

PAWCARE-Smart Pet Care Mobile Application

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Abstract

Pet care involves managing multiple responsibilities such as feeding, exercise routines, medical appointments, grooming schedules, and expense tracking. Many pet owners currently depend on manual record-keeping or multiple separate applications, which often results in missed reminders, fragmented data, and inefficient pet management. Existing systems generally focus on isolated aspects of pet care and lack a centralized, integrated solution for complete pet wellness management. To overcome these limitations, this project introduces PAWCARE – a Smart Pet Care Mobile Application, designed as a unified digital platform for comprehensive pet management. The application enables users to create detailed pet profiles, select breed-specific information, and access personalized care recommendations. It supports daily activity tracking, diet planning, expense management, and veterinary/grooming appointment scheduling, along with automated notifications and reminders to ensure timely care. The system is developed using Flutter (frontend framework) and Firebase (backend services), providing real-time database synchronization, secure cloud storage, and cross-platform compatibility. By integrating intelligent reminders and centralized data handling, PAWCARE improves pet health monitoring, care consistency, and owner convenience.

Overall, PAWCARE delivers a smart, scalable, and user-friendly pet care management solution that promotes responsible pet ownership, improved health tracking, and organized daily care routines, with potential for future enhancements such as AI-based recommendations and wearable device integration.

Keywords: Smart Pet Care, Mobile Application, Flutter, Firebase, Pet Management System, Health Tracking, Appointment Scheduling, Notification System, Breed-Based Recommendations, Digital Pet Care Platform.

Introduction

Pet care is a continuous responsibility that involves ensuring the health, nutrition, safety, and overall well-being of domestic animals. With the rising trend of pet adoption, especially dogs, cats, and other companion animals, pet owners are increasingly required to manage multiple daily tasks such as feeding routines, physical exercise, vaccination schedules, grooming sessions, and financial expenditures. Managing these responsibilities efficiently is becoming more challenging due to the growing complexity of pet care needs. Conventional approaches such as handwritten notes, diaries, calendars, or basic reminder applications are still widely used for tracking pet-related activities. However, these methods are often fragmented and lack integration, leading to incomplete record management and

reduced reliability. Information is usually scattered across different sources, making it difficult for pet owners to maintain consistent monitoring of their pets.

To overcome these limitations, PAWCARE – Smart Pet Care Mobile Application has been developed as an integrated digital solution. This application consolidates all essential pet care activities into a single platform, enabling users to manage pet profiles, monitor daily routines, track health-related activities, record expenses, and receive automated reminders for important events. The system aims to simplify pet management and improve the overall quality of pet care through a centralized and user-friendly mobile application.

Existing System

In the current approach, pet owners typically rely on manual or semi-digital methods to manage pet-related information. Records such as feeding times, vaccination dates, grooming schedules, and veterinary appointments are maintained using notebooks, calendars, or simple reminder applications. Financial expenses and medical histories are often stored separately or not recorded systematically.

Due to the absence of an integrated platform, data remains scattered across multiple sources, which reduces accessibility and increases the likelihood of missed or delayed activities. This fragmented approach limits the ability of pet owners to effectively monitor the overall health, routine, and financial aspects of pet care.

Proposed System

The proposed system, PAWCARE, is a mobile-based intelligent platform designed to provide a unified solution for comprehensive pet care management. It enables users to create detailed digital profiles for their pets, including attributes such as breed, age, weight, and health history.

The application facilitates the management of daily activities, dietary plans, medical appointments, grooming schedules, and financial records. It also incorporates automated notifications to ensure timely reminders for essential tasks. By utilizing cloud-based storage, the system ensures secure, synchronized, and anytime-anywhere access to pet data. Overall, PAWCARE enhances organization, reliability, and convenience in pet care management.

REQUIREMENT ANALYSIS

User Authentication Module:

The system provides secure registration, login, and logout functionality. Access to application features is granted only after successful authentication.

Admin Module:

The administrator is responsible for reviewing and approving or rejecting user profiles to ensure system integrity.

Pet Profile and Breed Module:

Users can create, modify, and delete pet profiles containing essential details such as name, breed, age, and weight. The system also displays complete pet information in an organized manner.

Activity Tracking Module:

This module records daily activities such as walking,

running, and playing. It also compares actual activity levels with recommended standards.

Diet Management Module:

The system generates feeding schedules and provides basic dietary plans based on pet characteristics and nutritional requirements.

Budget and Expense Module:

Users can log and categorize expenses, enabling them to monitor monthly and overall spending related to pet care.

Appointment and Reminder Module:

This module allows scheduling of veterinary and grooming appointments while providing automated reminders and notifications.

Life Cycle Model

The development of the PAWCARE system follows the **Waterfall Model**, a linear and structured software development approach in which each phase is completed before proceeding to the next.

The model consists of the following stages:

Requirement

All system requirements are gathered, analyzed, and documented based on user needs.

System

The overall architecture, module structure, and data flow of the application are defined.

Implementation:

The application is developed using Flutter for the frontend and Firebase for backend services.

Testing:

The system is tested thoroughly to identify and correct errors, ensuring reliability and performance.

Deployment:

After successful testing, the application is released for user access.

Maintenance:

Continuous updates, bug fixes, and performance improvements are carried out to enhance system efficiency.

DESIGN

Architecture

The PAWCARE system is designed using a layered architecture that separates the application into logical components to ensure scalability, maintainability, and efficient data handling. The overall architecture consists of a user interface layer, a business logic layer, and a backend service layer. The user interacts with the system through a mobile-based interface developed in Flutter, while Firebase handles authentication, database operations, and

cloud storage. Communication between the frontend and backend is performed through secure API calls

and real-time synchronization, ensuring that user data is consistently updated across all modules.

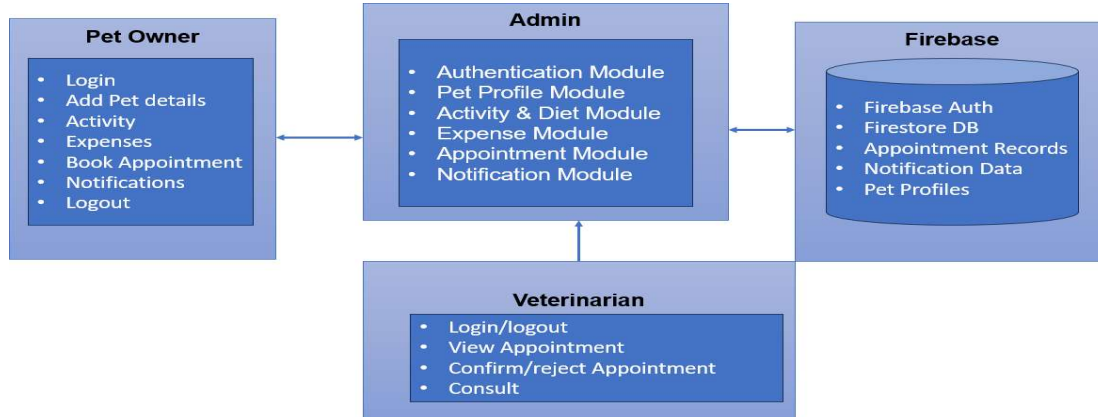


Fig 1 Software Architecture

The software architecture of PAWCARE is structured to support modular development, where each functional module such as pet profile management, activity tracking, diet planning, and appointment scheduling operates independently but

interacts seamlessly with shared backend services. This design improves system flexibility and allows future enhancements without affecting the entire system.

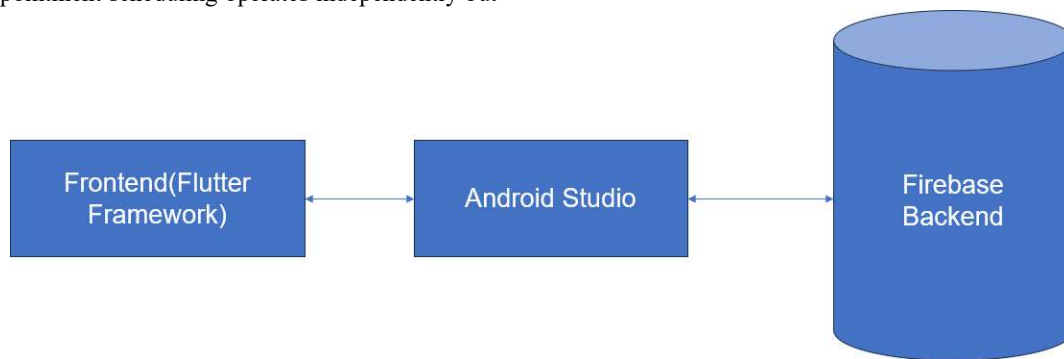


Fig 2 Technical Architecture

From a technical perspective, the architecture integrates Flutter as the frontend framework and Firebase as the backend platform. Flutter ensures cross-platform compatibility and responsive UI design, while Firebase provides real-time database capabilities, secure authentication, and cloud-based storage. Together, they form a robust technical ecosystem that supports smooth application performance and reliable data handling.

IMPLEMENTATION

The implementation of the PAWCARE application is carried out using modern mobile development technologies to ensure efficiency, scalability, and user convenience. The system is primarily built using Flutter, Firebase, and Dart programming language, each contributing to different layers of application functionality.

Flutter is used to design and develop the user interface of the application. It enables the creation of multiple screens such as login, registration, dashboard, pet profile management, activity tracking, diet management, and appointment scheduling. Flutter's widget-based architecture ensures a responsive and visually consistent user experience across different devices.

Firebase is utilized as the backend service for authentication, real-time database management, and cloud storage. It securely stores user information, pet profiles, activity logs, expenses, and appointment details. Additionally, Firebase supports real-time synchronization, ensuring that updates are instantly reflected across the application. It also handles user authentication, ensuring secure login and access control.

Dart is used as the core programming language for implementing the application logic. It handles

functional operations such as data validation, user authentication processes, activity tracking calculations, diet plan generation, and notification handling. Its high-performance execution contributes to the smooth functioning of the application.

Flutter offers several advantages such as cross-platform development capability, hot reload for faster development, rich UI components for designing attractive interfaces, and high performance due to native compilation. Firebase complements this by providing real-time database support, secure authentication, scalable cloud infrastructure, and reliable data storage services. Together, these technologies ensure that PAWCARE is efficient, secure, and scalable.

Pseudo Code

The application begins execution from the main entry point where Flutter initializes its engine and Firebase services are configured. Local storage and notification services are also initialized before launching the splash screen, which leads the user into the login interface. During login, user credentials are authenticated through Firebase, and upon successful validation, the user is redirected to the dashboard. In case of incorrect credentials, appropriate error messages are displayed.

The registration process involves creating a new user account in Firebase Authentication and storing user details in Firestore. Role-based validation is performed to ensure proper access control, especially for administrative accounts. Once registration is completed successfully, the user is redirected back to the login interface.

The dashboard dynamically retrieves user-related data such as the number of pets, reminders, and appointments from Firestore. This information is displayed in a summarized format to provide a quick overview of the user's activity within the system.

Pet management functionality allows users to add or update pet details such as name, breed, age, and weight. The system validates input data before storing it in Firestore, ensuring data accuracy and consistency. Activity tracking monitors daily pet activities and checks for missing entries. If no activity is recorded for a given day, notifications are triggered to alert the user.

Diet management calculates nutritional requirements based on pet breed and weight, generating a structured meal plan that is stored in the database. Appointment management allows users to search for veterinarians, book appointments, and

automatically schedule reminders with notification support.

The reminder module ensures that all user-defined reminders are stored and triggered at the appropriate time. Notifications are managed through a dedicated service that supports both instant and scheduled alerts, including daily recurring reminders and time-based notifications.

TESTING

Software testing plays a crucial role in ensuring that the PAWCARE application functions correctly, meets user requirements, and delivers a reliable experience. It involves evaluating different components of the system to identify errors, validate functionality, and ensure overall system quality before deployment.

Testing is essential in modern software development due to the increasing dependency on digital systems. Even minor defects can significantly impact user experience and system performance, making structured testing an integral part of the development lifecycle. The primary objectives of testing include improving software quality, enhancing security, ensuring reliability, and increasing user satisfaction. The testing process is conducted across multiple dimensions, including application layers such as the user interface, application logic, and database. It also includes different levels such as unit testing, integration testing, system testing, and acceptance testing. Each level focuses on identifying specific types of defects, ranging from individual component errors to full system validation.

Unit testing is performed to verify individual components or functions in isolation, ensuring that each module performs as expected. Integration testing focuses on the interaction between multiple modules, identifying issues in data flow and communication between components. System testing evaluates the complete application to ensure that it meets all functional and non-functional requirements. Finally, acceptance testing is carried out to confirm that the system satisfies user expectations and is ready for deployment.

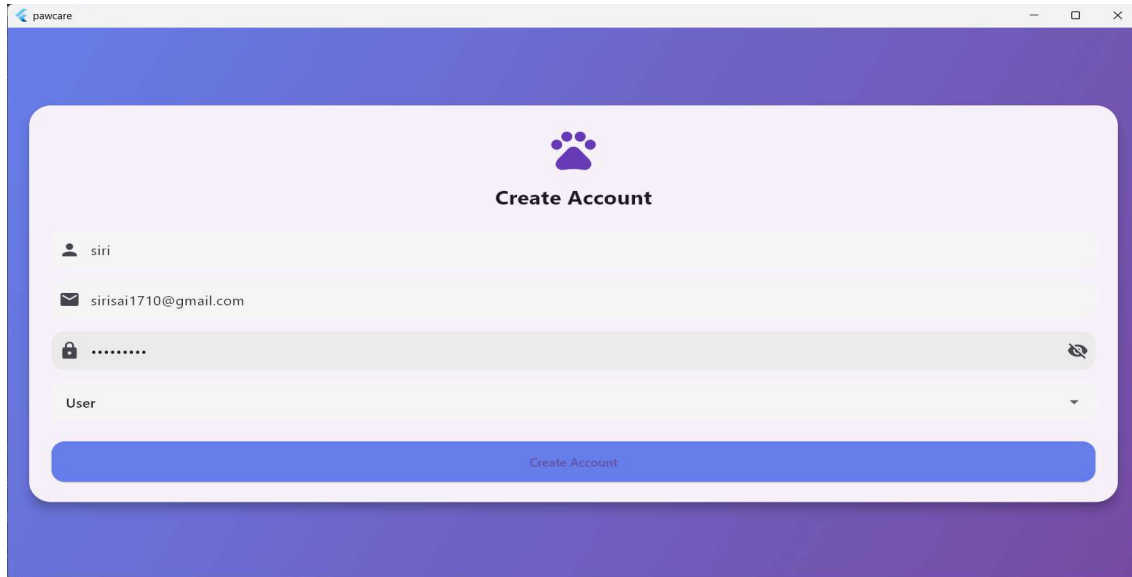
Different testing techniques are applied throughout the development process. Black-box testing is used to evaluate system functionality without considering internal code structure, while white-box testing focuses on internal logic and code paths. These techniques help ensure both functional correctness and structural integrity of the application.

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A comprehensive set of test cases is executed to validate different features of the system, including user authentication, pet profile management, activity logging, diet generation, expense tracking, reminder creation, appointment scheduling, and notification services. The results of testing indicate that the

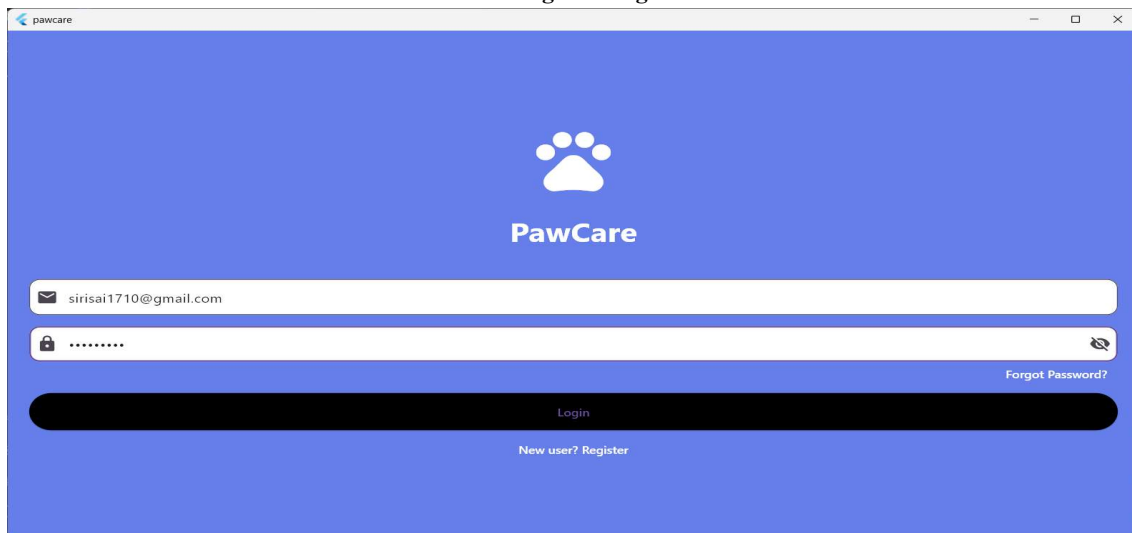
system performs as expected, with all major functionalities operating successfully and meeting the defined requirements.

Screenshots



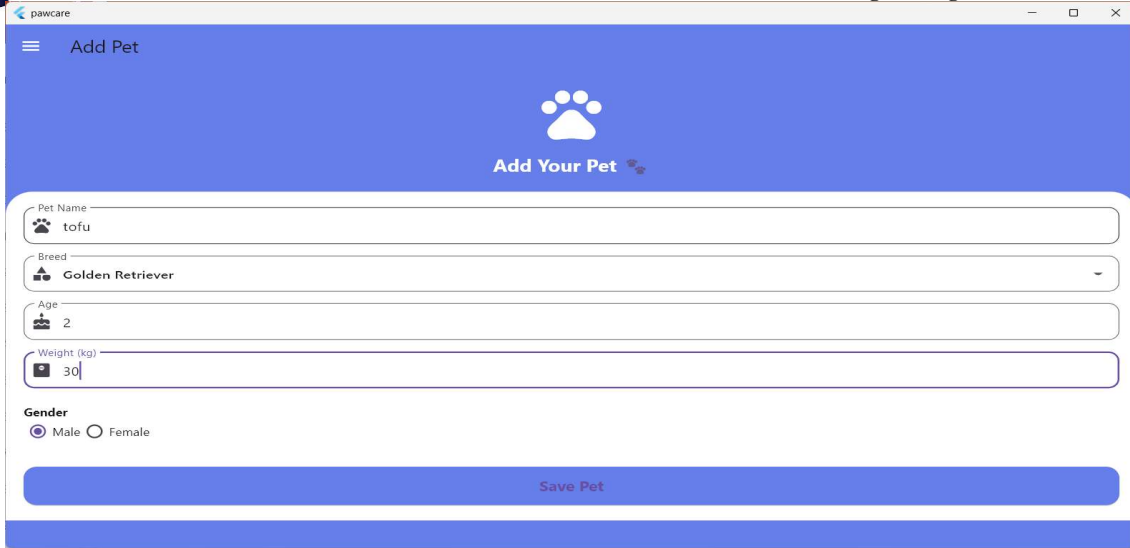
The screenshot shows the 'Create Account' page of the PawCare application. The page has a purple header and a light purple background. A white card in the center contains the following fields: a username field with 'siri', an email field with 'sirisai1710@gmail.com', a password field with masked characters and a toggle icon, and a dropdown menu labeled 'User'. A blue 'Create Account' button is at the bottom of the card.

Screenshot 1 :Register Page – PawCare



The screenshot shows the 'Login' page of the PawCare application. The page has a solid blue background. At the top center is the PawCare logo, which consists of a white paw print icon and the text 'PawCare'. Below the logo are two input fields: an email field with 'sirisai1710@gmail.com' and a password field with masked characters and a toggle icon. A 'Forgot Password?' link is to the right of the password field. A large black 'Login' button is at the bottom, with a 'New user? Register' link below it.

Screenshot 2 :Login Page – PawCare

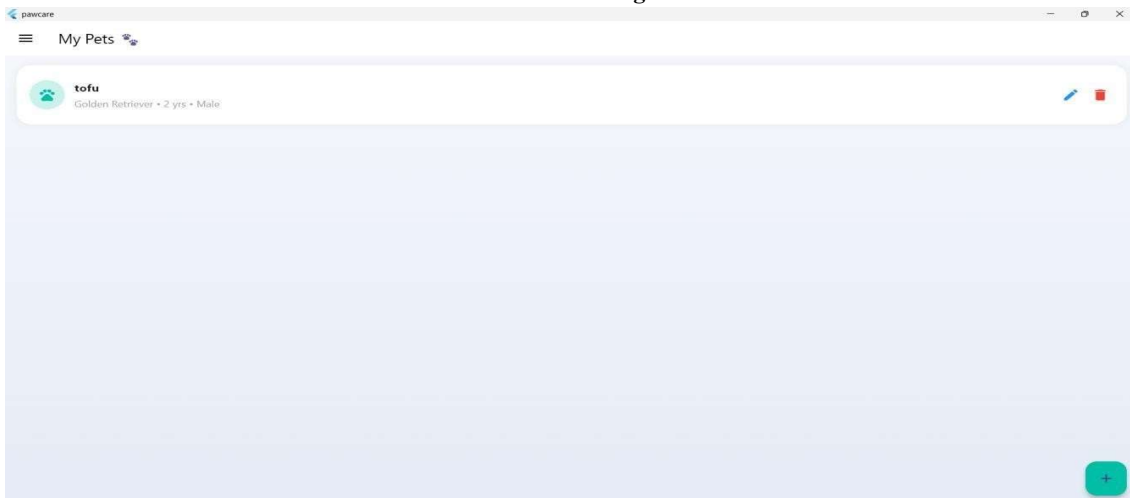


The screenshot shows the 'Add Pet' page in the PawCare application. The page has a blue header with a hamburger menu icon and the text 'Add Pet'. Below the header is a white section with a paw print icon and the text 'Add Your Pet'. The form contains the following fields:

- Pet Name:** A text input field with the value 'tofu'.
- Breed:** A dropdown menu with the value 'Golden Retriever'.
- Age:** A text input field with the value '2'.
- Weight (kg):** A text input field with the value '30'.
- Gender:** Radio buttons for 'Male' (selected) and 'Female'.

At the bottom of the form is a blue button labeled 'Save Pet'.

Screenshot 3 :Add Pet Page – PawCare



The screenshot shows the 'My Pets' page in the PawCare application. The page has a blue header with a hamburger menu icon and the text 'My Pets'. Below the header is a white section with a paw print icon and the text 'My Pets'. The form contains the following fields:

- Pet Name:** A text input field with the value 'tofu'.
- Breed:** A dropdown menu with the value 'Golden Retriever'.
- Age:** A text input field with the value '2 yrs'.
- Weight (kg):** A text input field with the value 'Male'.

At the bottom of the form is a blue button labeled 'Add Pet'.

Screenshot 4 :Add Pet Page – PawCare



The screenshot shows the 'Diet Planner' page in the PawCare application. The page has a blue header with a hamburger menu icon and the text 'Diet Planner'. Below the header is a white section with a paw print icon and the text 'Breed Based Diet Planner'. The form contains the following fields:

- Breed:** A dropdown menu with the value 'Golden Retriever'.
- Weight (kg):** A text input field with the value '30'.
- Diet Type:** Radio buttons for 'Veg' (selected) and 'Non-Veg'.

At the bottom of the form is a blue button labeled 'Generate Diet'.

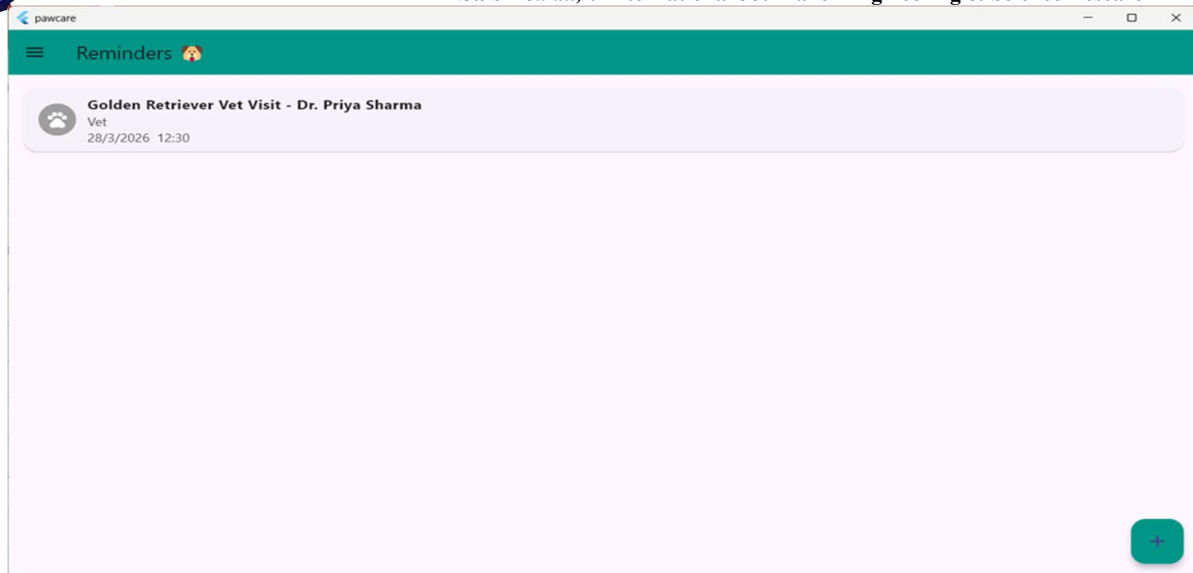
The diet plan is displayed below the form:

- Diet Plan (Large):** 3300 kcal/day
- Morning:** Milk (150 ml), Supplements
- Lunch:** Rice (300 g), Dal (60 g), Vegetables
- Evening:** Snacks (Fruits / Biscuits)
- Dinner:** Light Rice (210 g), Curd

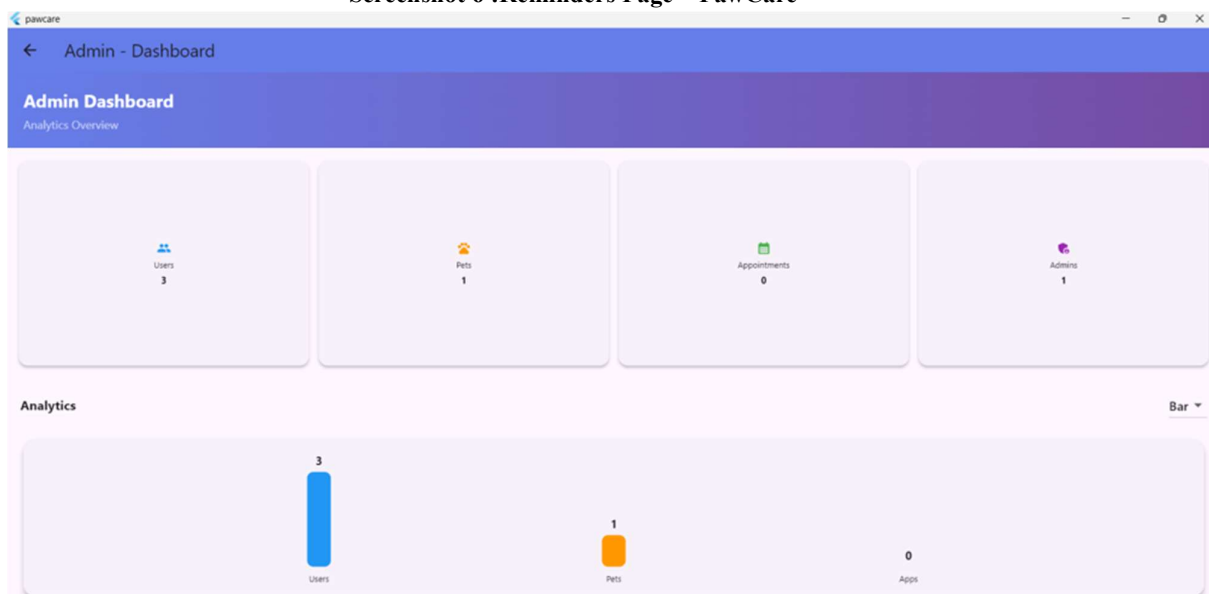
At the bottom of the diet plan is a green box with the following information:

- Protein: 60.0 g
- Carbs: 300.0 g
- Calories: 3300 kcal

Screenshot 5 :Diet Planner Page – PawCare



Screenshot 6 :Reminders Page – PawCare



Screenshot 7 : Admin Dashboard Page – PawCare

Conclusion

The PAWCARE system is developed as a comprehensive and centralized mobile solution for efficient pet care management. It integrates multiple functionalities such as pet profile maintenance, activity tracking, diet planning, expense monitoring, appointment scheduling, and reminder services into a single platform. By replacing traditional manual tracking methods, the application significantly reduces the likelihood of missing important pet-related tasks such as vaccinations, feeding routines, and medical appointments. The system also enhances data organization by storing all pet-related information in a structured and easily accessible

format. Through automated notifications and real-time updates, PAWCARE supports consistent monitoring of pet health and daily activities. This contributes to improved pet well-being and reduces the operational burden on pet owners. Overall, PAWCARE serves as a practical, reliable, and user-friendly digital solution that encourages responsible pet ownership while simplifying and streamlining the entire pet care management process.

Future Scope

The PAWCARE application has strong potential for further enhancement and expansion in future versions. One of the major improvements can be the

integration of wearable devices, which would enable real-time monitoring of pet health parameters such as physical activity, heart rate, and overall fitness levels. This would provide more accurate and continuous health insights. Another possible enhancement is the development of an advanced notification system, where users can fully customize reminders based on their preferences, urgency levels, and pet-specific needs. This would further improve usability and ensure better time management for pet care activities.

Additionally, a community-based platform for pet owners can be introduced, allowing users to interact, share experiences, exchange pet care tips, and build a supportive network. This feature would enhance user engagement and provide valuable social interaction among pet owners. These future improvements can significantly extend the functionality of PAWCARE and transform it into a more intelligent, connected, and community-driven pet care ecosystem.

REFERENCES

- [1] Pressman, R. S., & Maxim, B. R., *Software Engineering: A Practitioner's Approach*, McGraw-Hill Education, 8th Edition, 2023.
- [2] Sommerville, I., *Software Engineering*, Pearson Education, 10th Edition, 2024.
- [3] Benyon, D., *Designing User Experience: A Guide to HCI, UX and Interaction Design*, Pearson, 2025.
- [4] Nielsen, J., *Usability Engineering*, Morgan Kaufmann Publishers, 2023.
- [5] Krug, S., *Don't Make Me Think: A Common Sense Approach to Web Usability*, New Riders Publishing, 2024.
- [6] Android Developers, "Push Notifications and Background Services," Available: <https://developer.android.com/guide>
- [7] World Health Organization (WHO), "Guidelines on Animal Health and Welfare," Available: <https://www.who.int>
- [8] Islam, M. N., Karim, M. M., & Inan, T., "Investigating Usability of Mobile Health Applications," 2022.
- [9] Bahl, P., Padmanabhan, V., "RADAR: An In-Building RF-based User Location and Tracking System," IEEE INFOCOM, 2024.