DogPal: A Mobile Application for Organizing, Discovering, and Managing Dog-Friendly Events

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Abstrak

Ikatan antara manusia dan haiwan peliharaan mereka—khususnya anjing—mempunyai peranan penting dalam aspek teman dan interaksi sosial. Walaupun pemilikan anjing semakin meningkat, pemilik anjing masih menghadapi cabaran dalam menganjurkan dan menemui acara yang sesuai dengan keperluan haiwan mereka. Platform sedia ada seperti media sosial atau aplikasi pengurusan acara umum sering kali tidak menyediakan penapis baka khusus, kawalan berkaitan anjing, serta fungsi penyertaan yang relevan. Projek ini memperkenalkan DogPal, sebuah aplikasi mudah alih yang direka khas untuk memenuhi keperluan pemilik anjing, dengan membolehkan mereka mencipta, mencari dan mengurus acara berkaitan anjing. Melalui temu bual dan borang soal selidik yang diedarkan kepada pemilik anjing tempatan, beberapa keperluan pengguna telah dikenalpasti—seperti keupayaan untuk menganjurkan acara, mengehadkan kehadiran mengikut bilangan anjing atau pemilik, menetapkan sekatan baka, mencari acara berdekatan, melihat peserta, berkomunikasi dengan pengguna lain, serta menjana laporan. Keperluan-keperluan ini secara langsung membentuk reka bentuk fungsi sistem. Aplikasi DogPal dibangunkan menggunakan metodologi Agile, yang membolehkan fungsi dilaksanakan dalam kitaran pembangunan berulang secara berperingkat. Antara muka hadapan dibina menggunakan Android SDK dalam Java, manakala Firebase Firestore digunakan sebagai pangkalan data awan NoSQL. Perkhidmatan pihak ketiga seperti Cloudinary (untuk muat naik imej) dan Google Maps (untuk lokasi acara) turut diintegrasikan bagi meningkatkan pengalaman pengguna. Hasil akhir ialah aplikasi Android yang berfungsi sepenuhnya, merangkumi papan pemuka peribadi untuk peserta dan penganjur, modul laporan dengan analisis demografi dan maklum balas, serta pengendalian data masa nyata. Sistem ini telah diuji dengan teknik ujian kotak hitam dan kes ujian berdasarkan use case untuk memastikan kefungsian dan kebolehpercayaan. DogPal menyumbang kepada pembangunan perkhidmatan digital berkaitan haiwan peliharaan dengan meningkatkan aksesibiliti kepada acara anjing, mengukuhkan komuniti pemilik anjing, dan menggalakkan interaksi yang lebih selamat dan teratur.

Kata Kunci: Aplikasi Mudah Alih, Pengurusan Acara, Penglibatan Komuniti, Android, Data Masa Nyata.

Abstract

The bond between humans and their pets—particularly dogs—plays a vital role in companionship and social interaction. Despite increasing pet ownership, dog owners continue to face challenges when it comes to organizing and discovering events tailored to their pets' needs. Existing platforms such as social media or general-purpose event apps often lack breed-specific filters, dog-related controls, and relevant participation features. This project introduces DogPal, a mobile application designed specifically to meet the needs of dog owners by enabling them to create, discover, and manage dog-related events. Through interviews and survey forms distributed to local dog owners, several user needs were identified—such as the ability to organize events, limit attendance by dog or owner count, set breed restrictions, discover nearby events, view participants, communicate with others, and generate reports. These needs directly shaped the system's functional design. The DogPal app was developed using Agile methodology, allowing features to be implemented in short iterative cycles. The front-end is built with Android SDK in Java, while Firebase Firestore serves as the cloud-based NoSQL backend. Third-party services such as Cloudinary (for image uploads) and Google Maps (for event locations) were integrated to enhance user experience. The outcome is a fully functional Android application that includes personalized dashboards for both attendees and organizers, a reporting module with demographics and feedback analysis, and real-time data handling. The system was successfully tested using black-box testing techniques and use-case-based test cases to ensure functionality and reliability. DogPal contributes to the growing field of pet-related digital services by improving accessibility to dog events, strengthening community engagement among pet owners, and promoting safer and more organized pet interactions.

Keywords: Mobile Application, Event Management, Community Engagement, Android, Real-Time Data.

1.0 INTRODUCTION

Mobile applications have become a vital platform for enhancing connectivity, accessibility, and real-time interaction in today's digital society. These applications play a significant role in various fields such as education, healthcare, commerce, and community engagement. One growing trend is the use of mobile technology to facilitate **event management** and **community-based activities**, particularly among niche interest groups such as pet owners. According to Rouse (2022), mobile event platforms help users easily discover, organize, and manage social interactions through intuitive interfaces and real-time updates.

The advancement of Android-based development tools, along with Firebase integration for real-time databases and authentication, has enabled developers to build highly interactive and responsive applications. Research by Khan et al. (2021) emphasizes that real-time mobile apps improve user satisfaction by enabling dynamic updates and reducing communication delays, especially in community-based platforms.

In the context of pet ownership, many dog owners seek social opportunities not just for themselves, but also for their pets. Community-driven apps like Meetup and Facebook Events have highlighted the potential of technology to foster human and animal interaction through organized events. However, there remains a lack of dedicated applications that address the specific needs of dog event management, including breed compatibility, participant limits, feedback, and data-driven reporting.

To address this gap, this project introduces DogPal, a mobile event management application designed for dog owners to create, join, and manage pet-related social events. The system also provides real-time updates, personalized dashboards for both event organizers and attendees, and a reporting module that visualizes participant demographics and feedback. By combining real-time data access with community engagement principles, DogPal aims to enhance the experience of organizing and attending dog-centered events while fostering stronger connections within the pet-owning community.

The DogPal application leverages Firebase for authentication, Firestore for real-time data storage, and includes external integrations such as WhatsApp deep linking and Google Maps API for better usability. With intuitive interfaces and structured participation logic, DogPal empowers users to participate in meaningful outdoor and social experiences with their dogs while accessing relevant insights through visual reports.

2.0 LITERATURE REVIEW

Mobile Application for Dog Event Management and Community Engagement

The relationship between humans and companion animals—especially dogs—has long been established, offering psychological, emotional, and physical benefits (Leow, 2019). Pets help reduce stress and encourage social interaction (Lauren, 2023). Social companionship between dogs and their owners also contributes positively to aging health and overall well-being (Cimons, 2023). As this bond strengthens, there is an increasing demand among dog owners to participate in community activities and events centered around their pets. While several applications support social or event-related functions, few specifically serve the niche of dog-centered event management.

Existing applications like Eventbrite, Meetup, and Pawmates each offer partial solutions to this demand. Eventbrite is a robust event management platform that provides event creation, ticketing, attendee tracking, and reporting tools. It is widely used across various event types but is not tailored for dog owners. It lacks pet-specific filtering or verification features and offers no dog-related customization in user profiles. However, its strengths lie in professional-grade tools for planning and analyzing events efficiently.

Meetup, on the other hand, is a platform built around community formation and group events. It allows users to create and manage interest-based groups and activities. While Meetup does enable the creation of dog-related events, it does not offer features tailored to pet ownership. It also imposes membership fees on organizers, which can deter casual users. Its communication tools are more social than Eventbrite's, supporting group messaging and direct chats between members. Pawmates is the only app among the three that is specifically targeted toward dog owners. It offers social networking tools, allows dog profile creation, and lets users discover nearby dog-friendly locations and events. Its strength lies in community engagement and dog-specific matching. However, Pawmates lacks the event management depth found in Eventbrite and does not include safety checks like vaccination verification or detailed filtering when organizing events. Additionally, it does not offer reporting tools or structured management features, making it better suited for informal meetups rather than organized events.

Despite these strengths, a clear gap exists in the market. None of the reviewed platforms fully integrate event management with features tailored specifically for dog owners. Eventbrite lacks pet-specific tools. Meetup has limited customization for pet events and includes access fees. Pawmates excels socially but lacks robust event management and safety protocols. Additionally, none of the

platforms offer a system that verifies dog vaccination or matches dogs to appropriate events based on breed, age, or behavior—critical factors for ensuring safe and successful interactions at pet gatherings.

DogPal addresses these gaps by offering a comprehensive platform specifically designed for dog-related event management. It combines advanced event organization tools with dog-focused features such as detailed pet profiles, vaccination verification, and breed-based event filtering. Unlike Meetup and Eventbrite, DogPal allows free event creation and participation, removing cost barriers. In contrast to Pawmates, it includes safety features and more structured event planning. Moreover, DogPal supports community-building through clubs and social features, offering a more inclusive and purpose-built solution for the dog-owning community.

3.0 METHODOLOGY

DogPal was developed using the Agile-Scrum methodology, which allowed for flexible, iterative progress and continuous feedback. Development was structured in sprints, each consisting of research, design, implementation, and testing activities.

To gather requirements, interviews and surveys were conducted with dog owners and event organizers using Google Forms. Respondents shared their reliance on social media and word of mouth to find events, and emphasized the need for real-time updates, vaccination proof, attendee control, and location-based services. Based on this input, three main user roles were defined—General Users, Attendees, and Organizers—each with tailored functional requirements.

From these requirements, use cases were outlined and organized into modules. The system was designed accordingly, supported by UML diagrams (e.g., activity and sequence diagrams) to map user interactions and backend logic. UI design was planned in Figma to ensure intuitive flow, while internal processes were structured using pseudocode to define key algorithms. Database design was based on the data needs of each feature, ensuring support for modular functionality and relationship tracking.

Development was performed module by module, driven by the identified features and mapped use cases. Android Studio was used as the main development environment, with Java and XML forming the core codebase. Firebase services powered authentication and database operations, while external APIs like Google Maps and Cloudinary supported extended features. Helper classes and reusable components were implemented to ensure clean structure and minimize redundancy.

Testing activities were prepared alongside development. A test plan was designed to validate each module against its use case specification. Manual and automated tests were written using tools like JUnit for logic testing and scenario-based techniques for user interaction validation. Testing was carried out using both emulators and real devices connected to Firebase, with dummy data used to simulate real-world conditions. This structure ensured each feature was verified independently before integration.

4.0 RESULTS

4.1 Development Results

The development of the DogPal mobile application followed a modular and use case–driven approach. Each feature was developed as an independent module, based on the use cases defined earlier in the project, and implemented iteratively using Android Studio.

During development, a range of technologies were used to support DogPal's functionality, design, and overall user experience. Android Studio was the primary development environment, with Java for app logic and XML for UI design. Firebase Firestore and Authentication handled real-time data and user login. Cloudinary enabled image uploads, and Google Maps API supported event location features. WhatsApp Deep Linking allowed direct user communication. MPAndroidChart and Glide were used for data visualization and image loading, while Figma supported UI prototyping and design.

Development was organized according to the modular use cases (UC01–UC09), with each module implemented, tested, and refined before integration. Code was written with an emphasis on reusability and maintainability. Features such as dynamic button updates, role-specific dashboards, filter functions, and real-time state changes were implemented using helper classes, conditional logic, and modular Firebase queries. Each module followed the Software Requirements Specification (SRS) and Software Design Specification (SDS) to ensure full alignment with user needs.

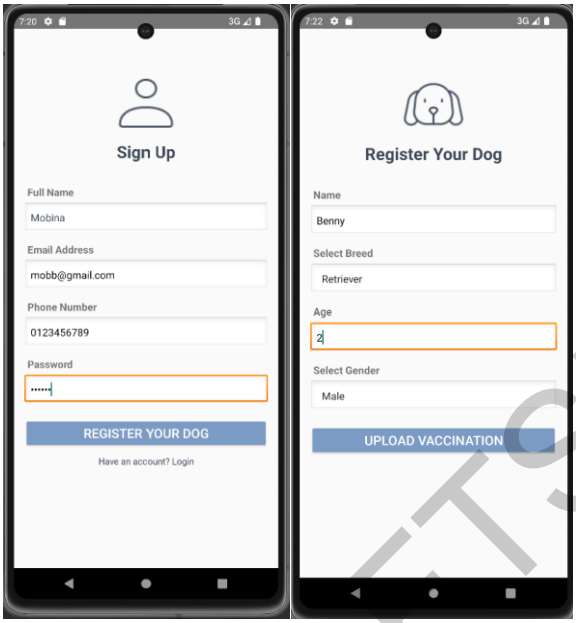

Figure 1: Register Screen

Users can sign up with personal and dog details (including vaccination proof) or log in with email to access the app.

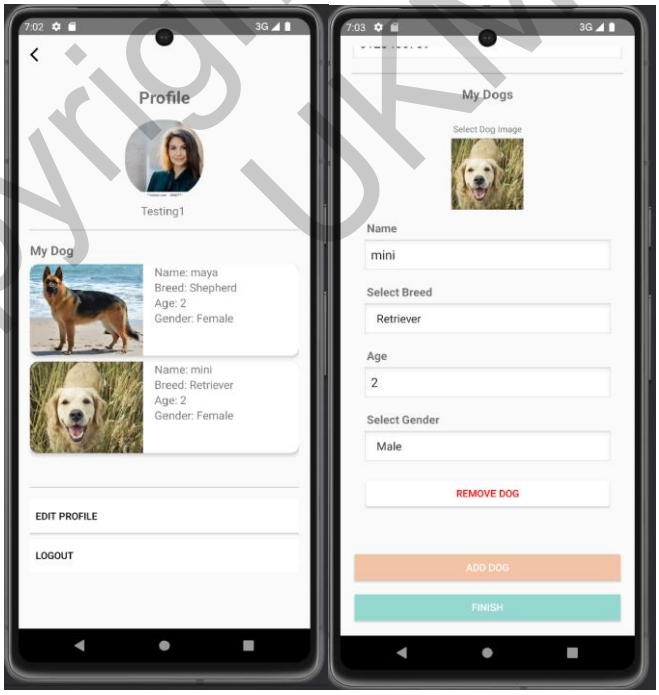

Figure 2: Profile Management

Users can view and edit their profile, update dog info, add new dogs, or remove existing ones.

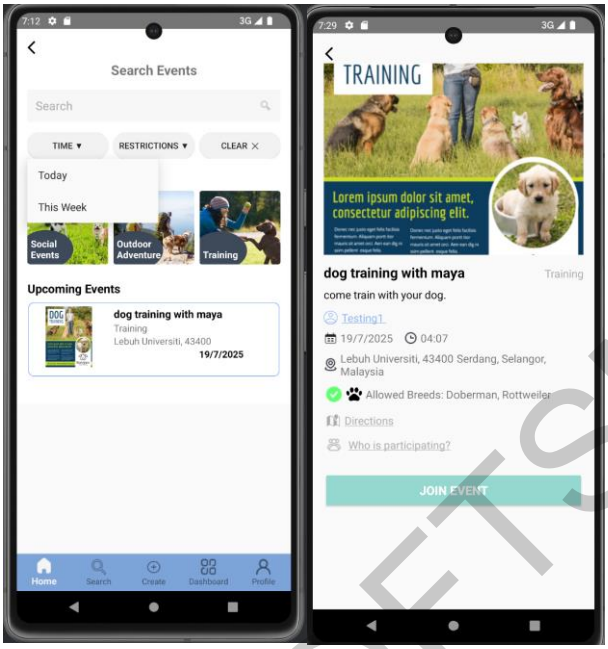

Figure 3: Event Discovery

Users browse or search for events using categories or keywords. A message appears if no results match and shows event info, organizer profile, location, and attendees.

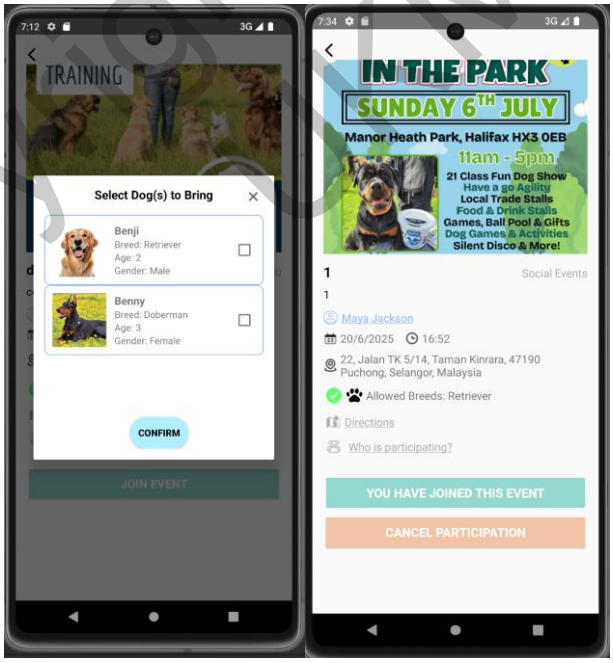

Figure 5: Join/Cancel Event

Users select which dog(s) to bring. System checks breed and capacity before confirming or allowing cancellation.

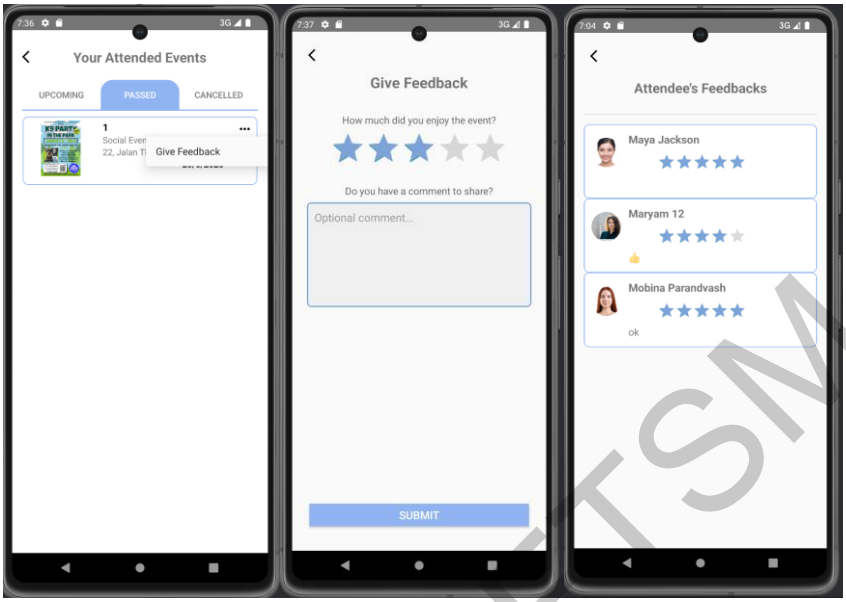

Figure 6: Attendee Dashboard and Feedback Submission

Displays joined events as Upcoming, Passed, or Cancelled. Users can also submit feedback for past events. After attending an event, users can rate and leave comments via the feedback form shown in the Passed category.

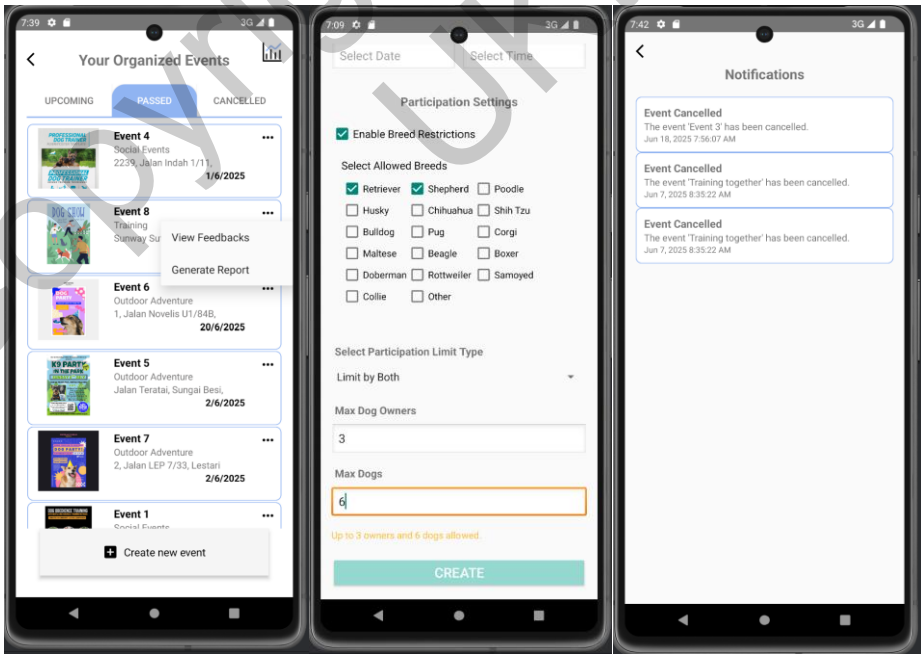

Figure 8: Event Creation / Management

Organizers create or update events with details and optional limits. Events can also be cancelled, notifying all attendees.

Figure 9: Single Event Report

Organizers view detailed reports for each past event, including demographics and feedback via tabbed sections.

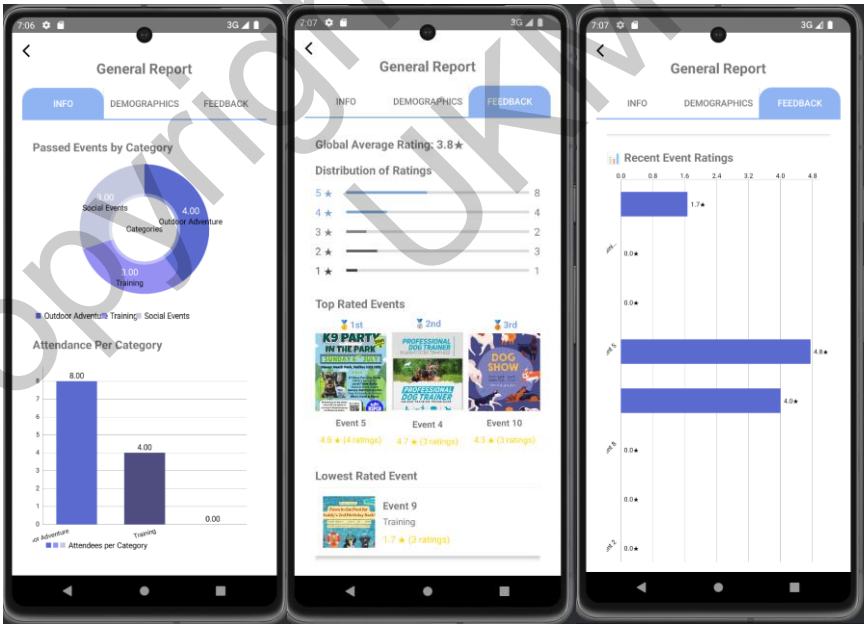

Figure 10: Combined Report

Generates summary reports for all past events by the organizer, showing charts on attendance, demographics, and feedback.

4.2 Testing and Evaluation Results

To ensure the DogPal application functioned correctly and met user needs, comprehensive testing was conducted based on the defined test plan. The testing phase was divided into white-box and black-box testing strategies to cover both the internal logic and the external user behavior.

Black-box testing was performed to validate the DogPal application from a user's perspective, covering all 9 core use cases such as registration, dog profile management, event participation, organizer dashboards, and reporting. A total of 92 functional test cases were executed using techniques like equivalence partitioning, boundary value analysis, scenario testing, and state transition testing. These tests were conducted on emulators and physical devices using live Firebase data, and they focused on both valid and invalid input scenarios to verify system behavior across different flows and inputs were handled correctly, UI states updated as expected, and all integrated components functioned smoothly.

White-box testing was conducted through unit tests to verify internal logic. Specifically, 14 unit tests were implemented for the validateJoin() method in the EventJoinValidator class, covering conditions like breed restrictions, participation limits, and edge cases (e.g., no dog selected or exceeding the maximum). All tests passed, confirming correct handling of these rules. Additionally, 6 unit tests validated the tab-based filtering logic in the attendee dashboard, simulating various event dates and statuses. Since both attendee and organizer dashboards use shared filtering logic, passing these tests also verified correctness across both modules.

Table 1: Test Result Summary

Metric	Value
Total Test Cases Executed	112
Functional Use Case Tests	92
Unit Tests (Validation + Filtering)	20
Total Use Cases Covered	9
Test Cases Passed	112
Test Cases Failed	0
Overall Pass Rate	**100%**

Testing results showed a 100% pass rate, with all 112 test cases (92 functional and 20 unit tests) passing successfully. No test case failures or regressions were observed, and the application met all defined functional requirements. Critical features like joining events, organizer updates, and reporting modules were verified under various test conditions. The system demonstrated stable performance, confirming DogPal's readiness for deployment and ensuring a reliable user experience for dog owners and event organizers.

5.0 CONCLUSION

The DogPal system effectively solved the problem of disconnected dog community engagement by offering a centralized, user-friendly platform for event discovery, participation, and management. With features like real-time updates, dog breed filtering, participant limits, and cancellation tracking, the app provides a streamlined solution for both organizers and attendees. It succeeded in simplifying event coordination, making it easier for users to connect and participate in dog-friendly activities.

This system has had a meaningful impact on dog owners, as it helps them easily find events that match their dogs' needs and social preferences. By allowing users to view detailed event information, see who's attending, and communicate directly through WhatsApp deep linking, DogPal encourages more active participation and community-building. It promotes both responsible pet ownership and more fulfilling social experiences for dogs and their owners alike.

From a developer's perspective, working on DogPal has significantly expanded my skills in mobile development, cloud integration, and API usage. Building the app exposed me to technologies like Firebase Firestore, Authentication, Google Maps API, Cloudinary, and data visualization tools like MPAndroidChart. This hands-on experience strengthened my understanding of real-time databases, user authentication, and efficient data handling, boosting my technical confidence and problem-solving abilities.

Looking ahead, DogPal has strong potential for future enhancement using artificial intelligence. By analyzing user feedback and event data, AI could generate smart summaries that inform organizers about event performance and areas of improvement. Additionally, AI-driven recommendations could suggest events to users based on their dogs' profiles, attendance history, or preferences—making the app more personalized, intelligent, and impactful.

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