PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang

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by

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ABSTRACT

Title	:	**PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang**
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This study developed and evaluated PawSense AI, a web-based veterinary clinic management system for the Animal House Alabang Branch that integrates appointment scheduling, medical records, inventory monitoring, notifications, online payments, an AI-powered chatbot for system guidance, and predictive analytics for forecasting client volume and service demand. Using structured survey questionnaires aligned with ISO 25010 quality characteristics (functionality, usability, reliability, and security), veterinary staff and pet owners reported high satisfaction, indicating the system's effectiveness in improving operational efficiency while safeguarding sensitive client and patient data through role-based access and controlled data management. The results indicate that the system is suitable for further enhancement and potential adoption in comparable veterinary or healthcare settings.

Key Words: PawSense AI, veterinary clinic management system, ISO 25010, AI-powered chatbot, predictive analytics, data security.

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Chapter 1

BACKGROUND AND RATIONALE OF THE STUDY

The study introduces a main issue faced by veterinary clinics, which focuses on the transformative role of Information Technology (IT). The chapter explains the research problem, which points out how the ongoing manual processes in the veterinary Clinics and hospitals that can lead to inefficiencies and make communication and customer awareness more difficult. Additionally, this chapter provided an overview of what the researchers discussed in this study. The introduction included different sections like the background of the study, theoretical and conceptual frameworks, statement of the problem, scope and limitations, significance of the study, and definitions of terms.

Background of the Study

Veterinary clinics and Hospitals are essential in ensuring the health and well-being of animals. However, some clinics still rely heavily on manual processes to handle day-to-day operations. One such example is Animal House Alabang branch, a veterinary clinic that manages customer interactions, records, and inventory using traditional, paper-based methods.

Through the interviews with the clinic's staff, several challenges in the current system became clear. Clients were accommodated on a walk-in basis without any form of appointment scheduling. This often led to overcrowding, making it difficult for staff to manage the flow of patients and provide quality services. Physical index cards were used to store customer and pet information, which not only **took** up space but also **posed** the risk of loss or damage. Some records had already been misplaced, creating problems when pets return for follow-ups or emergency care.

The clinic also managed its inventory manually. Staff members **had to count** products one by one, which was time-consuming and prone to human error, especially given the large number of items in stock. These inefficiencies affected the clinic's ability to plan, causing delays in service delivery and leading to customer dissatisfaction. This issue is not unique to the Animal House Veterinary clinic in Alabang. According to Karolina (2023), the majority of pet owners experience organizational issues when visiting veterinary clinics, such as long queues, difficulty in contacting clinics, lack of appointment scheduling options, and poor communication of services and reminders. These findings highlight a broader problem across many clinics: lack of modern management tools and customer service systems, which contribute to operational inefficiencies and lower customer satisfaction.

When asked about what improvements are needed, Animal House Alabang **emphasized** a desire for a more organized system that **could** handle online appointments, track inventory accurately, store customer records securely, and generate exportable reports in file formats like PDF and spreadsheets. Animal House Alabang also expressed interest in integrating new technologies like an AI-powered chatbot to respond to customer inquiries and predictive analytics to help anticipate the number of expected customers. These insights **could** help the clinic prepare resources in advance, such as staff schedules and medical supplies, minimizing the risk of mismanagement during busy periods.

To meet these needs, the researchers **developed** and developed PawSense AI: Smart Veterinary Clinic Management System for Animal House. This web application system integrates several modules, including Pet Healthcare, Appointment Scheduling, SMS/Email Notifications, Inventory Management, Online Payments, an AI Chatbot, Predictive Analytics, and Record Management. It **was designed** to replace manual workflows with a centralized, digital solution that improves efficiency, enhances customer experience, and supports better decision-making. According to Al Dhubayb and Al Dhubaib (2020), digital solutions integrated into veterinary clinic operations have enhanced the quality of service by streamlining some basic processes, including scheduling appointments and tracking medical information, as well as improving the transfer of information between doctors and patients.

By adopting a system like PawSense AI, Animal House could modernize operations, reduce manual errors, and provide more reliable care to clients. This shift aligns with broader trends in digital transformation, where even small veterinary clinics are beginning to embrace technology to improve service delivery and stay competitive in an increasingly digital world.

Theoretical Framework

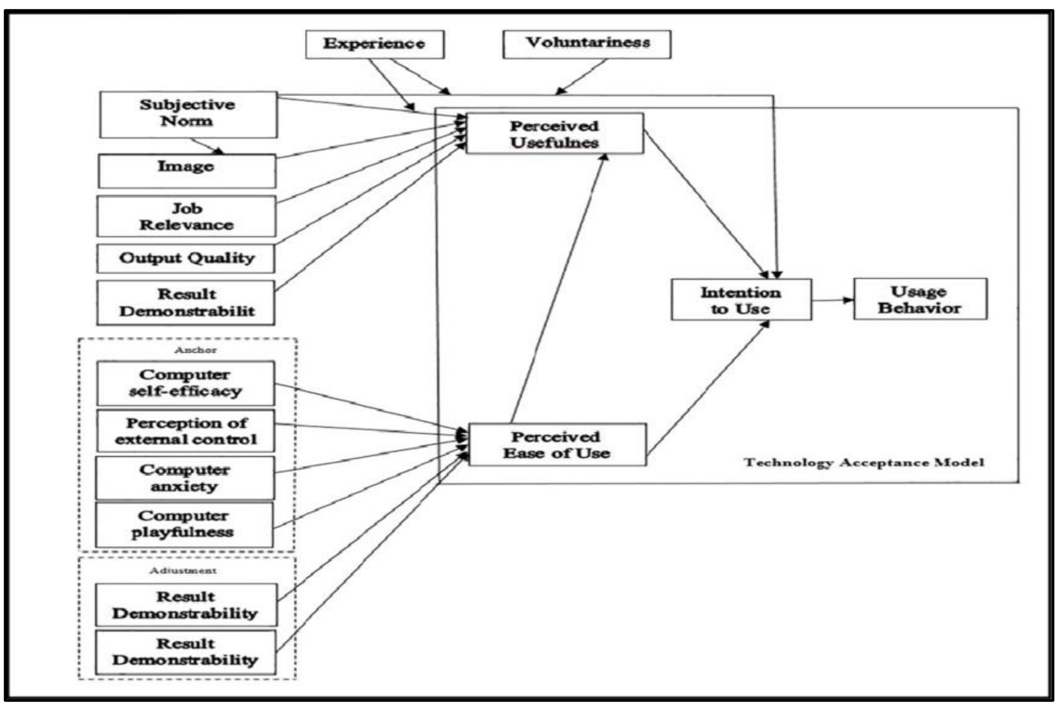
This study is grounded in the Technology Acceptance Model 3 (TAM 3), the Human-Computer Interaction (HCI) Framework, and the Artificial Intelligence in Healthcare (AIH) Framework to examine the adoption and impact of a digital record management and appointment system in Animal House Alabang Veterinary Clinic.

The Technology Acceptance Model (TAM 3) emphasizes the importance of perceived usefulness and ease of use in promoting the acceptance and adoption of new technologies. The Human-Computer Interaction (HCI) Framework focuses on the design and use of computer technology, particularly the interfaces between people (users) and computers, ensuring that digital systems are user-friendly, accessible, and efficient. The Artificial Intelligence in Healthcare (AIH) Framework explores how AI technologies can support clinical decisions, automate administrative tasks, and enhance the accuracy and responsiveness of veterinary services.

Together, these theoretical frameworks provide a comprehensive foundation for understanding how digital innovations can enhance operational efficiency, improve client satisfaction, and support better patient outcomes in veterinary care.

Technology Acceptance Model 3

Figure 1. Technology Acceptance Model 3



The Technology Acceptance Model 3 (TAM 3) is an advanced framework for explaining how users learn to accept and use new technology, particularly in corporate settings. Venkatesh and Bala developed TAM 3 in 2008, which expands on the original TAM by including new elements that impact user acceptability, such as social influence, enabling situations, and individual differences.

TAM 3 maintains the basic notions of perceived utility (the idea that the system will improve work performance) and perceived ease of use (the perception that the system will be free of effort) However, it further extends these with factors including computer self-efficacy, perceptions of external control, computer fear, and perceived satisfaction. These factors contribute to a more comprehensive understanding of how people engage with and respond to technology in real-world settings.

In corporate settings like Animal House Alabang Veterinary Clinic, TAM 3 assists in determining the behavioral, technological, and environmental factors that influence the adoption of digital solutions like chatbots for appointments and record management. For example, if employees feel knowledgeable utilizing the system (self-efficacy), believe it is supported by management (facilitating conditions), and believe the chatbot is pleasing and simple to use, they are more likely to adopt it into their everyday work.

TAM 3 offers a comprehensive framework for examining technology adoption behavior by encapsulating these complicated factors. It is especially helpful for understanding and improving the usage of AI-powered tools in veterinary care, where effective integration depends on organizational support, system usability, and user trust.

Human-Computer Interaction (HCI) Framework

Figure 2. Human-Computer Interaction (HCI) Framework

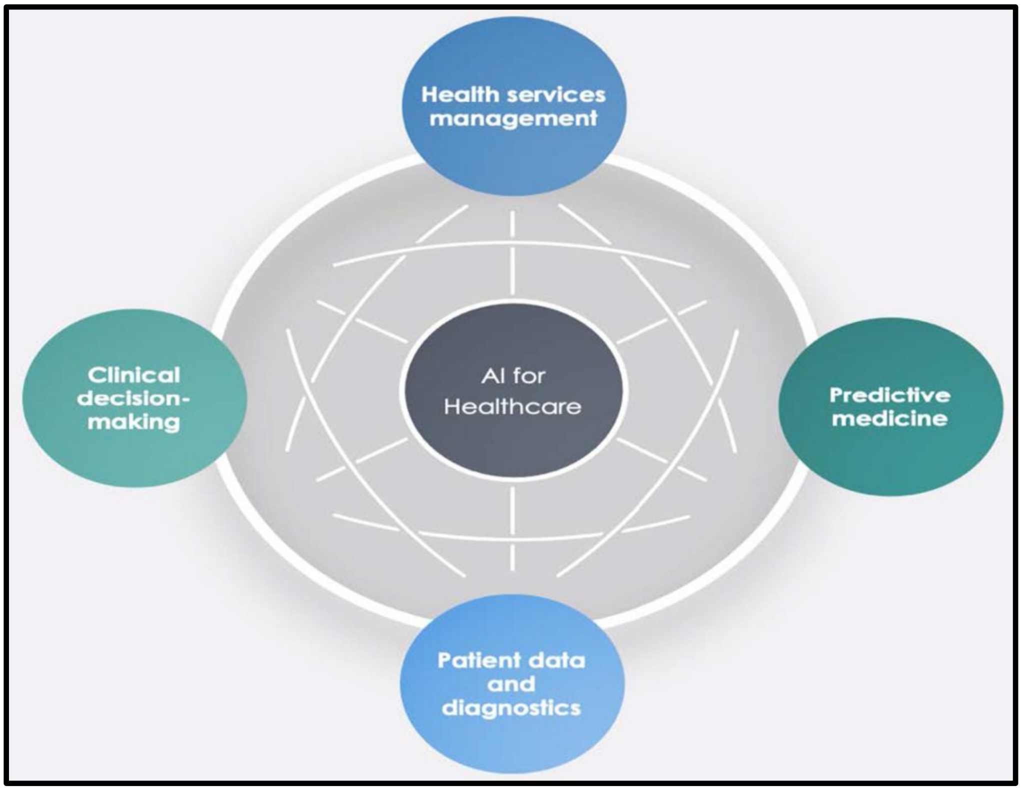
The Human-Computer Interaction (HCI) Framework combines many fields to study how people and computers interact through technology usage and design. In the 1980s, HCI began as a computer science branch guided by cognitive science and human factors engineering. The field has developed and expanded during the past several decades by connecting ideas from psychology, design, sociology, ergonomics and more.

HCI was initially focused on making computer systems more usable, but it has now broadened to include a variety of human-centered informatics concerns, such as user interface (UI) development, accessibility, interactive system design, and user experience (UX). The field is now a model of interdisciplinary collaboration, showing how various approaches and paradigms, from design thinking to empirical experiments, may be combined to provide a coherent framework for practice and research.

HCI emphasizes user-centered design, in which users' requirements, skills, and limitations are fully considered throughout the development process. Usability, effectiveness, learnability, error prevention, and satisfaction are among the fundamental concepts. These components are necessary to build systems that are not just useful but also understandable and adaptable to users' real-world contexts.

Artificial Intelligence in Healthcare (AIH) Framework

Figure 3. Artificial Intelligence in Healthcare (AIH) Framework



The goal of the Artificial Intelligence in Healthcare (AIH) Framework is to improve service delivery, decision-making, and overall efficiency by integrating AI technologies into healthcare systems. As opportunities to automate activities, analyze complicated information, and support clinical operations were provided by advances in computer science, data analytics, and machine learning, artificial intelligence (AI) in healthcare started to gain traction in the early 2000s. Insights from computer science, medical informatics, ethics, and healthcare administration have all been included into the AIH framework throughout time.

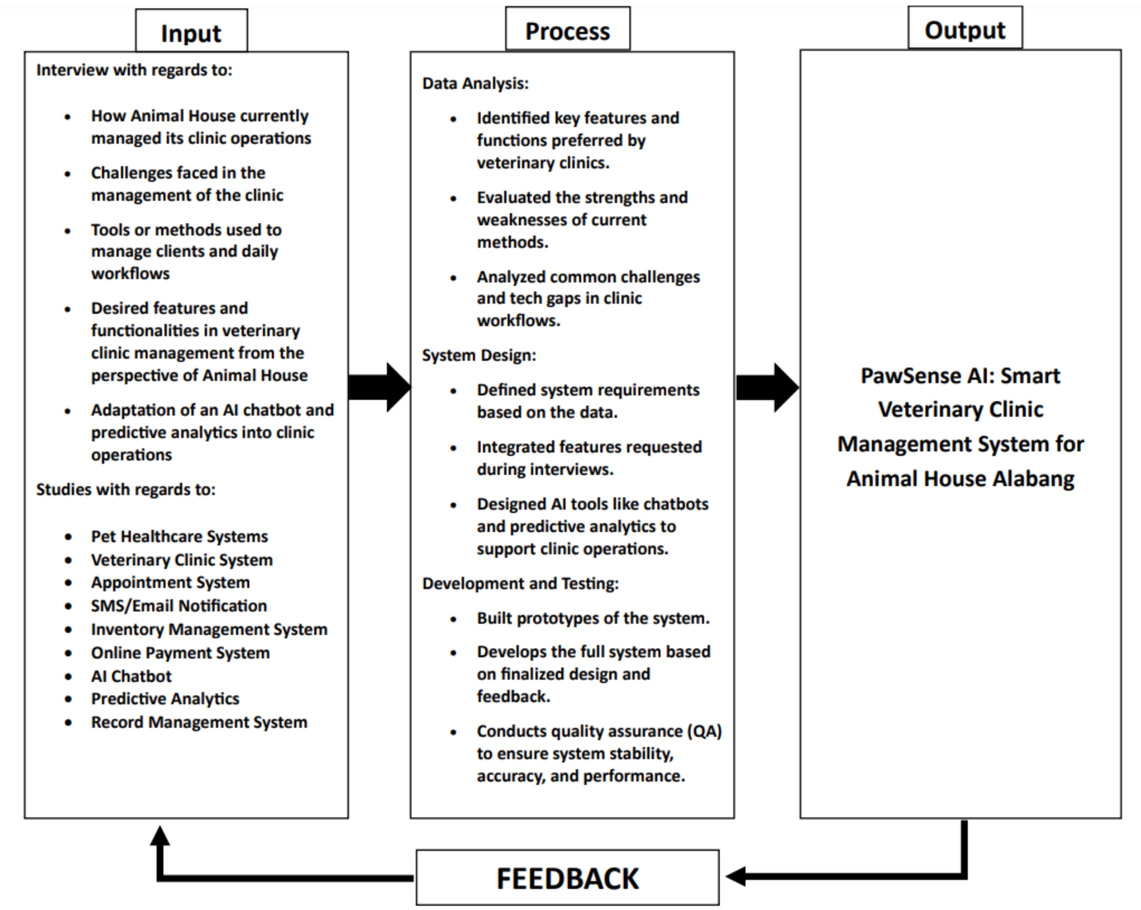
The AIH framework, originally focused on applications like diagnostic tools and predictive analytics, has evolved to include more interactive, user-oriented technologies such as chatbots. These technologies use artificial intelligence, namely natural language processing (NLP), to simulate conversations, answer inquiries, and help with administrative tasks. Chatbots work as digital assistants in veterinary settings like Animal House Alabang Branch, helping to schedule appointments, respond to client queries, and give basic pet care information.

This framework focuses on the intelligent enhancement of healthcare processes, in which AI does not replace human workers but supports them by handling routine interactions efficiently. The end result is a more responsive, simplified, and accessible service that fits customers' evolving expectations for modern veterinary care.

Conceptual Framework

This research explores the creation and development of PawSense AI: Smart Veterinary Clinic Management System, an adapted system for the improvement of clinic operations at Animal House Alabang. The conceptual framework presents the research problem and links associated theories, hypotheses, and concepts. It suggests an input-process-output (IPO) model to portray the flow of activities and information pertinent to the system development. This framework establishes a link between dependent and independent variables, identifying how these factors influence the development and effectiveness of PawSense AI for Animal House.

Figure 4. Input-Process-Output Model



This conceptual framework provides an overview of the development process for PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang. The framework adopts an Input, Process, Output (IPO) model to illustrate how information was collected, analyzed, and transformed into a functional system tailored for veterinary clinic operations.

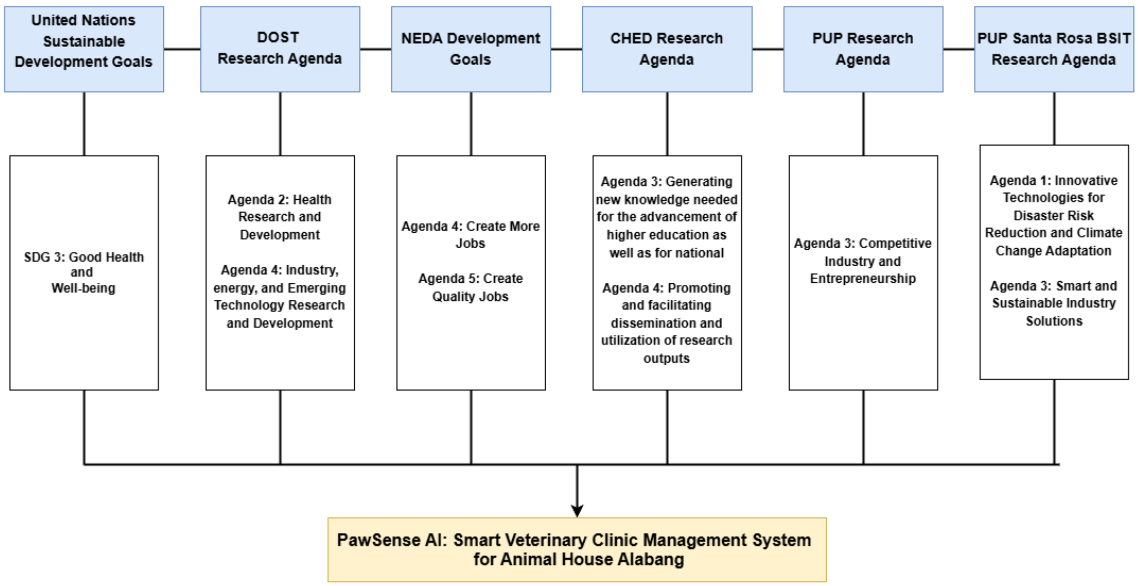
In the input phase, data was gathered through interviews with Animal House to examine existing clinic management practices, identify operational challenges, and document the tools and methods used for daily workflows. Insights were also collected regarding desired features in a clinic management system and the adaptation of AI technologies such as chatbots and predictive analytics. Supporting literature and related studies were reviewed, focusing on pet healthcare systems, veterinary clinic operations, appointment systems, SMS/email notifications, inventory management, online payment systems, record management, and emerging technologies like AI chatbots and predictive analytics.

During the process phase, data analysis was conducted to identify commonly preferred features, evaluate the strengths and weaknesses of current tools, and pinpoint workflow inefficiencies. Based on these findings, system requirements were defined, referring to the specific functionalities and technical needs that the system must fulfill. These requirements guided the system design, where developed features were incorporated, including AI-driven components to support automation and data-driven decision-making. The development and testing phase involved creating system prototypes, finalizing the design based on ongoing feedback, and constructing the full system. Quality assurance (QA) procedures were implemented to ensure stability, accuracy, and overall performance of core modules such as appointments, notifications, inventory, and records.

The output of this framework is the deployment of PawSense AI, a smart veterinary clinic management system designed to optimize operations at Animal House Alabang. This framework illustrates the structured approach followed in the system's development, ensuring alignment between identified needs and the delivered solution.

Research Agenda Alignment

Figure 5. Alignment of the Study to the Research Agenda



The research study entitled PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang conforms to a number of research and development objectives at the international, national, and institutional levels. In essence, the system serves the United Nations' Sustainable Development Goal (SDG) 3: to achieve good health and well-being by providing accessible and organized veterinary services. Although this goal concerns itself primarily with the health of people, animal health relates directly to public health and community well-being. Through organized access to appointment scheduling, health records, and clinic management, PawSense AI indirectly promotes healthier and more resilient communities.

Developed in accordance with the DOST Research Agenda, the system facilitates Agenda 2: Health Research and Development and Agenda 4: Industry, Energy, and Emerging Technology Research and Development. The initiative provides a digital solution to a process otherwise done manually and identifies and improves the efficiency and reliability of the veterinary services. The system incorporates existing technologies such as the management and forecasting tools, thereby engaging in innovation in the health sector without being overly complex or resource-intensive.

From the perspective of the National Economic and Development Authority's development objectives framework, the project is in line with Agenda 4: Creating More Jobs and Agenda 5: Creating Quality Jobs. There can be job creation in areas such as technological support, digital scheduling, and customer interaction as veterinary clinics upgrade operations through the use of tools such as PawSense AI. There can also be enhanced job quality through the automation of routine tasks so staff can handle more important and skill-based duties.

Supporting the CHED Research Agenda, the research serves Agenda 3: Generating new knowledge needed for the advancement of higher education as well as for national and Agenda 4: Promoting and facilitating dissemination and utilization of research outputs. It provides a practical illustration of the use of academic research to address actual issues, particularly in small business environments. Through its documentation and findings, the initiative serves as a rich resource for subsequent research and development interventions.

The project also supports the research agenda of the PUP, specifically Agenda 3: Competitive Industry and Entrepreneurship. The venture provides veterinary businesses with the tools they can use to enhance customer experience, optimize clinic performance, and make informed decision-making more feasible. These improvements make the small clinics more competitive in an expanding and more technologically driven marketplace.

Finally, through the PUP Santa Rosa BSIT research agenda, PawSense AI complements Agenda 1: Innovative Technologies for Disaster Risk Reduction and Climate Change Adaptation and Agenda 3: Smart and Sustainable Industry Solutions. Although the system is centered on clinic management, its digital system and predictive capability enable more intelligent business processes, eliminating manual inefficiencies and enhancing the resilience and responsiveness of operations to disruptions.

Overall, the project demonstrates the worth of practical and technologically oriented solutions in furthering health, industry, and innovation. It makes significant contributions to multiple agendas but stays within the boundaries of what this academic research, called PawSense AI, can achieve: Smart Veterinary Clinic Management System for Animal House Alabang.

Objectives of the Study

This study aims to develop PawSense AI: Smart Veterinary Clinic Management System to address the operational inefficiencies of Animal House Alabang Branch. The system seeks to streamline key processes through digital solutions and intelligent features. To assess its effectiveness, the study will evaluate the system based on selected ISO 25010 software quality characteristics. Specifically, this study aims to:

1.To develop PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang Branch

2. To integrate intelligent technologies including an AI-powered chatbot for automated client assistance and predictive analytics.

3. To implement secure, role-based access and data management protocols that ensure the privacy, integrity, and protection of sensitive client and pet information

4. To evaluate the developed system based on ISO 25010 software quality characteristics, specifically:

- Functionality
- Usability
- Reliability
- Security

Scope and Limitations of the Study

This study focuses on the development of PawSense AI: Smart Veterinary Clinic Management System that is specifically designed for the Animal House Alabang Branch, incorporating advanced digital features to enhance client interaction, data management, and service efficiency. The system's objective is to streamline essential veterinary processes such as appointment scheduling, inventory management, online payments, electronic medical records, and client communication via email and SMS. To guarantee a flawless experience, pet owners will be able schedule appointments, monitor real-time availability, and receive automated notifications and confirmations.

A key innovation in the system is the integration of an AI-powered chatbot, which serves as a virtual assistant to manage common queries and provide clinic service information. By operating 24/7 with natural language processing, this chatbot improves user interaction and reduces administrative pressure on veterinarian staff. The system also incorporates real time tracking of predictive analytics, which allows the clinic to estimate peak consultation hours for the next 1 year, and analyze patterns in pet health data through real time monitoring of treatment types, and number of appointments. These insights allow more proactive decision-making and resource planning.

The system also includes robust inventory management to track supplies and pharmaceuticals, as well as secure online payment through Gcash integration for quick and easy transactions. To maintain data security and proper access control, electronic record management will store detailed patient histories, immunization records, and treatment protocols, which will be available to designated user roles (veterinarians, staff, and pet owners). Clients will receive automated e-mail and SMS notifications with appointment alerts, follow-ups, and general updates.

The platform, which was built using Laravel Framework, Tailwind CSS, JavaScript, PHP, and MySQL, will also integrate third-party APIs for chatbot functionality powered by Gemini, communication services, and payment gateways. To secure sensitive client and patient information, strict data privacy and security protocols will be implemented. While this system was created specifically for Animal House Alabang Branch, its flexible design and innovative features make it extremely adaptable to other veterinary clinics alone looking to deploy smart, technology-driven solutions.

Despite the system's comprehensive design, several limitations must be acknowledged. One key limitation is its scalability. PawSense AI is tailored specifically for the operations of Animal House Alabang, and significant modifications would be required to support larger or multi-branch veterinary clinics. The system also depends heavily on consistent internet connectivity. Any disruption in network access may hinder critical functions, affecting both system reliability and user experience.

Another constraint involves the email notification feature. This relies on external mail servers, making it vulnerable to delays, delivery failures, or messages being flagged by spam filters. These are issues that fall outside the control of the system itself.

The predictive analytics module is limited specifically to 1 year window. This restriction is intentional because longer-term forecasts, such as those covering multiple years, could lead to inaccurate or unreliable predictions due to the high variability in client behavior and pet services over extended periods.

Inventory management also has limitations. Although the system allows administrators to send supply requests to suppliers via email, suppliers do not have access to the platform. This prevents them from directly confirming orders, updating delivery statuses, or responding within the system, which may result in communication gaps and reduced tracking efficiency.

Additionally, the online payment feature is currently limited to GCash, which restricts clients who prefer other digital wallets or traditional payment methods. Because GCash is not directly integrated into the system, clients complete the payment by scanning a QR code and submitting a screenshot of the transaction. The system then uses OCR to analyze the screenshot and verify whether the details match the required payment information, including the recipient's name, date, amount, and reference number. Payment is accepted only if the amount exactly corresponds to the service rendered and all required details are successfully validated; otherwise, the transaction is automatically rejected and may result in no refund.

Significance of the Study

Animal House Veterinary Hospital: The Veterinary Hospital will benefit from the implementation of the Developed system entitled PawSense AI: Smart veterinary clinic management system which will transition from manual processes to a fully automated veterinary clinic management, through this system it will help in improving operational efficiency, reducing clerical errors, and improving overall service quality. Through features such as appointment booking, inventory control, record keeping, and artificial intelligence, Animal House can provide customers with faster, accurate, and more organized services. The digital shift also enables the capabilities of the clinic to keep up with growing demands.

Business Owner: The system will give animal house owners more control over clinic operations. With accurate and organized data on appointments, inventory, and pet records, the owner can make informed decisions, manage resources efficiently, and reduce operational risks. Predictive analytics helps anticipate peak periods and guide staff in scheduling and supply management to ensure smooth operations during periods of high demand.

Business Staff: The staff of Animal House will benefit from reduced paperwork, easier access to records, and automation of the scheduling process. This process allows staff to focus on delivering priority services and less on administrative tasks. The system helps avoid overbooking, improves communication within the team, and ensures that inventory and medical supplies are properly managed.

Pet Owners: The pet owners or the clients of Animal House will experience improved services, including features such as online appointment booking, digital reminders via SMS or email, and better service amenities. Pets also receive better and more consistent care by having access to a system that has accurate records. The system builds trust by ensuring pet owners that their animals' medical histories and treatments are stored securely and are always accessible.

Researchers: This study offered an important contribution to the field by providing insights into practical implementations of technology in veterinary clinic management for better and quality service. This study serves as an opportunity for professional growth and development of the researcher by improving their skill in software development, writing academic papers, critical thinking, and verbal communications. Researchers also gain further understanding of the importance of how veterinary clinic management needs to be handled in order to achieve its goals in providing better and quality types of service.

Future Researchers: The study serves as a reference point for future researchers interested in developing systems for veterinary or other healthcare environments. The data, development process, and outcomes offer insights into system design, user needs, and implementation strategies that others can build upon. It also opens pathways for comparative studies or further enhancements using emerging technologies.

System Developers / Programmers: For developers, working on PawSense AI provides real-world experience in building systems tailored to actual operational workflows, like those at Animal House. It emphasizes functionality, usability, reliability, security while integrating advanced features such as AI-driven chat support and predictive analytics. Developers also gain insight into creating scalable and adaptable solutions that could apply to similar clinics elsewhere.

Definition of Terms

I. Operational Terms

Animal House Alabang Branch. Animal House Alabang Branch is a facility providing healthcare services to pets, including medical treatments, preventive care, and routine check-ups.

Pet Owners. Pet owners are individuals who are responsible for the care, well-being, and medical needs of their pets and bring them to the clinic for treatment or preventive services.

Record Management. Record management refers to the organized process of creating, storing, retrieving, and maintaining pet medical records, ensuring data accuracy and accessibility for effective care.

Appointment Scheduling. Appointment scheduling is the system or method used to arrange, manage, and track client appointments with veterinary professionals to streamline clinic operations.

Inventory Management. Inventory Management is a detailed list and management of all physical resources and supplies (e.g., medications, vaccines, pet food) available within the veterinary clinic or service provider's facility.

Online Payment. A digital transaction method that enables clients to pay for services or products through internet-based platforms using credit/debit cards, e-wallets, or online banking.

Electronic/SMS Notification. A method of communication that uses electronic messages, particularly **Short Message Service (SMS)**, to send reminders, confirmations, and updates to clients regarding appointments, payments, or other relevant information.

Predictive Analytics. The use of data, statistical algorithms, and machine learning techniques to identify the likelihood of future outcomes based on historical data—such as forecasting appointment trends or identifying potential health issues in pets.

AI Chatbot. An artificial intelligence-powered software designed to simulate human conversation, often used to assist clients in real-time by answering queries, scheduling appointments, or providing basic information via a website or messaging platform.

II. Technical Terms

Information Technology. Information Technology (IT) is the use of computers, software, networks, and other digital systems to store, process, and exchange data within organizations.

Web-Based Application System. A web-based application system is a software application that operates via the internet, allowing users to access and manage information through a web browser.

Automation. Automation refers to the use of technology to perform tasks with minimal human intervention, increasing efficiency and reducing manual effort.

E-mail Notification. An e-mail notification is an automated message sent to a user’s email address, often used to alert them to updates, reminders, or actions that require their attention.

Database. A database is an organized collection of data stored and accessed electronically, designed to efficiently manage, retrieve, and manipulate information.

Natural Language Processing (NLP). It is a branch of artificial intelligence that enables computers to understand, interpret, and respond to human language in a natural and meaningful way.

Chapter 2

REVIEW OF RELATED LITERATURE

As veterinary practices continue to adopt digital technologies to enhance service quality and client satisfaction, the need for integrated and intelligent systems has become more pressing. This study, titled *“PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang,”* seeks to design and implement a comprehensive digital platform that addresses key operational challenges in veterinary clinics, particularly in appointment scheduling, client communication, and medical record management. In support of this objective, the following review of related literature examines existing research and systems relevant to pet healthcare, veterinary clinic operations, appointment systems, SMS and email notifications, inventory and record management, online payments, AI chatbots, predictive analytics, and security features such as multi-factor authentication. The review aims to identify common themes, differences in implementation, and best practices that inform the conceptual and technical development of the developed system.

Pet Healthcare Systems

There are many systems created in Pet healthcare to mitigate the challenges that occur in daily life. In recent years, there have been remarkable innovations, transforming how the researchers monitor, manage, and provide healthcare for animals. As pets increasingly become important members in modern households, the demand for advanced systems to ensure their security and well-being increases. In one of their studies Mekha and Osathanunkul (2020) conduct a research study about an issue in veterinary care. When animals are mostly after surgery, the doctors can't continuously monitor animals after surgery leading to preventable deaths. In this study, the researcher developed a health monitoring system that tracks vital signs, mainly the heart rate and body temperature of sick animals, in real time. The system is integrated into a web application that alerts veterinary staff when abnormal readings are detected, allowing for immediate medical attention.

Pet owners are individuals who keep animals for companionship or other purposes like protection in their houses. As time passes its pet owners grow to love their pets as the time passes and they do all things to make sure their pets live longer. Studies show that most pet owners rarely visit veterinarians despite wanting better health for their pets. Prata (2020) identified weaknesses in current practices like microchipping and municipal registration, along with financial concerns affecting veterinary care access. The research recommends strategies to improve veterinary medicine perception and stakeholder awareness.

Gunaratne et al. (2022) also observed that the pet owners were struggling to manage their hectic life with proper pet care, so the researchers planned a web applicatios that is easy to use, anybody can use. The system is designed to assist pet owners in monitoring their pets' requirements while making pet management on a day-to-day level less daunting.

Increased pet ownership for emotional support has seen IoT-based solutions for pet care issues among busy pet owners (Lankani & Liyanage, 2021). Their app uses data analysis for enhanced human-animal bonding in the modern technological era. Lu (2022) designed a pet care system for booking appointments and purchasing products using the MVC design pattern with Bootstrap, MySQL, and a cloud server, even expanding it into an Android app.

López et al. (2023) applied the Rational Unified Process approach along with the use of Balsamiq mockup tools in creating a mobile phone application prototype for holistic pet health monitoring, garnering strong reviews from professionals. More recently, PetMedPal provides an extensive web-based app supporting digital pet health files, reminding appointments, and individualized nutrition counseling, highlighting technology's function in enlarging the pet-human connection as well as streamlining healthcare management (More et al., 2024).

Veterinary Clinic System

Veterinary clinic management systems have become essential for enhancing pet healthcare service efficiency as well as accessibility. The use of paper-based traditional record-keeping produces multiple issues including process delays and inefficient service distribution and error possibilities for critical interventions such as vaccinations and deworming and medical examination consultations. Digital solutions integrated into veterinary clinic operations have boosted service quality by simplifying several essential processes which include scheduling appointments and tracking medical information alongside improving messaging between doctors and their patients (Aldhubayb & Aldhubaib, 2020).

Veterinary practice depends heavily on clear communication which veterinarians need to establish with their pet owner clientele. Pet owners anticipate their veterinarians to demonstrate comprehension of their worries while offering personalized details that guide their decision-making choices according to Janke et al. (2021). Veterinarians encounter several business challenges that include time limitations because they need to attend to multiple clients while also dealing with language differences between them and their clients. The research underscores the value of collective decision-making between healthcare providers and clients in order to achieve better treatment success and satisfied patients.

Artificial Intelligence revolutionizes veterinary medicine through its diagnostic capabilities along with its administrative automation and clinical workflow enhancements. AI-based analytical tools make medical image diagnostics more efficient while NLP processes medical records and AI-powered chatbots create improved customer service interactions (Applebya & Basran, 2022). The adoption of AI technology in veterinary care faces obstructive barriers stemming from data reliability issues as well as moral preservation necessities together with official government monitoring policies. Maximizing artificial intelligence benefits depends on properly integrating it with responsible measures to handle foreseeable risks.

The Pet Care Management System represents one of the specialized digital systems that helps users book pet services and manage medical records and perform administrative tasks more efficiently. According to Yeow and Kamaludin (2023) users showed great satisfaction with the system, because the system delivered efficient performance along with simple operations and secure components. System security has received improvement through password encryption and email verification together with CAPTCHA mechanisms and developers aim to enhance user experience with notification systems and chatbots.

The veterinary sector showed its necessity for ongoing service delivery through digital platforms because of the COVID-19 pandemic. TerraVet functions as a mobile platform and website which lets pet owners schedule virtual veterinary consultations and purchase pet essentials and view pet health information on their electronic card system (Carlos et al., 2022). Through the system veterinarians maintained critical veterinary services while the pandemic occurred proving that telemedicine is vital for veterinary practice. Remote consultations and diagnostics combine to form PawHub which effectively connects pet owners to veterinarians through its web-based telehealth application (Blancaflor et al., 2023). Several web applications showcase how telemedicine has become pivotal for maintaining continuous veterinary service operations.

The veterinary industry has introduced VETGO among other mobile applications that work as a telehealth service similar to on-demand transportation systems. Pet owners receive immediate veterinary professional support through this system which breaks down obstacles to treatment particularly for those in communities with distant animal clinics (Blancaflor et al., 2024). The development of IoT pet care technology receives support from mobile applications which improve both accessibility and efficiency in veterinary services for pets.

Veterinary clinic management systems along with AI technology and telemedicine platforms and mobile applications have elevated pet healthcare services by providing better accessibility and quality care. Modern digital systems displaced paper-based management to deliver enhanced administrative operational efficiency thus improving the pet owner experience. Upcoming improvements of AI diagnostic capabilities and automated communication features and telehealth offerings will revolutionize veterinary medicine by providing better and more efficient pet health solutions.

Appointment System

Appointment systems have become a fundamental part of improving providing services in veterinary and healthcare settings. These methods have a substantial impact on operating efficiency, reducing wait times, and increasing client happiness. In the veterinary industry, Yusof and Fauzi (2023) created a web-based Veterinary Clinic Management System to overcome the inefficiencies of manual scheduling systems, which were aggravated during the COVID-19 outbreak. Using the Waterfall Model in the solution Development Life Cycle (SDLC), their solution allowed pet owners to make appointments online, view consultation records, and minimize in-clinic congestion. The study indicated that digital appointment tools help to simplify service delivery and increase consumer satisfaction.

Similarly, Fasha and Harith (2023) developed the Veterinary Online Appointment Booking System (VOAS) with a view to introducing convenience to users via digital device-mediated appointments. Yet, their study indicated serious shortcomings of the system, including the non-availability of choice of specific veterinarians and digital payment as an integral part of the system. Digital payments were provided via online interfaces, yet not in an integrated system. They developed the provision of online payment modes like Financial Process Exchange (FPX) and the addition of a customer service feature to integrate the system towards greater functionality as well as service to users. These shortcomings also indicate the necessity to accord the highest priority to both usability as well as customization in veterinary appointment systems.

While the original intention is veterinary usage, several healthcare-specific studies provide conclusions applicable to the practice of veterinary medicine. Aburayya et al. (2020) examined the use of a Hybrid Appointment System (HAS) in Dubai-based primary healthcare centers, which had both booked appointments and walk-in patient visits permitted. The HAS successfully decreased wait times and increased access to treatment. While not initially designed with veterinary clinics as the target facility, the hybrid system could potentially provide a practical model for practice in clinics seeing both routine visits and emergency clients.

In a different healthcare environment, Mayor (2021) developed and evaluated an appointment scheduling system for a medical clinic, from the ISO 9126 software quality model, with usability and performance as the areas of interest. The results of the User Acceptance Test (UAT), with a weighted mean of 4.10, indicated that the system was accepted by the users. The findings emphasize the need to perform formal evaluation when implementing appointment systems, which will assist veterinary clinics in maintaining the system quality up to date and enhancing client satisfaction.

In terms of optimization, Ala et al. (2023) provided an exhaustive review of 250 studies on Simulation-Based Appointment Scheduling Systems (SASS) in healthcare. From their analysis, efficiency in using simulation techniques in managing resource capacity versus patient demand to decrease waiting time and enhance scheduling processes was suggested. Although the models are used mostly in human healthcare, they can be modified for high-volume veterinary clinics to enhance better appointment management and provision of services.

The effective application of appointment systems depends on user acceptance. Khalil and Serhier (2023) explored users' attitudes toward Medical E-Appointment Systems (MEAS) in the delivery of mental health services. They surveyed 35 factors affecting system acceptance, such as perceived usefulness, ease of use, trust, and satisfaction, which are very close to the demands in veterinary environments, where pet owners' trust and confidence in using online scheduling systems are key to driving long-term use.

Digital appointment systems provide various benefits in veterinary and healthcare settings, including enhanced efficiency, reduced client waiting times, and enhanced satisfaction. There exist several drawbacks, including limited personalization features, a lack of inbuilt payment features, and ineffective user support mechanisms. A literature review of veterinary-specific and general healthcare literature suggests that the incorporation of hybrid scheduling models, optimization algorithms, and user-centric design features can significantly enhance the functionality of appointment systems. These findings are a sound foundation for the design of a more adaptive, efficient, and client-centered appointment system tailored to the operational requirements of veterinary clinics.

SMS/Email Notification

Implementation of SMS and email notification systems in digital health platforms has become an essential measure aimed at improving communication and efficiency as well as client interaction in veterinary as well as healthcare services. In intelligent veterinary systems, these communications technologies play an important role in filling gaps between clinic activities and pet guardians, toward an enhanced proactive management of pet healthcare.

Mahzir and Ilyas (2020) designed FELINERINARY, a healthcare app aimed at cat health record management as well as interaction between veterinary staff and pet owners. One of the features of the system is its push-notification function, alerting users of veterinary visits scheduled in the future, medication times, as well as vaccination schedules. Such real-time notifications enhance compliance with healthcare plans as well as minimize the avoidability of visits, overall pet healthcare outcomes being improved in the process. The system is designed to allow veterinary experts to keep health record updates online, making certain information easily retrievable. Developed based on the Waterfall model and powered by Firebase for data handling, the app garnered praise on aspects of user experience like usability, effectiveness, as well as satisfaction. Though the system initially existed for Android devices only and utilized a net connection, its use of timely notifications as an improvement on vet service delivery stood out as indispensable.

Likewise, Sari et al. (2023) designed a mobile app for the Kawan Kewan Veterinary Clinic based on the MVVM (Model-View-ViewModel) architecture. The system enabled clients to register pets as well as book services like veterinary consultation and grooming. In-app notifications as well as SMS notifications were utilized for confirmations as well as for informing clients about service details. This decreased uncertainty as well as enhanced client preparedness before appointments. Secure as well as scalable communication based on the use of Kotlin and Firebase Authentication guaranteed smooth implementation. Their research highlighted how these notifications act as key devices towards ensuring a smooth stream of information as well as curbing the disruption of service provision.

On a broader scale, dvm360 (2021) indicated how automated communications technology can help revamp veterinary clinic operations using SMS and email. Such systems were found to minimize blunders and streamline administrative tasks through the automated performance of tasks such as releasing medical documents, consent forms, and instructional messages on what is expected at an appointment. By pre-notifying clients, veterinary clinics were able to keep check-ins and exams brief. Further, such systems helped veterinary staff manage their time more effectively, leaving them with fewer tasks to do other than procedures on patients.

Rellon et al. (2020) examined the employment of SMS in a web-based document tracking system based on barcode technology. While the system was deployed in a typical administrative environment as opposed to veterinary medicine, the SMS feature was instrumental in terms of providing users with updates on the state of documents. This reduced the need for manual follow-ups as well as enhanced system reliability, demonstrating the adaptability and efficiency of SMS in automatic workflow as well as real-time user interaction.

Email alert systems have similarly been effective in the healthcare settings as well. Wisana et al. (2021) designed an IoT-based, low-cost health monitoring system utilizing piezoelectric sensors and the ESP32 Wi-Fi module to monitor the respiratory rates of patients in real time. One of the central features of the system was the capability for emailing alerts to medical staff or family members in case of abnormal respiratory patterns in patients. This capability for instant notification improved the responsiveness and safety of patients, demonstrating how email can be useful in remote monitoring and decision support in serious health situations.

In addition, Ende et al. (2021) deployed an automated email system to enhance compliance with the Accreditation Council for Graduate Medical Education (ACGME) standards in an obstetrics anesthesiology program. The system informed obstetrics anesthesiology fellows of rescheduled appointments at the last minute as well as active cases. Not only did this enhance the fellows' productivity, but it allowed for increased exposure to necessary clinical procedures as well. According to the study, email emerged as an effective method of enhancing operational compliance as well as learning outcomes in high-time-sensitive healthcare environments.

Lastly, Huang et al. (2023) tested the application of automated email summaries in sexual health clinics. Their system, called the Sexual Health Automated Visit Email (SHAVE), automatically sent follow-up emails based on electronic health record data. The findings were that these emails facilitated better patient-provider communications through timely, clear information on consultations. This promoted health literacy, patient engagement, as well as follow-up care compliance.

Altogether, these studies highlight the value of SMS and email alerting systems in today's digital health settings. In conjunction with smart veterinary systems like PawSense AI, these technologies serve not only to increase efficiency in operations and communications but also to boost client satisfaction and health outcomes considerably. By streamlining reminders, updates, and record sharing, veterinary clinics can build tighter bonds with pet owners, minimize the administrative load, and provide a more responsive and individualized experience for patients.

Inventory Management System

Business sustainability depends on inventory management because it creates operational efficiency while improving financial performance, specifically within small and medium enterprises (SMEs). Numerous research investigations focus on inventory management systems (IMS) to understand their capacity for enhancing operations and inventory optimization, and customer satisfaction enhancement.

The research by Chin et al. (2023) developed an IMS specifically for SMEs in Malaysia that continue using manual tracking procedures for their inventories. Through their system, users can optimize inventory control because it tracks stock receipts while recording reservation data and enables customer feedback integration. Similarly, Tanaman et al. (2023) created a web-based inventory system to remedy inventory tracking defects in a small Philippine business. The adoption of automated platform replacement for manual record-keeping enabled their research to demonstrate increased data accuracy together with enhanced operational performance.

Business performance relies significantly on inventory control according to Mohamed (2024) in his research about inventory management affecting financial strategies and operational efficiency. The study explained two main supply chain optimization strategies including Vendor-Managed Inventory (VMI) and Just-in-Time (JIT) which minimize inventory excess and enhance material movement efficiency. This aligns with the findings of Gaoat et al. (2023) established through their research that effective inventory management leads to solid operational and financial results for micro, small, and medium enterprises (MSMEs) in Santiago City.

Organizations need inventory management systems for two reasons: to enhance operational efficiency and to support sustainability efforts. The study conducted by Van et al. (2024) assessed how inventory management practices affect the sustainability outcomes of SMEs in Valencia City, Bukidnon. The researchers discovered that inventory control practices demonstrated the highest relationship to corporate sustainability across social, economic, and environmental domains. Small-scale pharmacies in Cavite were analyzed by Soliveres et al. (2024), who concluded that Economic Order Quantity (EOQ) and First Expiry First Out (FEFO) techniques with proper sourcing and stocking strategies ensured both inventory optimization and satisfied customers.

Anade et al. (2023) established a supply inventory management system at Leyte Normal University through their exploration of technical integration in inventory management. The study implemented JIT along with the two-bin system to enhance performance and decision-making following the technological approaches developed by Chin et al. (2023) and Tanaman et al. (2023). Bautista Jr. and Young (2022) developed a supply and distribution sector re-ordering system template that optimizes inventory levels and delivery processes to reinforce stock control as an essential business sustainability factor.

These research studies demonstrate inventory management systems as fundamental tools for business excellence and effective supply chain operations and sustainable practices.

Advanced inventory techniques linked to modern technology help businesses minimize both operational costs and environmental impact while improving overall sustainability.

Online Payment System

Kurniawan et al. (2024) present a global perspective, emphasizing how e-payments enhance efficiency, user satisfaction, and financial transparency. Their systematic review identifies ease of access, security, and transaction speed as major factors in adoption. However, barriers such as limited digital infrastructure, public mistrust in security, and lack of awareness remain, particularly in developing countries. The COVID-19 pandemic significantly accelerated the adoption of e-payments, highlighting the importance of expanding payment channels and strengthening infrastructure.

In relation to this, Ghosh (2021) discusses the surge of digital payments in India following the government's demonetization initiative and the pandemic. The shift toward digital platforms was fueled by increased smartphone use, affordable internet, and strong government backing. Like Kurniawan et al., Ghosh identifies convenience, safety, and time-efficiency as core reasons for increased adoption, noting that digital payments eliminate the need for physical cash and streamline everyday transactions.

Budi Trianto, et al. (2023) explored how micro entrepreneurs in Indonesia and Malaysia are integrating digital payments like e-wallets and ATM debit into their businesses. While adoption is widespread, the use of QR code-based systems is still limited. Their comparative analysis reveals that the motivations and obstacles to adopting digital payment tools vary by country, providing a nuanced view of FinTech implementation in Southeast Asia.

Similarly, Pueblos and Jr (2023) investigated how electronic payment platforms affect selected micro-entrepreneurs in Taguig City, Philippines. Their findings show that operational efficiency improves when e-payment platforms are used for sales, collections, and disbursements. However, persistent technical issues, such as system crashes and errors, hinder optimal functionality. The researchers recommend improvements in user interface, training, and technical support to enhance adoption and usability.

However, Susilo and Dizon (2023) shift the focus to the Philippine context, exploring the transition from cash to digital payments through the adoption of GCash. The study uses the Diffusion of Innovations theory to explain how digital payment technologies are spreading, especially among Generation Z. Key drivers include convenience, smartphone penetration, and social media integration. However, challenges remain in bridging the digital divide and addressing cybersecurity concerns.

Also, Afable (2024) further expands on this by tracing the evolution of GCash from a mobile wallet to a transformative financial instrument in the Philippines. He highlights its role in enhancing financial inclusion, supporting both local and international transactions, and serving as a model for mobile financial solutions. While competition and technological challenges remain, strategic partnerships and regulatory support have helped GCash achieve widespread reach.

Together, these studies showed how digital payments have reshaped business and consumer behavior globally and regionally. Convenience, speed, and accessibility are consistent motivators, while issues such as infrastructure gaps, trust, and technical limitations are common hurdles. Despite regional differences, the collective findings point to the growing significance of digital payments in driving economic participation and financial inclusion. There is still a need for more research focusing on age-based digital behaviors, long-term sustainability for microenterprises, and the evolving regulatory landscape.

AI Chatbot

Many healthcare and veterinary organizations implement AI chatbots to provide instant accessible help which users can easily obtain from these systems. Huang and Chueh (2021) established that pet owners seek convenient and always accessible chatbots that deliver accurate results with user-friendly interfaces. The features work to boost user satisfaction as well as trust levels. Users remain hesitant when it comes to utilizing chatbots for handling severe medical conditions because they lack full diagnostic skills while users also have privacy fears and unclear guidelines governing their use. Research indicated that better veterinary chatbots would result from regular system updates while connecting to veterinary databases accompanied by following ethical standards.

As explained by Aiumtrakul et al. (2024) in their study proved that AI chatbots offer assistance with diet planning tasks in healthcare operations. The research team used ChatGPT and Bard AI among four AI models that helped perform food classification regarding oxalate content to prevent kidney stones. Bard AI provided the most accurate results because this proves that chatbot technology can deliver customized health information and education.

Based on the study, Xiao et al. (2023) unveiled Jennifer, the health professional-created AI chatbot that received development from a team of 150 scientists and experts during the COVID-19 pandemic. Research conducted by Jennifer demonstrated both speed and precision in its responses while providing help to users through the health emergency. Regular system updates became necessary for this AI to maintain reliability as new information became available thus proving that trustworthy AI requires current content.

Also, Tsai et al. (2023) developed NutritionBot to provide nutritional counseling to disadvantaged pregnant women. The research team conducted a user-centered design by working with healthcare experts along with women who had low health literacy to develop the chatbot. The researchers established that their methods produced a chatbot that users could rely upon and easily access while remaining suitable for their needs. The investigation proved that Artificial Intelligence technology successfully tackles disparities in healthcare availability.

Alegado et al. (2022) established a web-based chatbot system that enabled online document request capabilities for users. Users received faster service and simpler document retrieval because of the chatbot system constructed with HTML, CSS, PHP, JavaScript and MySQL. The research established that chatbots have capabilities to enhance digital solutions in domains beyond healthcare.

AI chatbots prove to be useful platforms that support various workplace sectors. Experts as well as real users need to join forces with developers to create successful AI chatbot systems that are accurate and easy to use and maintain constant updates. Several barriers related to privacy and trust, alongside unclear guidelines, need resolution to enhance the adoption of chatbots.

Predictive Analytics

Through examining previous data veterinary clinics achieve service quality enhancements by generating more informed choices. Patient needs prediction and resource optimization, and successful treatment support are features veterinarians obtain through the implementation of R. Vijay Sai et al.'s approach. Pets receive protection from blockchain technology, which also enables secure pet record management and improved trust relations between veterinarians and their clients. Pet owners benefit from this secure system when medical teams need full access to monitor animals' health needs so they can provide continuous healthcare. The implementation of this system comes with expensive initial expenses and concerns about data privacy when information exchange takes place.

Predictive analytics serves as the subject of research investigation by Iqbal et al. (2021) to enhance veterinary systems. The research implemented DNNs and MD-LSTM models to advance appointment scheduling and resource management procedures. Through data mining approaches, vets can utilize past medical situation data to deliver enhanced patient healthcare outcomes according to their research. Their system integrated blockchain features together with performance tools which enabled system runtime evaluation.

The application of predictive analytics for medical decision support was demonstrated by Halimatusa'idah et al. (2024) in their research. The authors applied the Dempster-Shafer technique to merge disparate data sources regardless of their unclear or limited nature. Such healthcare techniques enable healthcare providers to make choices with improved effectiveness. Veterinary medicine benefits from predictive analytics since it produces comprehensive pet health insights by uniting symptoms with patient background knowledge and various related elements. An improved patient experience is achievable for both vets and pet owners because of this improved treatment selection process.

In addition, literature on time-series forecasting highlights that the sufficiency of historical data is strongly influenced by whether the target variable exhibits seasonality (for example, recurring monthly or yearly patterns in appointment volume). Forecasting systems commonly require enough observations to cover at least two complete seasonal cycles; for a 12-month seasonal cycle, this is often operationalized as a minimum of 24 monthly data points to estimate seasonality reliably, while additional history can further improve stability and accuracy.

The combination of veterinary studies demonstrates that predictive analytics enhances clinical care because it equips hospitals with data-informed choices. The system promotes correct pet therapies alongside enhanced care schedules while enhancing veterinary-client connections.

Record Management System

Record Management Systems (RMS) are necessary components in today's organizational environment, performing a pivotal function in the storage, retrieval, safeguarding, as well as use of information. RMS guarantees accuracy, efficiency, and timeliness in record management, which is paramount in service-oriented professions like healthcare as well as veterinary practice. In the case of PawSense AI, an intelligent veterinary platform, RMS is a foundation that ensures complete and retrievable pet health information in order for clinics to provide timely, secure, as well as effective care.

Sarto (2021) reinforced that whereas technology has enhanced record systems in public universities, the handling of physical files is still the key issue affecting administrative efficiency. It emerged that efficiency in RMS is not just correlated with digital tools but is also determined by human capacity in terms of teamwork, competence, and collaboration. Regardless of having access to contemporary systems, the human factor is still central in making it possible for the records to be managed, updated, and retrieved.

Concurrently, Gesmundo et al. (2022) tested how record management practices would affect professional performance among administrative personnel. Filing procedures, document protection, as well as methods for monitoring were found across their research as important elements of successful RMS. Their research showed that high-quality record management enhances service delivery as well as efficiency in terms of time, irrespective of such demographics as age or tenure. Ongoing training and skills acquisition were suggested for improving record-handling competency as well as for ensuring flexibility in line with changing systems.

Implementation of Electronic Record Management Systems (ERMS) is, while useful, accompanied by human as well as technological challenges. Bahri et al. (2022) established that resistance towards implementation, inadequate staff training, as well as poor organizational awareness often hinder implementation of ERMS. In addition, technical challenges such as infrastructural limitations as well as system integration challenges complicate implementation even further. These challenges emphasize the need for organizations to ready their workforce as well as IT environments for implementation in migrating towards electronic systems.

Uy et al. (2023) reported an effective RMS implementation experience at Baggao North Central School, where the digital system decreased human errors considerably, decreased response times, as well as improved administrative efficiency. Not only did the digitization of documents improve data retrieval, but it also facilitated better decision-making due to enhanced information at hand. Future developments in the form of automations as well as easy-to-use interfaces were suggested in the study, as envisioned for intelligent systems.

In a similar study, Ganiron (2023) evaluated a computer-based patient record system within the hospital environment. The study emphasized that it enhanced performance as well as usability, facilitating easy access to patient data for hospital administrators. Notwithstanding this, the research emphasized that system updates and staff orientation schemes on a routine basis were necessary for maximum effectiveness, as well as addressing issues of employment displacement as well as data security concerns.

Dela et al. (2023) have illustrated the applicability of development models such as the Rapid Application Development (RAD) model in designing a Records Tracking Management System (RTMS). This system facilitated rapid retrieval, identity authentication, and end-to-end monitoring of documents, with impressive ratings in system usability as well as reliability. This feedback-oriented model of ongoing refinement is an effective method for designing responsive and end-user-oriented RMS for use in veterinary clinics.

Yusuf et al. (2023) went on to explain the problems in public record management, such as system decentralization, resource constraints, and poor ICT infrastructure. Overcoming these obstacles, the research established major elements that impact successful recordkeeping, such as standardized procedures, centralized information systems, and highly skilled staff. These elements as an entirety promote improved public service provision and can be applied in clinical and veterinary contexts.

Nuhu et al. (2024) reemphasized the significance of embedding information systems within RMS by demonstrating their effects on efficiency in operations, reduction in redundancy, as well as data integrity. While identifying challenges of high expenditures and inadequate technical competence, the research recommended investments in employee training, security features, as well as system upkeep for the long-term effectiveness of electronic record systems.

Jointly, these studies highlight the transformative power of record management systems if designed with judicious regard for human as well as technological aspects. In the practice of veterinary medicine, where timely and accurate health information is paramount, the implementation of an effective RMS, such as the one outlined in PawSense AI, can support enhanced clinical decision-making, administrative efficiency, and overall pet healthcare delivery quality. As digital reform advances in the healthcare sector, smart and responsive RMS will become ubiquitous in contemporary veterinary clinics.

Multi-Factor Authentication

Multi-Factor Authentication (MFA) adds an element of enhanced security by insisting that users produce two or more credentials prior to accessing an organization. In contrast to using single passwords, which are standard, MFA introduces a second, third, etc., factor, often something that the user knows, something they possess, or something they are. Such authentication is extensively practiced in healthcare IT to keep sensitive medical information out of unauthorized hands.

In Suleski et al. (2023) review, the study emphasized how significant the role of MFA is in healthcare based on the increased incidence of cyber threats that characterized and still characterize the post-COVID-19 period. With hospitals embracing remote systems and Internet of Things (IoHT) devices, MFA is key to counteracting unauthorized access via compromised passwords or phishing. Their research cites frequent components of MFA, including one-time passwords (OTP), biometrics, and digital signatures, with the key finding that the confluence of these factors greatly minimizes threats via brute-force, social engineering, or man-in-the-middle attacks.

In practical application, the Australian and New Zealand College of Anaesthetists (ANZCA) implemented MFA across its systems in 2024 by integrating the Microsoft Authenticator application. This solution requires users to input a secondary verification code, which changes periodically, following the submission of standard login credentials. Even if a user's password is compromised, unauthorized access remains improbable due to the necessity of a secondary authentication factor. This approach not only bolsters user security but also aligns with prevailing data protection regulations, particularly in systems that process sensitive health information.

Despite these advancements, recent studies have highlighted critical limitations in current MFA implementations, particularly those relying on SMS-based verification. Jin et al. (2021) presented a comprehensive study on the vulnerabilities inherent in what they termed the “Online Account Ecosystem.” Their research revealed that many online accounts are interlinked, and the security of the entire ecosystem may depend on its weakest node. In their study, the authors introduced the concept of a “Chain Reaction Attack,” whereby attackers exploit less secure accounts often protected only by SMS-based MFA to extract sensitive personal information. This information can subsequently be leveraged to compromise more secure platforms within the same ecosystem.

To empirically examine these vulnerabilities, Jin et al. developed ActFort, a systematic framework for analyzing authentication mechanisms and account dependencies across various online services. The results of their study showed that SMS codes, while convenient, are highly susceptible to interception and misuse. Their measurements indicated that more than 80% of surveyed online platforms utilized SMS codes as part of the password reset process, often without additional safeguards. Moreover, critical personal data such as email addresses, phone numbers, and user IDs were frequently exposed upon initial compromise, thereby facilitating further intrusions through chained attacks.

These findings have profound implications for digital systems in veterinary healthcare. Given that such platforms may involve interconnected modules for medical records, appointment scheduling, billing, and telehealth services, the use of SMS-based MFA alone presents a significant risk. Should an attacker gain access to a peripheral service, the resulting exposure of linked accounts could jeopardize confidential client and patient data. Therefore, the integration of more secure MFA components such as biometric verification or hardware-based tokens is strongly recommended to enhance system resilience and user trust.

Synthesis

Amid the continuous evolution of healthcare technologies, veterinary medicine is likewise undergoing a transformation characterized by the adoption of digital solutions that improve service provision, make operations smoother, and improve client engagement. The reviewed literature collectively illustrates how diverse technological progressions are reshaping veterinary practices by replacing manual, paper-based systems with integrated digital platforms.

A prevailing theme across the studies is the focus on automation, accessibility, and efficiency. Appointment systems, record management platforms, inventory tools, AI chatbots, and predictive analytics are commonly utilized to support veterinary operations and client interactions. These systems aim to simplify administrative tasks, reduce waiting times, and provide real-time services to pet owners. For example, web-based applications developed by Yusof and Fauzi

(2023) and Mahzir and Ilyas (2020) demonstrate how digital platforms can facilitate appointment scheduling and health monitoring while enhancing client satisfaction. Predictive analytics and AI tools, as examined in the works of Iqbal et al. (2021) and Sai et al. (2024), further enhance decision-making by offering data-driven analyses into treatment planning and resource allocation.

Despite these common objectives, differences emerge in implementation strategies, functionalities, and system contexts. Veterinary-specific platforms often incorporate features such as vaccination tracking, grooming services, or nutritional advice, which are not typically present in general healthcare systems. Additionally, while some systems apply basic design frameworks, others employ more advanced architectures like the Model-View-ViewModel (MVVM) pattern or integrate cloud services to support scalability and user responsiveness. There are also variations in security approaches; for instance, some platforms rely on SMS-based multi-factor authentication for simplicity.

The practical applications of these systems extend across several key areas. Appointment scheduling systems enhance operational productivity by organizing consultations and reducing client wait times. Inventory and record management instruments improve administrative performance by ensuring the accurate tracking and retrieval of critical information. SMS and email notification systems help maintain timely communication between veterinary staff and pet owners, reinforcing adherence to care plans and improving service coordination. AI chatbots contribute to client support by offering accessible, personalized guidance, while predictive analytics enables more precise clinical decisions and proactive healthcare planning.

Collectively, these digital solutions represent a shift toward more intelligent, responsive, and secure veterinary healthcare environments. By synthesizing the strengths of existing systems and addressing limitations such as data privacy risks, usability issues, and integration challenges, future veterinary platforms can deliver thorough, reliable, and client-oriented services. These results give a strong conceptual foundation for the continued development and refinement of veterinary technologies aligned with the evolving demands of both practitioners and pet owners.

Technology Gap

Significant progress has been made in the creation of digital systems for veterinary clinics and pet healthcare, such as platforms for appointment scheduling, record management, AI chatbots, and inventory tracking. The potential of these systems and their ability to be combined into a single, comprehensive platform, specifically designed for small-to-medium veterinary clinics, however, remains untapped. Many of the current systems operate in isolation; for example, some offer efficient appointment scheduling but lack secure communication channels, integrated payment processing, or real-time health monitoring. Many studies highlight systems that have intriguing features, such as SMS/email notifications or predictive analytics, but many of these tools are either too general, do not allow users to customize their settings, or fail to adhere to security guidelines, such as robust multi-factor authentication. In spite of the leap forward in blockchain and AI applications, numerous systems continue to suffer from problems regarding data privacy, user-friendliness, and full adoption due to infrastructural gaps in technology. Moreover, though platforms employ sophisticated frameworks or mobile applications in the interest of convenience, there remains little emphasis on interoperability, accessibility by low-literacy end-users, and affordability for clinics that work on constrained budgets. This is an opportunity to create one collaborative, secure, and easy-to-use system that converges key functionalities, such as appointment scheduling, inventory management, storage of records, notifications, payments, and AI-driven support, into one streamlined application specifically tailored to the veterinary environment.

Chapter 3

RESEARCH AND SOFTWARE METHODOLOGY

This chapter presents the research methodology used to explore the implementation and effectiveness of PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang. This chapter outlines the research design, research locale, sources of data, research instrument, data gathering procedure, statistical data analysis, and ethical considerations that were used to gather relevant information. By accomplishing this, it intended to make it easier to understand the procedures involved in gathering and analyzing data. The methodology is designed to provide a comprehensive understanding of how the system affects the daily operations of the clinic and the experiences of its users.

Research Design

This study will use a descriptive developmental research design, aiming to obtain accurate information about the characteristics of the target population and specific aspects of the phenomenon being studied. The approach will involve quantitative methods and systematic data analysis to examine data distribution, frequency, and variation. These evaluations will help assess the study's results, identify limitations, and inform future recommendations.

To collect data, the researchers will use structured, closed-ended questionnaires distributed through Google Forms. This format enables efficient data gathering from a larger number of participants specifically, pet owners, veterinarians, and staff of Animal House Veterinary Hospital

Alabang. The use of closed-ended questions ensures consistency in responses, allowing for focused analysis relevant to the issues faced by the hospital.

The quantitative approach allows the researchers to obtain numerical data that can be used to identify patterns, compute averages, forecast possible outcomes, and examine potential relationships among variables. The descriptive component of the study aims to define key concepts, clarify the scope of the research, and provide measurable indicators that reflect the hospital’s needs and current challenges.

In conclusion, using quantitative research within a descriptive developmental framework supports the study’s objectives. By gathering structured data through Google Forms, the study is positioned to deliver meaningful insights into the specific concerns of Animal House Veterinary Hospital Alabang and contribute to the development of a reliable web-based veterinary system.

Research Locale

The research is conducted at Animal House Alabang, a small to medium-sized veterinary clinic located in G/F RCBC Building, 1770 Alabang–Zapote Rd, Muntinlupa, Metro Manila. Animal House Alabang offers a variety of services, such as routine checkups, vaccinations, grooming, blood transfusion, x-ray, lab test, and etc. The researchers will gather information from pet owners and veterinarian staff who interact with the system, observing how it affects daily operations, and evaluate how effective it improves customer satisfaction and clinic workflow. The selection of Animal House Alabang as the research locale offers an ideal environment for evaluating the real-world implications of implementing a digital management system in a veterinary clinic

Figure 6. Animal House Veterinary Hospital Alabang Clinic Map

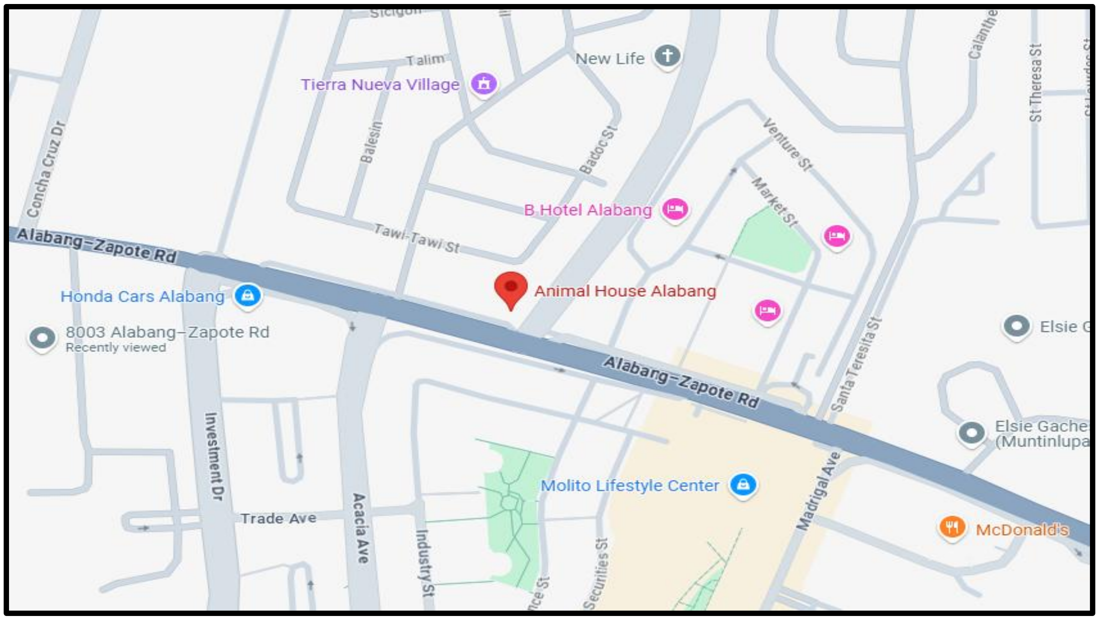


Figure 7. Animal House Veterinary Hospital Alabang Clinic (3D View)

Sources of Data

The researchers will employ a purposive sampling method, a type of non-probability sampling in which participants are deliberately selected based on their relevance to the research objectives. This approach is well-suited for the study, as it ensures that data is collected from individuals with direct experience and meaningful insights into the subject matter. Specifically, the study will involve pet owners, a veterinarian, and hospital staff from the Animal House Veterinary Hospital Alabang Branch, as these groups are directly involved in the clinic's day-to-day operations and interactions with its services.

In this case, the entire population of 100 respondents will be examined, consisting of 2 veterinary veterinarian staff members, 13 Veterinarians, and 85 pet owners. These participants were chosen because they are the primary users who will directly engage with the developed web-based record management and appointment scheduling system. By focusing on these specific individuals, the researchers aim to obtain a comprehensive understanding of the system's effectiveness, usability, and overall impact.

This sampling strategy ensures that all relevant perspectives particularly those with hands-on experience are included in the evaluation. It also supports the study's practical limitations, remaining feasible within the available time and resources. Furthermore, the data gathered will reflect the system's potential to enhance key features such as appointment scheduling, inventory management, online payments, electronic health records, SMS notifications, predictive analytics, and AI chatbot support. Ultimately, this targeted approach enables the researchers to evaluate the system's impact on both clinic operations and client satisfaction in a focused and meaningful way.

Table 1

Population of the Study

Name of Population	**Total**
Veterinarians	13
Veterinary staff	2
Pet Owners	85
Total	100

According to the Veterinary Staff, 80-140 pet owners visit the veterinary clinic within a week. Therefore, the researchers decided to have a sample size to align with the clinic's operational constraints and ensure that each pet owner receives proper attention and service ensuring a more manageable scope for the research.

Both veterinary staff and pet owners were the primary respondents for this research, providing the data necessary for evaluating the expected impact of PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang Branch. The accuracy and relevance of the study's findings relied on both groups' involvement in surveys and interviews, which allowed the researchers to provide comprehensive data that represents the real-world needs and expectations of all the primary users.

Research Instrument

A research instrument is a tool that is used to collect data for a research study. It allows researchers to measure or observe variables related to their study objectives in a systematic way. A research instrument guarantees a systematic, reliable, and valid approach to data collection that supports the objectives of the study.

Questionnaire

The researchers utilized a structured questionnaire as the research instrument for gathering quantitative data from the veterinary staff and pet owners at Animal House Alabang Branch. The researchers prepared 4 categories of questionnaires, for the evaluation of the developed system, all in the form of Likert Scale providing various options. The set of questionnaires, which is based on the ISO 25010, covered the Functionality, Usability, Reliability and Security of the developed system.

The **functionality** category aimed to determine whether the system effectively supports all necessary operations and processes without causing workflow disruptions. For veterinary staff, questions focused on core functions such as patient record management, appointment scheduling, and inventory management, assessing whether these features are fully supported by the system. For pet owners, the questions evaluated the ease and completeness of tasks such as booking appointments, viewing pet health records, and accessing online payment features.

In the **usability** category, the questionnaire assessed how easy the system is to use and navigate. For veterinary staff, it examined whether the interface was user-friendly, the design intuitive, and the instructions clear, all of which contribute to minimizing user errors and learning curves. Since pet owners may be occasional users, the usability questions for them concentrated on how easily they could book appointments, access pet information, or use the system without frustration.

The **security** category evaluated how effectively the system safeguards data privacy and protects against unauthorized access. For veterinary staff, the focus was on securing sensitive patient records, implementing appropriate access controls based on user roles, and ensuring internal data security. For pet owners, questions addressed the protection of personal information, such as the security of login credentials, pet data, and online payment transactions.

Lastly, the **reliability** category measured the system's stability and performance. Veterinary staff were asked whether the system maintains data integrity, functions well during periods of high usage, and operates without frequent errors or downtime. For pet owners, the questionnaire explored their experiences with system reliability, such as whether they encountered access issues or technical problems.

The questionnaire also considered key system features including appointment scheduling, inventory management, online payment, electronic record handling, SMS notifications, predictive analytics, and AI chatbot support. By structuring the instrument according to ISO quality characteristics and adapting it for both user groups, the researchers aimed to identify the system's strengths and uncover areas needing improvement. This methodical approach ensures that the developed veterinary system evolves into a more functional, secure, and user-friendly tool that meets the needs of both veterinarian staff and pet owners.

Table 2

Likert Scale

Parts of the Questionnaire	Likert Scale
Evaluate the software features of the PawSense AI: Smart Veterinary Clinic Management System using ISO 25010 standards, with an emphasis on aspects such as: ● Functionality ● Usability ● Reliability ● Security	5 - Strongly Agree 4 - Agree 3 - Uncertain 2 - Disagree 1 - Strongly Disagree

Data Gathering Procedure

The researchers started the data collection process by informing the client, Animal House Alabang Branch, about the implementation of the PawSense AI: Smart Veterinary Clinic Management System, a web-based application for record management, appointment scheduling, inventory monitoring, and online payment system with electronic/SMS notification, predictive analytics, and AI chatbot integration. The researchers presented the clinic management with a signed letter of consent, signed by the student researchers and the research adviser, detailing the study's objectives, participant rights, and confidentiality measures.

After the client reviewed and signed the consent letter, the researchers proceeded to distribute the prepared and assessed questionnaires in a hard copy format to the selected veterinary staff and pet owners, ensuring that they had fully consented to their participation and understood the study’s goals and their role in providing feedback. The set of questionnaires focused on the functionality, usability, security, and reliability of the developed system, in line with the ISO 25010 software quality standards. These questionnaires addressed key features such as appointment booking, inventory tracking, secure online payment processing, medical record management, communication via electronic/SMS notifications, the usefulness of predictive analytics for clinic operations, and the responsiveness of the AI chatbot.

The researchers gathered and examined each response to ensure accurate and comprehensive data after the respondents completed the questionnaires. By transforming the manually collected responses into a structured digital dataset, the researchers ensured that the data was prepared for detailed statistical analysis, providing valuable insights regarding the effectiveness and user satisfaction of the developed system.

Table 3

Data Analysis Plan

Answers the following	Data Collection	Data Type	Data Level	Basis
Evaluate the software features of the PawSense AI: Smart Veterinary Clinic Management System using ISO 25010 standards, with an emphasis on aspects such as Functionality, Usability, Reliability and Security.	Questionnaire	Quantitative	Primary	Validated Questionnaire Items

Statistical Data Analysis

For statistical analysis, the researchers used Google Forms and Google Sheets to efficiently organize, interpret, and visualize the collected data. The questionnaires were administered on-site at Animal House Alabang, where veterinary staff and pet owners answered the survey directly through Google Forms using mobile devices or laptops provided by the researchers. Since responses were automatically recorded in Google Sheets, this eliminated the need for manual encoding and ensured accurate, real-time data collection and analysis.

Weighted Mean

The researchers used Weighted Mean as a statistical tool that provides an enhanced average by giving different values in a data set varying levels of importance or "weights." Weighted Mean is used to compute the weight of the responses in the questionnaire from the respondents during the data gathering procedure. The formula for the weighted mean is as follow:

$$WM = \frac{\sum(fx)}{n}$$

Where: WM = Weighted Mean

$\sum$ = Summation

f = Frequency of response

x = Assigned weight

n = Total number of respondents

Table 4

Agreement Scale

The following are the corresponding verbal interpretations for the weighted mean

Weight	Verbal Interpretation	Weighted Mean
5	Strongly Agree	4.21 - 5.00
4	Agree	3.41 - 4.20
3	Uncertain	2.61 - 3.40
2	Disagree	1.81 - 2.60
1	Strongly Disagree	1.00 - 1.80

Ethical Consideration

The researchers' preparedness in conducting the study entitled **PawSense AI** reflects their strong commitment to ethical standards. The study relied on participant data collection, ensuring integrity and credibility. To maintain the study's validity and reliability, the researchers took steps to avoid bias in interpreting the data and ensured that no findings were manipulated. Data analysis focused on highlighting participant responses to produce higher-quality and trustworthy results.

This study upholds basic ethical principles to gain the approval and support of the individuals involved. The researchers secured informed consent from every respondent, ensuring that each participant understood the study's objectives, methods, and their rights prior to taking part. They were made fully aware that their involvement was voluntary and that they could withdraw from the study at any time without providing a reason.

All information collected from participants is handled with the highest level of confidentiality and integrity. The data will be stored securely, with access limited only to the researchers, the adviser, and the facilitator. To further protect the rights of participants, no identifying information will be disclosed, and results will only be presented in large groups to preserve anonymity. These safeguards apply particularly to the veterinary staff and pet owners who participated in the study.

The researchers also demonstrated respect and professionalism in all interactions with respondents, maintaining a positive attitude and prioritizing their welfare. Care was taken to ensure that participants experienced no harm or discomfort as a result of their involvement. Additionally, the researchers strictly avoided any form of plagiarism and upheld academic and research integrity at all times.

Only the researchers, along with the adviser and facilitator, are aware of the full flow and progress of the study, ensuring that any issues arising are handled responsibly and without misconduct. These practices form the ethical foundation of **PawSense AI**, a study grounded in responsibility, respect, and privacy. By applying these ethical principles, the research process was made both credible and reliable while safeguarding the rights and dignity of all participants.

Software Requirement Specification

Name of Project	**PawSense AI: Smart Veterinary Clinic Management System**
Requirement Classification	**(/)Whole System () Module/Feature**
Name of Module	**N/A**
Estimated Duration	**8 months**
	Software Requirements
Requirement No.1 **User Account Management**	This feature will focus on creating and managing user accounts in the web application. The User Account Management system enables users, including super admins, admins and pet owners, to create, log in, and manage their accounts securely.
Requirement No.2 **PawSense AI Veterinary Clinic Databases**	The PawSense AI: Smart Veterinary Clinic Management System Databases ensure organized and secure storage of all critical information, enabling efficient management of user accounts, appointments, and service records.
Requirement No.3 **Appointment Management**	Appointment Management in the PawSense AI: Smart Veterinary Clinic Management System streamlines the scheduling, rescheduling, and cancellation of appointments

	for both clients and veterinarian staff. Clients can easily book, reschedule, or cancel appointments through a user-friendly interface, with automated notifications reminding them of upcoming appointments and due treatments. Veterinarian staff and veterinarians can manage appointments through a centralized dashboard, where they can view, update, and filter appointments by date, status. This system ensures efficient workflow, reduces administrative workload, prevents scheduling conflicts, and improves both client satisfaction and clinic operations.
Requirement No.4 **Record Management**	Record Management in the PawSense AI: Smart Veterinary Clinic Management System allows the clinic to efficiently store, update, and manage the medical histories of pets. The system enables the addition of detailed records, including history record, and visit logs, all organized in a digital format for easy access. Veterinarians and veterinarian staff can update these records after each consultation, ensuring that all relevant information is kept up to date. The system also allows for the archiving of older records while ensuring that they remain accessible for reference. This feature enhances the accuracy of medical data, facilitates better decision-making by veterinarians, and ensures a comprehensive, easily retrievable history of each pet's health, ultimately improving patient care and

	clinic efficiency.
Requirement No.5 **Inventory Management**	Inventory Management in the PawSense AI: Smart Veterinary Clinic Management System allows for accurate tracking and organization of medical supplies, medications, and equipment. The system enables staff to update stock levels, monitor expiry dates, and receive low-stock alerts to prevent shortages. Archived records of used or expired items remain accessible for auditing and reference. This ensures efficient inventory control, reduces waste, and supports continuous, high-quality patient care.
Requirement No.6 **Client Notification**	Client Notification in the PawSense AI: Smart Veterinary Clinic Management System is a feature designed to keep pet owners informed and engaged. The system automatically sends reminders and notifications to clients about upcoming appointments, vaccinations, treatments, and follow-up visits via. These notifications help reduce no-shows, ensure that clients are aware of their pet's medical needs, and encourage timely care. Additionally, the system may send notifications for other important updates, such as changes to appointments or clinic hours. By automating these reminders, the system improves communication, enhances client satisfaction, and ensures that pets receive

	the necessary care on schedule.
Requirement No. 7 **Predictive Analytics**	Predictive Analytics for client appointments in the PawSense AI: Smart Veterinary Clinic Management System analyzes historical booking data to forecast peak appointment times and client demand. This allows the clinic to optimize scheduling, allocate staff efficiently, and reduce wait times. The system can also suggest ideal appointment slots based on client preferences and past visit patterns. As a result, it enhances client satisfaction and ensures smoother clinic operations.
Requirement No. 8 **AI Chatbot**	AI Chatbot in the PawSense AI: Smart Veterinary Clinic Management System provides instant, automated responses to client inquiries such as appointment scheduling, clinic hours, and basic pet care tips. It operates 24/7, enhancing customer support even outside clinic hours. The chatbot can also guide users through services offered and collect preliminary information for appointments. This improves client engagement, reduces staff workload, and streamlines communication.
Requirement No. 9	Search Functionality in the PawSense AI: Smart Veterinary Clinic Management System allows users to quickly locate specific information such as pet records, client contact

Search Functionality	details, appointments, or invoices. Users can enter keywords or apply filters like pet name, date, or status to narrow down results efficiently. This feature enhances workflow by reducing the time spent searching for data and ensures quick access to critical information. As a result, it supports better decision-making and improves overall clinic operations.
	Software Characteristics
Characteristic No.1 **Functionality**	The system must ensure that it performs its intended functions under specified conditions without failure.
Characteristic No.2 **Usability**	Intuitive interface designed for users with minimal technical expertise.
Characteristic No.3 **Efficiency**	The system must ensure data confidentiality, user authentication, and protection against unauthorized access, ensuring that sensitive information such as medical records and personal details are secure.
Characteristic No.4 **Reliability**	The system should ensure robust data backup procedures, real-time error monitoring, and system redundancy, guaranteeing minimal downtime and consistent availability.

	Design and Content Requirements
Requirement No.1 **Design must follow**	A consistent and visually appealing color palette, complemented by a clean and intuitive design that prioritizes simplicity to reduce cognitive load. The design elements must align seamlessly with assigned functions, ensuring proper coordination. Efficiency should be evaluated based on precision and ease of task execution.
Requirement No.2 **Design and content must be in**	Clear, legible fonts and accessible color schemes, ensuring readability and user comfort for all audiences, including those with visual impairments.
Requirement No.3 **Content will come from**	Veterinary staff and Clients of Animal House Alabang Branch.
Requirement No.4 **Logo and other icons**	Logo and other icons must reflect the clinic's branding while maintaining clarity and simplicity to support intuitive use and quick identification of functions.
Requirement No.5 **Design should consist**	Visually balanced layouts, with clear sections for appointments, patient records, inventory management, online payment, predictive analytics, ai chatbot and client notifications, promoting a clean, organized interface that

	minimizes clutter.
Requirement No.6 **The content should**	The content should be structured logically and categorized by type (e.g., patient records, invoices, appointment schedules), enabling users to easily access and navigate relevant information quickly.
	Network and Security Requirements
Requirement No.1 **Provide System and Database server**	The system and its data must be hosted on a dedicated server that runs PHP for the application and MySQL for the database. Administrators, superusers, and authorized users must have rigorous access to the server and its data, as determined by their roles and permissions. To protect the system's security and integrity, robust access restrictions should be implemented.
Requirement No.2 **Authentication Features**	The system must also support and handle HTTP methods (such as GET, POST, PUT, and DELETE) correctly, allowing for safe and fast client-server interaction. This ensures effective data management, easy contact with users, and a secure operating environment. The system's authentication features must ensure secure and easy access while also protecting sensitive user data.

The system should properly manage user accounts, permissions, and session handling by utilizing PHP and MySQL. To improve security, robust password regulations must be implemented, and passwords should be securely stored using advanced hashing methods. Multi-factor authentication (MFA), such as one-time passwords (OTP) or link-based verification provided via email via SMTP, should be used to add an extra layer of protection.

Email authentication using SMTP should provide safe procedures for password resets, account activation, and account recovery. To prevent brute-force assaults, the system should contain account lockout methods after many failed login attempts. Sessions should be securely maintained by associating them with user-specific credentials and putting in place safeguards to prevent session hijacking, such as regenerating session IDs and utilizing secure cookies.

APIs should use token-based authentication, such as JSON Web Tokens or custom tokens, to enable safe connection. Administrative access must comply with role-based access control (RBAC), which ensures that users may only access resources that are relevant to their jobs. Furthermore, critical authentication information, such as

	API keys and tokens, must be encrypted and securely kept. By integrating these characteristics, the system will provide robust security while being user-friendly.
	Hardware Requirements
Requirement No.1 **Devices**	To support and access the web-based application system and server, desktops and laptop computers will be required. To guarantee smooth functioning and engagement with the system, these devices should be equipped with contemporary web browsers (such as Chrome, Edge, or Firefox) and steady internet access.
Requirement No.2 **Server Requirements**	A multi-core processor, such as an Intel Xeon or AMD Ryzen, is required for best performance since it can effectively manage several concurrent requests and provide seamless data processing. Adequate memory (RAM) is required to handle user requests and system functions smoothly, without pauses or slowdowns. SSDs (Solid State Drives) are suggested for quicker read/write operations, particularly for accessing and administering the MySQL database, assuring rapid response times and dependability during peak demand periods.
Requirement No.3	MySQL is a file-based database that relies on local storage

Database Storage	for its operations, therefore selecting a storage media is crucial. To maintain data integrity and peak speed, save the database file on a secure, high-performance drive. A fast and dependable file system, such as ext4 on Linux or NTFS on Windows, is required for efficient read and write operations. These file systems offer reliability and speed, allowing for instant access to database files while minimizing latency in high-demand circumstances.
Requirement No.4 **Security Hardware**	A hardware or software-based firewall should be installed to protect the server by preventing unwanted access. The firewall should be set up to allow only critical traffic, such as HTTP/HTTPS, so that only genuine requests reach the server. This additional layer of protection protects the system from possible threats, unauthorized invasions, and harmful actions while allowing authorized users uninterrupted access.
	Management Requirements
Requirement No.1 **Present SDLC**	Researchers and developers must effectively communicate the Software Development Life Cycle (SDLC) to end users, describing essential phases such as planning, development, testing, deployment, and continuing maintenance, as well as how updates, issue resolution, and

	enhancements will be managed throughout time. Using the Agile methodology, the project will be built iteratively in different phases, with regular feedback loops to ensure that user demands are addressed and the system changes in real time. This strategy enables continual refinement, flexibility to changing requirements, and incremental upgrades while assuring functionality, usability, and efficiency. Regular communication will keep pet owners informed of developments, and issues will be prioritized and resolved quickly during each phase.
Requirement No.2 **Monthly Reporting**	Researchers and developers must provide monthly reports to stakeholders about system performance, development progress, and any issues that arise. These reports should include critical metrics, updates on tasks and security, user activity, and any issues encountered, as well as potential remedies. Stakeholders will evaluate the reports to assess the project's current state, verify goal alignment, and make informed decisions for continuous development.
Requirement No.3 **Final Reporting/Turnover of the System**	The system's final reporting and turnover focus on supplying extensive documentation outlining its design, functioning, and security measures, as well as an outline of known faults and ideas for future enhancements. This process comprises creating and distributing training

	materials for both users and administrators on issues such as system usage, troubleshooting, and administration. Furthermore, all source code, project files, and related documentation will be given over to the client, along with a detailed plan for continuing support and maintenance. These stages provide a smooth transition, allowing for successful system operation and administration in the long run.

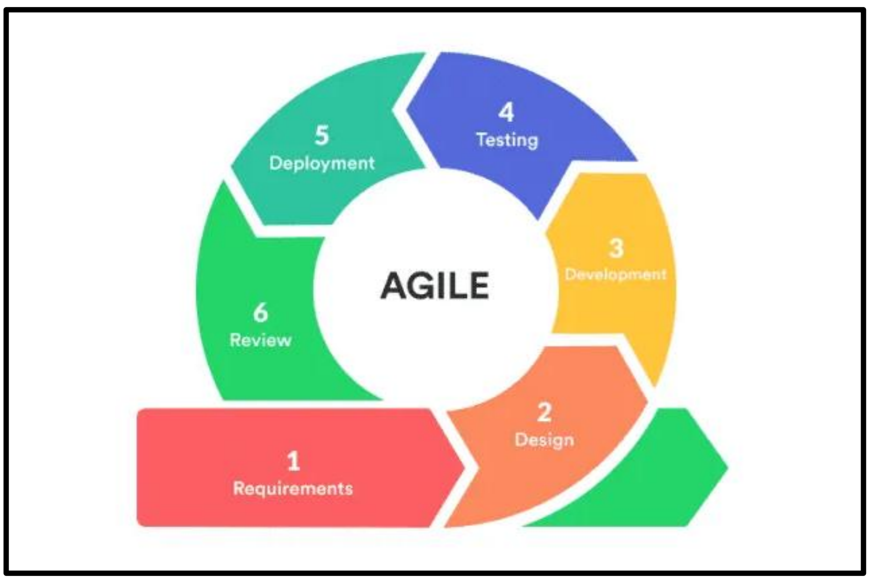
System Architecture

The system architecture of Animal House Alabang Branch's Smart Veterinary Clinic Management System which includes appointment scheduling, inventory management, online payment, electronic/SMS notifications, predictive analytics, AI chatbot integration, and record management was constructed using multiple diagrams to establish a robust, scalable, and user-friendly framework. A structured process known as the System Development Life Cycle (SDLC) guided the system's development, from planning and design to implementation and maintenance. The System Flow Diagram (SFD) outlines the sequential steps and procedures that define the system's operations, such as scheduling appointments, managing inventory levels, processing payments, and generating analytics.

A Data Flow Diagram (DFD) visualizes how data—like pet records, inventory updates, or payment transactions—flows between users, processes, and storage. The Hierarchical Input Process Output (HIPO) model breaks down the system's functions into hierarchical modules, highlighting each module's inputs (e.g., client data, inventory items), processes (e.g., chatbot interaction, report generation), and outputs (e.g., appointment confirmations, analytics reports). The Context Diagram (CD) represents the system's boundaries, illustrating the flow of data between Animal House Alabang Branch and external users or systems, such as pet owners, veterinarians, and payment gateways. Collectively, these diagrams map out the system's structure and functionality, providing clear guidance from the requirements gathering phase through to system design and full implementation.

Software Development Life Cycle

Figure 8. AGILE Methodology



The Software Development Life Cycle (SDLC) is a systematic method used by software development teams to design, build, test, and deploy software applications. The SDLC helps manage project timeframes, resources, and risks by following a set of processes. It also guarantees thorough testing, continuous improvements, and collaboration among stakeholders throughout the development process. The SDLC aims to produce software that meets the intended business objectives and is reliable, maintainable, and functional.

The Agile methodology differs from the traditional Software Development Life Cycle (SDLC). Agile follows an incremental and iterative approach, dividing development into small manageable sprints that deliver functional software after each cycle. This enables regular feedback and adjustments based on customer input, resulting in greater flexibility and responsiveness to change throughout the project. In contrast, the traditional SDLC is sequential, with each phase, such as requirements gathering, design, development, and testing must be completed before proceeding to the next. This rigid framework makes it difficult to make modifications once the process is underway.

The Agile methodology comprises six major phases: requirements, design, development, testing, deployment, and review. The first step, Requirements, involves gathering and prioritizing the clinic’s needs such as appointment booking, inventory tracking, online payment processing, record management, electronic/SMS communication, predictive analytics, and an AI-powered chatbot. By doing this, Animal House Alabang Branch’s primary goals are guaranteed to be met by the software.

The second phase is Design, during which the system’s architecture and user interfaces are developed. Prototypes or mock-ups are created to showcase features such as inventory dashboards, appointment interfaces, and chatbot flows. These are presented to Animal House Alabang Branch for feedback to ensure the design supports their workflow.

The third phase, Development, involves incrementally building the system, with each sprint delivering key features such as appointment scheduling, inventory updates, or chatbot integration. Early versions allow Animal House Alabang Branch to test these components and offer feedback to refine the software according to their needs.

The fourth phase is Testing, which ensures the system is free of bugs and functions as intended. Features like predictive analytics and SMS notifications are tested rigorously to guarantee reliable clinic operations and communication.

After testing, the software enters the Deployment phase, where functional modules, such as appointment scheduling, payment gateways, or inventory systems are released incrementally. This allows Animal House Alabang Branch to start using core features immediately while continuing to improve the system.

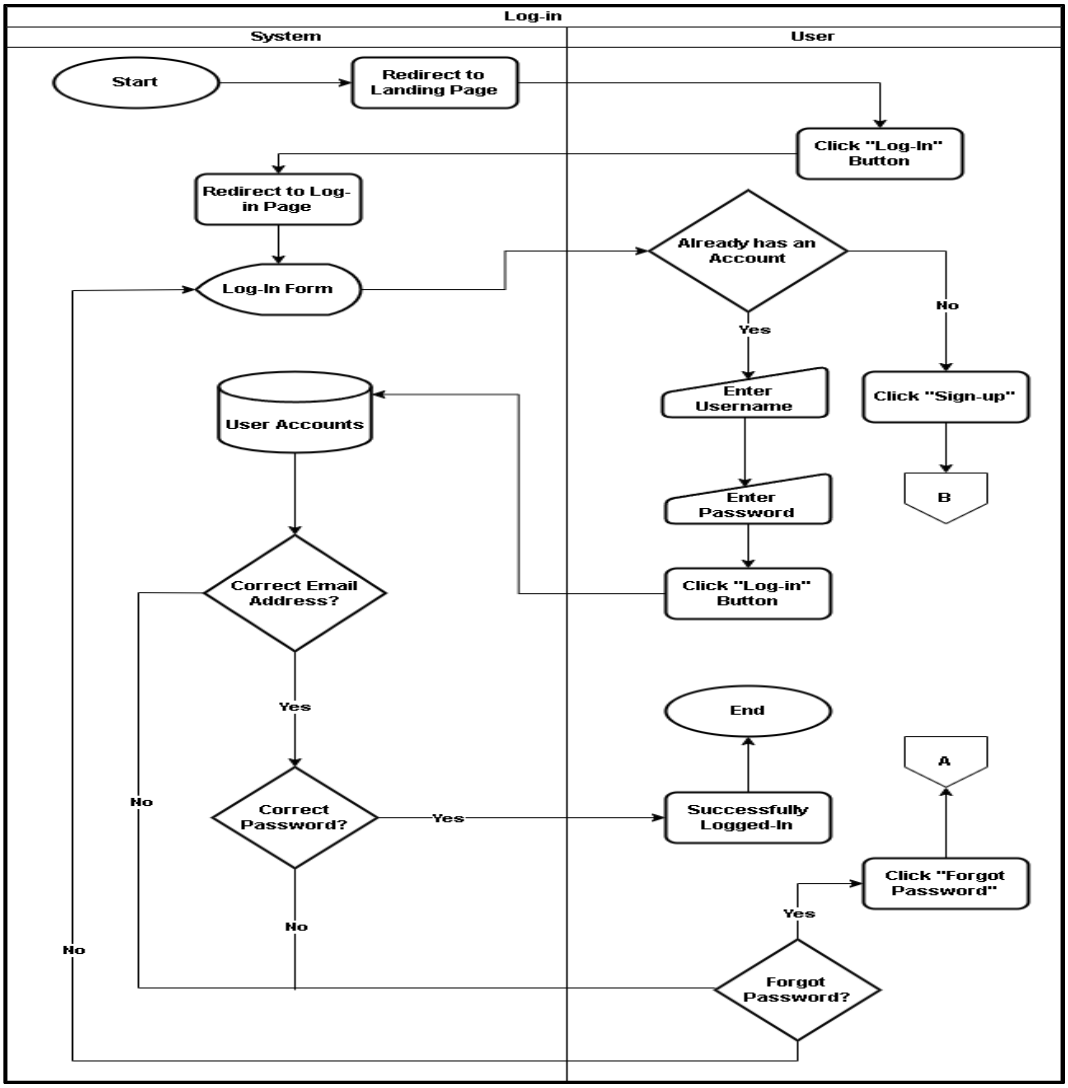
The final phase, Review, gathers feedback from Animal House Alabang Branch staff and pet owners regarding the effectiveness of the new features. This feedback helps the development team make informed decisions about future updates and improvements.

Together, these phases enable researchers to develop a system that meets the veterinary clinic’s operational needs and evolves over time to improve performance and user satisfaction.

In conclusion, the Agile methodology was an ideal software development approach for the PewSense AI Veterinary Clinic project. Its iterative nature allowed for continuous feedback and improvement, ensuring the software addressed the clinic’s needs—including appointment scheduling, inventory control, payment processing, record management, and intelligent features like predictive analytics and AI chatbot support. The ability to deliver features incrementally improved both client experience and clinic efficiency. Overall, Agile proved valuable in building a responsive, adaptable system tailored to Animal House Alabang Branch’s goals.

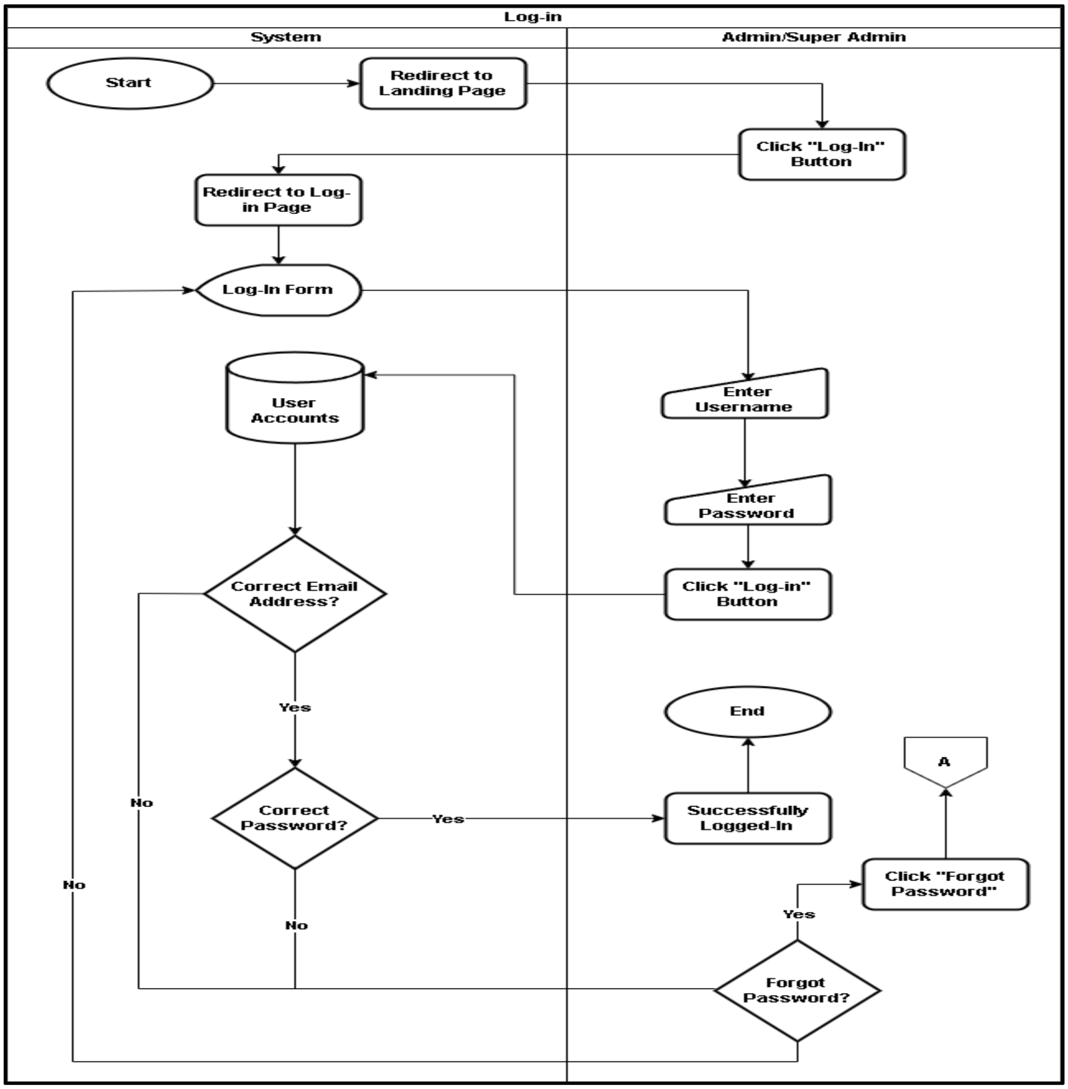
System Flow Diagram (SFD)

Figure 9. Log-In (User)



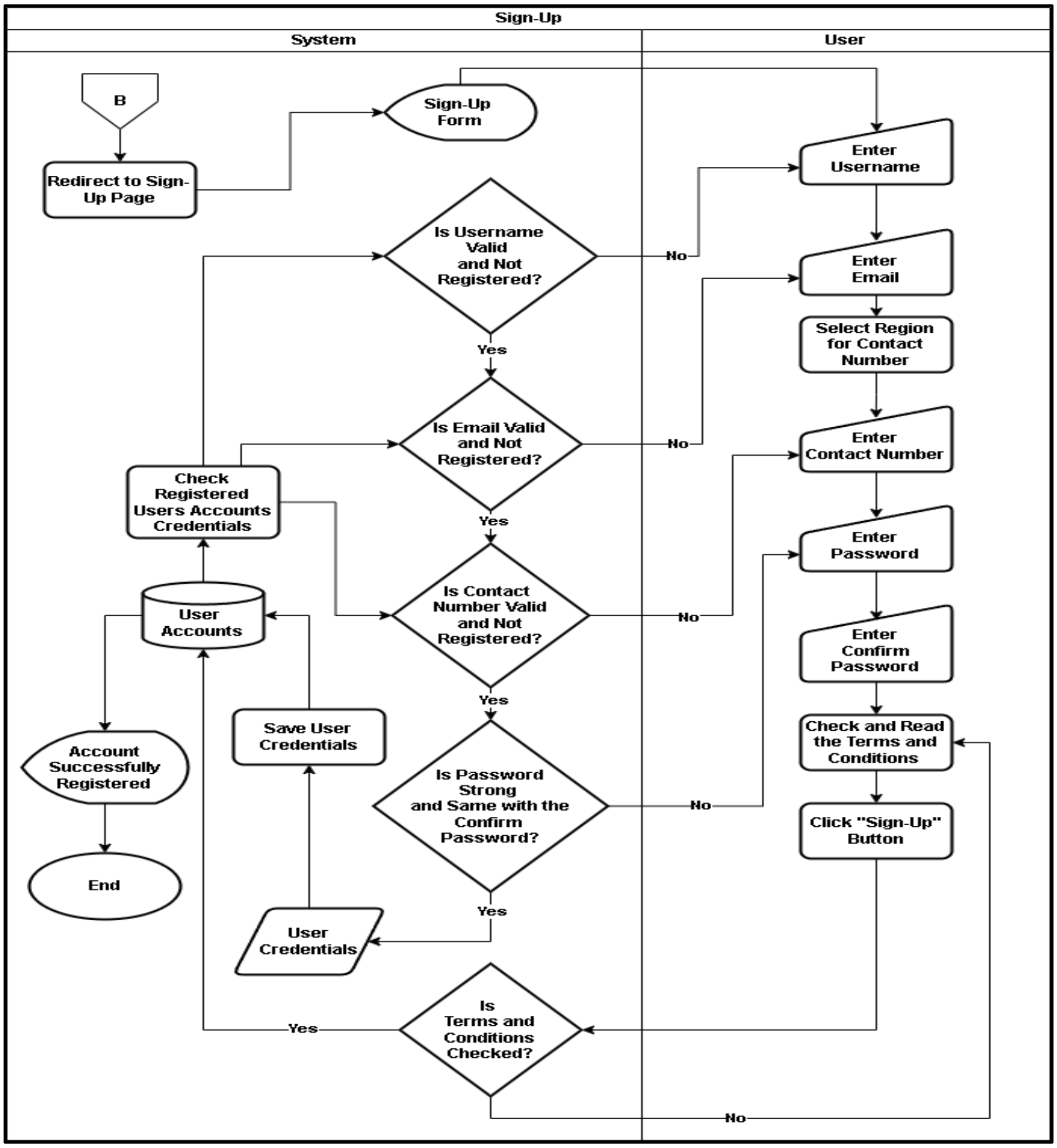
The "Log-In (User)" system flow diagram illustrates the process for a user to access the system, starting from the landing page. Users can either proceed to log in if they have an account or choose to sign up if they are new. For existing users, credentials are entered into the login form, which includes an option for forgotten passwords. Upon clicking "Log-In," the system validates the entered username and password against stored user accounts. Successful verification leads to a "Successfully Logged In" state, whereas incorrect credentials prompt re-entry. This robust process ensures secure and controlled user access to the system.

Figure 10. Log-In (Admin and Super Admin)



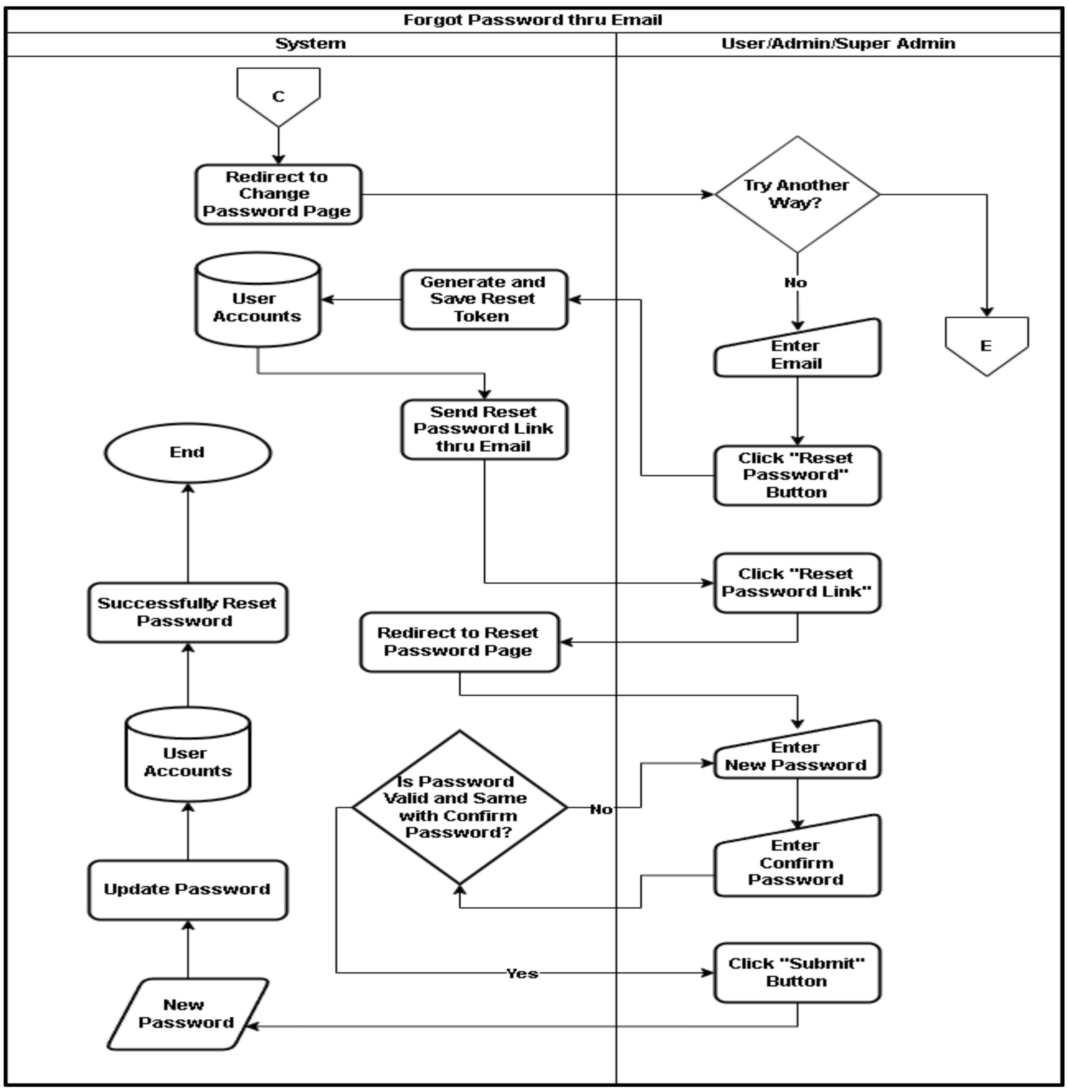
This system flow diagram, titled "Log-In (Admin and Super Admin)," outlines the secure authentication process for administrative users. The flow initiates with the admin starting the system and clicking the "Log-In" button, which redirects them to the dedicated login page. Here, the admin accurately enters their username and password into the provided form. The system then rigorously validates these credentials against its "User Accounts" database, first checking the email address and then the password. If both are correct, the admin is "Successfully Logged In," completing the process. Conversely, incorrect credentials will loop them back to the login form for re-entry, with an option available for forgotten passwords.

Figure 11. Sign-Up (User)



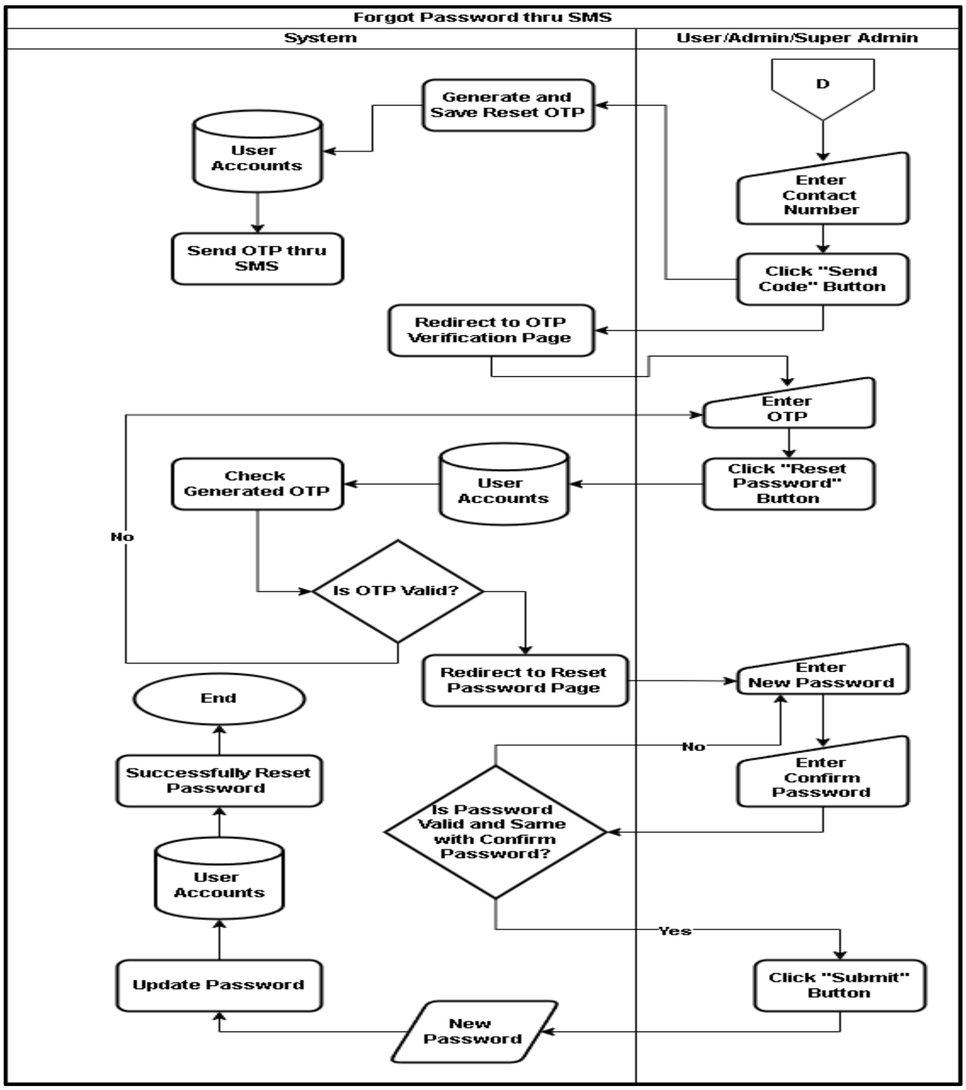
The "Sign-Up (User)" system flow diagram outlines the process for a new user to register for an account. The user is redirected to the "Sign-Up Form" where they enter their details such as their username, email, contact number, and a new password. Simultaneously, the system conducts real-time validations to ensure the uniqueness and validity of the provided information. Furthermore, the user must check and agree to the terms and conditions before proceeding with registration. Upon successful validation of all inputs, the system saves the user's credentials, confirming the "Account Successfully Registered" and concluding the process.

Figure 12. Forgot Password thru Email



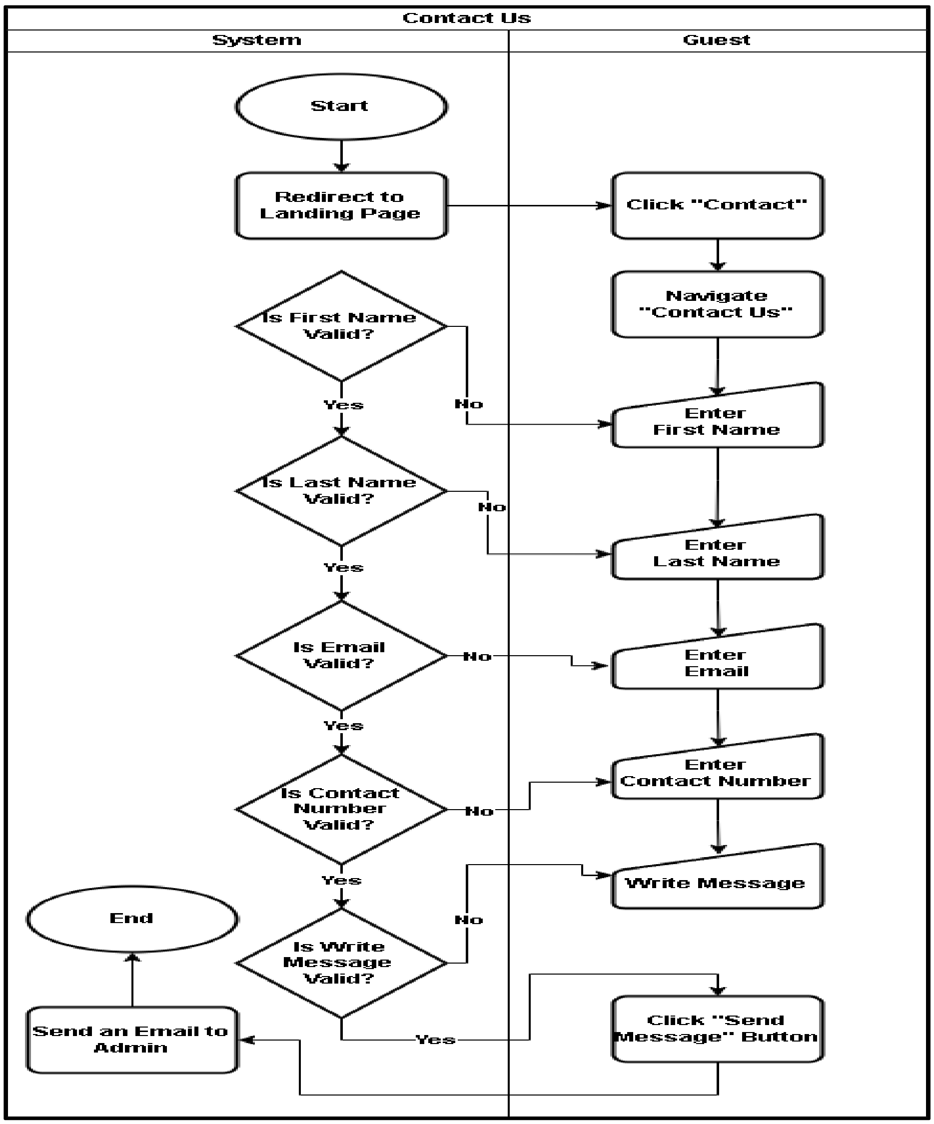
This system flow diagram, titled "Forgot Password thru Email," shows the process for a user to regain access to their account. Starting from a forgotten password prompt (C), the user first enters their email address and clicks the "Reset Password" button. The system then generates and saves a unique reset token before sending a password reset link to the user's registered email. Upon clicking this link, the user is redirected to a "Reset Password Page" where they can input and confirm their new password. The system validates the strength and consistency of the new password, prompting re-entry if invalid. Finally, once valid, the system updates the password in the user accounts database, confirming a successful password reset.

Figure 13. Forgot Password thru SMS



This system flow diagram, titled "Forgot Password thru SMS," details the process for a user to reset their password using their registered mobile number. Beginning from an entry point (D), the user enters their contact number and clicks "Send Code." The system then generates and saves an OTP, sends it via SMS, and redirects the user to an OTP verification page. The user inputs the received OTP and clicks "Reset Password," prompting the system to validate its correctness. If the OTP is valid, the user proceeds to a "Reset Password Page" to enter and confirm their new password. Finally, after validating the new password, the system updates it in the user accounts database, confirming a successful reset.

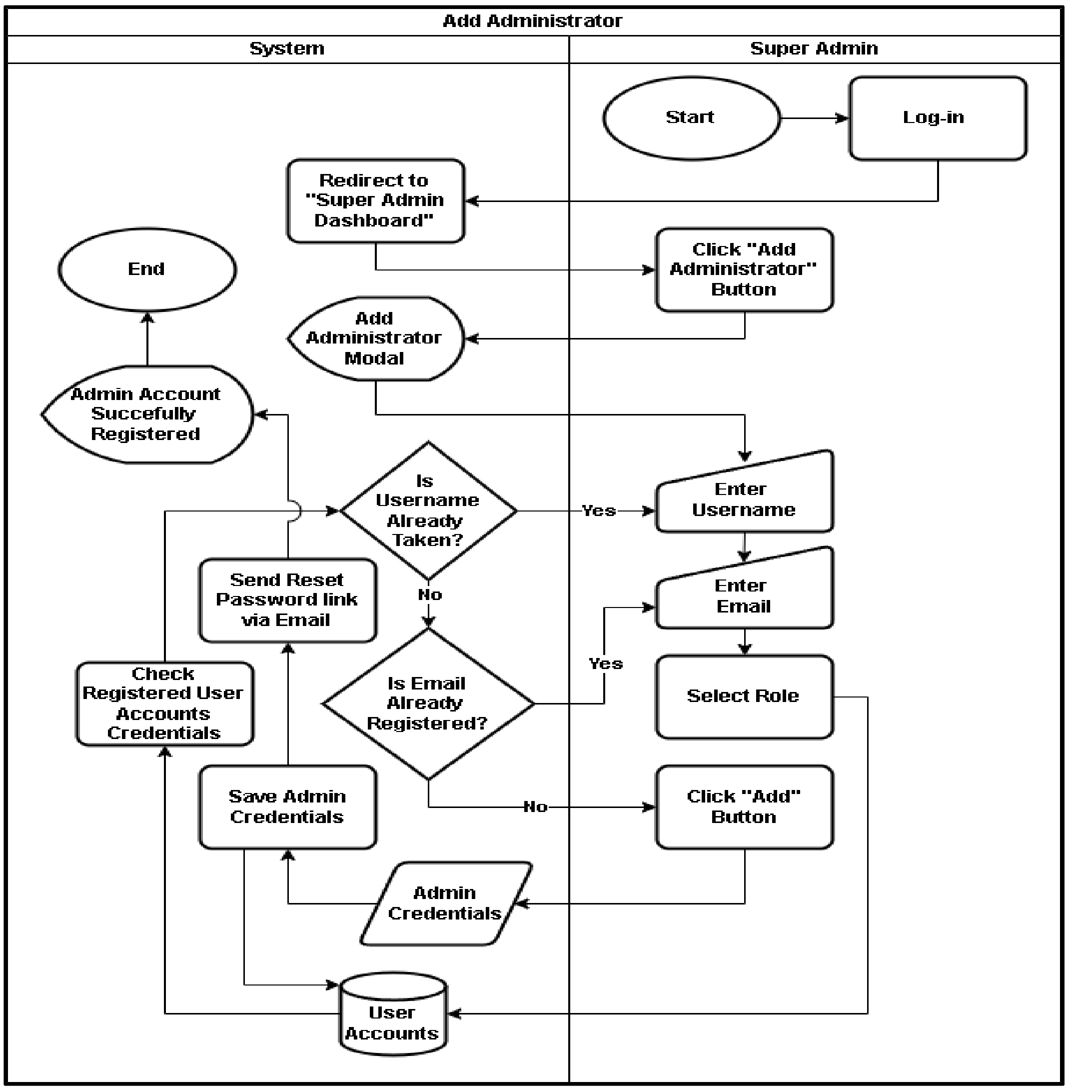
Figure 14. Contact Us



The "Contact Us" system flow diagram outlines the process for a guest to send inquiries to administrators. The user initiates this by navigating to the dedicated "Contact

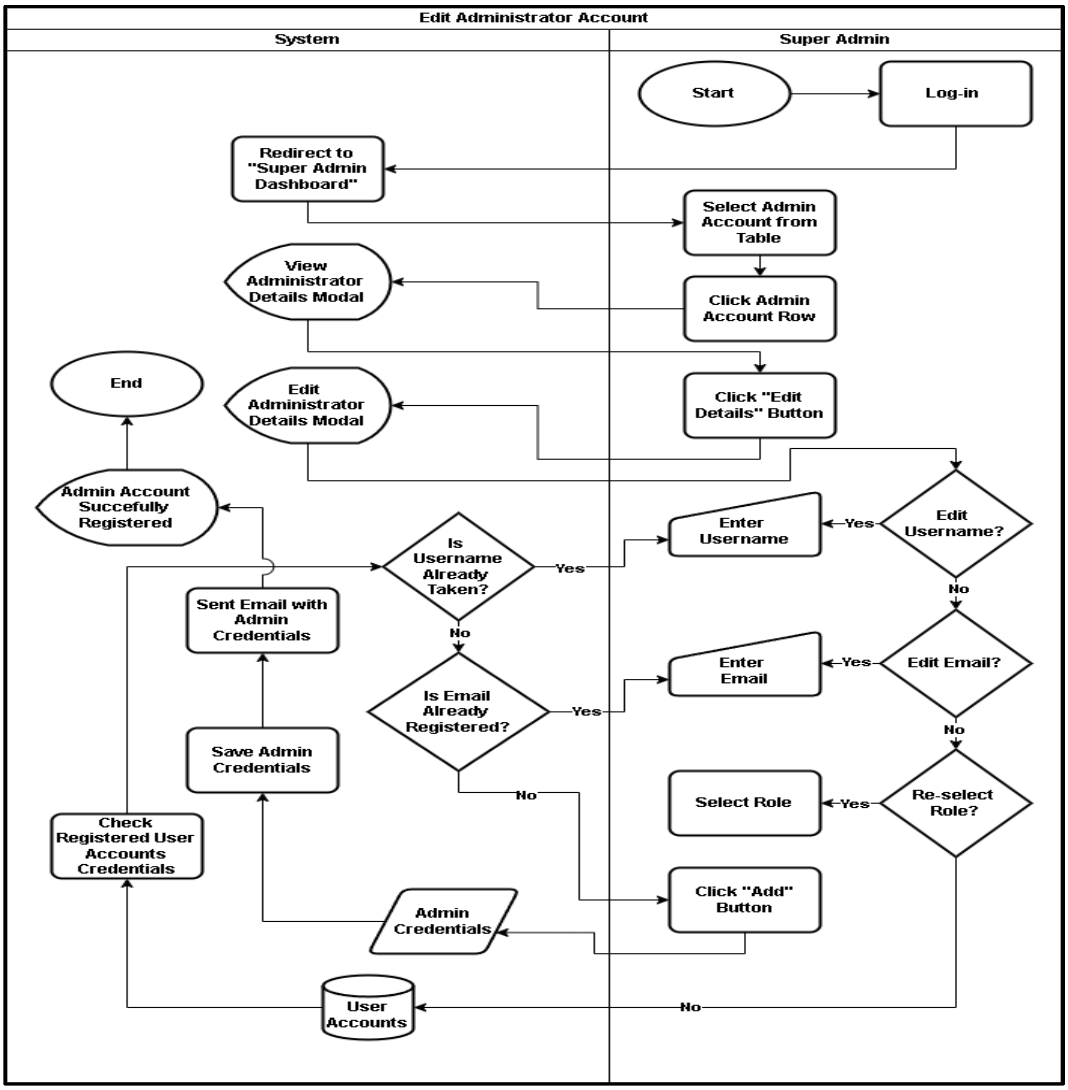
Us" section from the landing page. They then input personal details such as name, email, and contact number, alongside composing their message. The system validates all entered information in real-time, ensuring its correctness before submission. Finally, once all fields are valid, the guest clicks "Send Message," prompting the system to email the details to the Admin and conclude the process.

Figure 15. Add Administrator (Super Admin)



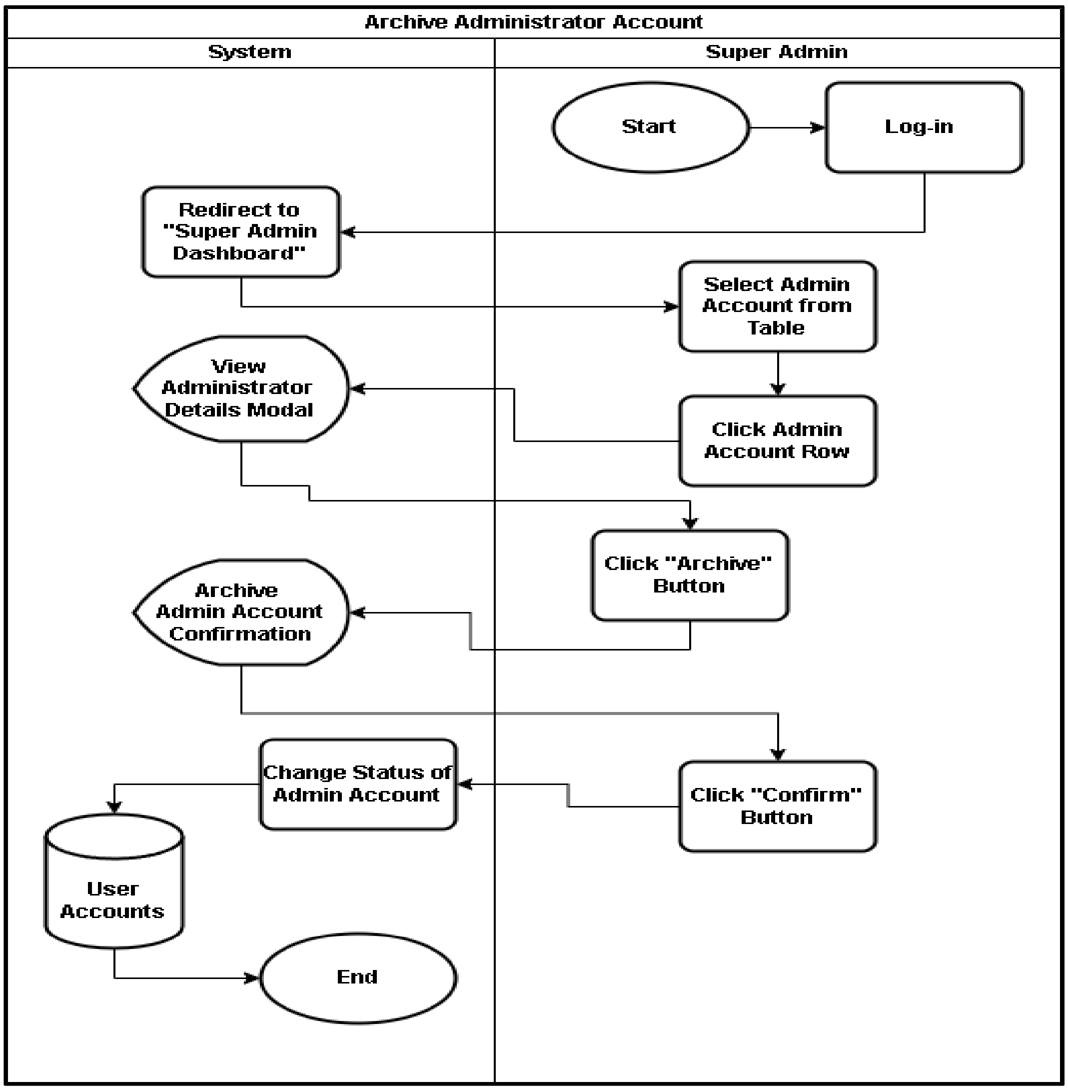
This system flow diagram, titled "Re-open Clinic," outlines the precise process for an Admin to reactivate a previously closed clinic date. The Admin initiates by logging into the system and navigating to the Clinic Schedule page. From the calendar, they select and click a date that is currently marked as closed, which prompts the system to display a "Re-open Clinic Modal." The Admin then confirms their intention to re-open the clinic on that selected date. Upon clicking "Reopen Clinic," the system updates the date's status within the clinic's schedules database. The process concludes with a clear confirmation that the "Clinic Re-opened Successfully," making the date available again for appointments.

Figure 16. Edit Administrator Account (Super Admin)



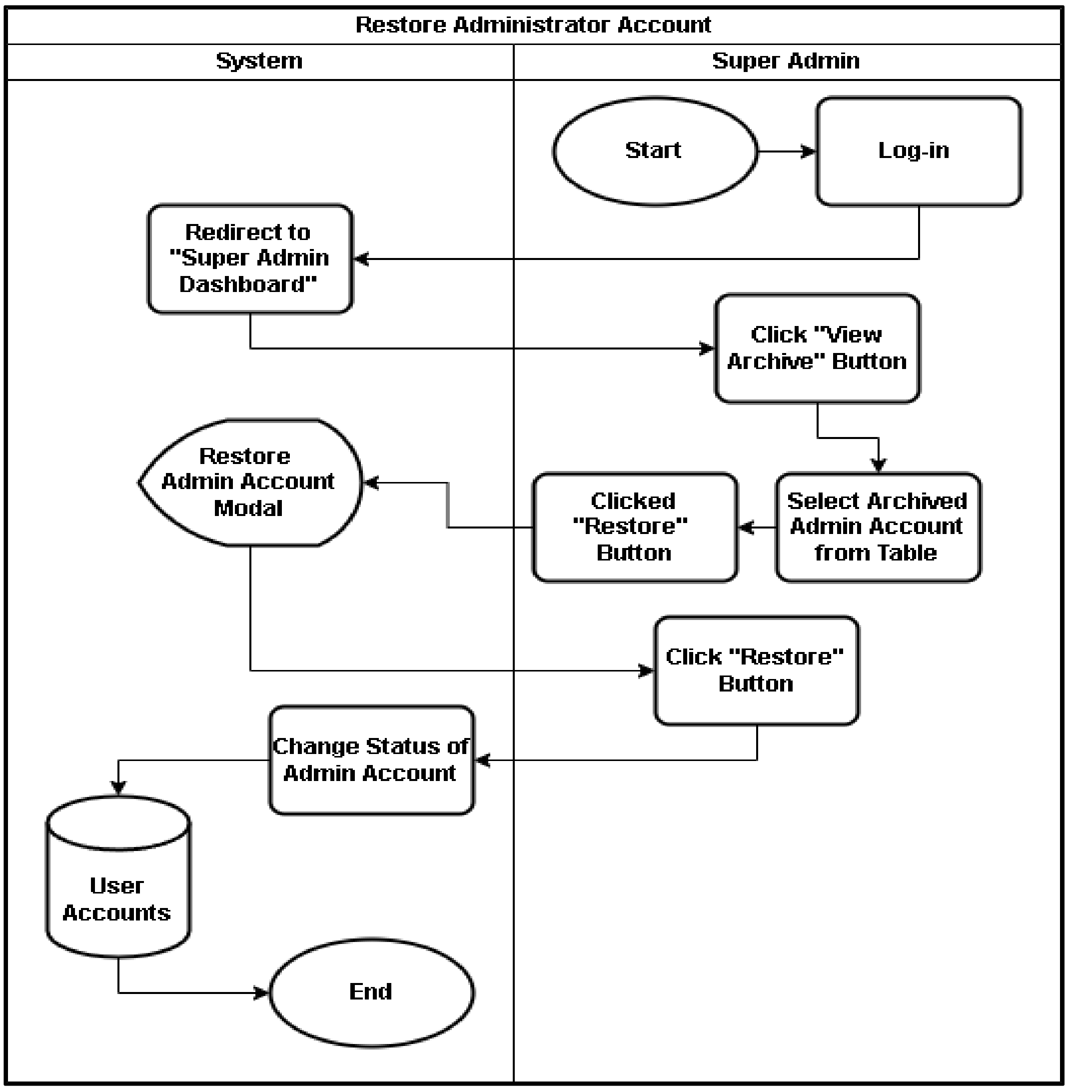
This "Edit Administrator Account" system flow diagram illustrates how a Super Admin modifies existing administrator profiles. After logging in, the Super Admin navigates to their dashboard, selects an admin account from a table, and clicks "Edit Details" from the view modal. An "Edit Administrator Details Modal" then appears, allowing updates to fields like username, email, or role. The system validates any changes for uniqueness and correctness, prompting for re-entry if issues are found. Upon successful submission, the system saves the updated credentials, sends a notification email with the modified details, and completes the account editing process.

Figure 17. Archive Administrator Account (Super Admin)



This system flow diagram, "Archive Administrator Account," details how a Super Admin moves an existing administrator's profile to an archived state. The process begins with the Super Admin logging in and navigating to the "Super Admin Dashboard." From there, they select a specific administrator account from the table and click its row to open the "View Administrator Details Modal." Within this modal, the Super Admin clicks the "Archive" button. A crucial "Archive Admin Account Confirmation" modal then appears, requiring the Super Admin to click "Confirm." Upon final confirmation, the system changes the status of the admin account in the "User Accounts" database, effectively archiving it.

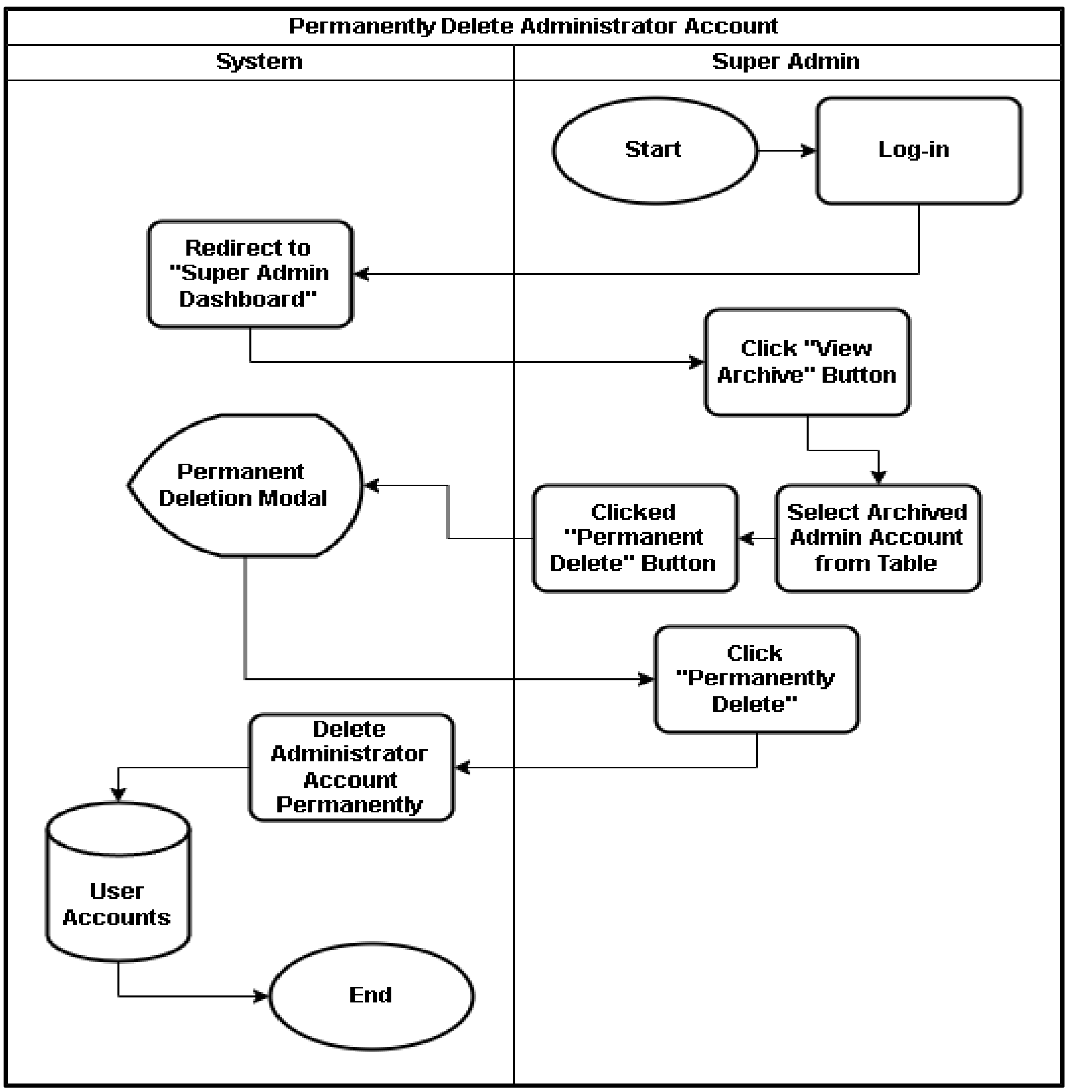
Figure 18. Restore Administrator Account (Super Admin)



This "Restore Administrator Account" outlines how a Super Admin reactivates an archived administrator profile. The process begins with the Super Admin logging into the system and navigating to their "Super Admin Dashboard." From there, they click "View

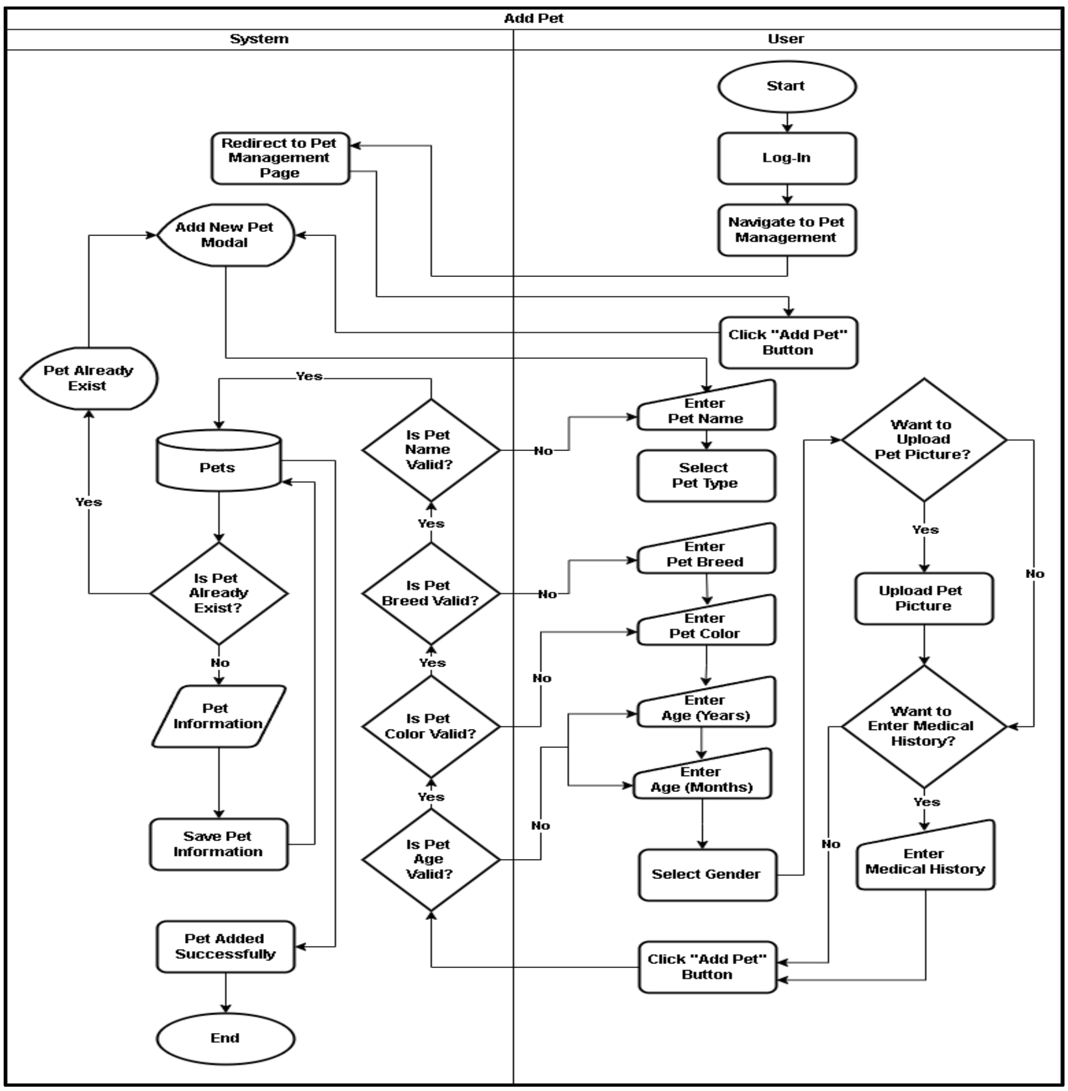
Archive" to access archived accounts, then select the specific administrator account for restoration from the displayed table. Upon selection, the Super Admin clicks a "Restore" button, which triggers the appearance of a "Restore Admin Account Modal." Within this modal, the Super Admin provides final confirmation by clicking the "Restore" button again. Finally, the system changes the status of the admin account in the "User Accounts" database, effectively restoring it to an active state.

Figure 19. Permanently Delete Administrator Account (Super Admin)



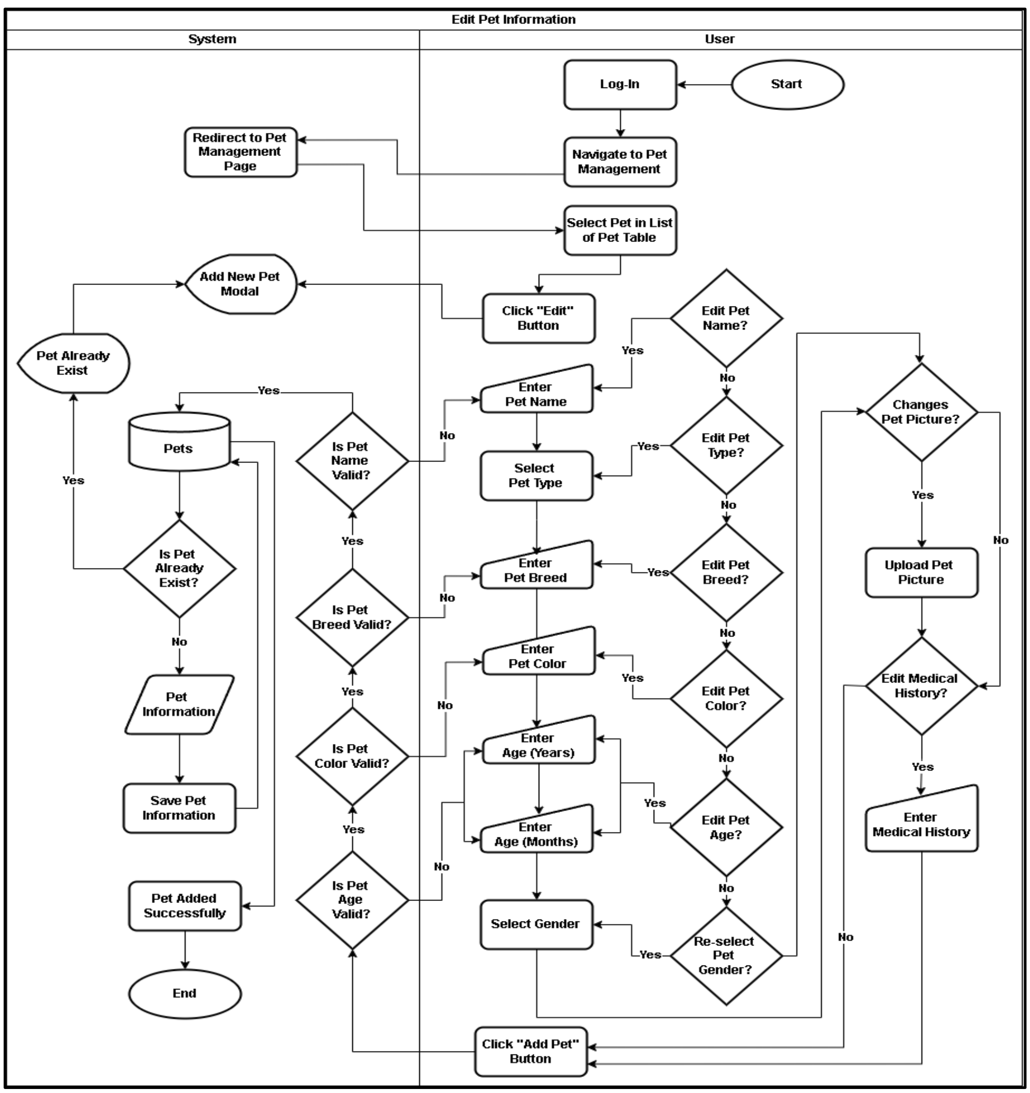
The "Permanently Delete Administrator Account" system flow outlines how a Super Admin irrevocably removes an archived admin profile. After logging in, the Super Admin accesses archived accounts via "View Archive" from their dashboard and selects the specific admin account for deletion. Clicking an initial "Permanent Delete" button triggers a "Permanent Deletion Modal" for critical confirmation. Within this modal, the Super Admin must confirm the irreversible action by clicking "Permanent Delete" again. The system then executes the permanent deletion of the administrator account from the database, concluding the process.

Figure 20. Add Pet (User)



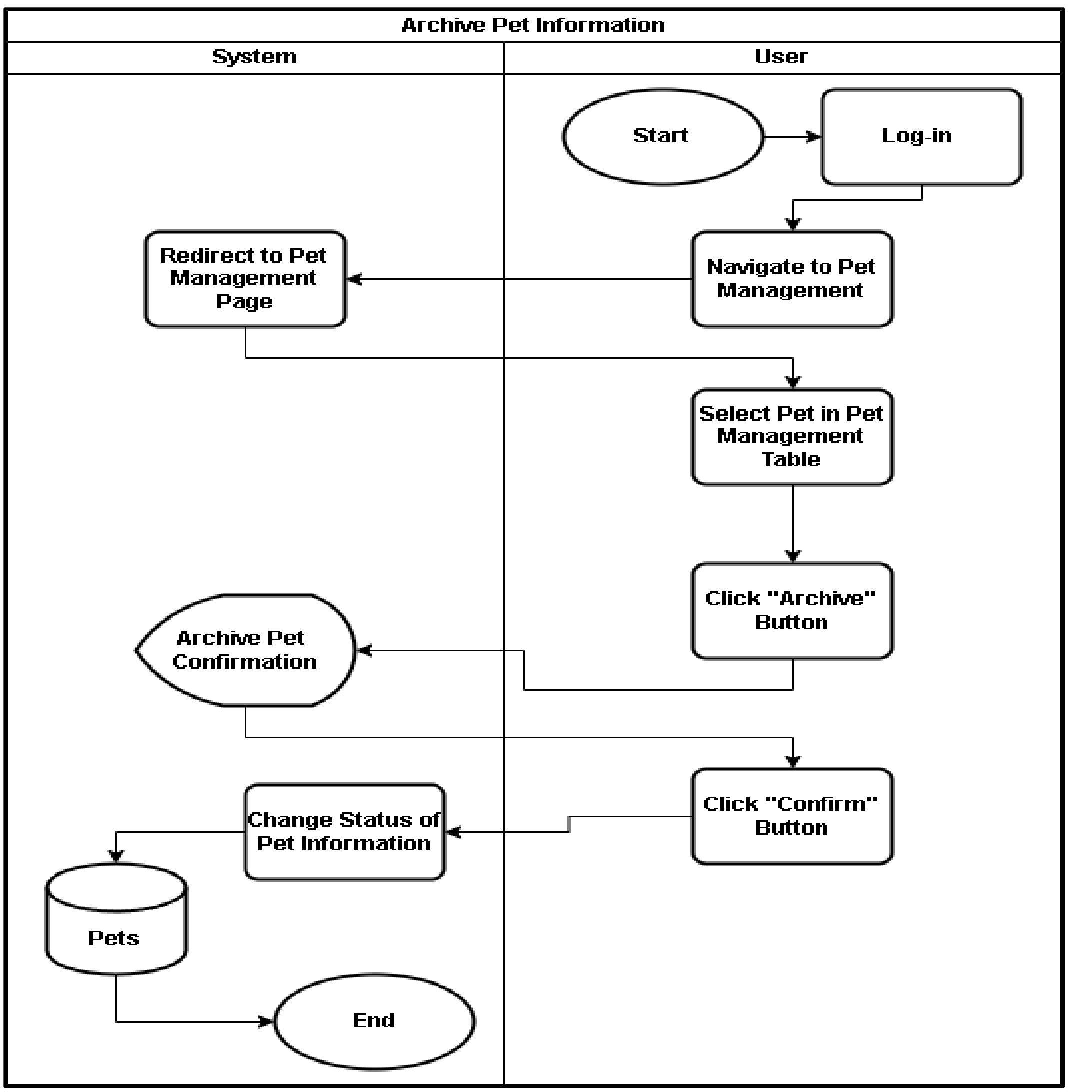
This system flow diagram, "Add Pet (User)," outlines the process for a user to register a new pet in the system. After logging in and navigating to the "Pet Management" page, the user clicks the "Add Pet" button, opening an "Add New Pet Modal". The user then inputs various pet details such as name, type, breed, and age, with optional fields for a picture or medical history. The system validates each piece of entered pet information for validity. Crucially, it checks if the pet already exists in the database, returning to the modal if a duplicate is found. Upon successful validation and uniqueness, the system saves the pet's information, confirming "Pet Added Successfully" and concluding the process.

Figure 21. Edit Pet Information (User)



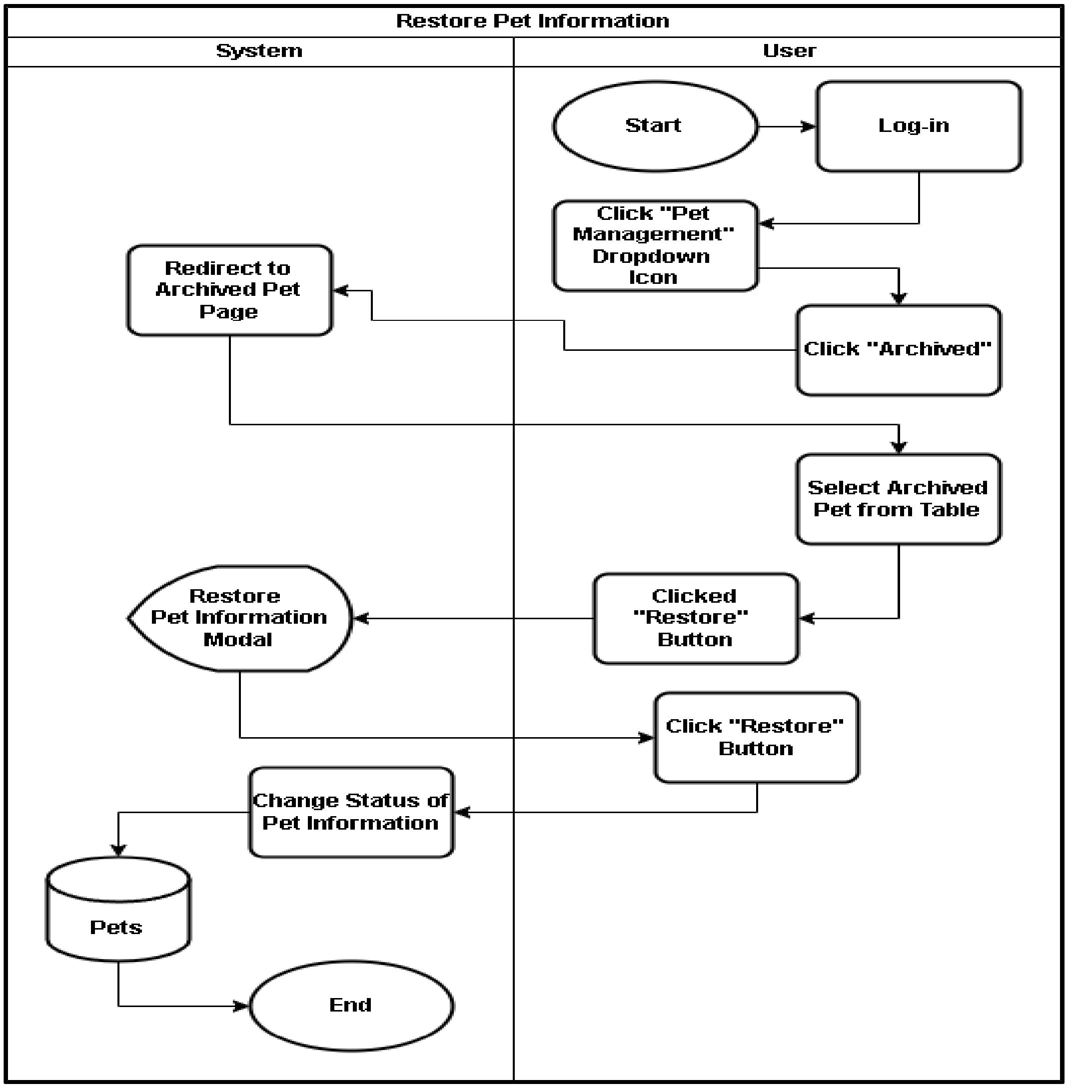
The Edit Pet Information process allows users to update details of a previously registered pet. Upon logging in and accessing the "Pet Management" page, the user selects a pet and chooses the "Edit" option. This opens a modal populated with the current information of the pet. The user can then modify any of the fields, including name, breed, age, and other details. The system validates the updated data to ensure compliance with format requirements and to avoid duplicate entries. Once the changes pass validation, the modified information is stored in the database, and a success notification is presented to the user. This function ensures that pet data remains accurate and up to date.

Figure 22. Archive Pet Information (User)



This diagram illustrates the process of archiving a pet’s profile. After logging into the system and navigating to the list of registered pets, the user selects the pet they wish to archive. By clicking the "Archive" button, a confirmation modal appears to ensure the action is intentional. Once confirmed, the system updates the pet's status in the database to "archived," effectively hiding the pet from the active list. This allows users to manage inactive or past pets without permanently deleting their records, preserving historical data for future reference.

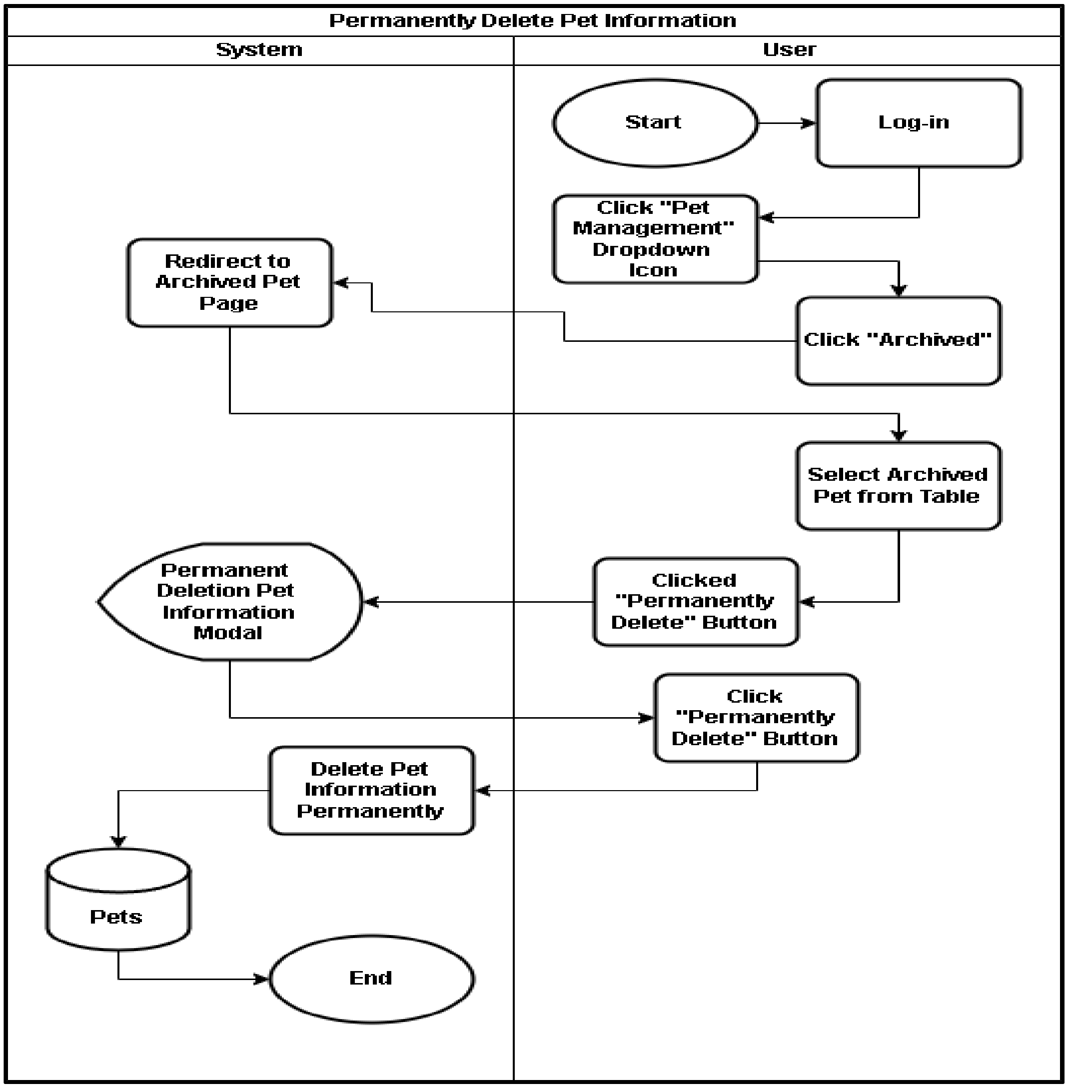
Figure 23. Restore Pet Information (User)



The restoration process allows users to reactivate a previously archived pet. The user accesses the "Archived Pets" section and selects the pet they want to restore. Upon clicking the "Restore" button, a confirmation modal appears to confirm the action.

When confirmed, the system changes the pet's status from "archived" to "active" in the database, restoring it to the visible list under "Pet Management." This ensures users have the flexibility to manage pet data dynamically and reversibly.

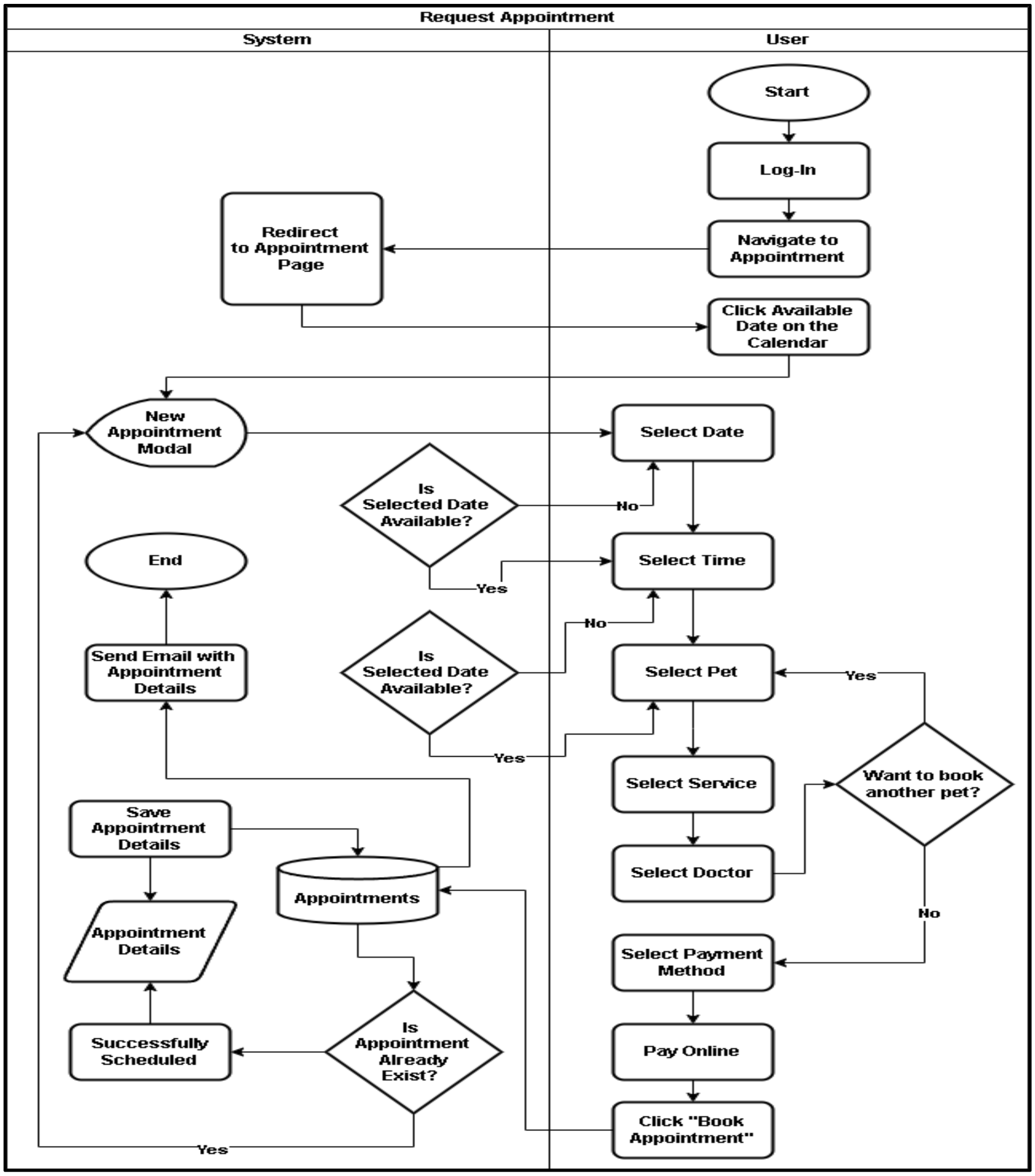
Figure 24. Permanently Delete Pet Information (User)



This process represents the final and irreversible deletion of pet records. After accessing the archived pet list, the user selects a pet and initiates the "Permanent Delete" process. A critical confirmation prompt ensures the action is deliberate.

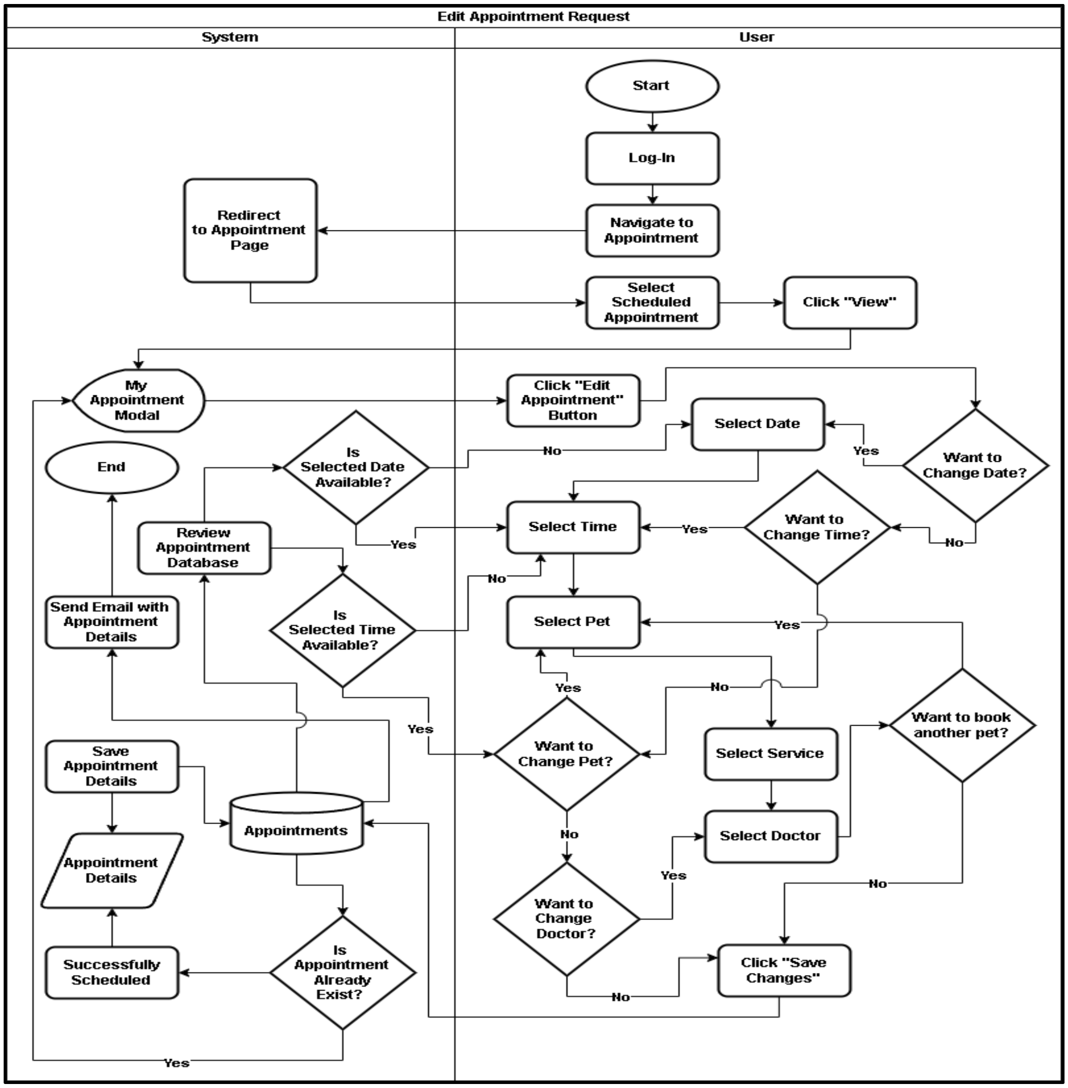
Upon confirmation, the system removes the pet's data from the database entirely. This functionality is crucial for maintaining a clean dataset and ensuring that obsolete or incorrect records are completely eliminated.

Figure 25. Request Appointment (User)



The Request Appointment process enables users to schedule veterinary appointments. After logging in, users navigate to the appointment page, choose a date and time, select a registered pet, and optionally add notes. The system validates the inputs and checks availability before storing the request as pending. A confirmation message is shown, and the request becomes visible to the administrator for further action. This facilitates structured and organized scheduling.

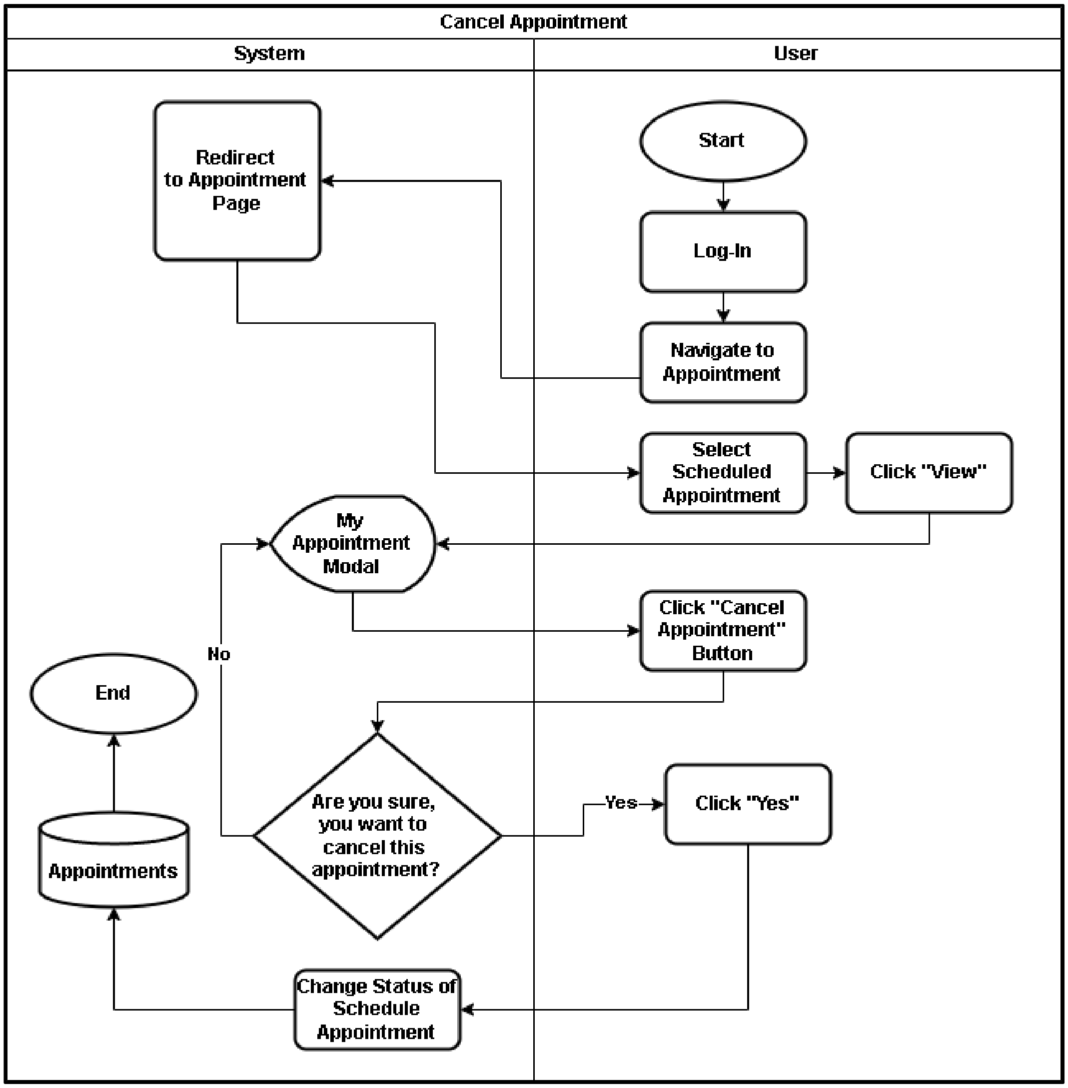
Figure 26. Edit Appointment Request (User)



This process details how users can modify pending appointment requests. After selecting an appointment, the user clicks the "Edit" button, which opens a modal containing current details.

The user can change fields such as the appointment date, time, and reason. The system validates new inputs, ensures there are no scheduling conflicts, and updates the record upon successful validation. A confirmation message is provided to complete the process.

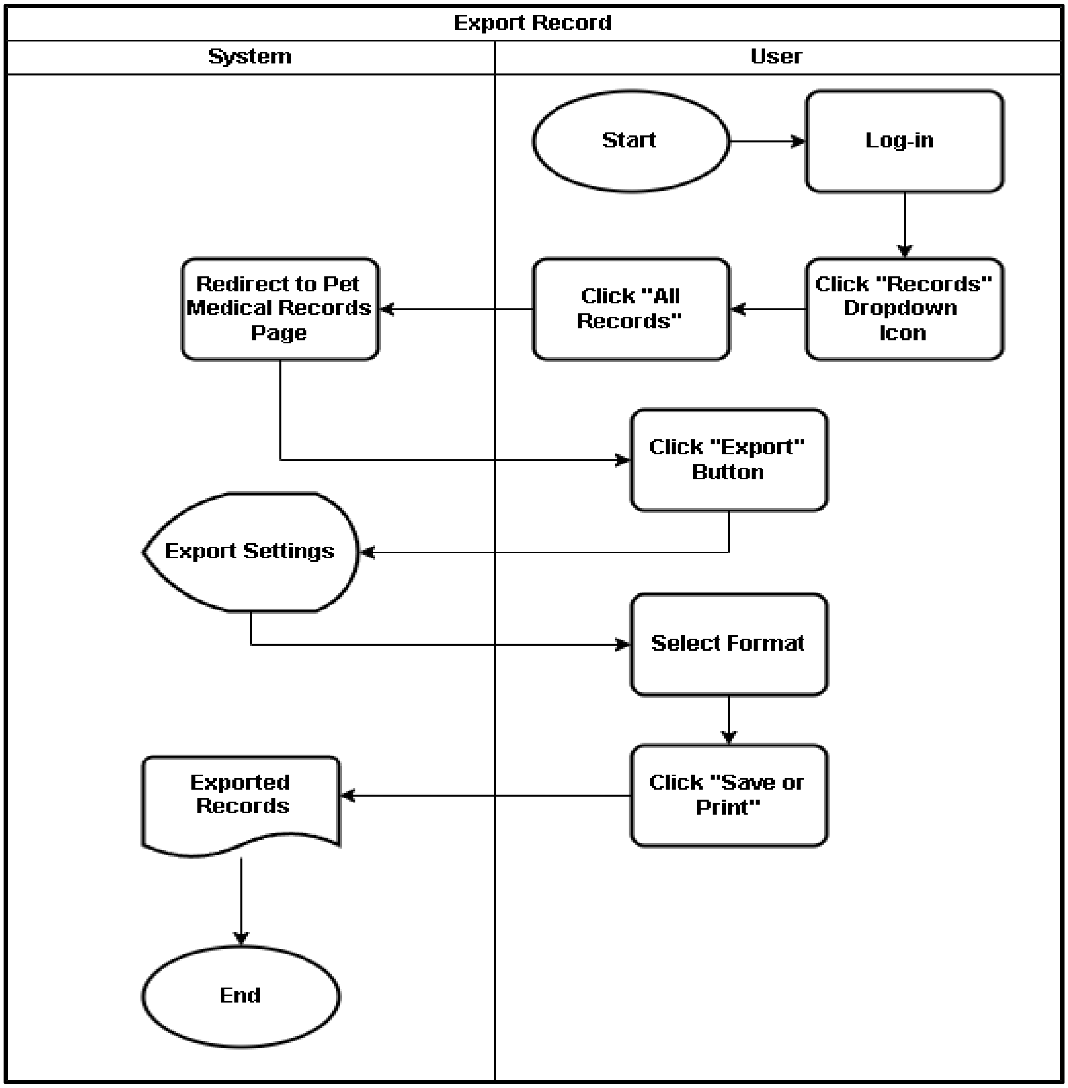
Figure 27. Cancel Appointment (User)



The "Cancel Appointment" process allows users to withdraw their scheduled or pending appointments. After logging in and navigating to their appointments list, the user selects an entry and clicks "Cancel."

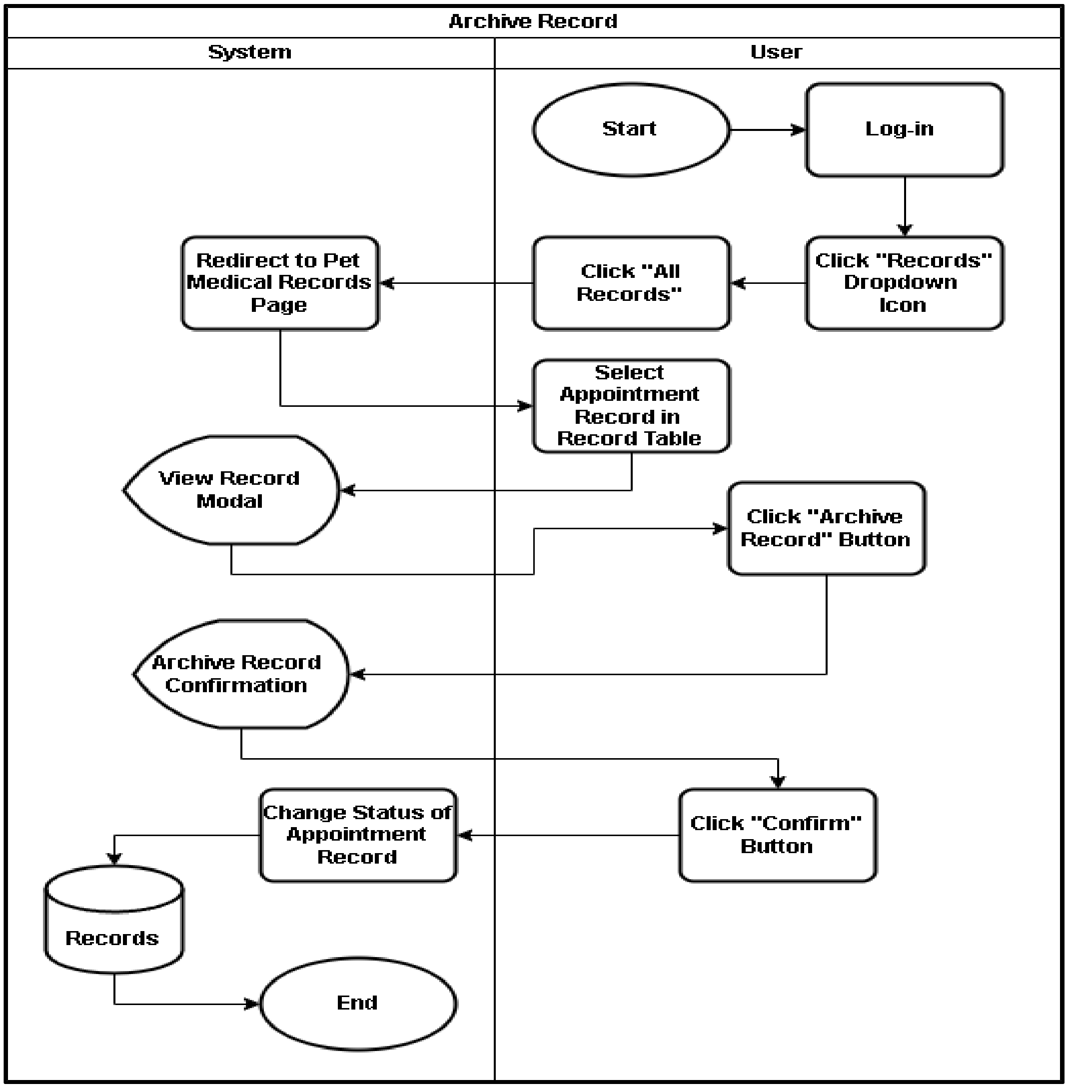
The system presents a confirmation dialog to prevent accidental cancellations. Once confirmed, the appointment status is updated to "canceled," and the slot is freed for other users. This ensures proper time management for both users and administrators.

Figure 28. Export Record (User)



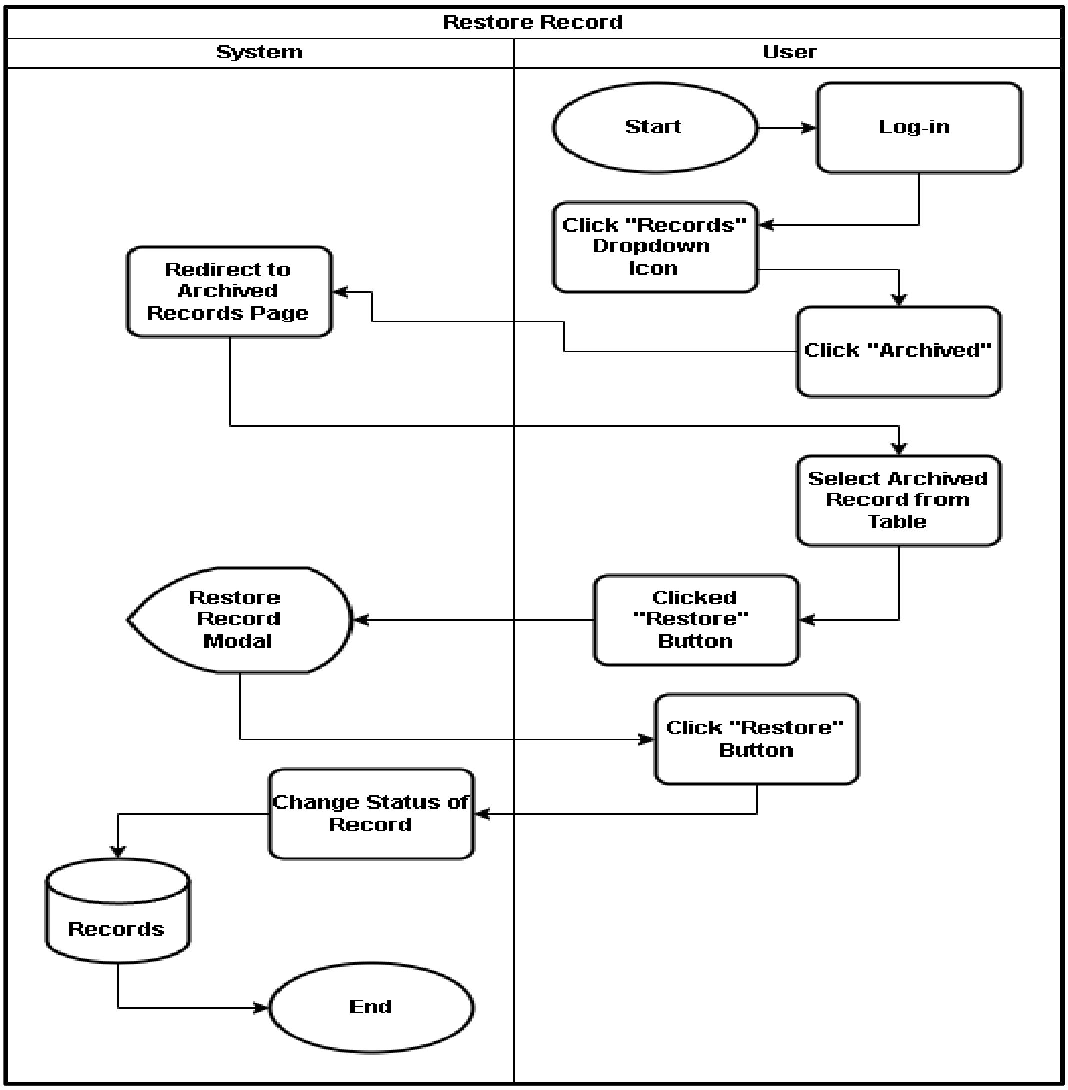
This system process enables users to export various data such as pet records or appointment logs. From the relevant section, the user clicks an "Export" button, prompting the system to compile and format the data into a downloadable file. The file, typically in PDF or CSV format, is then made available for download. This feature is beneficial for personal record-keeping, printing, or sharing information externally.

Figure 29. Archive Record (User)



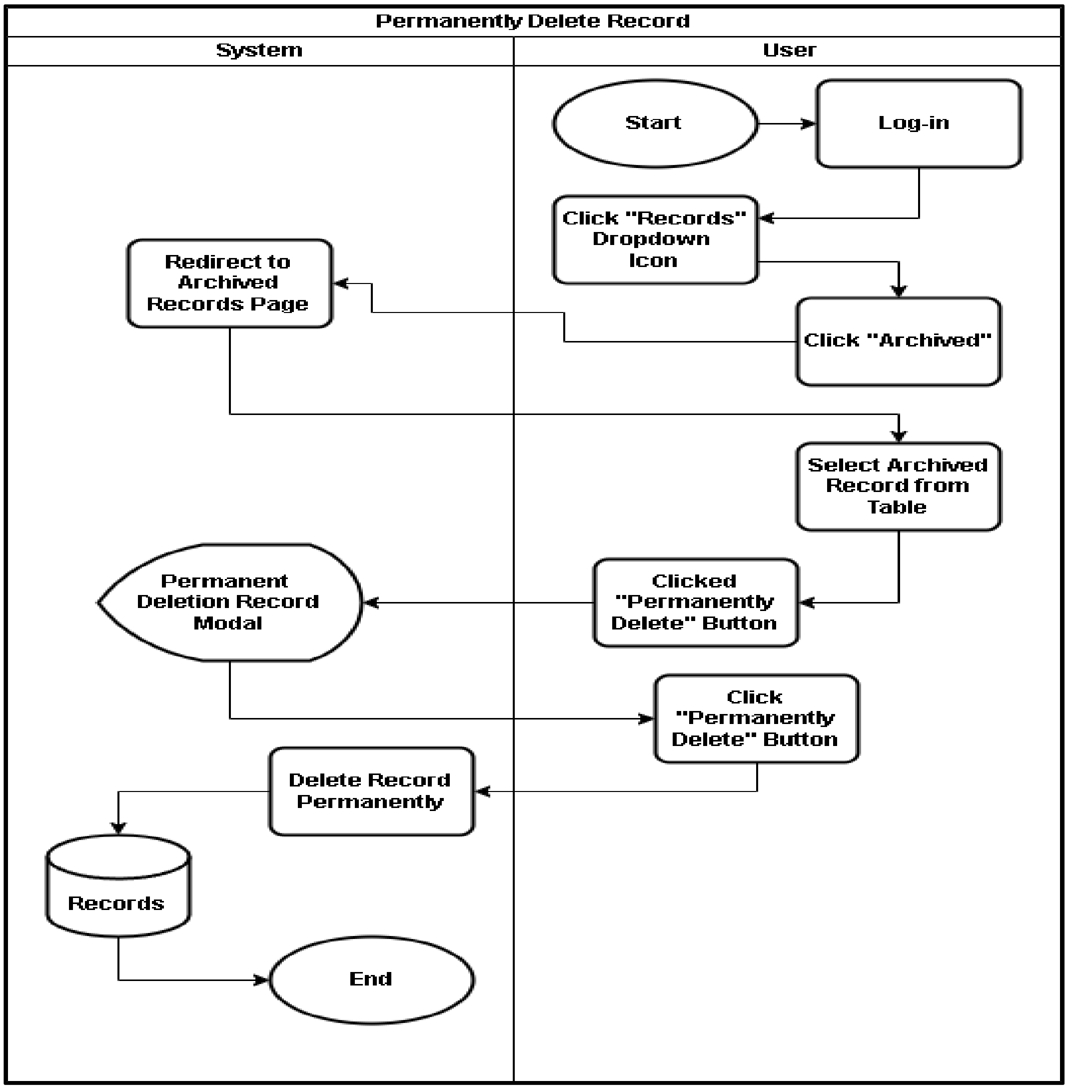
The "Archive Record (User)," shows the process for a user to move a pet medical record to an archived state. After logging in and navigating to the "Pet Medical Records Page" via the "Records" dropdown and "All Records" option. From the displayed record table, the user selects the specific appointment record they wish to archive. After selection, the user clicks the "Archive Record" button, which leads to a "View Record Modal" and subsequently an "Archive Record Confirmation" modal. Within this confirmation modal, the user provides final consent by clicking the "Confirm" button. The system then changes the status of the selected appointment record in the "Records" database, effectively archiving it and concluding the process.

Figure 30. Restore Record (User)



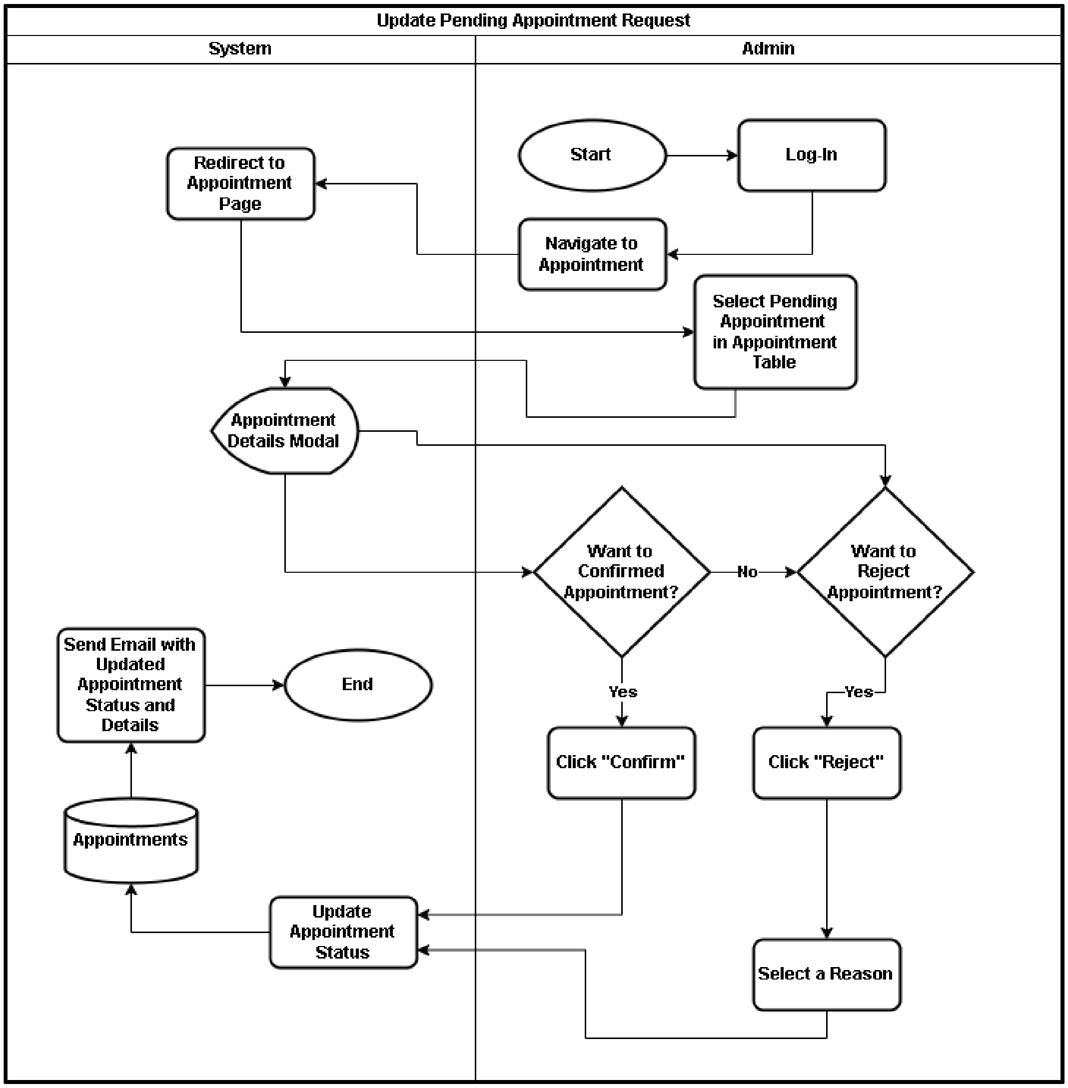
This system flow diagram, "Restore Record (User)," outlines the process for a user to reactivate an archived record. The user initiates this by logging in and navigating to the "Archived Records Page" via the "Records" dropdown. From the table of archived records, the user selects the specific record they wish to restore. After selection, the user clicks the "Restore" button, which triggers a "Restore Record Modal" for confirmation. Within this modal, the user provides final confirmation by clicking the "Restore" button again. The system then changes the status of the record in the "Records" database, bringing it back to an active state and concluding the process.

Figure 31. Permanently Delete Record (User)



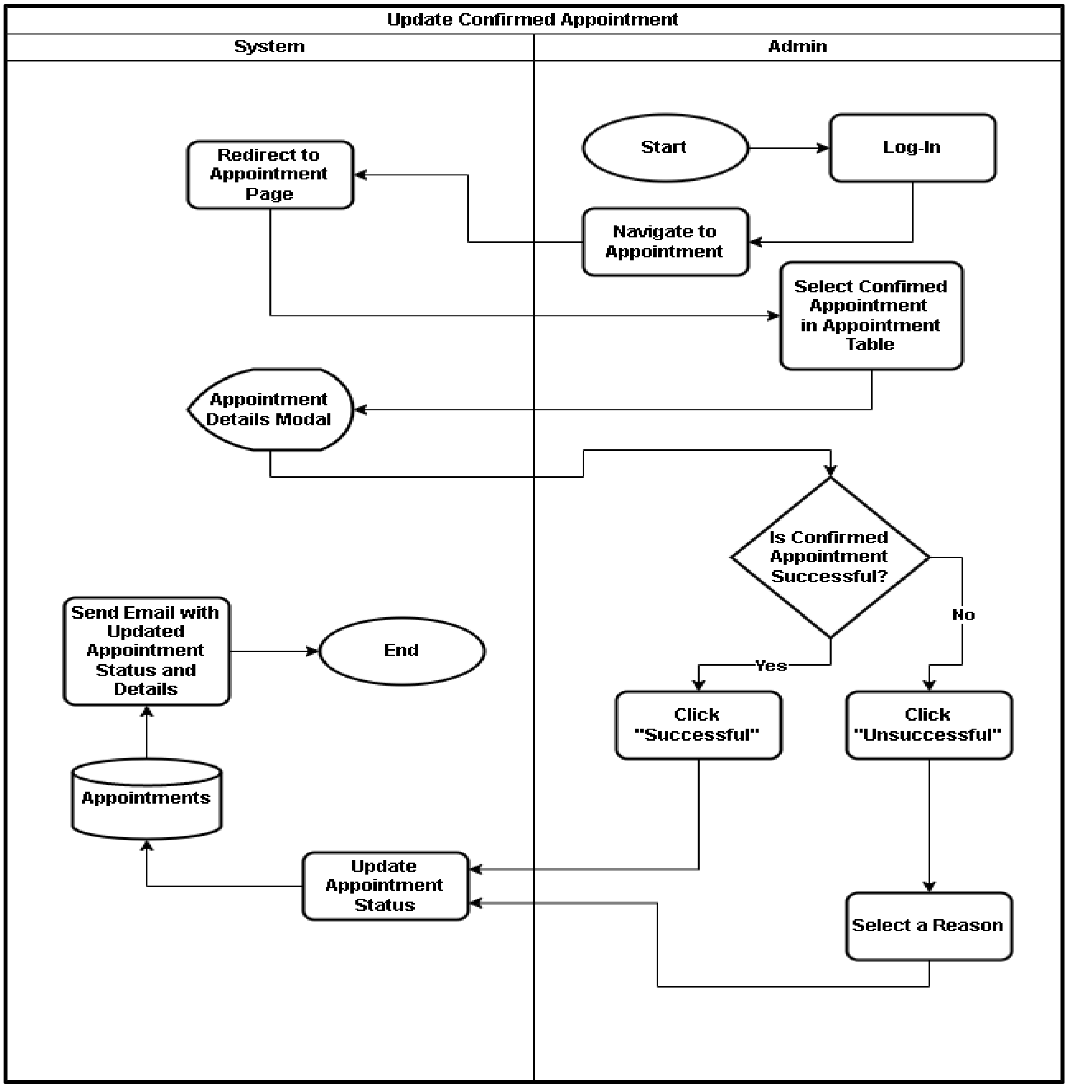
The "Permanently Delete Record" system flow diagram allows users to completely remove an archived record from the system. From the archive view, the user selects a record and chooses the delete option. The system prompts a final confirmation to avoid accidental deletion. Upon approval, the system removes the record from the database, ensuring it cannot be recovered. This function maintains data relevance and security.

Figure 32. Update Pending Appointment Request (Admin)



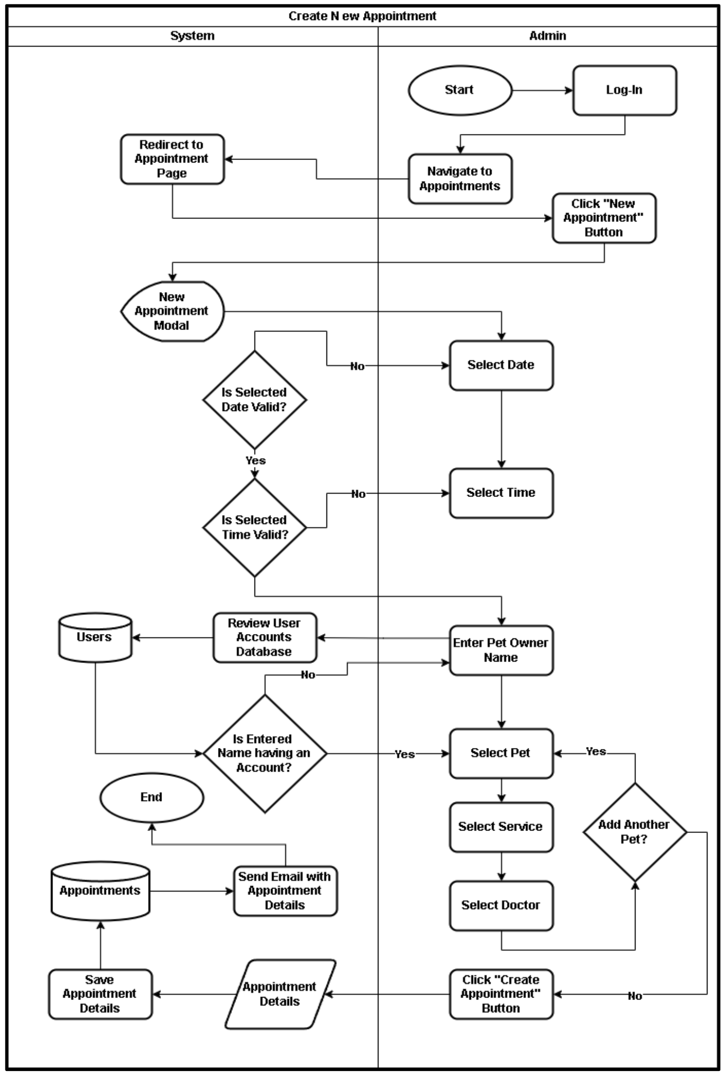
This system flow diagram, "Update Pending Appointment Request," outlines how an Admin manages incoming appointment requests. The Admin begins by logging in and navigating to the Appointment Page, then selecting a pending appointment from the table. This action opens an "Appointment Details Modal," presenting options to either confirm or reject the request. If the Admin chooses to confirm, they click "Confirm"; if they choose to reject, they click "Reject" and then select a reason. Following this decision, the system updates the appointment status in the "Appointments" database accordingly. Finally, an email containing the updated appointment status and details is sent, concluding the process.

Figure 33. Update Confirmed Appointment (Admin)



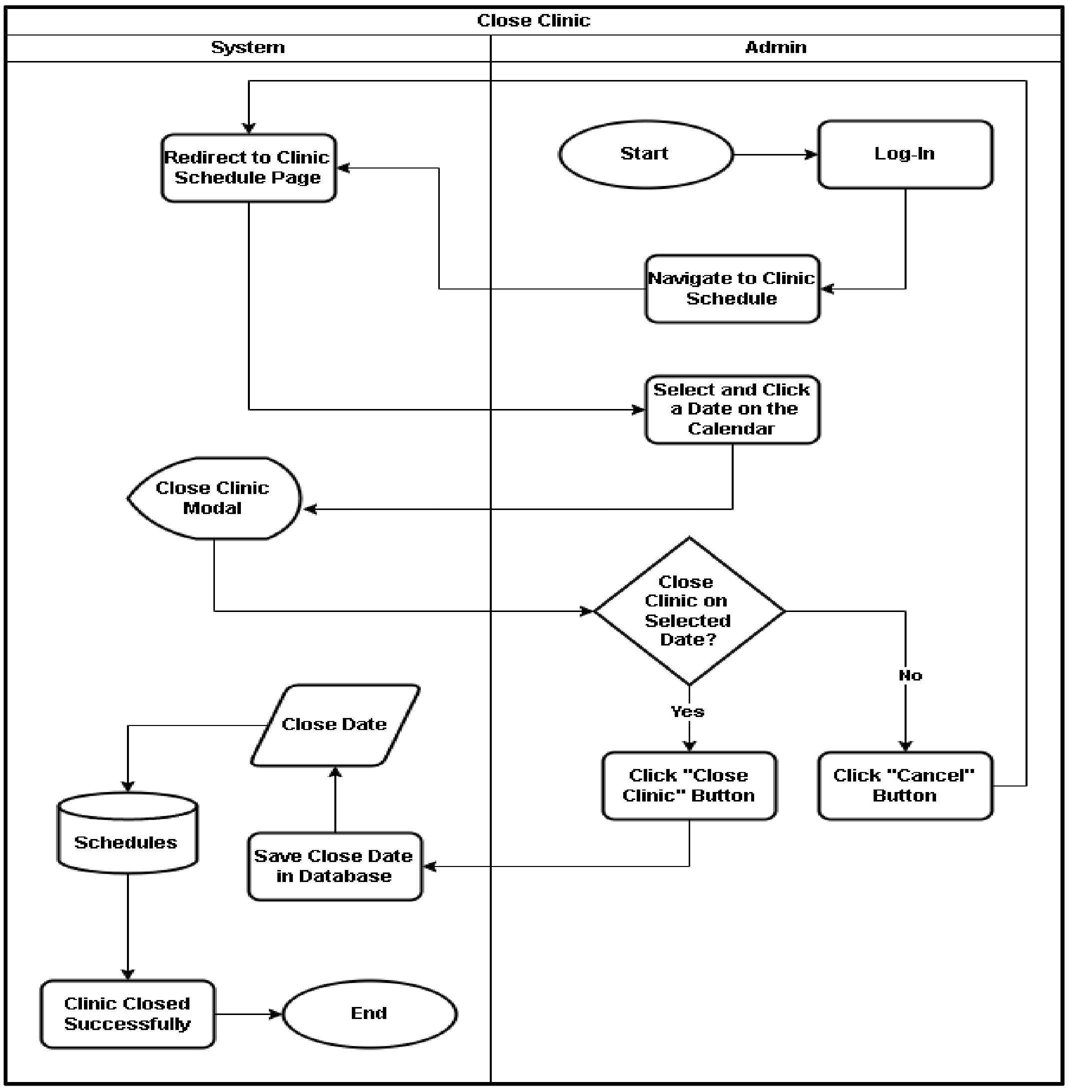
This system flow diagram, "Update Confirmed Appointment," illustrates how an Admin updates the status of a scheduled appointment. The Admin initiates the process by logging into the system and navigating to the Appointment Page. They then select a specific confirmed appointment from the table, which opens an "Appointment Details Modal". From the modal, the Admin decides if the appointment was "Successful" or "Unsuccessful," selecting a reason if unsuccessful. Following this decision, the system updates the appointment's status within the "Appointments" database. Finally, an email containing the updated appointment status and details is sent to the relevant parties, concluding the process.

Figure 34. Create New Appointment (Admin)



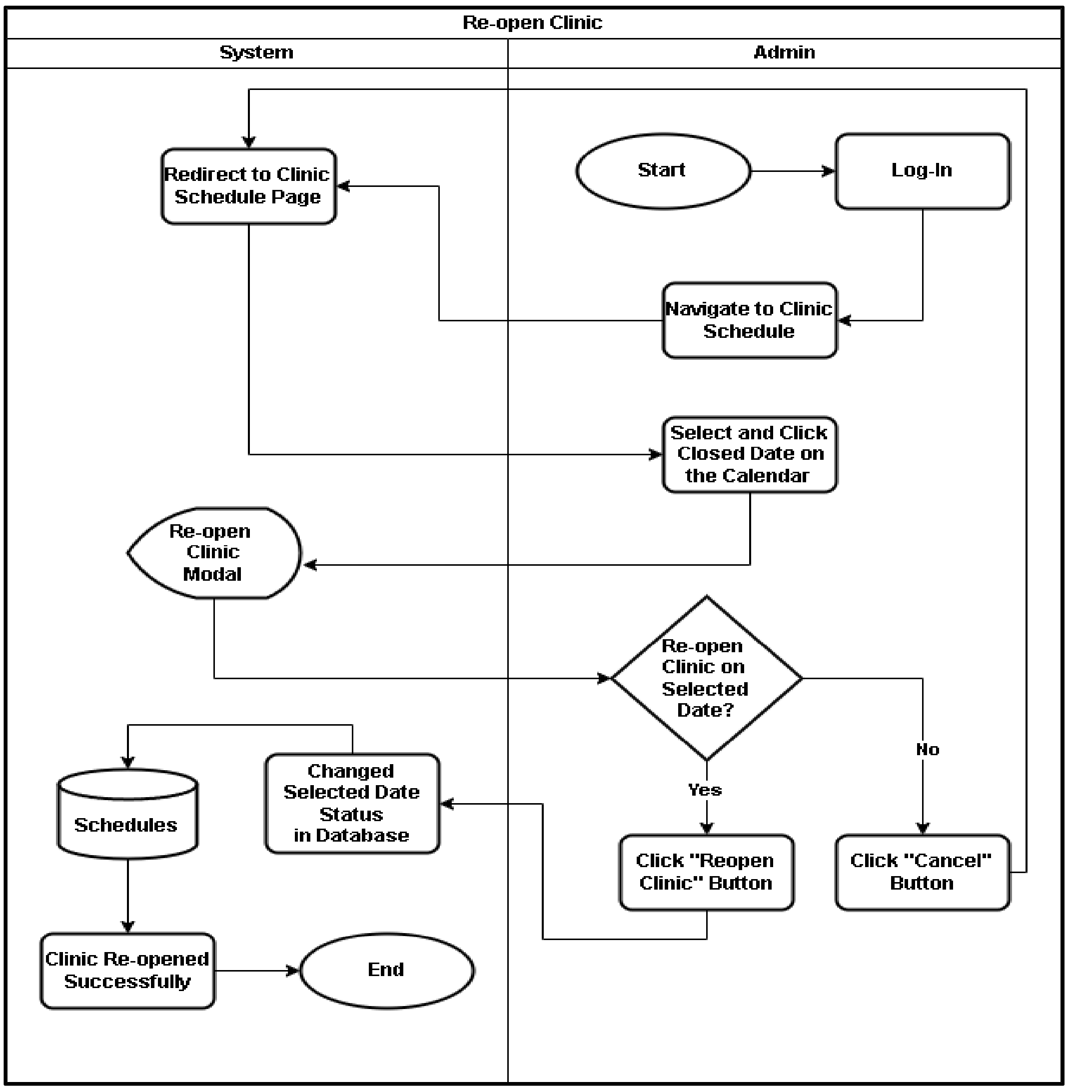
The "Create New Appointment (Admin)," outlines the process for an administrator to schedule a new appointment. The Admin begins by logging in, navigating to "Appointments," and clicking the "New Appointment" button, which opens a modal. The Admin selects the desired date and time, which the system validates for availability. Next, the Admin enters the pet owner's name, prompting the system to verify if an account exists, otherwise ending the process. If the owner is found, the Admin selects the pet, service, and doctor, with an option to add more pets before clicking "Create Appointment". Upon creation, the system saves the appointment details to the database and sends a confirmation email, concluding the process.

Figure 35. Close Clinic (Admin)



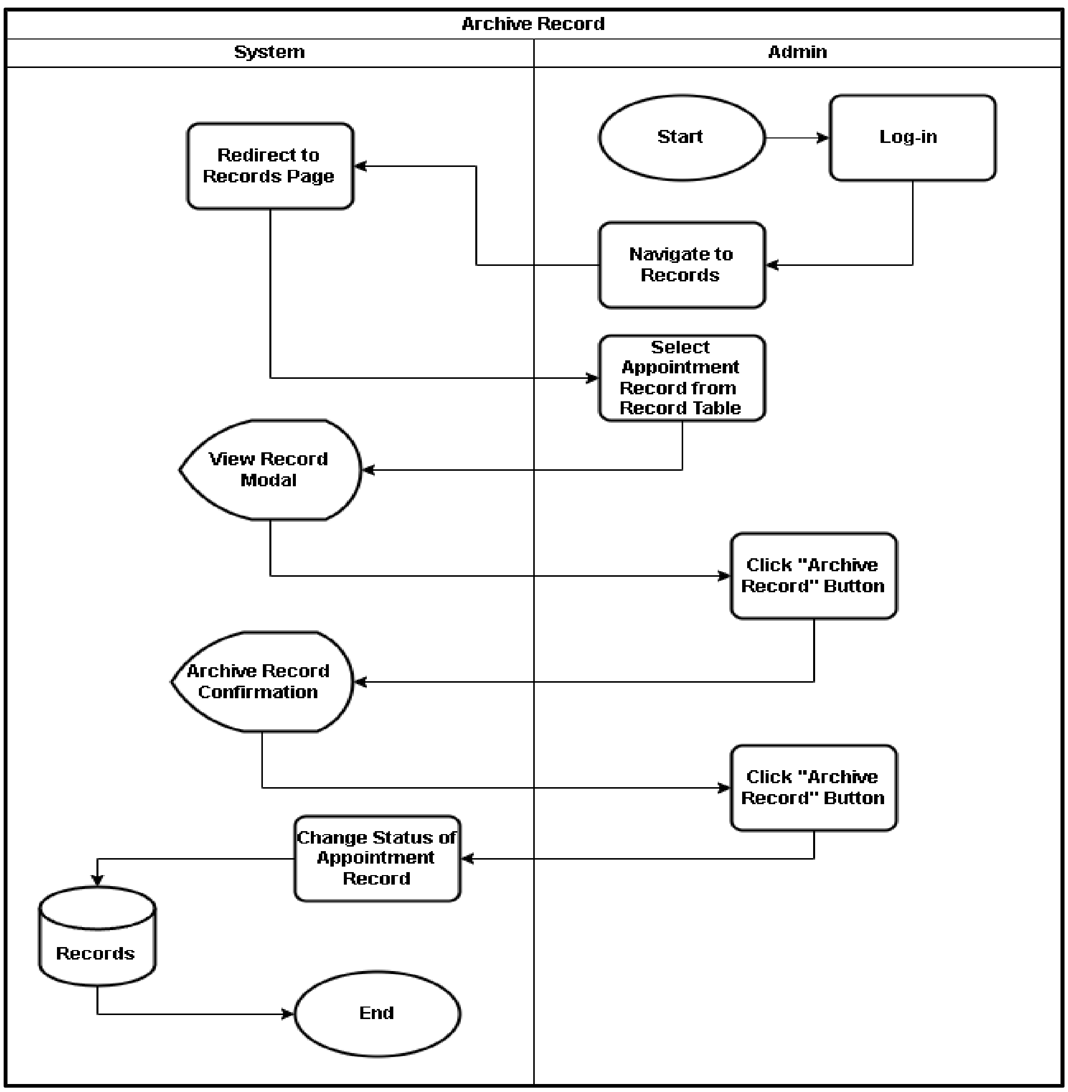
This system flow diagram, "Close Clinic (Admin)," details the process for an Admin to mark a specific clinic date as closed. The Admin initiates by logging into the system and navigating to the Clinic Schedule page. From the calendar, they select and click on the desired date, which triggers the appearance of a "Close Clinic Modal". The Admin then confirms their decision to close the clinic on the selected date within this modal. If confirmed, the Admin clicks the "Close Clinic" button, prompting the system to save the closed date in the database. The process concludes with a "Clinic Closed Successfully" message, indicating the date is now unavailable for appointments.

Figure 36. Re-open Clinic (Admin)



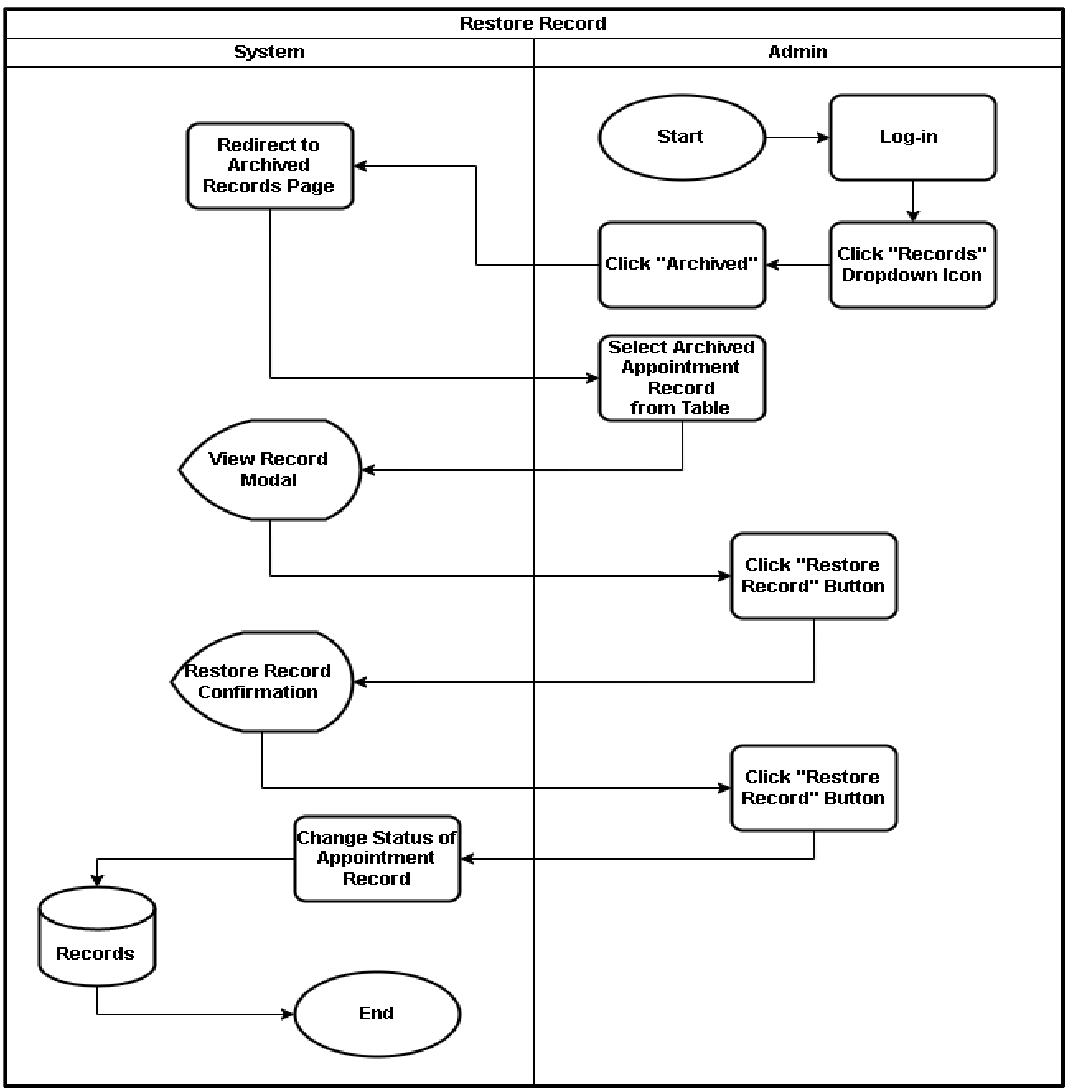
This process allows previously closed clinic dates to be made available again for appointment scheduling. Administrators begin by logging into their dashboard and navigating to the clinic schedule section. Closed dates are typically labeled or marked as unavailable in the system interface. When a closed date is selected, the admin clicks the "Re-open Clinic" button, which prompts a confirmation modal. Upon confirmation, the system updates the selected date's status from "closed" to "open" in the clinic schedule database. The date becomes accessible once again for booking appointments. This function enables flexible and responsive clinic scheduling and ensures that last-minute operational changes can be efficiently implemented.

Figure 37. Archive Record (Admin)



Admin users utilize the archive process to manage records that are no longer actively required but should be retained for reference or compliance. From the admin interface, they navigate to the records section and select one or multiple records. Upon clicking the "Archive" option, the system triggers a confirmation modal. Once confirmed, the system updates the record status to "archived," moving it out of the main active list. These archived records are preserved in a separate section, where they can be accessed or restored later. This process streamlines data visibility while ensuring no important information is lost.

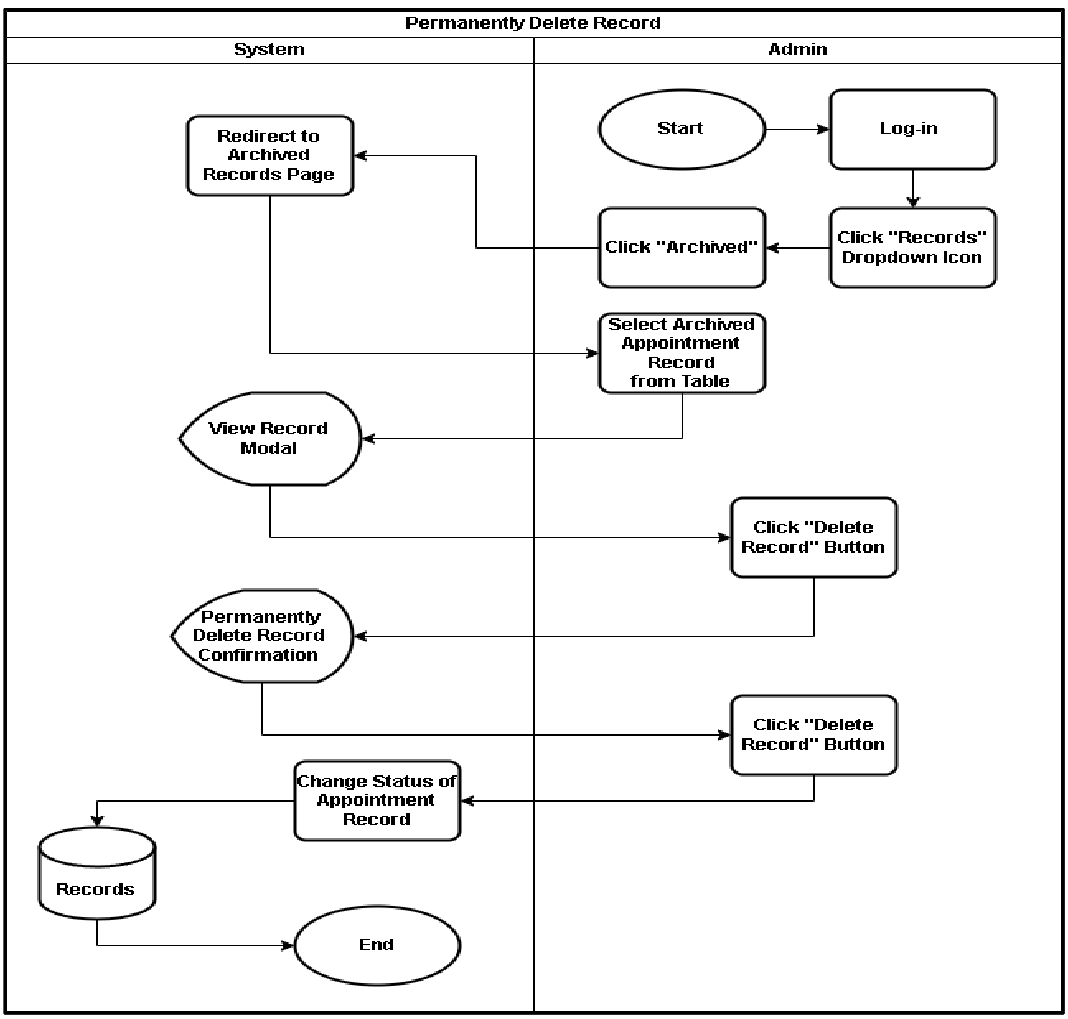
Figure 38. Restore Record (Admin)



The restore record process allows administrators to reactivate previously archived data entries. Admins access the archive section, review the list of archived records, and select the desired entry. By clicking the "Restore" button, a confirmation modal is presented to finalize the action.

Once approved, the system updates the record status to "active," reintegrating it into the current working dataset. This function provides flexibility in data management, ensuring that historical records can be retrieved and reused when needed for future operations or audits.

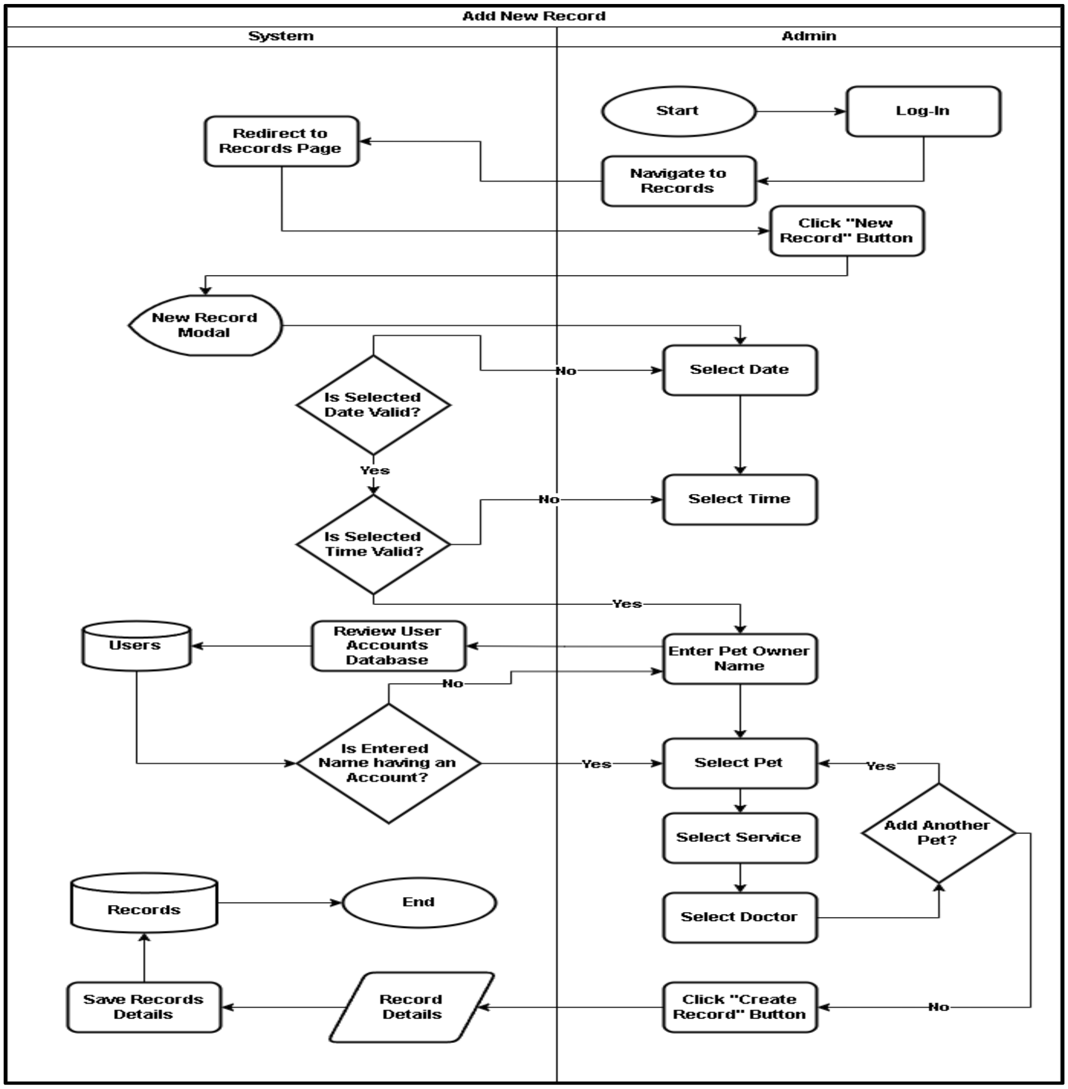
Figure 39. Permanently Delete Record (Admin)



In this process, administrators permanently remove archived records from the database. This is typically reserved for obsolete or redundant data. The admin accesses the archive, selects the target record, and clicks the "Permanently Delete" option, prompting a final confirmation dialog.

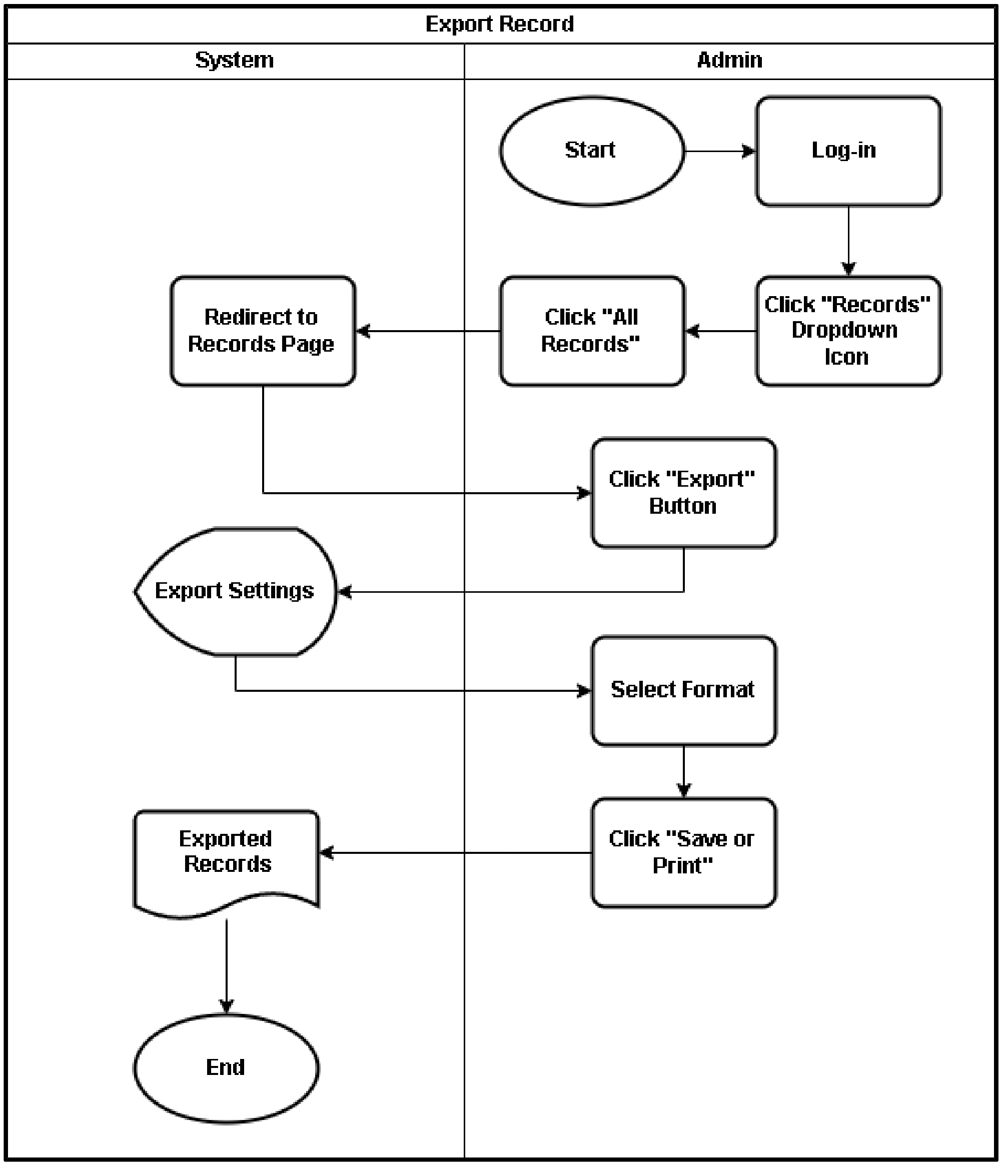
Once confirmed, the system deletes the record from the backend database entirely. This action is irreversible and must be carried out with caution. It is especially useful for maintaining a streamlined and efficient data storage environment, ensuring that only necessary and relevant records are retained.

Figure 40. Add New Record (Admin)



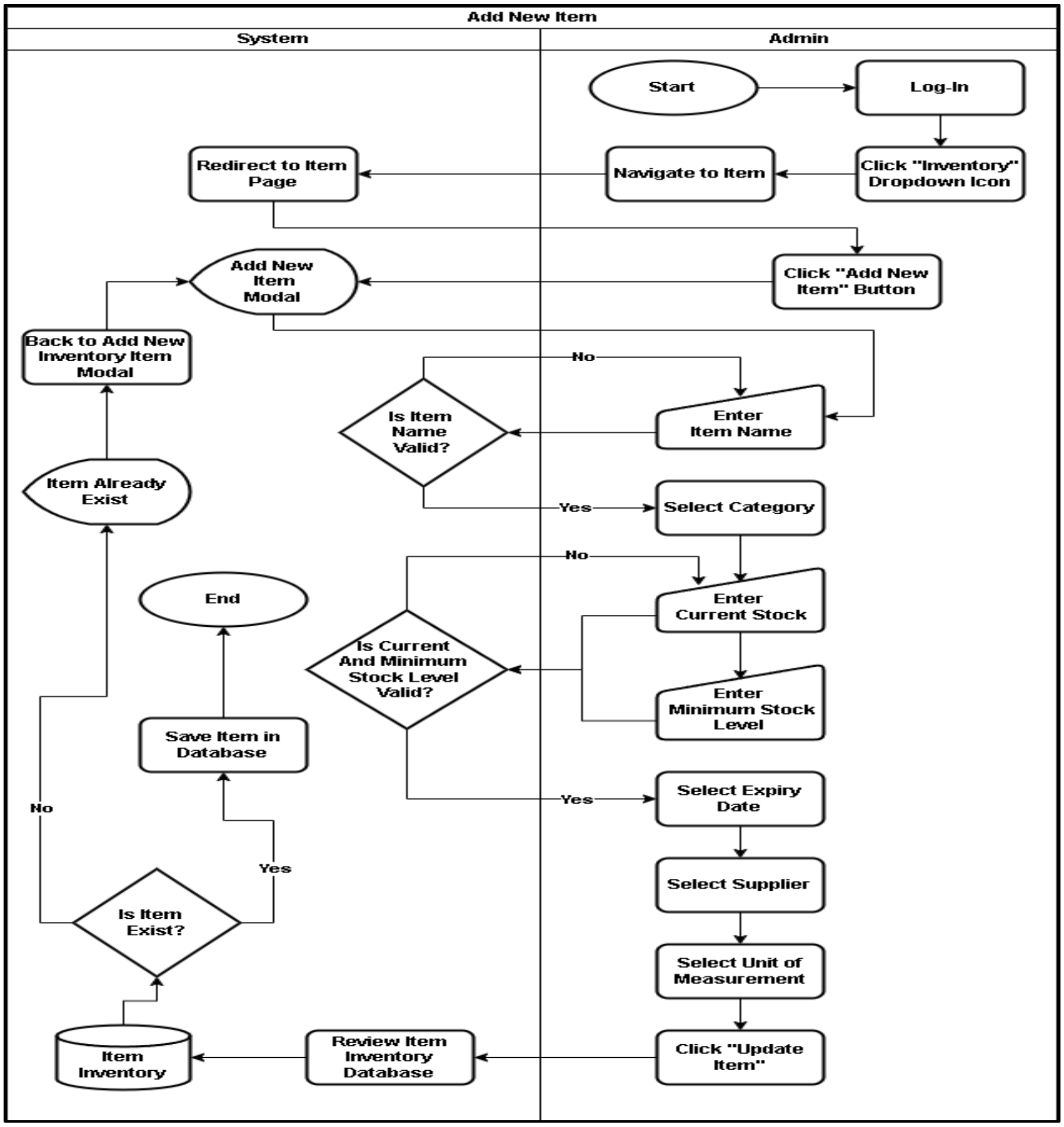
This process flow illustrates how administrators add new records related to users, pets, appointments, or medical logs. From the admin dashboard, they navigate to the record management section and click the "Add New Record" button. A form appears where information such as date, pet details, services rendered, and veterinarian notes can be entered. The system validates all input fields for completeness and correctness. Upon successful submission, the new record is stored in the system database and associated with the relevant user or pet profile. This capability supports comprehensive documentation and facilitates continuity of care and service delivery.

Figure 41. Export Record (Admin)



This system function allows administrators to export selected records for reporting, auditing, or sharing purposes. Admins select one or more records from the management interface and click the "Export" button. The system prompts for the desired format, typically PDF or CSV. After generating the file, the system provides a download link or emails the file to the admin's registered address. This feature is essential for generating official reports, maintaining backups, and supporting external communication with stakeholders or institutions.

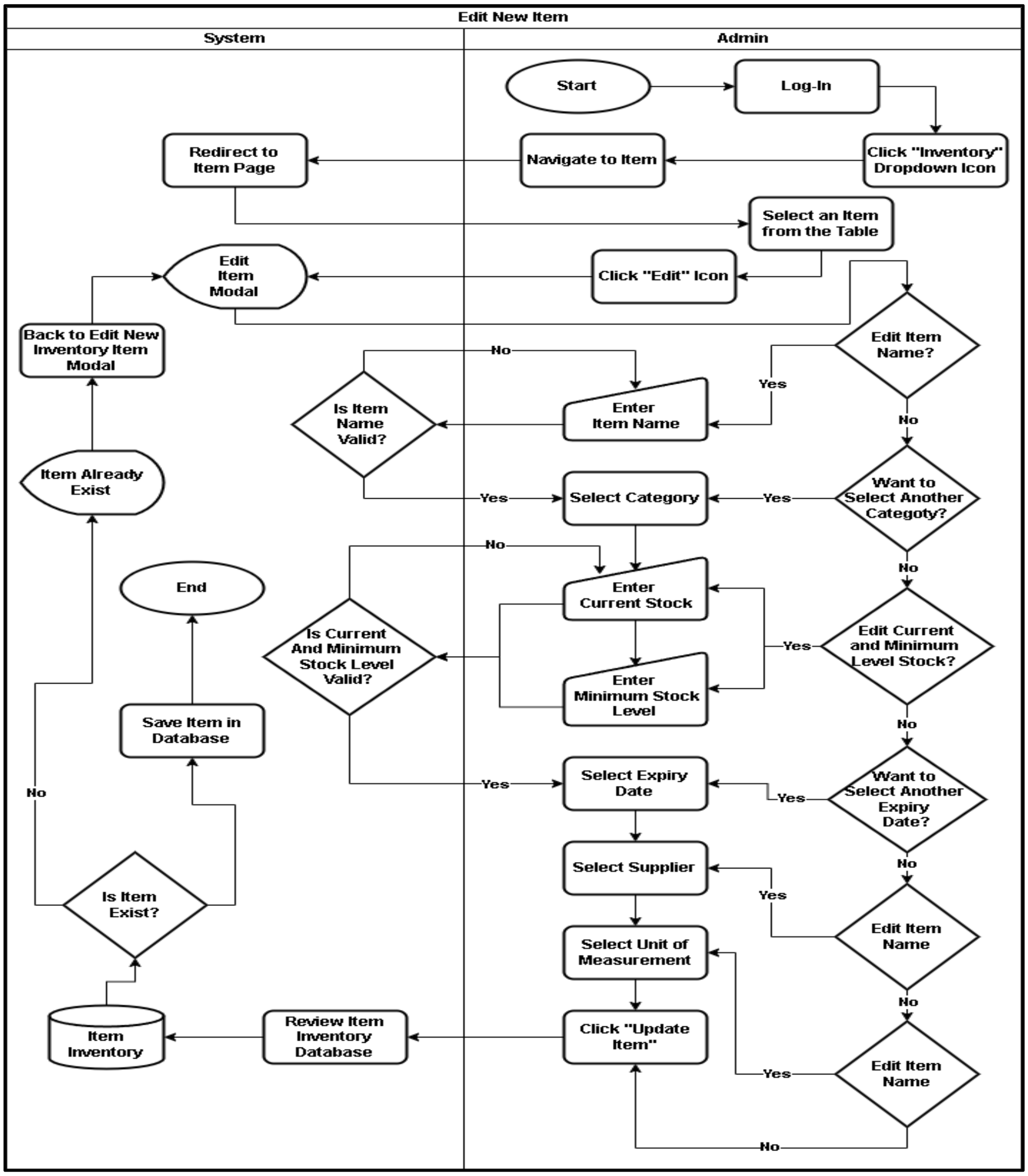
Figure 42. Add New Item (Admin)



The "Add New Item" process allows administrators to include new inventory items into the system. The admin opens the inventory module and selects the option to add a new item. A form is provided to enter item details such as name, quantity, category, unit price, and expiration date (if applicable). The system performs data validation to prevent entry of duplicate or incorrectly formatted information. After successful submission, the new item is saved in the inventory database and becomes available for future tracking, usage, or audits.

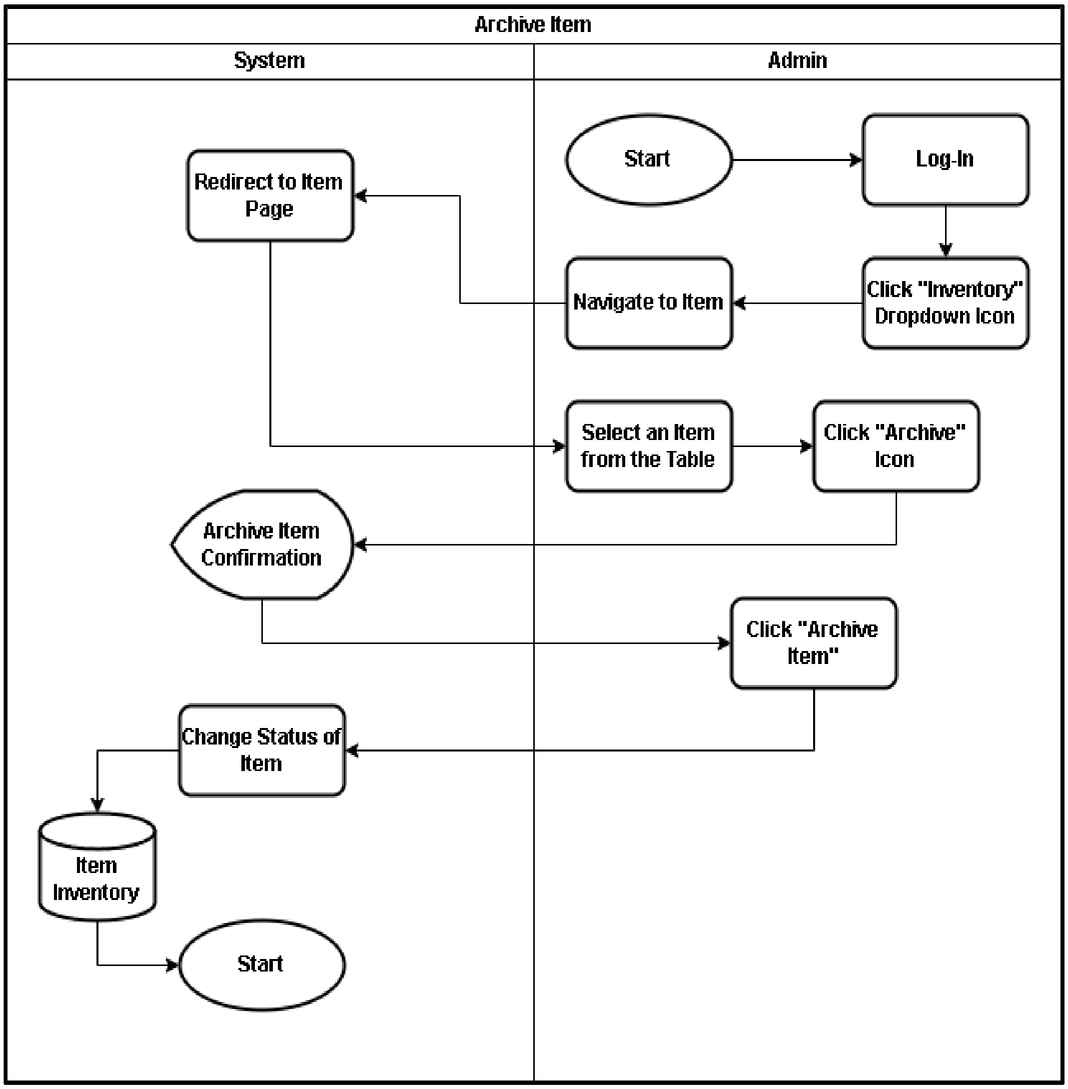
This supports effective inventory control and ensures clinic supplies are properly documented.

Figure 43. Edit Item (Admin)



This diagram outlines how administrators can modify details of an existing inventory item. The admin accesses the inventory module, searches for the item, and clicks the "Edit" button. A modal or page displays the current item details for editing. Changes may include quantity adjustments, supplier information, updated pricing, or item status. The system validates the edits and, upon approval, saves the updated information to the inventory database. This ensures accurate tracking and management of clinic resources.

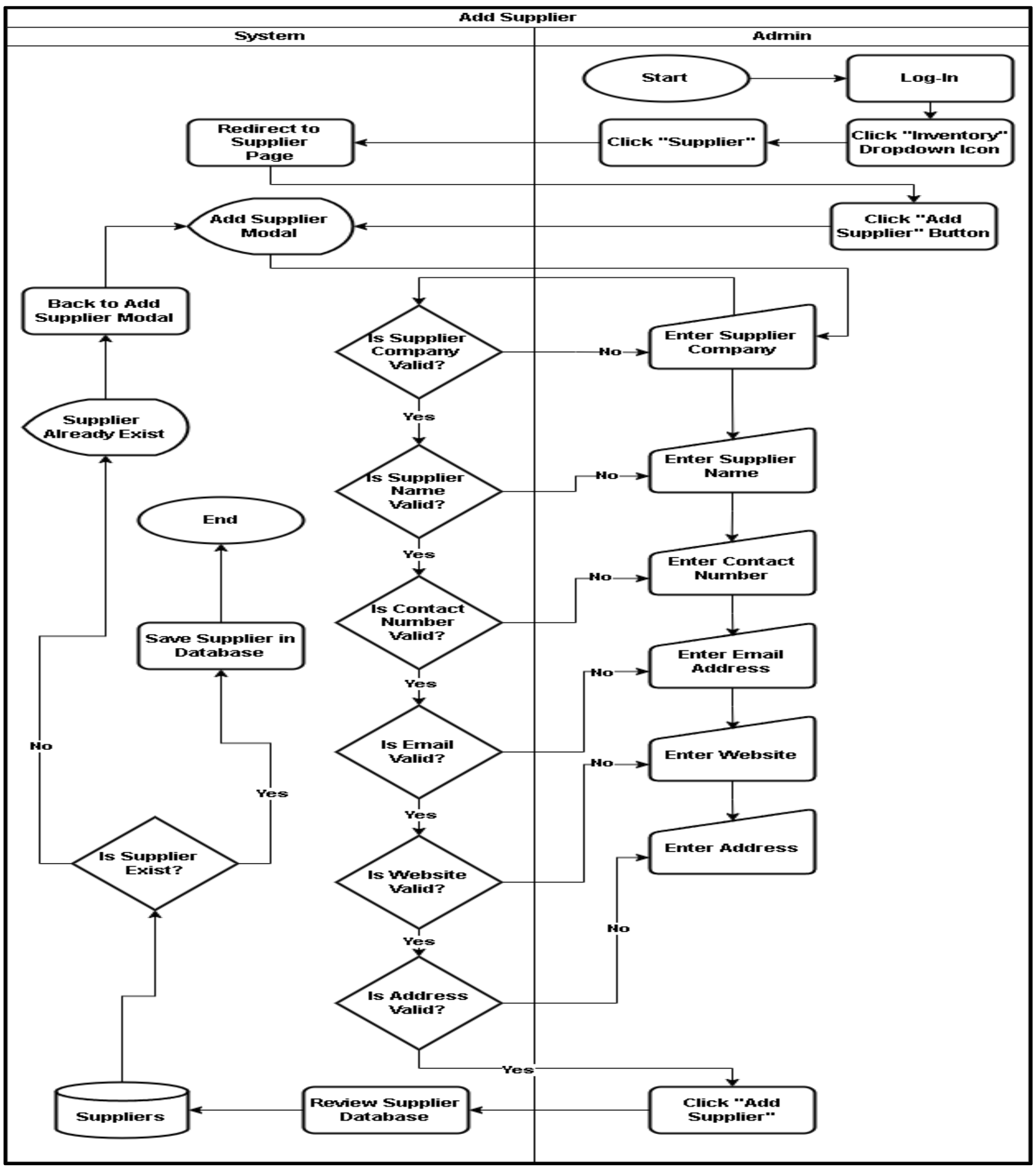
Figure 44. Archive Item (Admin)



The archive item process enables administrators to hide items that are outdated or temporarily out of circulation. The admin selects the item from the inventory list and clicks the "Archive" button, followed by a confirmation.

The system marks the item as archived and removes it from the active inventory view. Archived items are not available for regular use but remain accessible in a dedicated archive section. This functionality helps maintain a clean and relevant inventory interface.

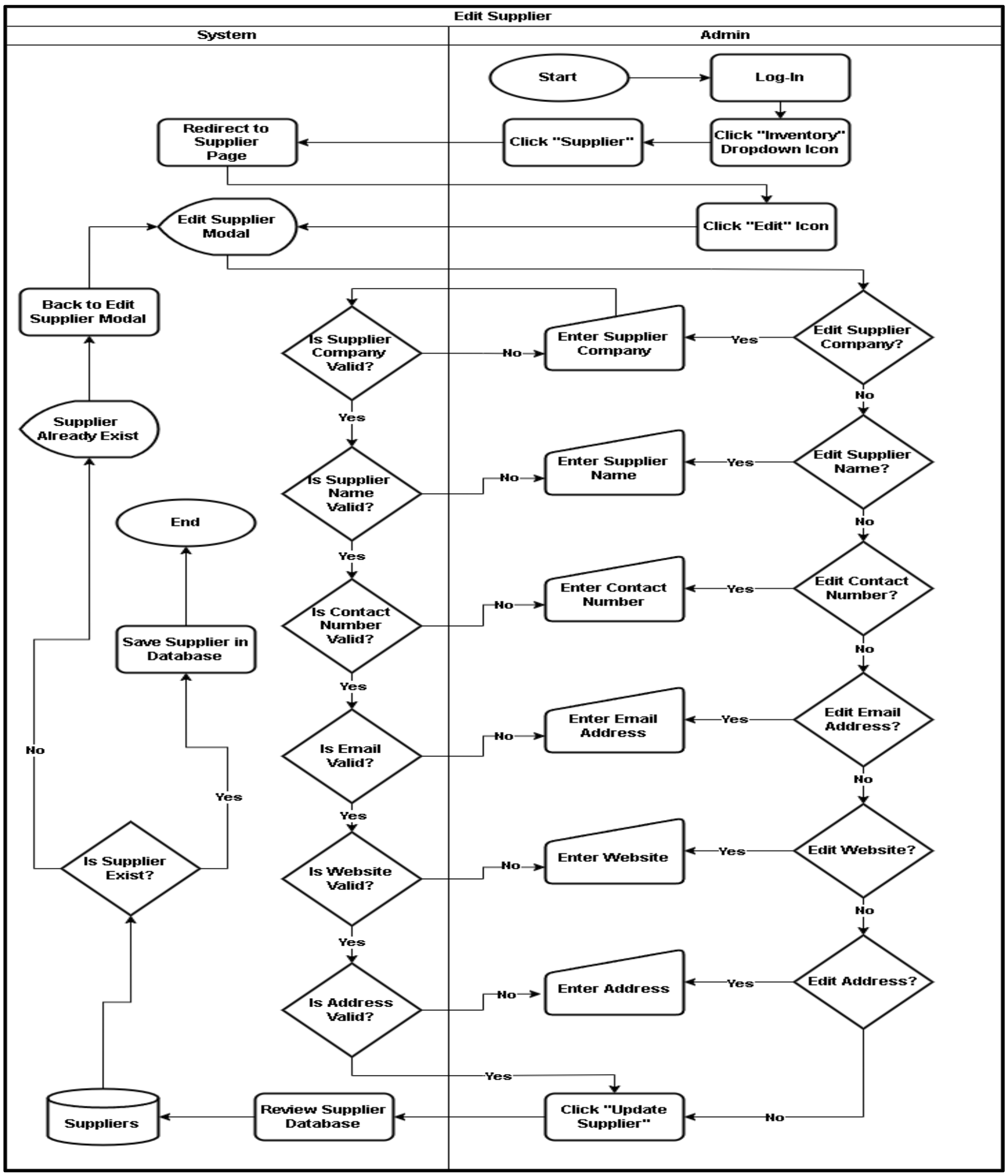
Figure 45. Add Supplier (Admin)



Administrators use this flow to register new suppliers within the system. By accessing the supplier management module, the admin clicks the "Add Supplier" button.

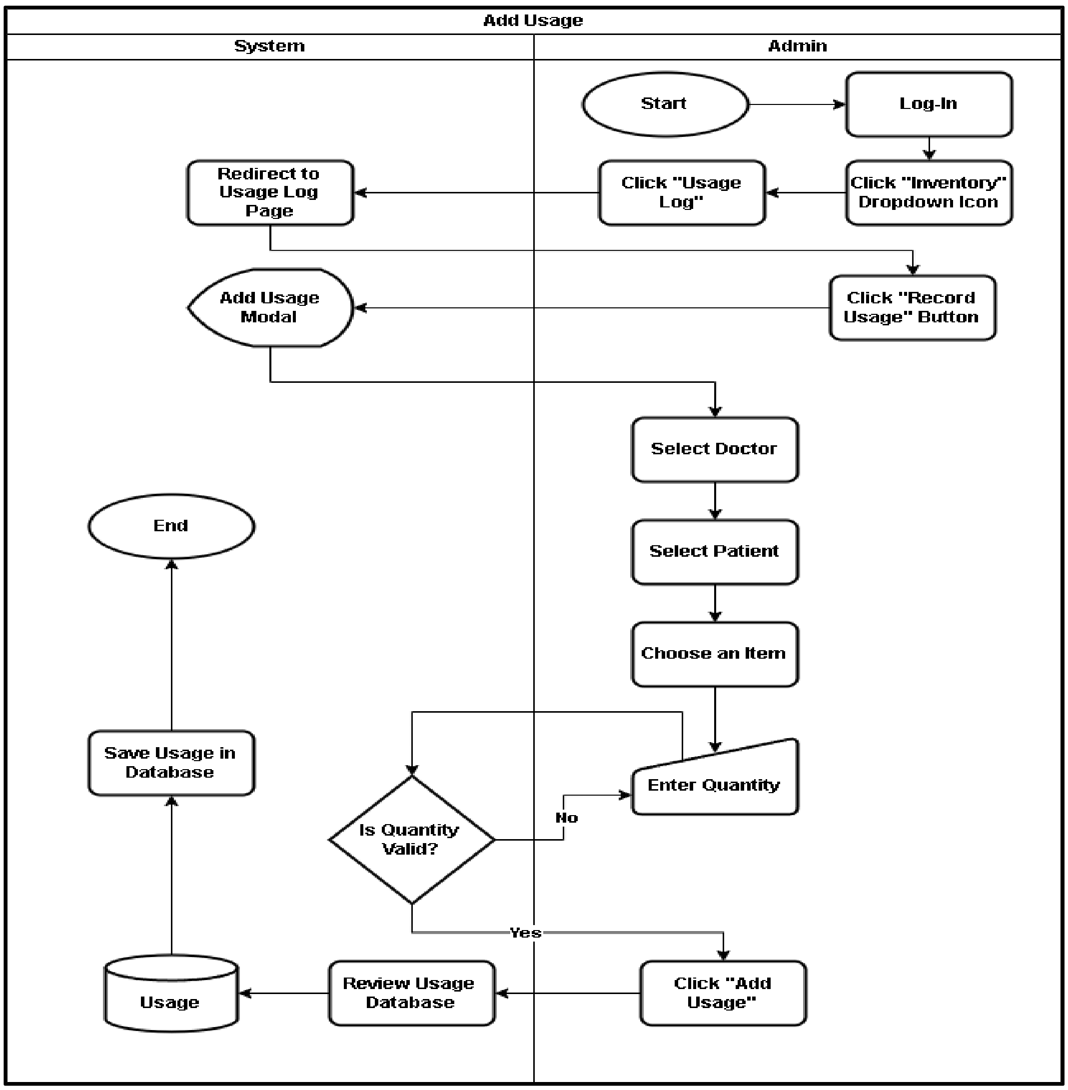
The form collects information such as supplier name, contact details, address, and product categories. The system checks for duplicates and validates format before adding the supplier to the database. This enables the clinic to build a reliable supplier network and ensures procurement activities are supported by up-to-date supplier records.

Figure 46. Edit Supplier (Admin)



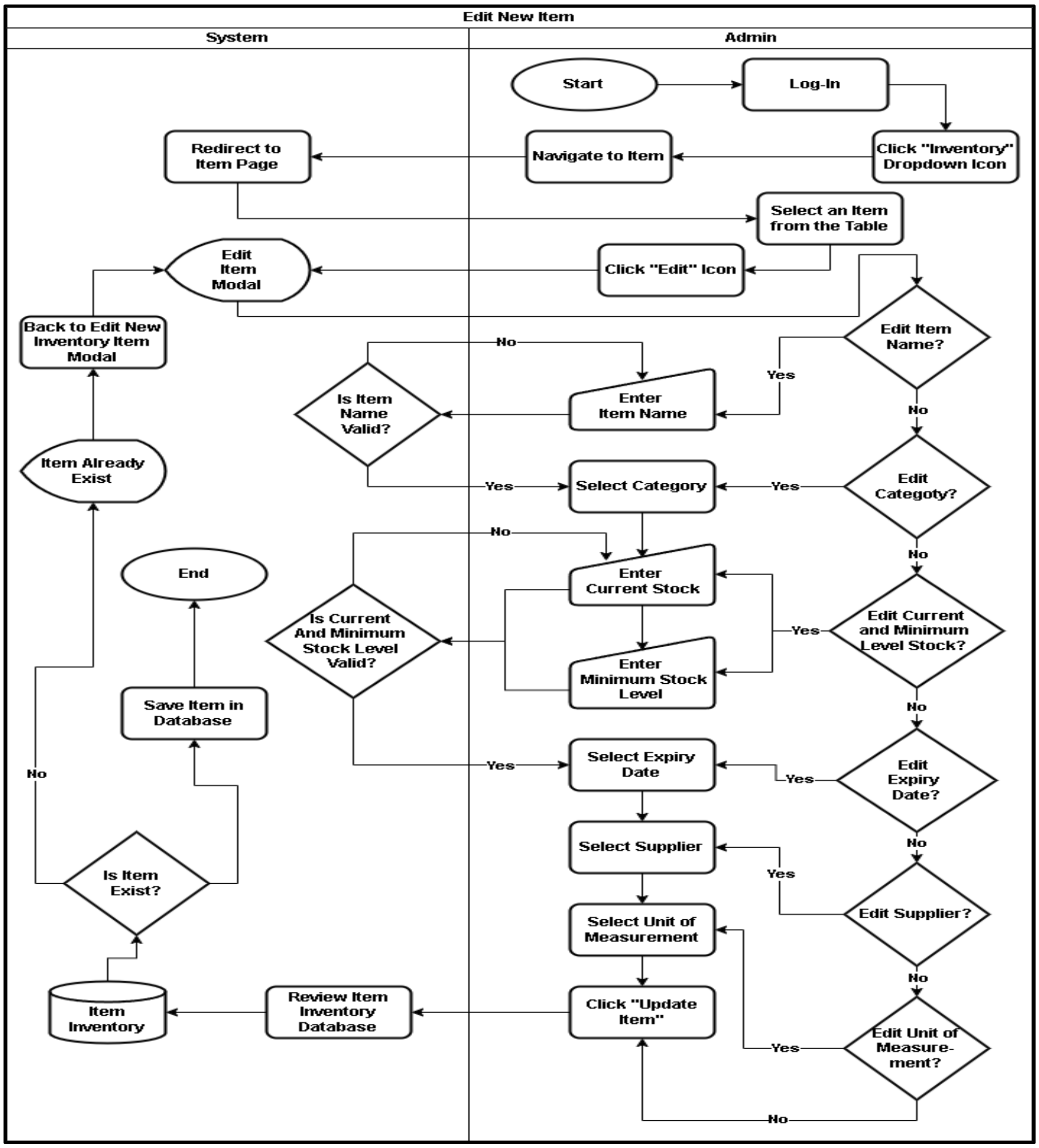
This process allows administrators to update existing supplier information. From the supplier list, the admin selects a supplier and clicks "Edit." The system loads the current data, allowing the admin to make necessary changes. Updated information is validated for accuracy before being saved. This ensures that all procurement communications and orders are based on current and verified supplier details.

Figure 47. Add Usage (Admin)



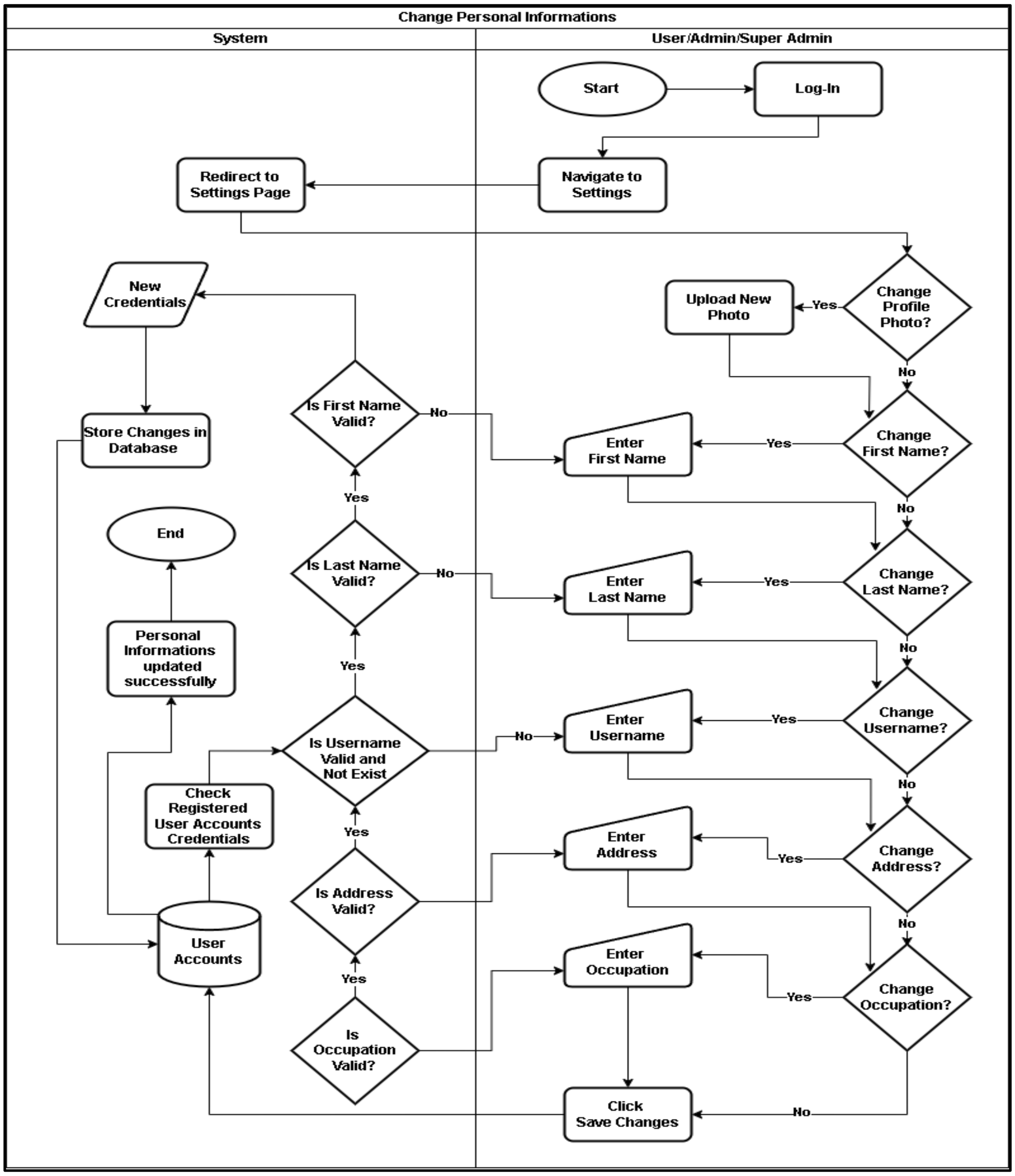
This process allows for logging how inventory items are used. The admin selects an item, enters the quantity used, purpose, and relevant date, then submits the entry. This is particularly useful for tracking daily usage in clinical or administrative operations. The system updates the inventory count accordingly and logs the usage for audit purposes. This function ensures transparent and traceable resource management.

Figure 48. Edit Usage (Admin)



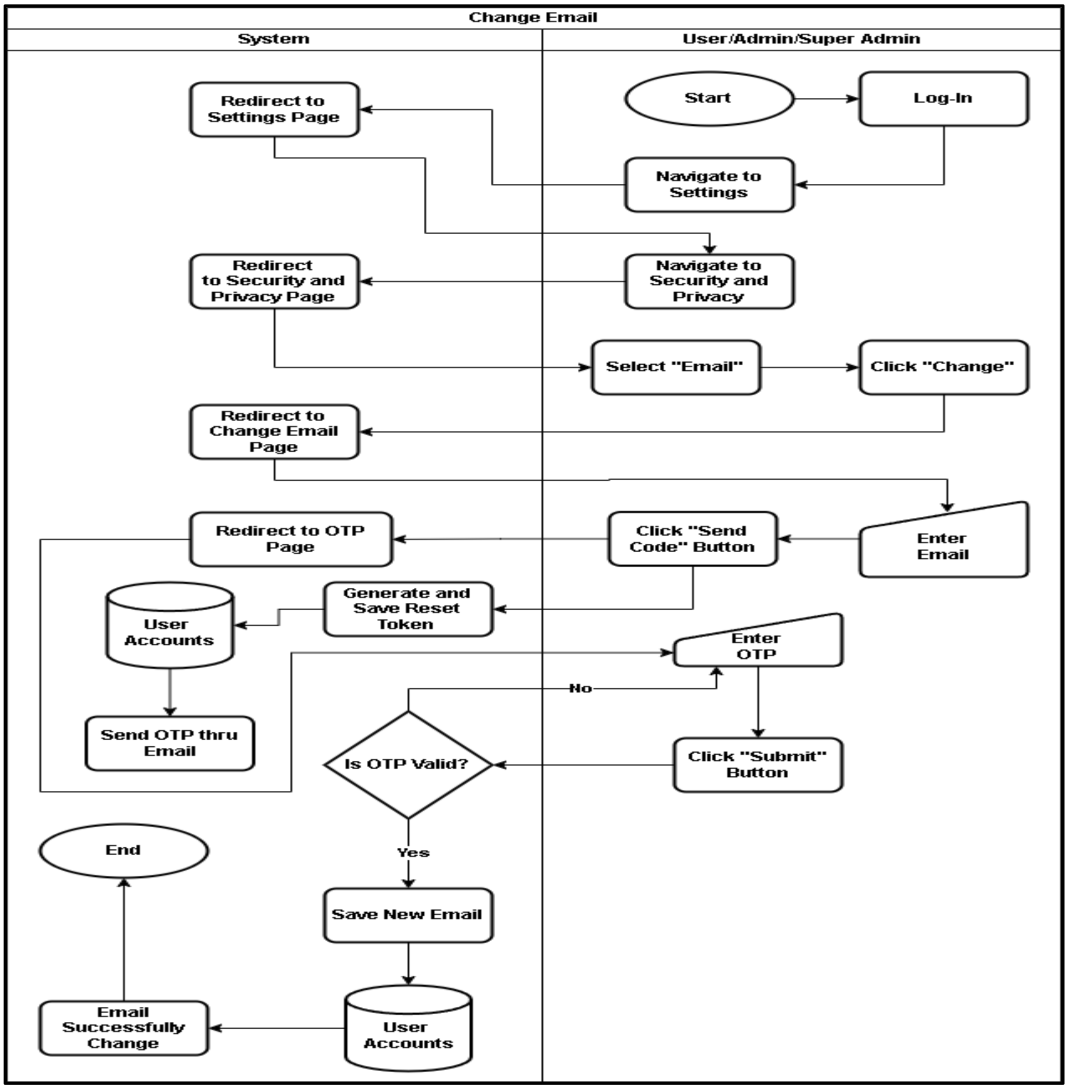
The "Edit Usage" process allows administrators to revise previously recorded usage data. This may be required for correcting mistakes or adding additional context. The admin selects the usage record, clicks "Edit," and updates the necessary fields. After validation, the system saves the revised record and adjusts the inventory as necessary. This ensures accurate consumption data and maintains audit readiness.

Figure 49. Change Personal Information



Users can update personal data such as name, address, and gender through this process. After accessing their profile settings, users make the desired edits and submit the form. For security, the system may request password confirmation. Once validated, the updated information is saved to the user's profile and reflected across the system. This ensures all interactions and records remain linked to accurate personal data.

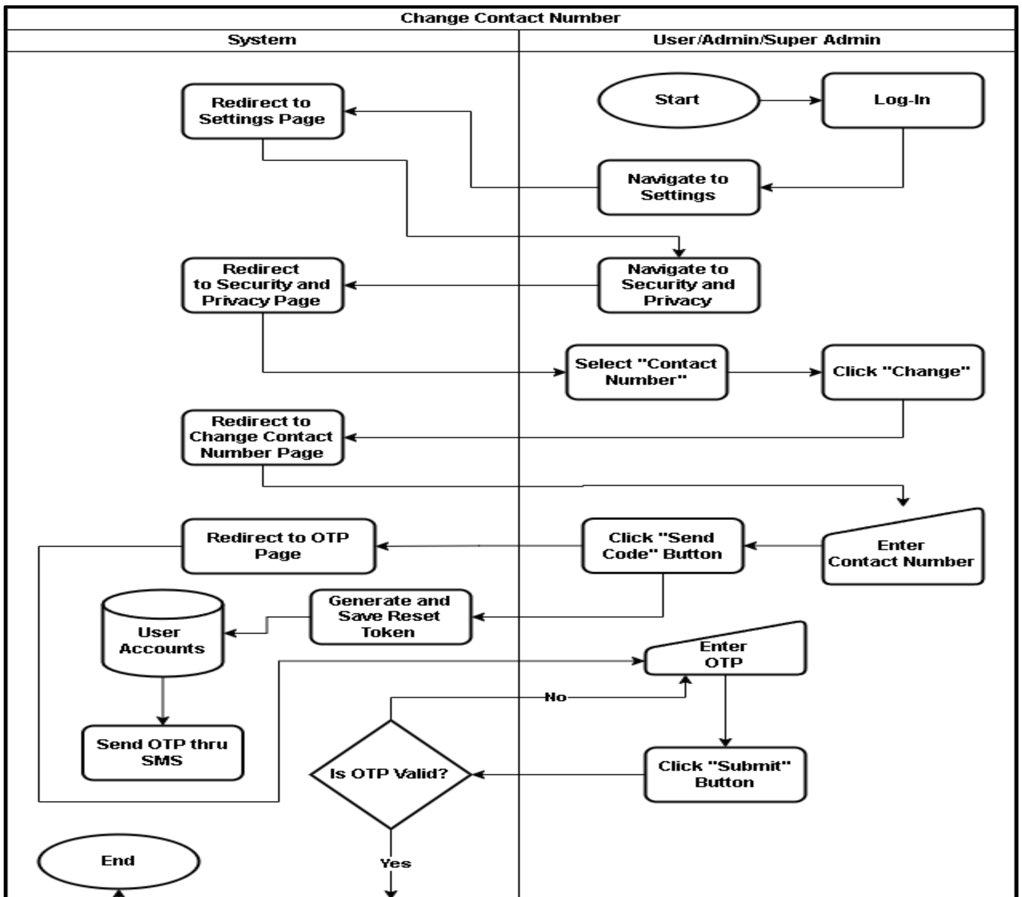
Figure 50. Change Email



This system flow diagram, "Change Email," outlines how any logged-in user (User, Admin, or Super Admin) updates their registered email address. After logging in, the user navigates through "Settings" to the "Security and Privacy Page," selects "Email," and clicks "Change". On the "Change Email Page," the user enters their new email and clicks "Send Code," prompting the system to send an OTP via email. The system then redirects to an

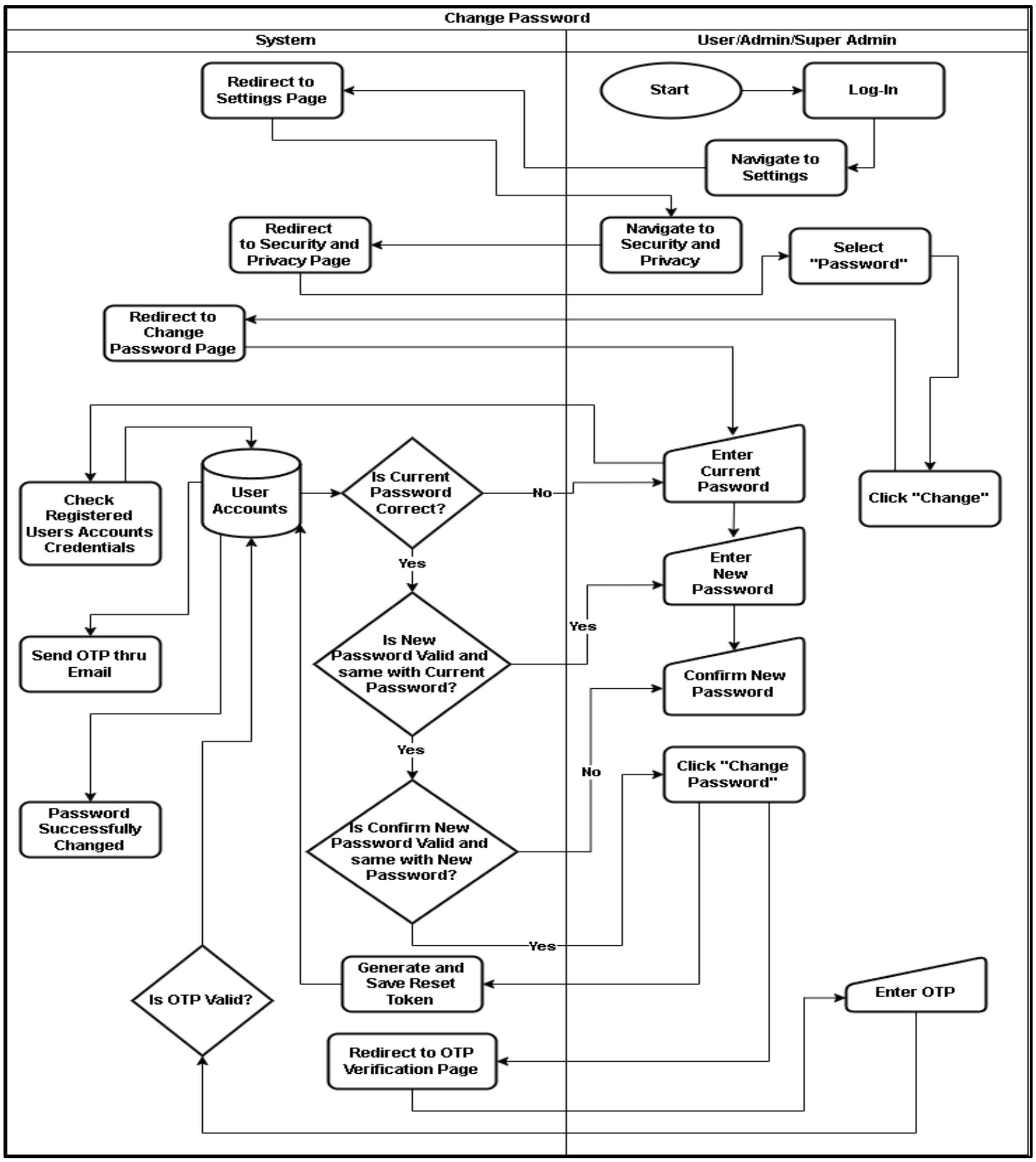
OTP Page where the user inputs and submits the received OTP for validation. Upon successful OTP validation, the system saves the new email in the "User Accounts" database and confirms "Email Successfully Change," concluding the process.

Figure 51. Change Contact Number



The "Change Contact Number," outlines how any logged-in user updates their registered contact number. After logging in, the user navigates through "Settings" to "Security and Privacy," selects "Contact Number," and clicks "Change". On the "Change Contact Number Page," they enter a new number and click "Send Code," prompting the system to send an OTP via SMS. The system redirects to an OTP Page where the user inputs and submits the received code for validation. Upon successful OTP validation, the new contact number is saved in the "User Accounts" database, confirming the change and concluding the process.

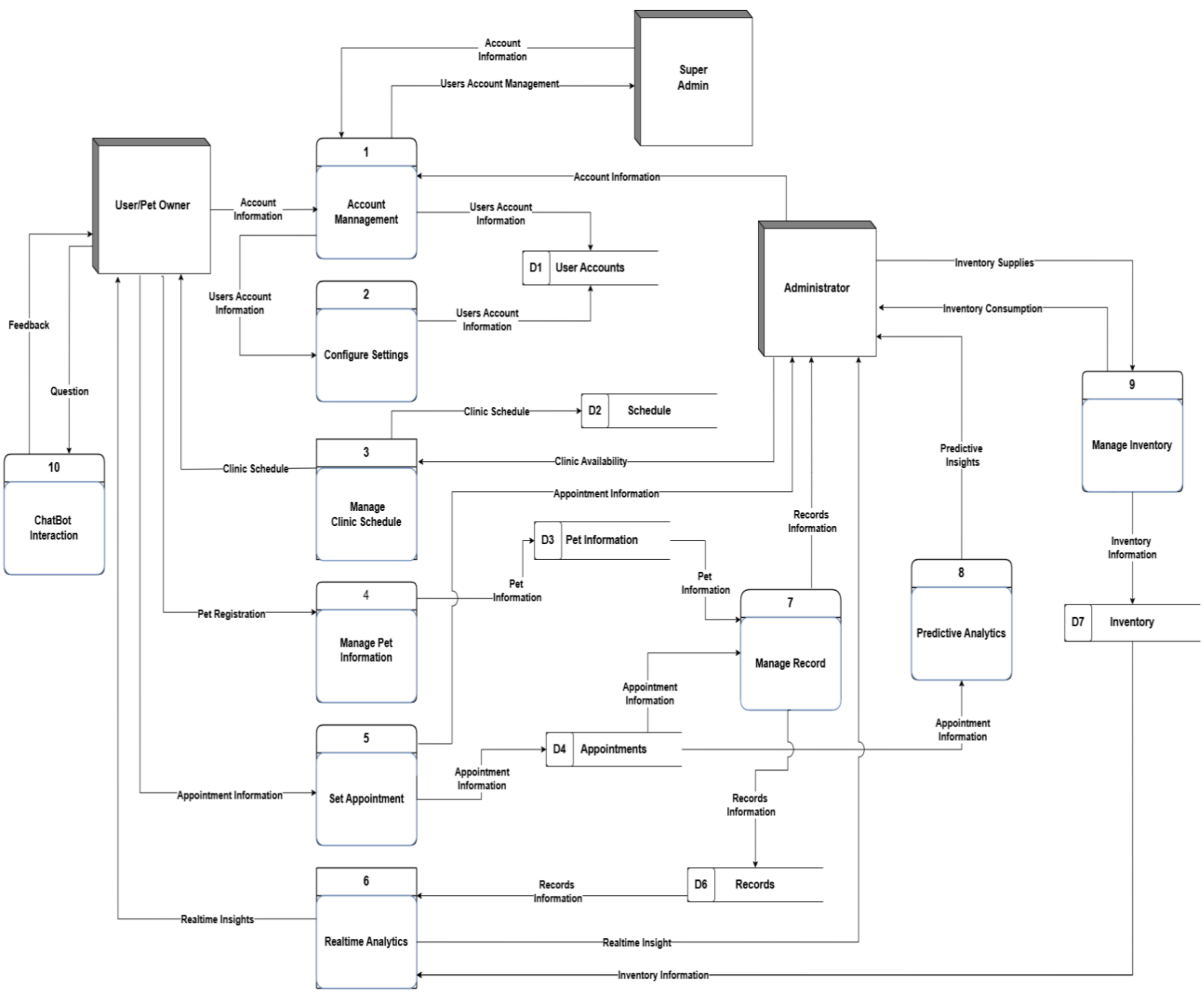
Figure 52. Change Password



The change password process allows users to strengthen or update their login credentials. After accessing the change password section, users must input their current password, the new password, and a confirmation of the new password. The system validates the new password's strength and ensures it does not match previous ones. Once verified, the system saves the new password and logs the change for security tracking. This feature enhances user control over account security.

Data Flow Diagram (DFD)

Figure 53. Pawsense AI Level 0 DFD



The User/Pet Owner, Administrator, and Super Admin all start by interacting with the Account Management process. They provide account-related information, which is stored and managed in the User Accounts (D1) data store. This process returns updated account information to each entity. All three roles can also access the Configure Settings process to personalize or manage their settings, which also involves passing and receiving user account information.

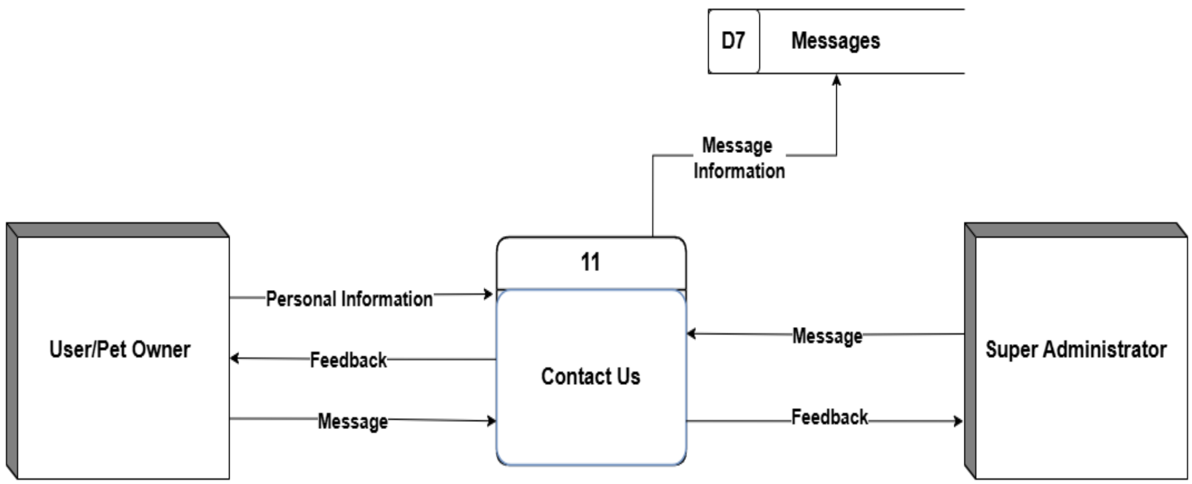
The Administrator manages the clinic schedule through the Manage Clinic Schedule process. The updated schedule is stored in Schedule (D2) and made available to users as Clinic Availability. Meanwhile, Users register their pets using the Manage Pet Information process. The system stores this data in Pet Information (D3) and also shares it with the Manage Record process and the Administrator.

After that, users can book appointments through the Set Appointment process. The appointment data is stored in Appointments (D4) and sent to the Manage Clinic Schedule, Manage Record, and Predictive Analytics processes. The Manage Record process takes in pet and appointment info, updates the Records (D6) data store, and sends the processed Records Information to both the Administrator and the Real Time Analytics process.

The Real Time Analytics process uses records and appointment data to generate Real Time Insights, which are sent back to the Administrator and the User/Pet Owner. At the same time, Predictive Analytics uses appointment information to generate Predictive Insights for the Administrator, helping forecast future appointments.

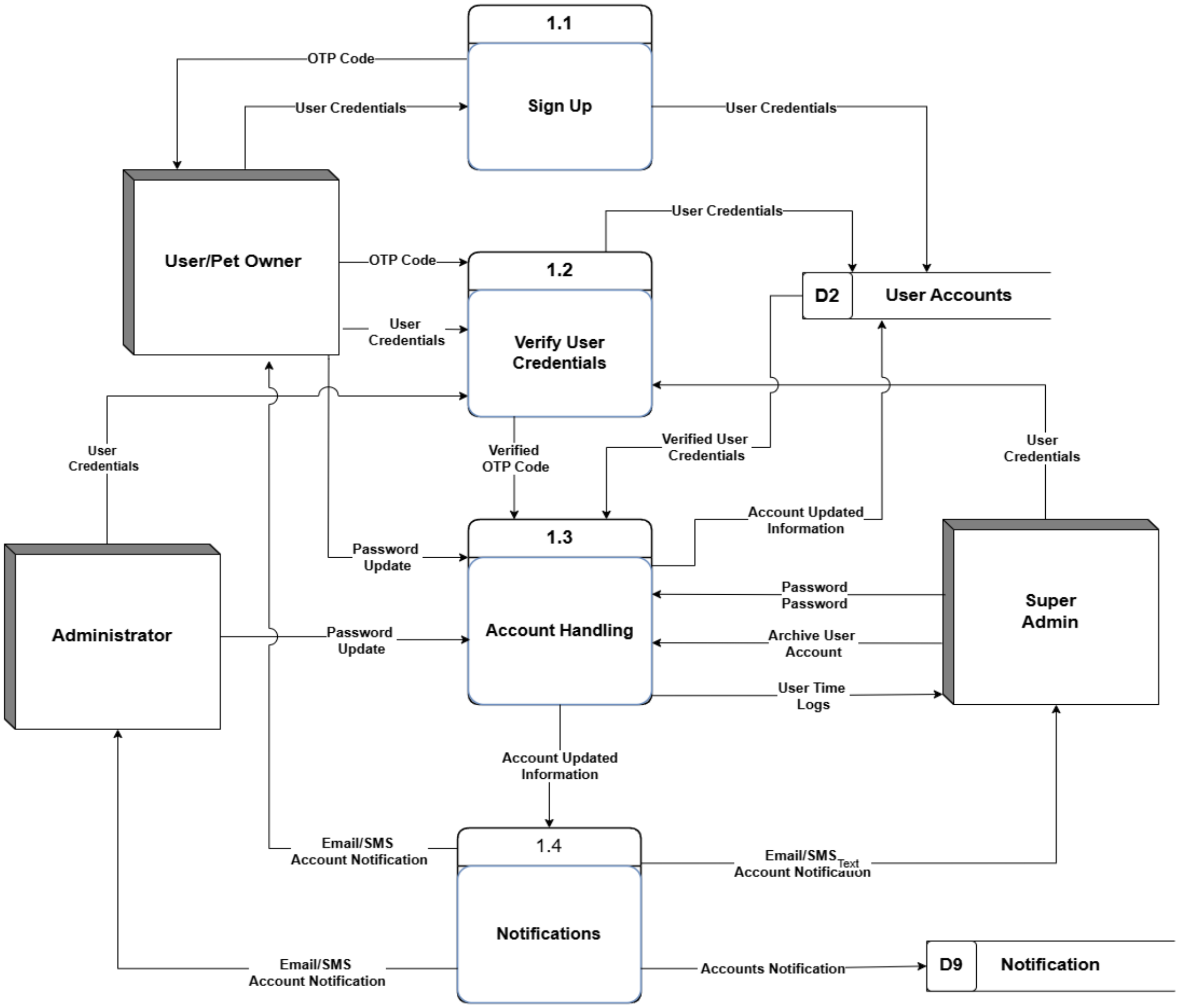
The Manage Inventory process is fed by inventory consumption data from the Administrator and receives supply updates. It updates the Inventory (D7) data store and passes Inventory Information to Real Time Analytics. Finally, the Chatbot Interaction process handles user questions and feedback directly from the User/Pet Owner, offering automated responses without involving data storage.

Figure 54. Pawsense AI Contact Us Level 0



This DFD illustrates the "Contact Us" process (11) within the system. A "User/Pet Owner" initiates contact by providing "Personal Information" and a "Message" to the "Contact Us" process. This "Message Information" is then stored in the "Messages" data store (D7). The "Contact Us" process also facilitates two-way communication: the "User/Pet Owner" can receive "Feedback" from the "Contact Us" process, and conversely, the "Super Administrator" can send a "Message" to the "Contact Us" process and receive "Feedback" from it. This setup enables both users and administrators to communicate through a centralized "Contact Us" module, with all messages being logged.

Figure 55. Pawsense AI Account Management Level 1



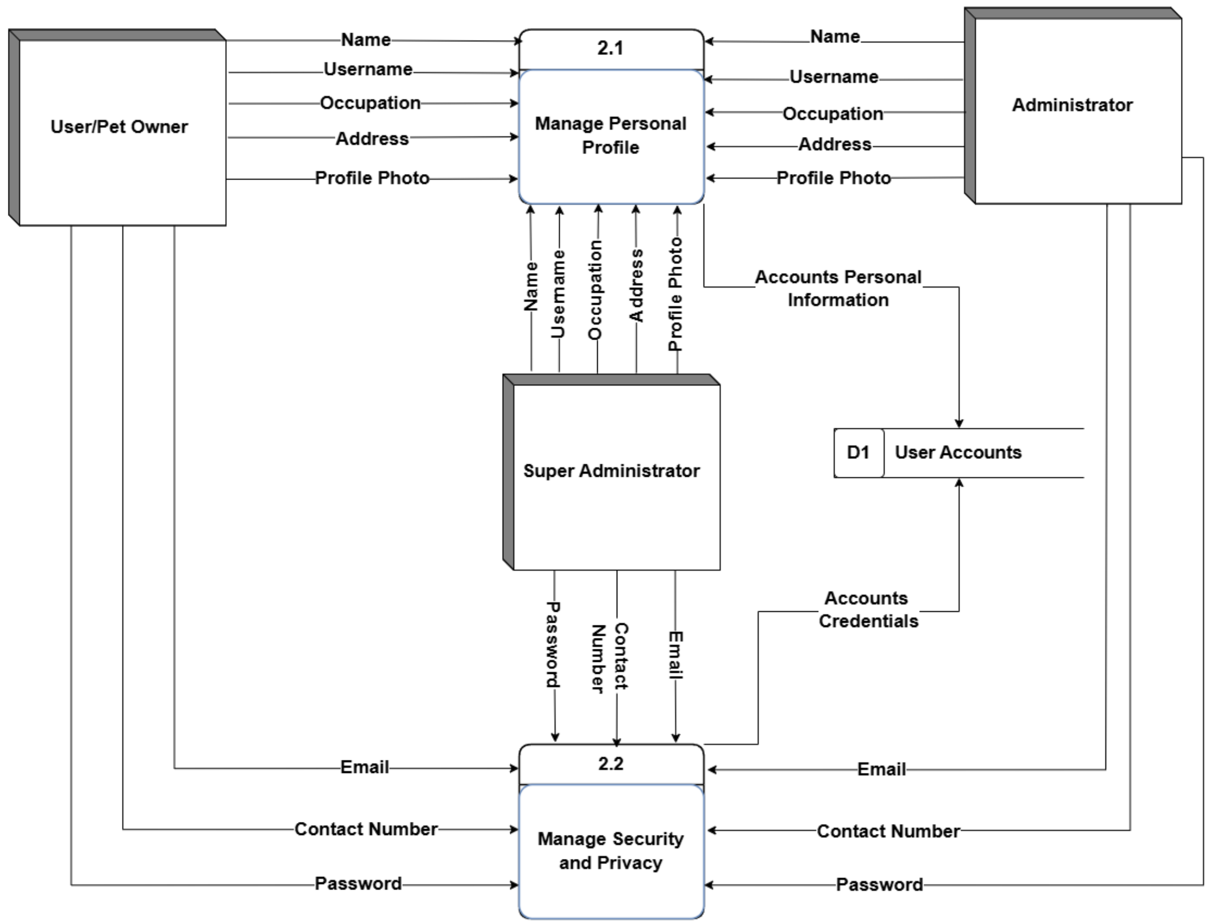
The process starts when the User/Pet Owner signs up through the Sign Up (1.1) process. They enter their User Credentials, which generates an OTP Code sent to them for verification. These credentials are passed to the Verify User Credentials (1.2) process, where the OTP code is validated. Once verified, the user's credentials are confirmed and stored in the User Accounts (D1) data store.

After successful verification, the Account Handling (1.3) process manages all updates to the user's account. This includes password updates from the User/Pet Owner, Administrator, or Super Admin. It also allows the Super Admin to archive accounts or log user time. Any account changes are saved back into User Accounts (D1) and are forwarded to the Notifications (1.4) process.

The Notifications process takes the updated account information and sends out Email or SMS notifications to the concerned parties. These notifications are also stored in the Notification (D9) data store for tracking or history purposes.

All three entities, the User/Pet Owner, Administrator, and Super Admin, can trigger different parts of this flow by submitting credentials, requesting password changes, or modifying account states. The data flow keeps all interactions connected through verification, storage, updates, and notifications, ensuring that every account action is verified, logged, and communicated.

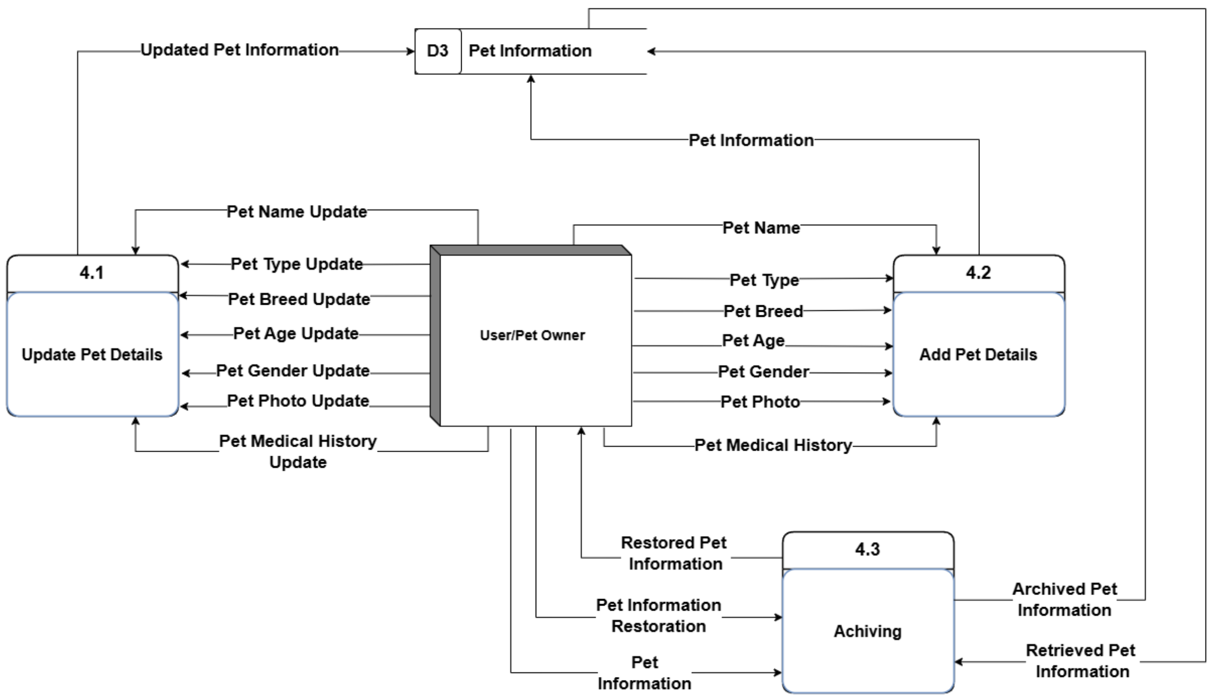
Figure 56. Pawsense AI Configure Settings Level 1



The Level 1 DFD for Configure Settings shows how User/Pet Owner, Administrator, and Super Administrator update and manage their account information. In Process 2.1 Manage Personal Profile, users provide or edit their name, username, occupation, address, and profile photo. This information flows to the Super Administrator, who monitors all accounts, and is stored in the User Accounts (D1) data store as personal information.

In Process 2.2 Manage Security and Privacy, users manage their email, contact number, and password. These security details are stored in D1 as account credentials. The Super Administrator ensures both personal information and security data are managed correctly and securely. The diagram shows how user data moves through the system, with the Super Administrator overseeing the entire process to maintain data integrity and privacy.

Figure 57. Pawsense AI Pet Management Level 1



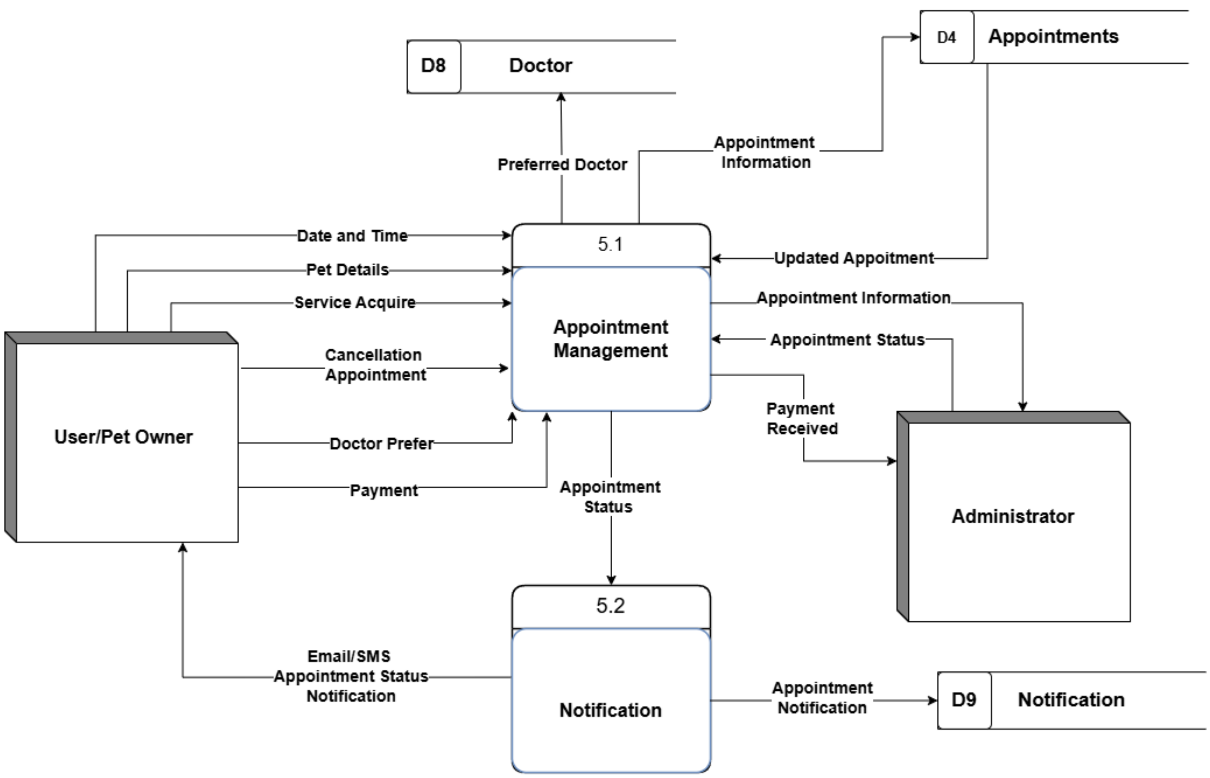
The User/Pet Owner manages pet-related information through three main processes: Update Pet Details (4.1), Add Pet Details (4.2), and Archiving (4.3). To add a new pet, the user inputs the Pet Name, Type, Breed, Age, Gender, Photo, and Medical History into the Add Pet Details process. These details are then stored in the Pet Information (D3) data store.

If the user needs to modify existing records, they use the Update Pet Details process. This process receives updated fields like Pet Name, Type, Breed, Age, Gender, Photo, and

Medical History from the user and saves the updated data into D3 as Updated Pet Information.

The user also has the option to archive or restore pet records. Through the Archiving process, pet information can be archived as Archived Pet Information, or retrieved when needed as Restored Pet Information. The archived or restored data is synced with the Pet Information (D3) database, allowing users to keep a history of their pets without permanently deleting records.

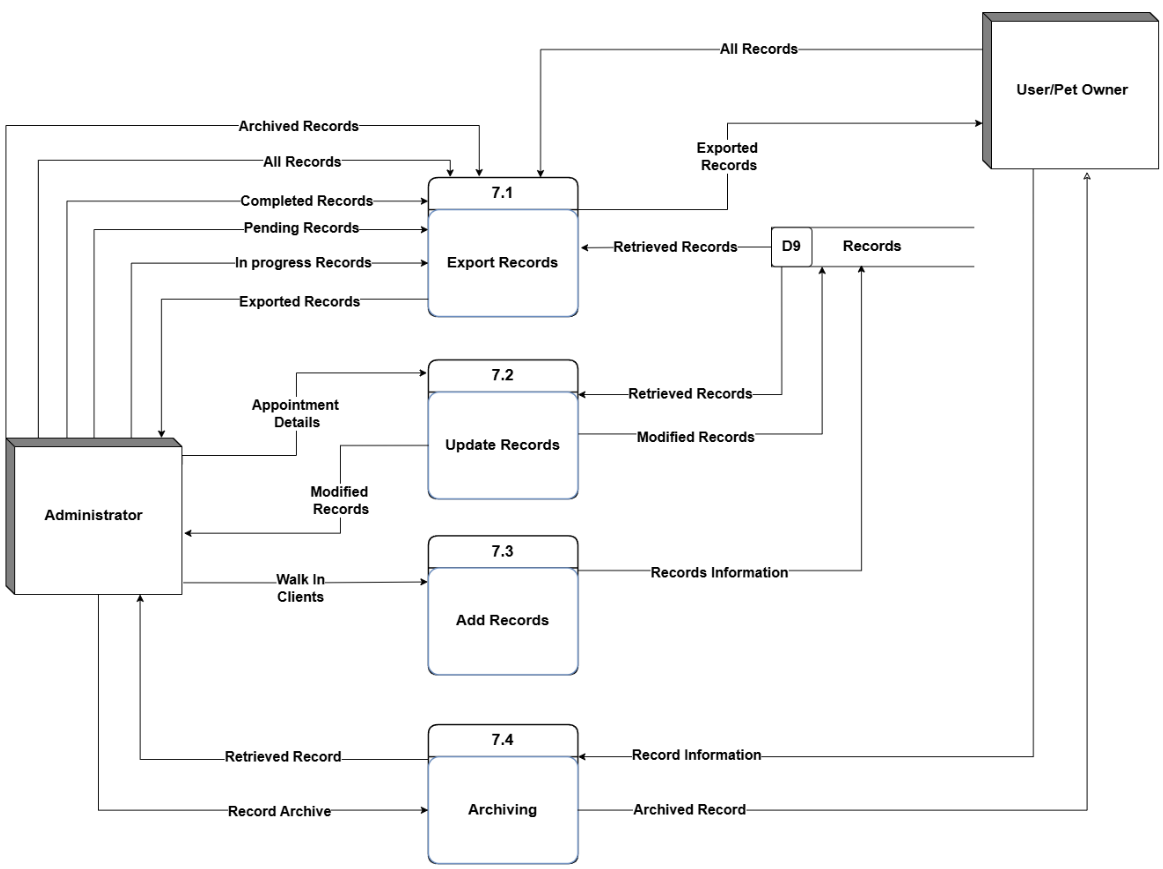
Figure 58. Pawsense AI Set Appointment Level 1



The Level 1 DFD for the Set Appointment process shows how the User/Pet Owner, Doctor, and Administrator interact with the system to manage appointments. In Appointment Management (5.1), the User/Pet Owner provides details such as date and time, pet information, selected service, preferred doctor, and payment. They can also request cancellations. The system sends appointment details and updates to the Doctor (D8) and stores all information in the Appointments data store (D4). The Administrator monitors the process, receives payment confirmation, and tracks appointment status.

The Notification (5.2) process handles communication with the User/Pet Owner by sending email or SMS updates about appointment status. It generates appointment notifications, which are stored in D9 Notification. The diagram shows how appointment information flows between users, processes, and data stores, while ensuring that the User/Pet Owner receives timely updates about their pet's appointment. The Administrator oversees the entire process, including payments and appointment records.

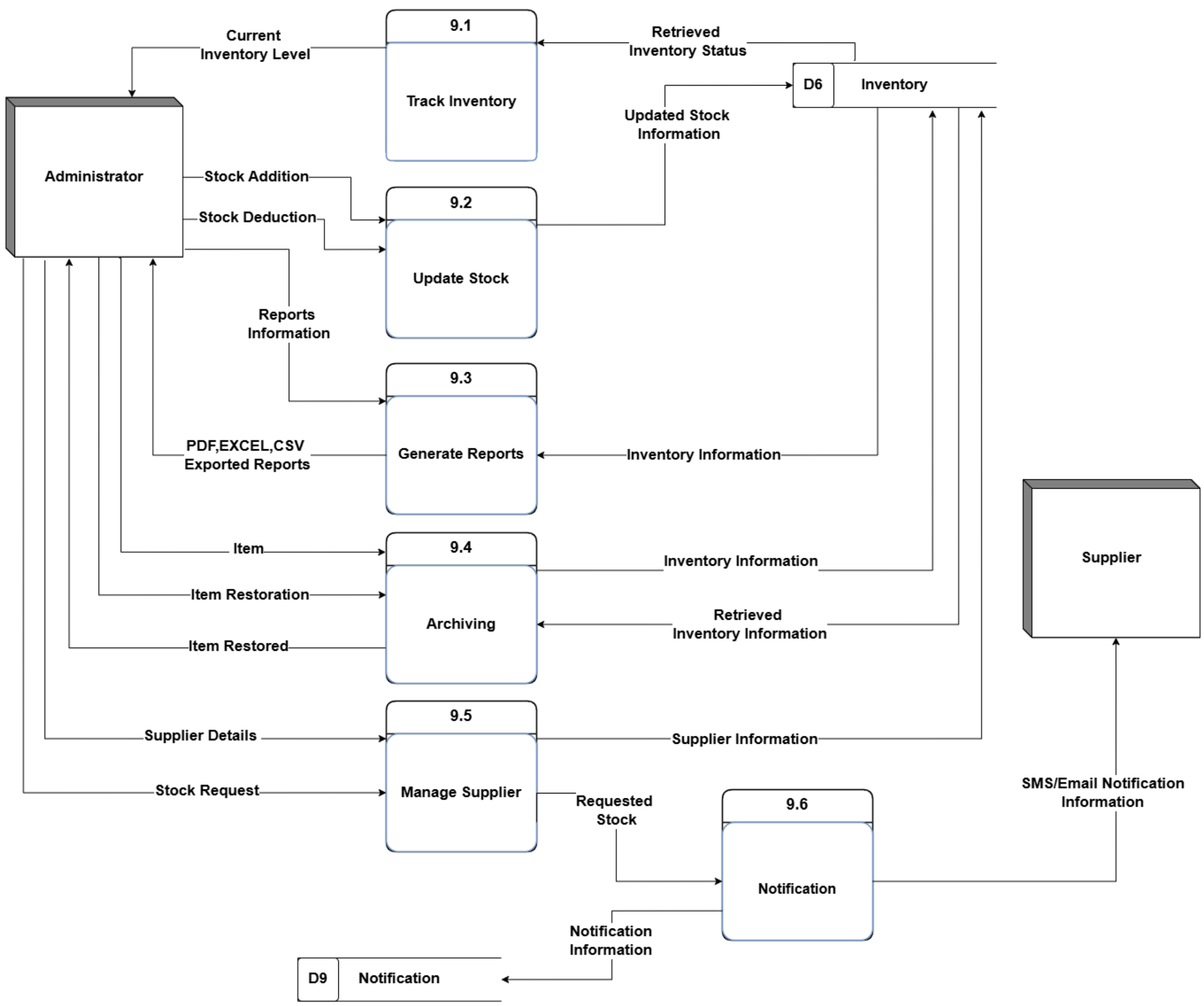
Figure 59. Pawsense AI Manage Records Level 1



This DFD details the "Record Management" subsystem, outlining how various records are handled within the system. The "Administrator" is central to this process, managing records through several sub-processes. The "Administrator" can initiate "Export Records" (7.1) by providing "Completed Records," "Pending Records," or "In Progress Records," receiving "Exported Records" in return. "Export Records" (7.1) also sends "Archived Records" and "All Records" to the User/Pet Owner. Additionally, the "Administrator" can "Update Records" (7.2) by providing "Modified Records," which are then stored in the "Records" data store (D9). "Update Records" also retrieves "Retrieved Records" from D9. New "Walk-in Clients" lead to the "Add Records" (7.3) process, which sends "Records Information" to the "Records" data store (D9).

The "Records" data store (D9) serves as the central repository, receiving "Records Information" from "Add Records" (7.3), "Modified Records" from "Update Records" (7.2), and providing "Retrieved Records" to "Update Records" (7.2). It also provides "Retrieved Records" to the "User/Pet Owner." For long-term storage, the "Administrator" initiates "Archiving" (7.4) by providing "Record Archive" information. "Archiving" (7.4) then sends "Archived Record" information to the "User/Pet Owner" and the "Records" data store (D9). Essentially, this subsystem ensures comprehensive management of client and pet records, from creation and updates to export and archival, serving both administrative needs and user access.

Figure 60. Pawsense AI Manage Inventory Level 1



This DFD details the Inventory Management subsystem, illustrating how stock levels are tracked, updated, and managed within the system. The Administrator plays a central role, providing "Current Inventory Level" to "Track Inventory" (9.1), which in turn retrieves "Retrieved Inventory Status" from and sends "Updated Stock Information" to the "Inventory" data store (D6). The Administrator also provides "Stock Addition" and "Stock Deduction" data directly to "Update Stock" (9.2), ensuring that the "Inventory" data store (D6) reflects accurate stock levels. Additionally, the Administrator receives "PDF, EXCEL, CSV Exported Reports" from "Generate Reports" (9.3), which pulls "Inventory Information" from D6 to compile these reports.

The subsystem also handles supplier interactions and notifications. The Administrator provides "Supplier Details" to "Manage Supplier" (9.5), which sends "Supplier Information" to the "Supplier" external entity. The Administrator also sends "Stock Request" to "Manage Supplier" (9.5), which generates "Requested Stock" and sends it to "Notification" (9.6). "Notification" (9.6) then sends "SMS/Email Notification Information" to the "Supplier" and stores "Notification Information" in the "Notification" data store (D9). Furthermore, the Administrator manages long-term inventory records by providing "Item" and "Item Restoration" data to "Archiving" (9.4), receiving "Item Restored" in return, while "Archiving" (9.4) also exchanges "Inventory Information" and "Retrieved Inventory Information" with the "Inventory" data store (D6).

Hierarchical Input Process and Output (HIPO)

Figure 61. Hierarchical Input Process and Output

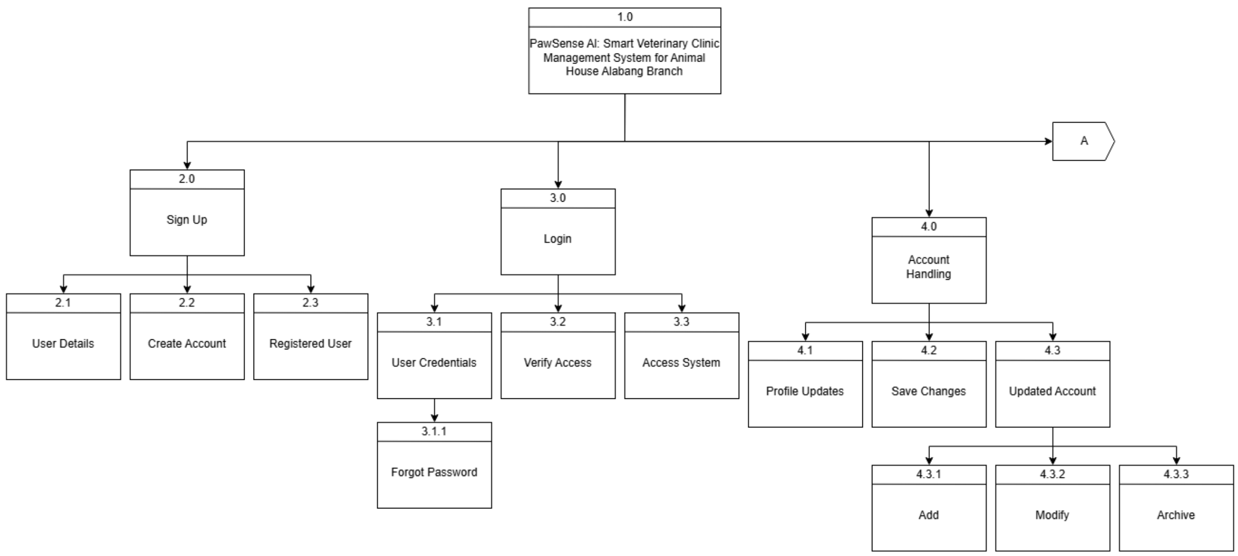


Figure 62. Continuation of Hierarchical Input Process and Output

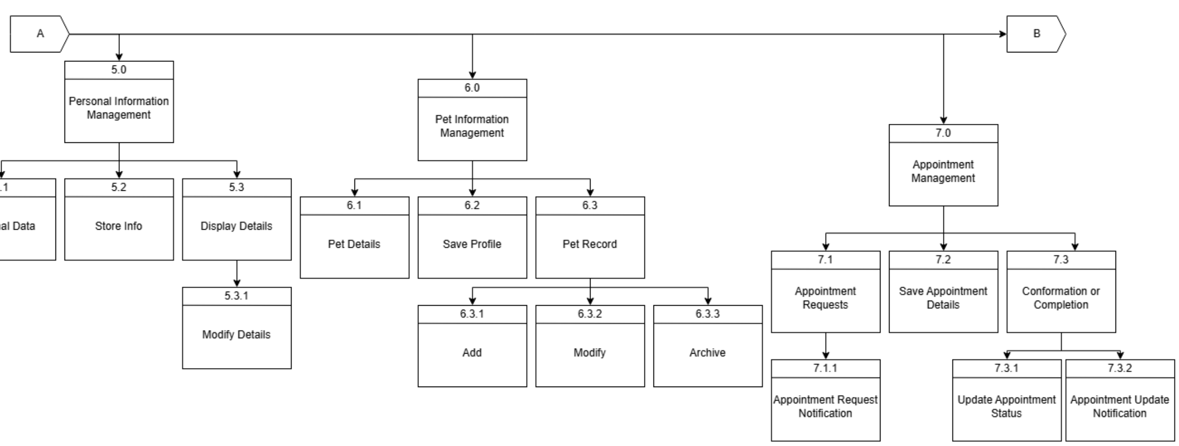


Figure 63. Continuation of Hierarchical Input Process and Output

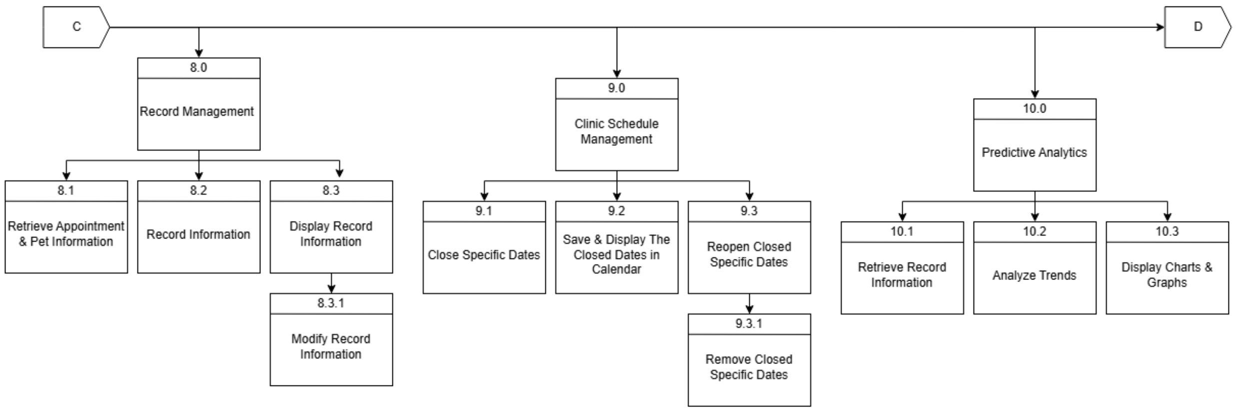
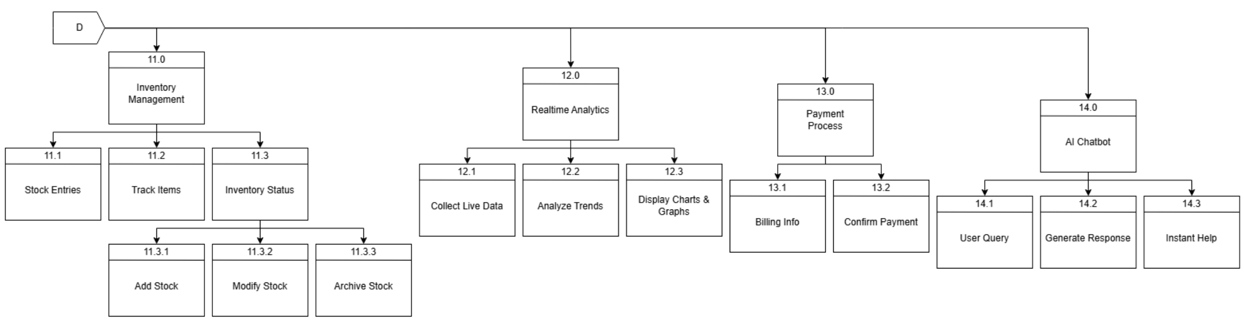


Figure 64. Continuation of Hierarchical Input Process and Output



The development and design of the PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang Branch followed a rigorous Hierarchical Input-Process-Output (HIPO) model. The HIPO model offered a structured method for establishing the functional flow of the data, process, and products throughout the different subsystems of the system. Each primary subsystem of the system is decomposed into further subcomponents that outline the manner in which the input is received, the process is carried out, and the output is provided to the users. The IPO model not only facilitates clarity in system development but also ensures effective implementation as well as interaction for the users throughout the system.

The system starts from Module 1.0, which defines the overall purpose of PawSense AI—a clever clinic management system for veterinary practices. Building from there, Module 2.0 (Sign Up) enables new users to register by entering user details, which are processed to create and register the user in the system. Subsequent to that is Module 3.0 (Login), in which users enter credentials to authenticate access and gain entry securely. There is also a sub-function for users who forget their passwords, enabling recovery and uninterrupted access.

Module 4.0 (Account Handling) focuses on handling users' accounts, like profile maintenance and account modifications. Users are allowed to perform actions like adding, editing, or archiving account details. Module 5.0 (Personal Information Management) allows users to enter, edit, and store personal information, which is then shown as and when required. The system provides easy-to-use interfaces for changing or viewing personal information.

Module 6.0 (Pet Information Management) enables users, especially pet owners and clinic personnel, to maintain pet profiles. It involves inputting pet information, saving the same, as well as viewing detailed pet records. As with account information, pet details can be entered, edited, or archived whenever the need arises. Module 7.0 (Appointment Management) facilitates appointment booking by enabling pet owners to make appointment requests. When a request is made, notifications are initiated, and once confirmed, the system saves and updates the status with follow-up reminders to keep users reminded about their appointments. Clinical data handling is facilitated by Module 8.0 (Record Management), in which appointment and pet details are pulled and saved into the medical records database. The records are presented for viewing and can be edited if there are updates. Module 9.0 (Clinic Schedule Management) is reserved for the scheduling of the clinic. Administrators are able to mark specific dates as closed, which are stored and are a part of the calendar system visually. Closed dates can be opened and deleted from the schedule when necessary, creating flexibility in the conducting of the clinic.

To support improved veterinary services, Module 10.0 (Predictive Analytics) utilizes historical record information for trend analysis. The input information undergoes processing by the system to provide graphical outputs in the form of charts and graphs, giving insight into the health of pets and treatment success. Module 11.0 (Inventory Management) deals with the medicine and supply inventory of the clinic. It facilitates the entry of stock entries, usage monitoring, and current inventory status maintenance. It also caters to adding, changing, or archiving stock information.

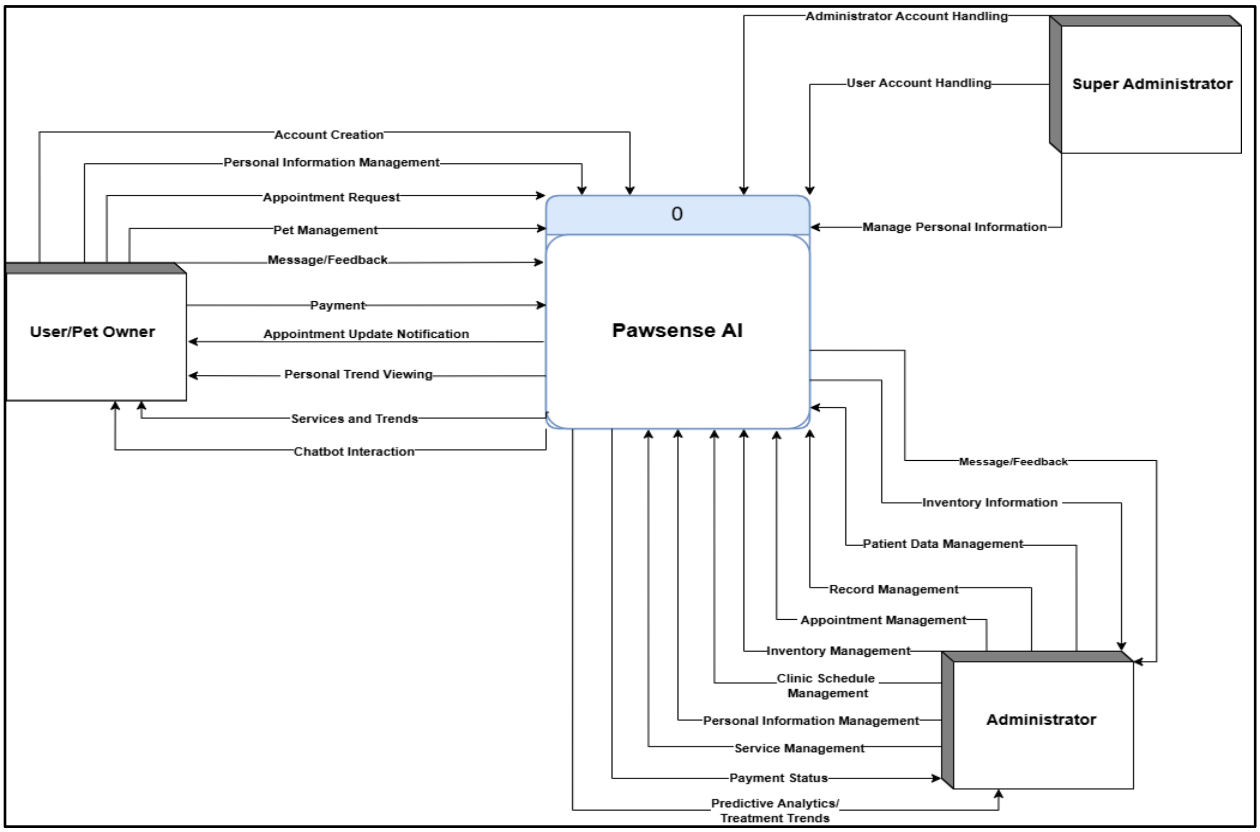
Module 12.0 (Realtime Analytics) functions dynamically by capturing live information from the activity of the system, breaking down the trend analysis, and graphically displaying the information in real-time by way of charts and graphs. It aids the evaluation of the current performance of the clinic and client interaction. Module 13.0 (Payment Process) deals with the financial side of the system, where billing details are input and processed to validate payments, providing an efficient transactional experience for clients.

Module 14.0 (Chatbot) is the intelligent assistant functionality of the system. Users are allowed to enter questions, which the chatbot analyzes and responds to immediately. The module supports users with faster assistance and minimizes the need for human customer service.

Each module of the PawSense AI system is networked and made to operate together so that information flows from input to output with smooth and efficient processing. The hierarchical IPO model not only gives a logical system design but also helps the system be reliable, usable, and scalable, such that the system is a viable option for contemporary veterinary clinic management.

Contextual Diagram

Figure 65. Pawsense AI Veterinary Clinic Contextual Diagram



The context diagram outlines in which ways Pawsense AI interfaces with three principal outside entities, namely, the user/pet owner, administrator, and super administrator. At the core of the system, Pawsense AI serves as a processing center for all information flows and system activities.

The user/pet owner can interact with the system in a variety of ways. The user/pet owner can sign up, edit their personal as well as pet information, book appointments, pass messages or feedback, or make payments. The user/pet owner receives appointment reminder notifications, sees their personal trends, access overall services as well as trends, as well as interact with an artificial intelligence chatbot for support.

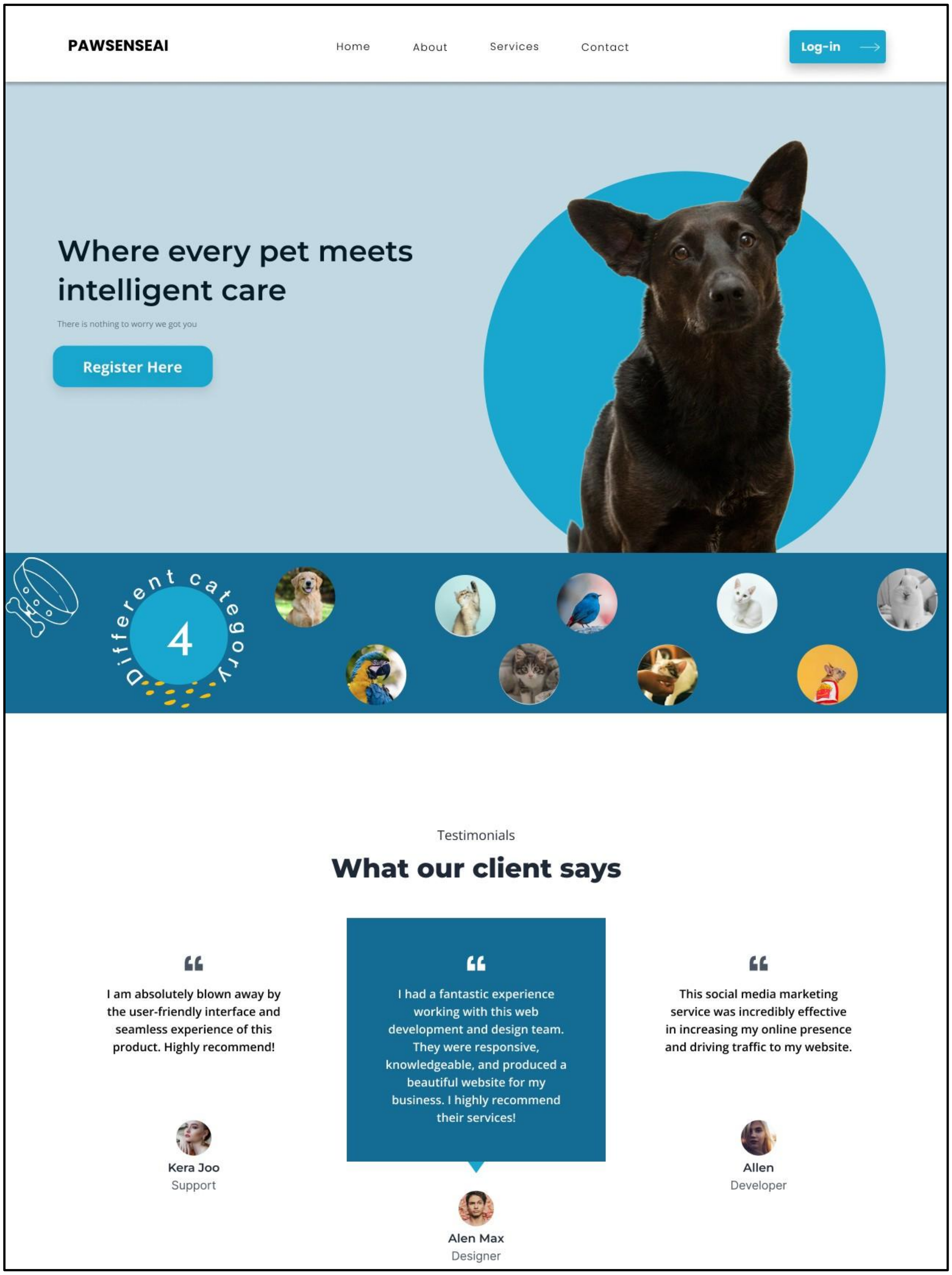
The administrator, a veterinarian or clinic employee, performs backend operations such as managing patient data, handling inventory and clinic schedules, processing appointments, managing personal and service information, and updating payment statuses. Administrators also contribute to predictive analytics related to treatment trends and can respond to user messages and feedback.

The super administrator oversees high-level system functions. They are responsible for managing both administrator and user accounts and updating their own personal information. Their role ensures proper access control and overall system management.

Pawsense AI functions as a centralized platform that supports users with personalized services, enables administrators to manage clinic operations efficiently, and allows super administrators to oversee the entire system structure. The diagram clearly shows the flow of data between these entities and the core system, highlighting how each user type interacts with and benefits from Pawsense AI.

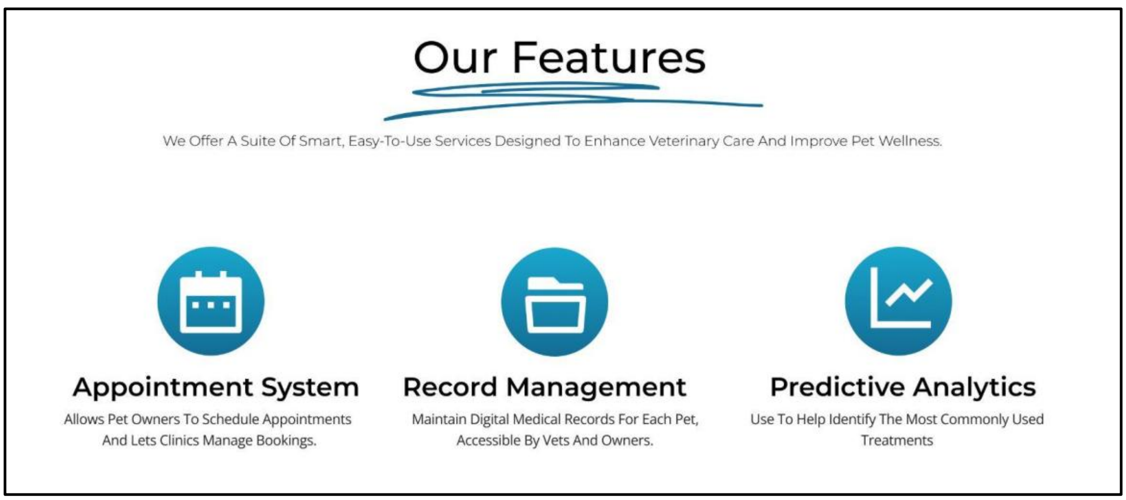
Software Prototype

Figure 66. Home Page



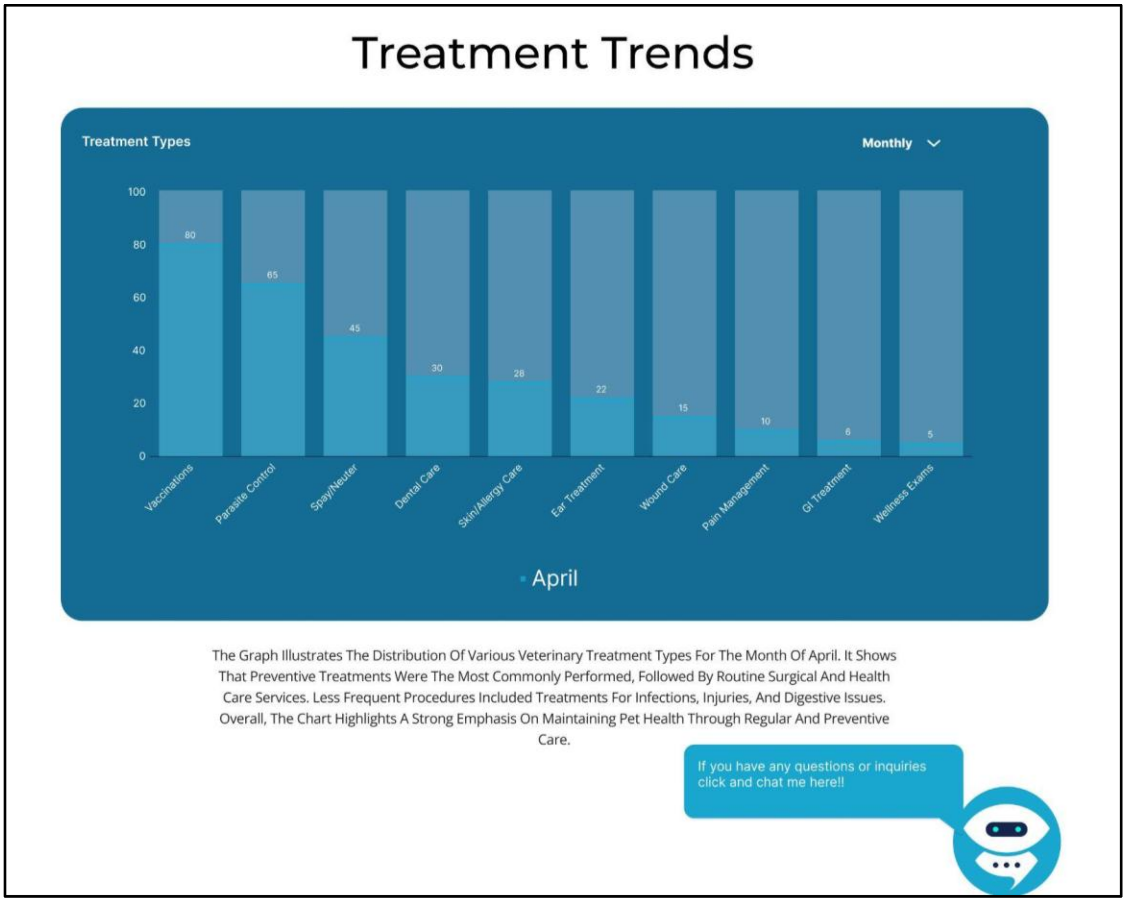
The "Home" page UI for the "Pawsense AI" system features a typical header with the "PAWSENSE AI" logo, navigation links ("Home," "About," "Services," "Contact"), and a "Log-in" button. The top section greets visitors with "Where every pet meets intelligent care" and "There is nothing to worry we got you," alongside a "Register Here" button. Visually, a large photo of a dog, partially rimmed by a blue circle, emphasizes the pet focus. Below, a section displays "4 Different Categories" of services or pets, represented by round icons of various animals. Further down, a "Testimonials" section, titled "What our client says," presents positive client feedback with quotes, names, and designations. This design conveniently introduces the clinic, shows its offerings, and inspires confidence with clear graphics and client testimonials.

Figure 67. Home Page (Our Features)



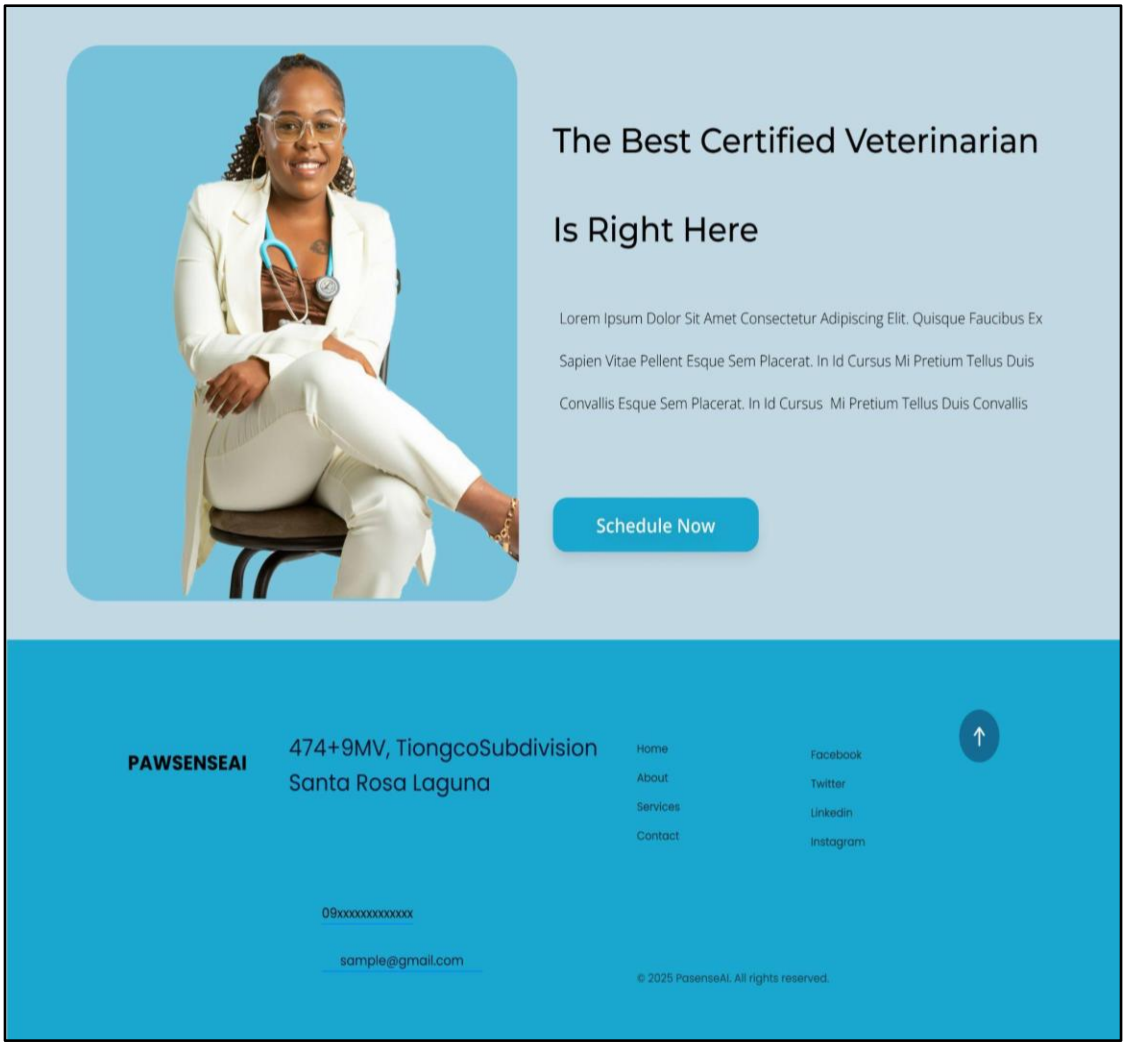
The "Home Page (Our Features)," highlighting its core functionalities. It showcases three main features designed to enhance veterinary care and improve pet wellness. These include an "Appointment System" that allows pet owners to schedule appointments and lets clinics manage bookings. "Record Management" enables the maintenance of digital medical records accessible by vets and owners. Lastly, "Predictive Analytics" is utilized to identify the most commonly used treatments.

Figure 68. Home Page (Treatment Trends)



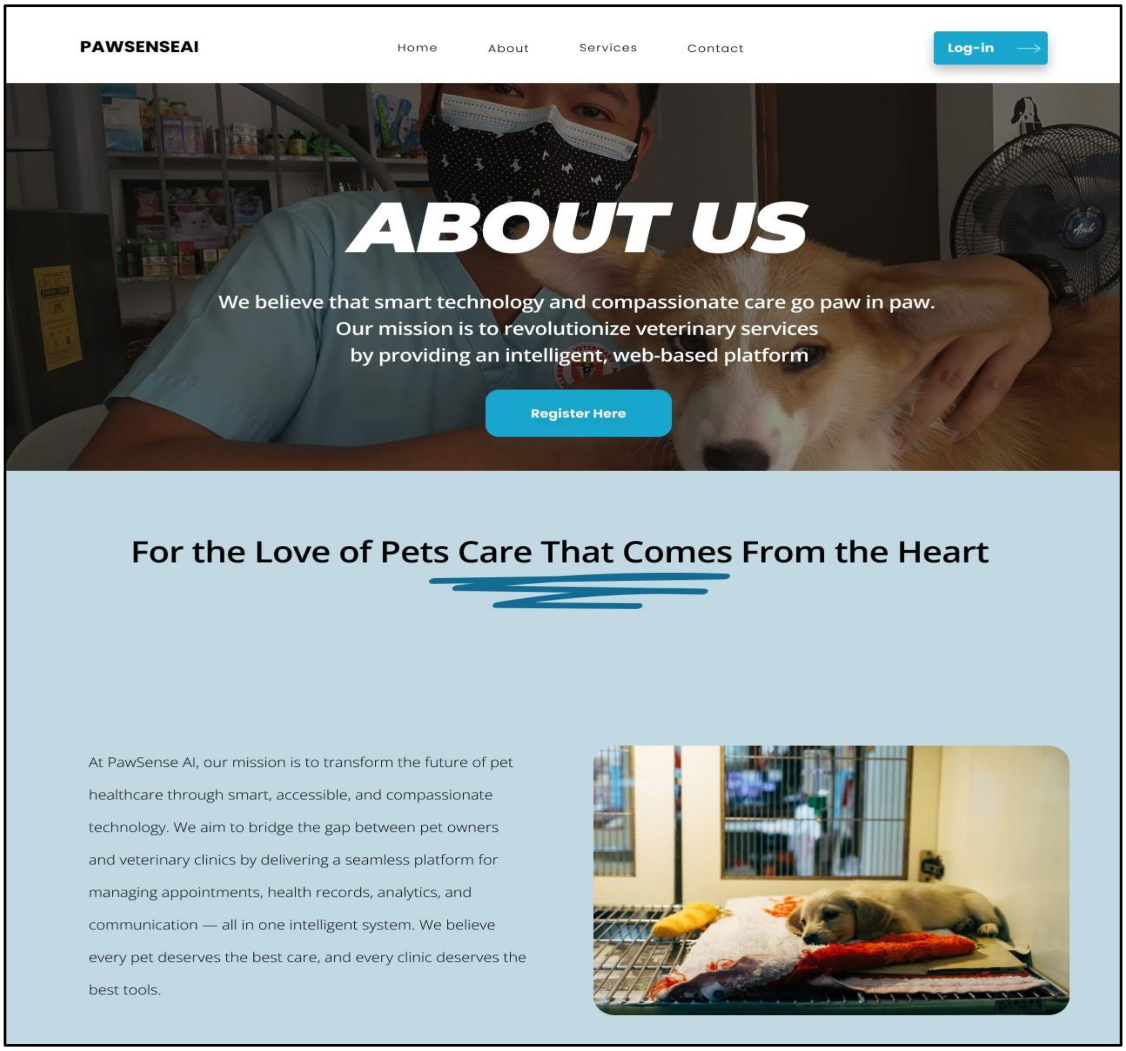
The home page continuation consists of "Our Features," an overview of the system that provides intelligent, user-friendly services for better veterinary care and pet health. Three features are featured with icons and captions: "Appointment System," where pet owners can book appointments and clinics can handle bookings; "Record Management," focused on making electronic medical records available to owners and vets; and "Predictive Analytics," employed for determining popular treatments. Next, a "Treatment Trends" section contains a bar graph showing the split of different kinds of veterinary treatments for a given month, with a dropdown to view by month. Below the graph, text describes the chart as showing frequent and less frequent procedures, emphasizing routine and preventive pet care. Lastly, a chat bubble icon with a question "If you have any questions or inquiries click and chat with me here!!" suggests a live chat support option.

Figure 69. Home Page (Schedule now)



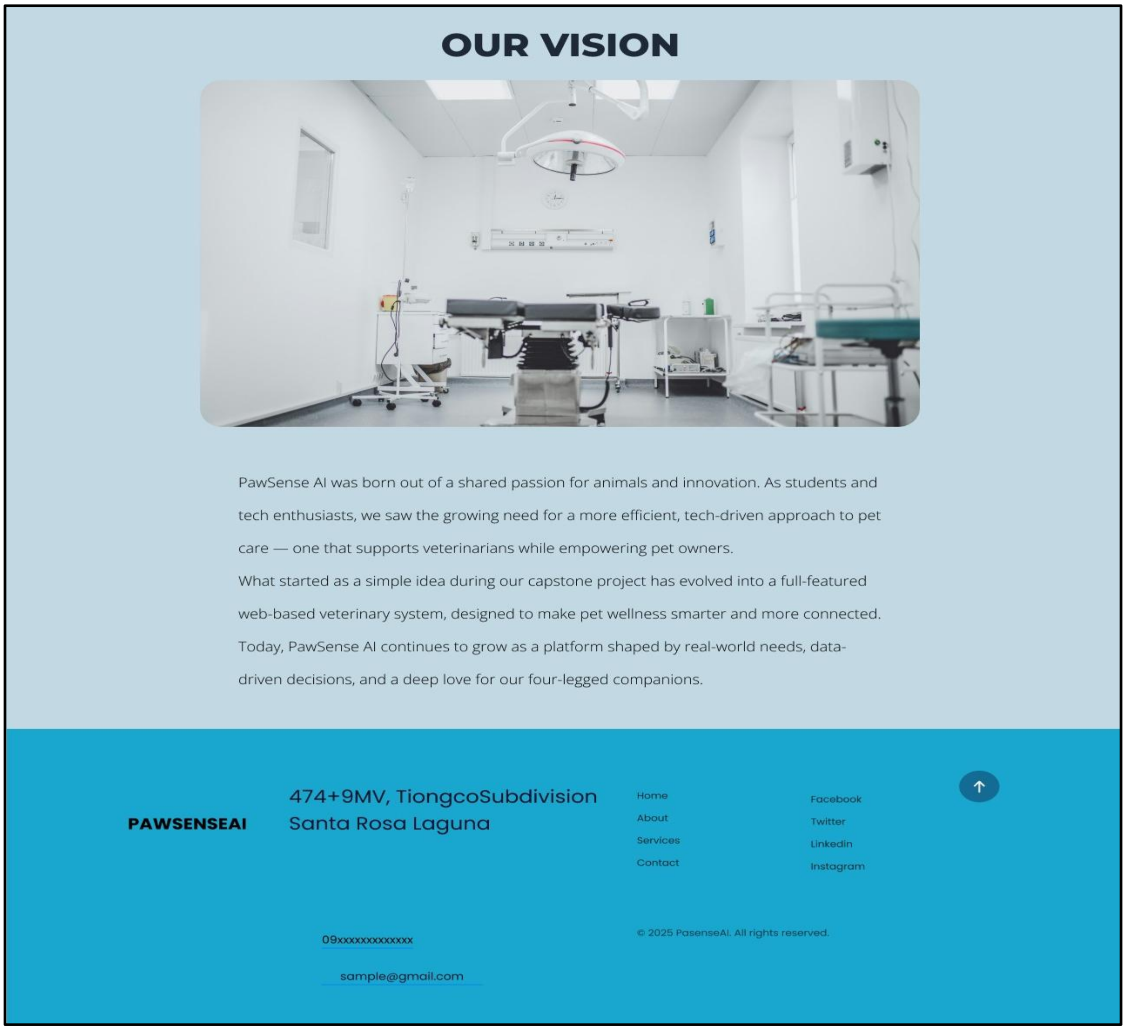
The page still has a section with the clinic's veterinary professionals, with a big photo of someone who appears to be a veterinarian in a clinic. This section is labeled "The Best Certified Veterinarian Is Right Here" and has placeholder text regarding the quality of care and expertise offered. There is a "Schedule Now" button to encourage users to book an appointment. The page concludes with a repeated footer, as with the other pages, with the "PAWSENSE AI" logo, the clinic's full address, phone number, and email. It also has quick nav links and social links. There is an arrow-up icon added, which enables users to scroll back to the top of the page. This final section is to provide user confidence by emphasizing the quality of the clinic's staff and providing direct calls to actions and full contact information.

Figure 70. About Us Page



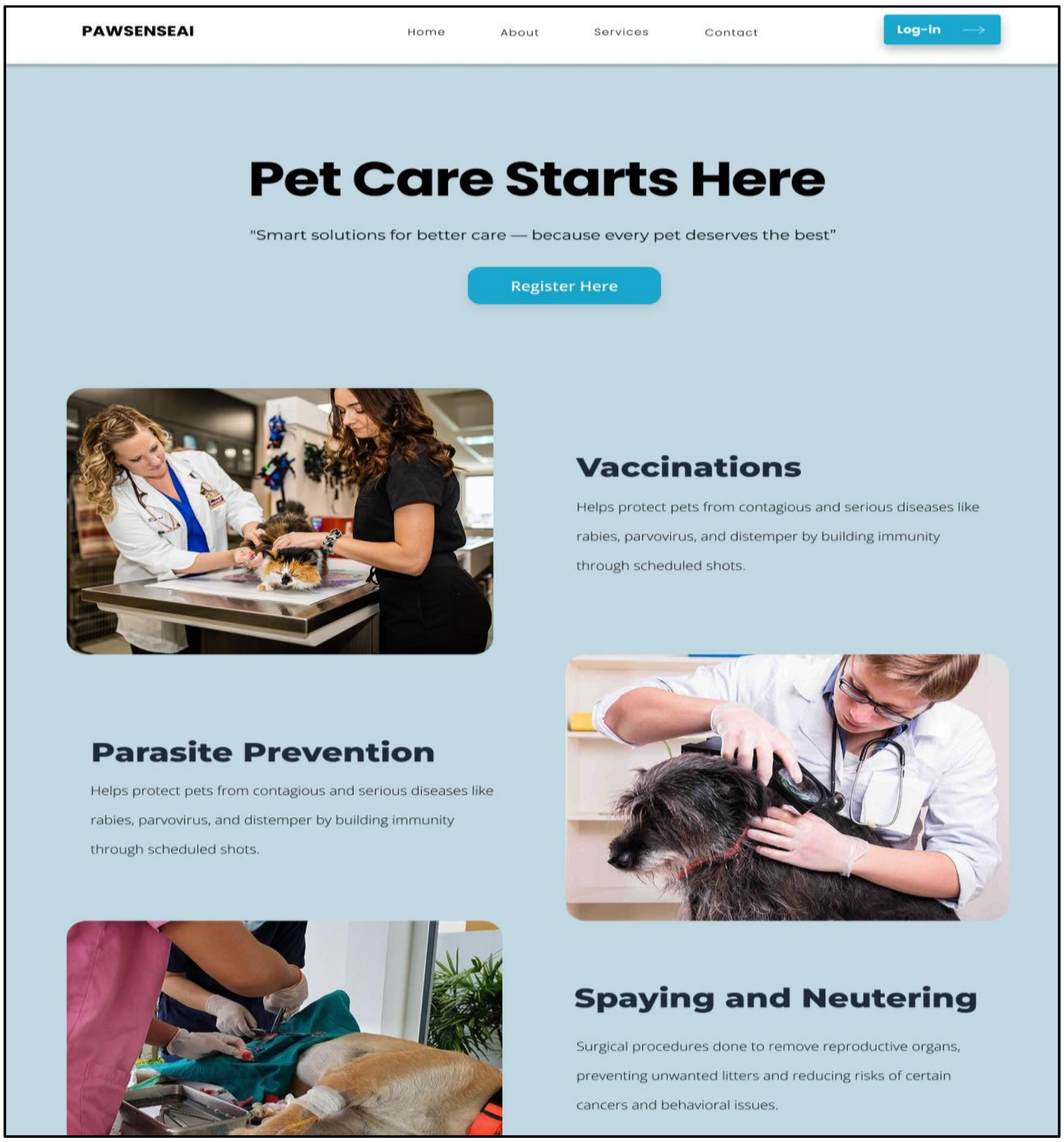
The "About Us" page UI for the "Pawsense AI" system features a bold "ABOUT US" heading above an image of a veterinarian with a pet. The tagline "smart technology and compassionate care" and dedication to an "intelligent, web-based platform" are prominently displayed, along with a "Register Here" button. A section titled "For the Love of Pets Care That Comes From the Heart" emphasizes the emotional aspect of their work. A block of text details their commitment to improving pet healthcare through accessible technology for appointment management, health records, analytics, and communications. This is followed by a picture of a puppy in a clinic setting. The UI effectively represents the clinic's identity, values, and system offerings to establish credibility with potential clients.

Figure 71. Our Vision (About Us Page)



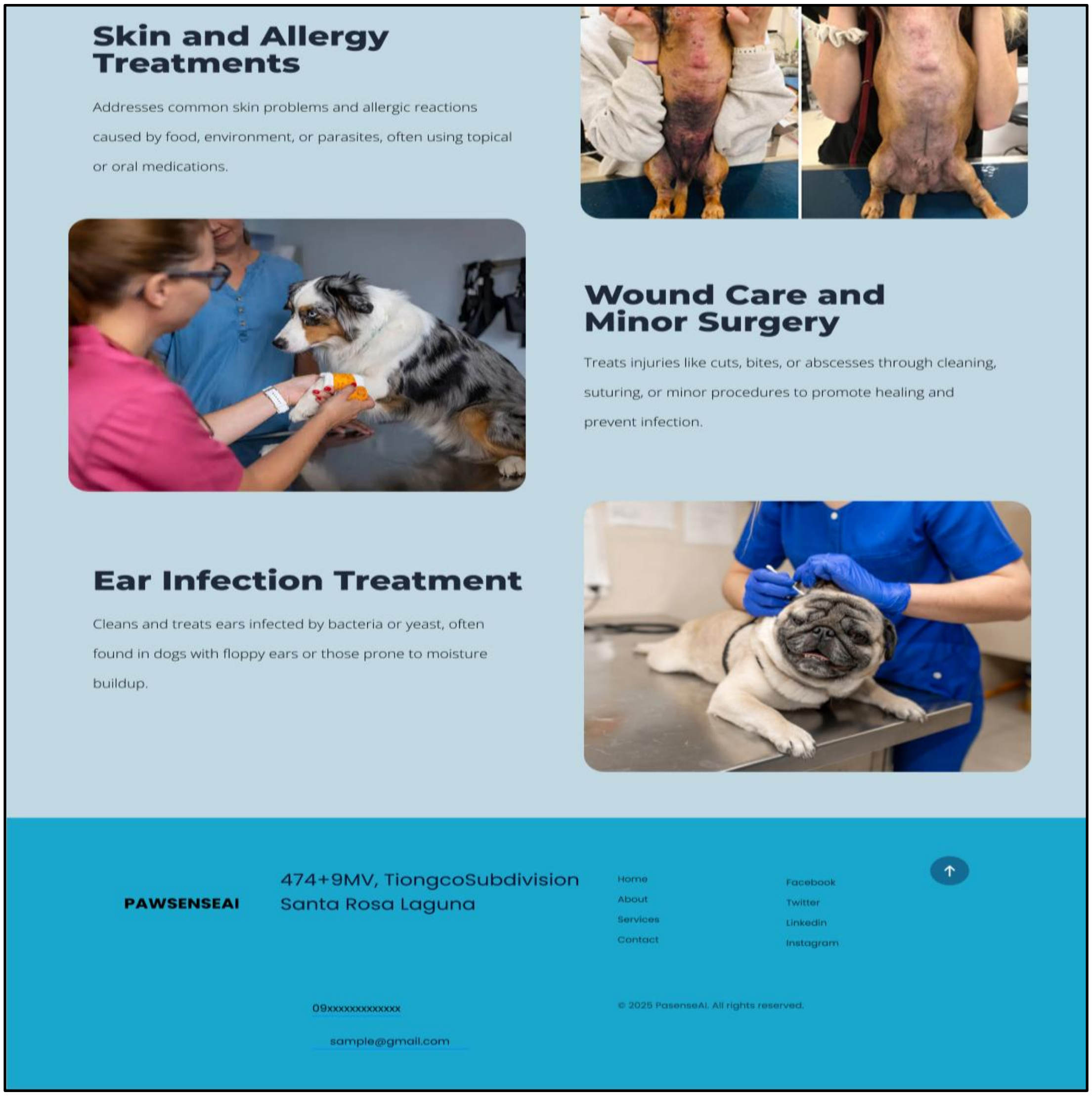
The second section of "About Us" is devoted to "OUR VISION." It contains a photo of a clean, modern veterinary operating room, emphasizing the professionalism of the clinic and the implementation of new care. Below the photo, a descriptive text block tells the story of the origin and evolution of Pawsense AI: "PawSense AI was born of a shared passion for animals and innovation. As students and tech enthusiasts, we saw the growing need for a more efficient, tech-enabled approach to pet care, one that supports veterinarians while empowering pet owners. What started as a simple idea in our capstone project has evolved into a full-featured web-based veterinary system, built to make pet wellness smarter and more connected. Today, PawSense AI continues to grow as a platform driven by real-world needs, data-driven decisions, and a deep affection for our four-legged friends." This text is meant to express the passion, experience, and evolution behind the system. This final section emphasizes the clinic's commitment to pet care through its vision and commitment to technological progress.

Figure 72. Services Page 1



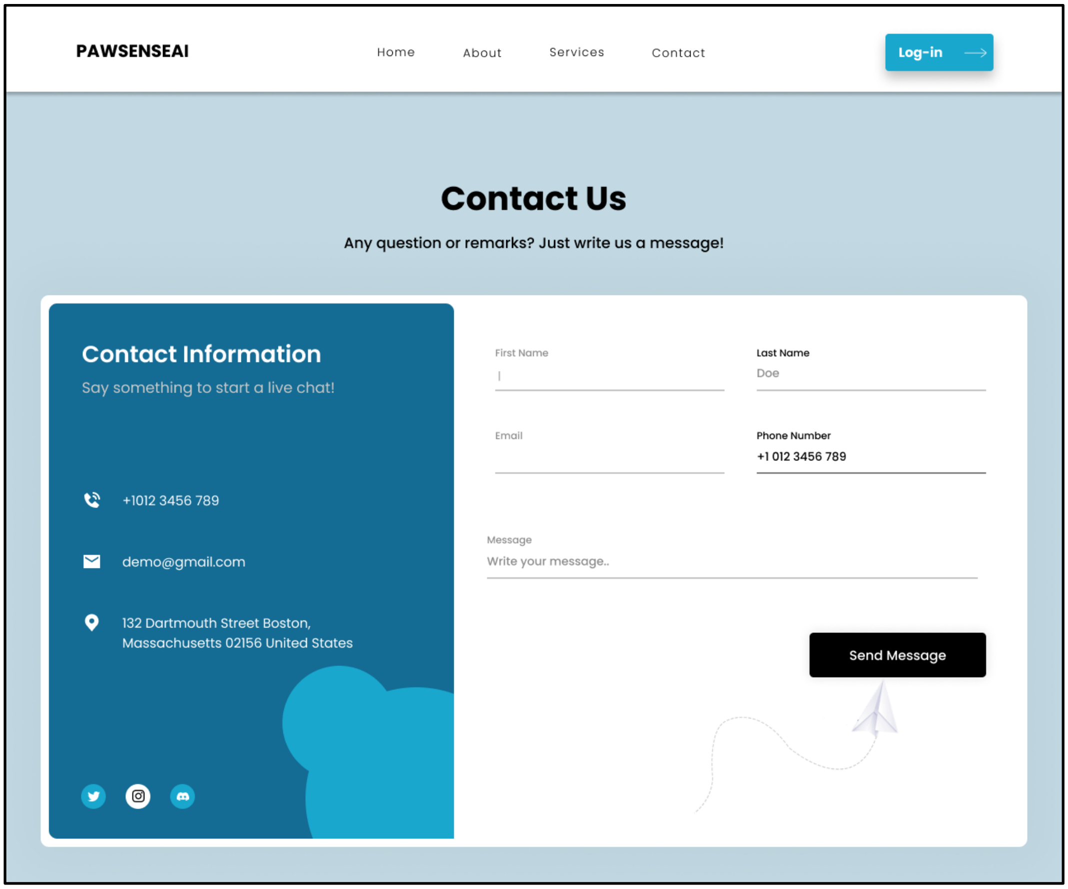
This section explains the "Services" page UI of the "Pawsense AI" system, which is intended to inform users what the veterinary clinic provides. The page includes a simple header with the logo and links such as "Home," "About," "Services," and "Contact," as well as a "Log-in" button. The principal section of the page begins with a large title, "Pet Care Starts Here," and a pet care tagline. A "Register Here" button welcomes new users to register. The principal content displays various clinic services in a grid. Each service includes an image and a brief description. For example, "Vaccinations" describes how shots keep pets safe, with an image of vets and a pet. "Parasite Prevention" also describes its advantage, and "Spaying and Neutering" describes its purpose, with a respective image. This structure is simple to view and understand the clinic's services.

Figure 73. Services Page 2



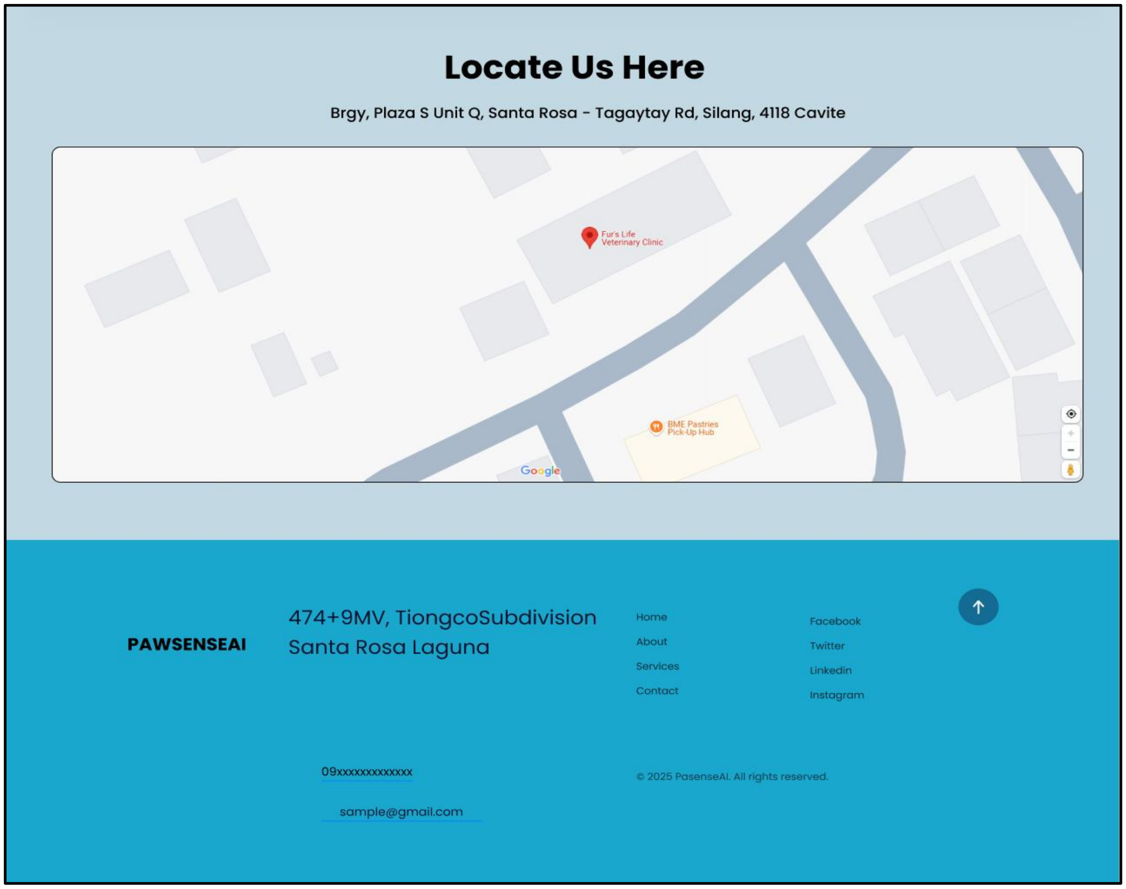
The "Services" page extension has more in-depth treatments. "Skin and Allergy Treatments" describe treatments for skin problems, with a relevant image. "Wound Care and Minor Surgery" describes the treatment of wounds, with an image of a dog undergoing treatment. "Ear Infection Treatment" describes the treatment of ear issues, with an image of a pug. The page finishes with a consistent footer, the clinic logo, address, contact details, navigation links, and social media links. A scroll-to-top arrow-up icon facilitates navigation to the top. This section still lists the clinic services in plain and visual fashion.

Figure 74. Contact Us Page



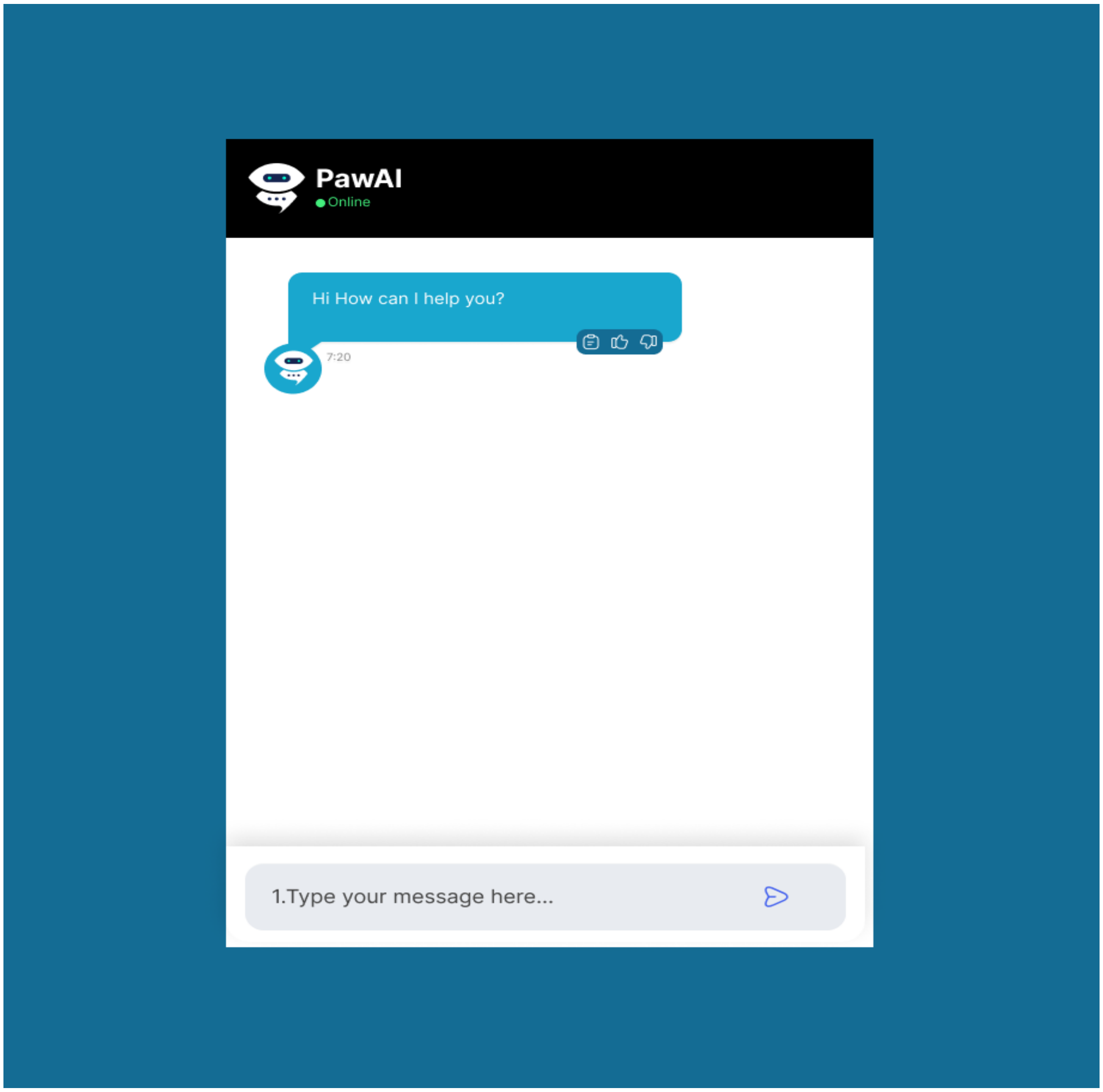
This section illustrates the "Contact" page UI of the "Pawsense AI" system, with the aim of easy communication. The page features a simple header with logo and navigation links, and a "Log-in" button. Most of the page bears the title "Contact Us," inviting users to send a message. The page is divided into two sections under one card. On the left-hand side, a blue "Contact Information" panel offers phone, email, and address information, and points to live chat. It also features social media icons. On the right-hand side, a "Message Form" enables users to send questions using fields for "First Name," "Last Name," "Email," "Phone Number," and a "Message" box. A "Send Message" button submits the form, with a small paper airplane icon suggesting the message is sent. This UI presents clear channels for users to communicate with the clinic.

Figure 75. Contact Us Page (Locate us)



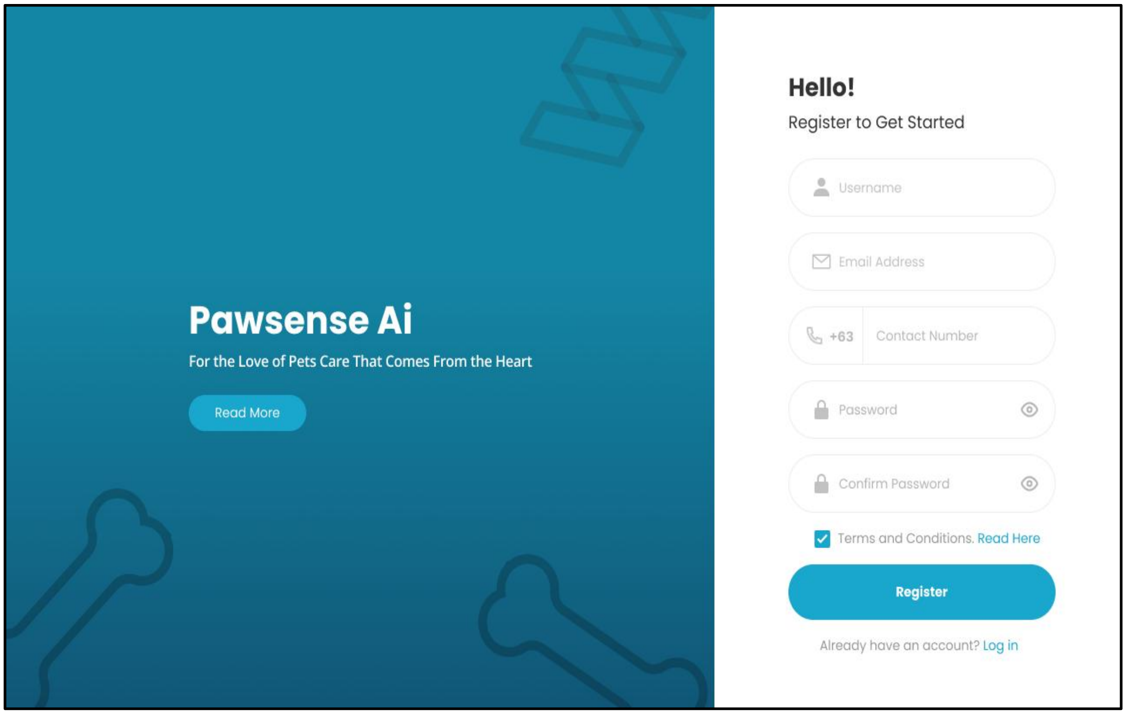
The provided image showcases the "Locate Us Here" section of the PawSense AI platform, designed to help users find the veterinary clinic. It prominently displays an embedded Google Map centered on "Paws n' Life Veterinary Clinic" in Silang, Cavite, with the full address clearly stated above the map. Below this interactive location feature, a comprehensive footer section for "PAWSENSE" is present, including another address detail, blurred contact number, generic email, and quick navigation links to various pages like "Home," "Services," and "Contact." Additionally, the footer integrates social media links for platforms such as Facebook and Instagram, along with copyright information for 2025, providing a complete resource for user engagement and clinic discovery.

Figure 76. Chat Bot



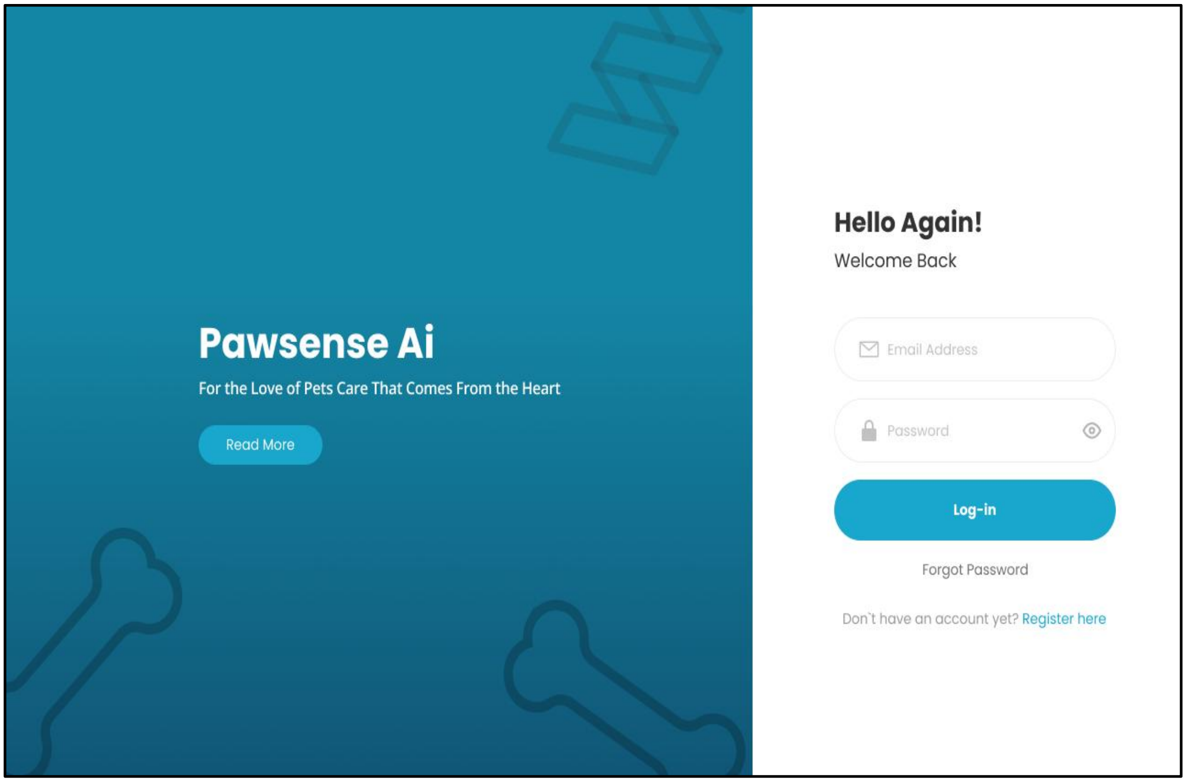
The PawAI Chatbot, a key component of the PAWSENSE AI smart veterinary clinic management system at Animal House Alabang, efficiently handles the most frequent client inquiries by providing immediate and accurate information on the clinic's services and operational details, such as clinic hours, appointment procedures, and general policies, thereby automating responses to common questions and significantly reducing the administrative workload on staff while enhancing the client experience.

Figure 77. Register Page



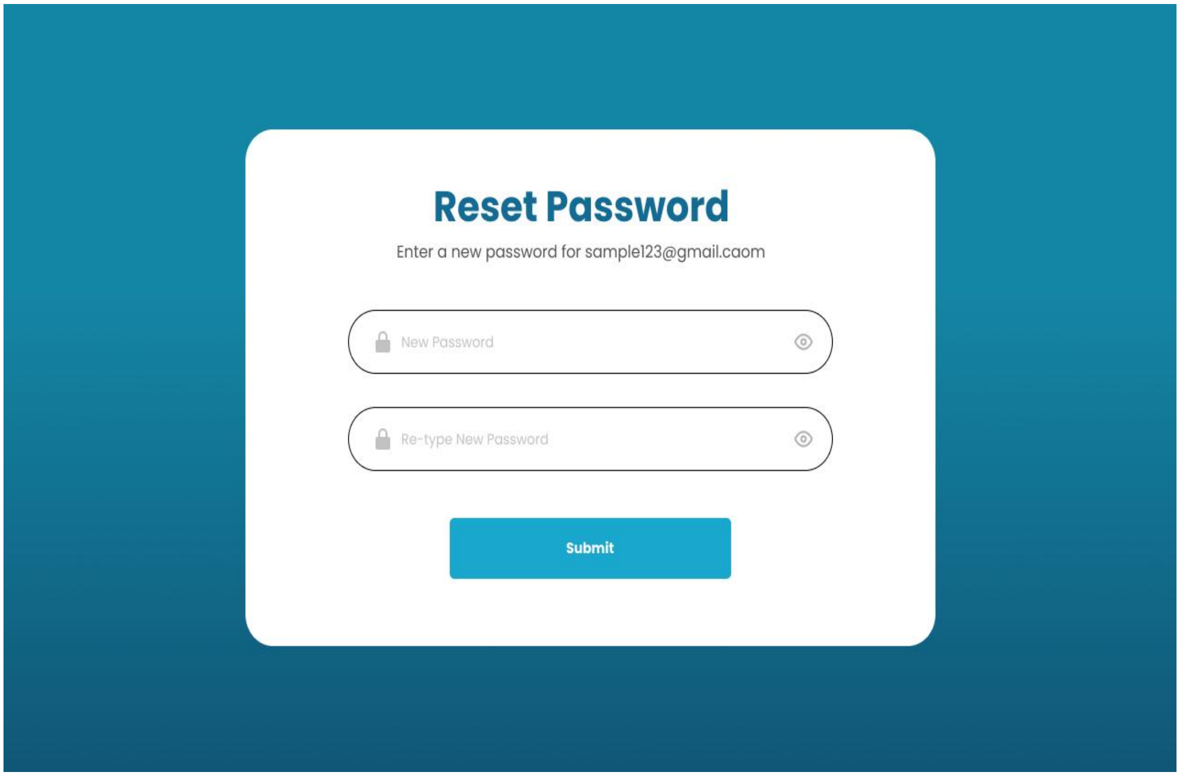
The purpose of the PawSense AI registration page is to facilitate the creation of a user account by collecting the necessary data. It provides input fields for a unique username, email address, contact number (pre-filled with the country code for the Philippines), and a secure password (which requires confirmation). A crucial functionality is the mandatory agreement to "Terms and Conditions," linked for user review. Finally, it offers a "Register" button to submit the collected information, and a "LogIn" link to redirect existing users to the sign-in page.

Figure 78. Login Page



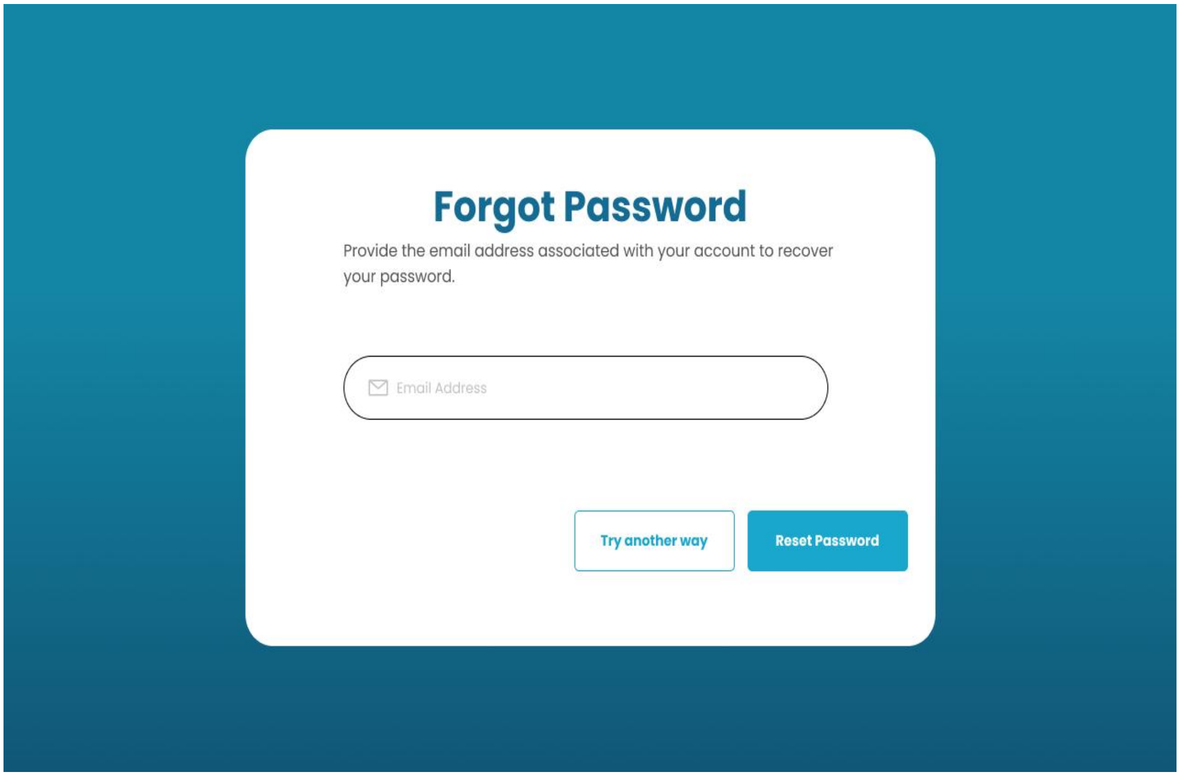
The PawSense AI login page serves as the authentication gateway for existing users of the veterinary clinic management system. Its core functionality is to securely authenticate users by requiring an email address and password. Upon successful login via the "Log-in" button, it grants users access to the system's features and data. It also includes account recovery functionality through a "Forgot Password" link and facilitates new user acquisition by providing a "Register here" link, directing them to the registration page. Its role is to ensure authorized access to the PawSense AI system to streamline clinic operations.

Figure 79. Reset Password Page



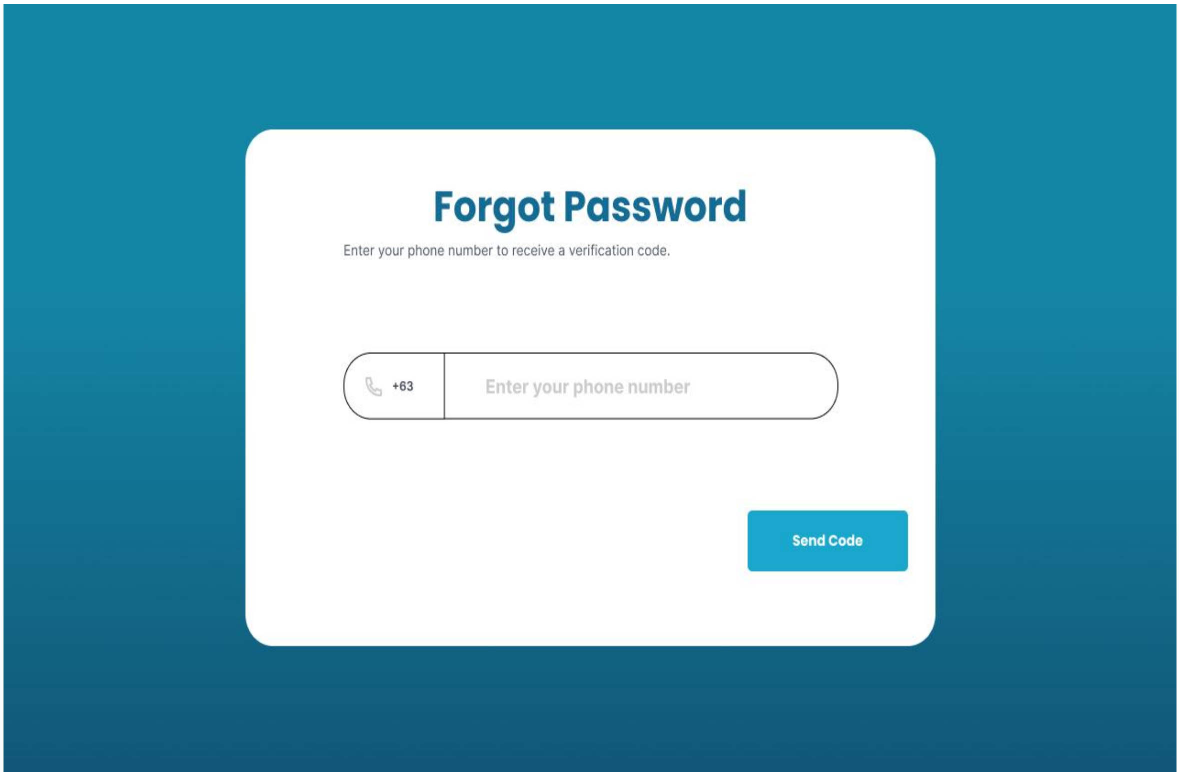
The "Reset Password" page's primary function is to enable users to change their forgotten password. It requires the user to enter and re-enter a new password for a specific email and then submit it to update the account credentials within the system. The "Reset Password" page in PawSense AI directly facilitates account recovery by allowing users to set a new password. It requires entering and re-typing the desired new password for a pre-specified email address, with a "Submit" button to complete the change, thereby restoring user access to the system.

Figure 80. Forgot Password Page (Email)



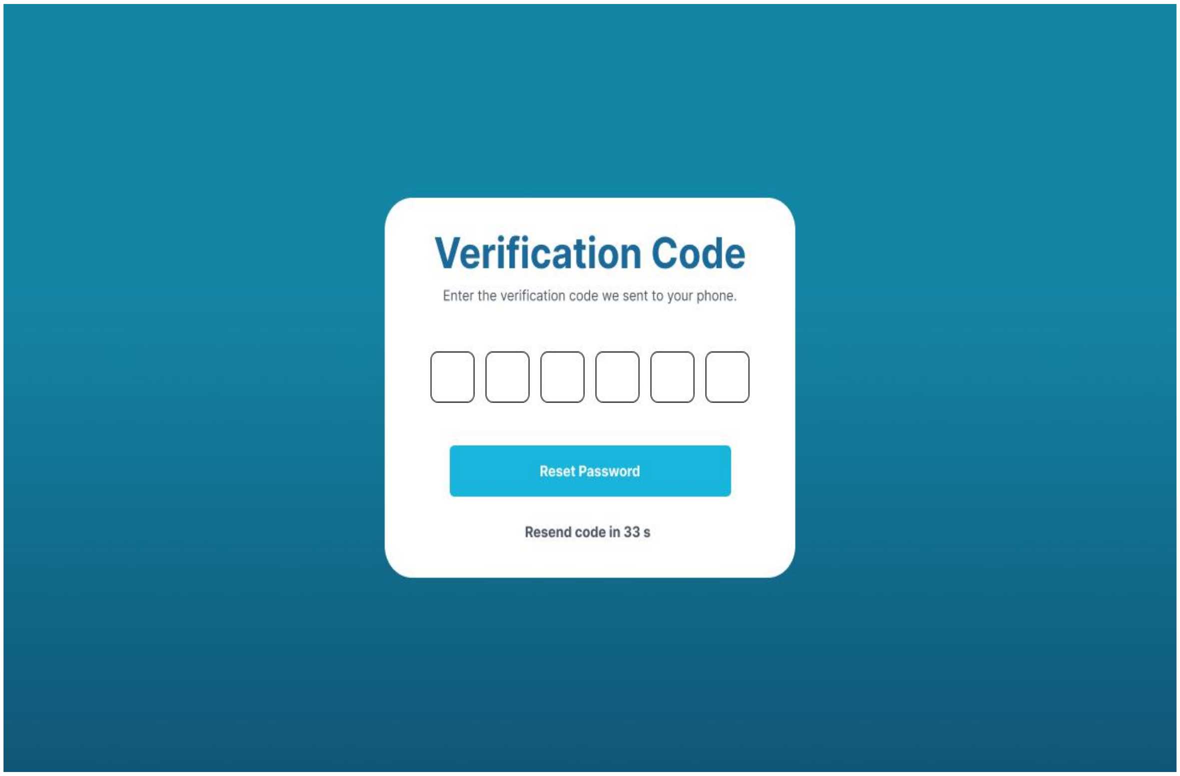
The "Forgot Password" page directly facilitates account recovery by allowing users to submit their registered email address. This will initiate the process of sending a password reset mechanism through a link that will allow the user to regain access to their PawSense AI account. It offers a "Reset Password" action, and an alternative recovery option.

Figure 81. Forgot Password Page (Number)



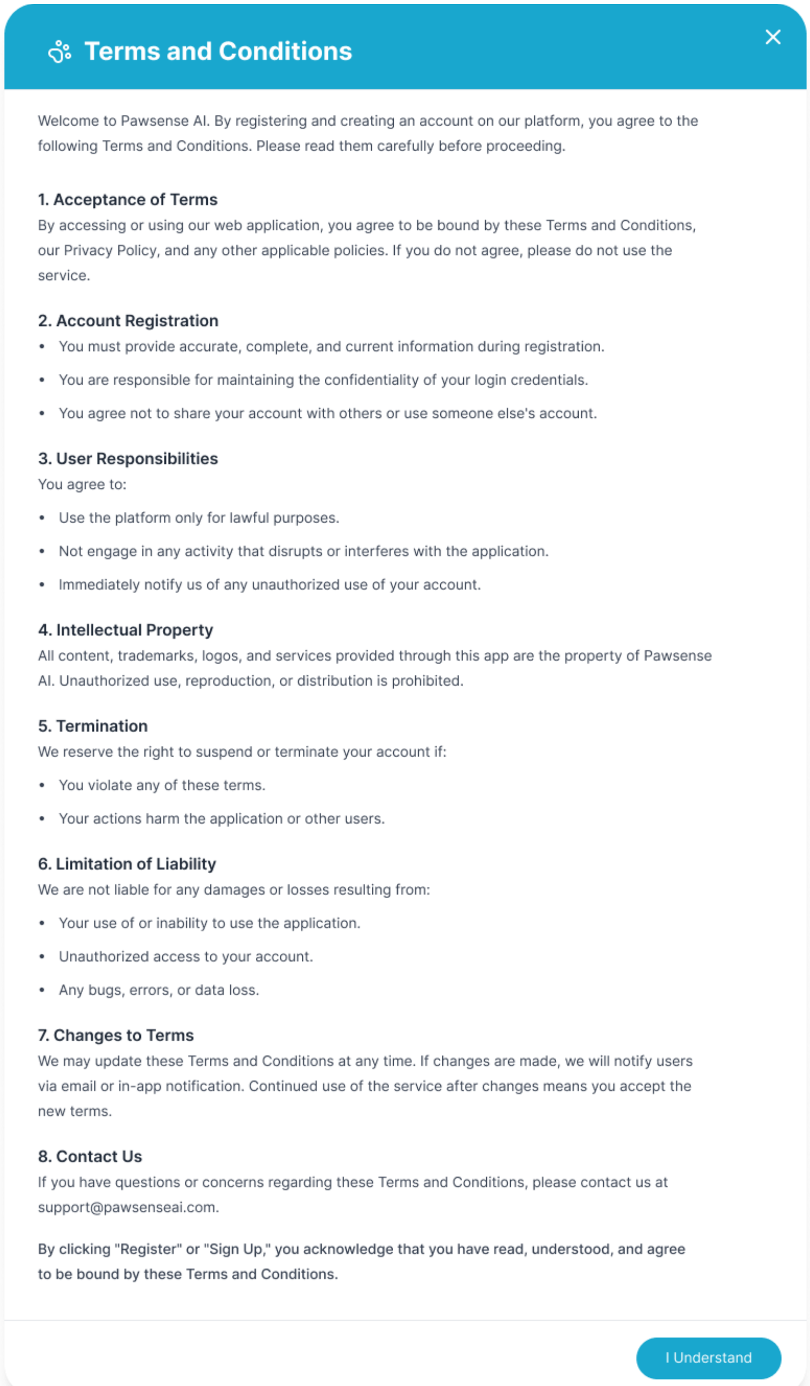
This "Forgot Password" page functions as a phone-based password recovery mechanism for PawSense AI. Its sole purpose is to receive a user's registered phone number, pre-filled with the +63 country code, and then trigger the sending of a verification code via the "Send Code" button, which is essential for initiating a password reset.

Figure 82. OTP Page



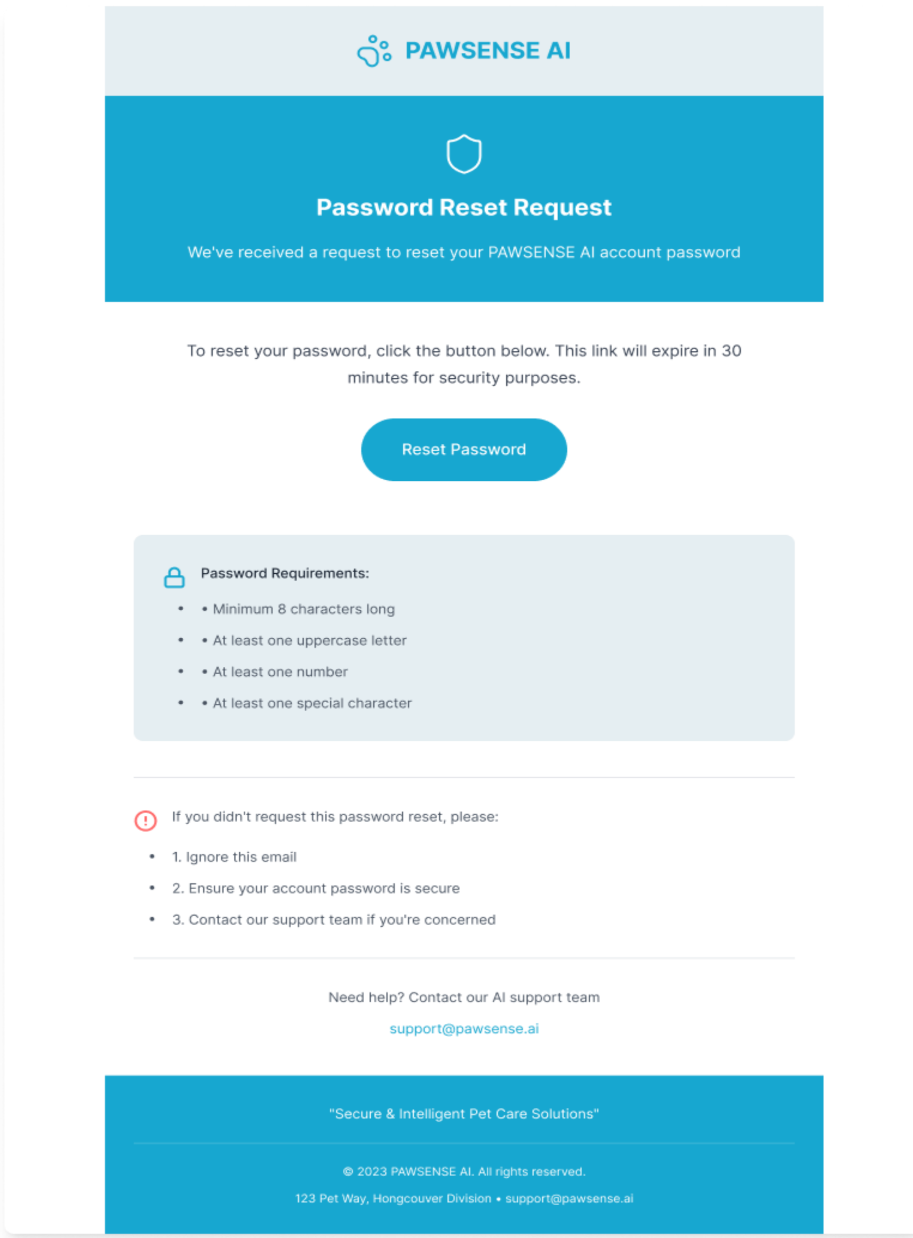
This PawSense AI "Verification Code" page is a security gatekeeping mechanism. Its function is to validate a user's identity by requiring them to enter a time-sensitive, multi-digit verification code received on their phone. Upon correct entry, the "Reset Password" button facilitates the next step in the password recovery process, while a "Resend code" timer allows for re-requesting the code if needed.

Figure 83. Terms and Conditions Page



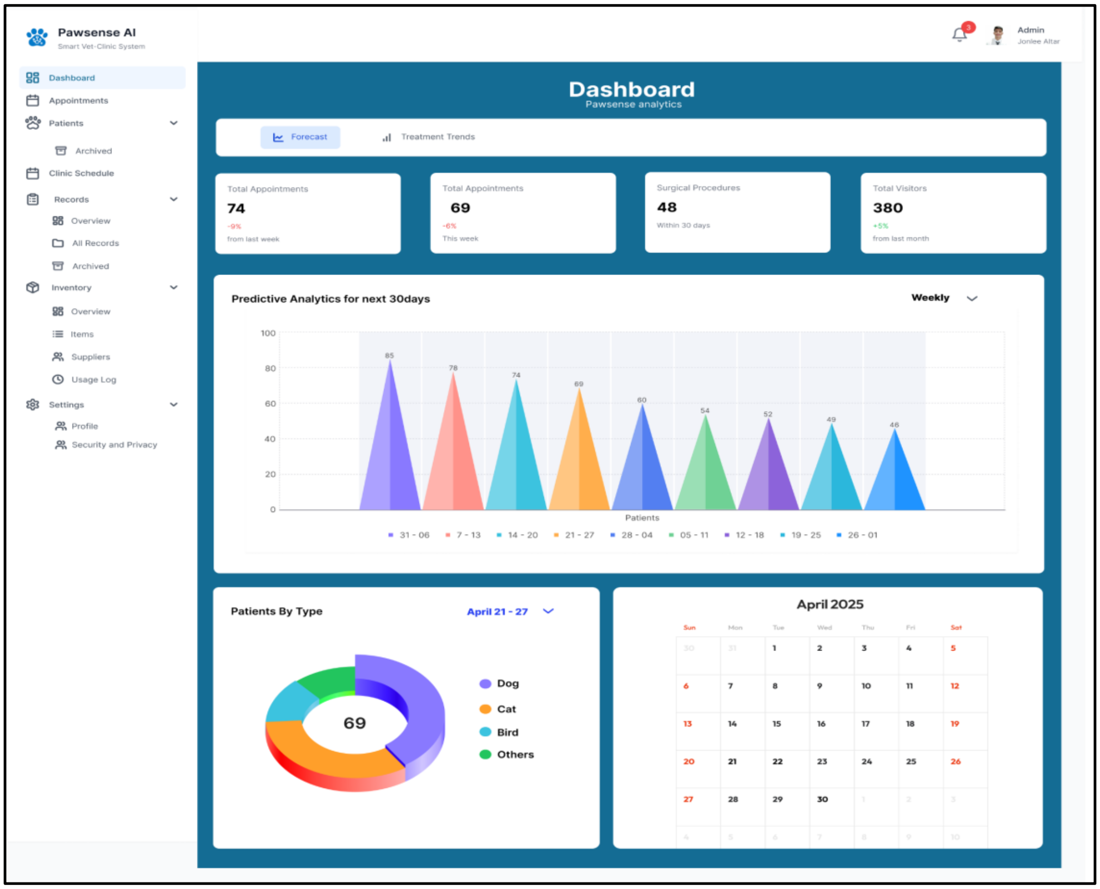
This "Terms and Conditions" page in PawSense AI functions as a legal disclosure and agreement mechanism. It details the rules and responsibilities that users accept when registering and using the platform, covering aspects such as account registration, user conduct, intellectual property rights, termination and limitation of liability. Its primary role is to ensure users acknowledge and consent to these terms before accessing PawSense AI services, indicated by the "I Understand" button.

Figure 84. Password Reset Request Page



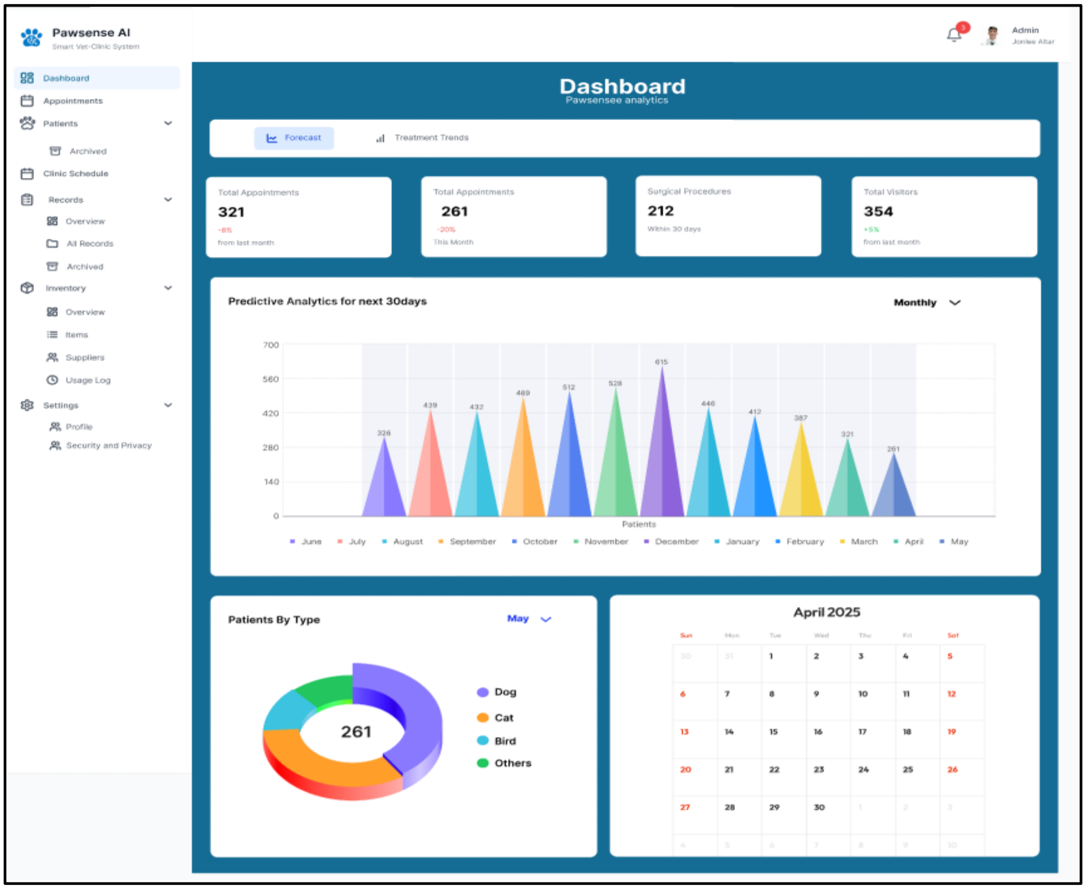
The "Password Reset Request" email from PawSense AI functions as a secure gateway for users to regain access to their accounts. Its primary role is to provide a time-limited "Reset Password" link (expiring in 30 minutes) that directs users to a page where they can set up a new password. The email also outlines password complexity requirements and provides clear instructions for users who did not initiate a reset, including contacting support and ensuring their account is secure.

Figure 85. Admin Dashboard Weekly Forecasting



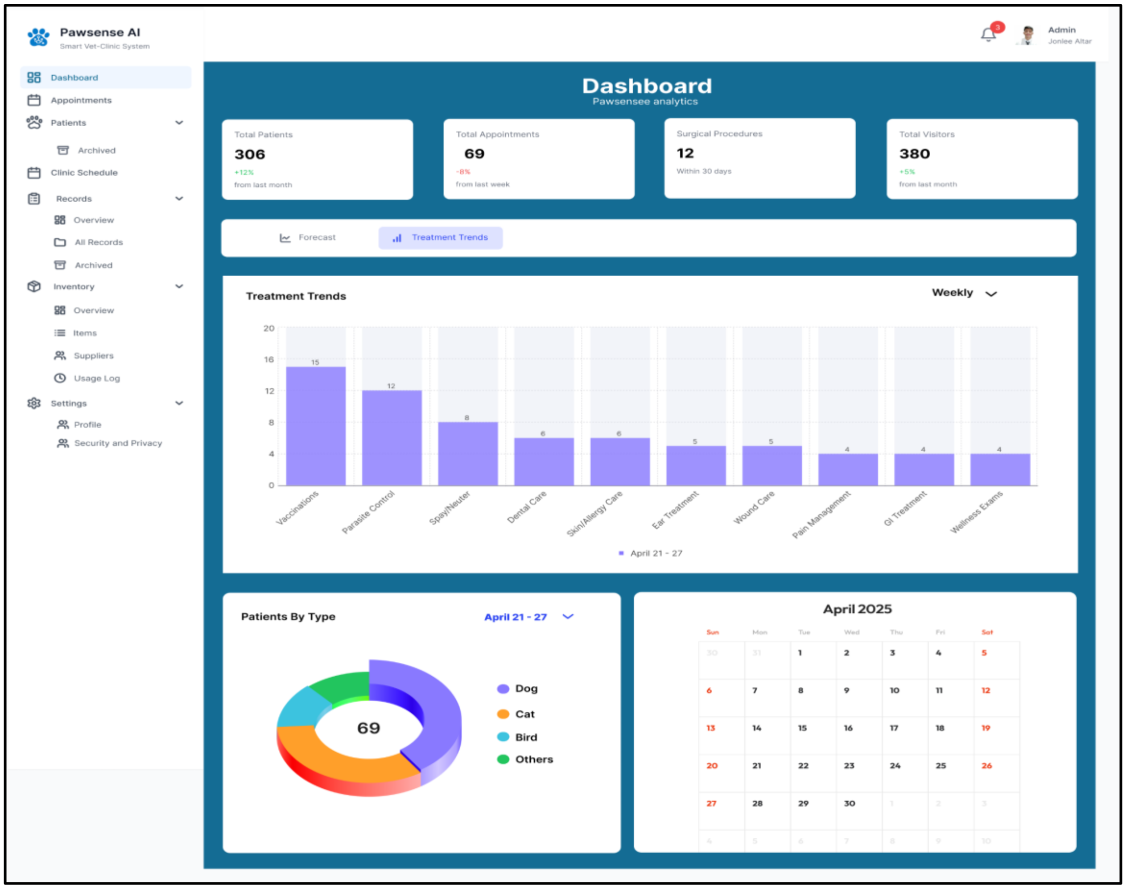
The PawSense AI dashboard for Animal House Alabang offers a Forecasting overview of clinic activity with a focus on short-term forecasting through its predictive analytics module. It displays key data such as total appointments, surgical procedures, and visitors, while predicting the number of clients expected over the next 30 days. These forecasts are divided into weekly segments like April 31 to May 6 or May 7 to 13 to help staff plan schedules, allocate resources, and prepare for busy or slow periods. The scope of predictions is limited to just four weeks to keep it accurate and actionable for near-term decisions. A pie chart shows the breakdown of patients by type (dogs, cats, birds, and others) for the selected week, supporting better inventory planning, while the calendar is included simply to track dates and align them with forecasts.

Figure 86. Admin Dashboard Monthly Forecasting



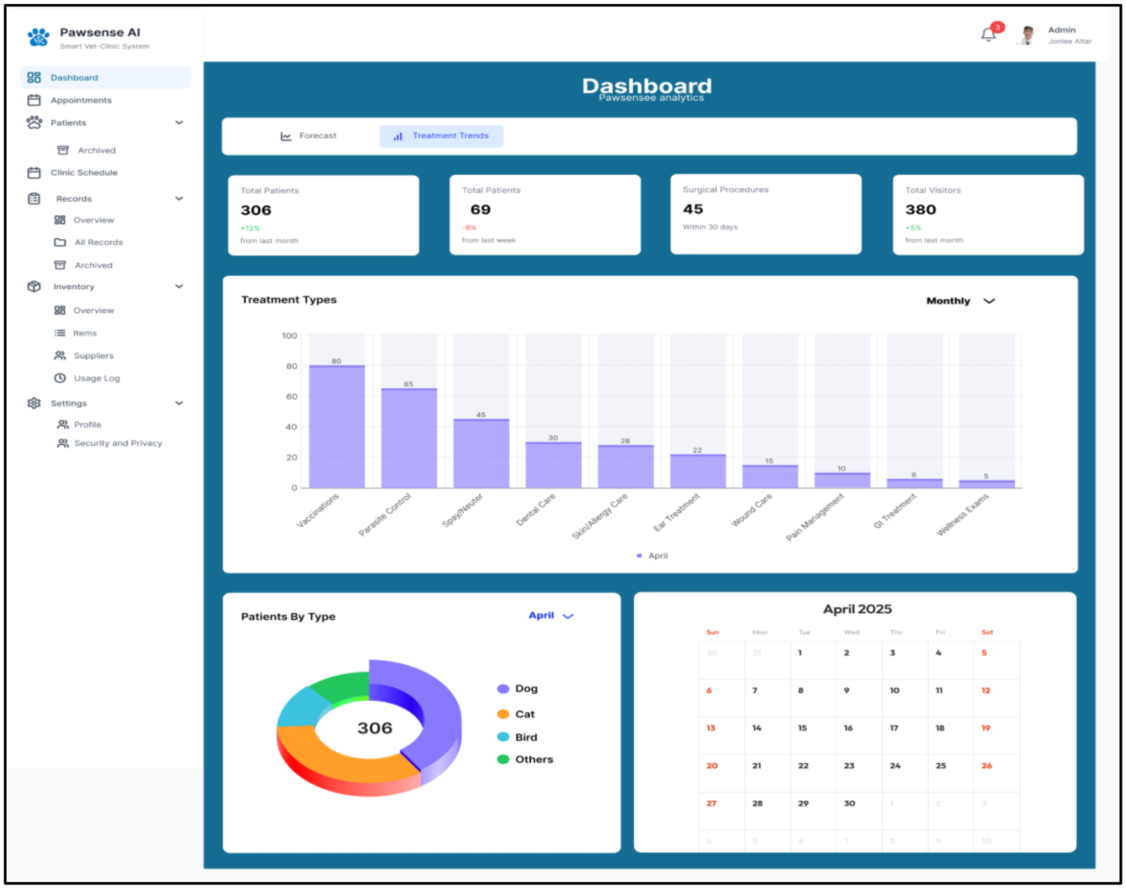
The PawSense AI dashboard for Animal House Alabang shows short-term forecasts using its predictive analytics to predict how many clients the clinic will have in the next 30 days. It displays key data like total appointments, surgeries, and visitors, with forecasts divided by month. Past months, such as March to April, show previous predictions, while selecting the current month, like May, starts a new 30-day forecast from the first day of that month. This helps the clinic plan for client volume, adjust operations, and manage resources based on expected demand. A pie chart breaks down predicted patient types including dogs, cats, birds, and others for the month, and the calendar shows dates aligned with the forecast to track when clients are expected.

Figure 87. Admin Dashboard Weekly Treatment Trends



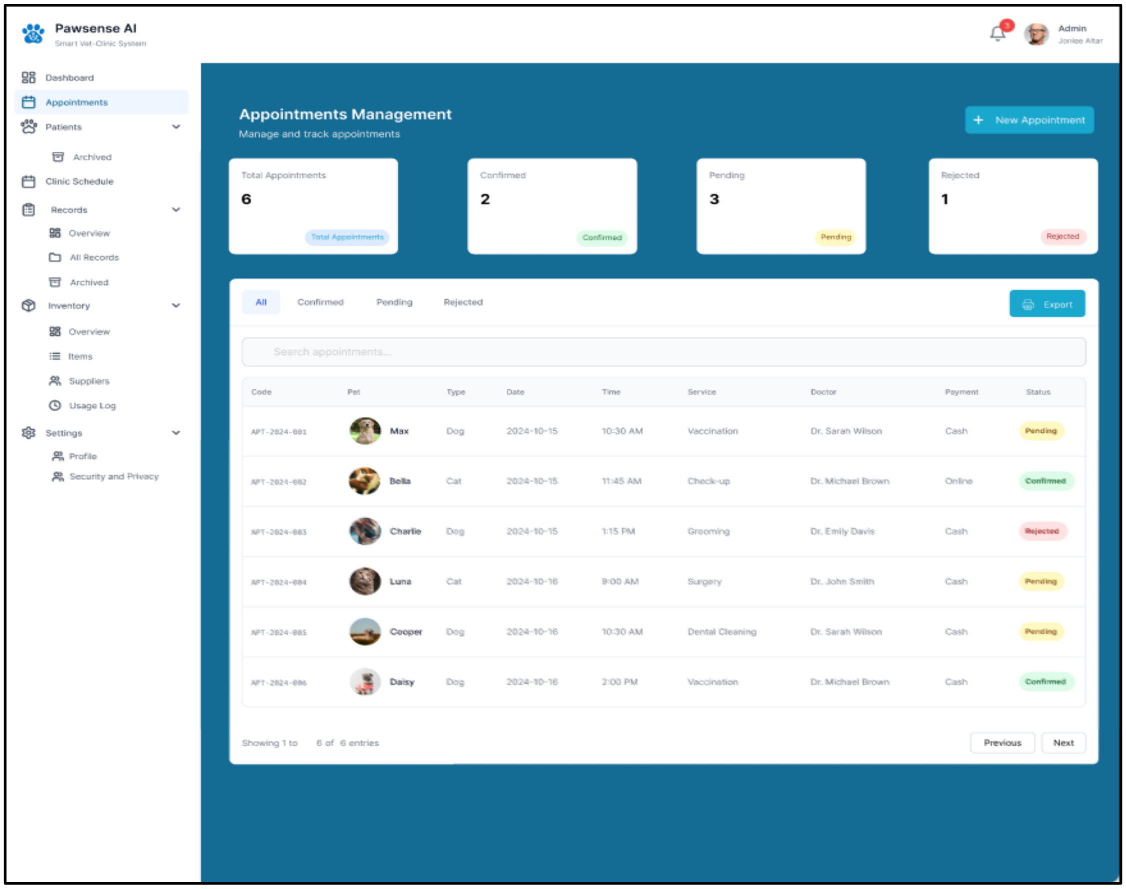
This treatment trends dashboard gives the admin a real-time overview of the clinic's weekly operations, showing the number and types of treatments performed. It also visualizes patient distribution by animal type, helping track service demand. The bar graph highlights common procedures like vaccinations and parasite control, while the calendar provides a quick reference for the current date. Overall, it supports better monitoring and decision-making for clinic management.

Figure 88. Admin Dashboard Monthly Treatment Trends



This treatment trends dashboard gives the admin a real-time overview of the clinic's monthly operations, showing the number and types of treatments performed. It also visualizes patient distribution by animal type, helping track service demand. The bar graph highlights common procedures like vaccinations and parasite control, while the calendar provides a quick reference for the current date. Overall, it supports better monitoring and decision-making for clinic management over a longer time frame.

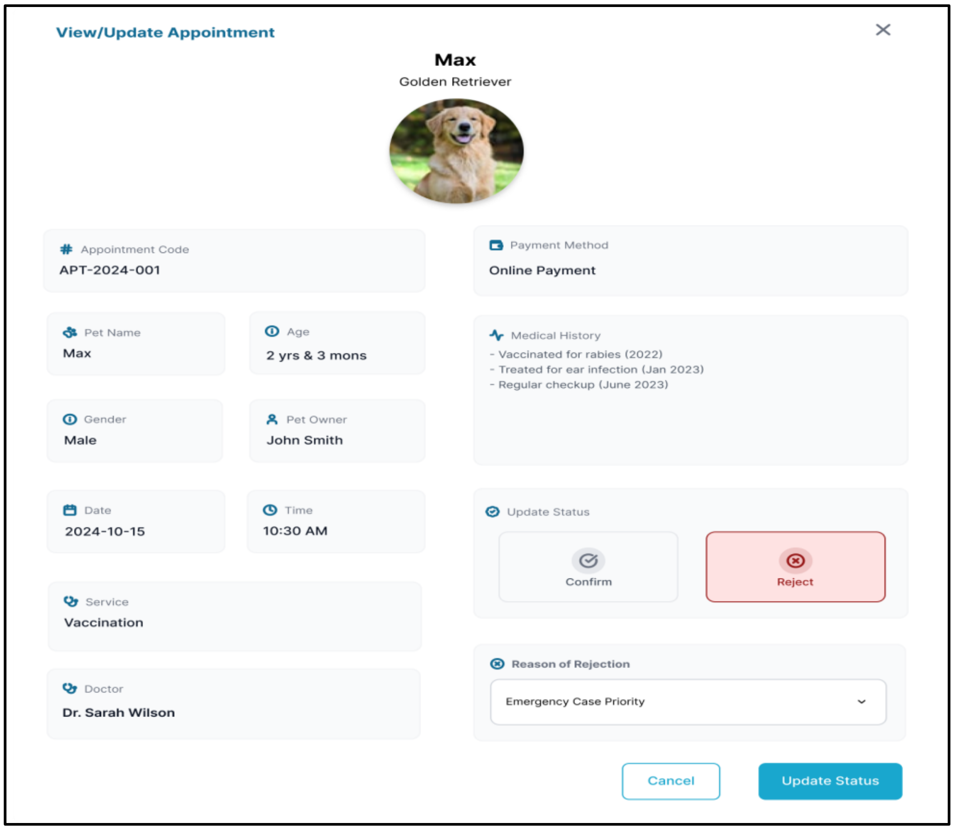
Figure 89. Admin Appointment Management Page



This image displays the "Appointments Management" section of the PawSense AI system, designed to manage and track all clinic appointments. At the top, key metrics provide an overview: "Total Appointments" (6), "Confirmed" (2), "Pending" (3), and "Rejected" (1). Below these summary cards, there's a main table listing all appointments, sortable by "All," "Confirmed," "Pending," or "Rejected" status via tabs. The table includes columns for "Code," "Pet," "Type" (e.g., Dog, Cat), "Date," "Time," "Service," "Doctor," "Payment" method, and "Status" (e.g., Pending, Confirmed, Rejected). A search bar allows for specific appointment lookups, and an "Export" button is available. The "New Appointment" button in the top right corner indicates the ability to add new bookings.

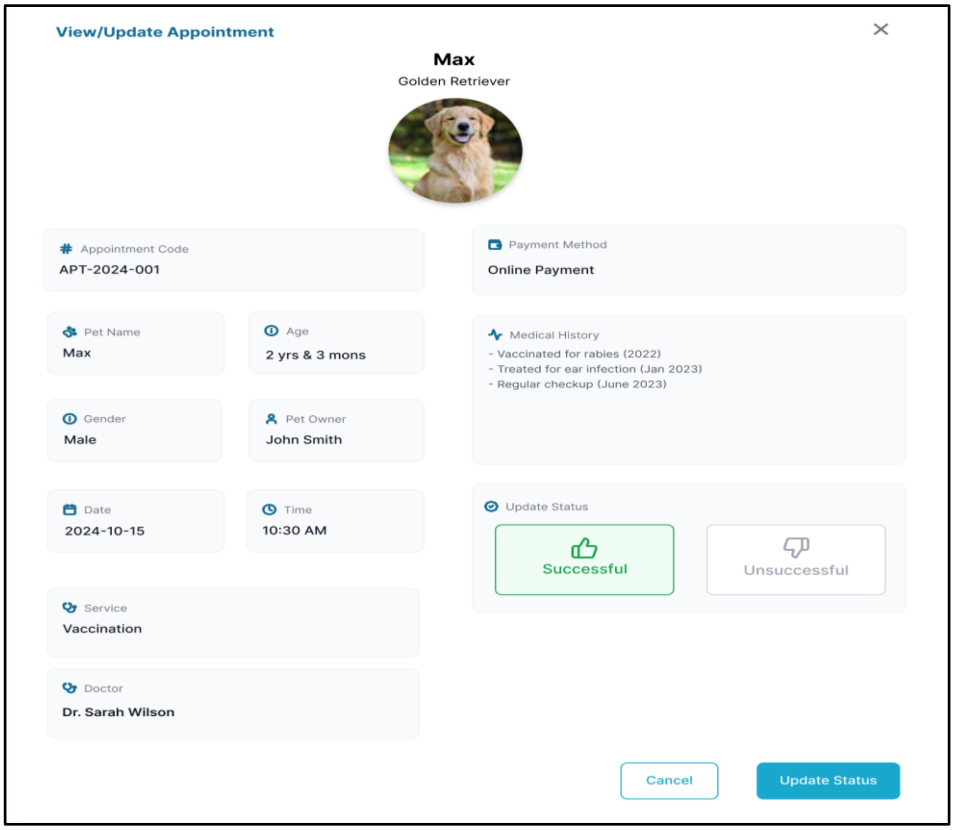
Pagination at the bottom shows "Showing 1 to 6 of 6 entries," confirming all current appointments are displayed.

Figure 90. Admin Update Pending Appointment Modal



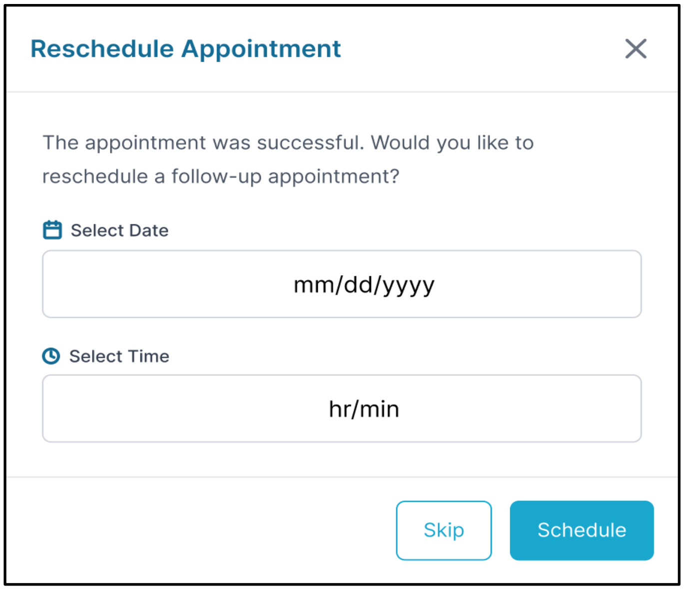
This image displays the "Appointments Management" section of the PawSense AI system, with a "View/Update Appointment" modal open, focusing on the details of a specific appointment. The modal shows comprehensive information for an appointment with "Max," a Golden Retriever. Details include the "Appointment Code", "Date", "Time", "Pet Name", "Age", "Gender", "Pet Owner", and "Doctor". The "Service" is "Vaccination," and the "Payment Method" is "Online Payment." A "Medical History" section lists past treatments for Max. Below these details, an "Update Status" section allows veterinary staff to change the appointment's status to "Pending," "Confirm," or "Reject." If "Reject" is chosen, a "Reason of Rejection" dropdown becomes available. In this specific view, the "Reject" option is highlighted, and an "Emergency Case Priority" field is also visible, indicating it might be a factor in status updates. At the bottom, "Cancel" and "Update Status" buttons are available to manage the appointment record.

Figure 91. Admin Update Confirmed Appointment Status



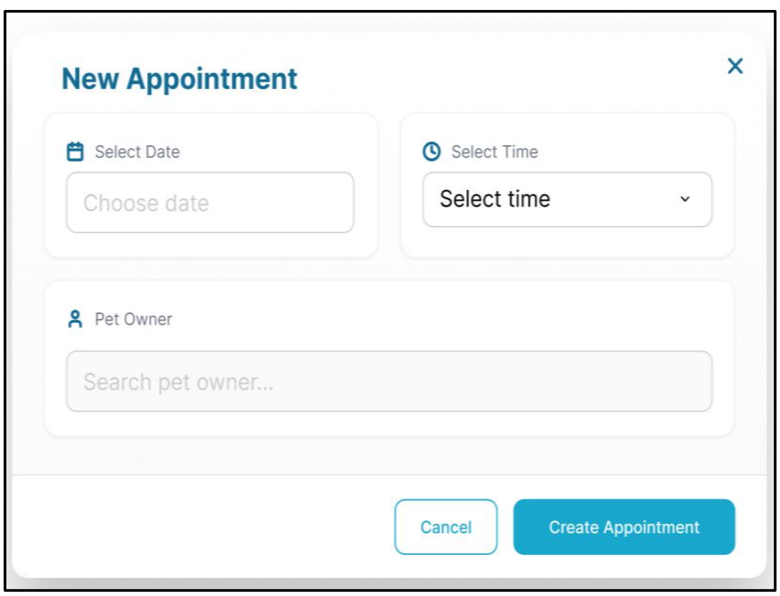
This "View/Update Appointment" modal in PawSense AI provides a comprehensive overview and status management for individual appointments. It displays full appointment details including pet information, owner, medical history, service, doctor, date, time, and payment method. Its core functionality is to allow veterinarian staff to update the appointment status to "Successful" or "Unsuccessful" via dedicated buttons, enabling precise tracking of completed services.

Figure 92. Admin Reschedule Successful Appointment Modal



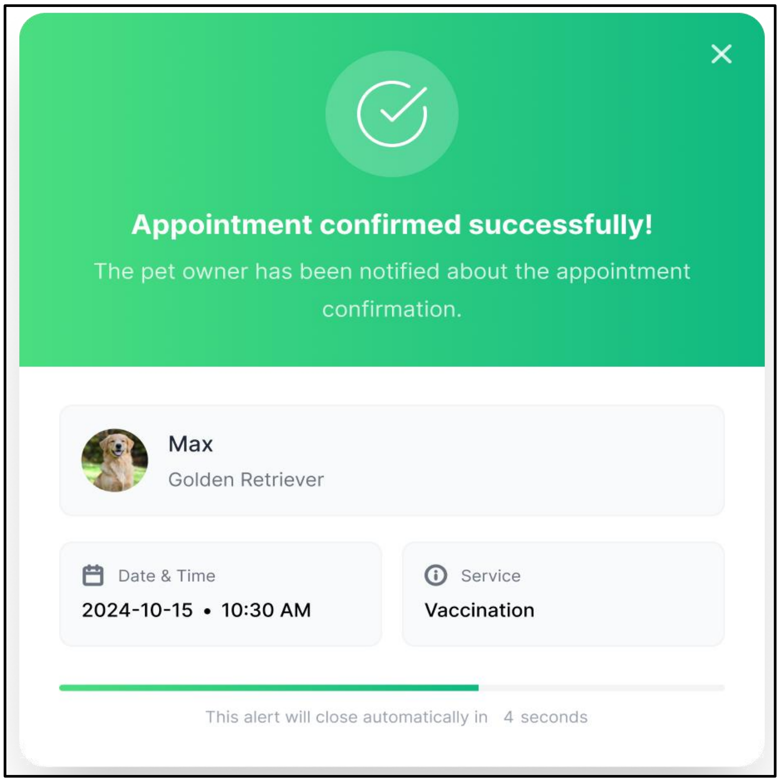
This "Reschedule Appointment" modal in PawSense AI functions to facilitate the booking of follow-up appointments after a successful prior one. It enables users to select a new date and time for a follow-up appointment. Users can either "Schedule" the follow-up or "Skip" this option, providing flexibility in managing recurring pet care needs.

Figure 93. Admin New Appointment Modal



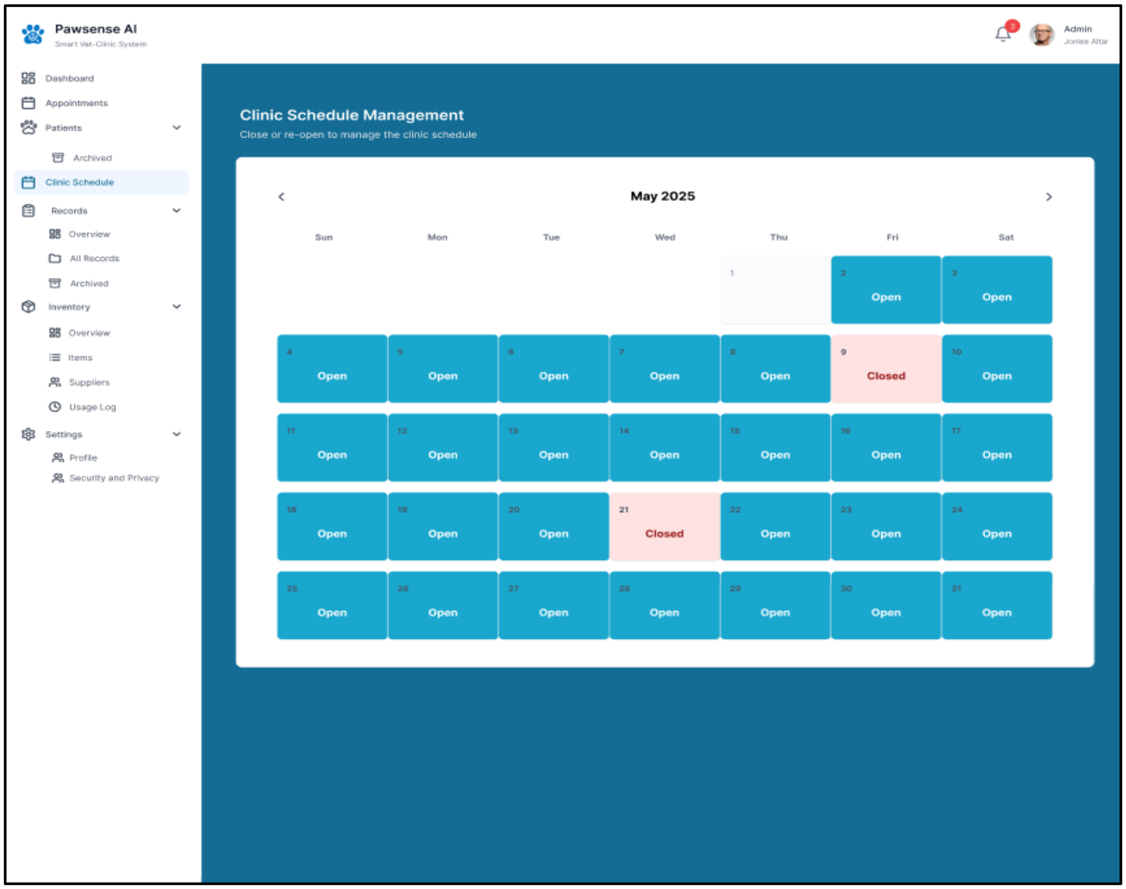
The "New Appointment" modal in PawSense AI functions to initiate the appointment booking process. It enables users to select a desired date and time for an appointment and to search for and select the pet owner, serving as the first

Figure 94. Appointment Management Alert Message



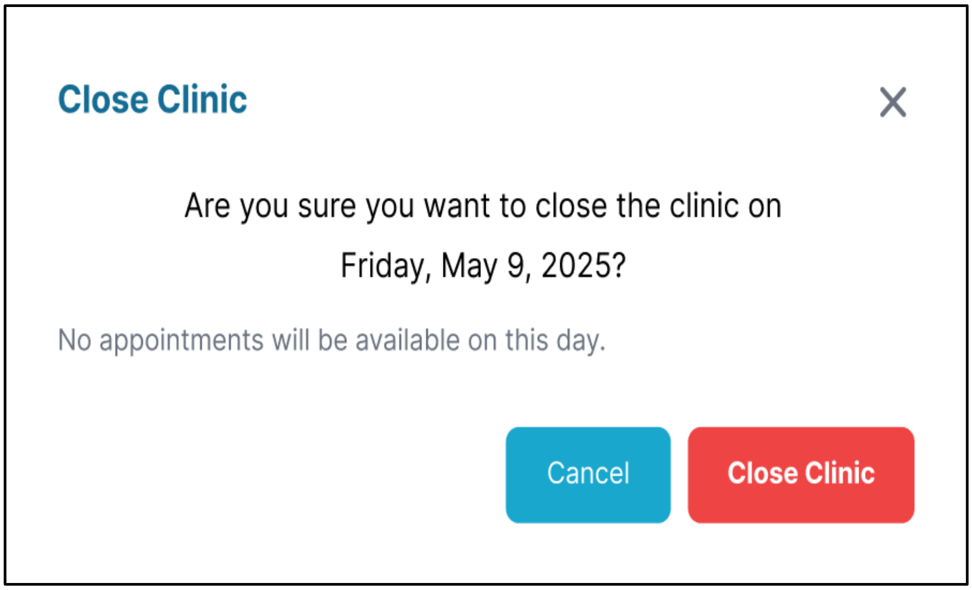
The PawSense AI system utilizes distinct Appointment Management Alert Messages to provide immediate feedback on appointment status changes. For successful bookings, a green "Appointment confirmed successfully!" pop-up appears, notifying staff that the pet owner has been informed and displaying key details like the pet's name, breed, date, time, and service, with an automatic four-second dismissal. Conversely, when an appointment is denied, a prominent red "Rejected Alert Message" modal indicates "Appointment rejected" and states that the pet owner will be notified of the cancellation. This rejection alert also includes core appointment details like the pet's name and owner, and the appointment date, similarly disappearing automatically after three seconds. These streamlined notification systems ensure veterinary staff are promptly informed of appointment outcomes (confirmed or rejected) and that relevant parties are aware of the booking status.

Figure 95. Admin Clinic Schedule Management



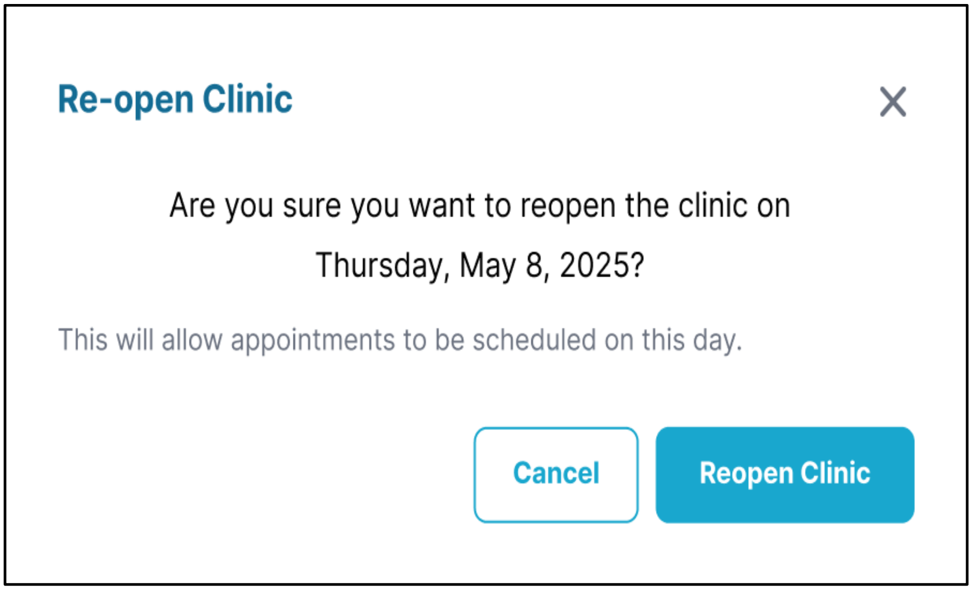
This image displays the "Clinic Schedule Management" section of the PawSense AI: Smart Veterinary Clinic Management System, presenting a calendar interface for managing the clinic's operating hours. The calendar for "May 2025" is shown, with each day represented by a tile. Most days are marked as "Open," indicating the clinic's availability. However, certain days, specifically May 9th and May 21st, are highlighted in red and labeled "Closed," signifying non-operating days. The interface suggests that administrators can easily "close or re-open" days to manage the clinic's schedule effectively, allowing for clear communication of availability to both staff and clients.

Figure 96. Admin Closing Clinic Schedule



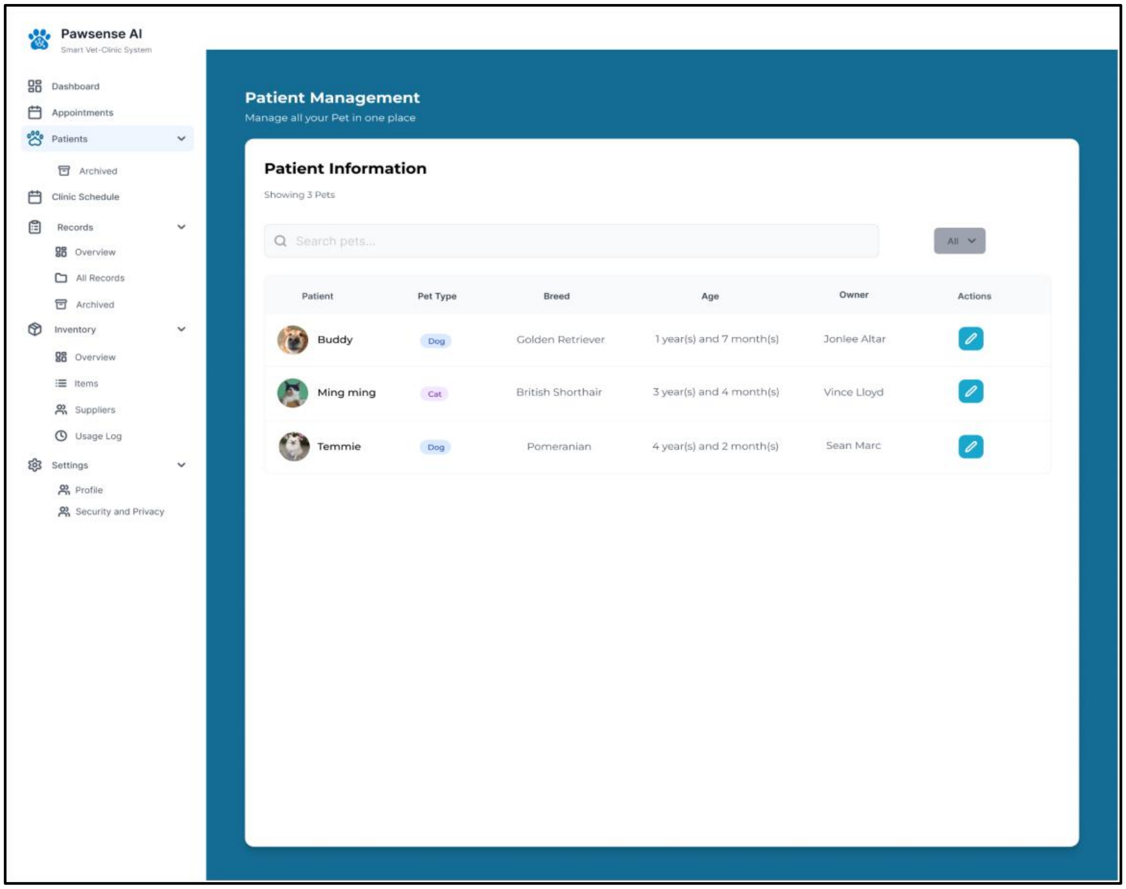
The image displays the "Clinic Schedule Management" section of the PawSense AI: Smart Veterinary Clinic Management System, with a "Close Clinic" pop-up modal prominently featured. This modal appears when an administrator is attempting to mark a specific day as closed. The modal asks, "Are you sure you want to close the clinic on Friday, May 9, 2025?" and includes a warning that "No appointments will be available on this day." This two-button confirmation system provides options to "Cancel" the action or "Close Clinic," ensuring that changes to the clinic's schedule are intentional and preventing accidental closures.

Figure 97. Admin Re-opening Clinic Schedule



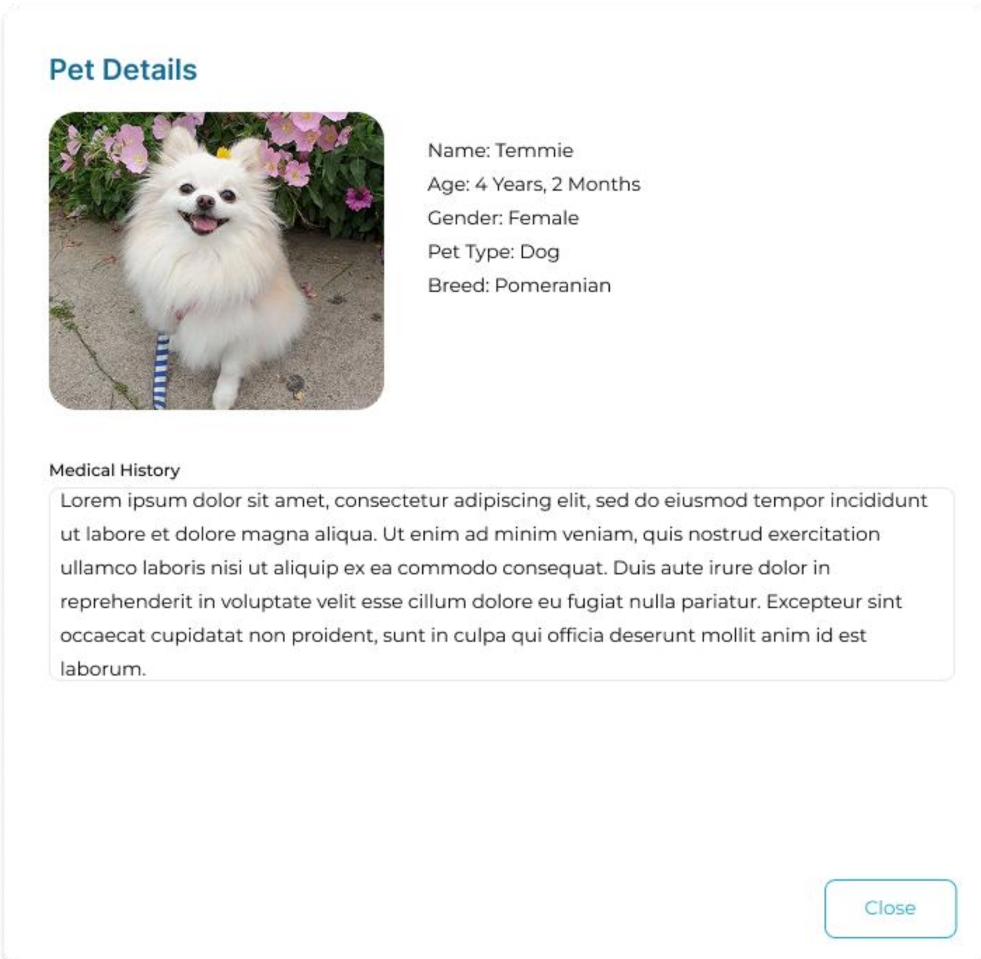
The image shows the "Clinic Schedule Management" section of the PawSense AI: Smart Veterinary Clinic Management System, highlighting a "Re-open Clinic" pop-up modal. This modal appears when an administrator attempts to change a previously closed day back to an open status. The modal asks, "Are you sure you want to reopen the clinic on Thursday, May 8, 2025?" and confirms that "This will allow appointments to be scheduled on this day." The user is given two options: "Cancel" to revert the action, or "Reopen Clinic" to confirm the change and make the day available for appointments. This confirmation step ensures deliberate scheduling adjustments and maintains accurate clinic availability.

Figure 98. Admin Patient Management



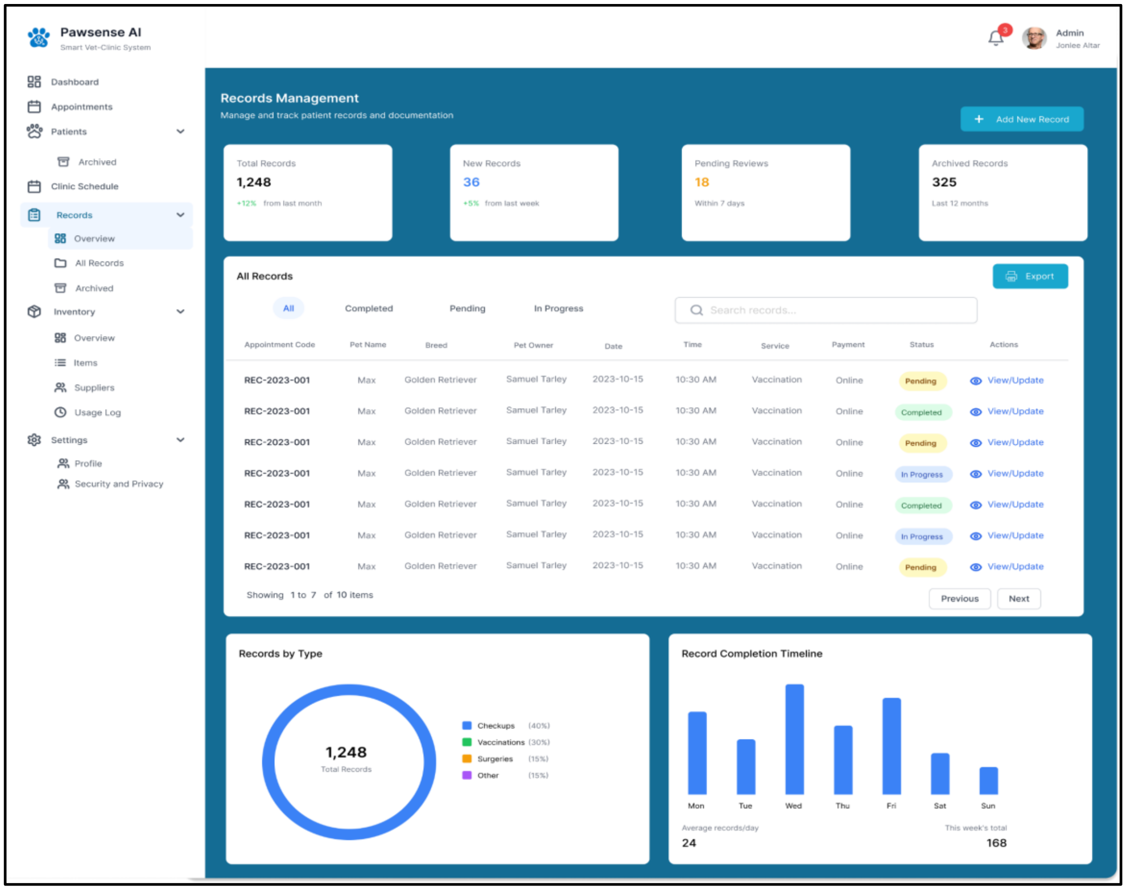
The Admin Patient Management section of the PawSense AI: Smart Veterinary Clinic Management System, specifically from the admin's perspective. This interface displays a "Patient Information" table that lists all registered pets along with their key details. The table includes columns for patient name, pet type, breed, age, and owner, with an "Actions" column featuring an edit button for each entry. Three pets are shown in the list: Buddy, a Golden Retriever owned by Jonlee Altar; Ming ming, a British Shorthair cat owned by Vince Lloyd; and Temmie, a Pomeranian owned by Sean Marc. A search bar at the top allows admins to look up pets by name, and a filter dropdown offers the option to sort by pet type. This section helps administrators manage and update pet records efficiently in one central place.

Figure 99. Admin Pet Details



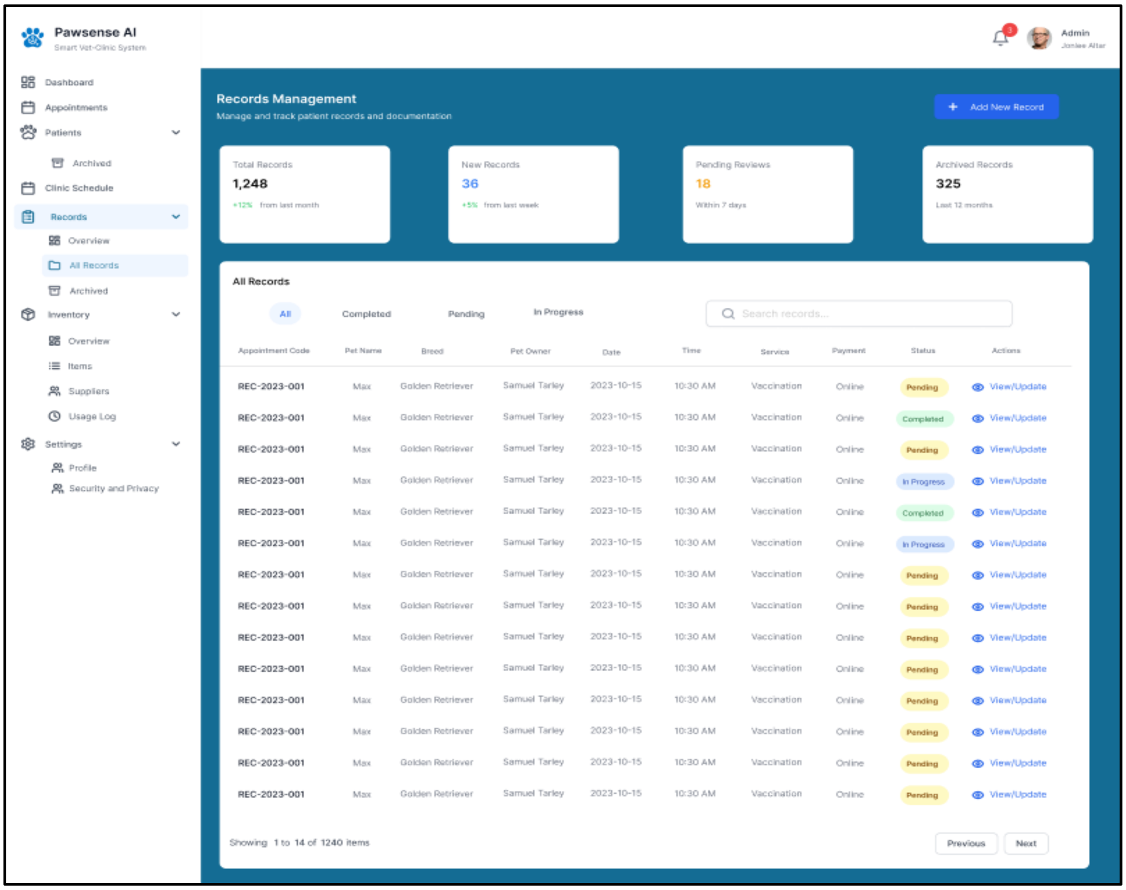
The "Pet Details" modal appears when an admin clicks on a patient entry in the Patient Management section. It provides a detailed profile of the selected pet, including a photo and key information such as name, age, gender, pet type, and breed. In this example, the pet is Temmie, a 4-year and 2-month-old female Pomeranian dog. Below the profile section, there is a "Medical History" field that displays the pet’s past health records. The modal includes a “Close” button to exit the view. This layout helps administrators quickly access complete and organized pet data without navigating away from the main patient list.

Figure 100. Admin Records Page (Overview)



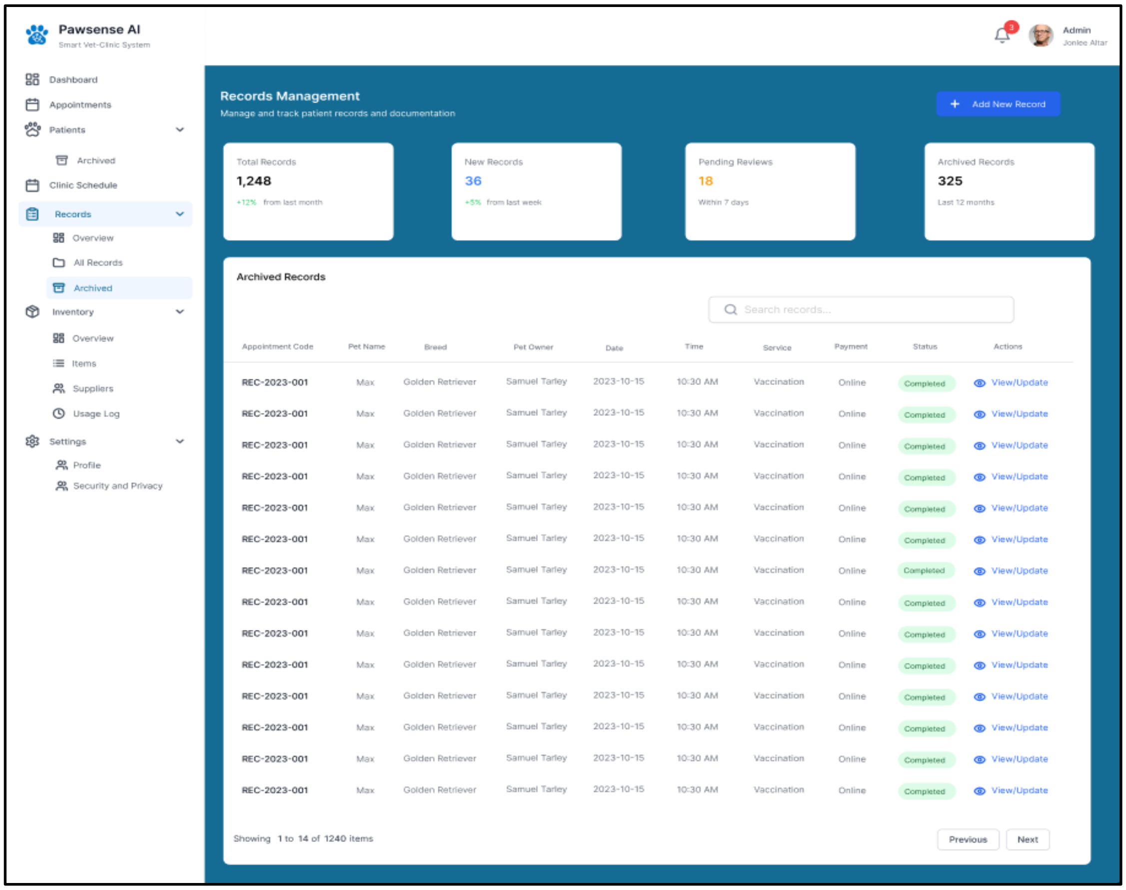
This image displays the "Overview" page of the Admin Records Page within the PawSense AI: Smart Veterinary Clinic Management System. It provides a comprehensive dashboard for managing patient records and documentation. Key metrics are highlighted at the top, including "Total Records," "New Records," "Pending Reviews," and "Archived Records," offering a quick glance at the system's activity. Below this, an "All Records" table lists individual patient records with details such as Appointment Code, Pet Name, Breed, Pet Owner, Date, Time, Service, Payment method, Status, and available "Actions" like "View/Update." The page also includes visual summaries such as "Records by Type" in a donut chart, showing the distribution of various record types, and a "Record Completion Timeline" bar chart, illustrating the daily record completion trends. This layout allows administrators to efficiently monitor, access, and manage all patient-related documentation within the clinic.

Figure 101. Admin Records Page (All Records)



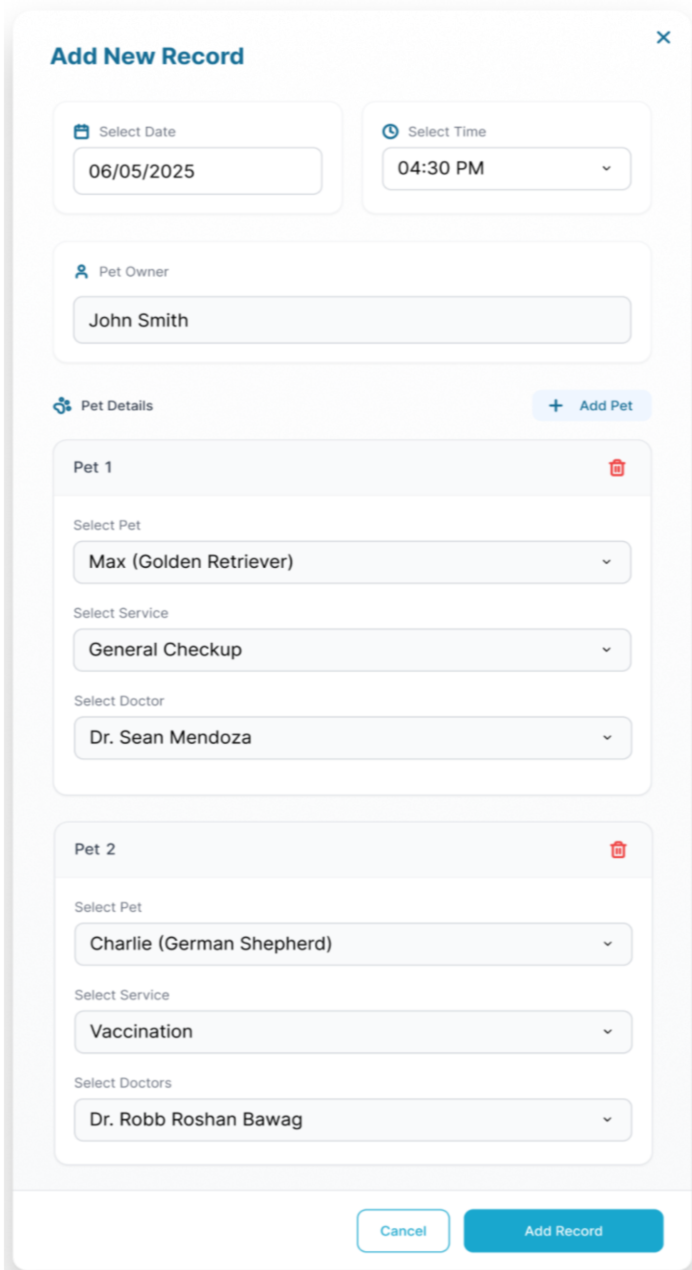
This image displays the "Records Management" section of the PawSense AI: Smart Veterinary Clinic Management System, focusing on an expanded view of the "All Records" table. This table is central to managing and tracking patient records and documentation, presenting a comprehensive list of entries with columns for Appointment Code, Pet Name, Breed, Pet Owner, Date, Time, Service, Payment, Status, and actionable "View/Update" links. The top section still provides a quick overview of key metrics like "Total Records," "New Records," "Pending Reviews," and "Archived Records," maintaining a high-level summary alongside the detailed record list. The presence of pagination ("Showing 1 to 14 of 1249 items") and navigation buttons ("Previous," "Next") indicates a robust system for handling a large volume of patient data, allowing administrators to efficiently browse and interact with individual records.

Figure 102. Admin Records Page (Archived)



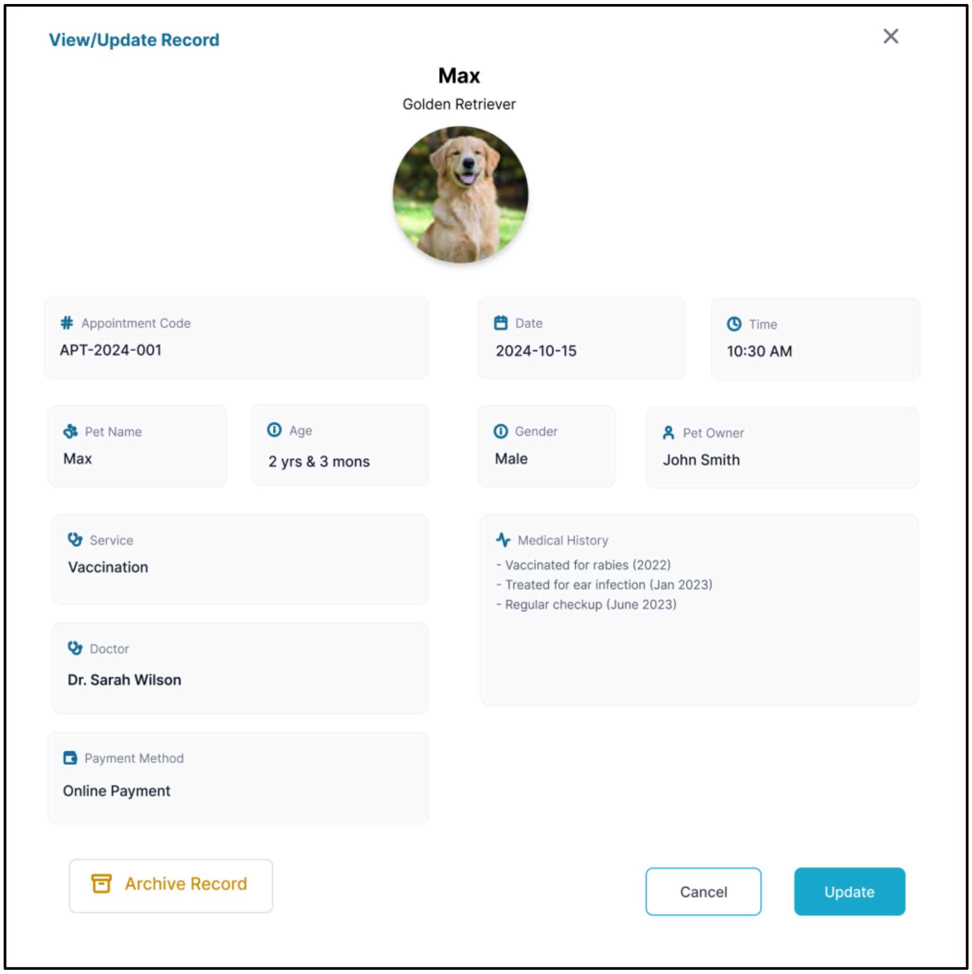
This image shows the "Archived Records" section within the PawSense AI: Smart Veterinary Clinic Management System's Records Management. Similar to the "All Records" view, it presents a table of patient records, but specifically focuses on those that have been archived. The table includes consistent columns such as Appointment Code, Pet Name, Breed, Pet Owner, Date, Time, Service, Payment, Status, and "View/Update" actions. The top panel continues to display key metrics like "Total Records," "New Records," "Pending Reviews," and "Archived Records," ensuring that administrators have an immediate grasp of the overall record status even when viewing a filtered list. This dedicated archived view allows veterinarian staff to access historical patient data while maintaining a streamlined current record management process.

Figure 103. Admin Add New Record Modal



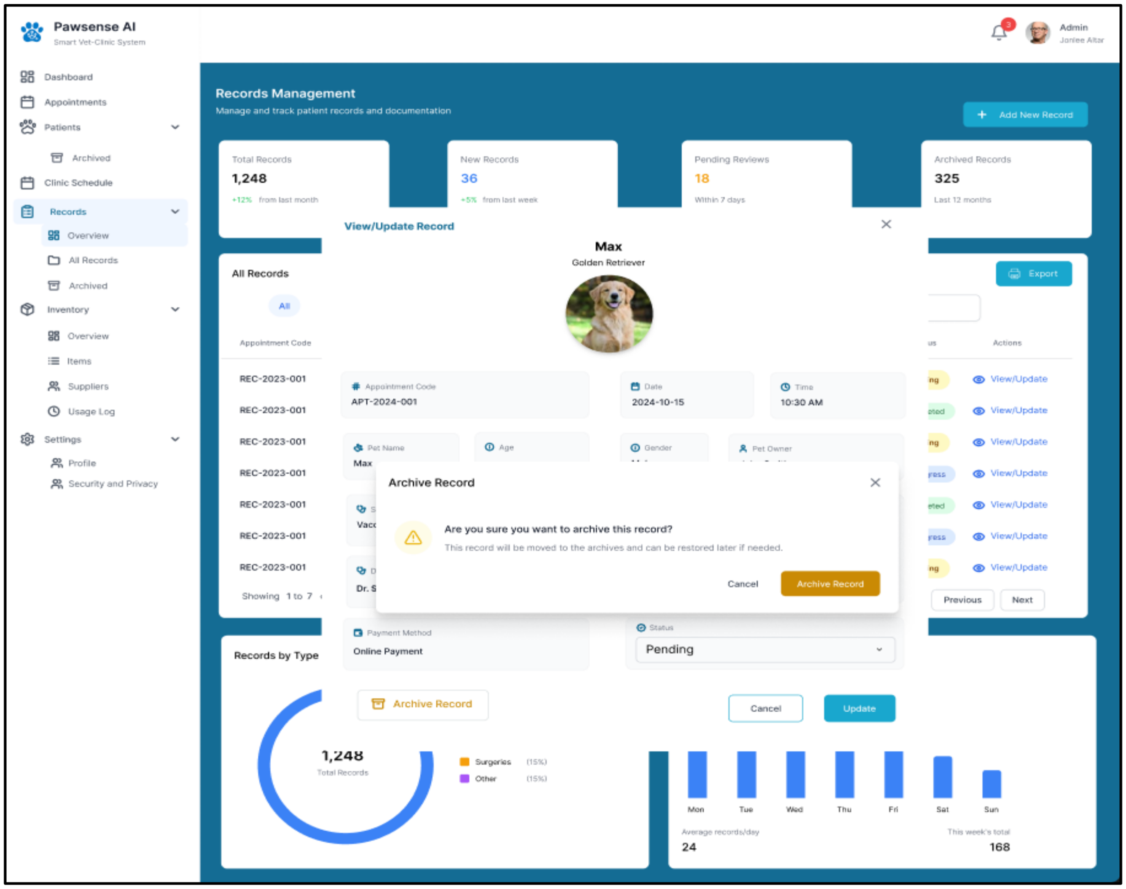
The UI titled "Add New Record" overlaid on the PawSense AI Records Management page. This modal is designed for creating new patient records and includes fields to capture essential information. Veterinary staff can select the "Select Date" and "Select Time" for the record. The form allows for specifying the "Pet Owner," "Doctor," and then details for "Pet 1" and potentially "Pet 2" (via an "Add Another Pet" option), including "Pet Name," "Breed," "Gender," and "Select Service." The "Payment Method" is specified as "Online Payment", and the "Status" is set to "Pending" by default. At the bottom of the modal, "Cancel" and "Create Record" buttons are available to either discard or save the new record. This streamlined interface facilitates the quick and organized entry of new patient data into the system.

Figure 104. Admin View/Update Record Modal



The UI "View/Update Record" modal overlaying the PawSense AI Records Management page. This modal is designed for reviewing and modifying existing patient records, clearly identified by the "Record Code" "REC-2023-001" and "Appointment Code" "APT-2024-001." It prominently displays a photo of the pet, "Max" the Golden Retriever, with details including "2 yrs & 3 mon." for age. Further information provided includes the "Date" and "Time" of the appointment, "Pet Owner" John Smith, and "Doctor" Dr. Sarah Wilson. The "Service" is listed as "Vaccination," and the "Payment Method" is specified as "Online Payment," with the current "Status" of the record being "Pending." A "Medical History" section provides a list of past treatments." Veterinary staff have options to "Archive Record," "Cancel" any changes, or "Update" the record with modified information.

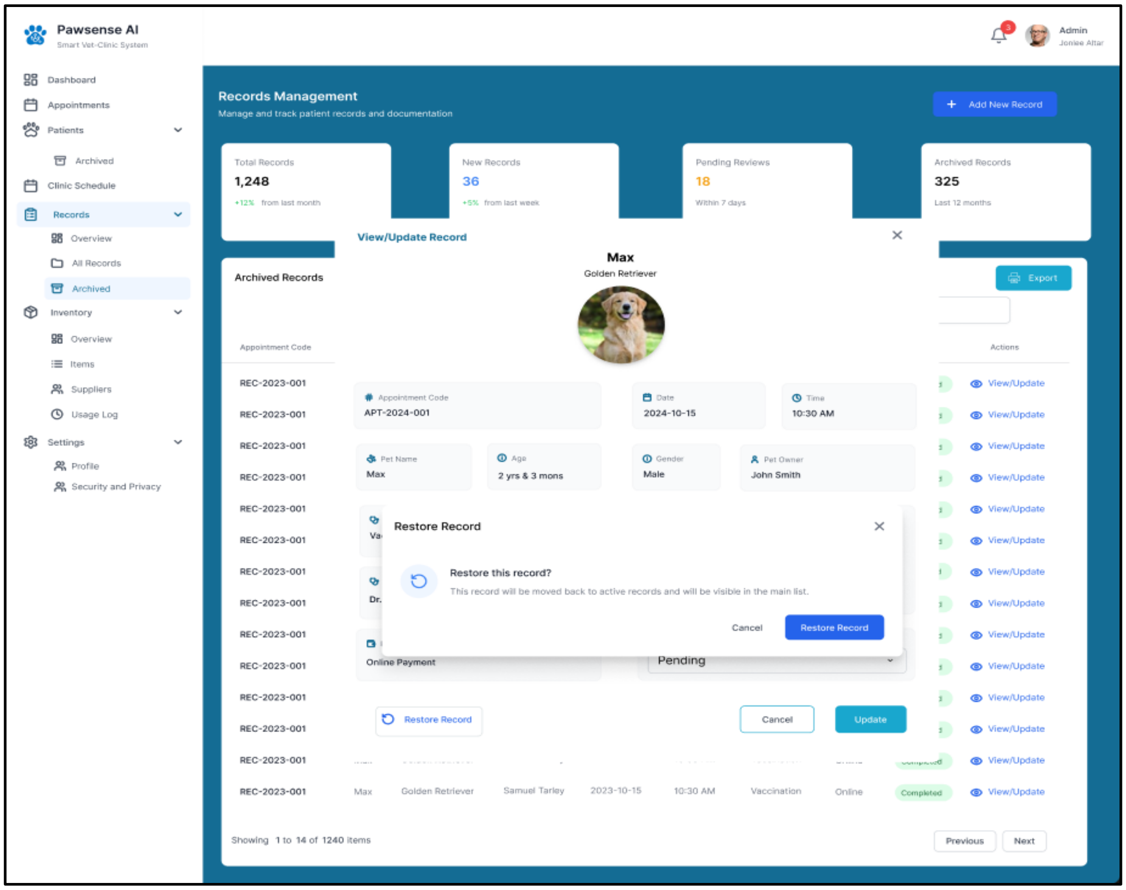
Figure 105. Admin Archiving a Record Pop-up Modal



The image displays the PawSense AI Records Management interface, with a "View/Update Record" modal active, specifically highlighting what happens when the "Archive Record" option is engaged. Upon clicking "Archive Record" within the "View/Update Record" modal, a smaller, confirmation modal pops up. This new modal asks, "Are you sure you want to archive this record?" and provides a crucial informational message: "This record will be moved to the archives and can be restored later if needed." The user is then presented with two options: "Cancel," to abort the archiving process, or "Archive Record," to proceed with moving the record to the archived section of the system.

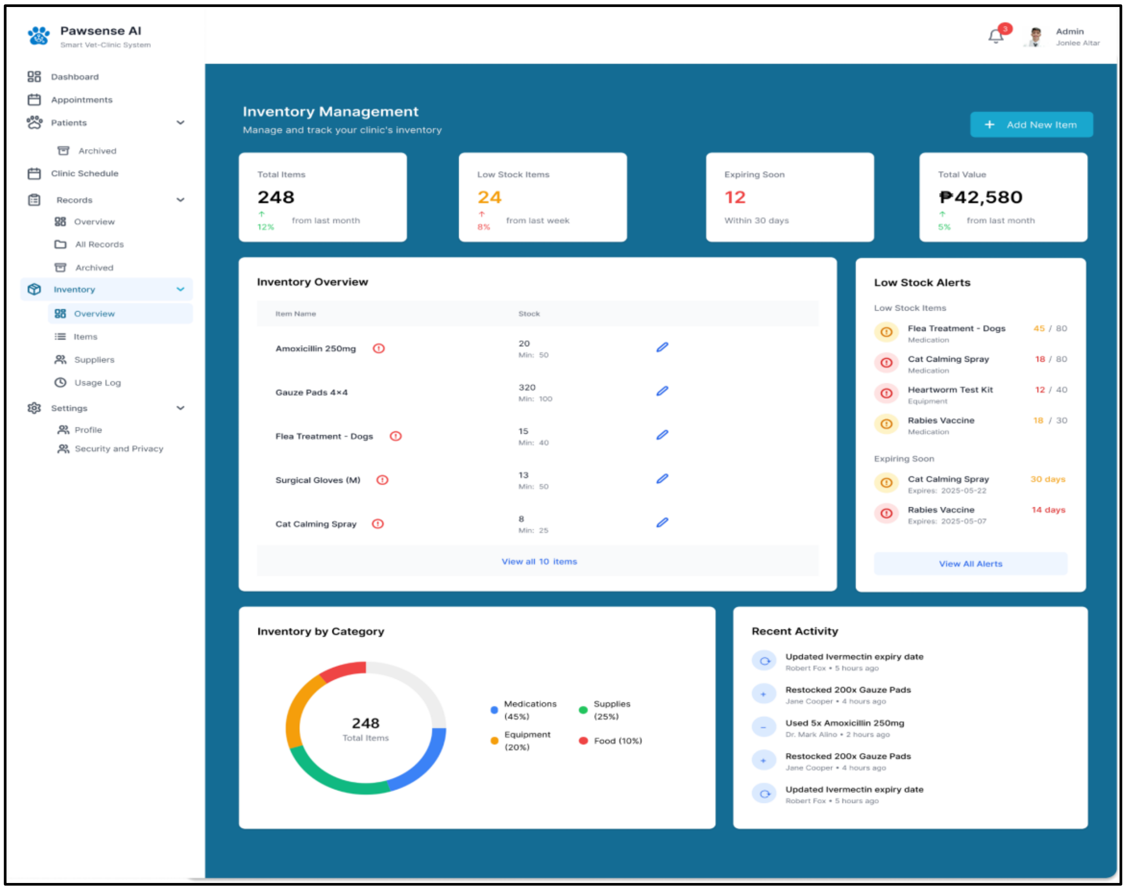
This two-step confirmation ensures that records are not accidentally archived and provides reassurance about data recoverability.

Figure 106. Admin Restoring an Archived Record Pop-up Modal



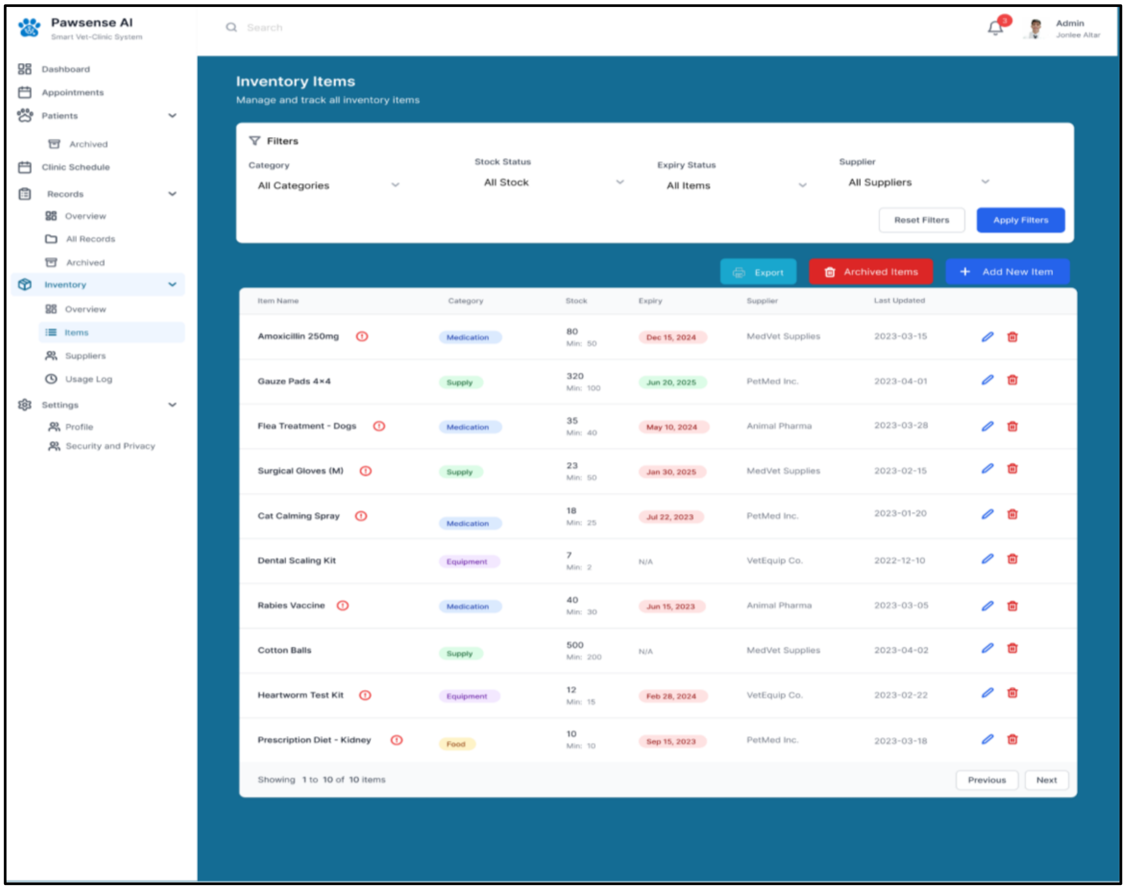
The image displays the PawSense AI Records Management page, specifically showing the "Archived Records" view with a "View/Update Record" modal open. Within this modal, a crucial action is being highlighted: the process of restoring an archived record. When the "Restore Record" button is clicked from within the "View/Update Record" modal for an archived entry, a small, new pop-up modal appears. This "Restore this record?" confirmation modal prompts the user, stating, "This record will be moved back to active records and will be visible in the main list." The user is then given two options: "Cancel" to stop the restoration, or "Restore Record" to proceed, effectively moving the patient's record from the archived state back into the active "All Records" list for continued management.

Figure 107. Admin Inventory Overview



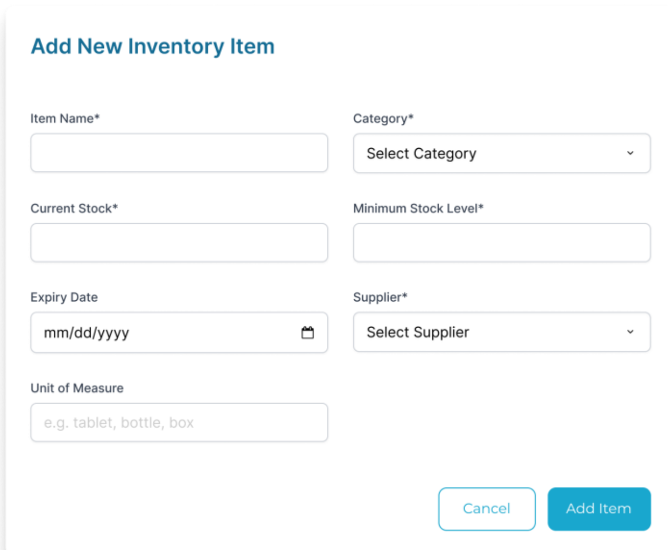
This image displays the "Inventory Overview" section of the PawSense AI system's "Inventory Management" module. It provides a comprehensive dashboard for tracking the clinic's inventory. At the top, key performance indicators (KPIs) are prominently featured: "Total Items," "Low Stock Items," "Expiring Items" (within 30 days), and "Total Value" of the inventory. Below this, an "Inventory Overview" table lists various items with their "Item Name" and "Stock" levels, alongside an edit icon. To the right, a "Low Stock Alerts" section highlights items that are low in stock or expiring soon, providing actionable insights. Further down, "Inventory by Category" is visualized through a donut chart, breaking down total items into categories like Medications, Supplies, Equipment, and Food. Finally, a "Recent Activity" feed shows recent inventory-related actions, such as updates, usage, and restocks, providing a chronological log of inventory changes.

Figure 108. Admin Inventory Items



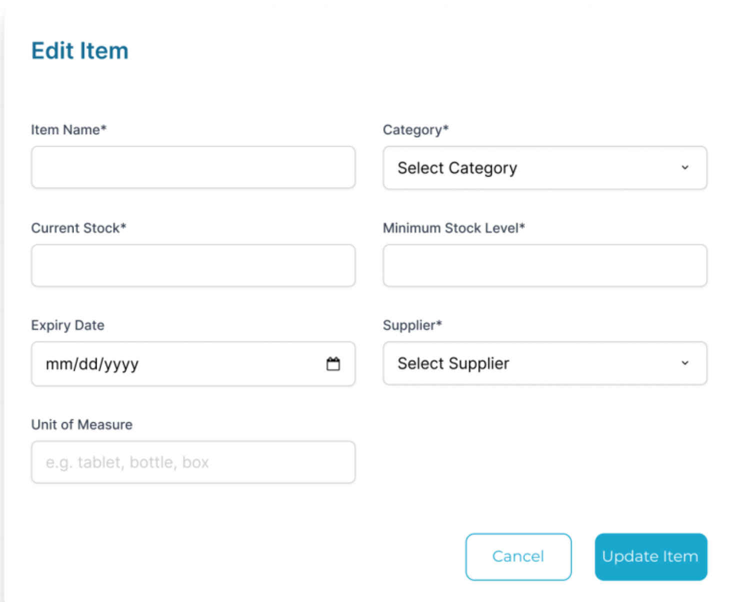
This image displays the "Inventory Items" section of the PawSense AI system, designed for managing and tracking all clinic inventory. At the top, there is a "Filters" section allowing users to narrow down the displayed items by "Category," "Stock Status," "Expiry Status," and "Supplier." Buttons for "Apply Filters" and "Reset Filters" are also present. Below the filters, the main content is an "Item List" table, which includes columns such as "Item Name," "Category," "Stock," "Expiry" date (with some highlighted in red, likely indicating nearing expiration), "Supplier," "Last Updated" date, and "Actions" (edit and delete icons). Above the table, there are "Export," "Archived Items," and "Add New Item" buttons for managing the inventory data. The pagination at the bottom ("Showing 1 to 10 of 10 items") indicates the current view of the inventory list.

Figure 109. Admin Inventory Add Item Modal



This part covers the User Interface (UI) of the "Add New Inventory Item" modal, a central component of functionality to enable the easy addition of new items of stock into the "Pawsense AI: Smart Vet-Clinic System." The modal, likely an overlay, is in an organized structure to capture every detail of a new item of inventory for completeness and accuracy of information. The modal features a bold heading "Add New Inventory Item" at the top, indicating its function. The form is separated into various input fields, some of which have an asterisk (*) in front of them to mark required input, to guide the user through the crucial information. These are "Item Name" and "Category," the latter having a dropdown for standard selection. Below them, "Current Stock," “Unit of Measure,” and "Minimum Stock Level" input fields are utilized to input quantities. "Expiry Date" is fitted with a date picker to monitor perishable items with accuracy, while "Supplier" also has a dropdown for uniform vendor selection. At the end, the modal features two action buttons: a "Cancel" button to close the modal without saving, and an "Add Item" button to add the new inventory record into the system upon form submission. The minimalist structure allows veterinarian staff to add new items easily and accurately into the inventory.

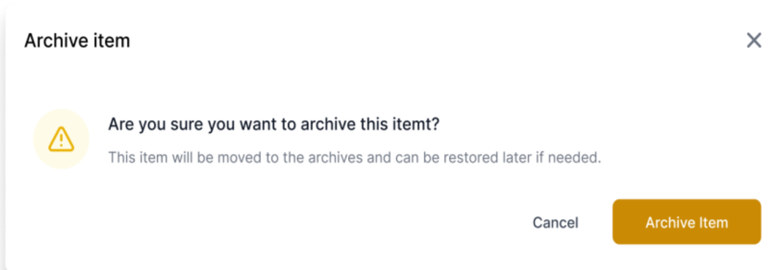
Figure 110. Admin Inventory Edit Item Modal



This part describes the User Interface (UI) of the "Edit Item" modal, part of the "Pawsense AI: Smart Vet-Clinic System," to edit existing inventory item information. This modal, resembling the "Add New Inventory Item" modal in appearance, is a styled form prefilled with the existing information of the selected inventory item to enable swift updates and maintain data integrity. The modal is also clearly identified as "Edit Item" at the top, indicating its purpose. The form also has the same layout and input fields as the addition modal, including fields such as "Item Name," "Category," "Current Stock," "Minimum Stock Level," "Expiry Date," "Supplier," and a "Unit of Measure," text field. Asterisk (*) fields still denote required input. The most notable difference is at the bottom with the action buttons: a "Cancel" button allows the user to cancel any changes and close out the modal, and an

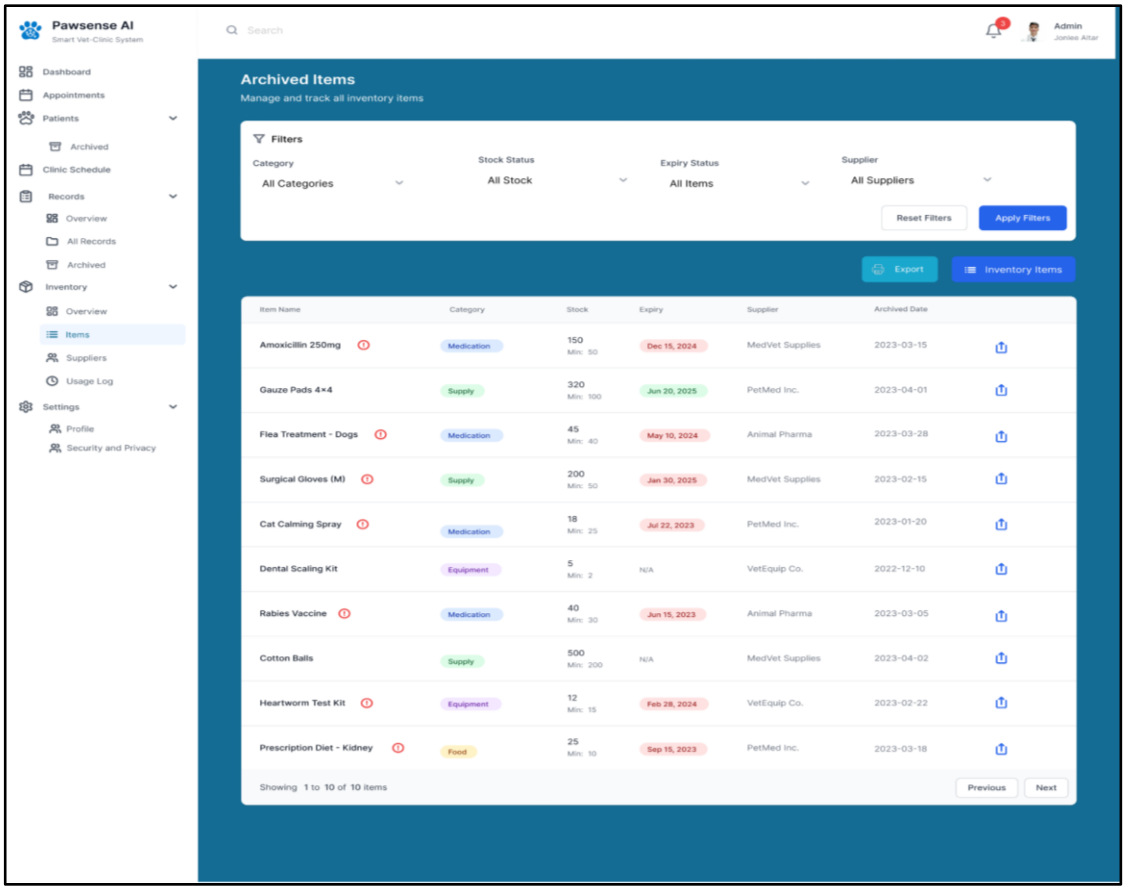
"Update Item" button is provided to effect the changes made to the inventory record, in place of the "Add Item" button present in the new item modal. This same layout and considerate interaction design enable veterinarian staff to update existing inventory data easily and accurately, maintaining an up-to-date and reliable inventory system.

Figure 111. Admin Inventory Archive Item Modal



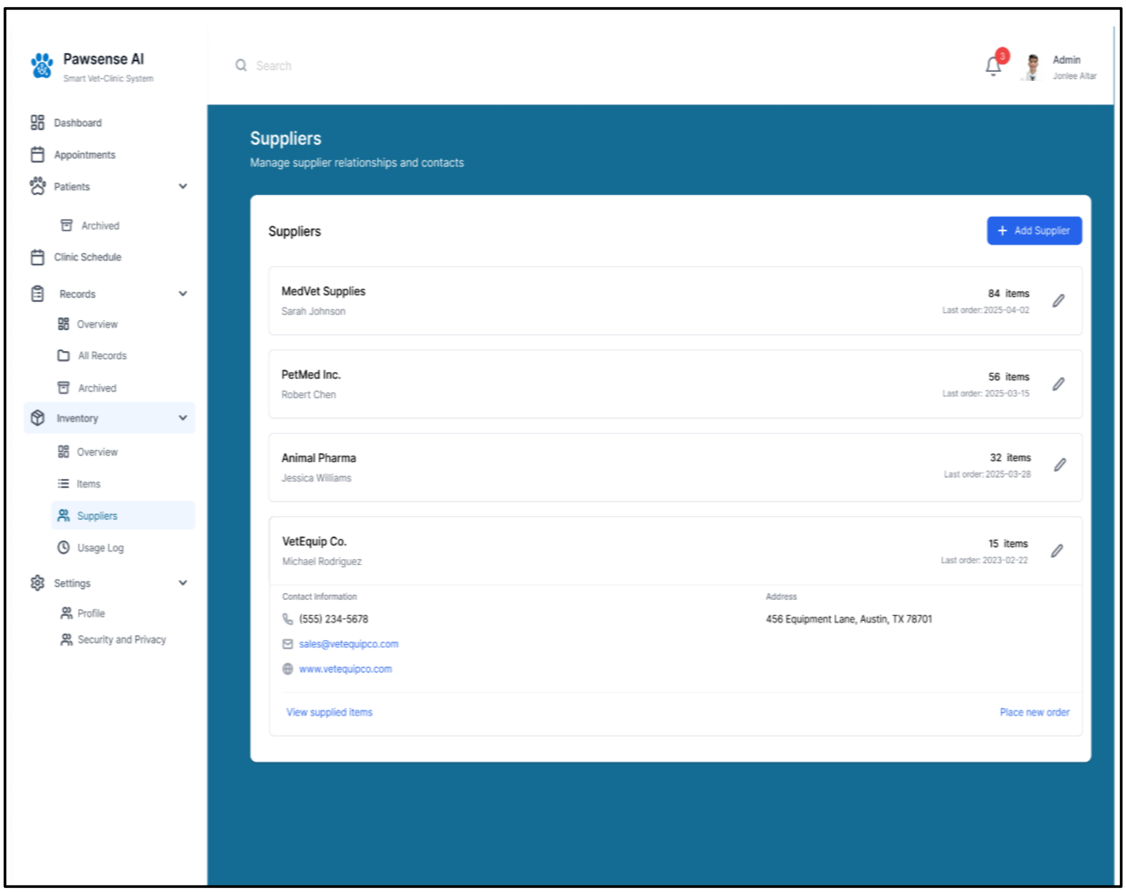
This part explains the User Interface (UI) of the "Archive Item" modal, a key confirmation dialog of the "Pawsense AI: Smart Vet-Clinic System" intended to avoid accidental deletion of stock items by providing a clear option to demote an item to an archived status instead. The purpose of this overlay modal is instantly apparent due to its brief "Archive Item" label at the top. It includes a prominent warning icon to visually notify the user of the action's importance. The center of the modal displays a straightforward query: "Are you sure you want to archive this item?" followed by a descriptive statement of the effect: "This item will be moved to the archives and can be restored later if needed." The user is guaranteed to understand the impact of their action and its reversibility thanks to this clear display. Two obvious action buttons are provided at the bottom: a "Cancel" button that lets the user end the archiving process and close the modal, and an "Archive Item" button that is typically designed to draw attention and, when clicked, confirms the user's action and proceeds to archive the selected item.

Figure 112. Admin Inventory Archived Items



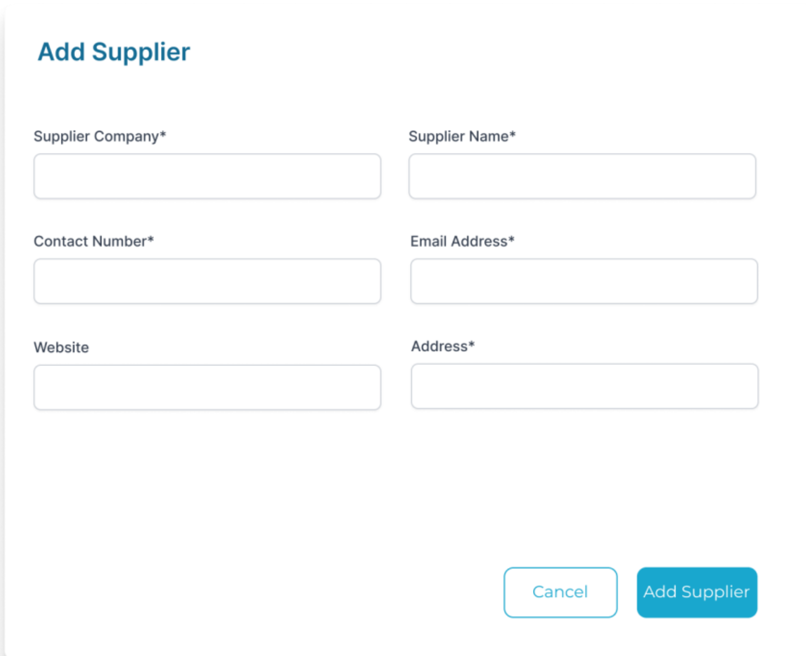
This section describes the User Interface (UI) of the "Archived Items" page of the "Pawsense AI: Smart Vet-Clinic System," specifically tailored to handle and track moved inventory items to an archived status rather than being irretrievably lost. The page is simply titled "Archived Items" at the top, with the subtitle "Manage and track all inventory items," clearly indicating its purpose. Similar to the active "Inventory Items" page, it includes a search bar for quick item search and a "Filters" panel. This panel offers dropdowns for "Category," "Stock Status," "Expiry Status," and "Supplier," to filter the list of archived items, with "Reset Filters" and "Apply Filters" buttons. Above the main table, an "Export" button to download the data and an "Inventory Items" button for quick return to the active inventory list are located. The middle of this page is a full table with all the archived inventory items. This table has columns for "Item Name," "Category," "Stock," "Expiry" date, "Supplier," and importantly, "Archived Date," the date the item was archived. Each row also includes an icon, presumably a restore or unarchive icon (e.g., an upload symbol), to restore the item back to active inventory if needed. The pagination controls are located at the bottom of the table to allow manageability for large archived lists. This UI is an easy and organized means of reviewing and perhaps restoring inactive inventory records, with a full historical record of all stock in the clinic.

Figure 113. Admin Inventory Suppliers



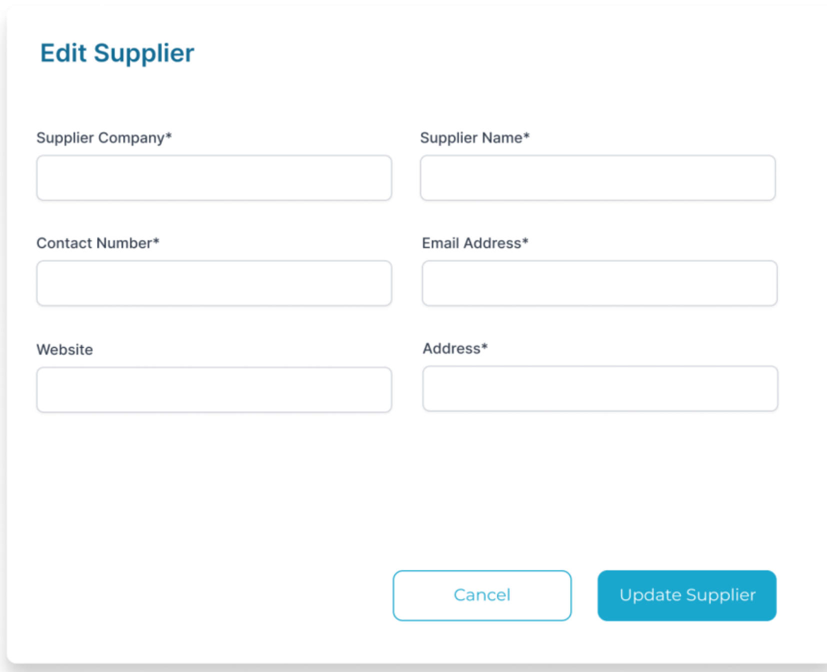
This section displays the User Interface (UI) of the "Suppliers" page of the "Pawsense AI: Smart Vet-Clinic System," specifically designed to manage and monitor all stock vendors' relationships and contact details. The page is simply labeled "Suppliers" at the top, with the descriptive subtitle "Manage supplier relationships and contacts," stating its function. In the top right of this section, there is a bold "+ Add Supplier" button, which allows users to easily add new vendor details to the system. The middle content section of the page bears a list of individual supplier cards, each bearing key information of a particular vendor. For each supplier, details generally encompass the supplier's name, the name of a principal contact person, the quantity of products supplied by them, and the date of the last update of their record. For certain suppliers, additional detailed contact details are shown, including phone number, email, website, and street address, suggesting a full record-keeping approach. Each supplier card also features action-oriented links or buttons, including "View supplied items" to view a list of products bought from that particular supplier, and "Place new order" to initiate a procurement process. This UI illustrates a centralized and structured way of managing vendor relations, with the means to facilitate effective communication and procurement of veterinary supplies and medicines.

Figure 114. Admin Inventory Add Supplier Modal



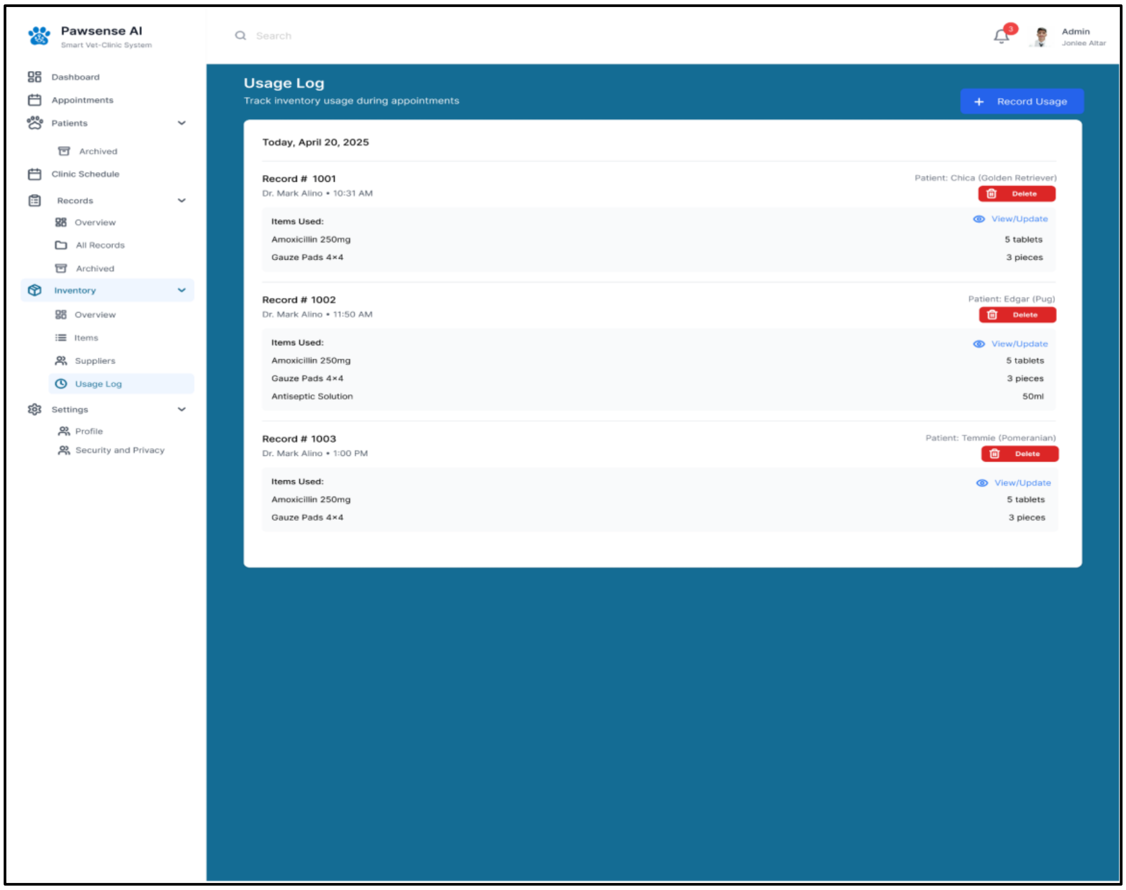
This section explains the User Interface (UI) of the "Add Supplier" modal, a key feature of the "Pawsense AI: Smart Vet-Clinic System" to facilitate inputting new supplier data. The modal, displayed in the form of an overlay, is a simple and intuitive form to input vital information about a new vendor. The modal is merely labeled as "Add Supplier" at the top, immediately making its purpose clear. The form is organized with a number of input fields, some of which have an asterisk (*) symbol to indicate required information, prompting the user to input all vital information. These are "Supplier Company" and "Supplier Name," allowing for identification of the company as well as identification of a primary point of contact. Vital contact data is accessed through "Contact Number" and "Email Address" fields. An optional "Website" field is offered for further reference, with "Address" being designated as a required field to input vendor records. Two different action buttons are located along the bottom of the modal: a "Cancel" button, which the user can use to close the modal without saving any of the input data, and an "Add Supplier" button, which, upon a click, inputs the new supplier's data into the system. This minimalist approach allows for effective and accurate onboarding of new vendor relations.

Figure 115. Admin Inventory Edit Supplier Modal



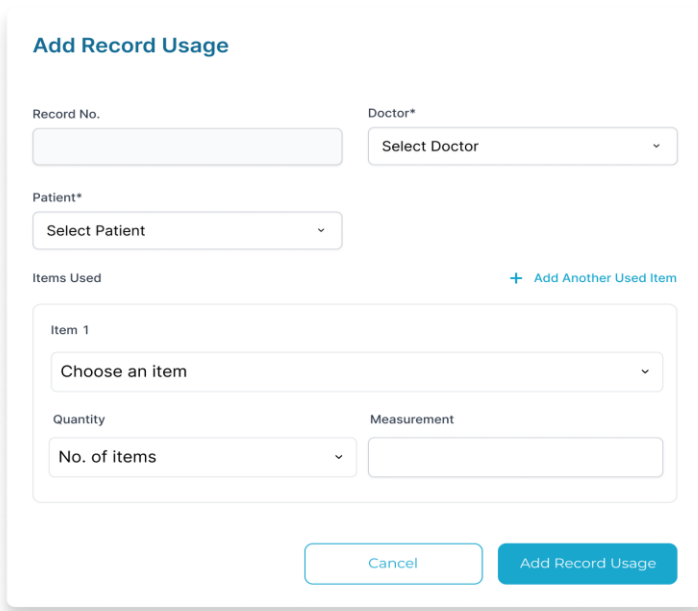
This section explains the User Interface (UI) of the "Edit Supplier" modal, a crucial part of the "Pawsense AI: Smart Vet-Clinic System" for updating existing supplier records. The modal, displayed as an overlay, offers a styled form filled with the existing information of the chosen supplier, thus making updates quick and accurate. The modal contains a clear title "Edit Supplier" at the top, indicating its precise purpose. The form is identical in appearance and input fields of the "Add Supplier" modal, i.e., "Supplier Company," "Supplier Name," "Contact Number," "Email Address," "Website," and "Address," with required fields marked by an asterisk (*). This similarity of appearance makes the user interface familiar for similar data input and update operations. The only difference from the "Add Supplier" modal is the action buttons towards the end: a "Cancel" button, through which the user may ignore any changes and close the modal, and an "Update Supplier" button, through which, upon clicking, the changes made to the supplier's record are saved in the system.

Figure 116. Admin Inventory Usage Logs



This section defines the User Interface (UI) of the "Usage Log" page in the "Pawsense AI: Smart Vet-Clinic System," designed to monitor and log usage of inventory items during consultations. The page simply reads "Usage Log" across the top, with the explanatory subtitle "Track inventory usage during appointments," summarizing its primary function. On the top right of this section, a highlighted "+ Record Usage" button is shown, enabling clinic personnel to activate the process of recording items used during a patient visit. The body content space is organized chronologically, with usage records by date. Each usage record is shown as a separate block, with a unique "Record #" and the name of the veterinarian performing the action and the recording time. Most notably, each record also includes the "Patient" details, with context to the usage. Below the patient, the list of "Items Used" is shown, with the name of the item used and quantity consumed. Each block for a record of usage also includes "View/Update" and "Delete" actions, enabling review, updating or deletion of the usage record. This UI offers a clear, detailed, and easy-to-browse history of inventory consumption, enabling accurate record-keeping, billing, and stock analysis on the veterinary clinic.

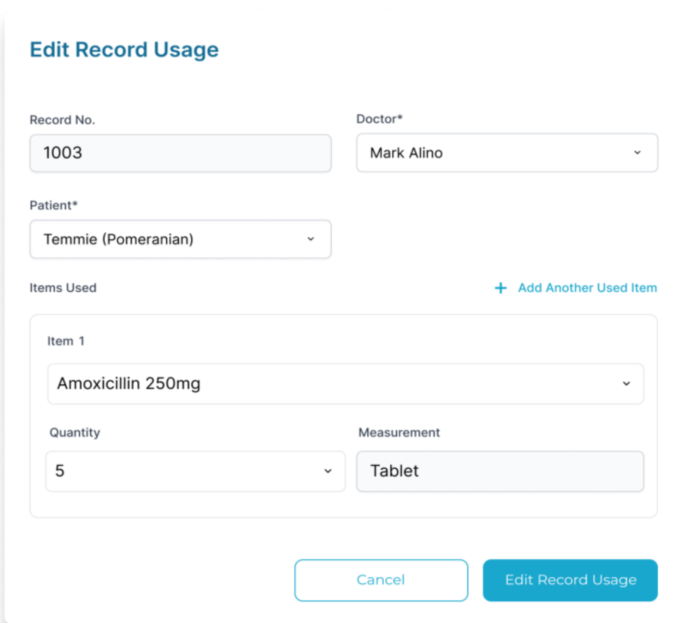
Figure 117. Admin Inventory Add Usage



The "Add Record Usage" modal, a key component of the "Pawsense AI: Smart Vet-Clinic System" that records the use of inventory items during consultations, is described in this section along with its User Interface (UI). This overlay display modal offers an organized method for recording every aspect of a usage event. With "Add Record Usage" at the top, the modal is clearly described, providing a concise description of its purpose. The form has dropdowns to select the "Doctor" and "Patient" involved in the usage incident, as well as an input field for "Record No." These fields are captioned as necessary where appropriate.

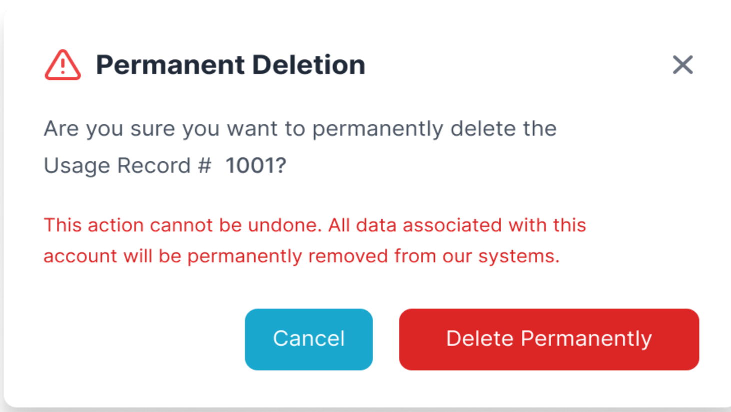
Multiple items can be entered into a specific "Items Used" section. This portion begins with "Item 1," followed by input fields for "Quantity" and "Measurement," as well as a dropdown to "Choose an item." The user can dynamically add more item input rows as needed by clicking on the prominent "+ Add Another Used Item" link, which enables the recording of numerous items per usage event. Last but not least, there are two action buttons at the bottom of the modal: a "Cancel" button that lets the user end the modal without recording the entry, and an "Add Record Usage" button that, when clicked, adds the new usage item to the system.

Figure 118. Admin Inventory Edit Usage



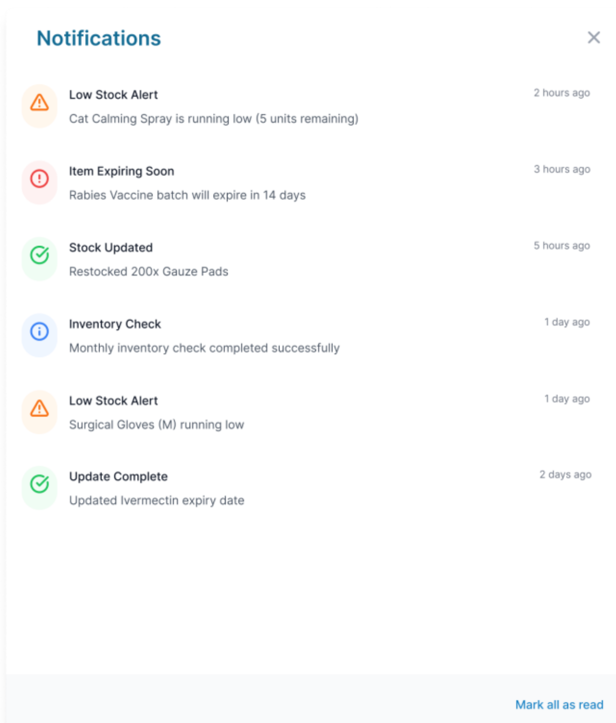
This part describes the user interface (UI) of the "Edit Record Usage" modal, an important feature in the "Pawsense AI: Smart Vet-Clinic System" for editing current records of usage of inventory. The modal, presented as an overlay, is a pre-filled structured form with the current details of the selected usage event; hence, updating is easy and accurate. The modal is appropriately labeled "Edit Record Usage" at the top, making its unique purpose obvious. The form is in the same format and input fields as the "Add Record Usage" modal, with "Record No." and dropdowns for the selection of the "Doctor" and "Patient" of the usage event, with the fields pre-filled with existing information. The "Items Used" section also follows the "Add Record Usage" modal, with current items displayed with their selected item name, quantity, and measure. A "+ Add Another Used Item" link is always present, allowing the user to dynamically add additional item entry rows to the current record should this be required. The main distinguishing feature from the "Add Record Usage" modal is the action buttons at the bottom: a "Cancel" button, which allows the user to disregard any changes and close the modal, and an "Edit Record Usage" button, which, when clicked, saves modifications made to the usage record in the system.

Figure 119. Admin Inventory Usage Deletion Modal



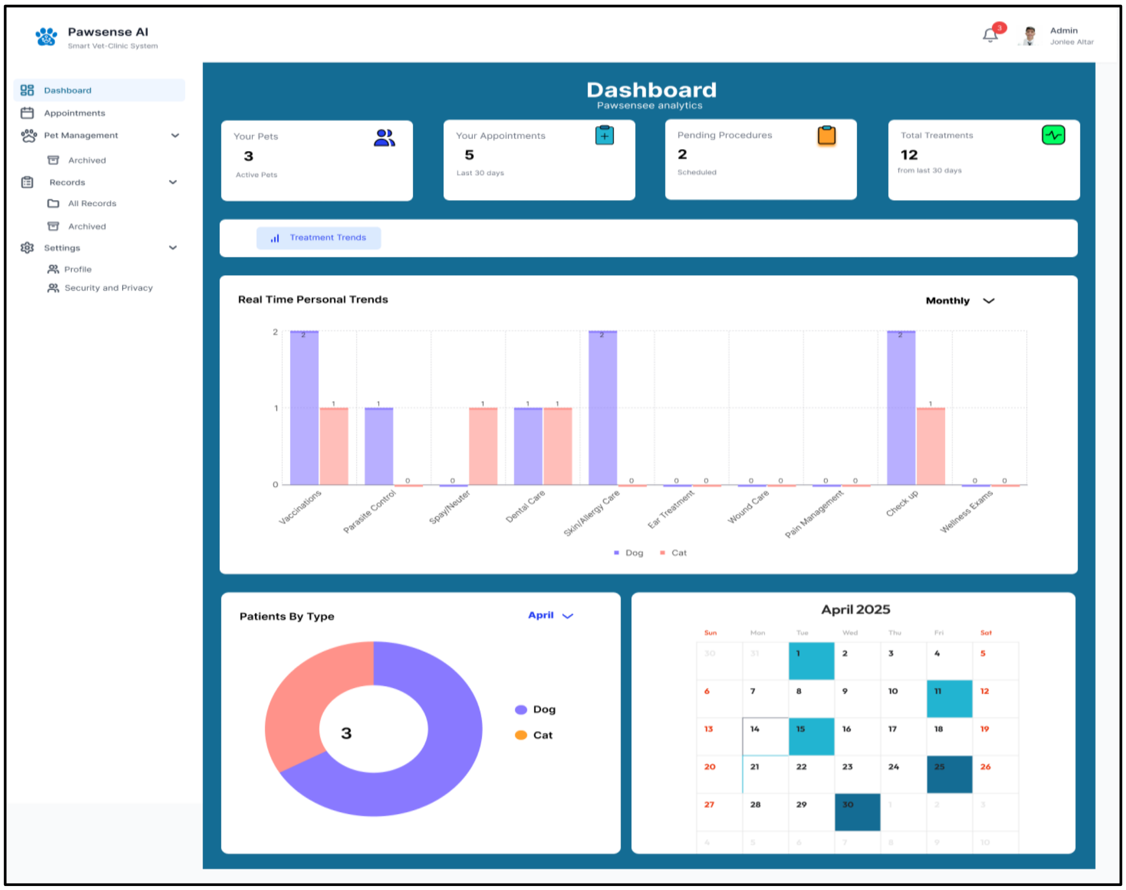
This part demonstrates the User Interface (UI) of the "Permanent Deletion" modal, a critical confirmation window of the "Pawsense AI: Smart Vet-Clinic System" intended to confirm the permanent deletion of a usage log record. This modal, displayed as an overlay, is simply titled "Permanent Deletion" at the top, immediately conveying the gravity of the action to be performed. A bold warning icon is shown in order to visually distinguish the gravity of the operation. The contents of the modal are a plain and direct question: "Are you sure you want to permanently delete the Usage Record # 1001?". This is immediately followed by a harsh warning in red: "This action cannot be undone. All data associated with this account will be permanently removed from our systems."This clear and explicit communication guarantees that the user is fully aware of the irreversibility and implications of their action. Two different action buttons are presented below: a "Cancel" button, usually colored lighter, allowing the user to cancel the deletion process and close the modal, and a "Delete Permanently" button, usually designed in a prominent color such as red, which, when clicked, will finalize the user's action and initiate the irreversible deletion of the chosen usage record.

Figure 120. Admin Inventory Notification



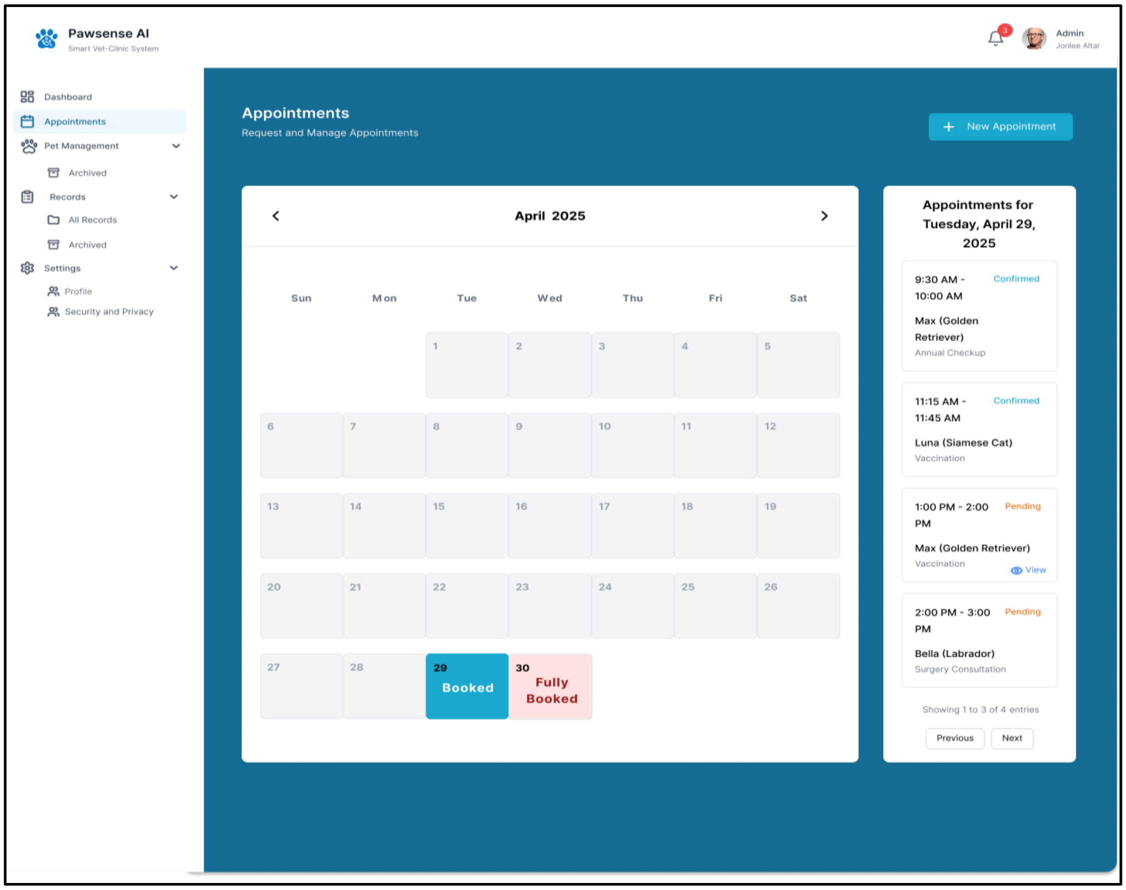
The "Notifications" modal, one of the most important communication centers of the "Pawsense AI: Smart Vet-Clinic System." This UI modal, which appears as an overlay, is titled "Notifications" at the top of the modal, with an "X" icon on the right of the modal to enable the user to close the modal. Each notification entry typically includes a descriptive title, along with a timestamp showing when the event occurred. Each notification is followed by an icon that visually describes the type or severity of the alert: a yellow warning icon for low stock or expired products, a green checkmark icon for successful updates or task completion, and a blue information icon for routine system checks. The notification body provides a brief summary of the event. A "Mark all as read" link is available at the bottom of the modal, allowing users to mark all notifications as read at once.

Figure 121. User Dashboard



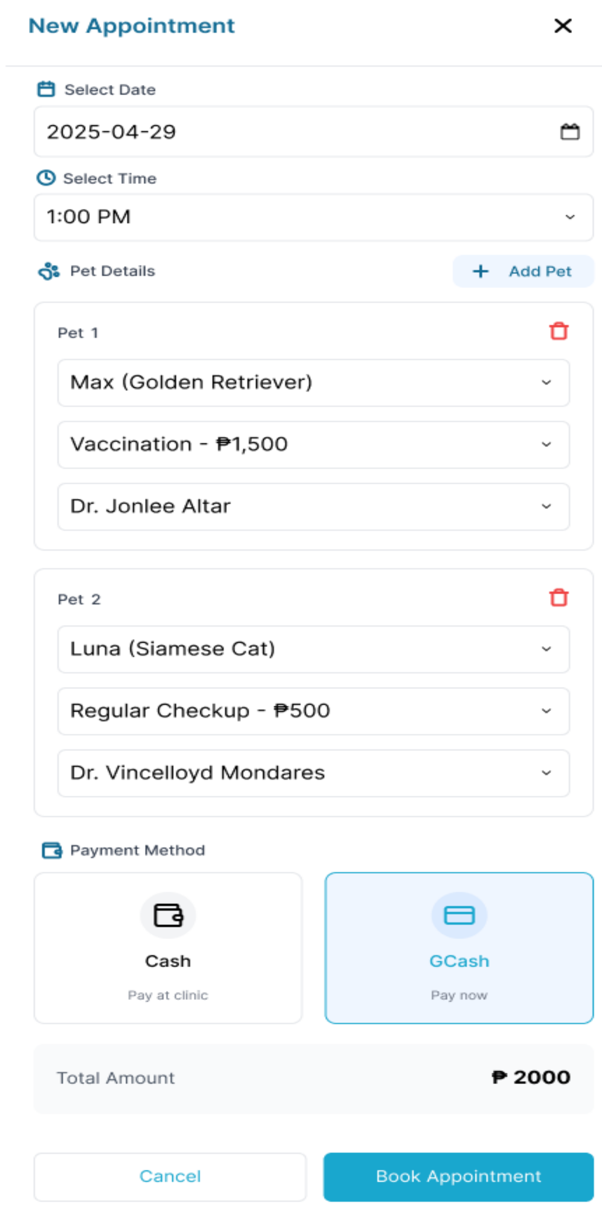
This PawSense AI User Dashboard serves as a central hub for managing pet healthcare, providing an overview of key metrics such as active pets, upcoming and pending appointments, and treatments. It visually displays real-time individual treatment trends by service type (e.g., vaccinations, dental care) for dogs and cats in the form of a bar graph. Additionally, it includes a pie chart showing the distribution of patients by type, and a comprehensive calendar for April 2025 highlighting scheduled dates. Its core functionality is to provide a comprehensive, at-a-glance analytical view of pet health data and schedules.

Figure 122. User Appointment



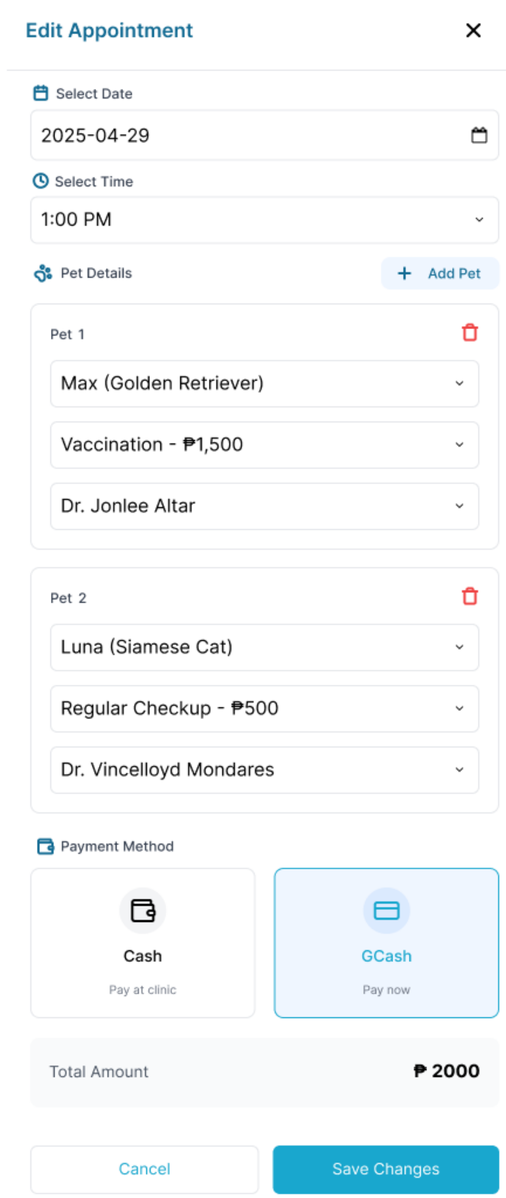
This "Appointments" page in PawSense AI enables users to request and manage their veterinary appointments. It provides a calendar view to select the desired date, indicating fully booked days. The right panel dynamically displays a list of appointments for the selected date, detailing the pet's name, time, service type, and status (confirmed or pending), with the option to view more details. A "New Appointment" button facilitates scheduling new consultations.

Figure 123. User New Appointment Modal



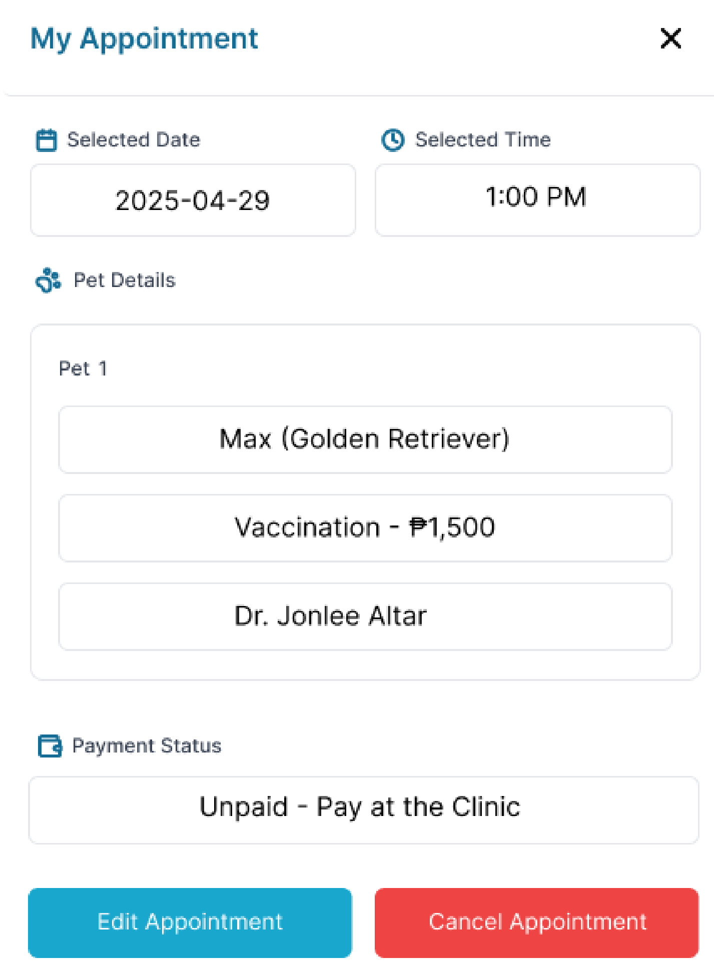
This "New Appointment" modal in PawSense AI functions to simplify multi-pet appointment scheduling and comprehensive booking management. It allows users to select a specific date and time, add multiple pets (e.g., "Max - Golden Retriever" and "Luna - Siamese Cat"), choose individual services with associated prices (e.g., "Vaccination - ₱1,500"), and assign different doctors to each pet. The modal automatically calculates the "Total Amount" (₱2000 in this example) and provides options for "Cash" or "GCash" payment before confirming the booking via the "Book Appointment" button.

Figure 124. User Edit Appointment Modal



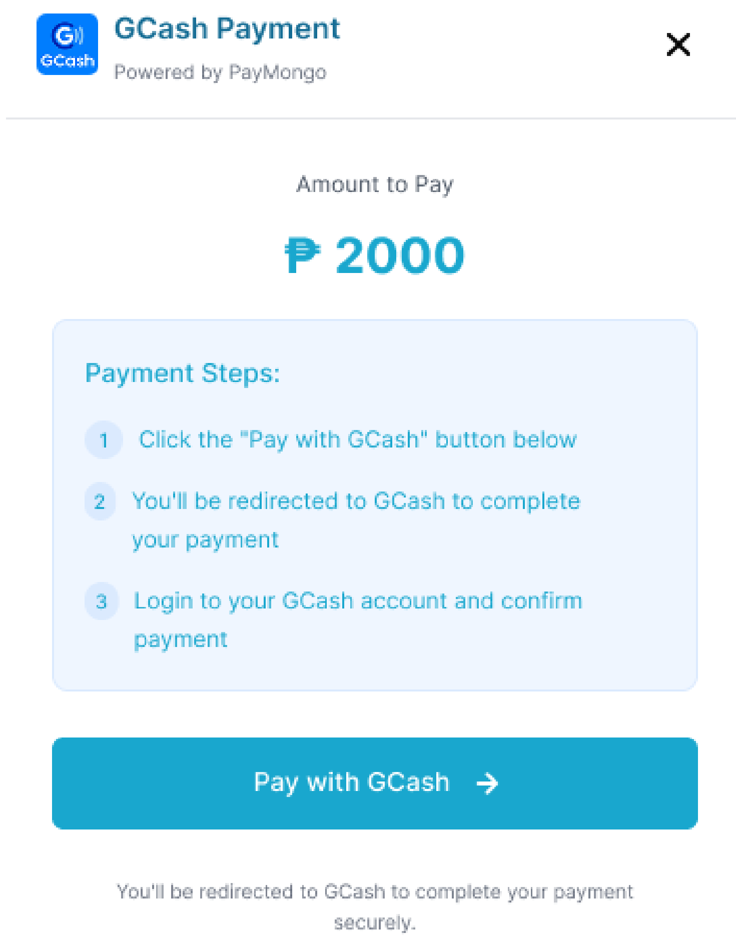
The "Edit Appointment" modal in PawSense AI functions to modify existing veterinary appointments. It enables users to adjust the selected date and time, update pet details including chosen service and assigned doctor for multiple pets, and verify the recalculated total amount. The "Save Changes" button confirms the modifications, while "Cancel" discards them, providing full control over scheduled appointments.

Figure 125. User Appointment Information Modal



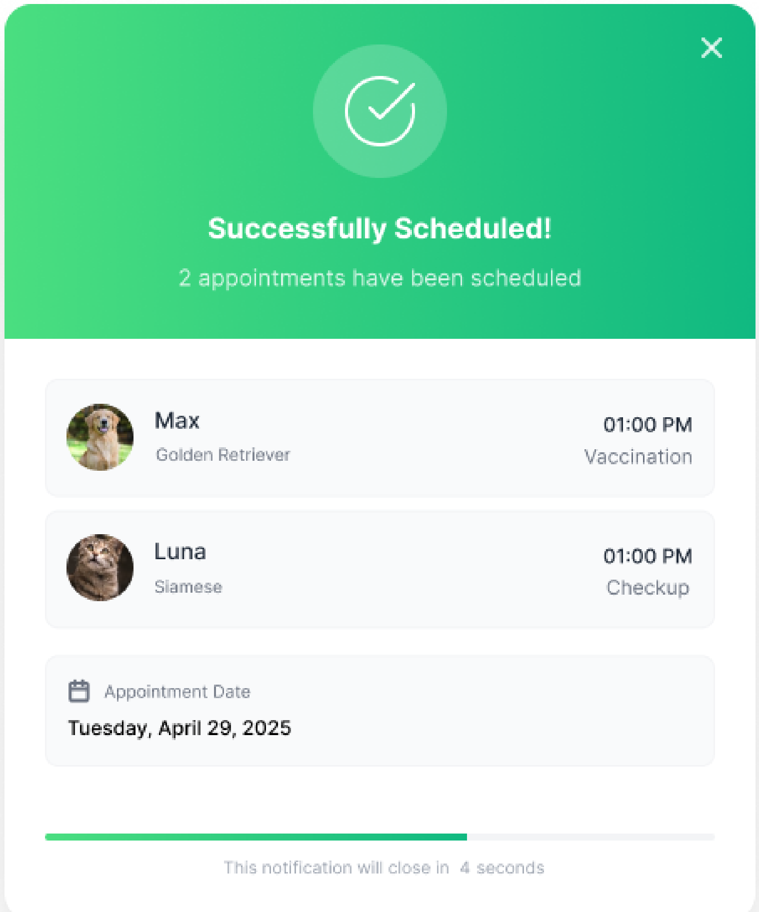
The "My Appointment" modal in PawSense AI provides a detailed overview of a specific scheduled veterinary appointment. Its core functionality is to display the selected date and time, detailed pet information (name, service, cost, assigned doctor), and the current payment status (e.g., "Unpaid - Pay at the Clinic"). Crucially, it offers direct actions to "Edit Appointment" for modifications or "Cancel Appointment" to remove the booking from the system.

Figure 126. User Gcash Payment Modal



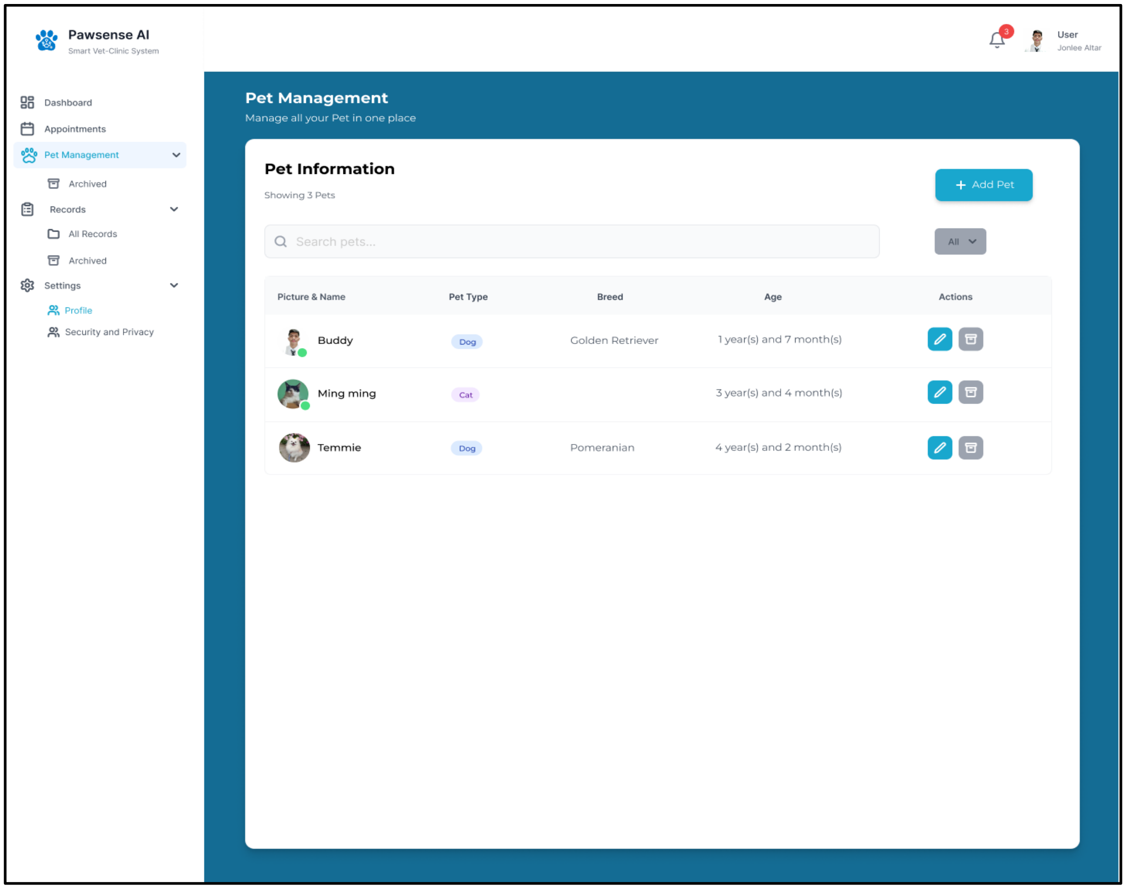
This GCash payment model is powered by PayMongo and facilitates secure digital payments within PawSense AI. Its function is to clearly display the "Amount to Pay" and guide the user through a three-step payment process: clicking "Pay with GCash," redirection to the GCash app, and logging in to confirm payment, thereby enabling online transaction completion for services.

Figure 127. User Successful Schedule Modal



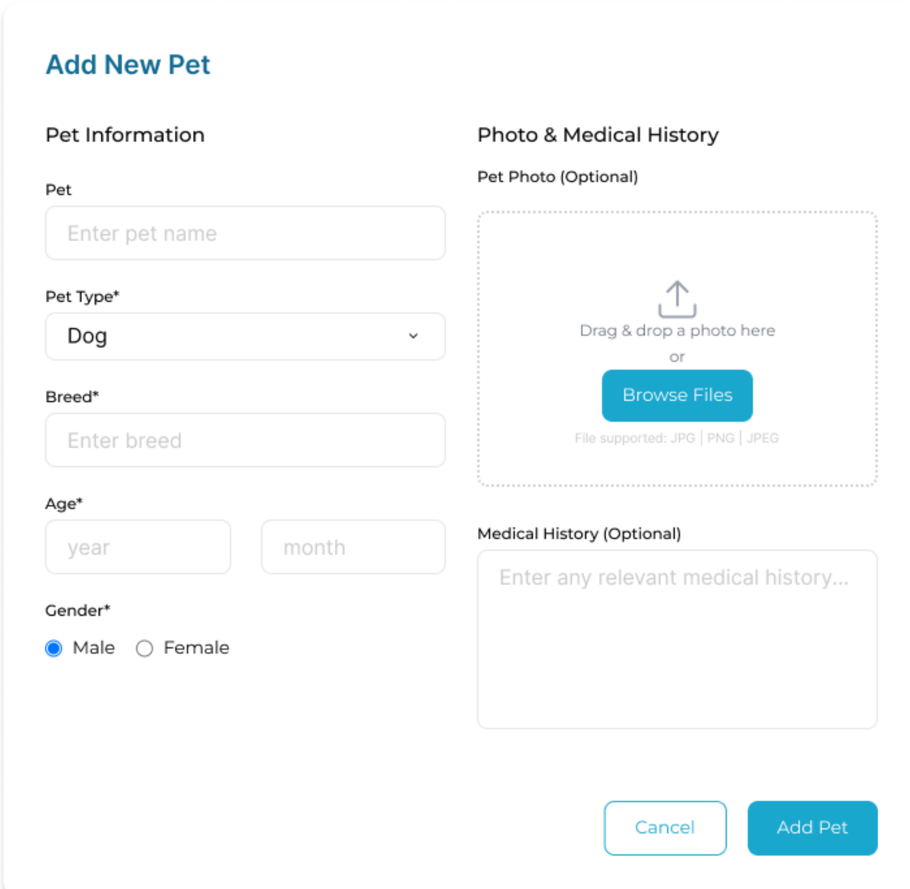
This "Successfully Scheduled" modal in PawSense AI functions as a confirmation and summation display for completed appointment bookings. It visually affirms the successful scheduling with a checkmark, lists the details of each scheduled appointment (pet name, time, service), and reiterates the appointment date. It also includes a timer that indicates when the notification will automatically close.

Figure 128. User Pet Management



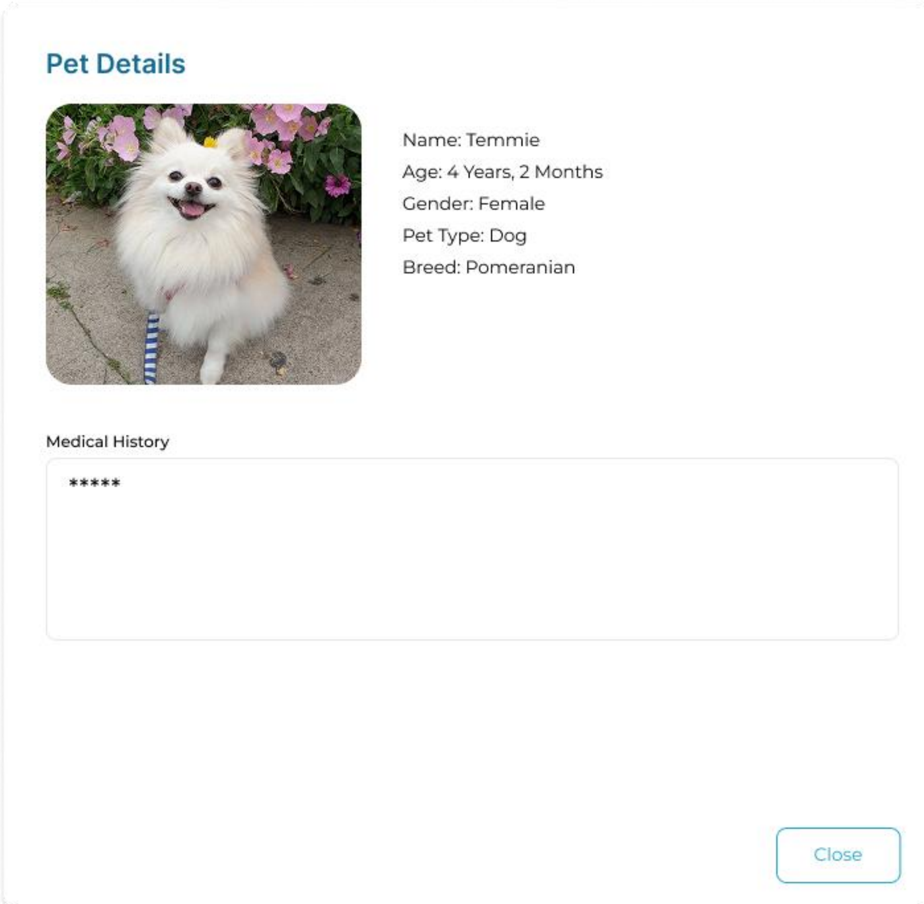
The "Pet Management" section in PawSense Ai's user interface allows for centralized management of pet information. It displays a list of active pets with their picture, name, type, breed, and age. Its core functionalities include adding new pet profiles via the "Add Pet" button, searching for specific pets, and performing actions such as editing pet details or archiving pet records.

Figure 129. User Add New Pet Modal



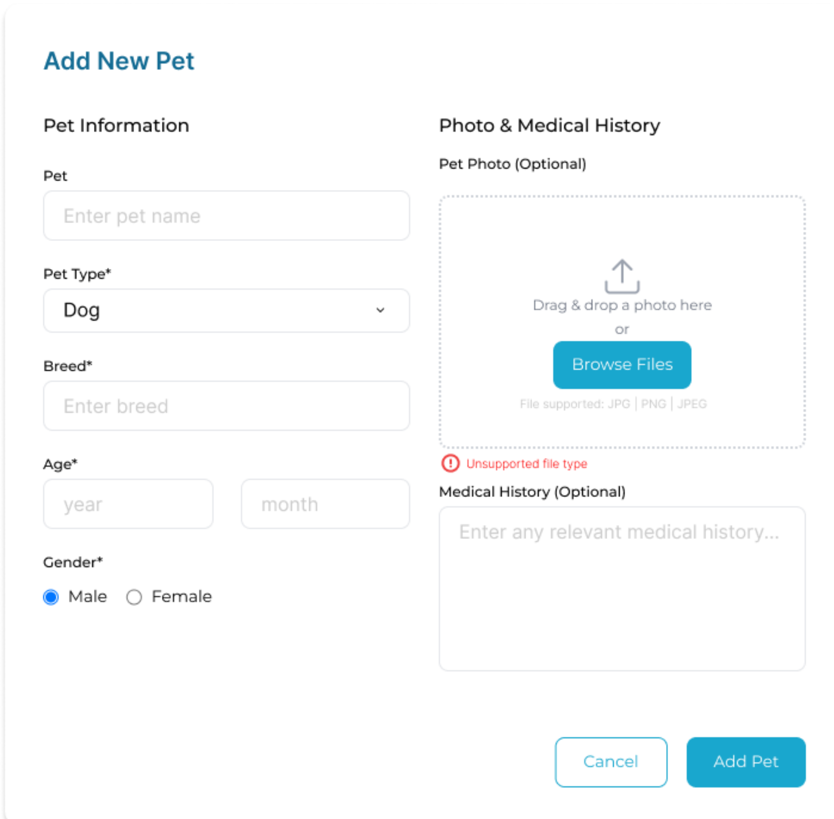
The "Add New Pet" modal in PawSense AI functions to onboard new pet profiles into the system. It enables users to input essential pet information, including name, type, breed, age (in years and months), and gender. Optionally, it allows for uploading a pet photo and inputting relevant medical history. The "Add Pet" button finalizes the creation of the new pet record.

Figure 130. User Pet Details Modal



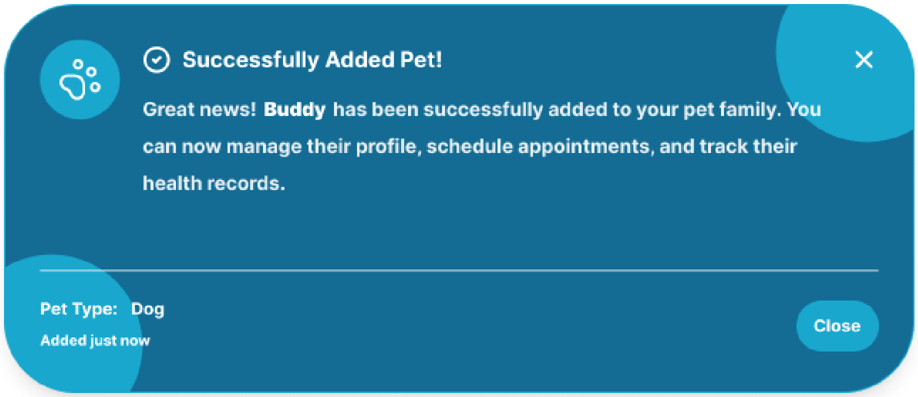
The "Pet Details" modal in PawSense AI functions to display comprehensive information about a specific pet. It provides a summary of the pet's profile, including its photo, name, age, gender, pet type, and breed. Additionally, it presents the pet's medical history, offering a centralized view of vital health information. A "Close" button allows the user to exit the modal.

Figure 131. User Add New Pet Error Modal



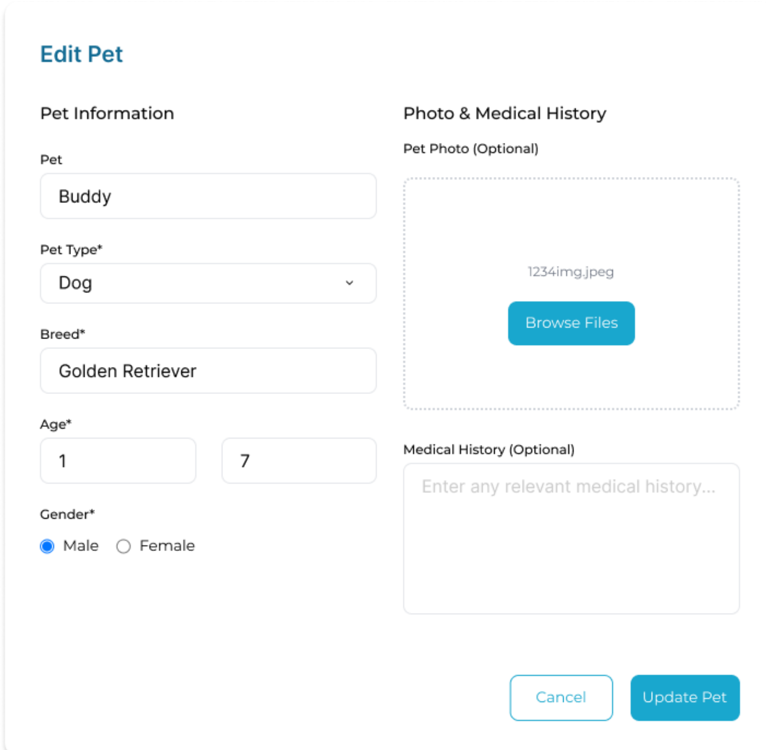
This "Add New Pet" modal, displaying an error message, functions to simplify the creation of new pet profiles while enforcing data validation for uploaded photos. It allows users to input pet information (name, type, breed, age, gender) and optional medical history. Its specific functionality showcased here is to detect and notify the user of an "Unsupported file type" when an invalid image format is attempted for the upload, ensuring data integrity before the "Add Pet" action can be completed.

Figure 132. User Alert Message Modal



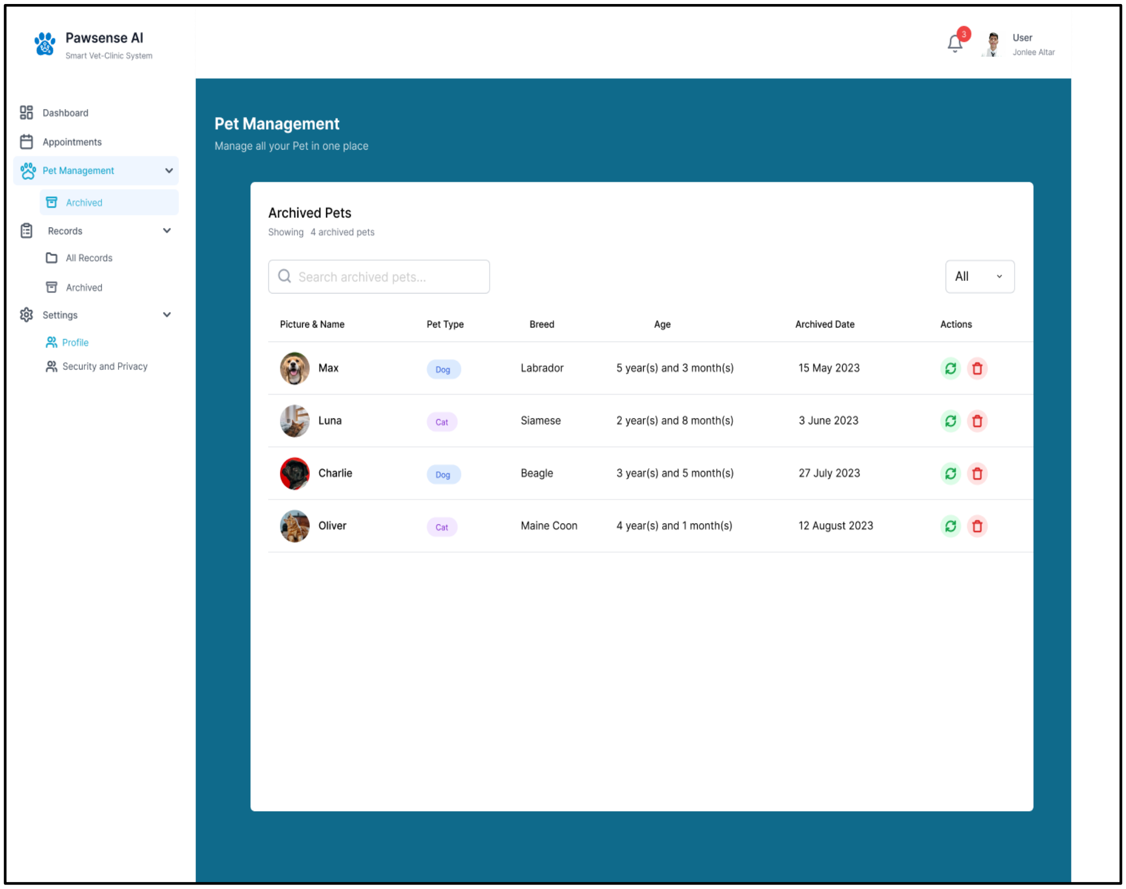
This "Alert Message" in PawSense AI functions as a confirmation and informational pop-up. It confirms the "Successfully Added Pet" action, states the newly added pet's name and type, and informs the user that they can now manage the pet's profile, schedule appointments, and track health records. The message includes a "Close" button to dismiss the notification.

Figure 133. User Edit Pet Modal



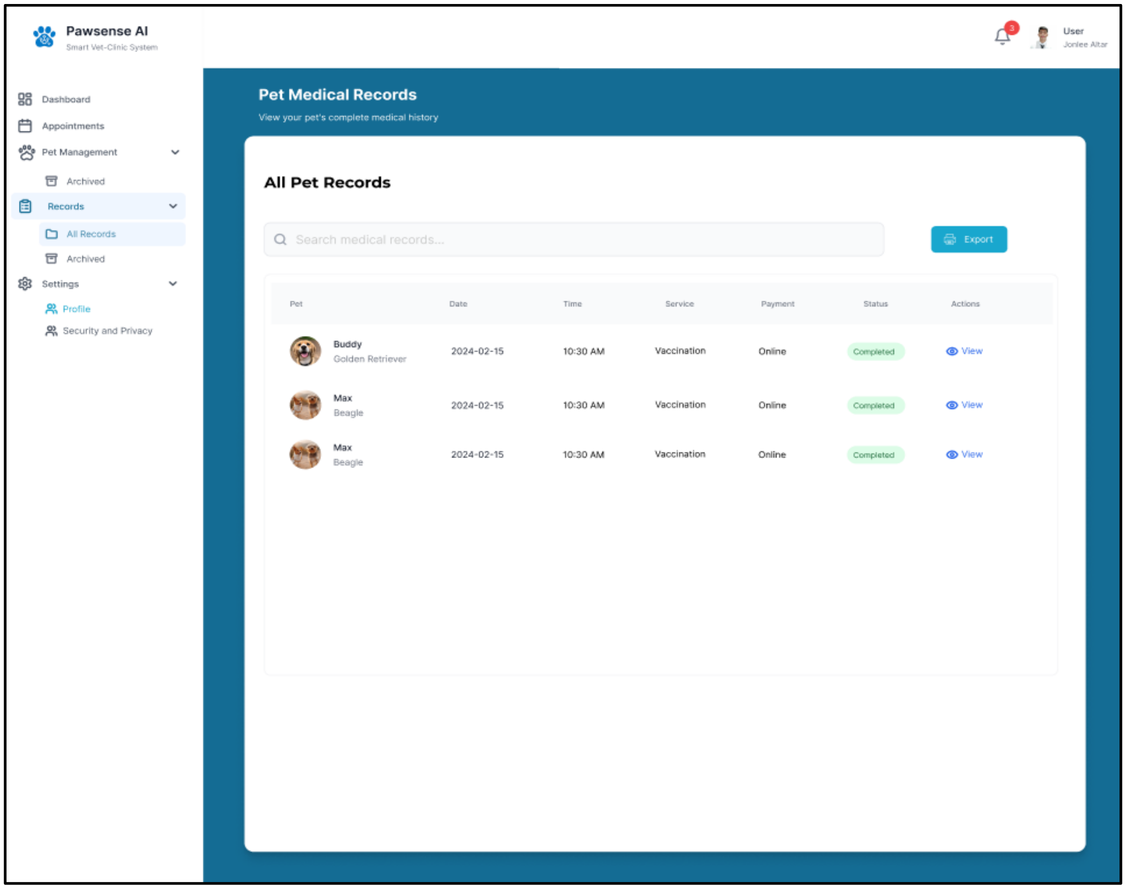
The "Edit Pet" modal in PawSense AI enables users to modify existing pet profiles. Its functionality includes updating a pet's name, type, breed, age, and gender, as well as uploading a new photo or editing existing medical history. The "Update Pet" button commits these changes, while "Cancel" discards them, providing complete control over pet record management.

Figure 134. User Pet Management Archive



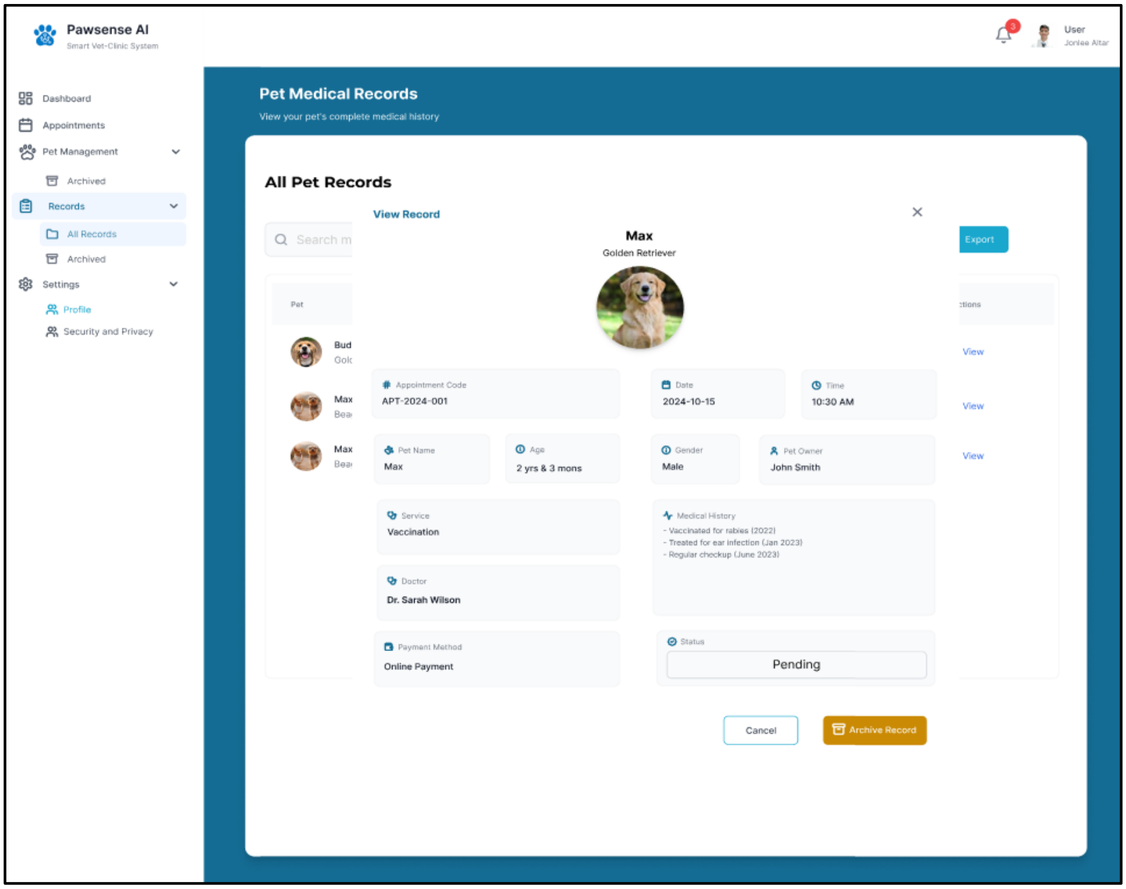
The "Archived Pets" section within PawSense AI's Pet Management functions as a repository for inactive pet profiles. It allows users to view a list of previously active pets with details like pet type, breed, age, and archive date. Users can search for specific archived pets and perform actions such as restoring them to active status or permanently deleting their records.

Figure 135. User Medical Records



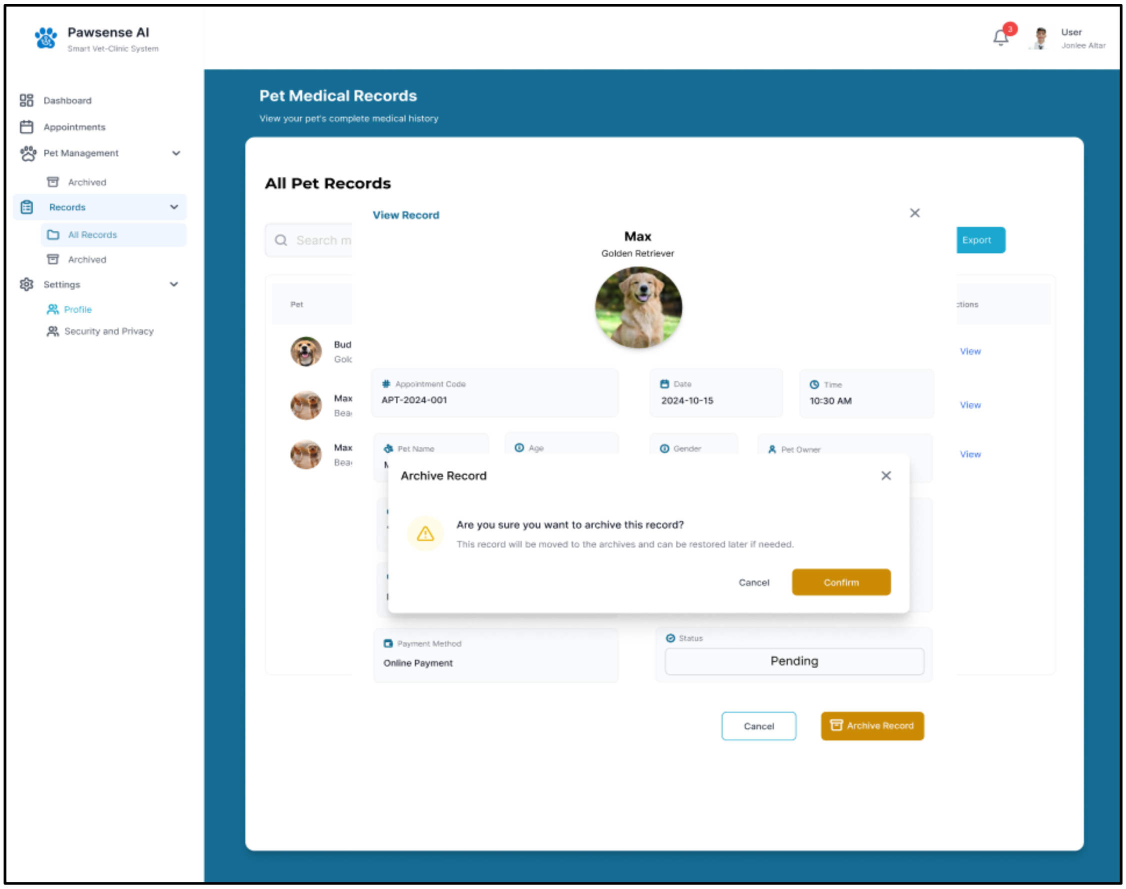
This image displays the "Pet Medical Records" section of the PawSense AI system, providing a streamlined view of a pet's complete medical history for the User. The main area features an "All Pet Records" table, presenting key information for each record. This includes the "Pet" (e.g., Buddy, Max, Molly, Maggie, Mia, Moz) with their breed (e.g., Golden Retriever, Beagle), the "Date" and "Time" of the record, the "Service" provided (e.g., Vaccination), "Payment" method (Online), and the "Status" (all shown as "Completed"). Each entry also includes a "View" action, allowing users to delve deeper into individual record details. A search bar at the top facilitates quick lookup of specific medical records, and an "Export" button is available for data portability. This interface simplifies the process of reviewing and managing a pet's medical history for the user.

Figure 136. User View Medical Records



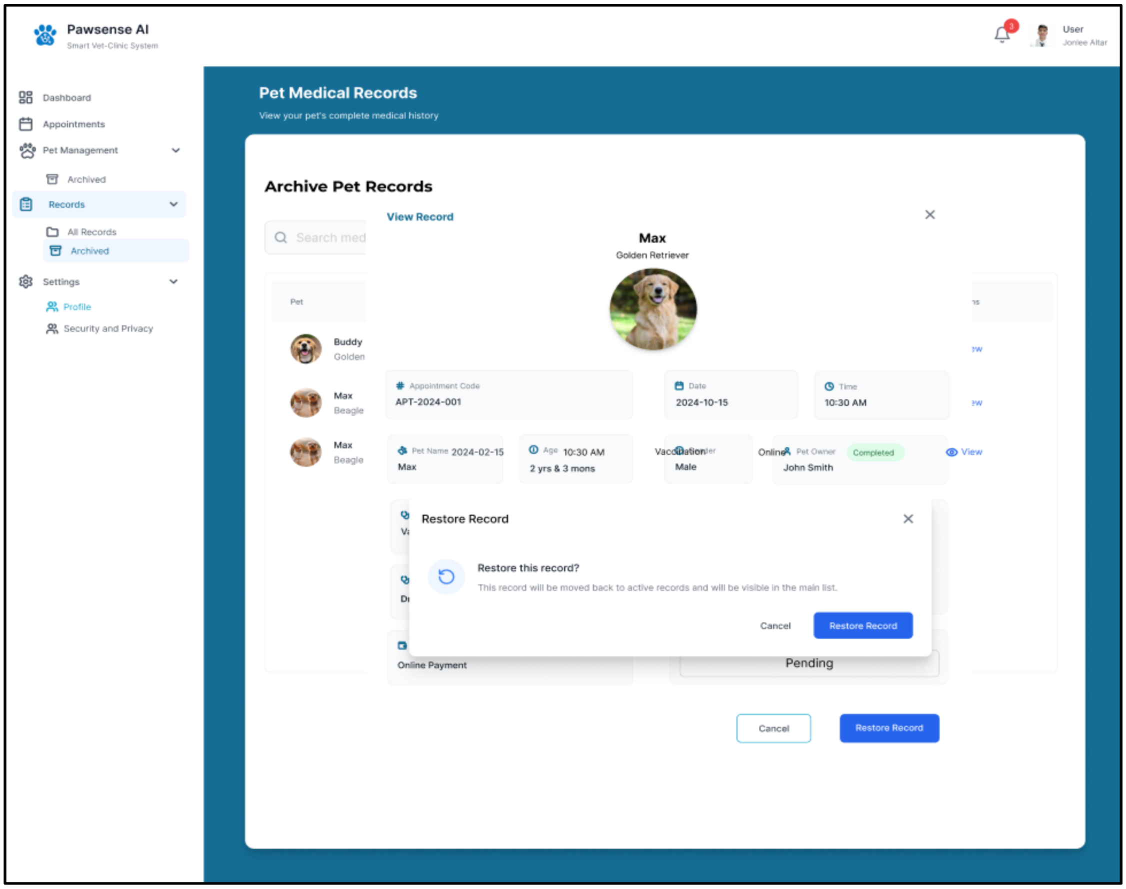
This image specifically highlights the "View Record" modal within the PawSense AI system's "Pet Medical Records" section, which is accessible to the user. This modal provides a comprehensive overview of a single pet's medical record, prominently featuring the pet's name "Max" (Golden Retriever) and an associated photo. Key details displayed include the "Appointment Code" (APT-2024-001), the "Date" (2024-10-15) and "Time" (10:30 AM) of the service, along with "Pet Name," "Age," "Gender," and "Pet Owner" (John Smith). It also lists the "Service" performed (Vaccination), the assigned "Doctor" (Dr. Sarah Wilson), the "Payment Method" (Online Payment), and the current "Status" (Pending). Notably, a "Medical History" section details past treatments. At the bottom, the user has options to "Cancel" the view or "Archive record," allowing for management of their pet's past documentation.

Figure 137. User Archive Medical Records



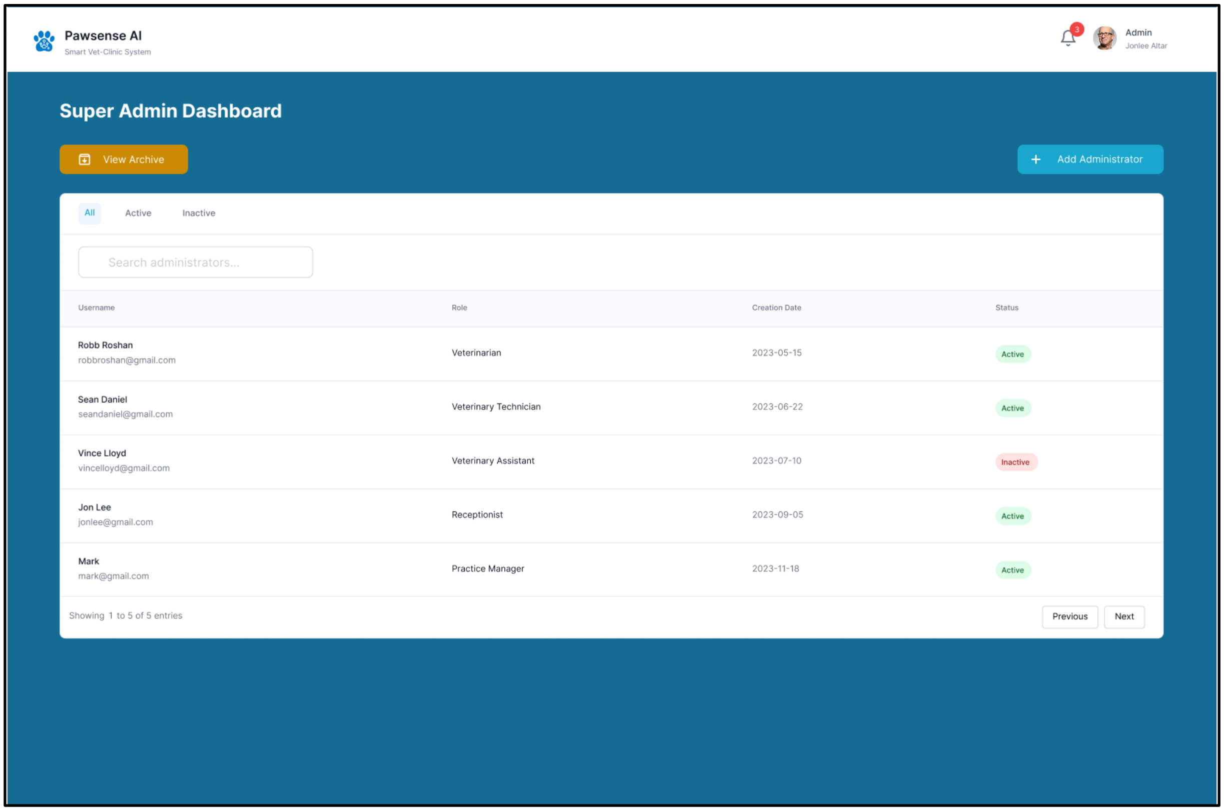
This image displays the "Pet Medical Records" section of the PawSense AI system from a user's perspective, with a "View Record" modal open for "Max" the Golden Retriever. When the user initiates the archiving process by clicking the "Archive record" button within this view record modal, a smaller, critical "Archive Record" confirmation modal pops up. This modal serves as a safeguard, asking, "Are you sure you want to archive this record?" It clearly informs the user that "This record will be moved to the archives and can be restored later if needed," providing reassurance about data recovery. The user is then presented with "Cancel" and "Confirm" options to finalize or abort the archiving action.

Figure 138. User Restore Medical Records



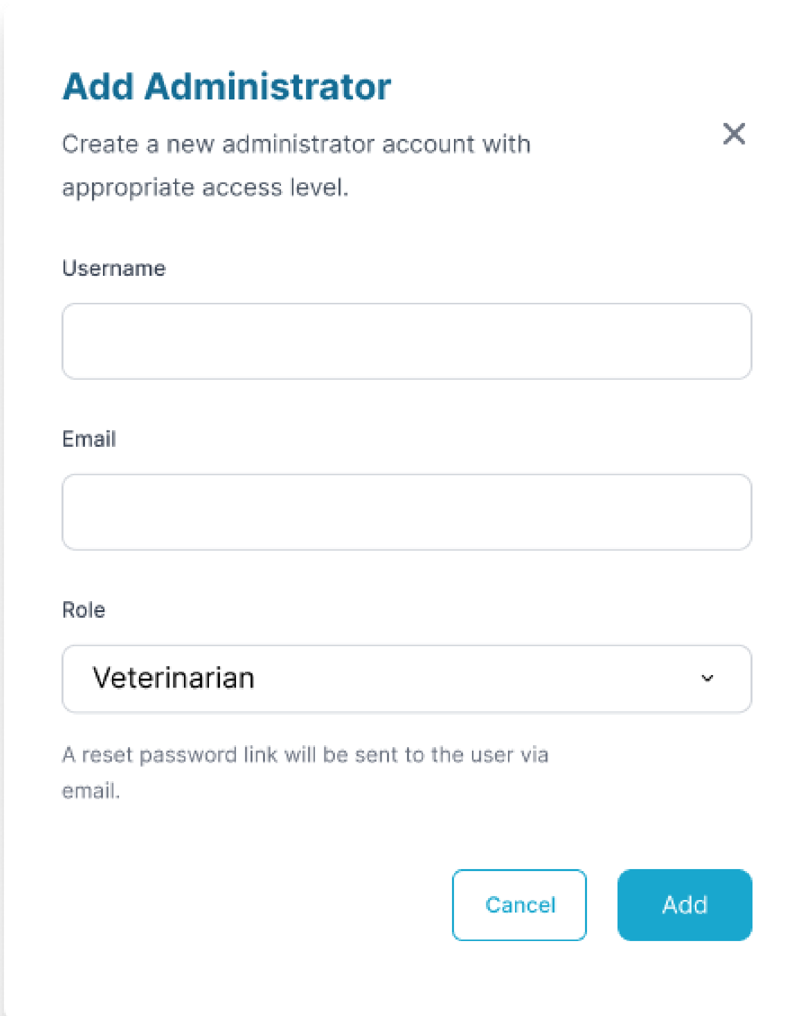
This image displays the "Archived Pet Records" section of the PawSense AI system from a user's perspective, featuring an open "View Record" modal for "Max" the Golden Retriever. When the user interacts with this archived record to restore it, a confirmation modal titled "Restore this record?" appears. This pop-up provides crucial information, stating that "This record will be moved back to active records and will be visible in the main list," confirming the outcome of the restoration. The user is then presented with two options: "Cancel" to abort the action or "Restore Record" to proceed with bringing the archived record back into their active medical records.

Figure 139. Super Admin Dashboard



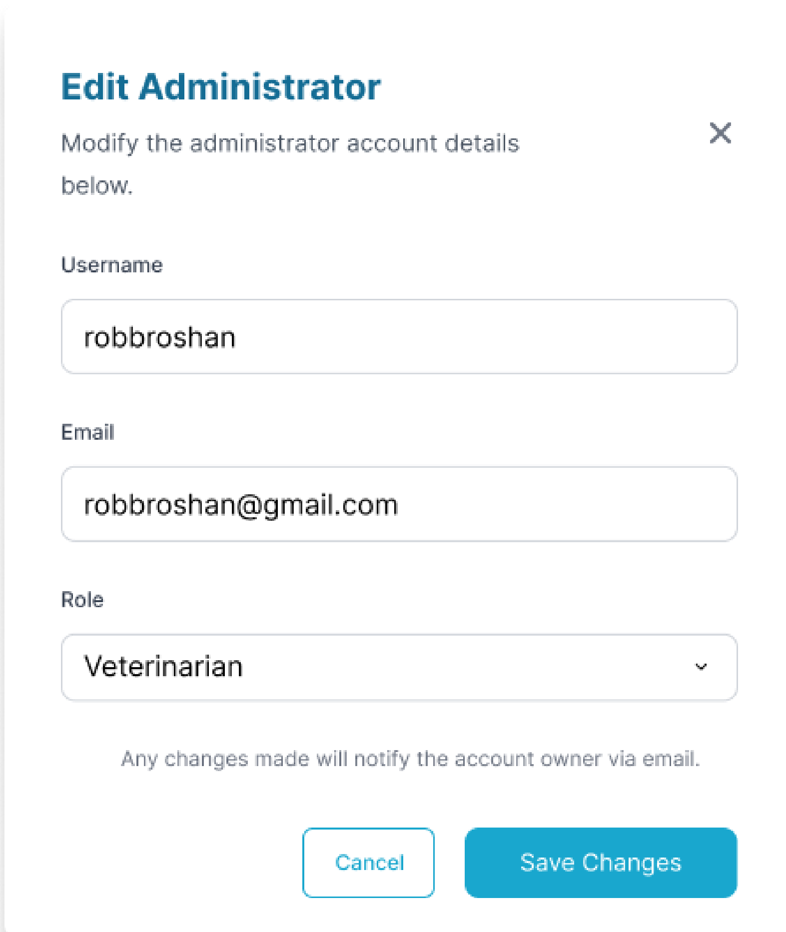
The "Super Admin Dashboard" in PawSense AI functions as the central control panel for managing clinic administrators. It enables super administrators to view a complete list of all active and inactive administrators, including their username, role (e.g., Veterinarian, Receptionist), creation date, and current status. Key functionalities include searching for specific administrators, adding new administrators via the "Add Administrator" button, and accessing an archive of administrator accounts through the "View Archive" option.

Figure 140. Super Admin Add Admin Modal



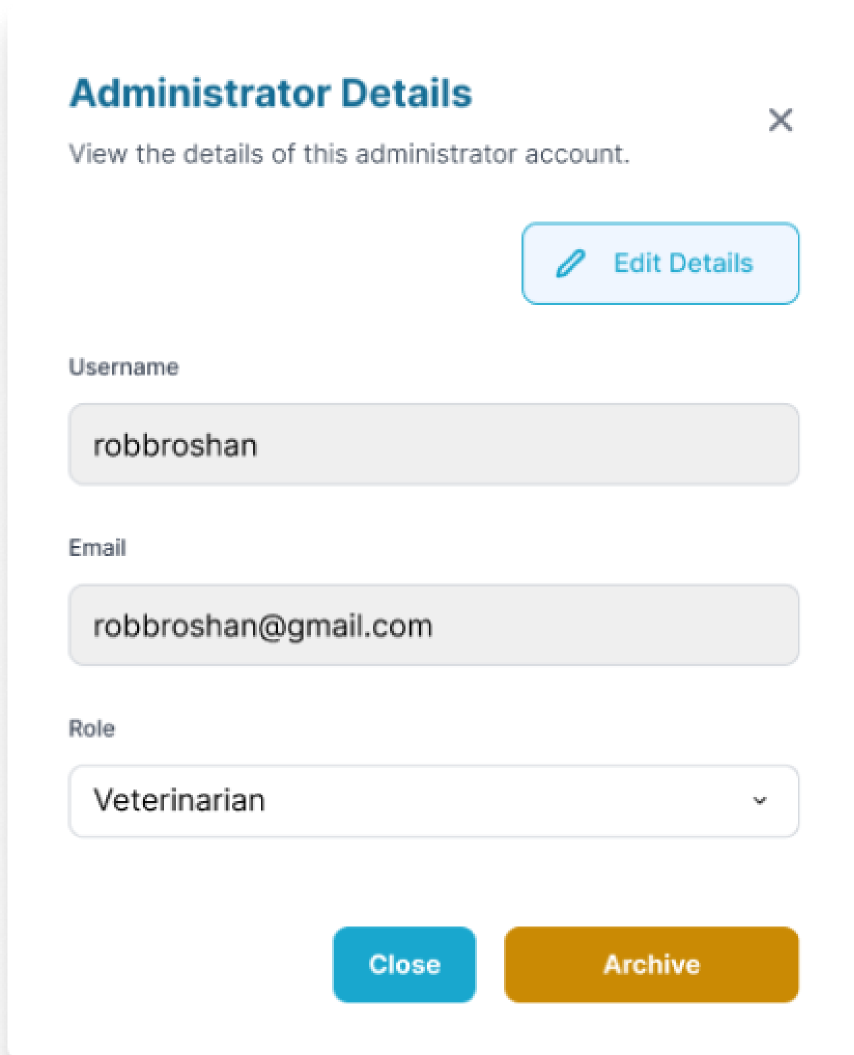
This "Add Administrator" modal in PawSense AI functions to create new administrator accounts with defined access levels. It requires input for a username and email address, and critically, allows for selecting a specific "Role" (e.g., Veterinarian) from a dropdown menu. Upon submission, a reset password link is automatically sent to the newly created administrator's email.

Figure 141. Super Admin Edit Admin Modal



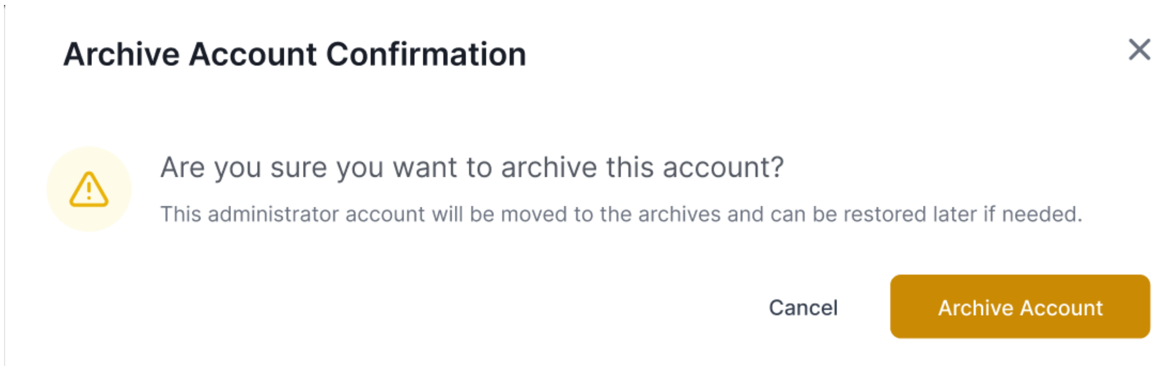
The "Edit Administrator" modal in PawSense AI directly functions to modify existing administrator account details. It allows for updating the administrator's username, email, and assigned role. Once changes are saved, the account owner will be notified via email, ensuring secure and transparent management of adjustments.

Figure 142. Super Admin View Admin Modal



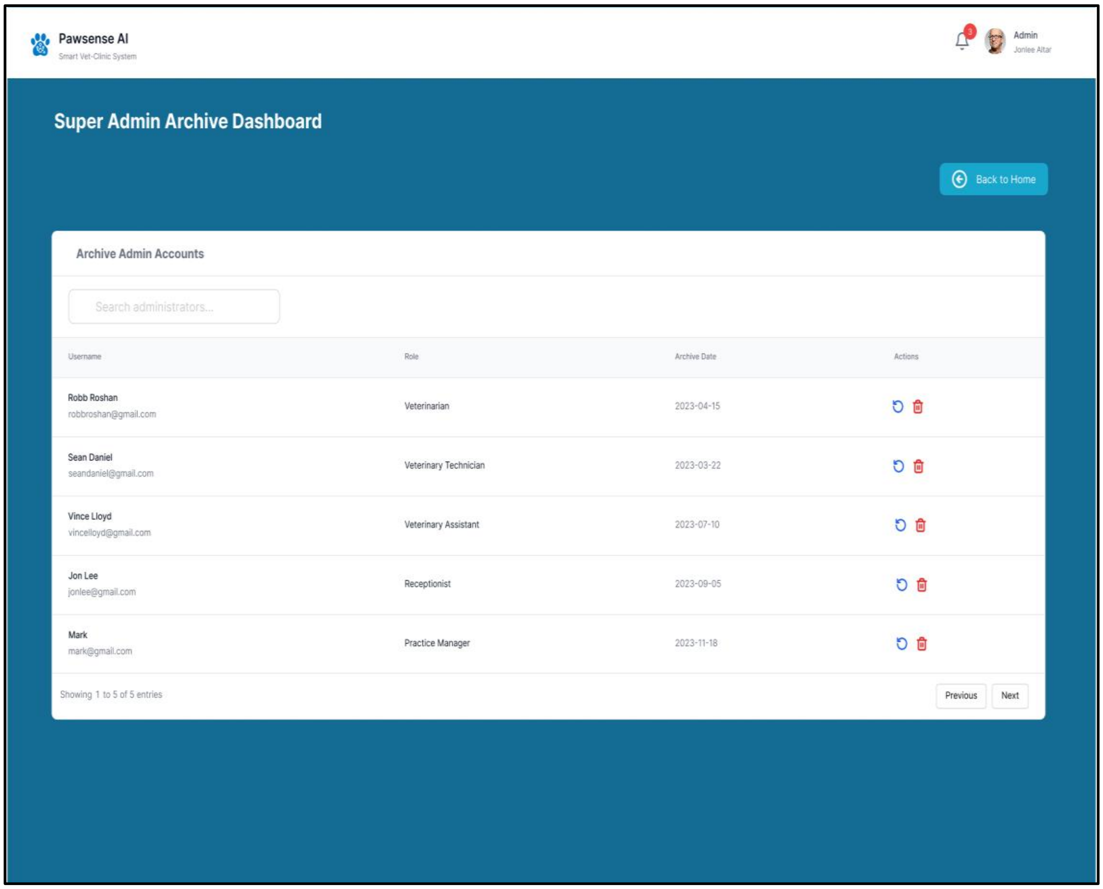
This "Administrator Details" modal in PawSense AI functions to display and manage a specific administrator's account. It shows the username, email, and assigned role, with an "Edit Details" button to modify this information. Crucially, it includes "Close" and "Archive" buttons, allowing for either dismissing the view or moving the administrator account to an inactive status.

Figure 143. Super Admin Archive Confirmation Modal



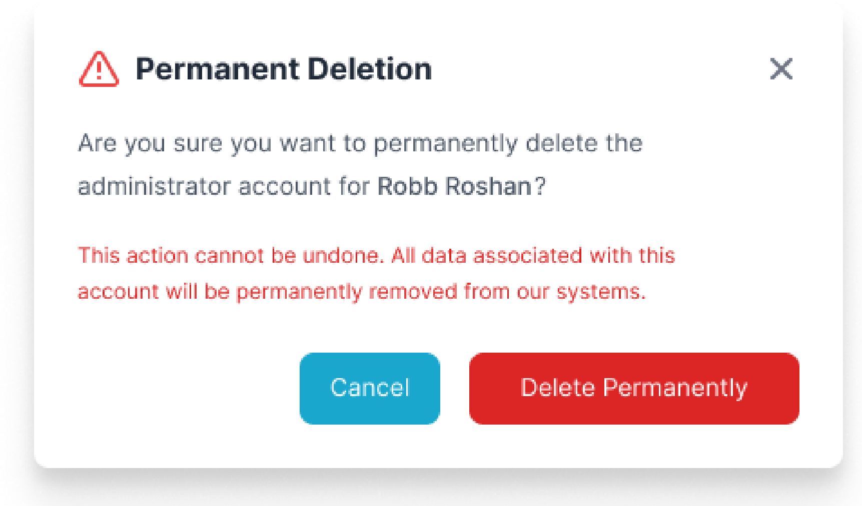
This "Archive Account Confirmation" modal in PawSense AI functions as a crucial safeguard before archiving an administrator account. It explicitly asks for confirmation to proceed with the archiving process, clearly stating that the account will be moved to the archive but can be restored later. This provides a user-friendly way to confirm or cancel the action, preventing important accounts from being accidentally archived.

Figure 144. Super Admin Archive Page



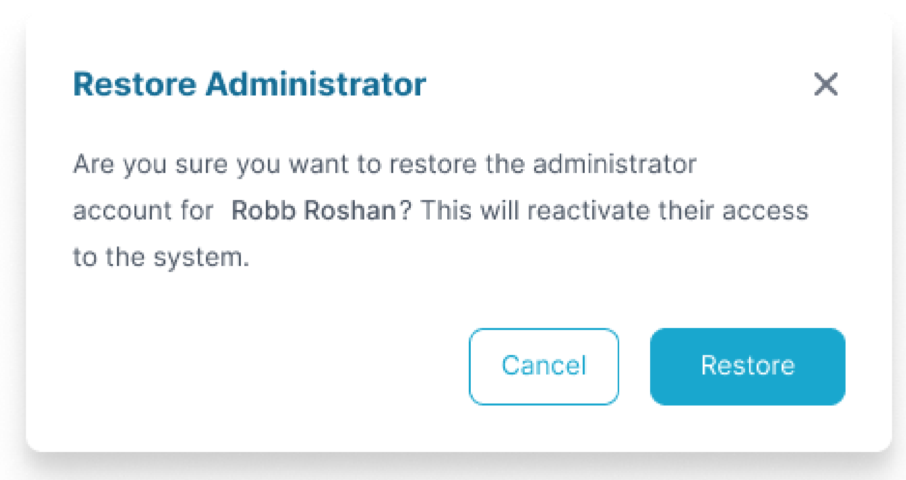
The "Super Admin Archive Dashboard" in PawSense AI functions as a dedicated module for managing inactive administrator accounts. It lists archived administrators by username, role, and archive date, enabling searching within the archived records. Crucially, it provides actions to restore (unarchive) or permanently delete specific administrator accounts, and a "Back to Home" button to return to the administrator dashboard.

Figure 145. Super Admin Deletion Modal



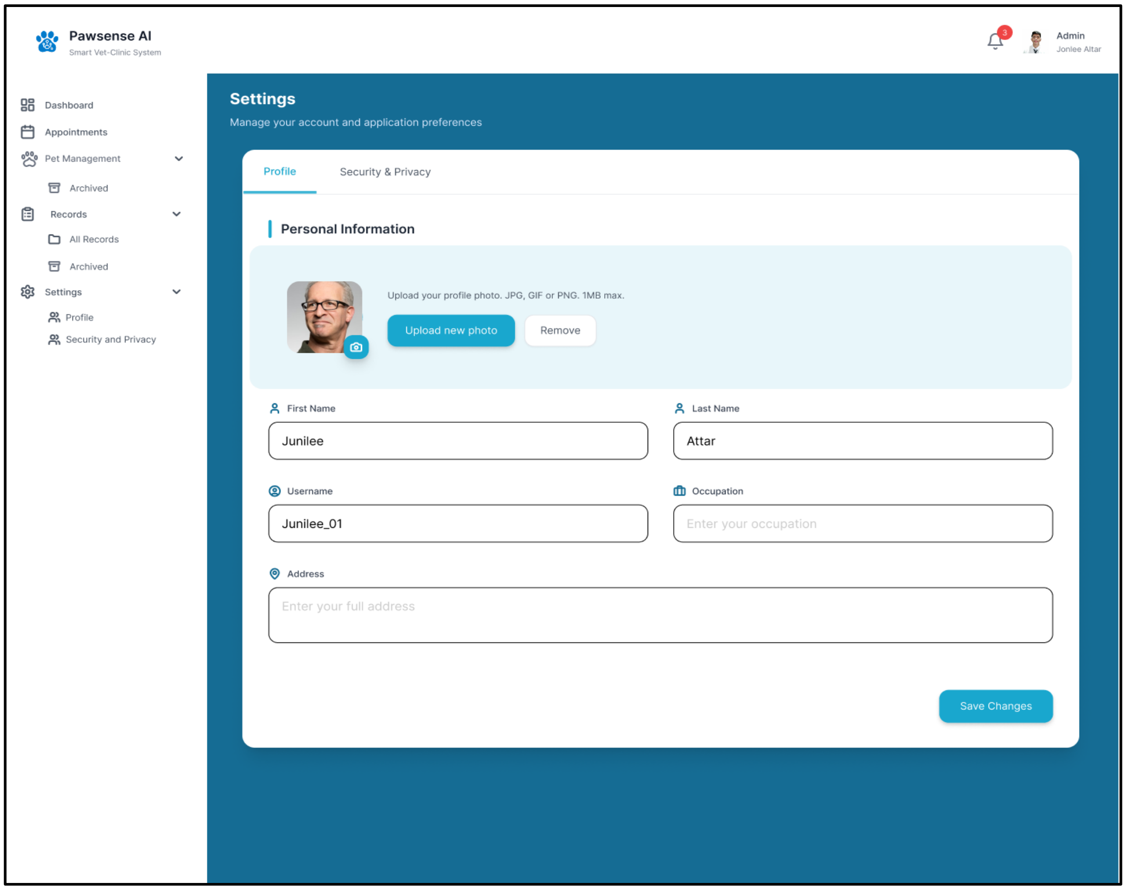
This "Permanent Deletion" modal in PawSense AI functions as a critical irreversible action confirmation. It explicitly warns the user that deleting the specified administrator account (e.g., for "Robb Roshan") is permanent and all associated data will be removed. Its role is to prevent accidental data loss by requiring explicit user confirmation via the "Delete Permanently" button or cancellation via "Cancel.

Figure 146. Super Admin Deletion Modal



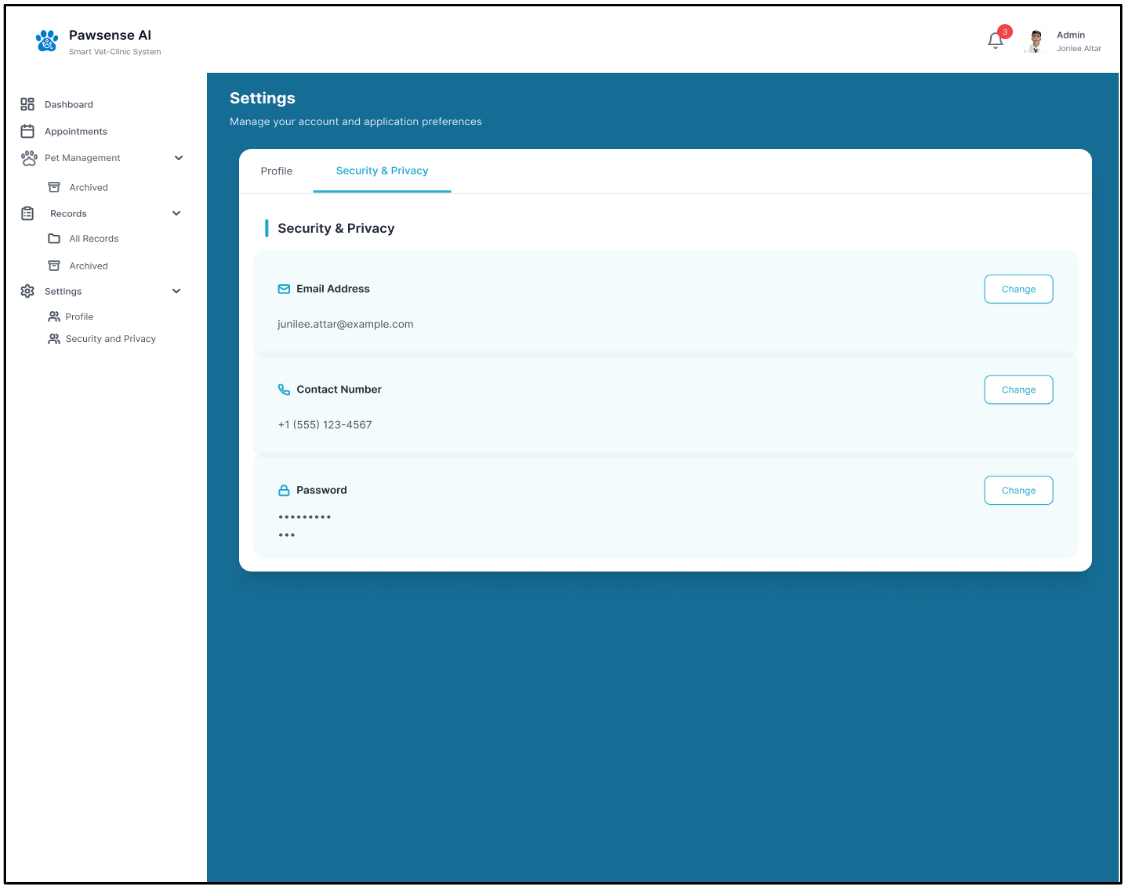
The "Restore Administrator" modal in PawSense AI functions as a confirmation prompt for reactivating an archived administrator account. Its core purpose is to seek user confirmation before restoring the specified account (e.g., "Robb Roshan"), which will thus reactivate their system access. It offers "Cancel" and "Restore" options to control the action.

Figure 147. Personal Settings



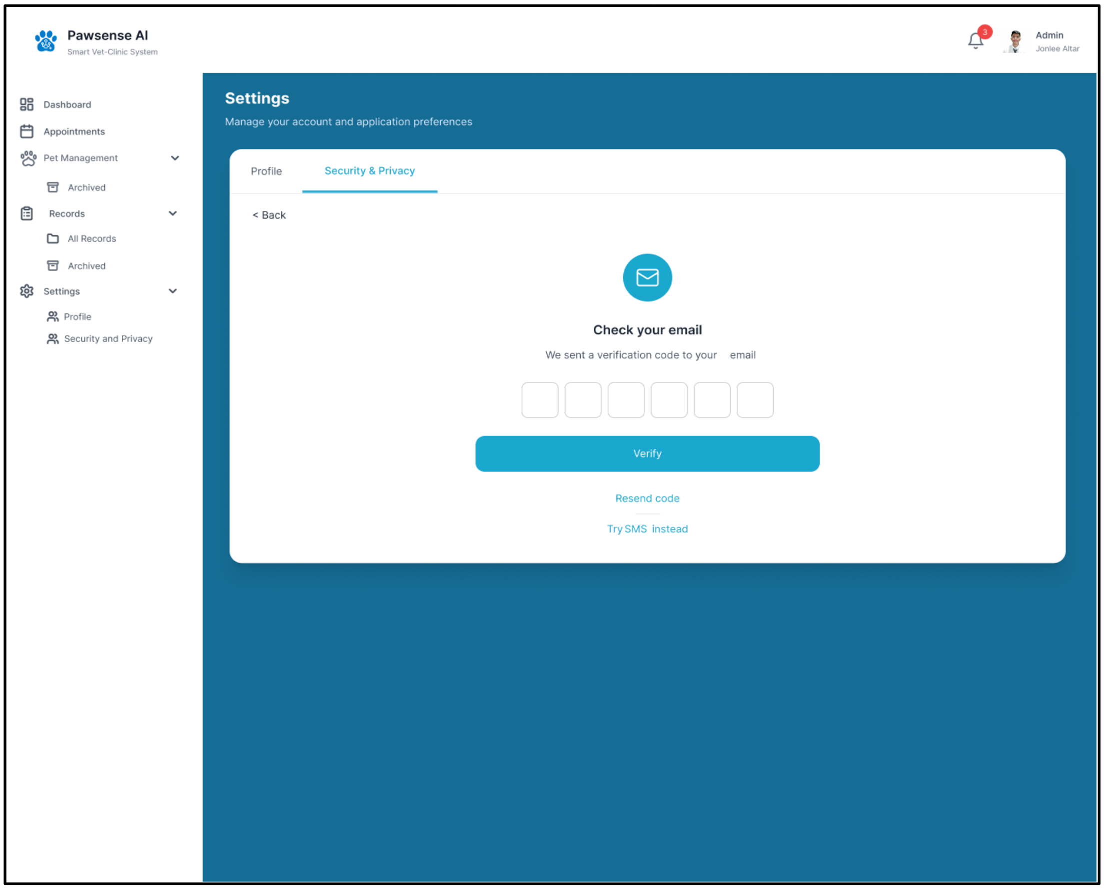
This "Personal Information Settings" page in PawSense AI functions to allow users to manage their account details. It enables updating profile photos, modifying personal information fields such as first name, last name, username, occupation, and address. The "Save Changes" button commits these updates, providing users control over their account preferences and data within the system.

Figure 148. Security and Privacy Settings



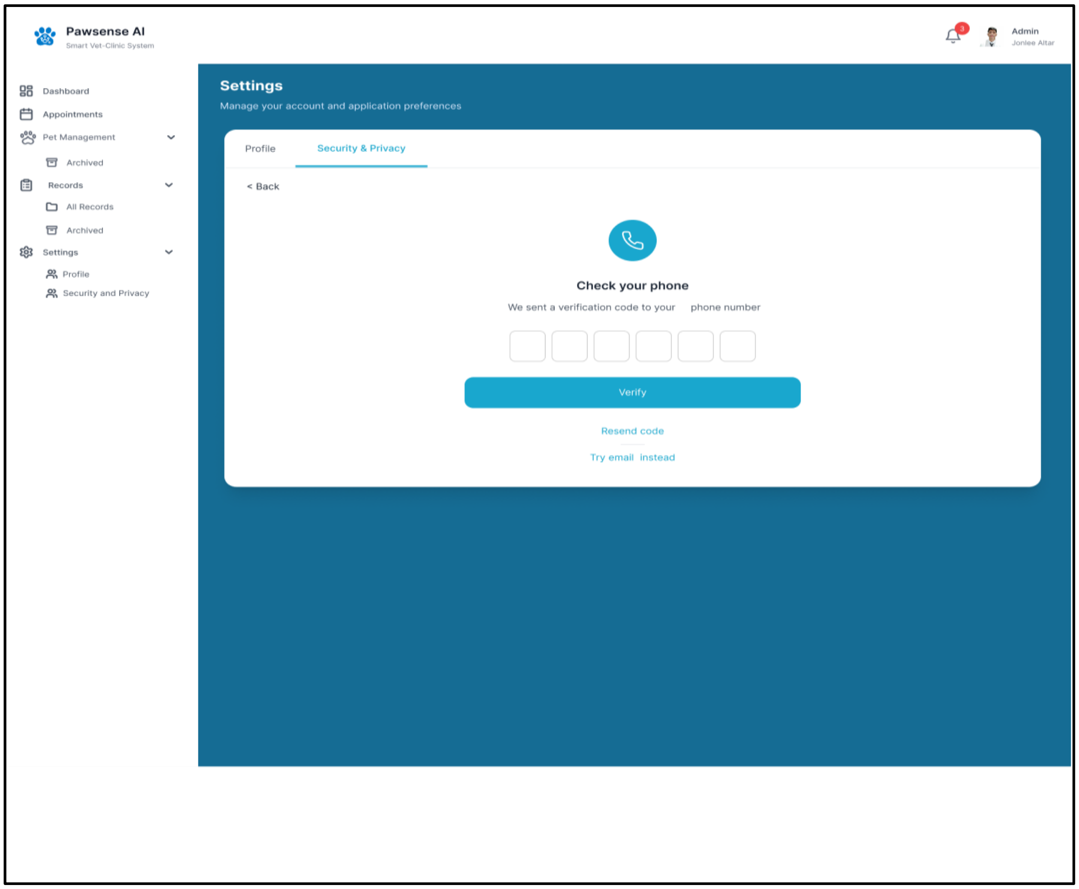
This "Security & Privacy" section within PawSense AI's settings allows users to manage critical account security features. Its functionality includes changing the registered email address, updating the contact number, and modifying the account password through dedicated "Change" buttons for each respective field. This centralized control helps users maintain the security and privacy of their PawSense AI account.

Figure 149. Security and Privacy OTP Email Settings Page



This "Verification Code" page in PawSense AI functions as a crucial step in email-based account verification or password recovery. Its specific function is to prompt the user to enter the verification code that has been sent to their email address. Users can submit the code via the "Verify" button, "Resend code" if needed, or "Try SMS instead" for an alternative method, thereby ensuring the legitimacy of the user's attempt to access or modify their account.

Figure 150. Security and Privacy OTP SMS Settings Page



The PawSense AI "Verification Code" page, accessed via SMS, functions as a security measure to confirm a user's identity. Its main purpose is to prompt users to enter a verification code sent to their phone number, allowing them to proceed with actions such as password recovery or account modifications. It also offers options to "Resend code" or "Try email instead" for alternative verification.

Project Implementation Plan

The Animal House Alabang Branch's project implementation plan offers a systematic approach to creating and executing a complete Smart Veterinary Clinic Management System. It guarantees that all activities, from planning and design to deployment and maintenance, are carried out effectively and consistently. This strategy intends to improve clinic operations by simplifying appointment scheduling, record administration, and client communication through electronic and SMS notifications. Additionally, the system integrates inventory management, secure online payment processing, predictive analytics for operational insights, and an AI-powered chatbot for real-time client assistance. These features work together to deliver improved service efficiency, decision-making, and overall customer satisfaction.

Table 5

Project Implementation Plan

Strategy (Phases)	Activities	Person Involved	Duration
Initiation	Define project goals and objectives	Researchers	7 days
	Draft initial list of system features	Researchers	7 days
Iteration 1 – Sprint 1	Sprint planning meeting	Researchers	3 days
	Design UI/UX for sign up and login pages	Designers	7 days

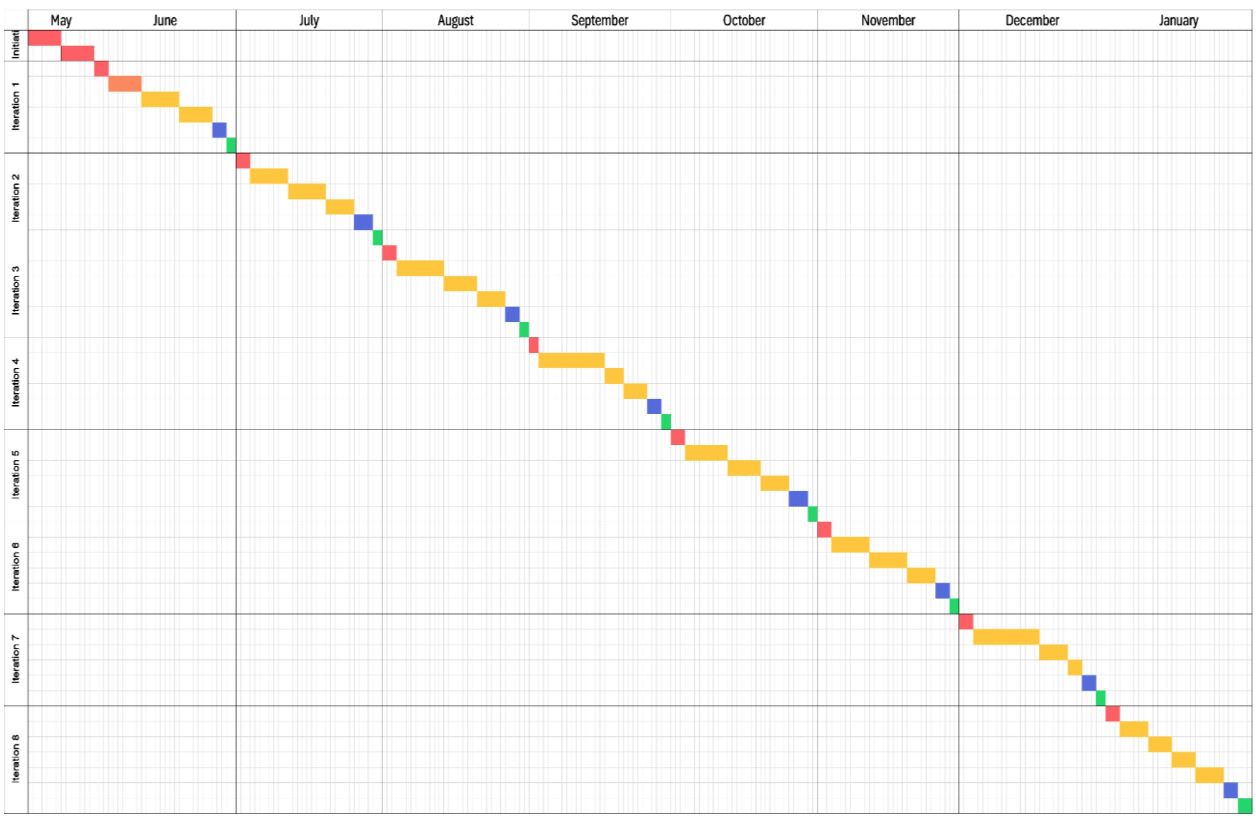
	Develop landing page, login & sign-up (with MFA)	Developers	8 days
	Integrate database and user authentication	Developers	7 days
	Testing of login system	QA Testers	3 days
	Sprint review and retrospective	Researchers	2 days
Iteration 2 – Sprint 2	Sprint planning meeting	Researchers	3 days
	Develop Pet Information Management module	Developers	8 days
	Implement Add/Modify/Archive functions	Developers	8 days
	Connect with database	Developers	6 days
	Testing	QA Testers	4 days
	Sprint review and retrospective	Researchers	2 days
Iteration 3 – Sprint 3	Sprint planning meeting	Researchers	3 days
	Build Appointment Management system	Developers	10 days
	Calendar integration	Developers	7 days

	Notification and status tracking	Developers	6 days
	Testing	QA Testers	3 days
	Sprint review and retrospective	Researchers	2 days
Iteration 4 – Sprint 4	Sprint planning meeting	Researchers	2 days
	Develop Record Management system	Developers	14 days
	Secure access and filters	Developers	4 days
	Add, modify, and archive records	Developers	5 days
	Testing	QA Testers	3 days
	Sprint review and retrospective	Researchers	2 days
Iteration 5 – Sprint 5	Sprint planning meeting	Researchers	3 days
	Clinic Schedule Management module	Developers	9 days
	Develop close/reopen specific date function	Developers	7 days
	Calendar display and logic	Developers	6 days
	Testing	QA Testers	4 days
	Sprint review and retrospective	Researchers	2 days

Iteration 6 – Sprint 6	Sprint planning meeting	Researchers	3 days
	Build Predictive Analytics module	Developers	8 days
	Integrate historical health data	Developers	8 days
	Display visual trends and graphs	Developers	6 days
	Testing	QA Testers	3 days
	Sprint review and retrospective	Researchers	2 days
Iteration 7 – Sprint 7	Sprint planning meeting	Researchers	3 days
	Create Inventory Management module	Developers	14 days
	Add/Edit/Archive stock	Developers	6 days
	Integrate alerts and item tracking	Developers	3 days
	Testing	QA Testers	3 days
	Sprint review and retrospective	Researchers	2 days
Iteration 8 – Sprint 8	Sprint planning meeting	Researchers	3 days
	Develop Payment Process module	Developers	6 days
	Implement billing info & confirm payment	Developers	5 days

Add AI Chatbot for user queries	Developers	5 days
Implement Real Time Analytics	Developers	6 days
Final system testing and bug fixing	QA Testers	3 days
Project final review and documentation	Researchers, Developers	3 days

Gantt Chart



The Gantt chart above reflects the complete project timeline for the PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang, with a development timeline of eight months, from the last two weeks of May through January of the subsequent year. This visual scheduling technique was employed in order to keep track of the progress of activities over eight iterations in a systematic manner, conforming to Agile methodology.

The color of every bar in the Gantt chart refers to a certain task, activity, or phase. The project timeline in days and months is represented in the horizontal direction, and the list of planned activities appears in the vertical direction. This organization facilitates easy viewing of the task duration, beginning and finishing dates, as well as the sequence flow.

The project begins with the Initiation Phase, with shorter bars representing rapid planning activities like objective definition and listing of features. These are then followed by Iteration 1 through Iteration 8, with each taking up a separate window of time and containing planned development sprints. These activities are further segregated into planning, design, development, test, and evaluation phases in the individual iterations. Repetitive color coding signifies the repetitive nature of the development sprints, while gaps or shifts are used visually to represent the review sessions and team member switches in roles.

This Gantt chart clearly depicts how project tasks are allocated and coordinated throughout the duration, providing a clear path for the management of resources and progress tracking. It also identifies coordinated parallelism and handoffs between development and checking for quality, fostering smooth and effective workflow. Using this predetermined scheduling instrument, the development team was in a position to meet project milestones, maintain high productivity, and respond collaboratively and adaptively towards iterative changes throughout the software development period.

Chapter 4

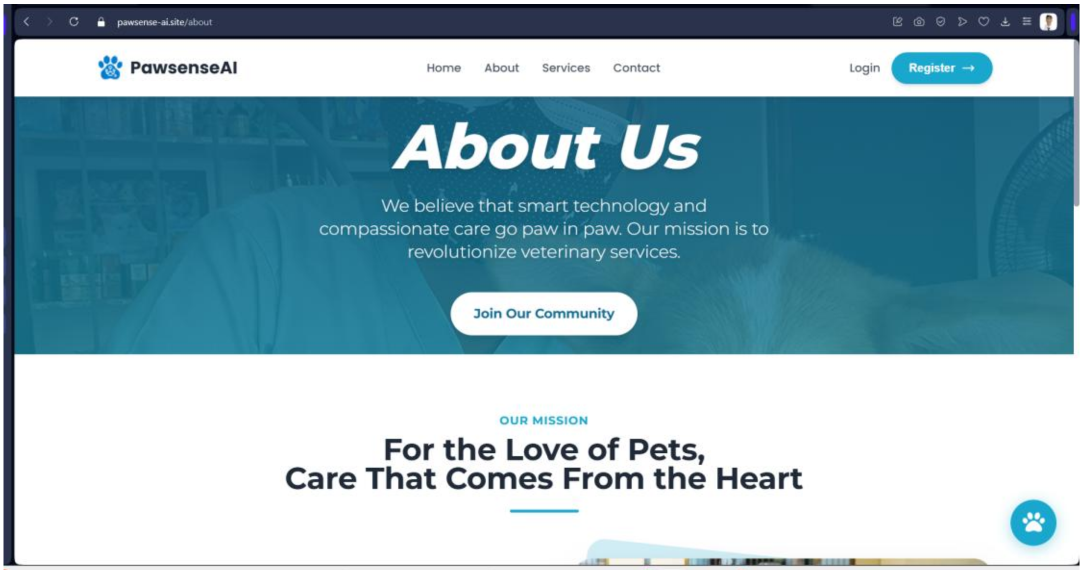
RESULTS AND DISCUSSION

This chapter focuses on interpreting the findings from the system assessment, particularly in relation to the implemented modules, including record management, appointment scheduling, inventory management, online payment integration, and automated client notifications, as well as the intelligent components such as predictive analytics and the AI-powered chatbot. Guided by the ISO 25010 software quality standards, the discussion examines the system's performance in terms of functionality, usability, reliability, and security, and explains how these quality attributes influence operational efficiency and user experience. Through systematic analysis and interpretation, this chapter provides evidence-based insights into the effectiveness of the developed solution in improving clinic workflows, strengthening client communication, and enhancing overall service delivery and user satisfaction.

Objective 1. To develop PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang Branch

The objective was achieved through the successful development of PawSense AI, a web-based smart veterinary clinic management system designed for Animal House Alabang Branch. The system was created to address the clinic's identified operational concerns, including appointment congestion due to walk-in processes, the risk of misplaced or damaged paper-based pet records, and inefficiencies in manual inventory monitoring. As a centralized platform, PawSense AI consolidates essential clinic functions into one accessible environment, supporting more organized workflow, faster information retrieval, and improved operational continuity.

Figure 151. Landing Page

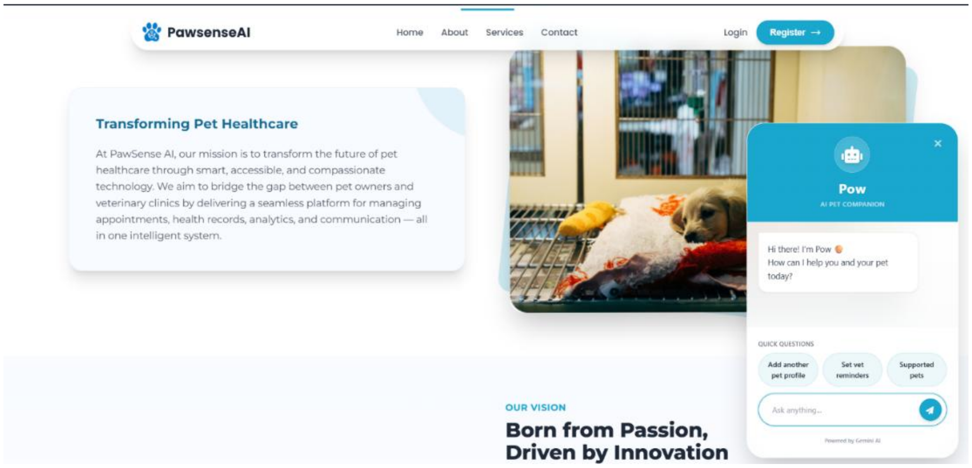


In terms of implementation, the deployed website demonstrates a functional and user-friendly interface that serves as an entry point for clients and supports clinic engagement. The platform provides structured navigation (Home, About, Services, Contact) with clear access to Login/Register, service information, testimonials, and contact/location details, including business hours and an embedded map. Overall, the developed system and website reflect the intended outcome of modernizing clinic operations and improving service delivery through a unified digital solution.

Objective 2. To integrate intelligent technologies including an AI-powered chatbot for automated client assistance and predictive analytics

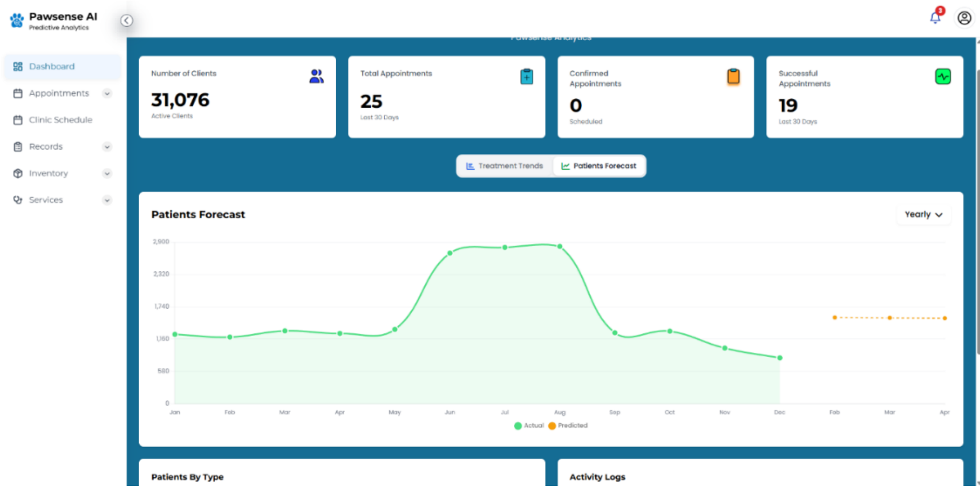
The integration of intelligent technologies in PawSense AI, specifically the AI-powered chatbot and the predictive analytics feature successfully met the intended objective. The AI-powered chatbot delivers automated client assistance by responding to common inquiries about Animal House Alabang clinic operations, including accommodated pet types, available services, and clinic policies. This capability reduces repetitive questions typically handled by staff and enables faster, more accessible support for clients. Meanwhile, the predictive analytics component generates one-year forecasts for both client volume and projected pet services/treatments by analyzing five years of filtered historical data, supporting optimized scheduling, staffing plans, and resource allocation. Overall, these intelligent features strengthen service readiness, streamline clinic workflows, and improve the overall client experience.

Figure 152. AI Chatbot



The AI-powered chatbot component of Pawsense AI reflects the literature that emphasizes accessibility, responsiveness, and user trust as critical advantages of conversational agents in healthcare-related contexts. The chatbot in the developed system is designed to provide instant assistance for clinic operations, particularly answering questions commonly asked by pet owners and clients regarding the Animal House Alabang clinic, such as accommodated pet types, available services, and clinic facts/policies. These findings mirror those of Huang and Chueh (2021), who identified convenience, constant accessibility, and ease of use as the primary drivers of chatbot preference. The interface and “quick questions” approach implemented in the chatbot support this expectation by making frequently requested information immediately available without requiring direct staff intervention.

Figure 153. Predictive Analytics



The predictive analytics feature is dependable because it is grounded in long-term historical records that support decision-making, service quality, and resource planning, as discussed by Vijay Sai et al. Its forecasting approach is reinforced by Iqbal et al. (2021), who emphasized that analyzing past appointment and service patterns strengthens scheduling and resource management in response to client demand. Time-series forecasting literature likewise indicates that reliable projections require enough historical observations to capture recurring seasonal patterns (e.g., at least 24 monthly data points for a 12-month cycle). Since PawSense AI uses five (5) years of filtered clinic data, it exceeds this requirement and produces a more stable basis for forecasting rather than relying on short-term fluctuations. Using this dataset, the system generates a 1-year forecast not only for expected client volume but also for projected service demand, estimating which pet services/treatments are most likely to occur throughout the year (such as high-frequency preventive services like vaccinations and parasite control). This enables the clinic to plan staffing schedules and prepare the necessary supplies and resources based on anticipated service workloads.

Objective 3. To implement secure, role-based access and data management protocols that ensure the privacy, integrity, and protection of sensitive client and pet information

Figure 154. Super Admin Dashboard

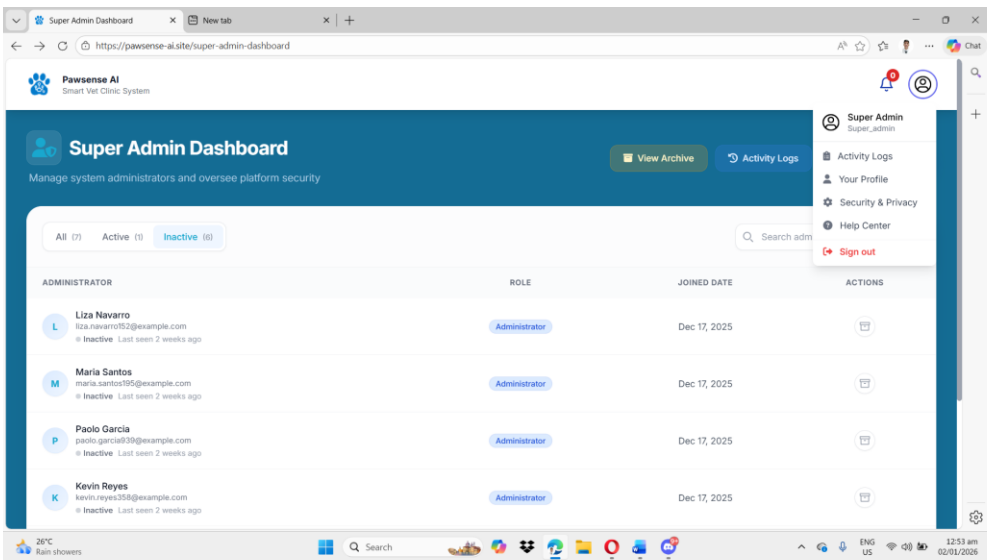
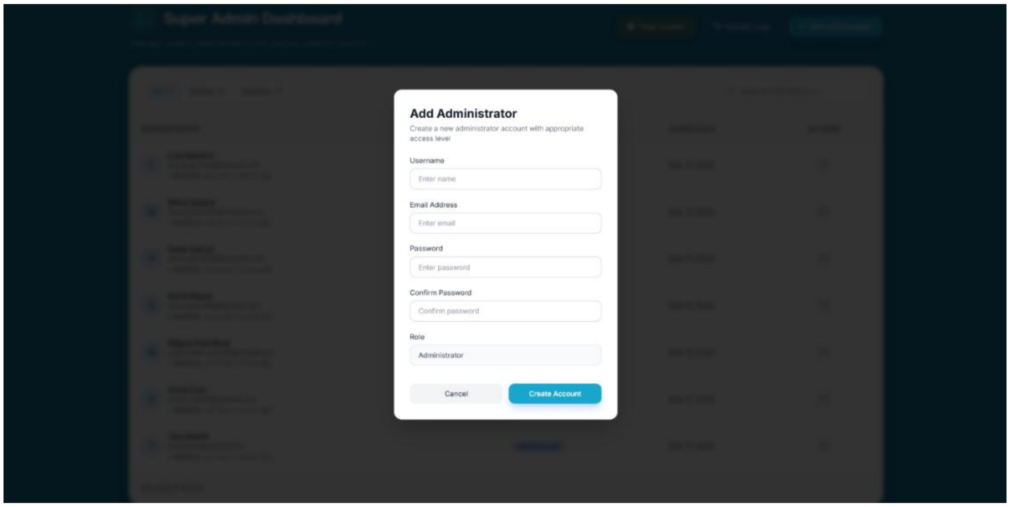
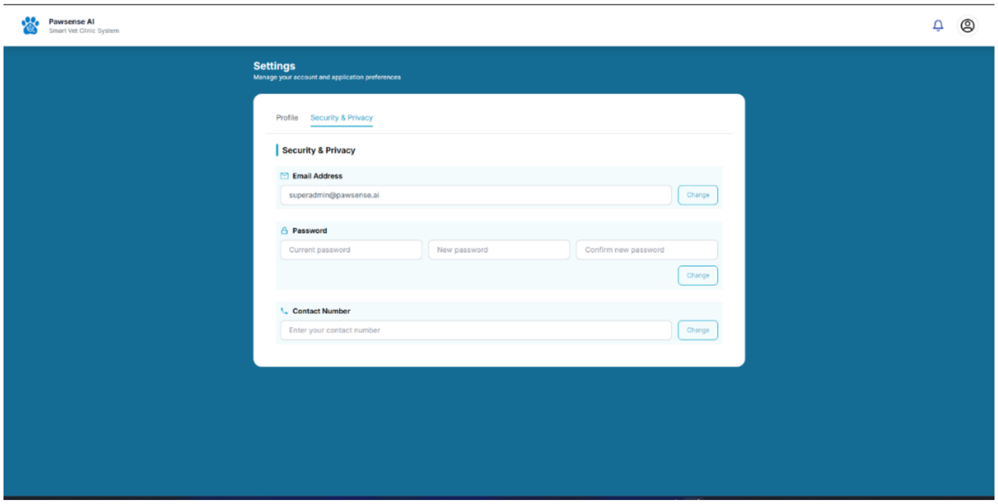


Figure 155. Add Administrator Module



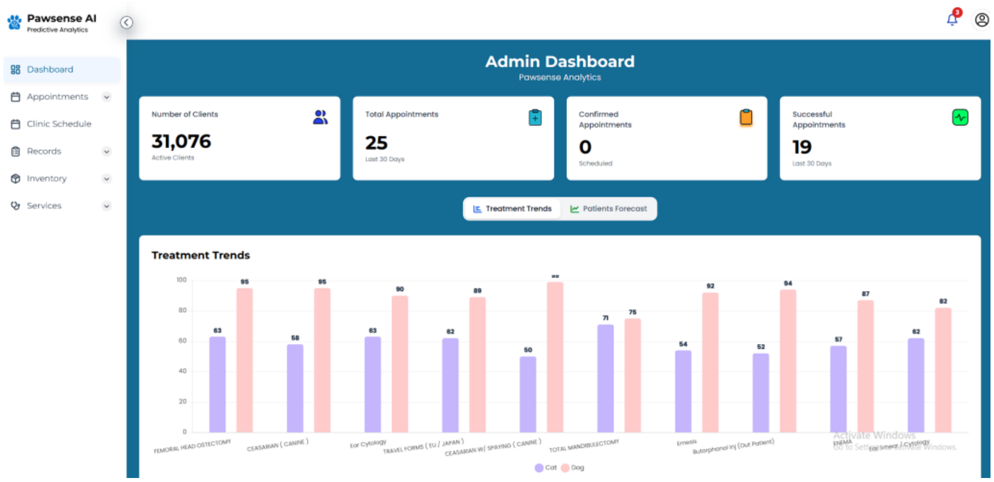
Objective 3 was achieved through the implementation of a secure, role-based administration layer in PawSense AI via the Super Admin Dashboard, which serves as the highest-privilege control point for governing user access and protecting sensitive client and pet records. In this module, only the Super Admin is authorized to provision and manage administrator accounts (e.g., adding and maintaining admin profiles), regulate account lifecycle actions such as archiving and deletion, and monitor administrative activities through built-in logging features, thereby strengthening accountability, preventing unauthorized privilege escalation, and supporting the confidentiality and integrity of stored clinical information. This implementation is aligned with the study's Chapter 2 discussion of security features, which highlights the importance of multi-factor authentication (MFA) and verification mechanisms such as one-time passwords (OTP) in safeguarding healthcare information systems; notably, Suleski et al. (2023) emphasized that MFA is critical in healthcare environments because it reduces the risk of unauthorized access arising from compromised credentials and common cyberattack vectors such as phishing and brute-force attempts.

Figure 156. Super Admin Settings Module



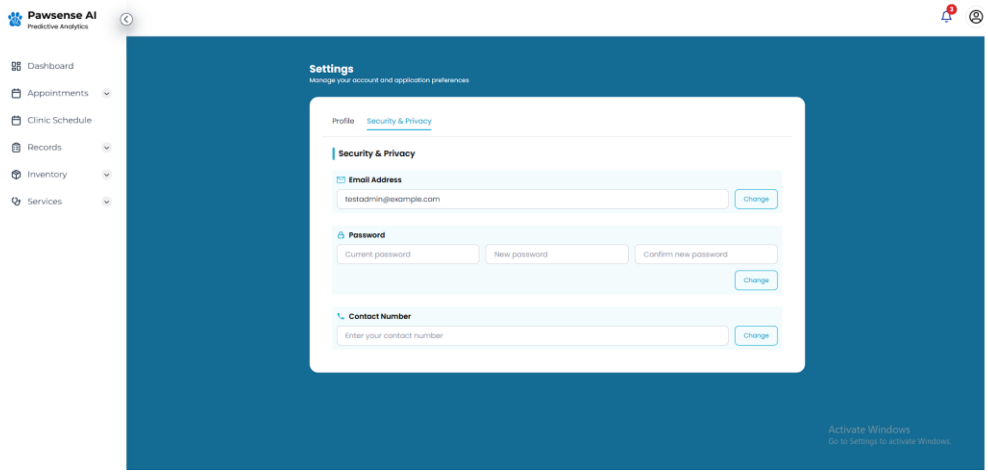
The Super Admin Settings module operationalizes Objective 3 by providing a dedicated Security & Privacy interface where only the highest-privilege user can manage critical account credentials and verification details, thereby strengthening confidentiality, integrity, and controlled access within PawSense AI. As reflected in the settings screen, the Super Admin can update the registered email address, change the password using a current-password validation workflow with confirmation fields, and maintain an official contact number, controls that help reduce unauthorized account takeover, prevent accidental or malicious credential changes, and ensure that sensitive client and pet information remains accessible only to properly authenticated and authorized personnel. This implementation is consistent with the study's Chapter 2 discussion emphasizing strengthened authentication and account security measures (e.g., layered verification and secure credential management) as essential protections for healthcare-related information systems; supporting this, Suleski et al. (2023) highlights that enforcing stronger authentication practices, such as multi-factor approaches, significantly reduces risks from compromised credentials and common attack vectors in healthcare environments.

Figure 157. Admin Dashboard



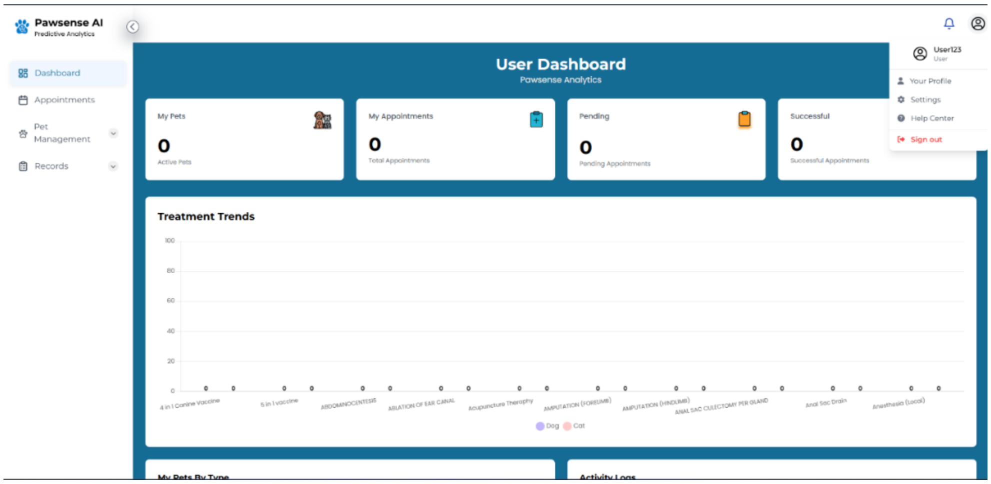
The PawSense AI Admin Dashboard was implemented as part of Objective 3 by providing a role-restricted, administrator-only workspace that centralizes clinic operations while preserving the privacy and integrity of sensitive client and pet information through controlled access. In this interface, administrators can monitor high-level indicators (e.g., active clients, appointment counts and status) and view aggregated visual summaries such as treatment trends, enabling operational oversight without unnecessarily exposing confidential medical details, while detailed electronic records (patient histories, immunization records, and treatment protocols) remain accessible only to designated user roles in accordance with the system's access-control design. This implementation is supported by the related literature in Chapter 2, particularly Dela et al. (2023), which emphasized that effective records tracking and management systems should incorporate identity authentication and end-to-end monitoring to strengthen secure information handling and reduce risks to data integrity.

Figure 158. Admin Settings Module



The Admin Settings module of PawSense AI directly supports Objective 3 by providing a dedicated Security & Privacy interface where authorized administrators can manage critical account credentials—specifically updating the registered email address, contact number, and password through controlled “Change” actions—thereby strengthening account protection and reducing the likelihood of unauthorized access to sensitive client and pet information. This implementation is supported by the related literature in Chapter 2: Dela et al. (2023) emphasized that effective records and information systems should incorporate identity authentication and end-to-end monitoring to ensure secure handling and traceability of sensitive data, while Suleski et al. (2023) highlighted the importance of stronger authentication measures in healthcare environments to mitigate risks from compromised credentials and common cyber threats such as phishing and brute-force attempts.

Figure 159. User Dashboard



The PawSense AI User Dashboard supports Objective 3 by enforcing role-based access for pet owners, ensuring that users can view only their own summarized information (e.g., registered pets and appointment counts/status) while restricting access to detailed clinical records and administrative functions, thereby minimizing unnecessary exposure of sensitive client and pet data and upholding confidentiality and integrity through controlled visibility. This implementation is supported by a study discussed in Chapter 2: Gesmundo et al. (2022) emphasized that effective record management practices must include document protection and monitoring methods to strengthen secure handling of information and improve service efficiency—principles reflected in PawSense AI's user-level access limitations and privacy-preserving dashboard design.

Objective 4. To evaluate the developed system based on ISO 25010 software quality characteristics, specifically functionality, usability, reliability, and security.

Figure 160. Booking appointments through the system is easy.

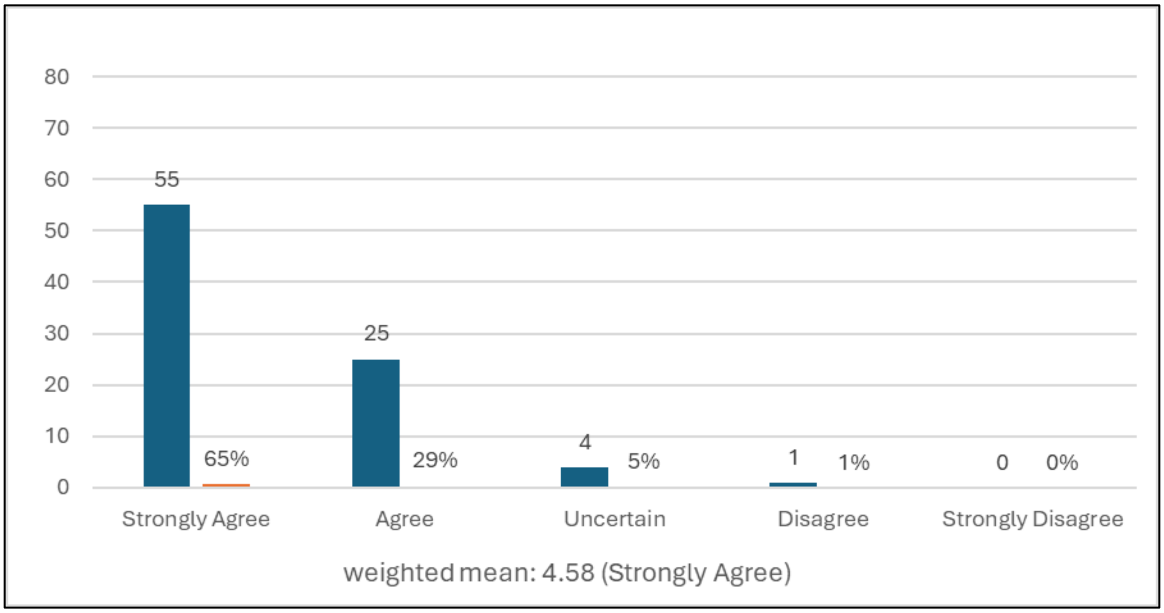


Figure 160 presents the responses for the statement, “Booking appointments through the system is easy.” Most participants rated the feature positively, with 65% (55) selecting Strongly Agree and 29% (25) selecting Agree. Only 5% (4) were Uncertain, and 1% (1) Disagreed, producing a weighted mean of 4.58 (Strongly Agree), which indicates that users can book appointments quickly and with minimal difficulty.

This finding aligns with Yusof and Fauzi (2023), who reported that a web-based veterinary clinic management system improved scheduling efficiency by enabling online appointment booking and reducing manual scheduling issues, which increased user satisfaction. It also supports Khalil and Serhier (2023), who emphasized that perceived ease of use is a key factor influencing acceptance and continued use of e-appointment systems, reinforcing the strong usability rating of the booking feature.

Figure 161. I can clearly view my pet's medical records and details.

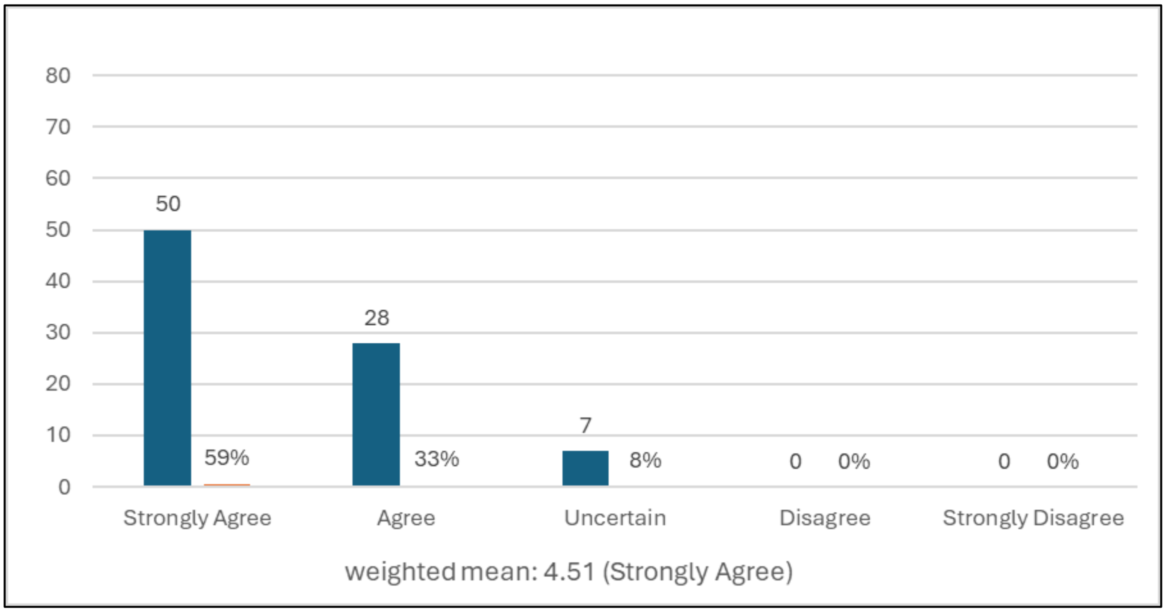


Figure 161 shows the responses for the statement, "I can clearly view my pet's medical records and details." Most respondents reported a positive experience, with 59% (50) selecting "Strongly Agree" and 33% (28) selecting "Agree." A small proportion of users, 8% (7), were uncertain, resulting in a weighted mean of 4.51 (strongly agree), which indicates that the system presents medical information in a clear, accessible, and user-friendly manner for record viewing.

This finding is supported by record management literature, which emphasizes that digitized record systems improve retrieval speed, reduce errors, and enhance service efficiency through organized and readily available information. Uy et al. (2023) reported that implementing a digital record management system reduced human errors and improved response time by making records easier to retrieve, which aligns with users' strong agreement that medical records and details are clearly viewable in the system.

Figure 162. Online notifications and reminders work properly

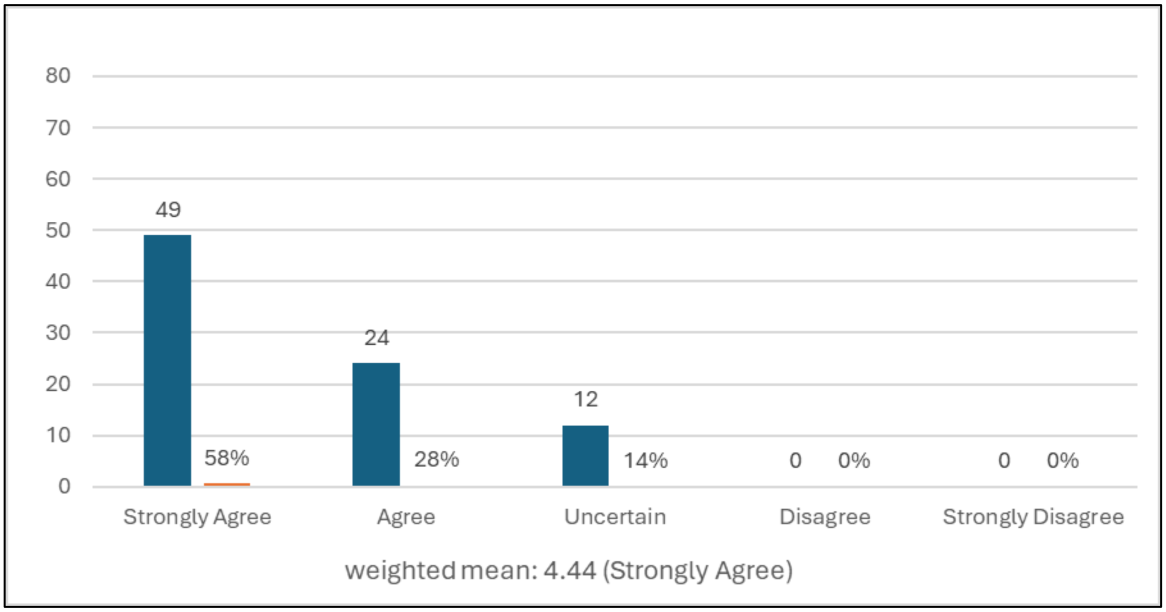


Figure 162 shows the responses for the statement, "Online notifications and reminders work properly." The results indicate a strong agreement, with 58% (49) of respondents selecting Strongly Agree and 28% (24) selecting Agree, while 14% (12) were Uncertain. The computed weighted mean of 4.44 (Strongly Agree) suggests that the system's notification feature consistently delivers timely reminders and updates, supporting smoother client communication and reducing missed appointments or overlooked clinic instructions.

This finding is supported by studies emphasizing that automated notifications strengthen service coordination by providing real-time confirmations and reminders. Sari et al. (2023) reported that combining in-app and SMS notifications for appointment confirmations and service updates reduced user uncertainty and improved client preparedness, indicating that notifications are essential for reliable scheduling support. Correspondingly, Mahzir and Ilyas (2020) highlighted that push-notification reminders for visits and medications improve compliance and ensure timely actions, reinforcing the observed reliability of the system's notification and reminder function.

Figure 163. Online payments process smoothly and accurately.

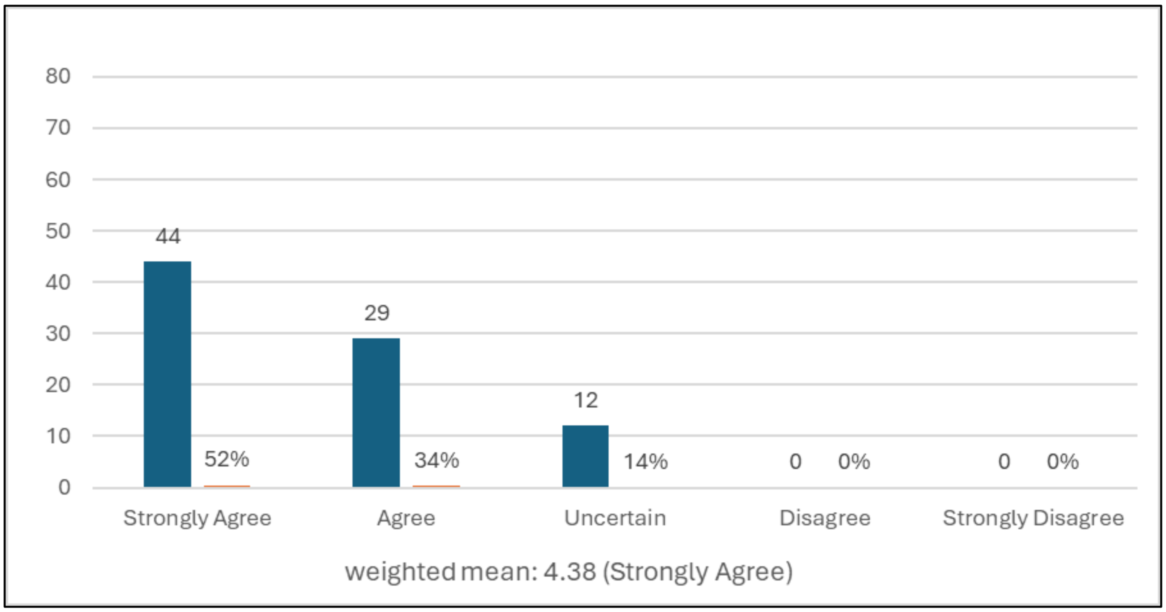


Figure 163 shows the responses for the statement, "Online payments process smoothly and accurately." The results reflect strong approval, with 52% (44) of respondents selecting Strongly Agree and 34% (29) selecting Agree, while 14% (12) were Uncertain. The weighted mean of 4.38 (Strongly Agree) indicates that users experienced reliable and seamless payment transactions, supporting accurate billing and convenient settlement of clinic fees through the system.

This finding is consistent with supporting research bases noting that e-payment systems improve efficiency and user satisfaction when transactions are fast, accessible, and importantly it is dependable. Kurniawan et al. (2024) emphasized that transaction speed, ease of access, and security are key factors that drive positive user acceptance of e-payments, which aligns with the high agreement that the payment process is smooth and accurate. According to Pueblos and Jr. (2023), in the Philippine context, "e-payment platforms boost operational efficiency; integrating these digital payments into the service workflow directly enhances both the transaction process and the overall client experience."

Figure 164. The AI chatbot in the system provides helpful and responsive assistance when I book appointments or encounter issues.

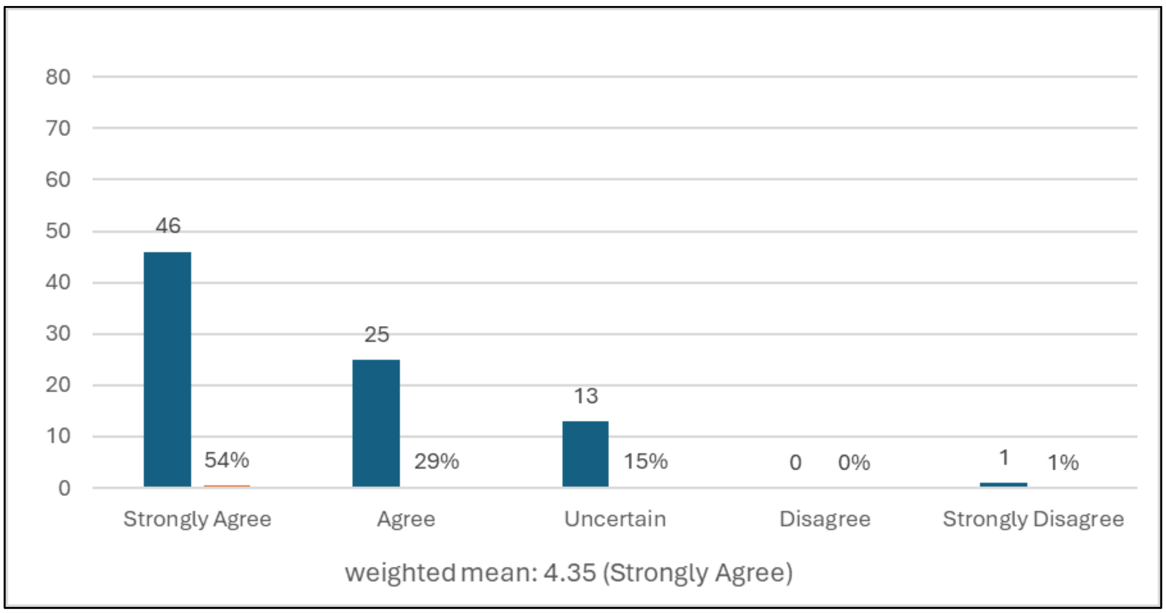


Figure 164 shows the responses for the statement, “The AI chatbot in the system provides helpful and responsive assistance when I book appointments or encounter issues.” The results indicate positive user feedback, with 54% (46) selecting Strongly Agree and 29% (25) selecting Agree. A moderate portion of respondents were 15% (13) Uncertain, while only 1% (1) selected Strongly Disagree, producing a weighted mean of 4.35 (Strongly

Agree). Overall, this response suggests that the chatbot effectively supports users during booking and problem resolution by providing timely and useful guidance.

This outcome aligns with literature emphasizing that AI chatbots enhance user experience when they provide accessible, accurate, and responsive support. Huang and Chueh (2021) reported that pet owners value chatbots that are convenient, always available, and easy to use, as these characteristics strengthen satisfaction and trust in veterinary digital services. Correspondingly, Tsai et al. (2023) demonstrated that a user-centered, expert-informed chatbot improved reliability and accessibility of assisting, and supporting the result that the system's chatbot can serve as an effective support tool when users need help during appointments or when issues arise.

Figure 165. The system is easy to use, even on a mobile device.

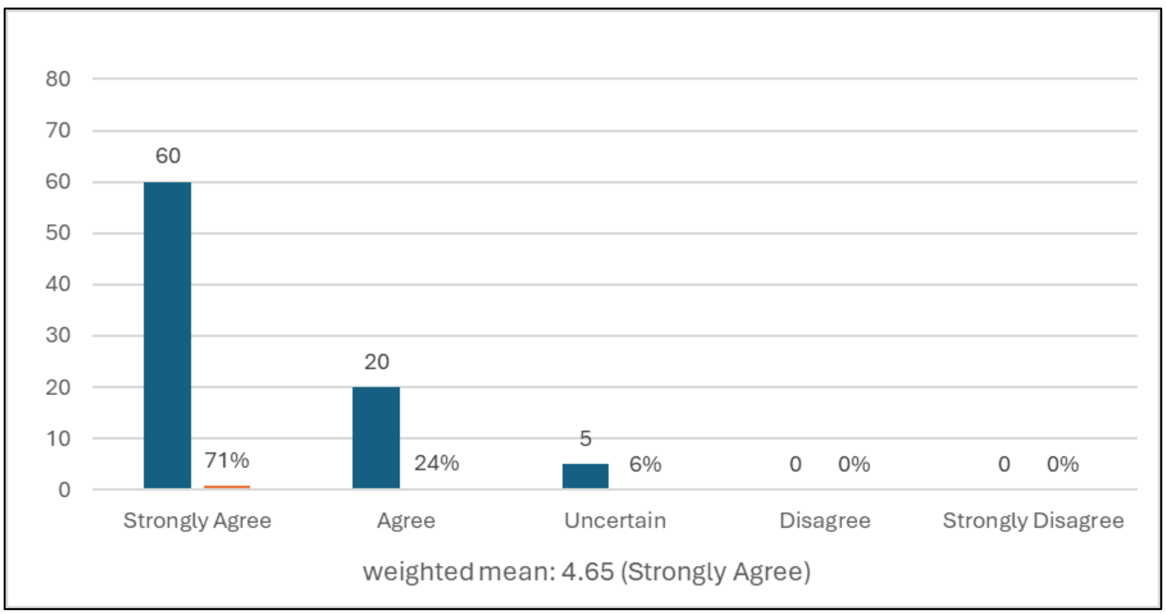


Figure 165 shows that 71% of the respondents strongly agree, 24% agree, and 6% are uncertain that the system is easy to use even on a mobile device. With a weighted mean of 4.65, interpreted as "Strongly Agree," the findings indicate that most users perceived the interface as intuitive and manageable on smaller screens, suggesting that core features can be accessed and navigated with minimal difficulty. The small proportion of uncertainty may reflect differences in device type, screen size, or internet stability, which can influence mobile interaction and may warrant minor interface refinements to further improve consistency of the user experience.

Supporting evidence is provided by Lu (2022), who developed a pet care system using Bootstrap and later expanded it into an Android application, highlighting how responsive design frameworks and mobile-oriented implementations help improve accessibility and ease of use for users across devices. This reinforces the present result by indicating that systems built with responsive, mobile-compatible technologies are more likely to be perceived as convenient and user-friendly when accessed through smartphones or other handheld devices.

Figure 166. I can navigate without needing help from staff.

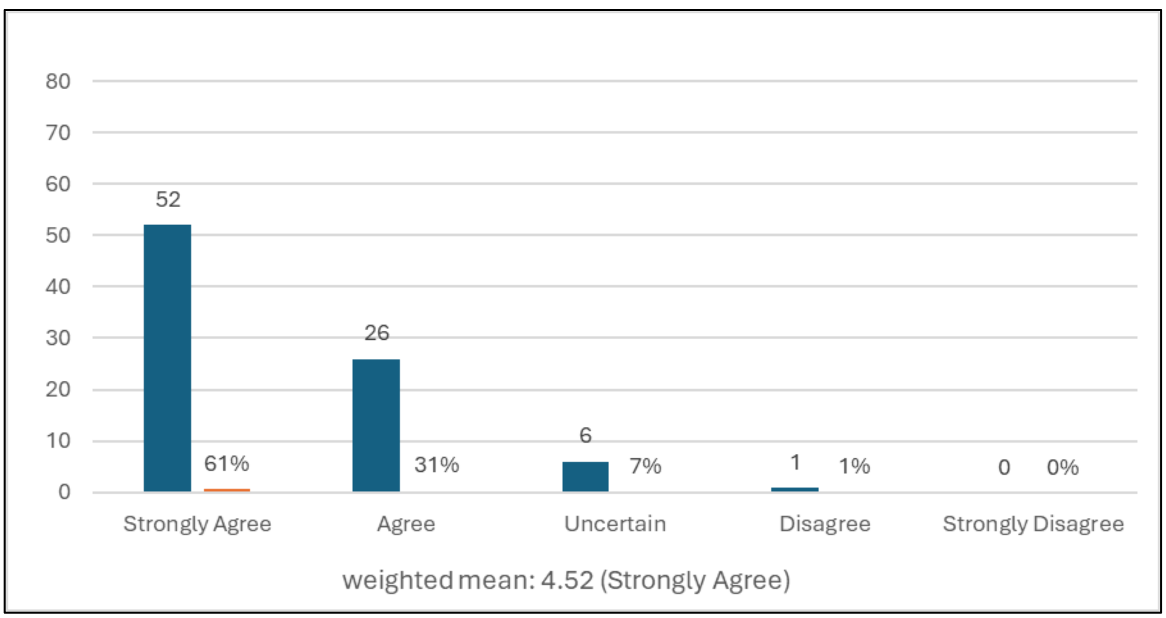
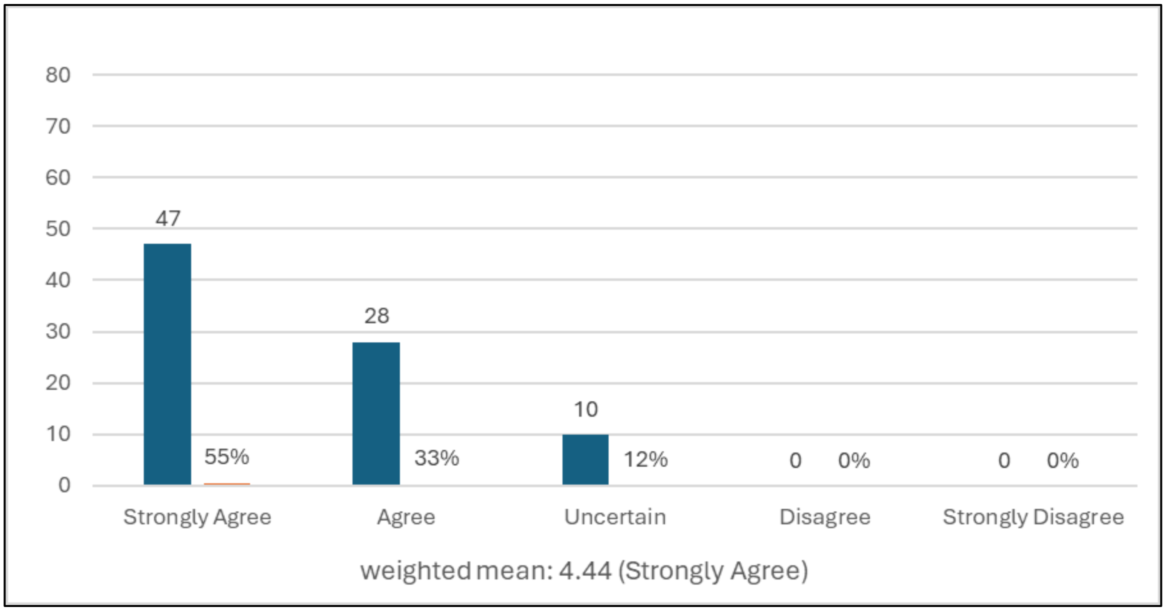


Figure 166 indicates that 61% of the respondents strongly agree, 31% agree, and 7% are uncertain that they can navigate the system without needing help from staff, while 1% expressed disagreement. With a weighted mean of 4.52, interpreted as “Strongly Agree,” the results suggest that the system’s navigation is largely intuitive and user-friendly, enabling most users to move through pages and complete tasks independently. The small proportion of uncertainty and minimal disagreement may reflect individual differences in digital familiarity or brief adjustment needs, implying that minor guidance features (e.g., tooltips or onboarding prompts) could further enhance confidence for all users.

A supporting study by Dela et al. (2023) reinforces this outcome by reporting that a developed records tracking management system achieved strong usability results, emphasizing that clear interface structure and well-organized controls reduce reliance on staff assistance and improve independent task completion. Their findings highlight that when navigation is designed around user needs and supported by systematic feedback during use, users are more capable of operating the system with minimal training—consistent with the high agreement levels observed in this evaluation regarding independent navigation.

Figure 167. Viewing records and booking appointments is simple.



As shown in Figure 167, 55% of the respondents strongly agree, 33% agree, and 12% are uncertain that viewing records and booking appointments is simple. With a weighted mean of 4.44, interpreted as “Strongly Agree,” the results indicate that most users found the system’s core functions easy to perform, suggesting that the interface and workflow were sufficiently clear for accessing pet information and completing appointment requests with minimal effort. The proportion of uncertainty may reflect users who are still adjusting to the process or who experienced minor difficulties due to device limitations or connectivity, indicating opportunities for small usability enhancements such as clearer step-by-step prompts or confirmation feedback.

A study by Yusof and Fauzi (2023) aligns with this finding by reporting that a web-based veterinary clinic management system that integrates online appointment scheduling improves service delivery and client satisfaction by streamlining the booking process and making clinic transactions more convenient for users. Their results emphasize that digital appointment modules, when designed with straightforward workflows, reduce effort and confusion for clients—consistent with the strong agreement observed in this evaluation regarding the simplicity of record viewing and appointment booking.

Figure 168. Buttons, labels, and instructions are easy to understand.

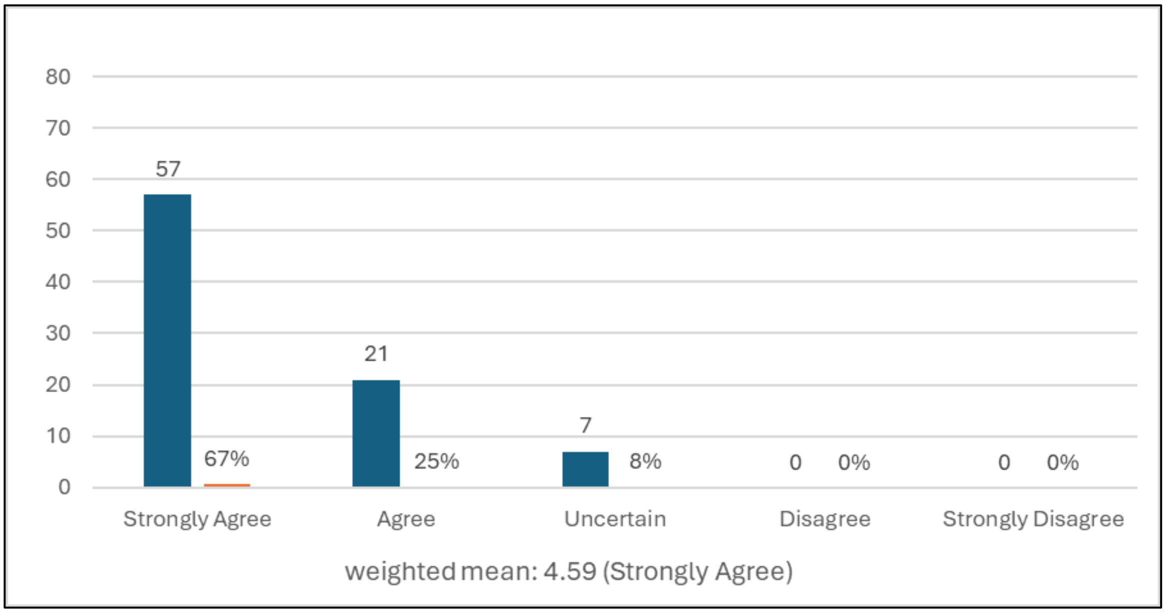
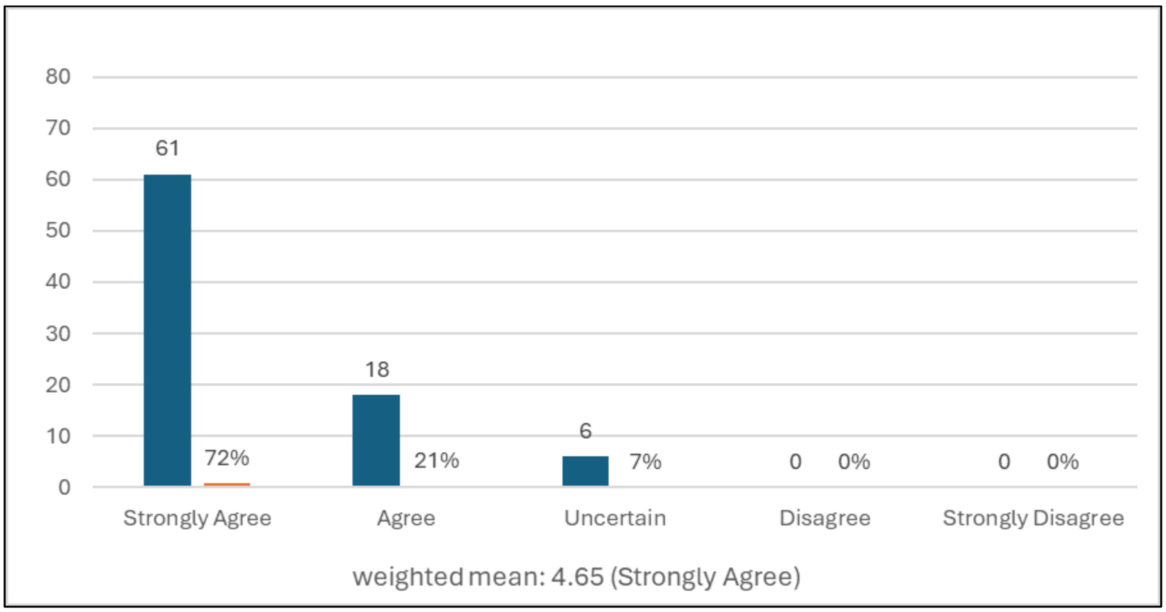


Figure 168 shows that 67% of the respondents strongly agree, 25% agree, and 8% are uncertain that the system's buttons, labels, and instructions are easy to understand. With a weighted mean of 4.59, interpreted as "Strongly Agree," the results indicate that the interface elements are generally clear and self-explanatory, enabling users to follow on-screen guidance and recognize functions with minimal confusion. The small percentage of uncertainty may suggest that a few users encountered terms or icons that required brief familiarization, indicating that minor refinements—such as clearer microcopy or additional tooltips—could further strengthen overall clarity for all user groups.

A supporting study by Ganiron (2023) reported that a computer-based patient record system improved usability because it enabled administrators to access and manage patient data more efficiently, highlighting that well-structured interfaces with clear controls contribute to easier system interaction and reduced user difficulty. The study underscores that when system components are designed with understandable labels and straightforward instructions, users can navigate processes more effectively and complete tasks with greater confidence—consistent with the high agreement levels observed in this evaluation regarding the clarity of PawSense AI's interface elements.

Figure 169. Pages load and display information clearly.



As shown in Figure 169, 72% of the respondents strongly agree, 21% agree, and 7% are uncertain that page's load and display information clearly. With a weighted mean of 4.65, interpreted as “Strongly Agree,” the results indicate that users generally experienced smooth page rendering and clear presentation of content, suggesting that the interface supports easy reading and understanding of displayed records, schedules, and appointment-related details. The small level of uncertainty may be linked to occasional loading delays influenced by device capability or internet conditions, implying that continued optimization for performance consistency could further enhance user experience.

A supporting study by Yeow and Kamaludin (2023) reported that users were satisfied with a pet care management system due to its efficient performance and straightforward operation, underscoring that clarity of displayed information and responsive page behavior are key contributors to perceived usability. Their findings emphasize that when a system consistently loads content in an organized and readable manner, users develop stronger confidence in navigating and interpreting the system's outputs—consistent with the high agreement levels observed in this evaluation regarding clear page loading and information display.

Figure 170. The system is available whenever I try to access it.

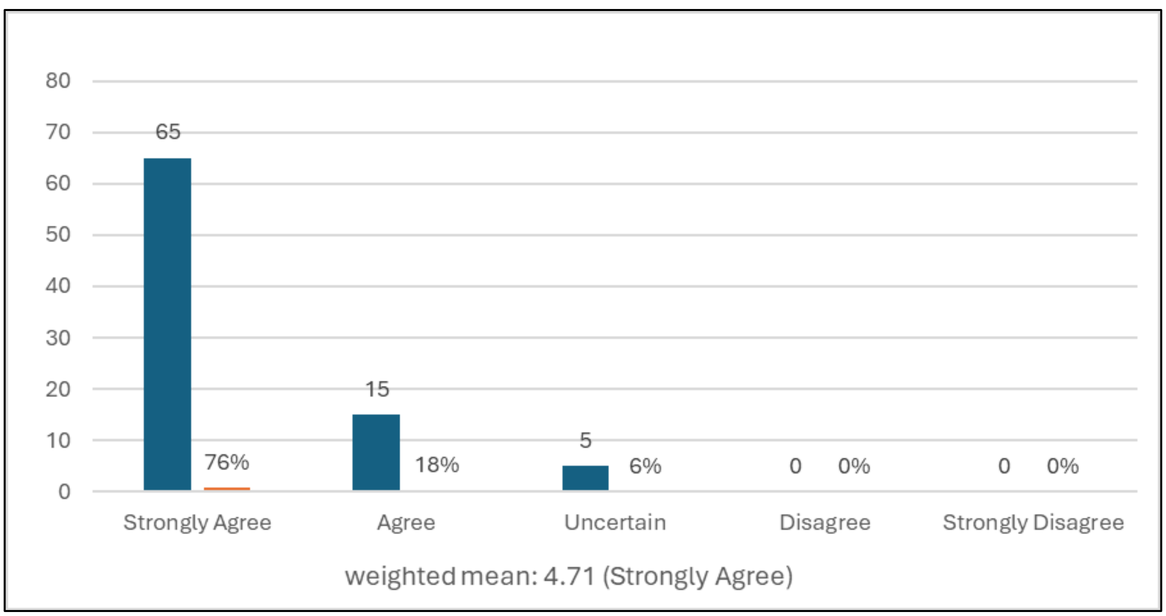
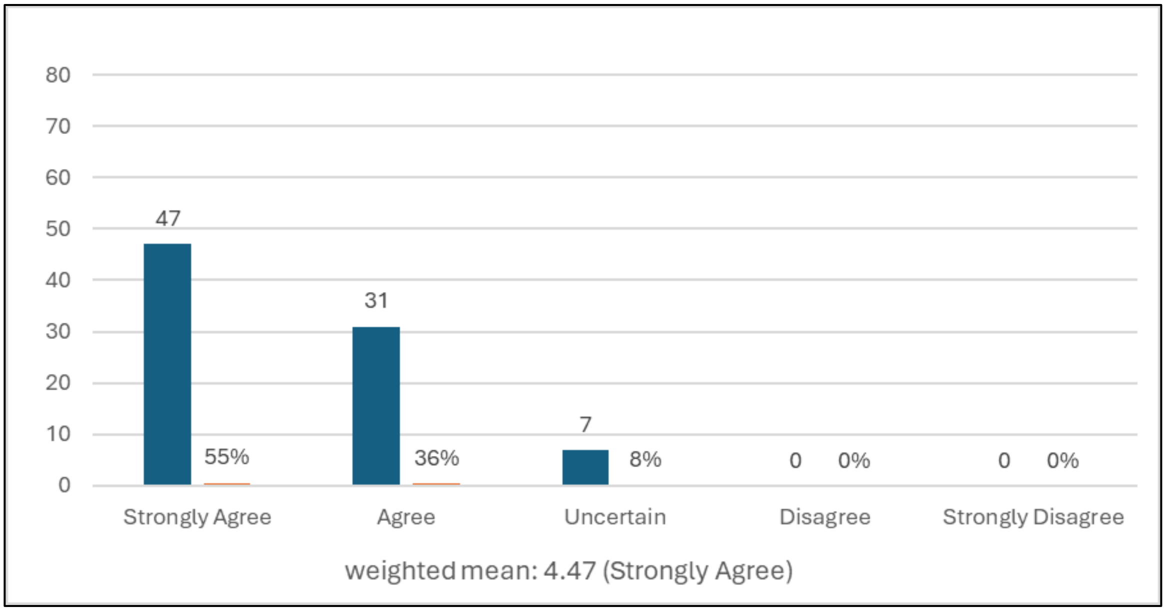


Figure 170 shows that 76% of the respondents strongly agree, 18% agree, and 6% are uncertain that the system is available whenever they try to access it. With a weighted mean of 4.71, interpreted as “Strongly Agree,” the results indicate that the system demonstrates a high level of availability and operational stability from the users’ perspective, suggesting that access to key functions and information can be consistently maintained during regular use. The small percentage of uncertainty may reflect occasional access delays or connectivity-dependent experiences, but overall feedback indicates that system availability is reliably sustained.

A supporting study by Dela et al. (2023) reinforces this finding, emphasizing that well-designed information and record-management systems achieve stronger reliability when they incorporate structured monitoring and controlled processes that support consistent access and dependable operation. Their work reported favorable reliability outcomes for a records tracking management system, underscoring that continuous monitoring and systematic implementation practices contribute to system dependability and sustained availability, consistent with the high agreement levels observed in this evaluation.

Figure 171. I do not experience errors when booking appointments.



As presented in Figure 171, the reliability item "I do not experience errors when booking appointments" indicates a highly favorable assessment, with 55% of respondents strongly agreeing, 36% agreeing, and 8% remaining uncertain. The item achieved a weighted mean of 4.47, interpreted as "Strongly Agree," suggesting that most users were able to complete appointment bookings smoothly and consistently, reflecting stable system behavior during a core transactional process. The small proportion of uncertainty may imply isolated instances of minor technical interruptions, user connectivity limitations, or occasional usability concerns that can be addressed through continued system refinement and monitoring.

Related empirical evidence supports this outcome. Uy et al. (2023) reported that implementing a digital record management system significantly reduced human errors and improved processing efficiency, indicating that shifting from manual workflows to structured electronic systems helps minimize operational inconsistencies that often cause user-facing errors. Similarly, Yusof and Fauzi (2023) found that a web-based veterinary clinic management system that enables online appointment scheduling improves service delivery and client satisfaction by streamlining the booking process, reinforcing the expectation that well-designed digital appointment modules can reduce booking-related issues and support reliable user transactions.

Figure 172. Notifications and updates arrive consistently.

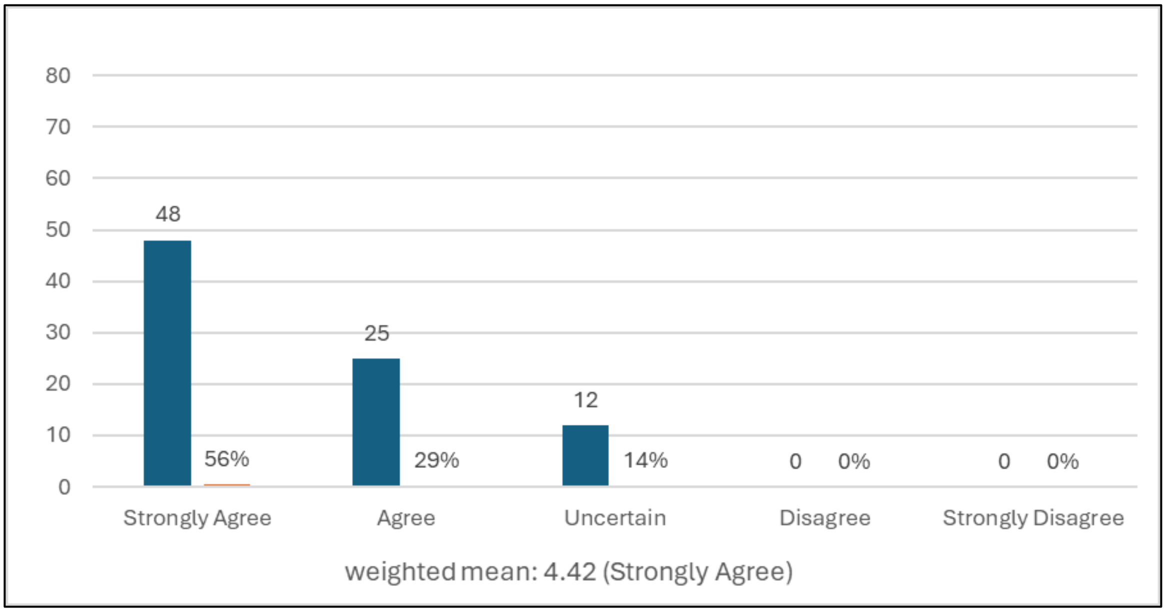
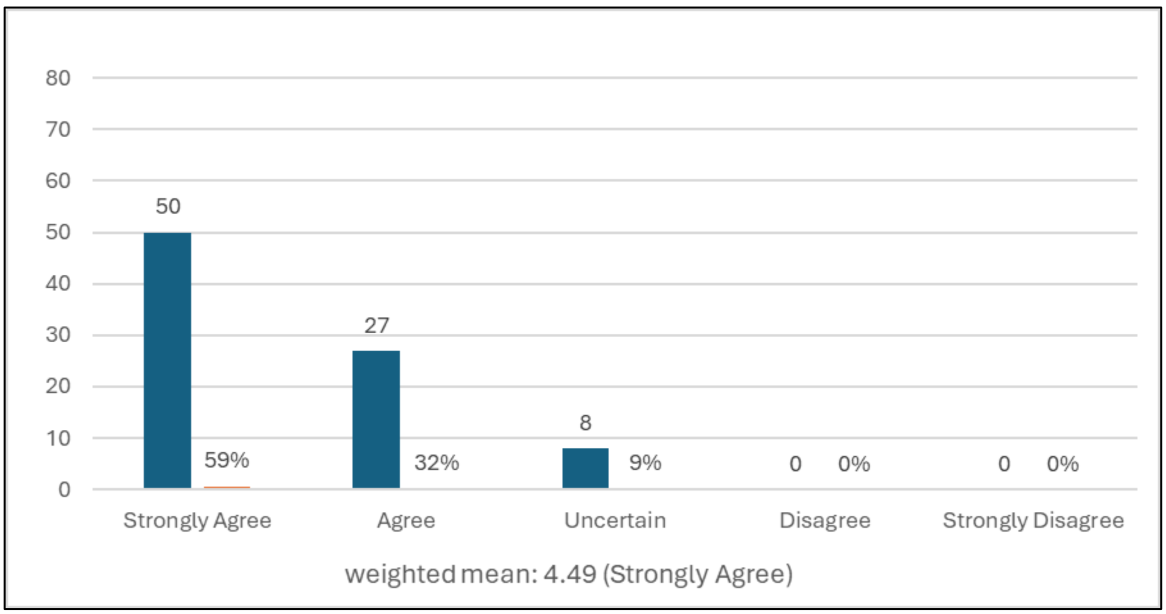


Figure 172 illustrates that 56% of the respondents strongly agree, 29% agree, and 14% are uncertain that notifications and updates arrive consistently. With a weighted mean of 4.42 interpreted as “Strongly Agree,” the results indicate that users generally perceive the notification feature as dependable for delivering timely reminders and system updates, which supports smoother coordination of appointments and clinic-related activities. The presence of uncertainty among a smaller portion of respondents suggests that a few users may have encountered occasional delays or inconsistencies, highlighting an area where further optimization of delivery timing and connectivity-dependent processes may strengthen overall reliability.

In supporting literature, Sari et al. (2023) reported that integrating in-app and SMS notifications for confirmations and service details improved client preparedness and reduced uncertainty prior to appointments, emphasizing the role of consistent notification delivery in maintaining reliable communication between clinics and clients. Similarly, Mahzir and Ilyas (2020) found that real-time push notifications for scheduled visits, medication, and vaccination alerts improved compliance and service outcomes, underscoring how consistent automated updates enhance user trust in digital veterinary systems.

Figure 173. My pet's records load without delays or missing data.



As shown in Figure 173, the reliability item "My pet's records load without delays or missing data" received a weighted mean of 4.49 (Strongly Agree), with 59% of respondents strongly agreeing, 32% agreeing, and 9% remaining uncertain. This distribution suggests that users generally experience timely and complete retrieval of pet records, indicating that the system can consistently display stored information without notable interruptions or omissions during regular use. The small proportion of uncertainty may reflect occasional connectivity limitations or isolated instances where users perceived slight delays, which can be addressed through continued performance optimization and monitoring to further strengthen confidence in record accessibility.

Evidence from Ganiron (2023) supports this finding by showing that a computer-based patient record system improved performance and usability by facilitating easy access to patient data for administrators, underscoring how well-implemented electronic record systems enhance dependable information retrieval and reduce operational friction. This aligns with the present result that consistent, fast-loading records contribute to perceived reliability, particularly in environments where timely access to accurate health information is essential for effective service delivery.

Figure 174. The system works smoothly every time I use it.

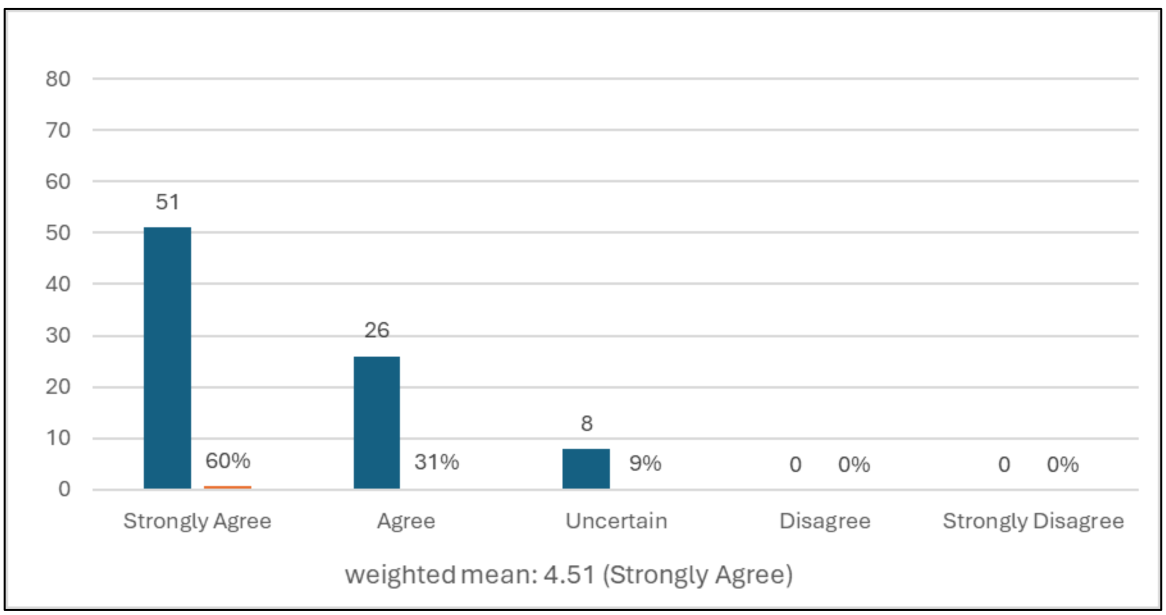
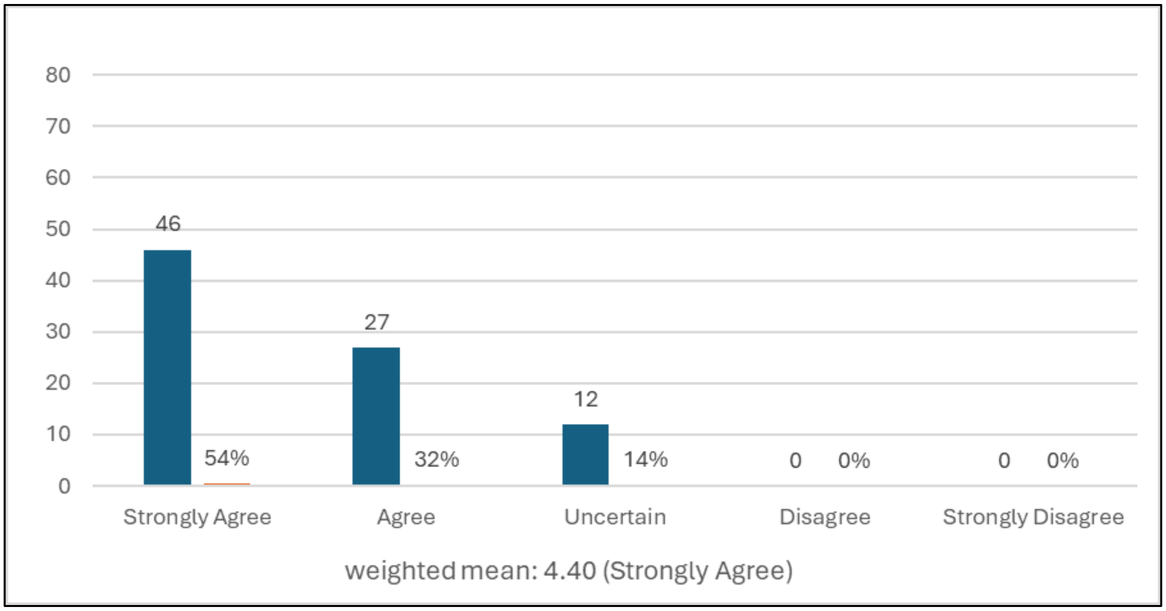


Figure 174 presents that 60% of the respondents strongly agree, 31% agree, and 9% are uncertain that the system works smoothly every time they use it. With a weighted mean of 4.51, interpreted as “Strongly Agree,” the findings indicate that most users consistently experience stable performance across repeated system use, suggesting minimal interruptions during routine tasks and transactions. The small portion of uncertainty may reflect occasional user-side factors (e.g., device performance or internet stability) or isolated instances that can be further addressed through continuous optimization and monitoring.

Supportive findings were reported by Yeow and Kamaludin (2023), where users expressed high satisfaction with a pet care management system due to its efficient performance and simple operations, alongside strengthened security components. Their results emphasize that when a veterinary-related digital platform is designed for smooth and efficient execution of tasks, user confidence and perceived reliability increase—consistent with the strong agreement observed in this evaluation regarding PawSense AI’s smooth system performance.

Figure 175. My personal data and pet's information feel safe in the system.

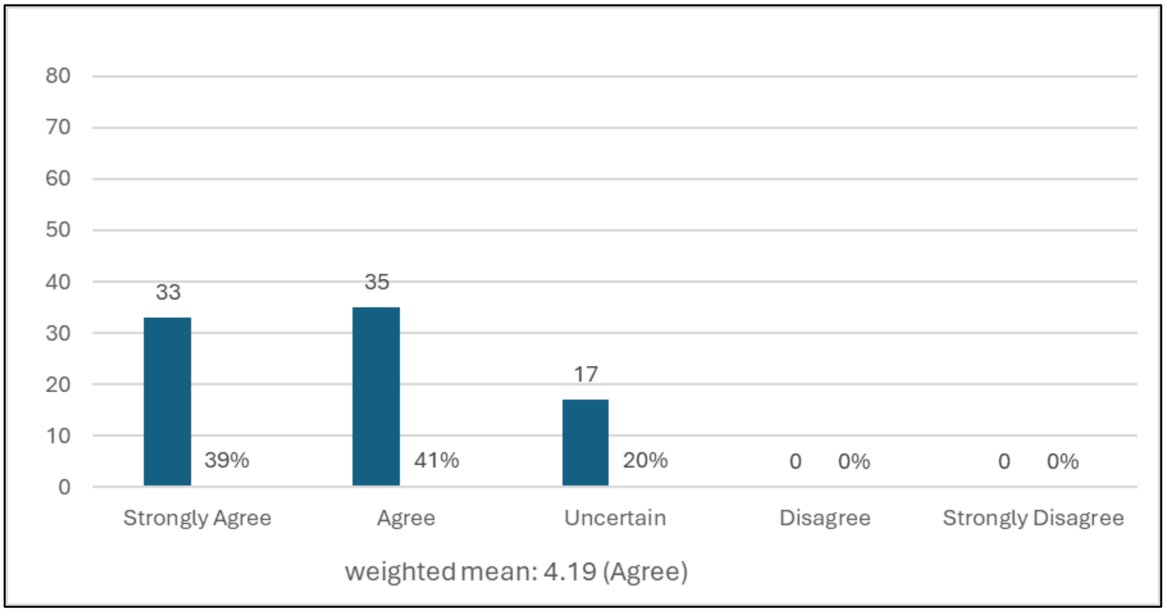


As shown in Figure 175, 54% of the 85 respondents strongly agree, 32% agree, and 14% are uncertain that their personal data and pet's information feel safe in the system. With a weighted mean of 4.40 interpreted as "Strongly Agree," the results indicate that most clients perceive PawSense AI as a secure platform for storing and accessing sensitive veterinary information. The presence of uncertainty among a smaller group may suggest varying user awareness of security features, limited familiarity with how data protection works, or caution arising from general concerns about online privacy—pointing to the value of continued security transparency and user guidance.

This strong sense of data safety aligns with security-focused literature emphasizing that enhanced authentication mechanisms strengthen protection for systems handling health-related records. Suleski et al. (2023) highlight that multi-factor authentication (MFA) reduces the risk of unauthorized access even when passwords are compromised, which supports higher user trust in secure platforms. At the same time, Jin et al. (2021) warn that

SMS-based verification can be vulnerable within interconnected account ecosystems, reinforcing the importance of stronger MFA methods and layered safeguards—an approach that supports the high agreement observed in PawSense AI regarding the safety of client and patient information.

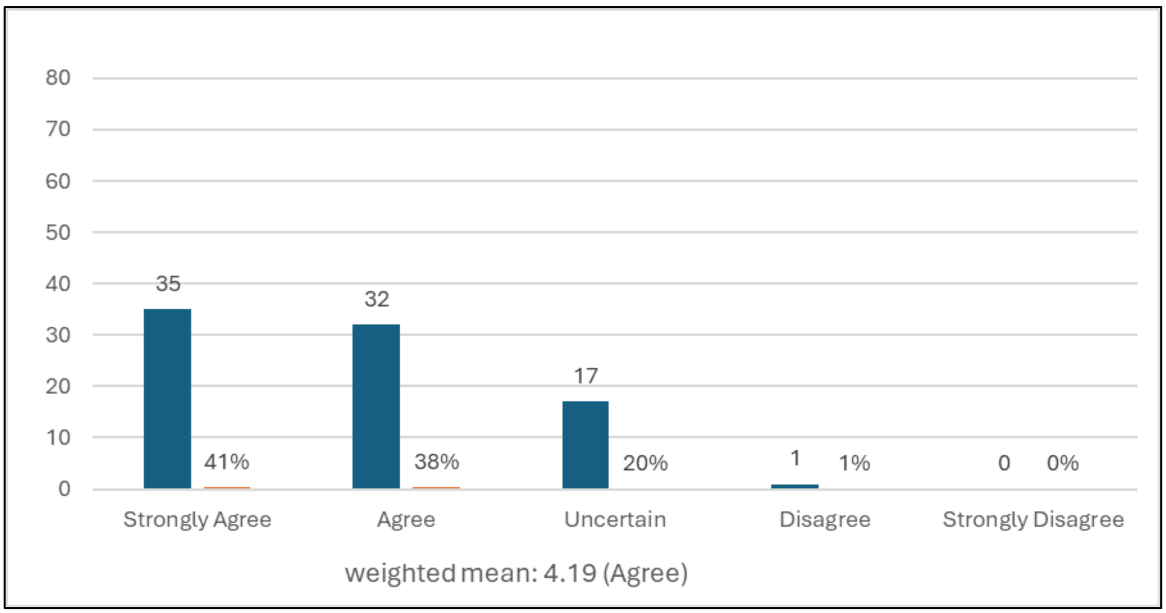
Figure 176. I trust the login process to protect my account.



As shown in Figure 176, 41% of the 85 respondents agree, 39% strongly agree, and 20% are uncertain that they trust the login process to protect their account. With a weighted mean of 4.19 interpreted as "Agree," the findings suggest that most clients view the system's login mechanism as a dependable layer of account protection. However, the relatively higher uncertainty compared to the previous item may imply that some users are not fully aware of the system's security controls (e.g., verification steps), or they may hold general caution toward online logins due to broader cybersecurity concerns.

This perception is supported by Suleski et al. (2023), who emphasized that stronger authentication measures such as multi-factor authentication (MFA) are essential in reducing unauthorized access risks, especially in health-related systems where sensitive records are stored. In addition, Jin et al. (2021) explained that relying on weaker authentication paths—particularly SMS-based verification in connected account ecosystems—can expose users to chained security breaches, reinforcing why robust login protection directly influences user trust. These findings align with the generally positive agreement observed in PawSense AI, while also justifying the need to continuously strengthen and clearly communicate login security features to further reduce user uncertainty.

Figure 177. Payment information is securely handled.

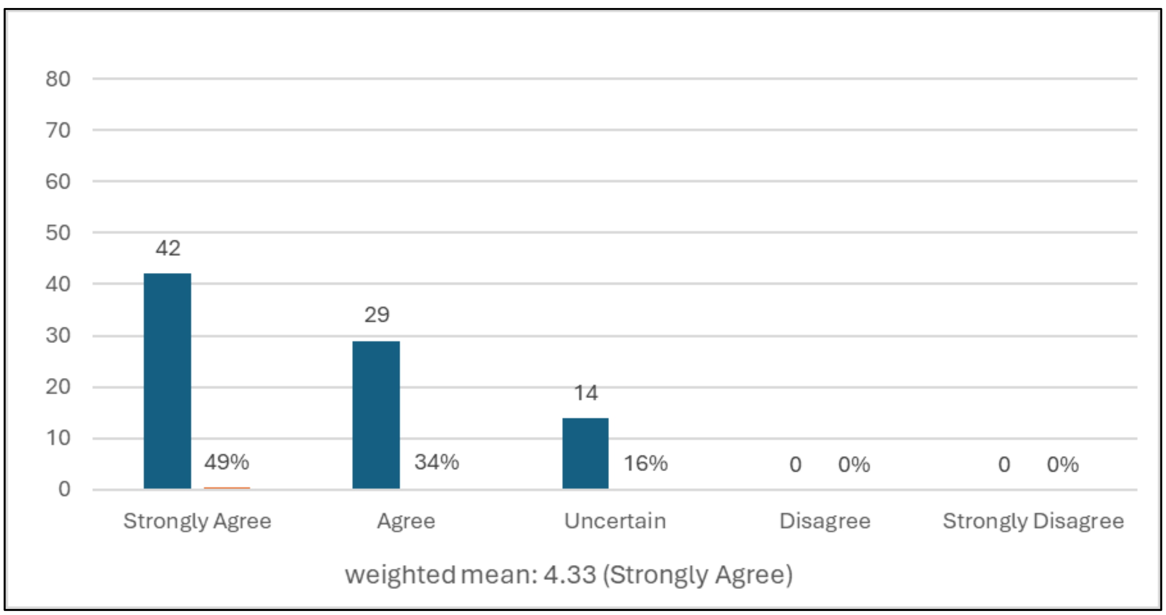


As shown in Figure 178, 41% of the 85 respondents strongly agree, 38% agree, 20% are uncertain, and 1% disagree that payment information is securely handled. With a weighted mean of 4.19 interpreted as "Agree," the results indicate that most clients have confidence that PawSense AI manages payment-related data with appropriate safeguards.

The small proportion of uncertainty and minimal disagreement may reflect user caution toward online transactions, especially when trust is influenced by perceived security, prior digital payment experiences, or concerns about potential technical issues during processing.

This result is consistent with literature emphasizing that user trust in digital payments is strongly tied to perceived security, transaction safety, and system reliability. Kurniawan et al. (2024) stressed that security and trust are major determinants in the adoption of e-payment systems, while Pueblos and Jr. (2023) noted that even when digital payments improve operational efficiency, technical issues such as system errors can reduce user confidence. These findings support the generally positive agreement observed in PawSense AI, while also reinforcing the importance of maintaining robust protections and ensuring smooth payment performance to further reduce uncertainty and strengthen user trust.

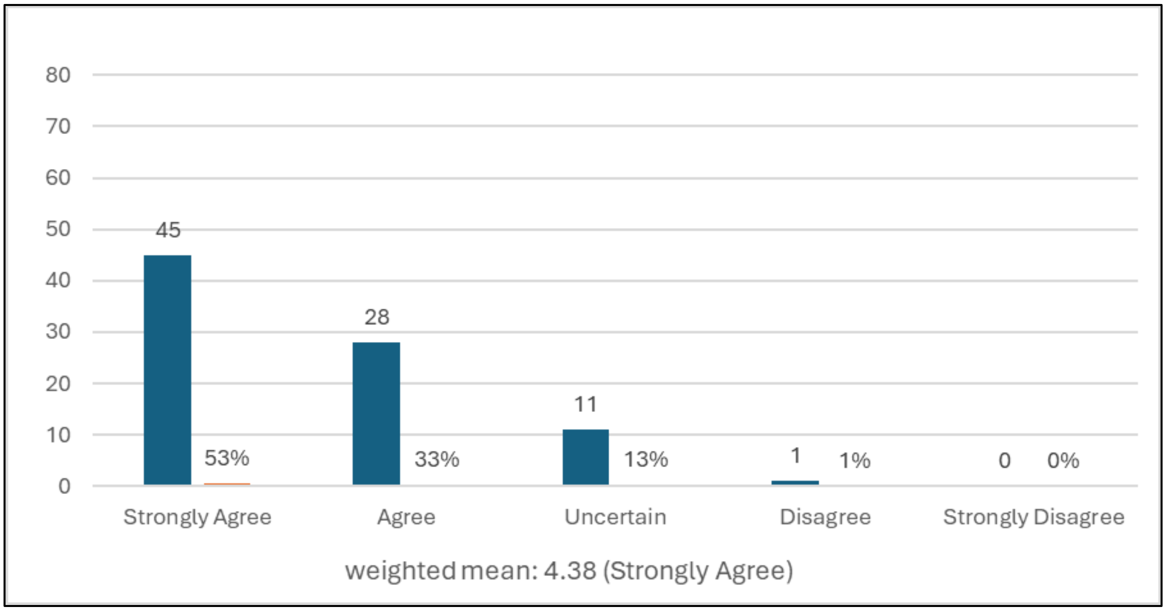
Figure 179. I feel confident that my contact details are protected.



As shown in Figure 179, 49% of the 85 respondents strongly agree, 34% agree, and 16% are uncertain that they feel confident their contact details are protected. With a weighted mean of 4.33 interpreted as “Strongly Agree,” the findings suggest that most clients perceive PawSense AI as effective in safeguarding personal contact information, which is essential for maintaining privacy in appointment coordination, reminders, and record-related communication. The remaining uncertainty may indicate that some users are generally cautious about sharing contact information online or may not fully recognize the security measures that protect stored personal data.

These results are supported by studies emphasizing that stronger authentication and security controls are crucial for protecting sensitive user information in healthcare-related platforms. Suleski et al. (2023) explained that multi-factor authentication (MFA) significantly reduces unauthorized access, which strengthens user confidence in systems handling personal data. In addition, Jin et al. (2021) demonstrated that weaker account recovery and interconnected services can expose personal identifiers (e.g., phone numbers and emails) during chained attacks, reinforcing the importance of robust protection mechanisms. This literature supports the strong agreement observed in PawSense AI, indicating that clients are more confident when digital platforms visibly prioritize privacy and layered security for personal contact details.

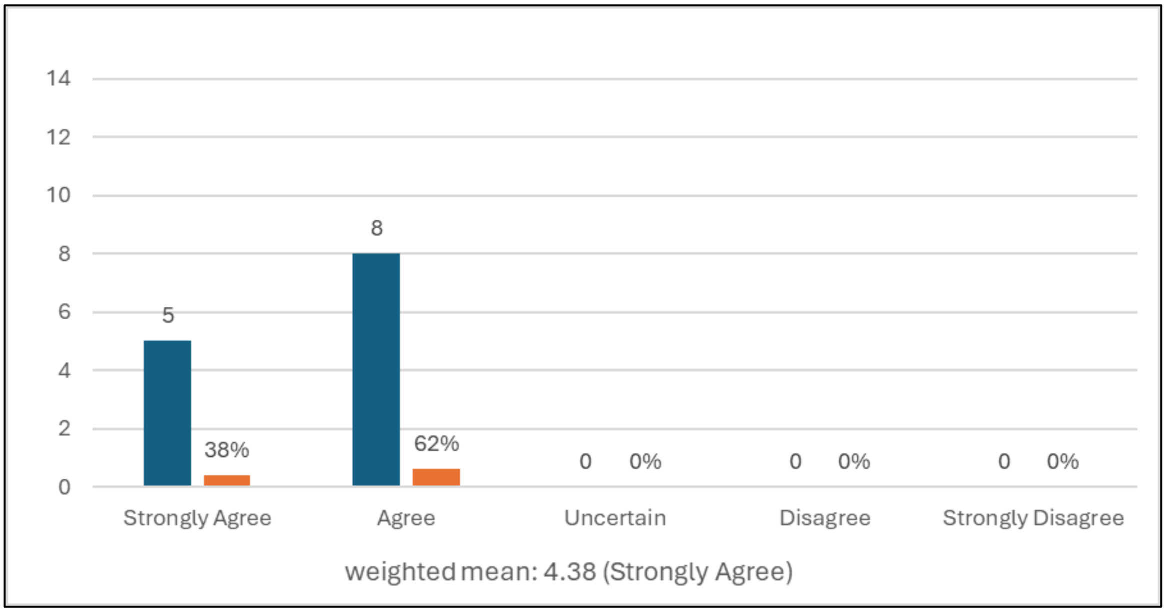
Figure 180. The system keeps my data private from unauthorized users.



As shown in Figure 180, 53% of the 85 respondents strongly agree, 33% agree, 13% are uncertain, and 1% disagree that the system keeps their data private from unauthorized users. With a weighted mean of 4.38 interpreted as “Strongly Agree,” the findings indicate that most clients perceive PawSense AI as capable of preventing unauthorized access to sensitive personal and pet-related information. The small uncertainty and minimal disagreement may reflect general user caution toward online systems or differing expectations about what “privacy” entails, which can be further addressed through clearer visibility of access controls and continuous security strengthening.

This result is strongly supported by Suleski et al. (2023), who emphasized that multi-factor authentication (MFA) is highly effective in reducing unauthorized access attempts, particularly in healthcare environments where confidential records must be protected from cyber threats. In addition, Jin et al. (2021) demonstrated that interconnected account systems can enable “chain reaction” compromises when weaker entry points exist, especially when services rely heavily on SMS-based mechanisms. Their findings reinforce the importance of layered defenses beyond passwords alone, supporting why respondents largely expressed strong agreement that PawSense AI safeguards user data from unauthorized users through reinforced authentication and privacy-focused security design.

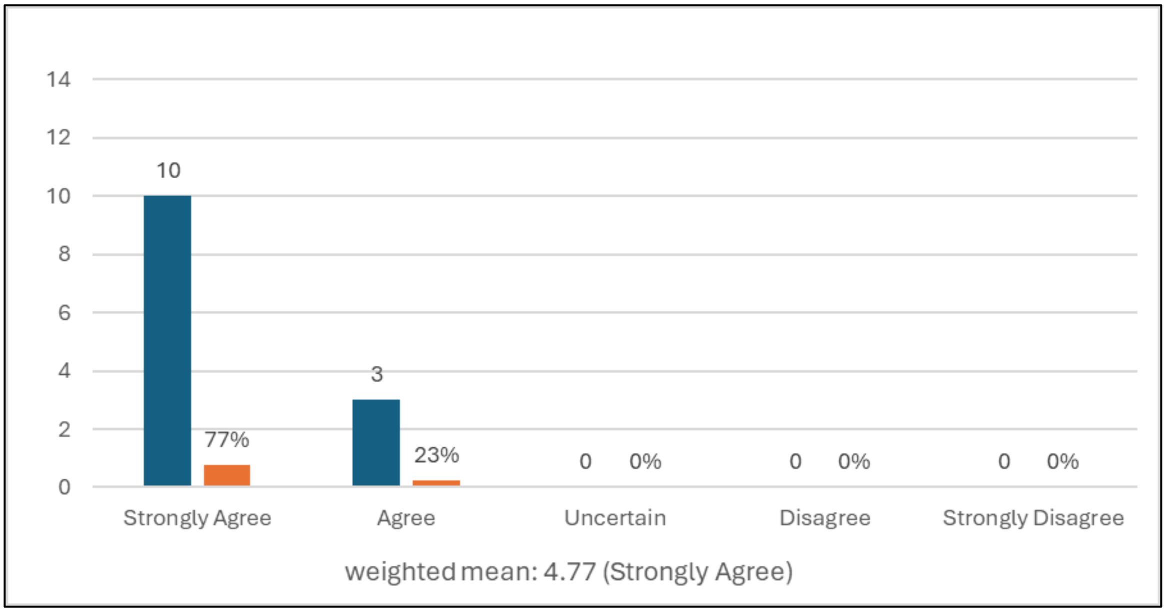
Figure 181. The system allows me to access and update pet medical records efficiently.



As shown in Figure 181, 62% (8) of the respondents *agree* and 38% (5) *strongly agree* that the system enables efficient access and updating of pet medical records. With a weighted mean of 4.38, interpreted as “Strongly Agree,” the findings indicate that users can retrieve and maintain records with minimal delays, supporting timely documentation and smoother clinic transactions.

This result is consistent with record management studies emphasizing that digital systems strengthen efficiency by improving retrieval speed and reducing errors in handling patient information. Uy et al. (2023) reported that a digital record management system reduced human errors and improved response time by making records easier to retrieve and use for administrative decision-making. Similarly, Nuhu et al. (2024) highlighted that integrating information systems into record management improves operational efficiency and data integrity, reinforcing the observed efficiency in accessing and updating pet medical records through the system.

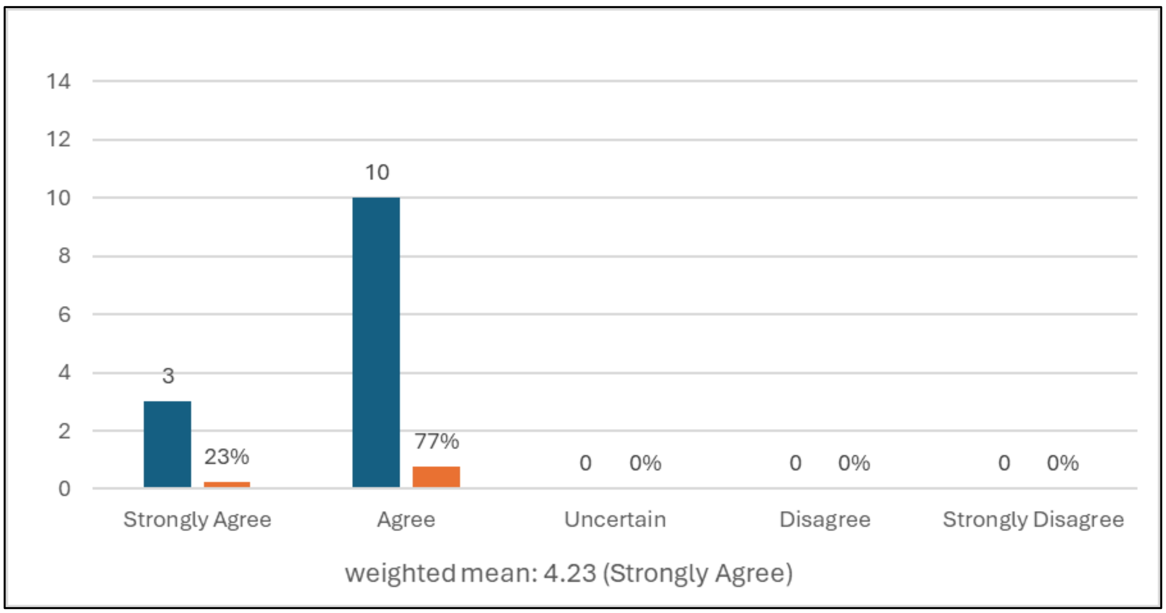
Figure 182. Appointment scheduling is accurate and works as intended.



According to Figure 182, there was unanimous agreement regarding the system's performance, with 77% (10) of participants strongly agreeing and 23% (3) agreeing that the scheduling process is both accurate and effective. With a weighted mean of 4.77, interpreted as “Strongly Agree,” the results indicate that the scheduling function performs reliably, supports correct booking outcomes, and reduces the likelihood of errors or conflicts during appointment creation.

This finding is consistent with prior research emphasizing that digital appointment systems improve operational efficiency when scheduling processes are dependable and well-implemented. Yusof and Fauzi (2023) reported that a web-based veterinary clinic management system addressed manual scheduling inefficiencies by enabling effective online appointment booking and reducing service disruptions. In addition, Ala et al. (2023) highlighted that appointment scheduling approaches designed to match service capacity with client demand help minimize waiting time and improve overall scheduling performance, supporting the strong reliability observed for the system's appointment scheduling feature.

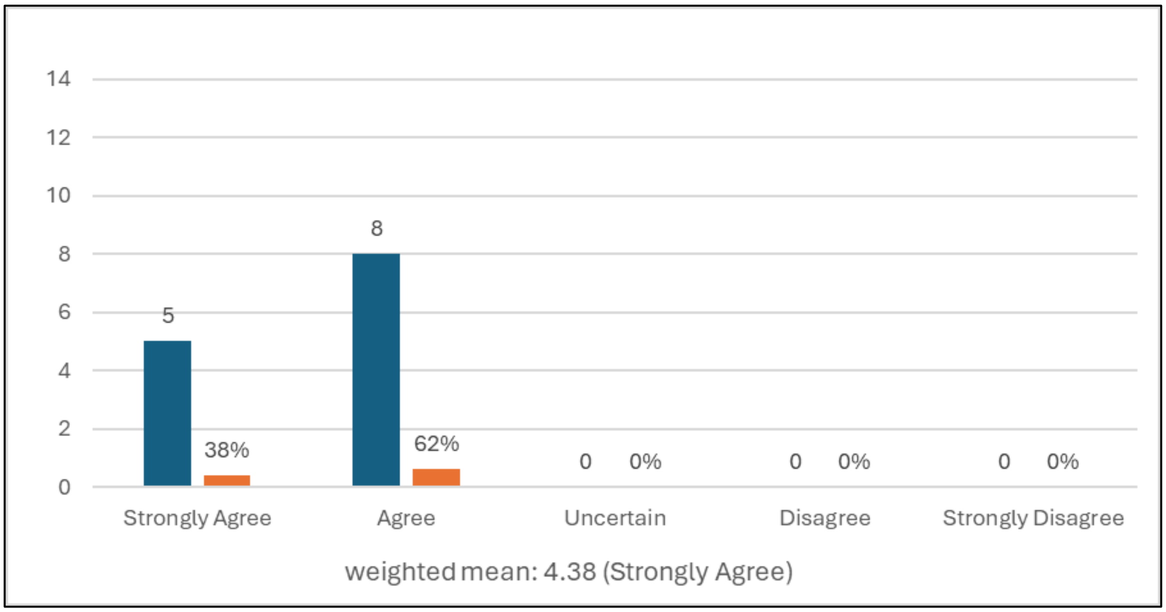
Figure 183. I can perform all necessary clinical tasks without technical issues.



As shown in Figure 183, 77% (10) of the respondents agree and 23% (3) strongly agree that they can perform necessary clinical tasks without encountering technical issues. With a weighted mean of 4.23, interpreted as "Strongly Agree," the findings indicate that the system delivers stable performance during routine operations, allowing users to complete core tasks with minimal disruptions.

This result aligns with literature emphasizing that digital clinic systems improve service efficiency when key processes run reliably and without delays. Aldhubayb and Aldhubaib (2020) noted that integrated digital solutions enhance veterinary clinic operations by streamlining essential activities such as scheduling and information tracking, which supports smooth task execution. In addition, Yeow and Kamaludin (2023) reported high user satisfaction with a pet care management system due to its efficient performance and simple operation, reinforcing that stable system performance is a major contributor to successful clinical task completion.

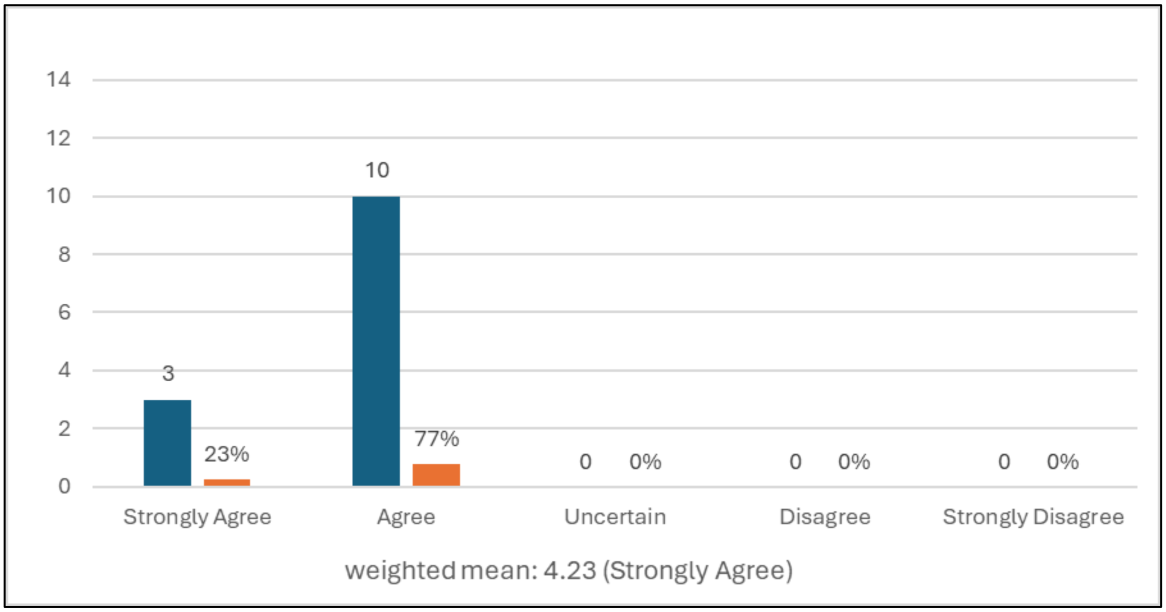
Figure 184. The system provides the essential features needed for my job responsibilities.



As illustrated in Figure 184, the system's feature set received a highly positive response: 62% (8) of respondents agreed and 38% (5) strongly agreed that the platform provides the essential tools for their job responsibilities. With a weighted mean of 4.38 (interpreted as "Strongly Agree"), these findings indicate that the platform effectively supports core clinic workflows by providing the necessary functions to complete routine tasks efficiently.

This result aligns with research emphasizing that integrated veterinary systems enhance service delivery by consolidating operational functions. Aldhubayb and Aldhubaib (2020) noted that digital solutions drive efficiency by simplifying processes like scheduling and communication a sentiment reflected in the participants' positive perception of the system’s features. Furthermore, Yeow and Kamaludin (2023) observed that high user satisfaction and acceptance are directly linked to feature completeness and practical performance, mirroring the results found in this study.

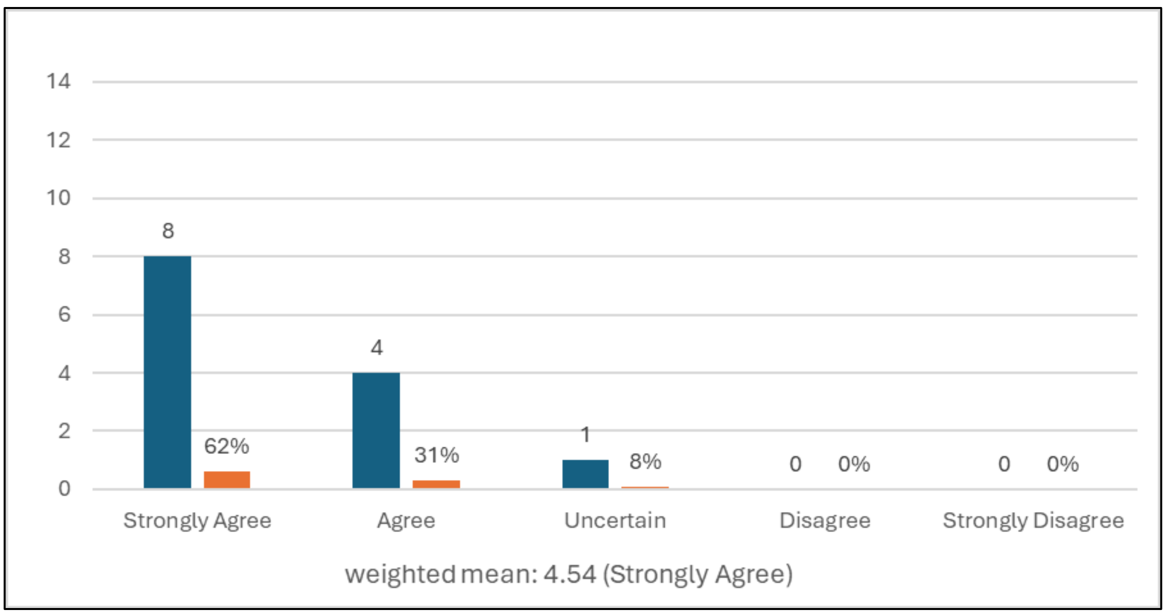
Figure 185. The features function smoothly during clinical operations.



In Figure 185, the majority of respondents expressed confidence in the system's operational stability; 77% (10) agreed and 23% (3) strongly agreed that features function smoothly during clinical operations. Supported by a weighted mean of 4.23 (interpreted as “Strongly Agree”), these findings suggest that the platform performs reliably in a live environment, facilitating continuous workflow and minimizing technical interruptions during routine clinic tasks.

This result is consistent with studies highlighting that well-integrated digital clinic systems enhance operational efficiency when core functions run consistently and without delays. Aldhubayb and Aldhubaib (2020) emphasized that digital solutions improve service quality by simplifying essential clinic processes such as scheduling and medical information tracking, which supports smoother daily operations. Likewise, Yeow and Kamaludin (2023) reported strong user satisfaction in a pet care management system due to its efficient performance and simple operation, reinforcing that stable feature performance is a key contributor to effective clinical workflow.

Figure 186. The user interface is intuitive and easy to learn.



As reflected in Figure 186, the interface received consistently favorable ratings, with 62% (8) selecting Strongly Agree and 31% (4) selecting Agree, while only 8% (1) were

Uncertain. The weighted mean of 4.54 (Strongly Agree) indicated that users learned the system quickly and navigated its functions with minimal adjustment, suggesting that the layout, labels, and overall flow were easy to understand.

This finding aligns with usability-focused studies showing that intuitive design improves acceptance and overall user satisfaction in appointment and clinic-related systems. Mayor (2021) emphasized that usability evaluation is essential for ensuring that scheduling systems remain user-accepted and easy to operate. Similarly, Yeow and Kamaludin (2023) reported high user satisfaction in a pet care management system due to its simple operations and efficient performance, which supports the strong agreement that the system's interface was easy to learn and use.

Figure 187. The system layout makes it easy to find the tools I need.

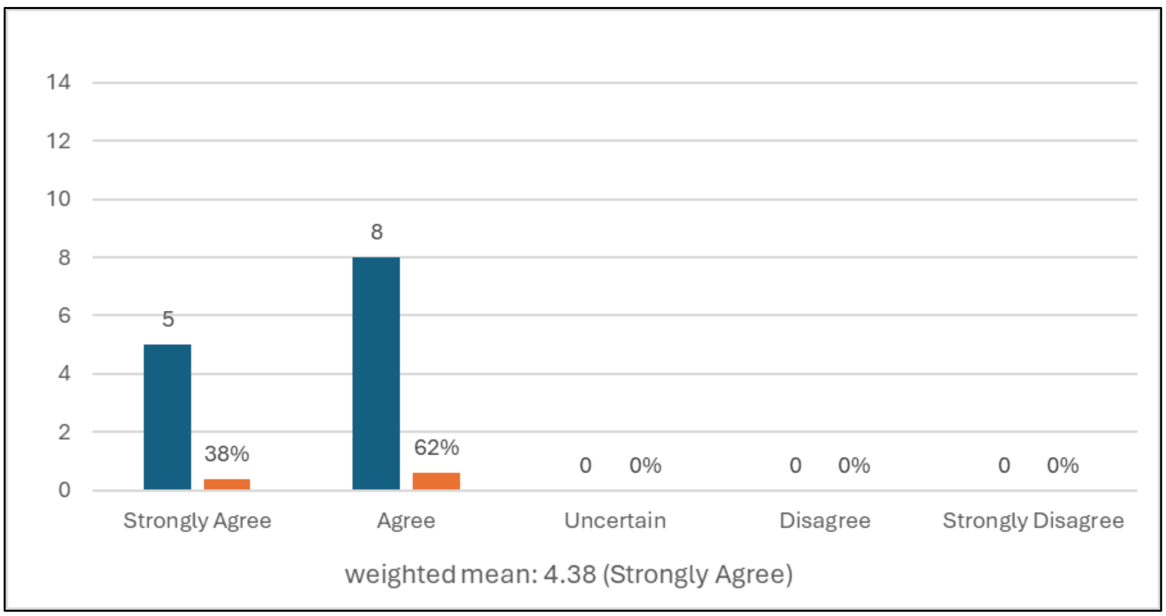
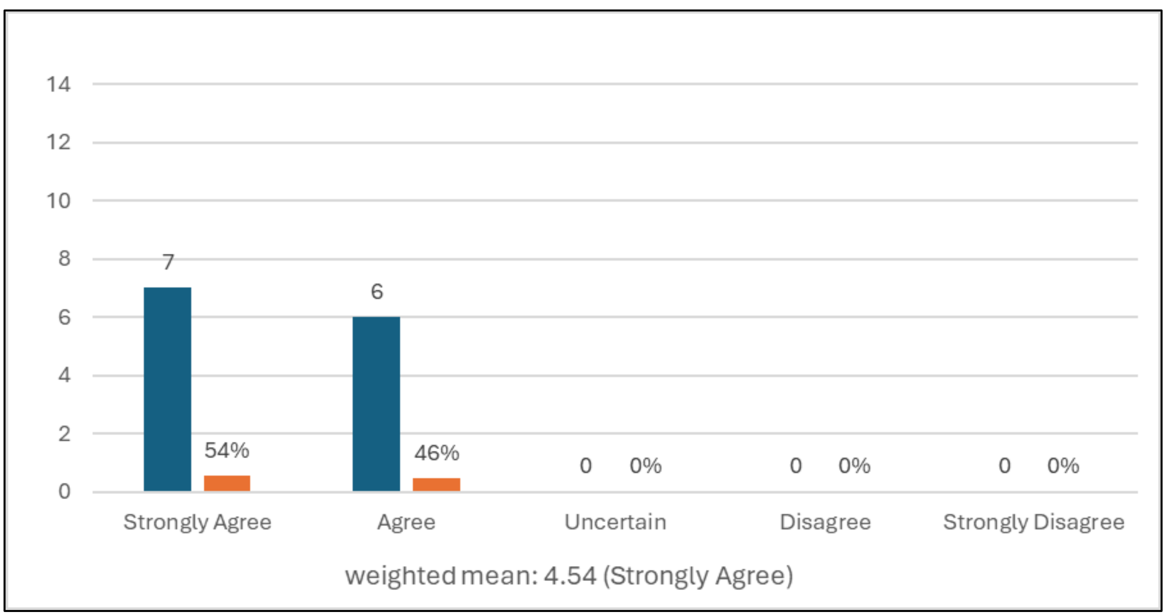


Figure 187 demonstrates high user satisfaction with the interface: 62% of respondents agreed and 38% strongly agreed that the layout allows for efficient navigation of tools. With a weighted mean of 4.38, interpreted as “Strongly Agree,” the findings indicate that the platform’s organization and navigation support quick access to essential functions, minimizing time spent searching for features during common tasks.

This result is consistent with usability-focused literature highlighting that clear structure and simple navigation improve user acceptance and satisfaction in digital service systems. Yeow and Kamaludin (2023) reported high user satisfaction in a pet care management system because of its simple operations and efficient performance, indicating that well-organized interfaces contribute to smoother user interaction. In addition, Mayor (2021) emphasized that usability and performance are central indicators of system acceptance in scheduling platforms, reinforcing the importance of intuitive layouts for effective tool discovery and sustained user approval.

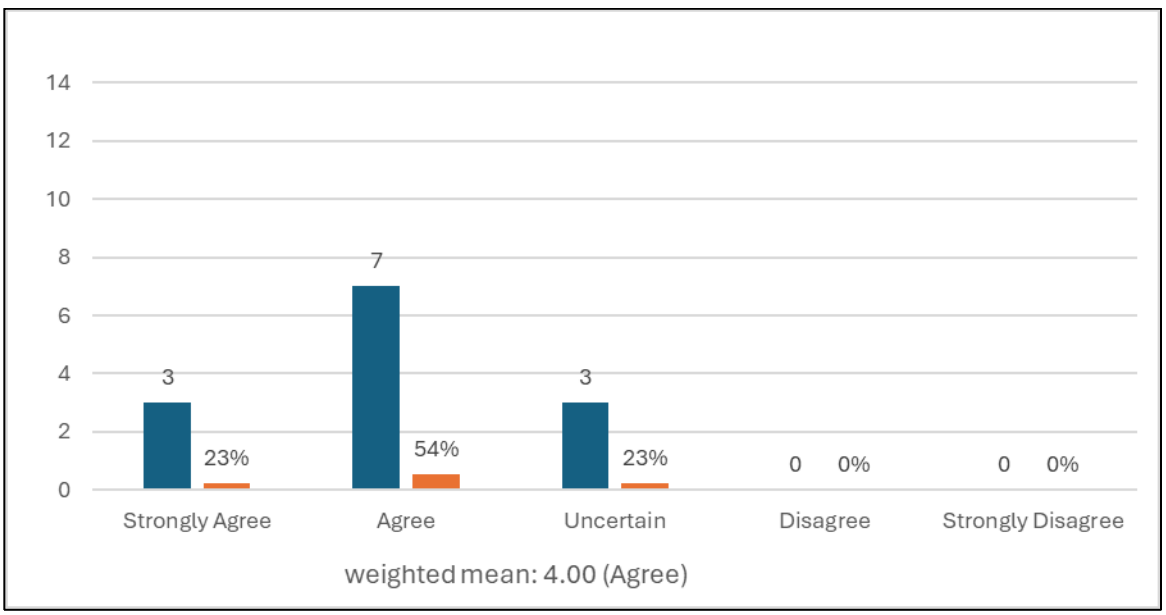
Figure 188. Navigation through different modules is smooth and organized.



As shown in Figure 188, 54% (7) of the respondents strongly agree and 46% (6) agree that navigation across different modules is smooth and organized. With a weighted mean of 4.54, interpreted as “Strongly Agree,” the findings indicate that users can move between key sections of the system with minimal effort, suggesting consistent menu structure and clear module flow that supports efficient task completion. This outcome is supported by studies emphasizing that streamlined navigation and simple operations are key contributors to positive user experience in clinic management platforms.

Yeow and Kamaludin (2023) reported high satisfaction in a pet care management system due to its efficient performance and simple operation, reinforcing that organized module design improves usability. Likewise, Aldhubayb and Aldhubaib (2020) noted that digital clinic systems enhance service quality by simplifying essential processes such as scheduling and information tracking, indicating that well-structured navigation contributes to smoother service delivery and improved client interaction.

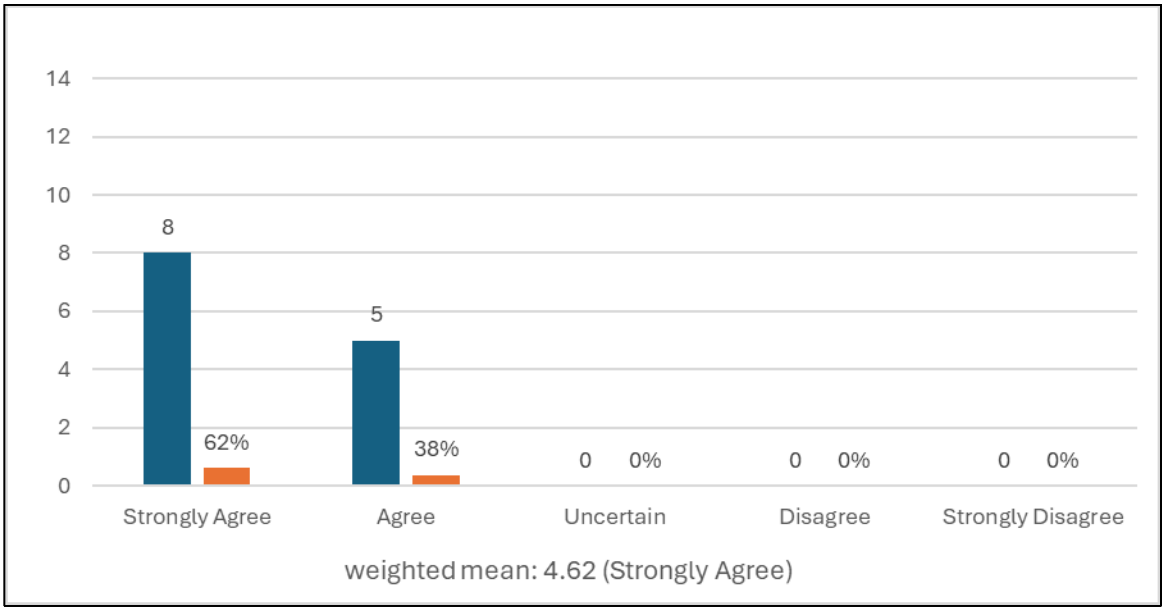
Figure 189. Minimal training was required to use the system confidently.



As shown in Figure 189, 54% (7) of the respondents agree and 23% (3) strongly agree that minimal training was required to use the system confidently, while 23% (3) were uncertain. With a weighted mean of 4.00, interpreted as “Agree,” the results indicate that most users were able to learn the system with limited guidance; however, the noticeable uncertainty suggests that a portion of users may still need brief orientation, particularly when first encountering unfamiliar features or workflows.

This pattern aligns with literature noting that user confidence in digital systems is strengthened not only by the interface design but also by user readiness and support during adoption. Bahri et al. (2022) reported that inadequate staff training and limited organizational awareness can hinder effective use of electronic record systems, indicating that even functional systems may require introductory guidance to ensure confident usage. Similarly, Ganiron (2023) emphasized that regular orientation and system updates help maximize usability and performance in computerized record systems, supporting the value of short onboarding steps to reduce uncertainty and improve user confidence.

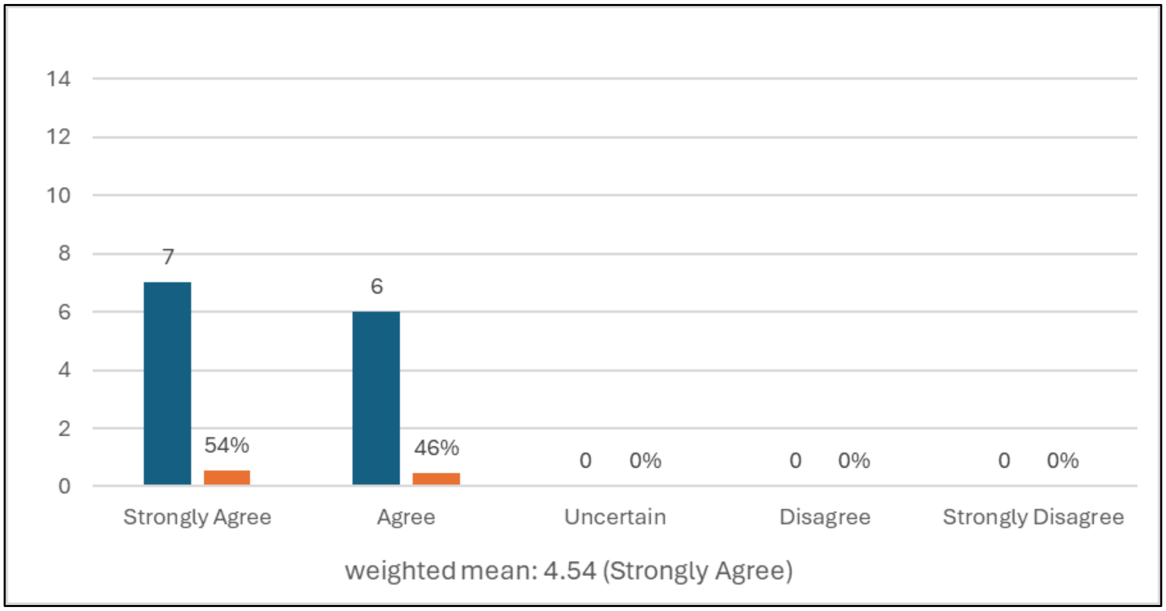
Figure 190. Icons, labels, and buttons are clear and understandable.



As shown in Figure 190, 62% (8) of the respondents strongly agree and 38% (5) *agree* that the system's icons, labels, and buttons are clear and understandable. With a weighted mean of 4.62, interpreted as "Strongly Agree," the findings indicate that users can easily recognize functions and navigate actions without confusion, which supports faster task completion and reduces the likelihood of user errors.

This result aligns with usability evidence showing that clear interface cues improve system acceptance and user performance. Mayor (2021) emphasized that usability is a key basis for user acceptance in scheduling and service systems, particularly when interface elements are easy to interpret during actual use. In addition, Yeow and Kamaludin (2023) reported high satisfaction in a pet care management system due to its simple operations, suggesting that clarity in labels and controls contributes to a smoother and more efficient user experience.

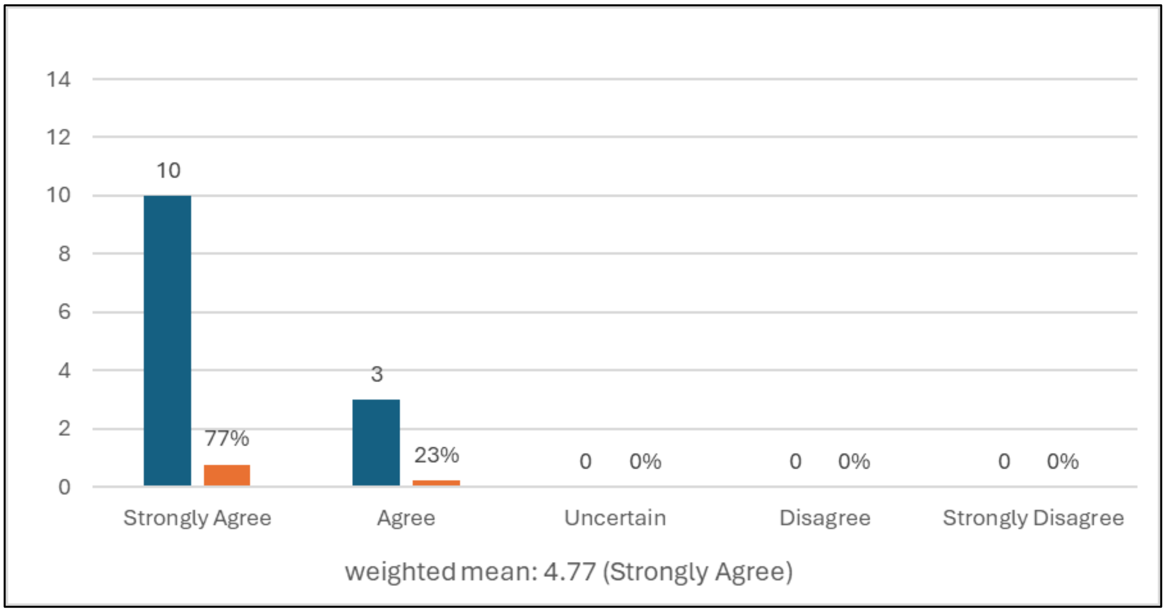
Figure 191. The system runs smoothly during my work hours without crashing.



As shown in Figure 191, 54% (7) of the respondents strongly agree and 46% (6) agree that the system runs smoothly during their work hours without crashing. With no respondents expressing uncertainty or disagreement, and a weighted mean of 4.54, interpreted as “Strongly Agree,” the results indicate a very high level of user confidence in the system’s stability and reliability. These findings suggest that the system is capable of supporting daily clinical operations without technical interruptions, which is essential in a veterinary setting where system downtime can disrupt workflows, delay services, and affect patient care.

This outcome is consistent with studies emphasizing system stability as a critical factor in healthcare information system adoption. Aldhubayb and Aldhubaib (2020) noted that reliable system performance significantly improves user trust and operational efficiency in digital healthcare environments, particularly when replacing paper-based processes. Similarly, Yeow and Kamaludin (2023) reported that system stability and smooth performance were among the highest-rated attributes in a pet care management system, directly contributing to user satisfaction and continued system use. These studies support the finding that a crash-free and stable system enhances confidence among users and promotes seamless integration into routine veterinary clinic operations.

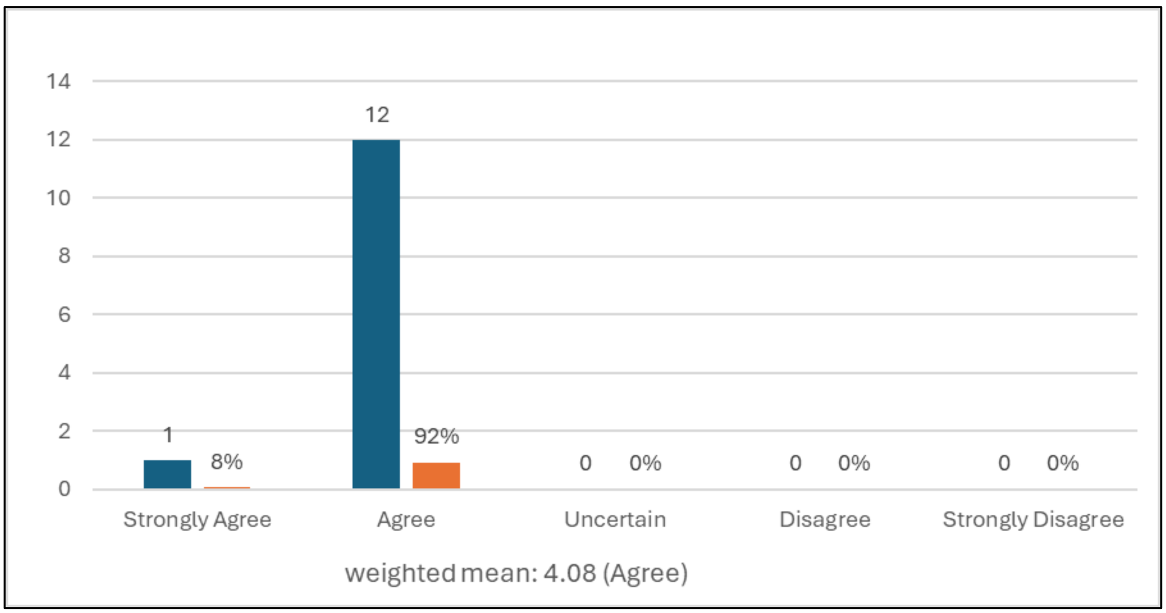
Figure 192. My changes (e.g., records, schedules) are saved correctly and consistently.



As illustrated in Figure 192, a large majority of the respondents expressed strong confidence that their changes such as records and schedules are saved correctly and consistently, with 77% (10) strongly agreeing and 23% (3) agreeing. No respondents indicated uncertainty or disagreement. The computed weighted mean of 4.77, interpreted as “Strongly Agree,” reflects an exceptionally high level of trust in the system’s data handling and reliability. These results suggest that the system effectively ensures data integrity, a critical requirement in veterinary clinics where accurate and consistent record-saving is essential for clinical decision-making, scheduling, and continuity of patient care.

This finding aligns with existing literature emphasizing the importance of reliable data storage in healthcare information systems. Gesmundo et al. (2022) reported that consistent and accurate record-handling mechanisms significantly improve service efficiency and professional performance in administrative and clinical settings. Likewise, Nuhu et al. (2024) highlighted that electronic record systems with strong data integrity features reduce redundancy and errors, thereby strengthening user confidence and operational reliability. These studies support the present result, underscoring that dependable data-saving functions are fundamental to the successful adoption and sustained use of veterinary clinic management systems.

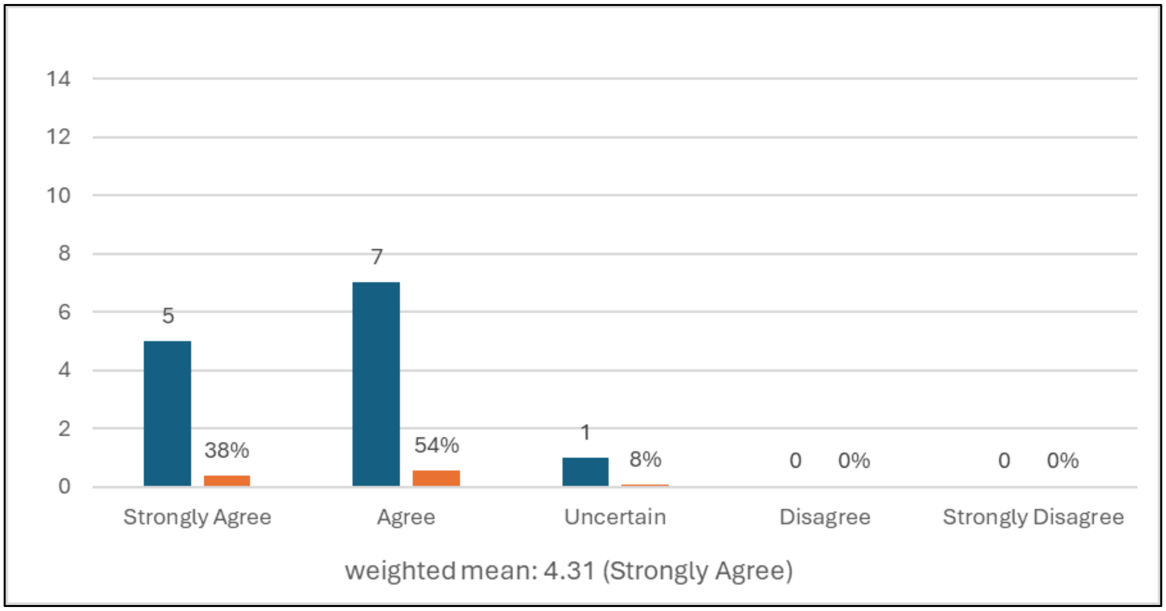
Figure 193. I rarely experience bugs or delays while using the system.



As presented in Figure 193, the majority of respondents reported minimal technical issues while using the system, with 92% (12) agreeing and 8% (1) strongly agreeing that they rarely experience bugs or delays. No respondents expressed uncertainty or disagreement. The weighted mean of 4.08, interpreted as “Agree,” indicates that users generally perceive the system as dependable during routine use. While the results reflect positive system performance, the lower proportion of strong agreement compared to other performance indicators suggests that minor delays or occasional bugs may still be encountered, though not at a level that significantly disrupts workflow.

This observation is supported by studies highlighting that even well-designed information systems may experience minor performance limitations without undermining overall usability. Applebya and Basran (2022) noted that system responsiveness and reliability are critical determinants of user satisfaction in healthcare systems, yet small technical delays are often tolerated when core functions remain stable. Similarly, Aldhubayb and Aldhubaib (2020) emphasized that consistent performance with minimal disruptions enhances user trust and acceptance, even if occasional system refinements are still needed. These findings support the present results, suggesting that while the system performs reliably, continuous optimization can further strengthen user confidence and operational efficiency.

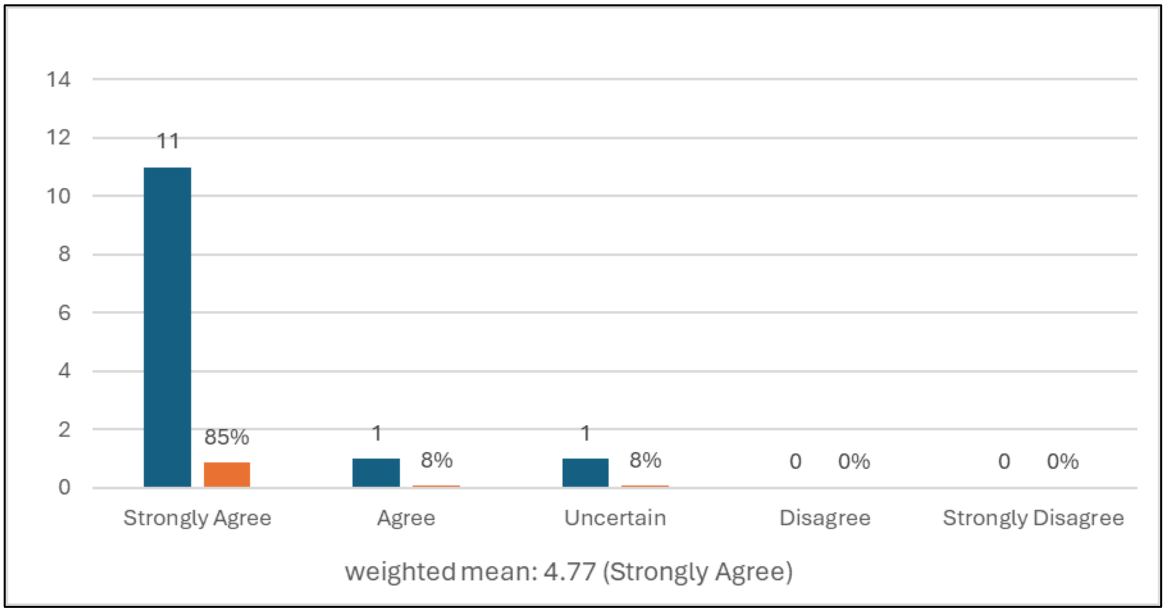
Figure 194. The system loads pages and functions without long delays.



As shown in Figure 194, most respondents indicated positive experiences regarding system responsiveness, with 54% (7) agreeing and 38% (5) strongly agreeing that the system loads pages and functions without long delays. A small portion, 8% (1), remained uncertain, while no respondents expressed disagreement. The weighted mean of 4.31, interpreted as “Strongly Agree,” suggests that users generally perceive the system as responsive and efficient during routine operations. However, the presence of a small percentage of uncertainty may indicate that occasional delays are still experienced under certain conditions, such as peak usage or network variability.

This result is supported by literature emphasizing the importance of system response time in healthcare and veterinary information systems. Applebya and Basran (2022) noted that fast system response and smooth page loading significantly influence user satisfaction and workflow efficiency in clinical environments. Likewise, Yeow and Kamaludin (2023) reported that responsive system performance reduces user frustration and promotes sustained system use in pet care management platforms. These studies support the present findings, underscoring that efficient loading times contribute to user confidence and effective system utilization, while continued optimization can further minimize perceived delays.

Figure 195. Scheduled tasks and reminders work consistently as expected.



As depicted in Figure 195, the majority of respondents expressed strong confidence in the reliability of scheduled tasks and reminders, with 85% (11) strongly agreeing and 8% (1) agreeing that these features work consistently as expected. A small proportion, 8% (1), indicated uncertainty, while no respondents expressed disagreement. The weighted mean of 4.77, interpreted as “Strongly Agree,” reflects a very high level of user trust in the system’s automation features. These findings suggest that the system effectively supports routine clinical operations by ensuring timely execution of reminders and scheduled tasks, which are essential for maintaining consistency in veterinary services such as appointments, follow-ups, and treatment schedules.

This result is consistent with studies highlighting the role of automated reminders in improving service reliability and compliance in healthcare systems. Mahzir and Ilyas (2020) emphasized that automated notification and reminder functions enhance adherence to schedules and reduce missed appointments in veterinary applications. Similarly, Sari et al. (2023) found that consistent reminder systems improve user preparedness and workflow coordination in veterinary clinics. These studies support the present findings, demonstrating that dependable scheduling and reminder functionalities contribute significantly to system effectiveness and user confidence in digital veterinary platforms.

Figure 196. Only authorized personnel can access sensitive pet and clinic information.

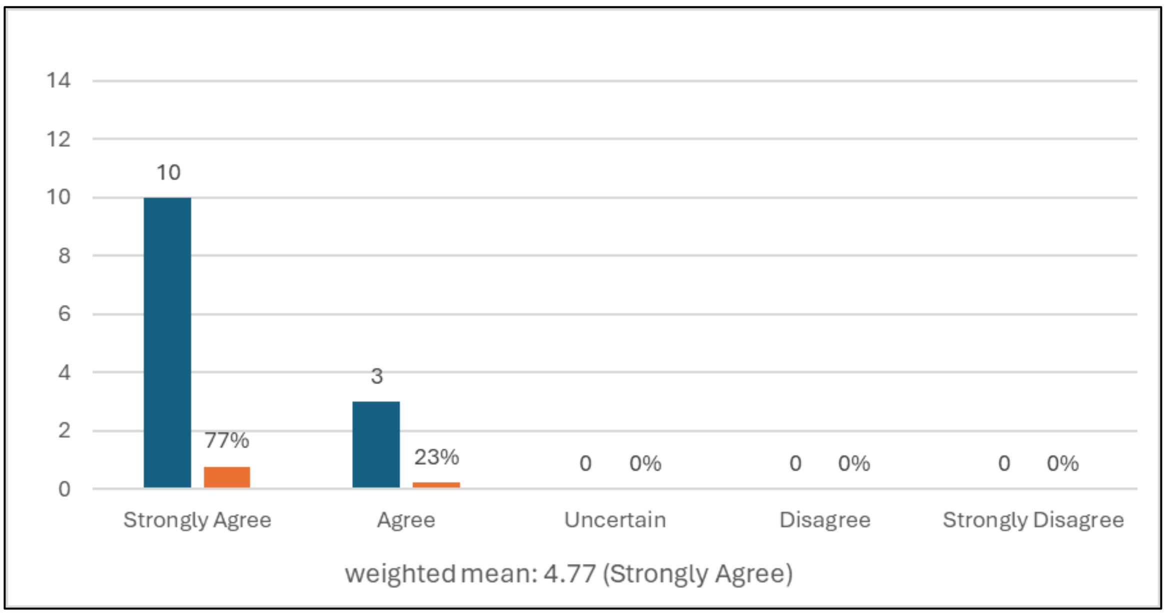


Figure 196 shows that 77% of the respondents strongly agree and 23% agree that only authorized personnel can access sensitive pet and clinic information. With a weighted mean of 4.77, interpreted as “Strongly Agree,” the findings indicate a strong level of user confidence in the system’s access controls, suggesting that PawSense AI effectively restricts sensitive records to appropriate roles and minimizes the risk of unauthorized viewing or misuse of confidential clinic data.

Supporting evidence from Suleski et al. (2023) emphasizes that healthcare information systems require strengthened authentication mechanisms—particularly multi-factor authentication (MFA)—to prevent unauthorized access resulting from compromised passwords, phishing, and similar cyber threats, reinforcing the importance of strict access control in environments handling sensitive records. This aligns with the system's security design that highlights role-based access control and enhanced authentication features to ensure that only permitted users can reach protected information.

Figure 197. I feel confident that client and patient data are protected.

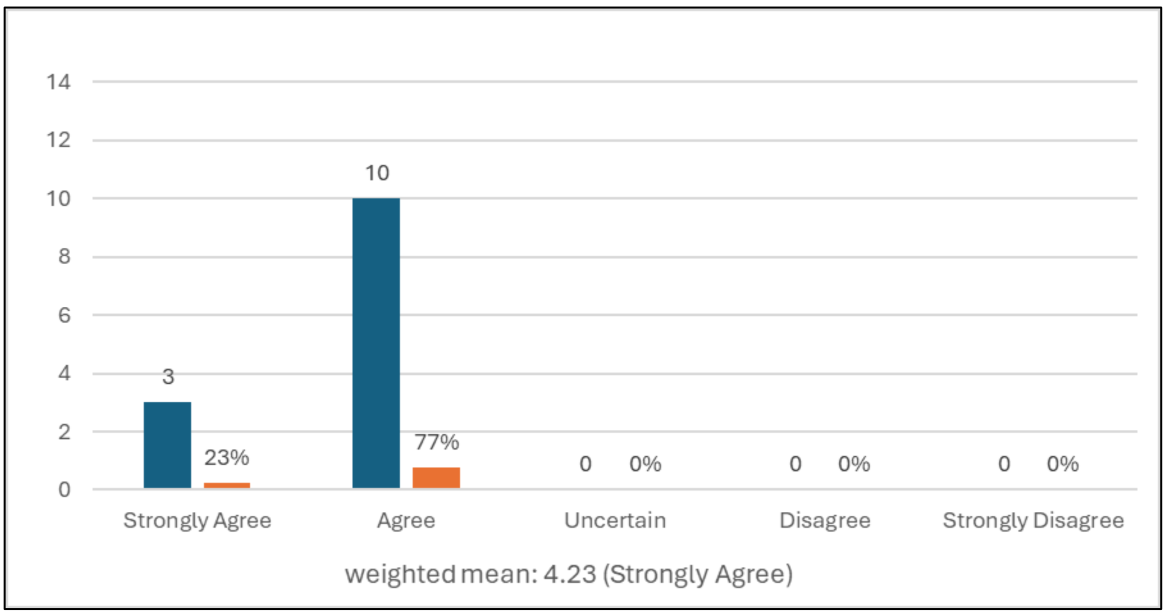


Figure 197 illustrates that 77% of the respondents agree and 23% strongly agree that they feel confident client and patient data are protected. The item yielded a weighted mean of 4.23, interpreted as "Strongly Agree," indicating an overall positive perception of the system’s data protection measures. The greater share of “Agree” responses suggests that users generally trust the safeguards in place, while also implying that further strengthening visible security assurances (e.g., clearer privacy indicators, session/security notices, or verification prompts) could help elevate confidence toward stronger affirmation.

Yeow and Kamaludin (2023) support this result by reporting high user satisfaction with a pet care management system that incorporated secure components, including password encryption, email verification, and CAPTCHA mechanisms, emphasizing that strengthened security controls contribute to user trust and confidence in handling sensitive information. This aligns with the present finding, where users expressed strong confidence that client and patient data are protected when security mechanisms are embedded into the system’s design and access processes.

Figure 198. The login and access control system is secure and reliable.

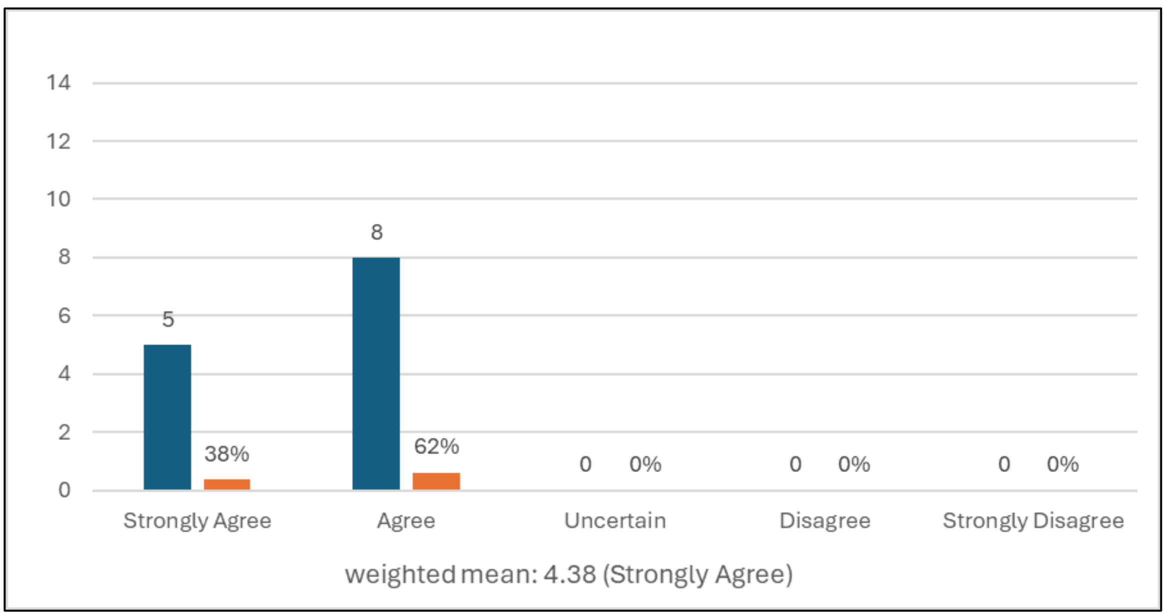
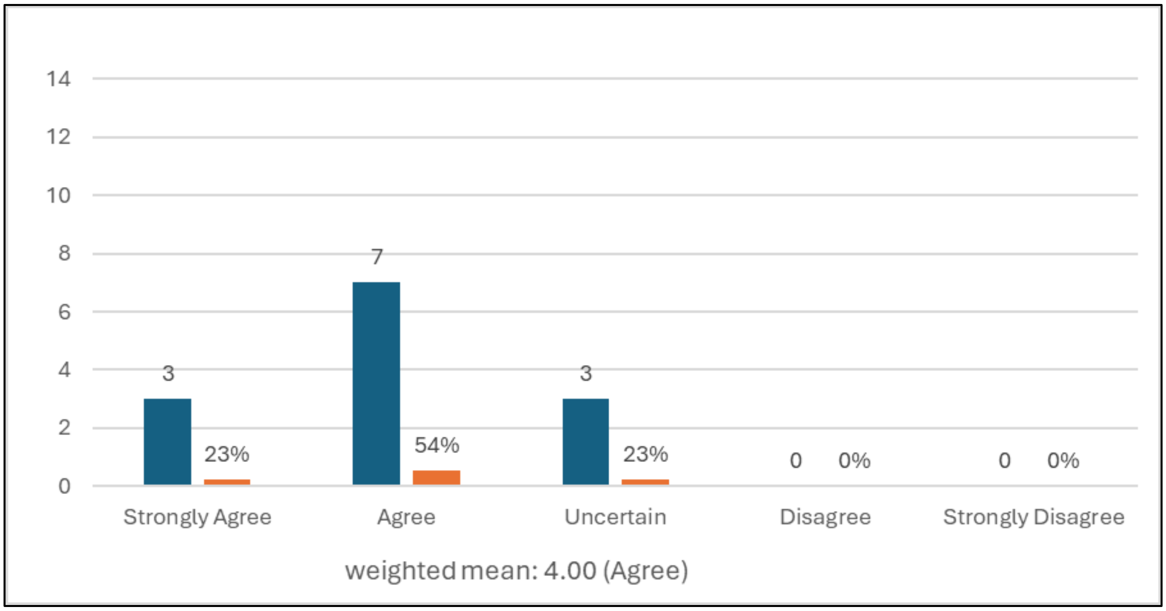


Figure 198 shows that 62% of the respondents agree and 38% strongly agree that the login and access control system is secure and reliable. With a weighted mean of 4.38, interpreted as “Strongly Agree,” the results suggest that users generally trust the system’s authentication and access restrictions to protect accounts and limit entry to authorized users. The higher proportion of “Agree” responses indicates strong overall acceptance, while also implying that reinforcing visible security cues (e.g., clearer session notices, verification feedback, or security reminders) could further strengthen user assurance regarding the reliability of the login process.

A supporting study by Yeow and Kamaludin (2023) reported that users expressed high satisfaction with a pet care management system that strengthened account security through mechanisms such as password encryption, email verification, and CAPTCHA, emphasizing that layered authentication safeguards improve both perceived security and reliability of system access. Their findings highlight that when login protection is reinforced with multiple validation measures, users develop greater confidence in the system’s ability to prevent unauthorized entry—consistent with the positive ratings observed for PawSense AI’s login and access control features.

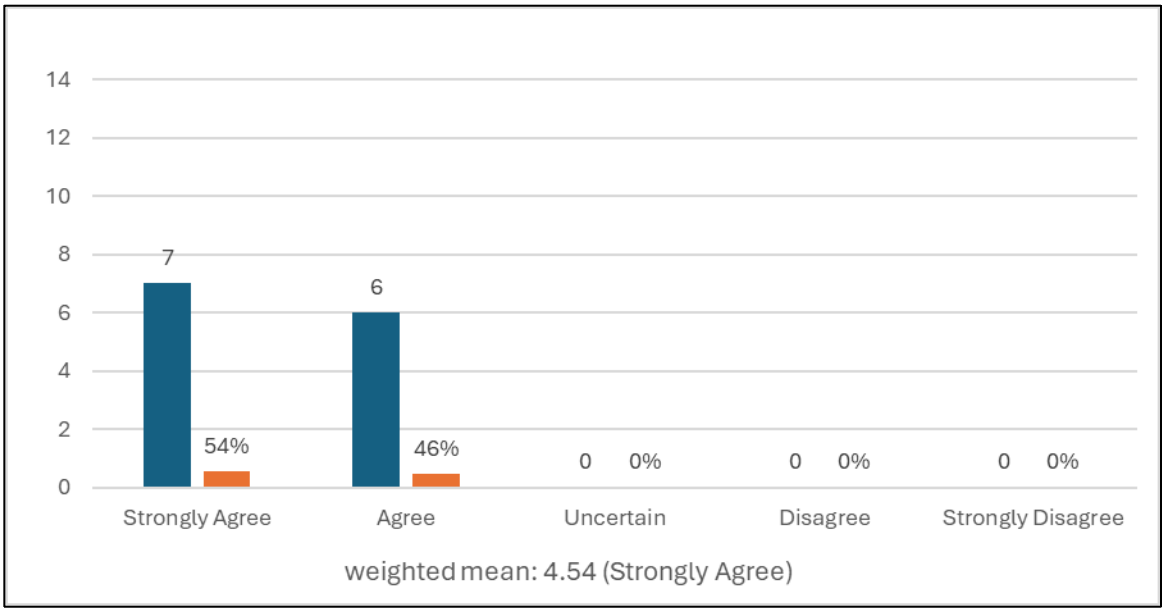
Figure 199. The system protects confidential data from unauthorized use.



As shown in Figure 199, 54% (7) of the respondents *agree* and 23% (3) *strongly agree* that the system protects confidential data from unauthorized use, while 23% (3) were *uncertain*. With a weighted mean of 4.00, interpreted as "Agree," the findings indicate that users generally perceive the platform as secure; however, the level of uncertainty suggests that some users may not fully recognize the specific safeguards in place or remain cautious about data privacy in online systems.

This perception is supported by security literature emphasizing that strong authentication and layered safeguards are essential in systems that store sensitive health information. Suleski et al. (2023) highlighted that multi-factor authentication strengthens protection by reducing the risk of unauthorized access even when passwords are compromised, which directly supports user confidence in data confidentiality. In addition, Jin et al. (2021) explained that weak authentication paths can trigger "chain reaction" account compromises within connected ecosystems, reinforcing the importance of robust access controls to maintain user trust and reduce uncertainty regarding data protection.

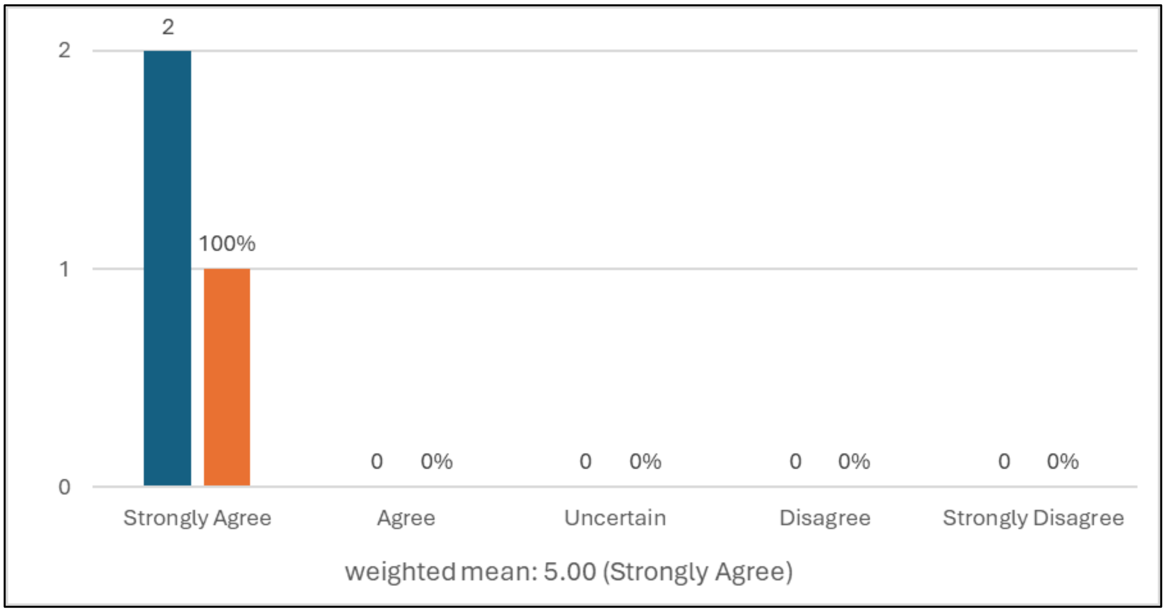
Figure 200. I can reset or recover my password easily when needed.



As shown in Figure 200, 54% (7) of the respondents *strongly agree* and 46% (6) *agree* that they can reset or recover their password easily when needed. With a weighted mean of 4.54, interpreted as "Strongly Agree," the findings indicate that the password recovery process is straightforward and accessible, allowing users to regain account access promptly with minimal difficulty.

This result is supported by Yeow and Kamaludin (2023), who reported strong user satisfaction in a pet care management system that implemented security-related account mechanisms such as password protection and verification features, indicating that well-designed account controls can remain both secure and user-friendly. In addition, Jin et al. (2021) emphasized that recovery mechanisms are a critical security pathway because weak reset processes can be exploited for chained account compromises; this highlights the importance of maintaining a recovery feature that is easy for legitimate users while remaining structured enough to prevent misuse.

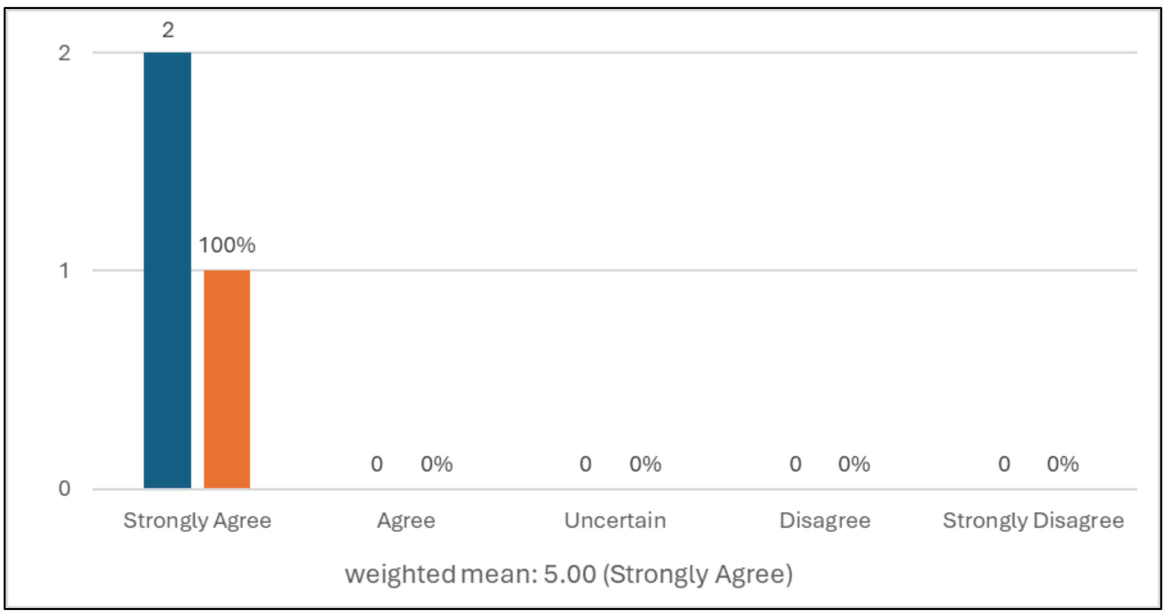
Figure 201. The system simplifies my daily tasks like managing inventory and appointments.



As shown in Figure 201, 100% of the two (2) veterinary staff respondents strongly agree that the system simplifies their daily tasks such as managing inventory and appointments. With a weighted mean of 5.00 interpreted as “Strongly Agree,” the result indicates unanimous staff confirmation that PawSense AI effectively streamlines routine clinic operations. This suggests that core administrative workflows—particularly scheduling and inventory-related tasks—were perceived as easier to perform within the system, supporting its practical usefulness in reducing manual workload and improving day-to-day efficiency.

This finding is supported by related studies emphasizing that digital veterinary appointment and clinic management systems significantly improve operational efficiency by replacing manual processes. Yusof and Fauzi (2023) reported that web-based appointment systems reduce scheduling inefficiencies and improve service delivery, while Aldhubayb and Aldhubaib (2020) highlighted that digitizing clinic operations helps address delays and errors common in paper-based workflows. In addition, inventory management literature noted that automated inventory systems enhance tracking accuracy and operational performance compared to manual monitoring (Chin et al., 2023; Tanaman et al., 2023). Collectively, these studies align with the unanimous staff agreement observed, indicating that integrating appointment and inventory functions into one platform directly supports smoother and more efficient clinic task execution.

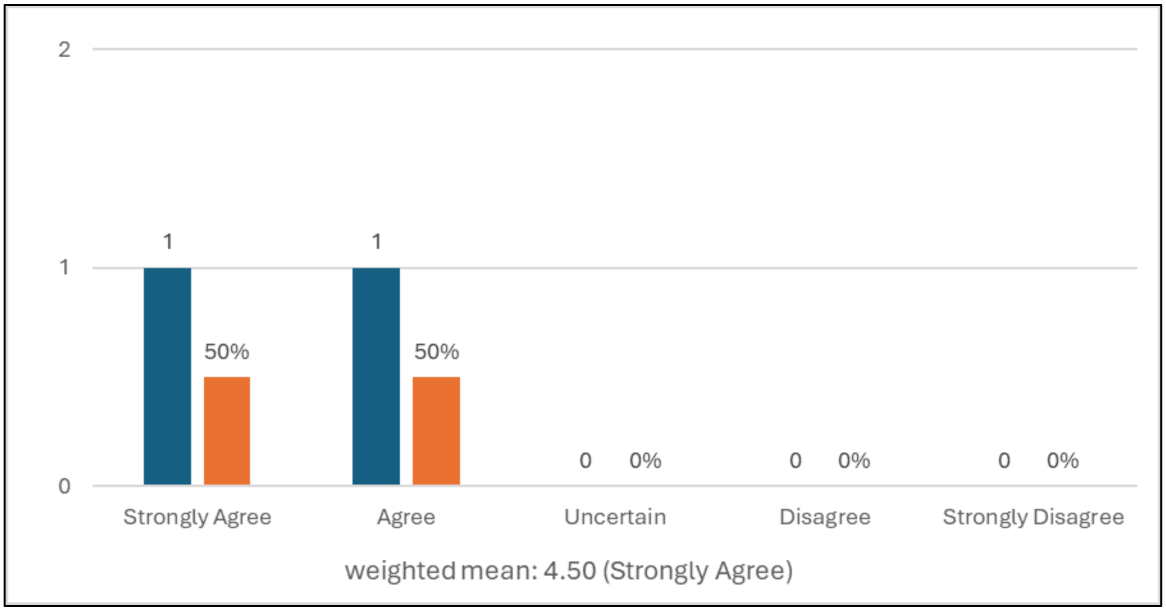
Figure 202. I can quickly send notifications and access necessary records.



As shown in Figure 202, 100% of the two (2) veterinary staff respondents strongly agree that they can quickly send notifications and access necessary records through the system. With a weighted mean of 5.00 interpreted as “Strongly Agree,” the result indicates unanimous staff validation that PawSense AI supports rapid communication and efficient retrieval of clinic information needed for daily operations. This suggests that the platform effectively reduces delays in sending client updates and minimizes time spent searching for records, which is critical in maintaining smooth clinic workflows and timely service delivery.

This finding is supported by literature emphasizing that automated notifications and digital record systems strengthen operational efficiency and responsiveness in veterinary and healthcare settings. dvm360 (2021) explained that automated SMS and email communications streamline administrative tasks, reduce manual errors, and improve coordination by sending documents and instructions ahead of appointments. Similarly, Mahzir and Ilyas (2020) highlighted that timely notifications improve compliance and ensure smoother clinic-client coordination, while Uy et al. (2023) reported that digital record management improves retrieval speed and reduces human error, enabling more efficient decision-making. These studies align with the unanimous staff agreement observed in PawSense AI, indicating that integrating notification tools with accessible records directly enhances clinic communication and record-handling efficiency.

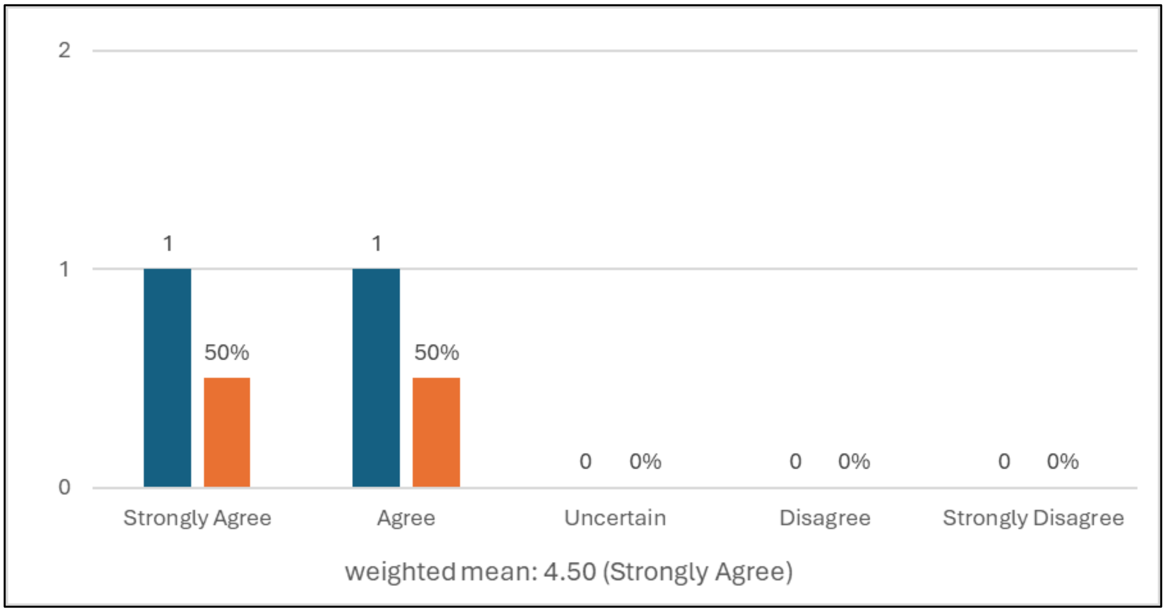
Figure 203. All features used for clinic operations are present and functional.



As shown in Figure 203, 50% of the two (2) veterinary staff respondents strongly agree and 50% agree that all features used for clinic operations are present and functional. With a weighted mean of 4.50 interpreted as “Strongly Agree,” the findings indicate that the system’s core modules were perceived as complete and operationally usable for routine clinic activities. This suggests that PawSense AI adequately supports essential workflows—such as appointment handling, record access, and operational coordination—without major feature gaps that could hinder daily service delivery.

This result is consistent with related literature highlighting that veterinary clinic management platforms are most effective when they integrate necessary functions into a single, reliable system. Yeow and Kamaludin (2023) reported high user satisfaction in a pet care management system due to its efficient performance, simple operations, and secure components, implying that completeness and functionality of features contribute directly to positive system evaluation. Similarly, Aldhubayb and Aldhubaib (2020) emphasized that digital clinic systems enhance operational efficiency by streamlining essential processes such as scheduling and medical information tracking, which depends on the availability and proper functioning of operational features. These studies support the staff's strong agreement, indicating that the perceived completeness and functionality of PawSense AI aligns with best practices identified in existing veterinary system implementations.

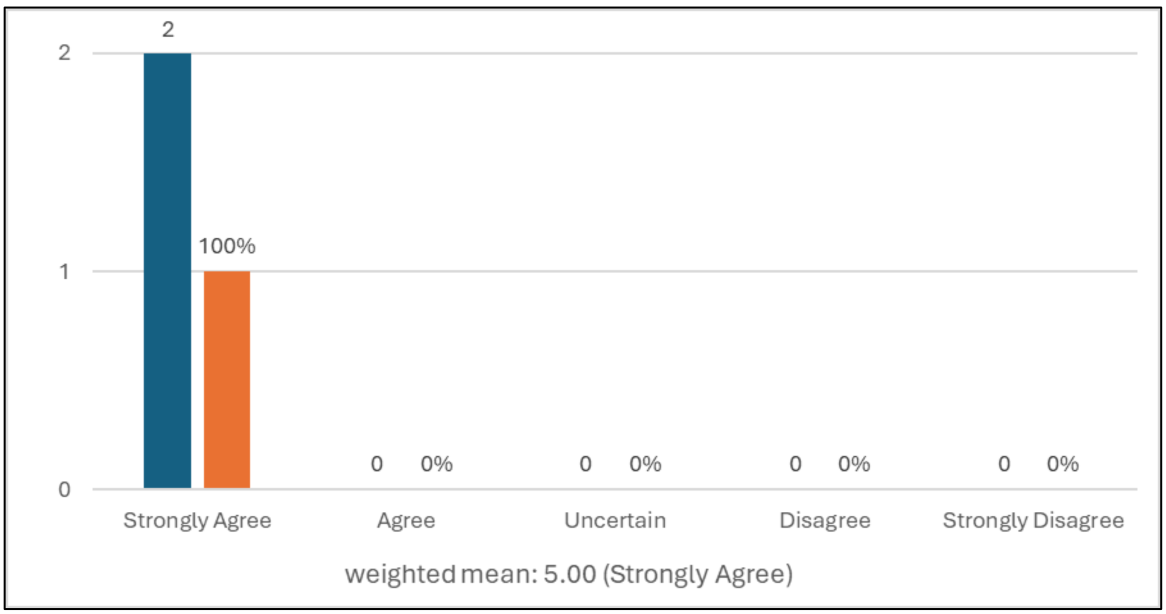
Figure 204. Billing, scheduling, and inventory tools function properly.



As shown in Figure 204, 50% of the two (2) veterinary staff respondents strongly agree and 50% agree that the billing, scheduling, and inventory tools function properly. With a weighted mean of 4.50 interpreted as "Strongly Agree," the findings indicate that the system's key operational components were perceived as working reliably in actual clinic use. This suggests that PawSense AI effectively supports essential transactions and routine management tasks, which is critical for maintaining service continuity and reducing errors in daily operations.

These findings are supported by related literature emphasizing that properly functioning scheduling and inventory tools directly improve operational efficiency in veterinary and business settings. Yusof and Fauzi (2023) reported that digital appointment systems reduce manual inefficiencies and improve service delivery, highlighting the importance of reliable scheduling functions. In addition, inventory management studies found that automated systems improve tracking accuracy and operational performance compared with manual approaches (Chin et al., 2023; Tanaman et al., 2023). Together, these studies align with the staff's strong agreement, reinforcing that when billing-related processes and core operational modules are functional and stable, clinics are better positioned to deliver timely services and manage resources effectively.

Figure 205. The system helps reduce manual work in operations.

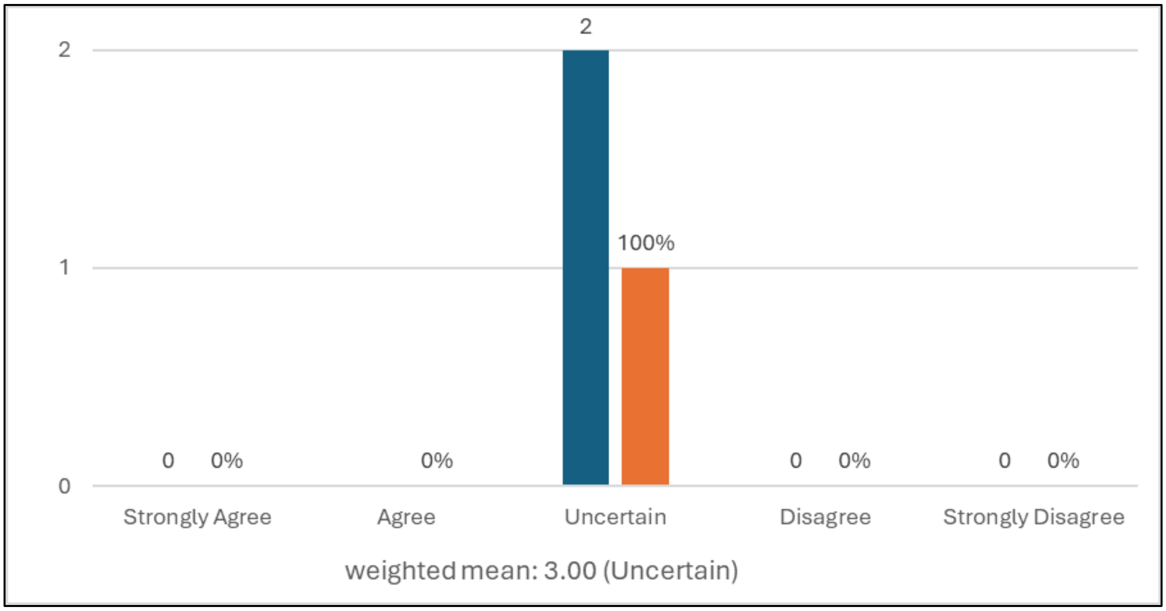


As shown in Figure 205, 100% of the two (2) veterinary staff respondents strongly agree that the system helps reduce manual work in operations. With a weighted mean of 5.00 interpreted as "Strongly Agree," the findings indicate unanimous staff perception that

PawSense AI effectively minimizes repetitive clerical tasks and reduces reliance on manual processes in daily clinic workflows. This suggests that the system supports faster task completion and more efficient coordination of routine activities, allowing staff to allocate more time to patient care and other higher-value responsibilities.

This result is supported by literature emphasizing that digitizing clinic operations reduces delays and errors commonly associated with paper-based workflows. Aldhubayb and Aldhubaib (2020) reported that digital veterinary clinic systems enhance service efficiency by streamlining processes such as scheduling and medical record tracking, which directly lowers manual workload. In addition, dvm360 (2021) explained that automated communications and digital workflow tools reduce administrative burden by minimizing manual follow-ups and routine paperwork, thereby improving operational flow. These studies align with the unanimous agreement observed among staff, indicating that PawSense AI's integrated features contribute to meaningful reductions in manual operational effort.

Figure 206. The system is user-friendly and doesn't require technical knowledge.

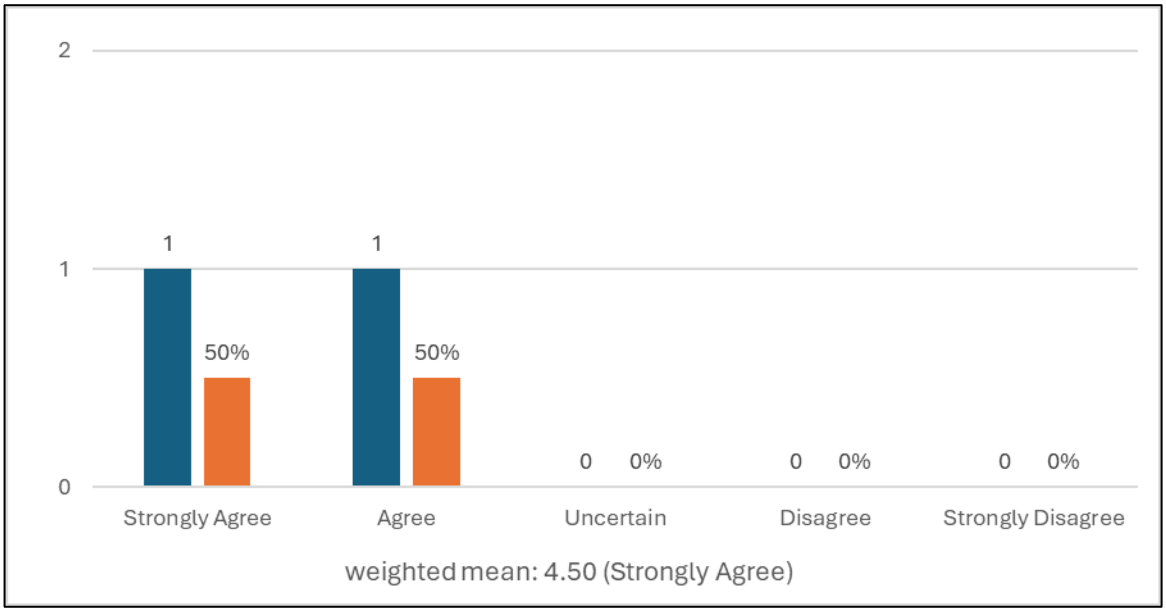


As shown in Figure 206, 100% of the two (2) veterinary staff respondents were uncertain that the system is user-friendly and does not require technical knowledge. With a weighted mean of 3.00 interpreted as "Uncertain," the findings indicate that although the system may be functional for clinic operations, the staff were not fully confident that it can be used effortlessly without some level of technical familiarity. This unanimous uncertainty may reflect the reality that administrative platforms often involve multiple modules (e.g., billing, inventory, scheduling, and records) that can appear complex at first use, especially when users have different levels of exposure to digital clinic systems.

This outcome is consistent with literature highlighting that user confidence in healthcare-related digital systems is strongly shaped by perceived ease of use and user support. Khalil and Serhier (2023) identified perceived ease of use as a key factor influencing acceptance of e-appointment systems, implying that uncertainty often emerges when users feel the system may require additional learning before it becomes intuitive.

Similarly, Bahri et al. (2022) emphasized that electronic record management systems commonly face challenges such as inadequate training and user readiness, which can reduce confidence even when the technology is beneficial. These studies support the interpretation that improving onboarding, guided instructions, and staff orientation may reduce uncertainty and strengthen perceptions of user-friendliness in PawSense AI.

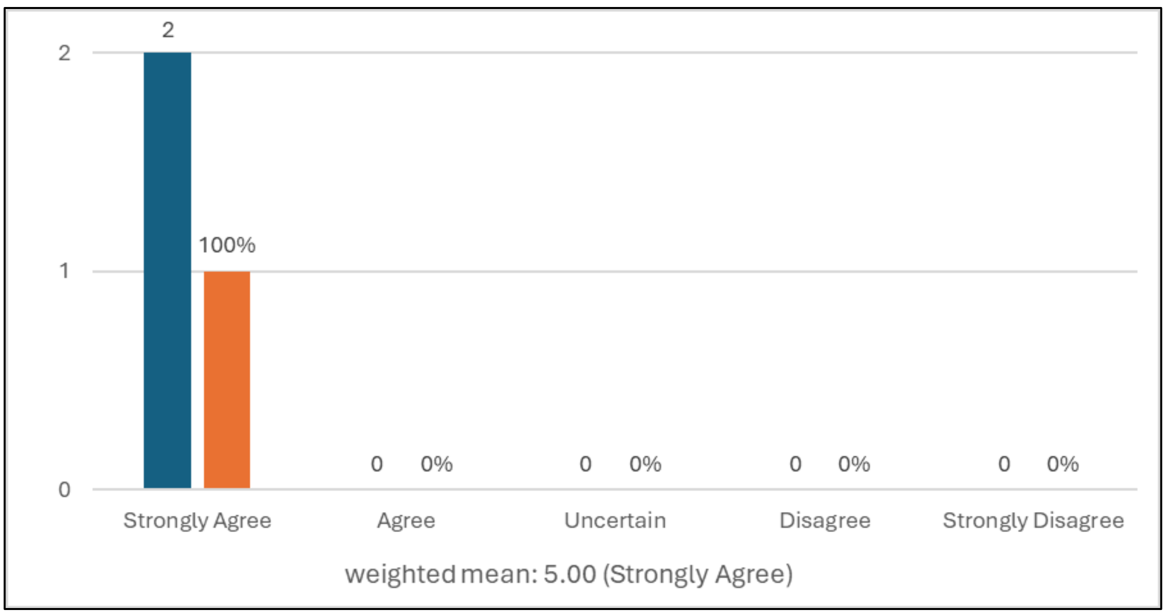
Figure 207. Switching between modules (payments, inventory, appointments) is simple.



As shown in Figure 207, 50% of the two (2) veterinary staff respondents strongly agree and 50% agree that switching between modules (payments, inventory, and appointments) is simple. With a weighted mean of 4.50 interpreted as “Strongly Agree,” the findings indicate that the system’s navigation and module integration were perceived as smooth and easy to manage during routine use. This suggests that PawSense AI supports efficient workflow continuity, allowing staff to move between operational tasks without unnecessary delays or confusion—an important requirement in clinic settings where time-sensitive coordination is common.

This result aligns with related literature emphasizing that integrated digital systems improve clinic efficiency when core functions are well-organized and accessible. Aldhubayb and Aldhubaib (2020) noted that veterinary clinic digital solutions enhance service delivery by streamlining essential processes such as scheduling and record handling, which depends on seamless access across system components. In addition, Khalil and Serhier (2023) identified perceived ease of use as a key factor influencing acceptance of e-appointment systems, reinforcing that simple navigation strengthens user confidence and continued use. These studies support the strong agreement observed, indicating that module switching simplicity contributes to the system's overall operational usability in PawSense AI.

Figure 208. Buttons and labels clearly indicate what they do.

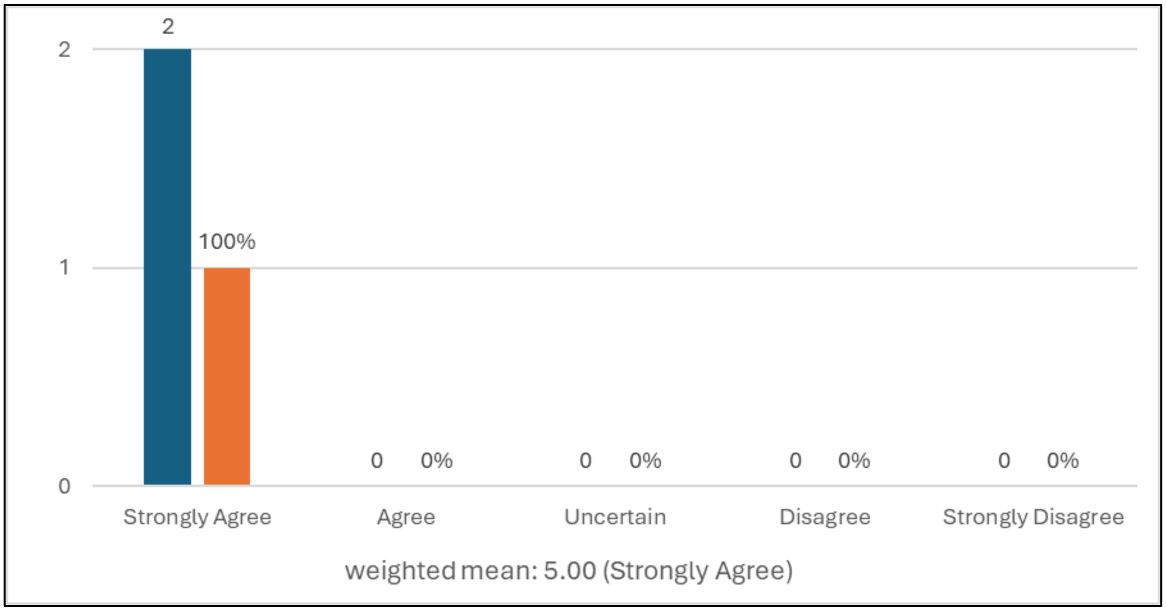


As shown in Figure 208, 100% of the two (2) veterinary staff respondents strongly agree that buttons and labels clearly indicate what they do. With a weighted mean of 5.00

interpreted as “Strongly Agree,” the findings indicate unanimous staff confirmation that the system’s interface elements are clear and understandable during use. This suggests that PawSense AI reduces ambiguity in performing tasks because staff can easily recognize functions through properly labeled controls, which supports faster navigation and lowers the likelihood of operational errors in routine clinic processes.

This result is supported by literature emphasizing that clarity and simplicity in system interaction improves user satisfaction and acceptance in veterinary-related digital platforms. Yeow and Kamaludin (2023) reported high user satisfaction with a pet care management system due to its simple operations and efficient performance, implying that clear interface design strengthens usability and confidence. In addition, Khalil and Serhier (2023) identified perceived ease of use as a major factor influencing acceptance of e-appointment systems, reinforcing that users are more likely to trust and adopt a platform when system controls are intuitive and clearly presented. These findings align with the unanimous agreement observed, indicating that clear button and label design contributes meaningfully to PawSense AI’s usability for clinic staff.

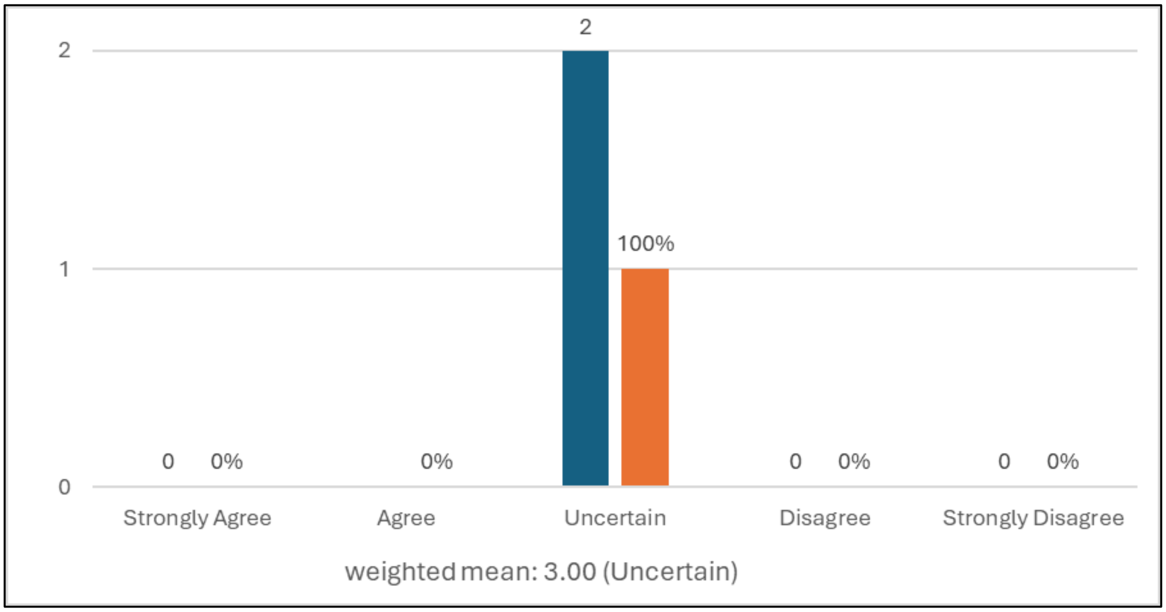
Figure 209. Instructions and tooltips help me understand how to use features.



As shown in Figure 209, 100% of the two (2) veterinary staff respondents strongly agree that the system's instructions and tooltips help them understand how to use its features. With a weighted mean of 5.00 interpreted as "Strongly Agree," the findings indicate unanimous staff confirmation that built-in guidance supports smoother feature usage and reduces confusion during task completion. This suggests that PawSense AI promotes easier learning and navigation by providing immediate clarifications within the interface, which is especially important in clinic settings where staff must operate multiple modules efficiently.

This finding aligns with literature emphasizing that usability and user confidence improve when digital systems provide clear support mechanisms that make functions easier to learn and execute. Khalil and Serhier (2023) identified perceived ease of use as a major factor influencing acceptance of e-appointment systems, implying that guidance features such as instructions contribute to stronger user readiness and satisfaction. In addition, Bahri et al. (2022) discussed that electronic record systems often face implementation barriers due to insufficient training and user preparedness, reinforcing the value of embedded guidance that reduces dependence on external training. These studies support the unanimous agreement observed, indicating that tooltips and instructions in PawSense AI help strengthen usability and encourage more confident system use among veterinary staff.

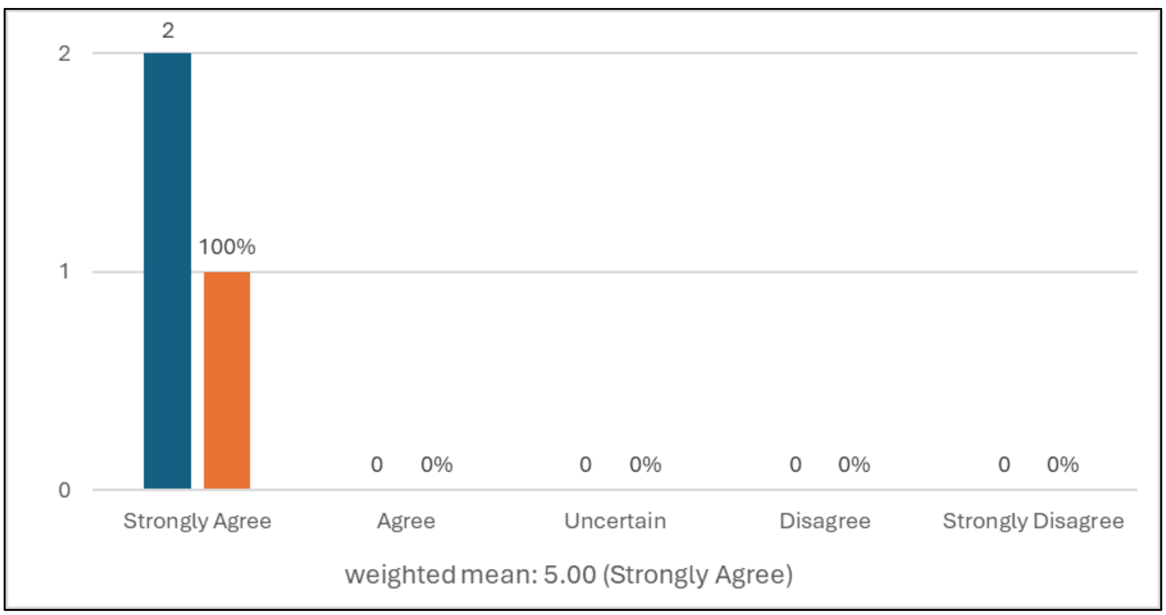
Figure 210. I can complete tasks efficiently without needing advanced technical knowledge.



As shown in Figure 210, 100% of the two (2) veterinary staff respondents were uncertain that they can complete tasks efficiently without needing advanced technical knowledge. With a weighted mean of 3.00 interpreted as “Uncertain,” the findings suggest that while PawSense AI may support clinic operations, the staff were not fully confident that task completion can remain consistently efficient without some level of technical familiarity. This may indicate that certain workflows (e.g., handling billing details, configuring inventory entries, or navigating record modules) still require an adjustment period, especially when users are transitioning from manual processes or are not regularly exposed to multi-module digital systems.

This result aligns with literature emphasizing that perceived ease of use and user readiness strongly influence acceptance and efficiency in digital healthcare platforms. Khalil and Serhier (2023) identified perceived ease of use as a major determinant of user acceptance in e-appointment systems, implying that uncertainty can occur when users feel additional learning is needed before the system becomes efficient to use. Likewise, Bahri et al. (2022) explained that electronic record management systems often face challenges due to inadequate training and organizational preparedness, which can reduce user confidence even if the system is beneficial. These studies support the staff's uncertainty, indicating that improving onboarding, role-based guidance, and short orientation sessions may strengthen efficiency perceptions and reduce the need for advanced technical familiarity when using PawSense AI.

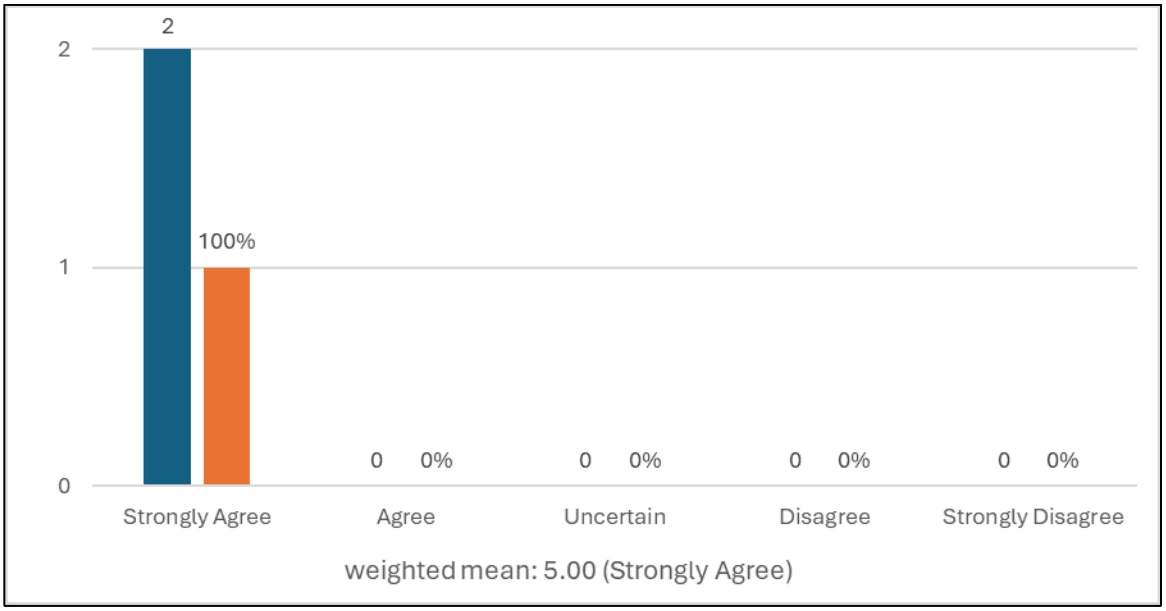
Figure 211. The system is always available when I need it.



As shown in Figure 211, 100% of the two (2) veterinary staff respondents strongly agree that the system is always available when they need it. With a weighted mean of 5.00 interpreted as “Strongly Agree,” the findings indicate unanimous staff confirmation that PawSense AI provides consistent accessibility during clinic operations. This suggests that the platform can be relied upon for routine tasks—such as checking schedules, updating records, or managing inventory—without interruptions that would normally slow down service delivery or disrupt workflow continuity.

This finding is supported by related literature emphasizing that digital veterinary and healthcare platforms must maintain availability and continuity to ensure efficient service delivery. Carlos et al. (2022) demonstrated that digital veterinary platforms were crucial in sustaining clinic operations during the COVID-19 period by enabling continuous access to services and health information through online systems. Similarly, Uy et al. (2023) reported that implementing digital record management improved administrative efficiency and reduced delays because information became readily accessible when needed. These studies align with the staff’s unanimous agreement in PawSense AI, indicating that consistent system availability is a key contributor to improved operational efficiency and dependable clinic performance.

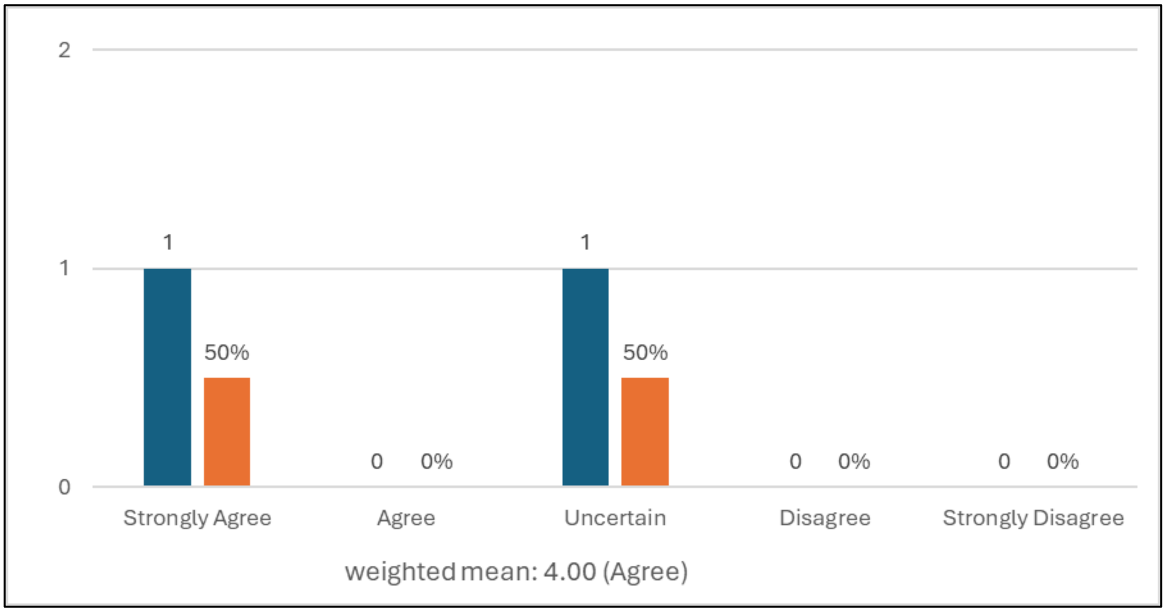
Figure 212. Sending SMS, email, or appointment confirmations works reliably.



As shown in Figure 212, 100% of the two (2) veterinary staff respondents strongly agree that sending SMS, email, or appointment confirmations works reliably. With a weighted mean of 5.00 interpreted as “Strongly Agree,” the findings indicate unanimous staff confirmation that the system consistently delivers communication outputs without failures or delays during use. This suggests that PawSense AI effectively supports dependable client coordination through automated confirmations and reminders, which are essential for reducing missed appointments, improving preparedness, wand maintaining smooth clinic-client interaction.

This finding is strongly supported by literature emphasizing that automated SMS and email notifications improve operational efficiency and service communication in veterinary and healthcare systems. Sari et al. (2023) reported that SMS and in-app notifications reduced uncertainty and enhanced client preparedness by providing timely service confirmations. Similarly, dvm360 (2021) explained that automated messaging streamlines administrative workflow and reduces errors by sending appointment-related instructions and updates ahead of visits. These studies align with the unanimous agreement observed among staff, indicating that reliable notification delivery in PawSense AI reinforces effective communication and supports more organized clinic operations.

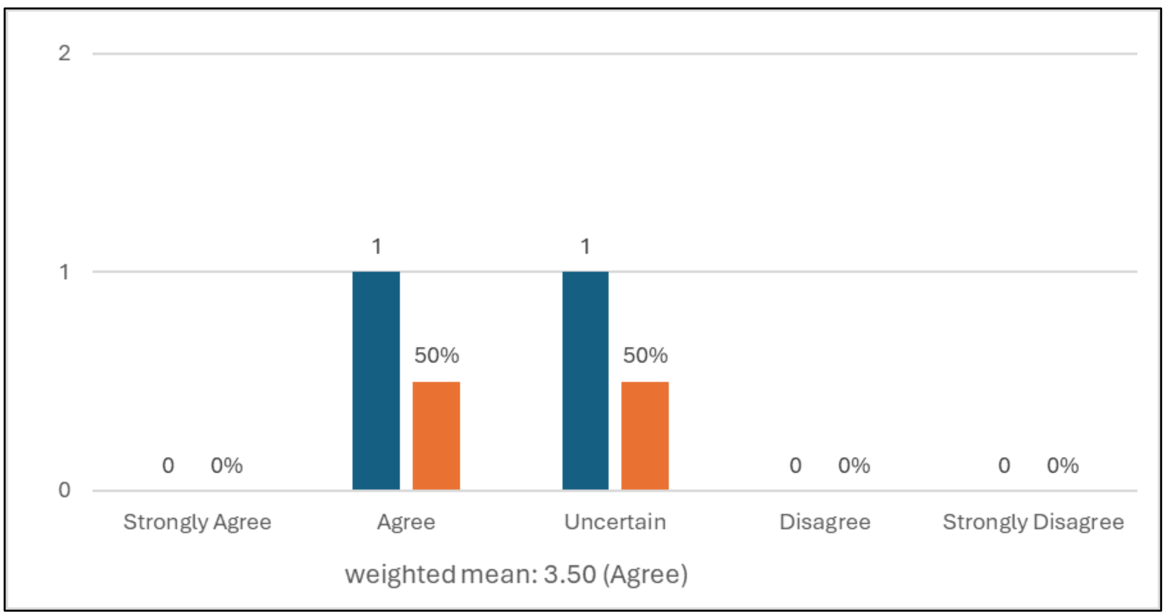
Figure 213. Data entries like supplies or pet info are saved without errors.



As shown in Figure 213, 50% of the two (2) veterinary staff respondents strongly agree and 50% are uncertain that data entries such as supplies or pet information are saved without errors. With a weighted mean of 4.00 interpreted as “Agree,” the findings indicate a generally positive assessment of the system’s data-saving accuracy, yet with a notable level of hesitation among staff. This uncertainty may reflect cautiousness due to the high importance of accurate encoding in clinic operations, where even minor saving issues (e.g., incomplete fields, accidental duplication, or connectivity-related delays) can affect inventory monitoring and patient record integrity.

This outcome is supported by literature emphasizing that digital inventory and record systems improve accuracy, but user confidence can still be influenced by implementation conditions and readiness. Tanaman et al. (2023) reported that adopting a web-based inventory system improved data accuracy and operational performance compared with manual tracking, supporting the positive agreement that PawSense AI can minimize encoding errors. However, Bahri et al. (2022) highlighted that electronic record management systems often face challenges such as insufficient training and system integration issues, which can lead to uncertainty even when the platform is functional. These studies align with the present findings, suggesting that strengthening validation controls, providing brief staff orientation, and ensuring consistent system stability can further increase confidence that entries are saved correctly every time.

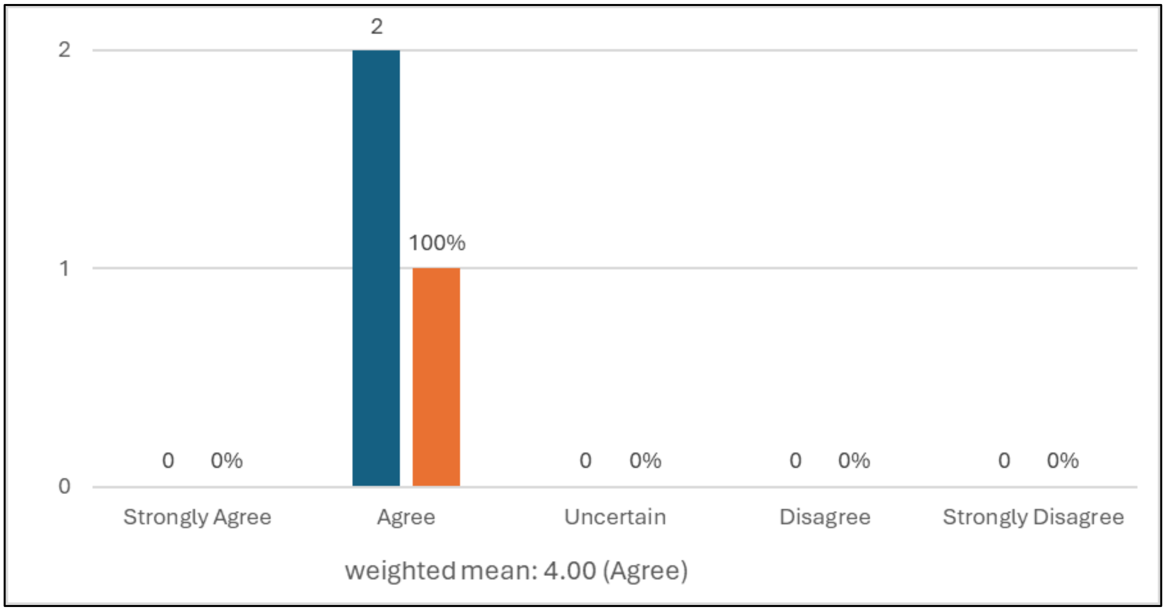
Figure 214. The system performs consistently even during busy hours.



Based on Figure 214, 50% of the two (2) veterinary staff respondents agree and 50% are uncertain that the system performs consistently even during busy hours. With a weighted mean of 3.50 interpreted as “Agree,” the findings suggest that PawSense AI generally maintained acceptable performance under peak conditions, yet staff confidence was not fully established. The equal uncertainty may indicate that respondents have limited exposure to high-traffic usage scenarios, or they remain cautious because system responsiveness during busy periods is highly dependent on factors such as network stability, concurrent users, and workload volume.

This result is consistent with performance-related literature stressing that system acceptance and operational trust are influenced by stable execution under real-world conditions. Mayor (2021) reported that users accept appointment systems more strongly when usability and performance criteria are met, underscoring the importance of consistent responsiveness to sustain confidence. Similarly, Ala et al. (2023) emphasized that appointment scheduling systems in high-demand environments benefit from efficiency-focused approaches that balance service capacity and user demand to reduce bottlenecks. These studies support the present finding by reinforcing that while PawSense AI achieved a positive performance evaluation, further optimization and monitoring during peak usage can help reduce uncertainty and strengthen staff confidence in the system’s consistency.

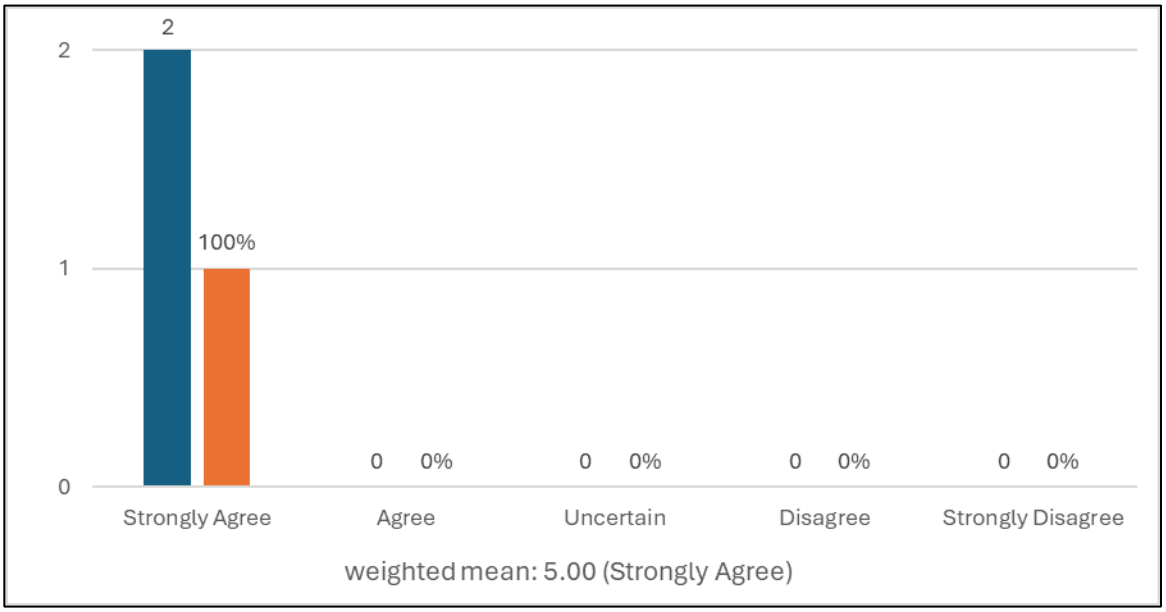
Figure 215. I rarely experience loading delays or glitches.



As shown in Figure 215, 100% of the two (2) veterinary staff respondents agree that the system performs consistently even during busy hours. With a weighted mean of 4.00 interpreted as "Agree," the findings indicate that staff generally experienced stable system performance despite higher workload conditions, suggesting that PawSense AI can support clinic operations without major slowdowns when demand increases. The absence of "strongly agree" responses, however, may imply that while the system remains functional during peak periods, staff may still anticipate occasional performance limitations or have not yet observed enough high-volume scenarios to express stronger confidence.

This finding is supported by Mayor (2021), who evaluated an appointment scheduling system using software quality criteria and found strong user acceptance when usability and performance were maintained, reinforcing that stable performance is essential for continued system trust. In addition, Yeow and Kamaludin (2023) reported high satisfaction with a veterinary-related management system due to its efficient performance and simple operations, indicating that consistent execution of tasks contributes to perceived reliability in clinic environments. These studies align with the staff's agreement in PawSense AI, emphasizing that maintaining stable performance under operational pressure is a key indicator of system effectiveness in real-world clinic workflows.

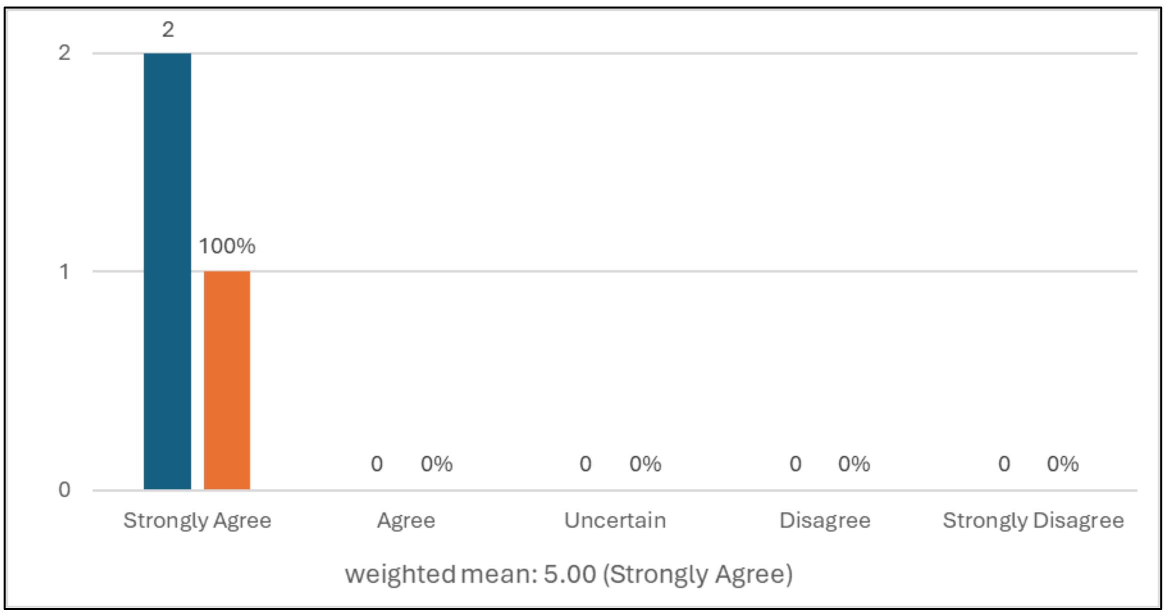
Figure 216. My user role limits what I can access, helping protect sensitive data.



As shown in Figure 216, 100% of the two (2) veterinary staff respondents strongly agree that their user role limits what they can access, helping protect sensitive data. With a weighted mean of 5.00 interpreted as "Strongly Agree," the findings indicate unanimous staff recognition that role-based access restrictions strengthen privacy by ensuring that only authorized personnel can view or manage confidential clinic information. This suggests that PawSense AI supports clearer boundaries in system use, reducing unnecessary exposure of client and patient records and reinforcing responsible handling of sensitive data within daily operations.

This result is supported by security-focused literature emphasizing that access controls and strengthened authentication mechanisms are essential in protecting healthcare-related systems from unauthorized exposure. Suleski et al. (2023) highlighted that layered security measures such as multi-factor authentication (MFA) reduce the risk of unauthorized access, particularly in environments handling sensitive health records. In addition, Jin et al. (2021) demonstrated that account ecosystems can become vulnerable when weaker access points expose personal identifiers, reinforcing the importance of restricting access through stronger controls and limiting privileges. These studies align with the unanimous agreement observed, indicating that role-based limitations in PawSense AI contribute to stronger data protection and improved confidence in system security.

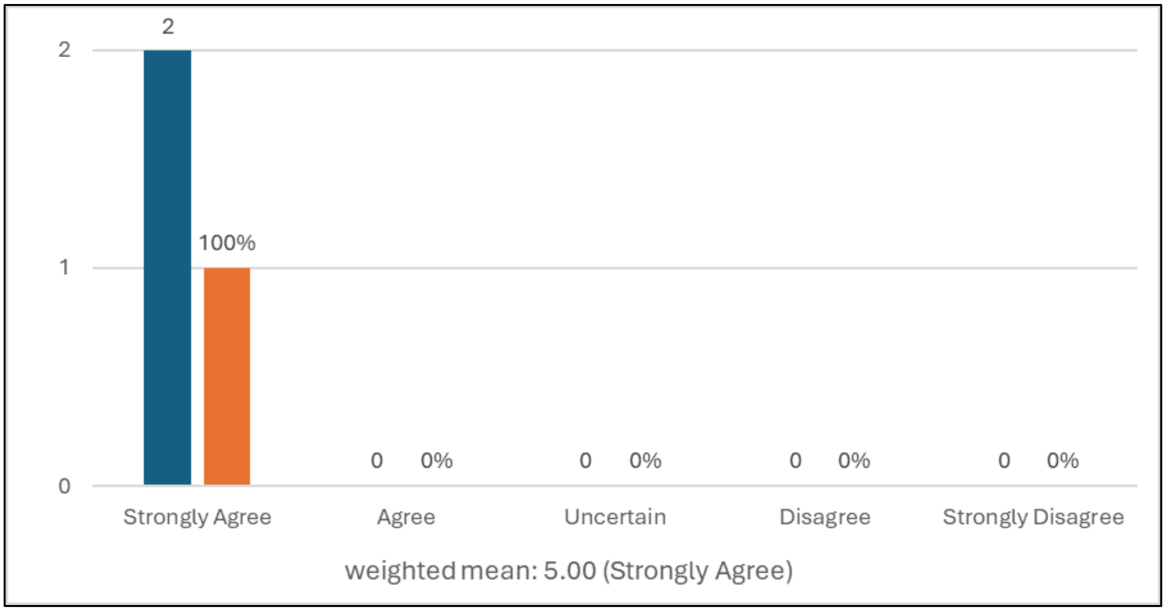
Figure 217. Unauthorized access to clinic or client information is prevented.



As shown in Figure 217, 100% of the two (2) veterinary staff respondents strongly agree that unauthorized access to clinic or client information is prevented. With a weighted mean of 5.00 interpreted as "Strongly Agree," the findings indicate unanimous staff confidence that PawSense AI effectively safeguards confidential records from being accessed by individuals without proper authorization. This suggests that the system's security controls support privacy protection for both clinic operations and client data, which is essential in maintaining trust and ensuring responsible handling of sensitive veterinary information.

This finding is supported by Suleski et al. (2023), who emphasized that healthcare information systems require stronger security mechanisms, particularly multi-factor authentication (MFA), to reduce the likelihood of unauthorized access despite increasing cyber threats. In addition, Jin et al. (2021) demonstrated that unauthorized access risks increase when interconnected services rely on weaker protection methods, enabling chained compromises that expose personal identifiers and account details. These studies reinforce the staff's strong agreement by underscoring that preventing unauthorized access requires layered defenses and strict access control, which aligns with the security perception observed in PawSense AI.

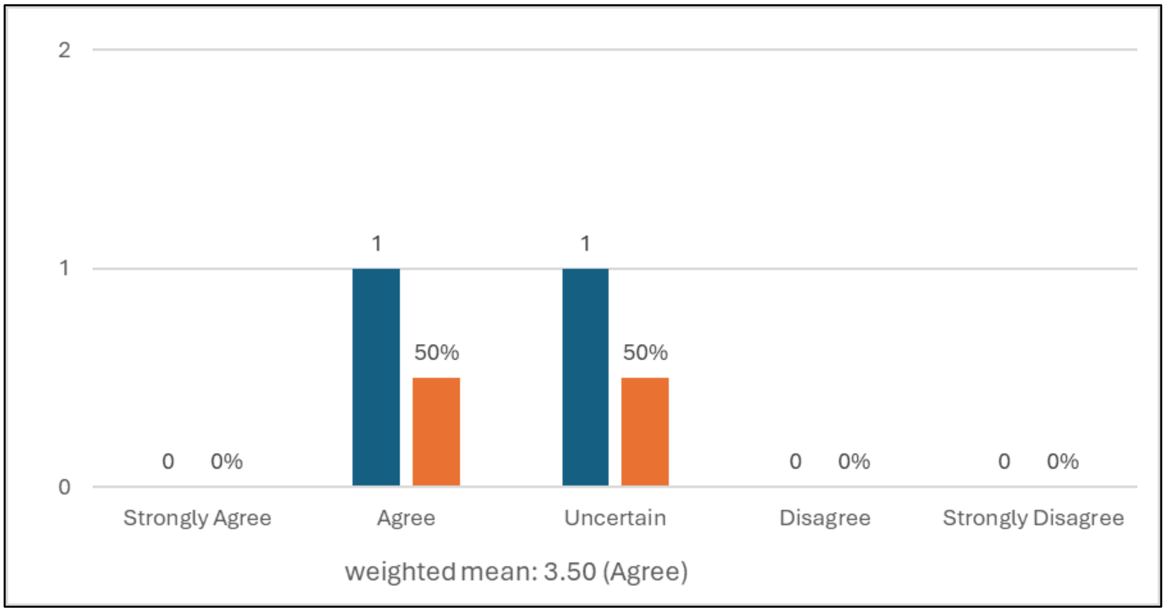
Figure 218. I trust the system to secure personal and business records.



As shown in Figure 218, 100% of the two (2) veterinary staff respondents strongly agree that they trust the system to secure personal and business records. With a weighted mean of 5.00 interpreted as "Strongly Agree," the findings indicate unanimous staff confidence that PawSense AI protects sensitive clinic information, including both client-related records and operational data. This suggests that the platform's security design is perceived as dependable for safeguarding information that is critical to clinic continuity, professional accountability, and client trust.

This result is supported by literature emphasizing that secure record management and strengthened authentication are essential for systems handling sensitive healthcare data. Nuhu et al. (2024) highlighted that integrating information systems into record management improves data integrity and operational efficiency, but long-term effectiveness depends on investments in security features and system upkeep. In addition, Suleski et al. (2023) emphasized that multi-factor authentication (MFA) significantly reduces unauthorized access risks in healthcare information systems, strengthening user trust in the protection of stored records. These studies align with the unanimous agreement observed in PawSense AI, indicating that strong security controls and reliable record protection contribute directly to staff trust in the system's ability to secure personal and business records.

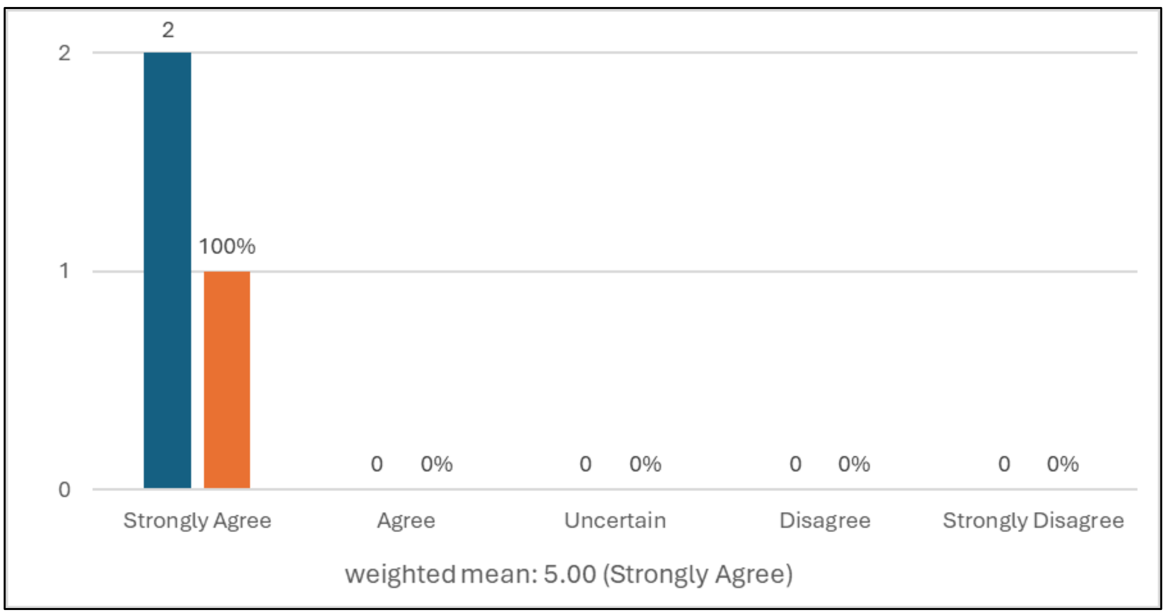
Figure 219. Login details are protected and not easily breached.



As shown in Figure 219, 50% of the two (2) veterinary staff respondents agree and 50% are uncertain that login details are protected and not easily breached. With a weighted mean of 3.50 interpreted as "Agree," the findings indicate a moderately positive perception of login security, but with a clear level of hesitation among staff. This uncertainty may reflect heightened awareness that login protection depends on multiple safeguards beyond passwords alone (e.g., authentication layers, recovery mechanisms, and user practices), which can lead staff to withhold full confidence unless security controls are clearly strengthened and consistently communicated.

This result is supported by security literature emphasizing that healthcare-related platforms require robust authentication to reduce account compromise risks. Suleski et al. (2023) stressed that multi-factor authentication (MFA) is critical in preventing unauthorized access even when passwords are exposed through phishing or brute-force attacks. Moreover, Jin et al. (2021) highlighted vulnerabilities in interconnected online accounts, showing that weaker authentication routes, particularly SMS-based verification, can enable chained compromises that expose credentials and personal identifiers. These studies align with the staff's mixed agreement and uncertainty, reinforcing that improving authentication strength and clarifying security protections are essential to increasing confidence that login details are not easily breached in PawSense AI.

Figure 220. Data is backed up and protected against loss or tampering.



As shown in Figure 220, 100% of the two (2) veterinary staff respondents strongly agree that data is backed up and protected against loss or tampering. With a weighted mean of 5.00 interpreted as “Strongly Agree,” the findings indicate unanimous staff confidence that PawSense AI safeguards clinic information through protective measures that preserve data availability and integrity. This suggests that the system is perceived as dependable for maintaining continuous access to critical records even in situations involving accidental deletion, system interruptions, or potential unauthorized modifications, an essential requirement for ensuring operational continuity and accountability in veterinary practice.

This result aligns with record management literature emphasizing that effective electronic record systems must prioritize data integrity, protection, and long-term reliability. Nuhu et al. (2024) highlighted that information systems embedded in record management improve operational efficiency and reduce redundancy, but sustained effectiveness requires strong security controls and system maintenance to protect data integrity. Similarly, Dela et al. (2023) reported that a records tracking management system achieved strong evaluations in reliability, underscoring that protecting records against loss or alteration is a key indicator of system quality. These studies support the unanimous agreement observed in PawSense AI, indicating that reliable backup and anti-tampering protections contribute directly to staff trust in the system’s capability to preserve sensitive clinic data.

Table 6

Evaluation by the Clients of the System's Functionality

Statements on Functionality	Weighted Mean	Verbal Interpretation
1. Booking appointments through the system is easy.	4.58	Strongly Agree
2. I can clearly view my pet's medical records and details.	4.51	Strongly Agree
3. Online notifications and reminders work properly.	4.44	Strongly Agree
4. Online payments process smoothly and accurately.	4.38	Strongly Agree
5. The AI chatbot in the system provides helpful and responsive assistance when I book appointments or encounter issues.	4.35	Strongly Agree
Overall Weighted Mean	**4.45**	**Strongly Agree**

Table 6 presents the clients' evaluation of the developed system's functionality, showing an overall weighted mean of 4.45, verbally interpreted as "Strongly Agree." The results indicate that pet owners perceived PawSense AI as highly functional across its core services. Among the indicators, respondents strongly agreed that booking appointments is easy (4.58), suggesting that the scheduling process is simple and convenient for users. High ratings were also recorded for the ability to clearly view pets' medical records and details (4.51), reflecting satisfaction with record accessibility and transparency. In addition, respondents strongly agreed that online notifications and reminders work properly (4.44) and that online payments process smoothly and accurately (4.38), indicating that communication and transaction-related features were perceived as reliable and supportive of a smooth service experience. Lastly, the AI-powered chatbot was also rated positively

(4.35), showing that users generally found it helpful and responsive when booking appointments or encountering issues.

Table 7

Evaluation by the Veterinarians of the Developed System's Functionality

Statements on Functionality	Weighted Mean	Verbal Interpretation
1. The system allows me to access and update pet medical records efficiently.	4.38	Strongly Agree
2. Appointment scheduling is accurate and works as intended.	4.77	Strongly Agree
3. I can perform all necessary clinical tasks without technical issues.	4.23	Strongly Agree
4. The system provides the essential features needed for my job responsibilities.	4.38	Strongly Agree
5. The features function smoothly during clinical operations.	4.23	Strongly Agree
Overall Weighted Mean	**4.40**	**Strongly Agree**

Table 7 summarizes the veterinarians' assessment of the developed system's functionality, yielding an overall weighted mean of 4.40, which is verbally interpreted as "Strongly Agree." This indicates that the veterinary staff perceived PawSense AI as highly functional and suitable for supporting routine clinical operations. The highest-rated indicator was that appointment scheduling is accurate and works as intended (4.77), suggesting strong confidence in the reliability of the scheduling module for managing daily clinic flow.

Respondents also strongly agreed that the system enables them to access and update pet medical records efficiently (4.38) and that it provides the essential features needed for their job responsibilities (4.38), reflecting the system's effectiveness in supporting documentation and core professional tasks. Moreover, positive evaluations were recorded for the ability to perform necessary clinical tasks without technical issues (4.23) and that features function smoothly during clinical operations (4.23), indicating stable feature performance during actual use. Overall, these findings suggest that PawSense AI delivers the necessary functional components to facilitate veterinary work processes effectively and reliably.

Table 8

Evaluation by the Veterinary staff of the Developed System's Functionality

Statements on Functionality	Weighted Mean	Verbal Interpretation
1. The system simplifies my daily tasks like managing inventory and appointments.	5.00	Strongly Agree
2 I can quickly send notifications and access necessary records.	5.00	Strongly Agree
3. All features used for clinic operations are present and functional.	4.50	Strongly Agree
4. Billing, scheduling, and inventory tools function properly.	4.50	Strongly Agree
5. The system helps reduce manual work in operations.	5.00	Strongly Agree
Overall Weighted Mean	**4.80**	**Strongly Agree**

Table 8 presents the veterinary staff's evaluation of the developed system's functionality, reporting an overall weighted mean of 4.80, verbally interpreted as "Strongly Agree." This indicates that staff members regarded PawSense AI as highly functional in supporting day-to-day clinic operations, particularly in reducing workload and improving task efficiency. The highest ratings were recorded for the statements that the system simplifies daily tasks such as managing inventory and appointments (5.00), enables staff to quickly send notifications and access necessary records (5.00), and reduces manual work in operations (5.00), reflecting strong agreement that the platform streamlines routine administrative and clinical coordination tasks.

In addition, staff strongly agreed that all features used for clinic operations are present and functional (4.50) and that billing, scheduling, and inventory tools function properly (4.50), suggesting that the system's essential modules are complete and reliably operational. Overall, the results imply that PawSense AI effectively supports workflow integration, minimizes manual processes, and strengthens operational efficiency within the clinic, making it a practical tool for veterinary staff in managing core service activities.

Table 9

Evaluation by the Clients of the System's Usability

Statements on Usability	Weighted Mean	Verbal Interpretation
1. The system is easy to use, even on a mobile device.	4.65	Strongly Agree
2. I can navigate without needing help from staff.	4.52	Strongly Agree
3. Viewing records and booking appointments issimple.	4.44	Strongly Agree
4. Buttons, labels, andinstructions are easy tounderstand.	4.59	Strongly Agree
5. Pages load and display information clearly.	4.65	Strongly Agree
Overall Weighted Mean	**4.57**	**Strongly Agree**

Table 9 presents the clients' evaluation of the developed system's usability, yielding an overall weighted mean of 4.57, verbally interpreted as "Strongly Agree." The results indicate that clients perceived PawSense AI as highly usable and easy to interact with across different features and devices. Among the indicators, respondents strongly agreed that the system is easy to use even on a mobile device and that pages load and display information clearly, both obtaining the highest weighted mean of 4.65, suggesting that accessibility and system clarity were among the strongest aspects of the platform. High ratings were also recorded for the clarity of buttons, labels, and instructions (4.59), reflecting that the interface design supports intuitive interaction.

Furthermore, respondents strongly agreed that they could navigate the system without needing assistance from staff (4.52), indicating that the system promotes user independence and minimizes the need for external support. Viewing records and booking appointments were also rated favorably (4.44), demonstrating that core tasks can be performed with ease and efficiency. Overall, these findings suggest that the system's usability features effectively support a positive user experience, enabling clients to interact confidently with the platform and complete essential tasks smoothly, thereby reinforcing PawSense AI as a user-friendly and accessible veterinary management system.

Table 10

Evaluation by the Veterinarians of the Developed System's Usability

Statements on Usability	**Weighted Mean**	**Verbal Interpretation**
1. The user interface is intuitive and easy to learn.	4.54	Strongly Agree
2. The system layout makes it easy to find the tools I need.	4.38	Strongly Agree
3. Navigation through different modules is smooth and organized.	4.54	Strongly Agree
4. Minimal training was required to use the system confidently.	4.00	Agree
5. Icons, labels, and buttons are clear and understandable.	4.62	Strongly Agree
Overall Weighted Mean	**4.42**	**Strongly Agree**

Table 10 presents the veterinarians' evaluation of the developed system's usability, with an overall weighted mean of 4.42, verbally interpreted as "Strongly Agree." The findings indicate that veterinary staff perceived PawSense AI as user-friendly, well-structured, and easy to operate during clinical tasks. Among the indicators, the highest rating was given to the clarity of icons, labels, and buttons (4.62), suggesting that interface elements are easy to understand and support accurate system use. Veterinarians also strongly agreed that the user interface is intuitive and easy to learn (4.54) and that navigation across modules is smooth and organized (4.54), reflecting that the system flow and module arrangement help users move efficiently between functions.

In addition, the system layout received a high weighted mean of 4.38 (Strongly Agree), indicating that most respondents could easily locate the tools they needed. Meanwhile, the item on minimal training required to use the system confidently obtained a weighted mean of 4.00 (Agree), showing that although the system is generally easy to use, some orientation or short familiarization may still be beneficial for veterinary staff. Overall, the results suggest that PawSense AI supports efficient and confident system use among veterinarians through clear interface design and organized navigation, strengthening its usability within a clinical setting.

Table 11

Evaluation by the Veterinary staff of the Developed System's Usability

Statements on Usability	**Weighted Mean**	**Verbal Interpretation**
1. The system is user-friendly and doesn't require technical knowledge.	3.00	Uncertain
2. Switching between modules (payments, inventory, appointments) is simple.	4.50	Strongly Agree
3. Buttons and labels clearly indicate what they do.	5.00	Strongly Agree
4. Instructions and tooltips help me understand how to use features.	5.00	Strongly Agree
5. I can complete tasks efficiently without needing advanced technical knowledge.	3.00	uncertain
Overall Weighted Mean	**4.10**	**Strongly Agree**

Table 11 presents the veterinary staff's evaluation of the developed system's usability, with an overall weighted mean of 4.10, verbally interpreted as "Strongly Agree." This indicates that, in general, the veterinary staff viewed PawSense AI as usable and supportive of their daily tasks. Among the indicators, the highest ratings were given to the clarity of buttons and labels (5.00) and the usefulness of instructions and tooltips (5.00), both verbally interpreted as Strongly Agree. These results suggest that the system provides clear guidance and well-defined interface elements, helping staff understand system functions with ease.

Furthermore, respondents strongly agreed that switching between modules such as payments, inventory, and appointments is simple (4.50), highlighting the system's efficient module integration and workflow continuity. However, two indicators—being user-friendly without requiring technical knowledge (3.00) and completing tasks efficiently without advanced technical knowledge (3.00)—were verbally interpreted as Uncertain. This implies that while the interface and guidance features are clear, some staff may still feel unsure about using the system independently without prior familiarity or technical confidence. Overall, the findings suggest that PawSense AI demonstrates strong usability features for veterinary staff, particularly in interface clarity and system guidance, while also indicating the need for brief orientation or training to further enhance user confidence and task efficiency.

Table 12

Evaluation by the clients of the Developed System's Reliability

Statements on Reliability	**Weighted Mean**	**Verbal Interpretation**
1. The system is available whenever I try to access it.	4.71	Strongly Agree
2. I do not experience errors when booking appointments.	4.47	Strongly Agree
3. Notifications and updates arrive consistently.	4.42	Strongly Agree
4. My pet's records load without delays or missing data.	4.49	Strongly Agree
5. The system works smoothly every time I use it.	4.51	Strongly Agree
Overall Weighted Mean	**4.52**	**Strongly Agree**

The results shown in Table 12 reflect the clients' assessment of the developed system's reliability, with an overall weighted mean of 4.52, verbally interpreted as "Strongly Agree." This indicates that pet owners generally viewed PawSense AI as a dependable platform that performs consistently during routine use. The highest-rated item was that the system is available whenever they try to access it (4.71), suggesting strong confidence in system accessibility. Similarly, respondents strongly agreed that the system works smoothly every time they use it (4.51), reinforcing perceptions of stable performance across repeated interactions.

Other indicators also received consistently high ratings, including the ability to use the system without encountering problems when booking appointments (4.47) and the assurance that pet records load without delays or missing data (4.49), reflecting trust in both transaction reliability and data completeness. In addition, respondents strongly agreed that notifications and updates arrive consistently (4.42), indicating dependable communication support. Overall, these findings suggest that PawSense AI demonstrates reliable availability, stable performance, accurate record loading, and consistent updates—qualities that strengthen user trust and support an efficient client experience.

Table 13

Evaluation by the Veterinarians of the Developed System' Reliability

Statements on Reliability	Weighted Mean	Verbal Interpretation
1. The system runs smoothly during my work hours without crashing.	4.54	Strongly Agree
2. My changes (e.g., records, schedules) are saved correctly and consistently.	4.77	Strongly Agree
3. I rarely experience bugs or delays while using the system.	4.08	Agree
4. The system loads pages and functions without long delays.	4.31	Strongly Agree
5. Scheduled tasks and reminders work consistently as expected.	4.77	Strongly Agree
Overall Weighted Mean	**4.49**	**Strongly Agree**

Table 13 provides the veterinarians' evaluation of the developed system's reliability, yielding an overall weighted mean of 4.49, which is verbally interpreted as "Strongly Agree." This indicates that the veterinary respondents generally perceived PawSense AI as stable and dependable for supporting clinic operations during regular use. Notably, the highest ratings were recorded for the statements that changes (e.g., records and schedules) are saved correctly and consistently (4.77) and that scheduled tasks and reminders work consistently as expected (4.77), reflecting strong confidence in the system's consistency in handling updates and automated functions.

In addition, respondents strongly agreed that the system runs smoothly during work hours without crashing (4.54) and that pages and functions load without long delays (4.31), suggesting that system availability and responsiveness were perceived as reliable in practice. The only item interpreted slightly lower was that they rarely experience bugs or delays while using the system (4.08), which was still positive but verbally interpreted as "Agree." Overall, these results suggest that PawSense AI is viewed as a reliable platform in terms of stability, saving accuracy, automation consistency, and general responsiveness, while also indicating that continued refinement to further reduce occasional bugs or delays could strengthen reliability perceptions even more.

Table 14

Evaluation by the veterinary staff of the Developed System's Reliability

Statements on Reliability	**Weighted Mean**	**Verbal Interpretation**
1. The system is always available when I need it.	5.00	Strongly Agree
2. Sending SMS, email, or appointment confirmations works reliably.	5.00	Strongly Agree
3. Data entries like supplies or pet info are saved without errors.	4.00	Agree
4. The system performs consistently even during busy hours.	3.50	Agree
5. I rarely experience loading delays or glitches.	4.00	Agree
Overall Weighted Mean	**4.30**	**Strongly Agree**

As reflected in Table 14, the veterinary staff's assessment of the developed system's reliability produced an overall weighted mean of 4.30, verbally interpreted as "Strongly

Agree." This indicates that the staff generally regarded PawSense AI as reliable for supporting clinic operations, particularly in terms of accessibility and communication functions. The highest-rated indicators were that the system is always available when needed (5.00) and that sending SMS, email, or appointment confirmations works reliably (5.00), demonstrating strong confidence in system availability and the consistency of its notification features.

At the same time, several items received slightly lower, but still favorable ratings. The staff agreed that data entries such as supplies or pet information are saved without errors (4.00), that the system performs consistently during busy hours (3.50), and that they rarely experience loading delays or glitches (4.00). These results suggest that while the system is perceived as highly dependable in being accessible and delivering confirmations, there remains some reservation regarding performance stability under peak workload conditions and the absolute consistency of saving and loading operations. Overall, the findings imply that PawSense AI is considered reliable by staff, with opportunities for further optimization focused on minimizing delays and ensuring stable performance during high-demand periods.

Table 15

Evaluation by the clients of the Proposed System's Security

Statements on Security	Weighted Mean	Verbal Interpretation
1. My personal data and pet's information feel safe in the system.	4.40	Strongly Agree
2. I trust the login process to protect my account.	4.19	Agree
3. Payment information is securely handled.	4.19	Agree
4. I feel confident that my contact details are protected.	4.33	Strongly Agree
5. The system keeps my data private from unauthorized users.	4.38	Strongly Agree
Overall Weighted Mean	**4.30**	**Strongly Agree**

Table 15 outlines the clients' evaluation of the proposed system's security and indicates an overall weighted mean of 4.30, which is verbally interpreted as "Strongly Agree." This suggests that pet owners generally perceived PawSense AI as a secure platform for handling personal and pet-related information. The strongest security perceptions were reflected in the statements that personal data and pet information feel safe in the system (4.40) and that the system keeps data private from unauthorized users (4.38), indicating a high level of confidence in privacy protection and access safeguarding. Respondents also strongly agreed that they feel confident their contact details are protected (4.33), further reinforcing positive perceptions regarding the protection of personal identifiers within the system.

However, two indicators were rated slightly lower and interpreted as “Agree,” specifically trust in the login process to protect accounts (4.19) and the belief that payment information is securely handled (4.19). While these results remain favorable, they may imply that some clients exercise greater caution toward authentication and payment-related processes, which are often viewed as higher-risk areas in online systems. Overall, the findings reflect strong client confidence in PawSense AI’s security features, while also suggesting that further strengthening and clearly communicating login and payment protections may help elevate user trust in these components.

Table 16

Evaluation by the veterinarian of the Proposed System’s Security

Statements on Security	**Weighted Mean**	**Verbal Interpretation**
1. Only authorized personnel can access sensitive pet and clinic information.	4.77	Strongly Agree
2. I feel confident that client and patient data are protected.	4.23	Strongly Agree
3. The login and access control system is secure and reliable.	4.38	Strongly Agree
4. The system protects confidential data from unauthorized use.	4.00	Agree
5. I can reset or recover my password easily when needed.	4.54	Strongly Agree
Overall Weighted Mean	**4.38**	**Strongly Agree**

Table 16 reports the veterinarians' evaluation of the proposed system's security, yielding an overall weighted mean of 4.38, which is verbally interpreted as "Strongly Agree." This indicates that the veterinary respondents generally viewed PawSense AI as secure in protecting clinic and patient information. The highest-rated indicator was the statement that only authorized personnel can access sensitive pet and clinic information (4.77), reflecting strong confidence in access restriction measures. High agreement was also observed for the ability to reset or recover passwords easily when needed (4.54), suggesting that the system supports secure yet usable account recovery procedures. In addition, veterinarians strongly agreed that the login and access control system is secure and reliable (4.38) and that client and patient data are protected (4.23), reinforcing positive perceptions of the platform's security controls.

One item obtained a comparatively lower rating where respondents agreed that the system protects confidential data from unauthorized use (4.00). This may imply that while access control and recovery mechanisms are perceived as strong, some respondents remain cautious about broader risks of unauthorized use that can occur through user-side factors or evolving cybersecurity threats. Overall, the findings suggest that PawSense AI is perceived by veterinarians as a secure system, particularly in enforcing authorized access and supporting reliable login and recovery processes, while also indicating that continued enhancement and transparency of confidentiality safeguards could further strengthen security confidence.

Table 17

Evaluation by the veterinary staff of the Proposed System's Security

Statements on Security	Weighted Mean	Verbal Interpretation
1. My user role limits what I can access, helping protect sensitive data.	5.00	Strongly Agree
2. Unauthorized access to clinic or client information is prevented.	5.00	Strongly Agree
3. I trust the system to secure personal and business records.	5.00	Strongly Agree
4. Login details are protected and not easily breached.	3.50	Agree
5. Data is backed up and protected against loss or tampering.	5.00	Strongly Agree
Overall Weighted Mean	**4.70**	**Strongly Agree**

Table 17 presents the veterinary staff's evaluation of the proposed system's security, with an overall weighted mean of 4.70, verbally interpreted as "Strongly Agree." This indicates that the staff generally perceived PawSense AI as highly secure in protecting clinic and client information through access controls and data protection measures. Four of the five indicators received the maximum rating, showing strong consensus that security features are well implemented. Specifically, staff strongly agreed that role-based access limits what they can access (5.00), that unauthorized access to clinic or client information is prevented (5.00), and that they trust the system to secure personal and business records (5.00). Likewise, they strongly agreed that data is backed up and protected against loss or tampering (5.00), indicating high confidence in both confidentiality and data integrity safeguards.

In contrast, the statement that login details are protected and not easily breached received a lower evaluation (3.50, “Agree”). While still positive, this suggests that staff may remain cautious about the risk of credential compromise, possibly due to broader cybersecurity awareness or the understanding that login security often depends on multiple layers (e.g., authentication strength, password practices, and recovery mechanisms). Overall, the results suggest that PawSense AI is viewed as highly secure by veterinary staff, particularly in enforcing access restrictions and protecting stored data, while also indicating that strengthening visible login protections may further improve confidence in account-level security.

Chapter 5

SUMMARY of FINDINGS, CONCLUSIONS, and RECOMMENDATIONS

This chapter will serve as the concluding chapter that integrates and synthesizes the major results of the study, drawing together the key insights derived from data analysis and system evaluation. This chapter will present a coherent summary of the study's outcomes, articulate the conclusions reached based on empirical evidence, and offer well-grounded recommendations, thereby providing a clear and comprehensive closure to the research and highlighting its overall contributions and implications.

Summary of Findings

The summary of findings provides a concise overview of the study's key outcomes. It highlights the results derived from the development, evaluation, and analysis of the system, focusing on its performance against the objectives set. The findings emphasize the system's evaluation based on ISO 25010 standards, showcasing its strengths in functionality, usability, reliability, and security. This summary offers a clear understanding of how the research objectives were achieved and the implications of the results.

Finding 1. The developed PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang Branch

Automated Clinic Management. The development and implementation of PawSense AI enabled the clinic to digitize and streamline key veterinary operations by integrating appointment scheduling, medical record management, inventory monitoring, notifications, and online payments into a single web-based platform. By transitioning essential processes from manual or paper-based methods to a centralized system, PawSense AI supports more organized handling of client and pet information while reducing common operational issues such as delayed record retrieval, repetitive encoding, and workflow inefficiencies.

Client Self-Service Appointment and System Guidance. PawSense AI provides a self-service appointment module where clients can independently book and manage their appointments through the system. In addition, the platform includes an AI chatbot that serves as an interactive guide to help users understand system features, navigation, and procedures. Importantly, the chatbot does not automatically create appointments; instead, it supports users by answering system-related questions and providing step-by-step guidance so clients can complete transactions on their own with greater confidence.

Improved Operational Efficiency and Service Support. The overall implementation of PawSense AI improves clinic operations by reducing manual administrative workload and enabling faster access to essential tools and records needed for service delivery. With dependable scheduling, accessible records, consistent notifications, and integrated transactions, veterinary staff can focus more on clinical responsibilities and patient care. Consequently, the system contributes to improved service efficiency and a more convenient experience for clients, supported by an AI-guided help feature that enhances user understanding of the platform.

Finding 2. The integrated intelligent technologies including an AI-powered chatbot for automated client assistance and predictive analytics

Enhanced Client Support and Responsiveness. The integration of an AI-powered chatbot strengthened client assistance at Animal House Alabang by delivering automated, immediate, consistent, and accessible responses to common inquiries and appointment-related concerns. By guiding clients through booking procedures and addressing common questions, the chatbot reduced reliance on clinic staff for basic support and improved the continuity of client communication, particularly during peak operating hours. This capability contributed to a smoother client experience by ensuring that assistance remained available even when personnel were engaged in clinical operations.

Improved Service Planning Through Predictive Insights. The inclusion of predictive analytics enhanced operational decision-making at Animal House Alabang by enabling the forecasting of both the probable number of clients and the expected pet services or treatments within a specified period, based on recorded appointment, transaction, and service patterns. Rather than relying solely on manual estimation, the system's predictive component provided an evidence-based foundation for planning, supporting more proactive preparation in scheduling, service readiness, and resource allocation in line with anticipated demand. This integrated forecasting capability allowed the clinic to anticipate workload levels, identify high-demand services, align staffing assignments, and prepare the necessary medical supplies in advance, thereby strengthening its capacity to manage projected workloads effectively and maintain consistent service delivery during periods of fluctuating client demand.

Strengthened Operational Efficiency and Decision Reliability. The combined deployment of intelligent technologies contributed to more organized and dependable service delivery at Animal House Alabang by complementing standard operational processes with automation and analytics-driven guidance. The AI-powered chatbot facilitated more timely completion of client-initiated tasks by minimizing delays in accessing necessary information and instructions, whereas predictive analytics enhanced the reliability of planning decisions by grounding them in system-generated projections of expected client volume and treatment type . Collectively, these integrated features demonstrated practical value in strengthening client assistance and reinforcing evidence-based operational management within the veterinary clinic setting.

Finding 3. The implemented secured role-based access and data management protocols that ensure the privacy, integrity, and protection of sensitive client and pet information

Secured Role-Based Access. The implementation of secured, role-based access in PawSense AI directly fulfills Objective 3, which focuses on ensuring the privacy and controlled handling of sensitive client and pet information. Through the Super Admin Dashboard, only the highest-privilege user can create and manage administrator accounts, regulate account actions such as archiving and deletion, and prevent unauthorized privilege escalation. This strengthens confidentiality and ensures that only properly authorized personnel can access protected records.

Protected Credential and Account Management. Objective 3 was further met through the Security & Privacy settings available to Super Admin and Admin users, where credential updates are performed using controlled workflows (e.g., current-password validation and confirmation fields). These features reduce the risk of account takeover and unauthorized credential changes while maintaining official verification details such as email and contact number. By enforcing secure credential management, PawSense AI improves integrity and preserves secure access to sensitive clinical data.

Controlled Data Visibility and Monitoring. The system supports Objective 3 by restricting information exposure based on user roles. Administrators can view operational summaries (e.g., appointment counts, client totals, trend visualizations) without unnecessarily revealing full medical details, while pet owners can only access their own summarized records and appointment information. This role-based visibility minimizes data leakage and supports privacy-preserving operations. Overall, the findings confirm that PawSense AI effectively implements access control, monitoring, and secure data handling practices aligned with recommended healthcare security measures in the related literature.

Finding 4. The evaluated the developed system based on ISO 25010 software quality characteristics, specifically functionality, usability, reliability, and security.

The developed system was evaluated by the veterinary staff and pet owners of Animal House Alabang based on selected ISO 25010 software quality characteristics, namely functionality, usability, reliability, and security. Structured survey questionnaires using a five-point Likert scale were administered to both respondent groups. For the functionality and security criteria, distinct questionnaires were provided to veterinary staff and pet owners to reflect their specific roles and system interactions. Meanwhile, the same set of questionnaires was used to evaluate usability and reliability, as these characteristics apply equally to all system users.

Functionality: The findings reveal that the veterinary staff expressed very high satisfaction with the system's functionality, with an overall weighted mean of 4.80, verbally interpreted as "Strongly Agree." The system was perceived as effective in supporting core clinic operations, particularly in managing appointments, maintaining records, and facilitating organized workflows. On the client side, pet owners likewise provided favorable ratings across the system's functional features, particularly those related to appointment booking, record viewing, and notification support, indicating that the platform meets user expectations in delivering essential services. Overall, the results confirm that PawSense AI demonstrates strong functional performance aligned with veterinary clinic requirements.

Usability: The usability evaluation indicates consistently positive feedback, with pet owners reporting an overall weighted mean of 4.57, verbally interpreted as "Strongly Agree." This suggests that users found the system easy to navigate and generally intuitive, enabling them to complete tasks such as booking appointments and accessing information with minimal difficulty. The results further imply that the interface design, labels, and task flow support a smooth user experience, reinforcing that the developed system is highly acceptable in terms of ease of use and accessibility for clients.

Reliability: Results for reliability show strong user approval, with pet owners rating the system with an overall weighted mean of 4.52, verbally interpreted as "Strongly Agree." This indicates that clients generally perceived the system as stable and dependable during use, particularly in terms of consistent access to features, accurate saving of transactions and appointments, and reliable delivery of system updates such as reminders or notifications. Although minor improvements may still be considered to further strengthen performance consistency during heavier usage, the findings overall suggest that the system operates reliably from the client perspective.

Security: The security evaluation reflects a high level of confidence in the system’s protection of sensitive information, with veterinary staff reporting an overall weighted mean of 4.70, verbally interpreted as “Strongly Agree.” This indicates that respondents trusted the system’s role-based access implementation and data handling safeguards, particularly in preventing unauthorized access and maintaining confidentiality of client and pet records. While one item related to the robustness of login security received a comparatively lower verbal interpretation than other indicators, the overall results still support that PawSense AI implements strong security measures suitable for veterinary clinic data management.

Conclusions

This study concludes that the development and implementation of PawSense AI: Smart Veterinary Clinic Management System effectively contributed to the modernization of veterinary clinic operations at Animal House Alabang Branch. The system demonstrated its capacity to unify essential clinic processes within a single web-based platform, enabling a more structured, organized, and technology-driven approach to managing veterinary services. Overall, the outcomes indicate that PawSense AI successfully fulfilled its intended purpose of improving how clinic operations are conducted while supporting both staff efficiency and client convenience.

The integration of intelligent technologies played a critical role in strengthening the system's overall impact. The combined use of an AI-powered chatbot and predictive analytics enhanced both client interaction and internal planning, allowing the clinic to respond more efficiently to client needs while preparing proactively for anticipated service demands. These intelligent features complemented the core system functions by reducing routine workload, supporting informed decision-making, and promoting continuity of service even during periods of high operational demand. As a result, PawSense AI demonstrated how automation and analytics can work together to reinforce effective clinic management.

In addition, the system's emphasis on security and controlled data handling underscored its suitability for managing sensitive veterinary information. The implementation of role-based access and structured account management ensured that confidentiality, integrity, and proper data use were maintained across different user roles. This approach reflects the system's alignment with established practices for safeguarding healthcare-related data and reinforces user trust in the platform as a secure environment for handling clinical records and transactions.

Finally, the overall evaluation based on ISO 25010 software quality characteristics confirmed that PawSense AI achieved a high level of acceptability among its intended users. The positive assessment across functionality, usability, reliability, and security indicates that the system not only performs its intended tasks effectively but also provides a dependable and user-friendly experience. Taken together, the findings support the conclusion that PawSense AI is a viable, scalable, and adaptable solution for veterinary clinic management, with strong potential for further enhancement and broader application in similar veterinary or healthcare settings.

Recommendations

AI-Assisted Appointment Form Completion and Intelligent Reminders. The system should enhance the AI chatbot by enabling auto pre-fill functionality for appointment forms while retaining user confirmation prior to submission. This feature may reduce encoding time and improve booking convenience by automatically suggesting client details, pet information, service type, and preferred schedule based on prior records and user inputs. In addition, intelligent reminders may be incorporated to provide timely prompts for upcoming appointments, follow-up visits, or required preparations, thereby strengthening client compliance and improving overall appointment attendance.

Expansion of Payment Options. The system should incorporate additional payment methods to accommodate clients with different transaction preferences and improve accessibility. Expanding beyond a single payment channel may increase the system's usability and flexibility, particularly for users who rely on alternative e-wallets, online banking, or other digital payment services. This improvement may also support a smoother payment experience and reduce barriers that could discourage appointment completion.

Direct API-Based GCash Payment Integration. The system should implement direct API-based integration for GCash payments to improve the accuracy and reliability of transaction validation. Compared to screenshot-based submission and verification, API integration may reduce processing delays, minimize user errors, and ensure real-time confirmation of payment details such as amount, reference number, recipient, and transaction status. This enhancement would strengthen the integrity of payment processing and improve user trust in the online payment feature.

Two-Factor Authentication with Trusted Device Option. The system should strengthen account protection by implementing Two-Factor Authentication (2FA), either on every login or through an optional “remember this device for 30 days” mechanism. Requiring 2FA per login can provide stronger protection against unauthorized access, while the trusted-device option may balance security with usability for frequent users. This recommendation supports stronger privacy safeguards, particularly given the sensitive nature of client and patient records handled by the system.

Multi-Branch Deployment and Evaluation Across Animal House Facilities. The system should be deployed and evaluated across multiple Animal House branches to assess scalability, consistency of performance, and adaptability to varying operational workflows. A multi-branch implementation may provide broader evidence of effectiveness and identify branch-specific requirements that can guide further refinement. This expansion would also strengthen the system’s potential for institutional adoption and establish its practicality as a unified clinic management solution for a multi-branch veterinary setting.

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APPENDICES

Appendix i – Letter of Approval of the Client

Republic of the Philippines
POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
SANTA ROSA CAMPUS
City of Santa Rosa, Laguna

To Whom It May Concern,

We are third-year BSIT students from Polytechnic University of the Philippines – Santa Rosa, currently taking Capstone 1. As part of our course requirement, we are conducting a research study and system development project titled "PawSense AI: AI-Driven Veterinary System for Smart Pet Health and Clinic Management."

With this, we would like to request your approval to use your veterinary clinic as the subject of our study. We also seek your permission to conduct surveys and interviews with your institution for research purposes. Kindly affix your signature below as a reference of your approval.

Rest assured that all gathered data will be handled with confidentiality and used solely for academic purposes. Thank you very much.

Sincerely yours,

ALIÑO, MARK B.
Student Researcher

ALTAR, JONLEE F.
Student Researcher

MENDOZA, SEAN DANIEL MARC S.
Student Researcher

MONDARES, VINCE LLOYD R.
Student Researcher

BAWAG, ROBB ROSHAN L.
Student Researcher

HAYNES, MELCHIZEDEK A.
Student Researcher

Noted by:
(Sgd) Mr. Owen Harvey Balocon
Facilitator, Capstone 1

Conforme: JOHN K. SANGAT D.T ADMIN. Animal House

Date Signed: MAY 21, 2025

PUP LCA Boulevard, Brgy. Tagapo, City of Santa Rosa, Laguna
Direct Line: 0961-8023780
Website:https://pupsrc101.school.blog/| Email: starosa@pup.edu.ph

THE COUNTRY'S 1st POLYTECHNICU

ISO 9001:2015 CERTIFIED
CERTIFICATE NUMBER: SCP000413Q

Appendix ii – Research Adviser's Acceptance Letter

Republic of the Philippines
POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
SANTA ROSA CAMPUS
City of Santa Rosa, Laguna

March 14, 2025

MS. ROSE ANN SAN PASCUAL
Senior High School Teacher
CITI Global College
Calamba Campus

Dear **Ms. SAN PASCUAL:**

We are the students under the program of Bachelor of Science in Information Technology currently taking up our subject, Capstone 1. As part of our requirement, we are obliged to have a research adviser. In line with this, we would like to propose to you the accepted topic that we want to pursue during this research.

1. PurrfectCare: AI-Driven Veterinary System for Smart Pet Health and Clinic Management
2. Unmaskify: AI Security System for Facial Obstruction Detection and Emergency Alert
3. ROAMify: Intelligent Motion Tracker for Employee Monitoring

Given your extensive background in the field of research and information technology, we would like to seek your guidance in crafting our paper and be our research adviser.

Your acceptance and positive response regarding this matter is highly appreciated. Thank you very much and God Bless.

Sincerely yours,

ALINO, MARK B.
Student Researcher

ALTAR, JONLEE F.
Student Researcher

BAWAG, ROBB ROSHAN L.
Student Researcher

MONDARES, VINCE LLOYD R.
Student Researcher

MENDOZA, SEAN DANIEL MARC S.
Student Researcher

HAYNES, MELCHIZEDEK A.
Student Researcher

Accepted and Approved:

MS. ROSE ANN SAN PASCUAL

Date Signed: March 14,2025

PUP LCA Boulevard, Brgy. Tagapo, City of Santa Rosa, Laguna
Direct Line: 0961-8023780
Website:https://pupsrc101.school.blog/| Email: starosa@pup.edu.ph

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Appendix iii. Proposal Defense Approval Form

Republic of the Philippines
POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
OFFICE OF THEVICE PRESIDENT FOR CAMPUSES
SANTA ROSA CAMPUS

APPLICATION FOR TITLE PROPOSAL
TITLE DEFENSE

Program	Bachelor of Science in Information Technology
Group No.	
Group Leader	Altar, Jonlee F.
Group Members	Aliño, Mark B. Bawag, Robb Rashan L. Haynes, Melchizedek A. Mendoza, Sean Daniel Marc S. Mondares, Vince Lloyd R.
Research Adviser	Ms. Rose Ann San Pascual - Rayon
Course/ Year/ Section	BSIT 3-1
Date Submitted	June 11, 2025

No	Proposed Titles	Methods of Research	Librarian Certification
1	PawSense AI: Smart Veterinary Clinic Management System for Animal House Alabang	Quantitative	[illegible] RL, MLIS

ACTION TAKEN

TOPIC APPROVED

Research Adviser	Faculty Expert	Program Coordinator

iv. Sample Data Gathering tools (with no answers)

Republic of the Philippines
POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
SANTA ROSA BRANCH
City of Santa Rosa, Laguna

SURVEY QUESTIONNAIRE

(Veterinarian's side)
Name (Optional): ____

Direction: Please read each statement carefully and check (✓) only one box that best shows your level of agreement:

5 – Most Likely: Strongly agree   4 – Likely: Agree   3 – Uncertain: Not sure
2 – Unlikely: Disagree   1 – Most Unlikely: Strongly disagree

Part 1

Functionality					
Statement	**1**	**2**	**3**	**4**	**5**
1 .The system allows me to access and update pet medical records efficiently.					
2. Appointment scheduling is accurate and works as intended.					
3. I can perform all necessary clinical tasks without technical issues.					
4. The system provides the essential features needed for my job responsibilities.					
5. The features function smoothly during clinical operations.					

Part 2

Usability					
Statement	**1**	**2**	**3**	**4**	**5**
1. The user interface is intuitive and easy to learn.					
2. The system layout makes it easy to find the tools I need.					
3. Navigation through different modules is smooth and organized.					
4. Minimal training was required to use the system confidently.					
5. Icons, labels, and buttons are clear and understandable.					

Part 3

Reliability					
Statement	**1**	**2**	**3**	**4**	**5**
1. The system runs smoothly during my work hours without crashing.					
2. My changes (e.g., records, schedules) are saved correctly and consistently.					
3. I rarely experience bugs or delays while using the system.					
4. The system loads pages and functions without long delays.					
5. Scheduled tasks and reminders work consistently as expected.					

Part 4

Security					
Statement	**1**	**2**	**3**	**4**	**5**
1. Only authorized personnel can access sensitive pet and clinic information.					
2. I feel confident that client and patient data are protected.					
3. The login and access control system is secure and reliable.					
4. The system protects confidential data from unauthorized use.					
5. I can reset or recover my password easily when needed.					

Republic of the Philippines
POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
SANTA ROSA BRANCH
City of Santa Rosa, Laguna

SURVEY QUESTIONNAIRE

(Veterinarians' Staff side)
Name (Optional): ____

Direction: Please read each statement carefully and check (✓) only one box that best shows your level of agreement:

5 – Most Likely: Strongly agree
4 – Likely: Agree
3 – Uncertain: Not sure
2 – Unlikely: Disagree
1 – Most Unlikely: Strongly disagree

Part 1

Functionality					
Statement	**1**	**2**	**3**	**4**	**5**
1. The system simplifies my daily tasks like managing inventory and appointments.					
2. I can quickly send notifications and access necessary records.					
3. All features used for clinic operations are present and functional.					
4. Billing, scheduling, and inventory tools function properly.					
5. The system helps reduce manual work in operations.					

Part 2

Usability					
Statement	**1**	**2**	**3**	**4**	**5**
1. The system is user-friendly and doesn't require technical knowledge.					
2. Switching between modules (payments, inventory, appointments) is simple.					
3. Buttons and labels clearly indicate what they do.					
4. Instructions and tooltips help me understand how to use features.					
5. I can complete tasks efficiently without needing advanced technical knowledge.					

Part 3

Reliability					
Statement	**1**	**2**	**3**	**4**	**5**
1. The system is always available when I need it.					
2. Sending SMS, email, or appointment confirmations works reliably.					
3. Data entries like supplies or pet info are saved without errors.					
4. The system performs consistently even during busy hours.					
5. I rarely experience loading delays or glitches.					

Part 4

Security					
Statement	**1**	**2**	**3**	**4**	**5**
1. My user role limits what I can access, helping protect sensitive data.					
2.Unauthorized access to clinic or client information is prevented.					
3. I trust the system to secure personal and business records.					
4. Login details are protected and not easily breached.					
5. Data is backed up and protected against loss or tampering.					

Republic of the Philippines
POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
SANTA ROSA BRANCH
City of Santa Rosa, Laguna

SURVEY QUESTIONNAIRE

(Customer side)
Name (Optional): ____

Direction: Please read each statement carefully and check (✓) only one box that best shows your level of agreement:

5 – Most Likely: Strongly agree   4 – Likely: Agree   3 – Uncertain: Not sure
2 – Unlikely: Disagree   1 – Most Unlikely: Strongly disagree

Part 1

Functionality					
Statement	**1**	**2**	**3**	**4**	**5**
1. Booking appointments through the system is easy.					
2. I can clearly view my pet's medical records and details.					
3. Online notifications and reminders work properly.					
4. Online payments process smoothly and accurately.					
5. The AI chatbot in the system provides helpful and responsive assistance when I book appointments or encounter issues.					

Part 2

Usability					
Statement	**1**	**2**	**3**	**4**	**5**
1. The system is easy to use, even on a mobile device.					
2. I can navigate without needing help from staff.					
3. Viewing records and booking appointments is simple.					
4. Buttons, labels, and instructions are easy to understand.					
5. Pages load and display information clearly.					

Part 3

Reliability					
Statement	**1**	**2**	**3**	**4**	**5**
1. The system is available whenever I try to access it.					
2. I do not experience errors when booking appointments.					
3. Notifications and updates arrive consistently.					
4. My pet's records load without delays or missing data.					
5. The system works smoothly every time I use it.					

Part 4

Security					
Statement	**1**	**2**	**3**	**4**	**5**
1. My personal data and pet's information feel safe in the system.					
2. I trust the login process to protect my account.					
3. Payment information is securely handled.					
4. I feel confident that my contact details are protected.					
5. The system keeps my data private from unauthorized users.					

Appendix v. Curriculum Vitae

CURRICULUM VITAE

Name: Jonlee F. Altar

Address: 141 2nd street BestowHomes Barangay Canlalay Binan Laguna

Contact Number: 09530614889

E-mail Address: jonleefaltar@iskolarngbayan.pup.edu.ph

PERSONAL DATA

Date of Birth: March 27, 2044

Citizenship: Filipino

Sex: Male

Civil Status: Single

Height: 169 cm

Weight: 65 kg

Religion: Baptist

SKILLS

- Computer Literate
- Microsoft Office Skills
- Familiar with Jira, Agile, and SCRUM
- Knowledgeable in using IntelliJ, Figma, and VS Code.
- Familiar with ChatGPT/AI Tools
- Team Collaboration and Communication skills

EDUCATIONAL ATTAINMENT

ELEMENTARY:	Palapag I Central Elementary School	2010-2016
JUNIOR HIGH SCHOOL:	Sumuroy Agro-Industrial School	2016-2020
SENIOR HIGH SCHOOL:	Biñan Integrated National High School	2020-2022
COLLEGE:	Polytechnic University of the Philippines Santa Rosa Branch	2022-2026

I hereby certify that the above information is true and correct.

Jonlee F. Altar
Signature over Printed Name

CURRICULUM VITAE

Name: Mark B. Aliño

Address: Blk 7 Lot 12 Sitio Coral na Bato, Brgy. Pulong Sta. Cruz, Sta. Rosa City of Laguna

Contact Number: 09483560523

E-mail Address: markbalino@iskolarngbayan.pup.edu.ph

PERSONAL DATA

Date of Birth: September 15, 2001

Citizenship: Filipino

Sex: Male

Civil Status: Single

Height: 163 cm

Weight: 79 kg

Religion: Roman Catholic

SKILLS

- Computer Literate
- Microsoft Office Skills
- Familiar with Jira, Agile, and SCRUM
- Basic Programming Skils
- HTML, CSS, JavaScript and PHP
- Experienced using Git and GitHub
- Experienced using LARAVEL Framework and Node.js
- Experienced using MySQL
- Knowledgeable in using IntelliJ, Figma, and VS Code.

EDUCATIONAL ATTAINMENT

ELEMENTARY:	Dila Elementary School	2008-2014
JUNIOR HIGH SCHOOL:	Aplaya National High School - Annex	2014-2018
SENIOR HIGH SCHOOL:	Asian Institute of Technology, Sciences and the Arts	2018-2020
COLLEGE:	Polytechnic University of the Philippines - Santa Rosa Branch	2022-2026

I hereby certify that the above information is true and correct.

MARK BRAZAL ALIÑO
Signature over Printed Name

CURRICULUM VITAE

Name: Robb Roshan L. Bawag

Address: 273 San Jose St. Barangay 2
Carmona, Cavite

Contact Number: 090612396048

E-mail Address: robbroshanlbawag@iskolarngbayan.pup.edu.ph

PERSONAL DATA

Date of Birth: August 11, 2004

Citizenship: Filipino

Sex: Male

Civil Status: Single

Height: 168 cm

Weight: 60 kg

Religion: Roman Catholic

SKILLS

- Proficient in using computers and basic IT tools
- Skilled in Microsoft Office applications (Word, Excel, PowerPoint)
- Experienced with Agile methodologies, SCRUM, and tools like Jira
- Capable of using development and design platforms such as IntelliJ, Figma, and Visual Studio Code
- Comfortable using AI tools such as ChatGPT and other productivity AIs
- Strong teamwork, collaboration, and communication abilities

EDUCATIONAL ATTAINMENT

ELEMENTARY:	Children of Mary Immaculate School	2010-2016
JUNIOR HIGH SCHOOL:	Carmona National High School	2016-2020
SENIOR HIGH SCHOOL:	Angelo Levardo Loyola Senior High School	2020-2022
COLLEGE:	Polytechnic University of the Philippines Santa Rosa Branch	2022-2025

I hereby certify that the above information is true and correct.

ROBB ROSHAN L. BAWAG
Signature over Printed Name

CURRICULUM VITAE

Name: Melchizedek A. Haynes

Address: Block 7 Lot 37 Ph1 Narra St. Alfonso Homes II Brgy. Sinalhan City of Santa Rosa, Laguna

Contact Number: +63-9267065941

E-mail Address: melchizedekahaynes@iskolarng bayan.pup.edu.com

PERSONAL DATA

Date of Birth: August 15, 2003

Citizenship: Filipino

Sex: Male

Civil Status: Single

Height: 155 cm

Weight: 60 kg

Religion: Christian

SKILLS

- HTML5
- CSS3
- JavaScript
- Adobe Premiere Pro
- Adobo Photoshop
- Figma

EDUCATIONAL ATTAINMENT

ELEMENTARY:	Central 3 Santa Rosa City of Laguna	2012-2016
JUNIOR HIGH SCHOOL:	Santa Rosa Science and Technology High School	2016-2020
SENIOR HIGH SCHOOL:	Santa Rosa Science and Technology High School	2020-2022
COLLEGE:	Polytechnic University of the Philippines Santa Rosa Branch	2022-2025

I hereby certify that the above information is true and correct.

Melchizedek A. Haynes
Signature over Printed Name

CURRICULUM VITAE

Name: Sean Daniel Marc S. Mendoza

Address: Block 20 Lot 3 Villa Susana Subdivision, Barangay Malitlit, City of Santa Rosa, Laguna

Contact Number: 09366265473

E-mail Address: seandanielmarcsmendoza@iskolarngbayan.pup.edu.ph

PERSONAL DATA

Date of Birth: April 24, 2003

Citizenship: Filipino

Sex: Male

Civil Status: Single

Height: 5'8

Weight: 73 kg

Religion: Christian

SKILLS

- Computer Literate
- Microsoft Office Skills
- Basic Programming
- Knowledgeable in using Figma and VS Code.
- Familiar with Jira, Agile, and SCRUM
- Familiar with ChatGPT/AI Tools
- Team Collaboration and Communication skills
- Photo and Video Editing Skills
- Basic Cybersecurity Awareness

EDUCATIONAL ATTAINMENT

ELEMENTARY:	San Lorenzo Christian School	2010-2016
JUNIOR HIGH SCHOOL:	San Lorenzo Christian School	2016-2020
SENIOR HIGH SCHOOL:	Asia Technological School of Science and Arts	2020-2022
COLLEGE:	Polytechnic University of the Philippines - Santa Rosa Branch	2022-2026

I hereby certify that the above information is true and correct.

Sean Daniel Marc S. Mendoza
Signature over Printed Name

CURRICULUM VITAE

Name: Vince Lloyd R. Mondares

Address: Block 2 Lot 15, Mahogany St. Brgy. loma, City of Binan, Laguna

Contact Number: 09637087547

E-mail Address: vincelloydrmondares@iskolarngbayan.pup.edu.ph

PERSONAL DATA

Date of Birth: May 06, 2003

Citizenship: Filipino

Sex: Male

Civil Status: Single

Height: 162 cm

Weight: 50 kg

Religion: Roman Catholic

SKILLS

- Computer Literate
- Microsoft Office Skills
- Basic Programming
- Knowledgeable in using Figma and VS Code.
- Familiar with Jira, Agile, and SCRUM
- Familiar with ChatGPT/AI Tools
- Team Collaboration and Communication skills
- Basic Cybersecurity Awareness
- Quality assurance skills

EDUCATIONAL ATTAINMENT

ELEMENTARY:	Mahayahay Elementary School	2010-2016
JUNIOR HIGH SCHOOL:	Western Masbate Roosevelt High School	2016-2020
SENIOR HIGH SCHOOL:	Masbate National Comprehensive High School	2020-2022
COLLEGE:	Polytechnic University of the Philippines - Santa Rosa Branch	2022-2025

I hereby certify that the above information is true and correct.

VINCE LLOYD ROC[illegible] MONDARES
Signature over Printed Name