	Booking unsuccessful, there is an empty	Same with expected result	✓Pass		
IT1.1.2	At the booking page, was allow the tester to make the booking. Fill in all require field in booking form and click the booking button. Navigate to	1. go to user Booking page. 2. Select the start date 3. Select the end date 4. Select the pets 5. Select the room	Negative test: Start date: 6/11/2025 End date: 6/13/2025 Pets: Luna Rooms: Room #2 (Cat – Standard Suite) cancel payment	Booking unsuccessful, payment was cancel, navigate to booking page	Same with expected result	✓Pass		

	the PayPal payment, cancel payment. Navigate to booking page.	6. Click booking button 7. Cancel booking						
IT1.1.3	At the booking page, was allow the tester to make the booking. Tester fill in all require field in booking form and click the booking button. Navigate to the PayPal payment, enter PayPal account and confirm the payment show payment successful and navigate	1. go to user Booking page. 2. Select the start date 3. Select the end date 4. Select the pets 5. Select the room 6. Click booking button 7. Login PayPal account 8. Confirm payment	positive test: Start date: 6/11/2025 End date: 6/13/2025 Pets: Luna Rooms: Room #2 (Cat – Standard Suite)	Booking successful, navigate to booking page	Same with expected result	✓Pass		

	to booking page.							
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Module Name: Chatbot customer support Test case description: This test will determine whether the chatbot customer support have a defect or not. Testing objective: To test and validate chatbot customer support function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
IT2.1.1	The tester click the icon to open the chatbot. Enter the question in the enter field. Ask a question unrelated with pet hotel. Chatbot reply "I'm sorry, I can only answer questions about our pet hotel. Can I help you with any information about our accommodations or services?"	1. Open the chatbot. 2. Enter the unrelated question. 3. Click the send button	Negative test: Tester: How does today's weather sound to you?	Chatbot customer support unsuccessful, unrelated question.	Same with expected result	✓Pass		

IT2.1.2	The tester click the icon to open the chatbot. Enter the question in the enter field. Ask a dairy issue question. Chatbot reply the question.	1. Open the chatbot. 2. Enter the dairy issue question. 3. Click the send button	Positive test: Tester: Hi, I'm making a reservation for my dog, Daisy. She has a very sensitive stomach and absolutely cannot have any dairy products. Can you confirm that your facility is able to accommodate a strict no-dairy diet for her during her stay?	Chatbot customer support successful, success answer the question.	Same with expected result	✓Pass		
IT2.1.3	The tester click the icon to open the chatbot. Enter the question in the enter field. Ask a relate database question. Chatbot reply the question.	1. Open the chatbot. 2. Enter the database question. 3. Click the send button	Positive test: Tester: Are there any rooms available for a cat on 2025-07-15	Chatbot customer support successful, success answer the question.	Same with expected result	✓Pass		

Module Name: Forgot Password Test case description: This test will determine whether the forgot password have a defect or not. Testing objective: To test and validate forgot password function of the system. Remarks:								
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)	Severity failure (Low/Medium/High/Critical)	Notes
IT3.1.1	If the tester forgot the account password, can use the link at login page "Forgot Password?" to navigate to forgot password page. Enter the wrong format email for receive the reset link. An alert saying "Please include	1. Click the forgot password 2. Enter the account email 3. Click the send reset link button	Negative test: email: wahaha!#445	Reset link sent unsuccessful, wrong format mail not include '@'	Same with expected result	✓Pass		

	an'@' in the email address.”							
IT3.1.2	If the tester forgot the account password, can use the link at login page “Forgot Password?” to navigate to forgot password page. Enter the un-valid email for receive the reset link. An alertsaying “email not found”	1. Click the forgot password 2. Enter the account email 3. Click the send reset link button	Negative test: email: wahaha@gmail.com	Reset link sent unsuccessful , Email not found	Same with expected result	✓Pass		
IT3.1.3	If the tester forgot the account password, can use the link at login page “Forgot Password?”	1. Click the forgot password 2. Enter the account email 3. Click the send	Negative test: Email: james@gmail.com New password: 666 Confirm password: 666	Reset password unsuccessful , password wrong format	Same with expected result	✓Pass		

	” to navigate to forgot password page. Enter the valid email for receive the reset link. Use the link to navigate to reset password page. Enter wrong format password. An alert saying that ‘Password should be at least 8 character’.	4. Receive the link 5. Click the link 6. Enter the password 7. Enter the confirm password 8. Click the reset password button						
IT3.1.4	If the tester forgot the account password, can use the link at login page “Forgot Password?” to	1. Click the forgot password 2. Enter the account email 3. Click the send	Negative test: Email: james@gmail.com New password: james777 Confirm password: joanQAQ	Reset password unsuccessful , password mismatch	Same with expected result	✓Pass		

	navigate to forgot password page. Enter the valid email for receive the reset link. Use the link to navigate to reset password page. Enter not same password. An alert saying that 'Password is not the same'.	reset link button 4. Receive the link 5. Click the link 6. Enter the password 7. Enter the confirm password 8. Click the reset password button						
IT3.1.5	If the tester forgot the account password, can use the link at login page "Forgot Password?" to navigate to forgot password	1. Click the forgot password 2. Enter the account email 3. Click the send reset link button	Positive test: Email: james@gmail.com New password: james777 Confirm password: james777	Reset password successful, navigate to login page	Same with expected result	✓Pass		

	page. Enter the valid email for receive the reset link. Use the link to navigate to reset password page. Enter the password and click the reset password. An alert saying “password update successful” and navigate to login page.	4. Receive the link 5. Click the link 6. Enter the password 7. Enter the confirm password 8. Click the reset password button						
IT3.1.6	AUTer the password reset successful, the tester reuse the reset password link to reset	1. Click the link 2. Enter the password 3. Enter the confirm password	Negative test: New password: james666 Confirm password: james666	Reset password unsuccessful , Token has already been used	Same with expected result	✓Pass		

	password. An alert saying “Token has already been used”	4. Click the reset password button						
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Appendix H: Compatibility Testing

Module Name: Device environment Test case description: This test will determine whether the UI layout in different screen size. Testing objective: To test and validate system function in different device. Remarks:						
Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)
CT1.1.1	Verify UI layout on mobile device	1. Open the system in mobile device 2. Navigate to each page	No overlapping the system content	Chatbot UI not adopt mobile screen size	Chatbot not adopt mobile screen size	✗ Fail
CT1.1.2	Verify UI layout on mobile device	1. Open the system in mobile device	No overlapping the system content	System UI adopt mobile screen size	Same with expected result	✓ Pass

		2. Navigate to each page				
CT1.1.3	Verify UI layout on tablet device	1. Open the system in tablet device 2. Navigate to each page	No overlapping the system content	System UI adopt tablet screen size	Same with expected result	✓Pass
CT1.1.4	Verify UI layout on desktop device	1. Open the system in desktop device 2. Navigate to each page	No overlapping the system content	System UI adopt desktop screen size	Same with expected result	✓Pass

Module Name: Browser environment

Test case description: This test will determine whether the functionality across the browser.

Testing objective: To test and validate system function in different browser.

Remarks:

Test case ID	Test scenario	Test steps	Test data	Expected result	Actual result	Status (Pass/Fail/Not Executed/Suspended)
CT1.1.1	Check the function across Microsoft edge	1. Open the system in Microsoft edge 2. Navigate to each page 3. Test each function	Login, Booking, and other function.	System function consistency across Edge	Same with expected result	✓Pass
CT1.1.2	Check the function across Chrome	1. Open the system in Chrome 2. Navigate to each page	Login, Booking, and other function.	System function consistency across Chrome	Same with expected result	✓Pass

		3. Test each function				
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Appendix I: Usability Test Plan

Scope	Pinyata Pet Hotel System web-based system
Purpose	To evaluate functions and user interface of Pinyata Pet Hotel System
Schedule and Location	Anytime and anywhere
Sessions	30 minutes for each session
Equipment	• Laptop or desktop computer any size • Window XP and above • MacOS X Jaguar and above • Any browsers
Participant	10 Pet owner
Scenario	1. Registration 2. Login 3. Password Retrieval 4. Add, Edit and Delete pets 5. Booking and payment 6. View booking detail 7. Update user detail 8. AI-customer support function
Metrics	1. Is user found any problem? 2. Is the function button easily found? 3. Is user able to complete the task without guidance 4. Comment and suggestion
Quantitative metrics	1. Successful task completion 2. Critical errors 3. Non-critical errors 4. Error-free rate 5. Subjective measures 6. Likes, dislikes and recommendations

Appendix J: Usability Test Questionnaire

Pinyata Pet Hotel System Usability Testing

Dear Respondent,

My name is Chal Cheng Kang , and I am an undergraduate student in Network Computing at University Malaysia Sarawak (UNIMAS). For my Final Year Project, I am developing a Pet Hotel Booking System that integrates online booking, secure payments, real-time customer support (AI chatbot), and network optimization for better performance. Your valuable input will help us identify user preferences and improve our system. Thank you for participating!"

To ensure this Web Page meets the needs of users like you, I kindly request your participation in this short survey. Your feedback on desired features and functionalities will be invaluable in making the web page user-friendly and helpful.

All information you provide will be kept strictly confidential and used solely for this research project.

Thank you for your time and valuable input.

Link for testing:
<https://pinyatapet.infinityfreeapp.com>

Sincerely,

Chal Cheng Kang

Network Computing, FCSIT, UNIMAS

79027@siswa.unimas.my

Pinyata Pet Hotel System Usability Testing

kang82525@gmail.com [切换账号](#)

 未共享的内容



* 表示必填

Section 1: Participant Information

Are you a pet owner? *

☐ Yes

☐ No

Age group: *

☐ Below 18

☐ 18-25

☐ 26-35

☐ 36-45

☐ 46 and above

