PROJECT PROPOSAL FOR PETPAL: A UNIFIED PLATFORM FOR PET ADOPTION AND PET SITTING

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Team: PetPal (Team 4)

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Executive Summary

Picture a pet enthusiast like yourself searching for a pet but overwhelmed by the endless search through different websites. Or imagine a pet owner facing an unexpected business trip, anxious about leaving their beloved furry companion in the care of no one or a stranger. Our innovative web application aims to solve these problems. By connecting pet adoption agencies, potential adopters, pet owners, and pet sitters together in one easy-to-use platform, we are making their lives easier and stress-free.

Our platform is not just a tool—it's a comprehensive solution. The adoption process for agencies is streamlined, allowing them to create detailed profiles for each pet like photos, health information, and etc... This helps potential adopters quickly find their perfect match using a comprehensive search function. The built-in messaging feature allows seamless direct communication, making it easy for potential buyers to ask questions, express interest, and arrange meetings.

Furthermore we understand that pet owners also need peace of mind when they're away from their lovely pets. That's why we've created an extra pet-sitting feature that allows owners to list their pets with specific care requirements and enables sitters to find opportunities that suit their availability. Through built-in secure messaging, owners and sitters can connect and ensure that every pet receives the best possible care.

Technologically, our platform is built to scale, using secure cloud infrastructure like AWS servers. Ensuring that user data is protected and that the app performs smoothly as we scale. The UI-UX is intuitive and accessible, allowing easier navigation of the app.

Our web app is set to redefine the pet adoption and pet-sitting experience in Singapore by making it more efficient, more connected, and more enjoyable. We are fostering a community where every pet can find a loving home and every pet owner can find trusted care—quickly, easily, and all in one place.

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Problem Statement

The current pet adoption process in Singapore is highly fragmented, requiring potential adopters to navigate multiple websites and platforms to find a suitable pet. This lack of centralization results in inefficiencies and delays, making it difficult for users to make informed decisions. A study conducted by the Petco Foundation found that 28% of potential adopters found the pet adoption process difficult due to the fragmented nature of information and the time-consuming process of searching through various platforms, underscoring a clear need for a more streamlined and user-friendly solution.

As pet ownership increases in Singapore as reported by CNA, the demand for reliable pet care services, such as pet sitting, has grown significantly. According to a survey done by Rover, 55% of pet owners say that finding a great dog sitter is more difficult than finding a great babysitter, and 39% of pet owners admit to missing a trip because they couldn't find a suitable sitter.

Moreover, the absence of mandatory licensing across all services in Singapore's pet sector exacerbates the difficulty of finding reliable sitters, as there are no standardized regulations to ensure quality and safety. Given the unregulated nature of many pet care services in Singapore, there is a critical need for a unified platform that allows users to post and access reviews of pet sitters and other services. Such a platform would help pet owners make more informed decisions, reduce the risk associated with unlicensed services, and promote higher standards of care within the community.

Objectives

Authentication

The system must be able to verify the identity of a pet agency, and keep track of the roles of the user accounts - users, admins, pet agencies, and offer the accounts a way to register and login.

Pet Adoption

The system must be able to store pets available for adoption, and the system must be able to list the pets available for adoption given criterias such as species, age, gender, medical status - including but not limited to - sprayed, allergies etc.. The system must be able to keep track of the users that ask a question about a pet or show interest in adopting a pet, and offer a way for the agency to confirm, reply or deny the requests. The system must allow the agency to unregister the pet for adoption at any time.

Pet Sitting

The system must be able to store pets sitting services, and offer pet sitters a way to register their services for a given wage and desired location optionally, and offer users a way to message the pet sitters for the service. The system must allow the pet sitters to unregister their service at any time.

Pet Events

The system must be able to store available pet events, offer users and agencies a way to host pet events, and offer users a way to register for pet events. The system must allow users to search for available pet events given its theme and location.

Technical Approach

Customer Needs

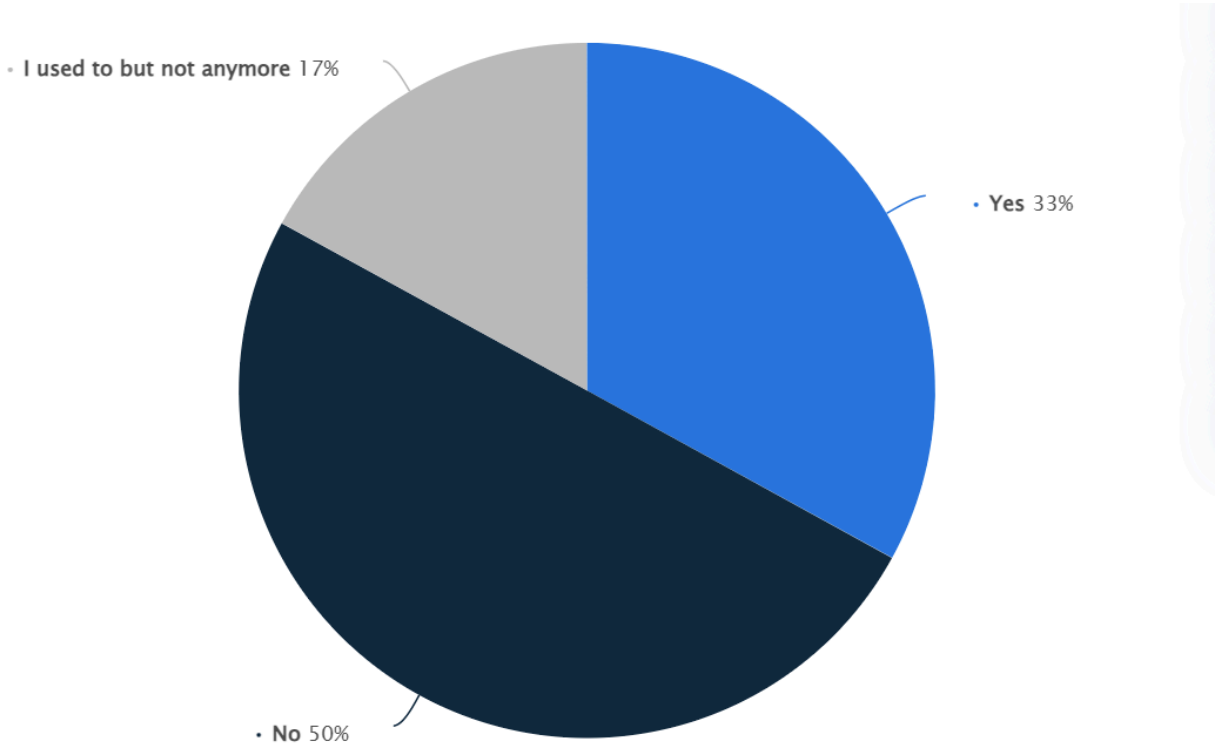


Figure 1: Share of people who owned pets in Singapore as of January 2022

Singapore's pet ownership landscape has evolved dramatically over the years, with pets increasingly being seen as integral members of the family. According to a survey on pet ownership conducted by Rakuten Insight in 2022[1], more than half the respondents were pet owners or had raised one previously. This trend has fueled a significant shift in the needs and expectations of pet owners, who now seek increased services and leisure activities for their pets[2]. This produces a demand for affordable and quick pet services to fit into the dynamic schedules of modern individuals. Our proposed pet application aims to cater to this growing and increasingly discerning market by providing a comprehensive platform that addresses the diverse needs of Singaporean pet owners.

For those who wish to adopt one, as there are many pet agencies in Singapore, and it is tedious for users to sieve through them to find a suitable pet for adoption, we aim to offer a centralized way for users to look for pet adoption from pet agencies. There is also a lack of social media platforms for pets, so it is convenient to have a centralized way to find pet sitters and pet events.

Target Specifications

PetPals will have three functionalities – assisting users to find their ideal pet for adoption, connecting pet sitters with their services, and serve as a platform for users to organize and join pet-themed events.

Users can find their ideal pet for adoption by searching the database for available pets for adoption. Users can specify keywords such as “German Shepherd” or “silver, male” to narrow down the search criteria. The data is to be populated by the pet adoption agencies as they post data on the site for greater visibility. Users can ask the pet adoption agency for more information about a given pet, in which the agency can respond with chat messages.

Users can also find pet sitters or register as pet sitters. Users can give their criteria for location, duration and wage, for both searching and listing their services. Pet sitters can review their requested services and accept, deny or inquiry for each request.

Users can, through the app, also join or host community-led pet-themed events. Users can find events they like and related to the pet they are bringing. Users can also be an event host, providing details of the event, location and date, and also view, accept or reject users who signed up for the event.

Technology Considerations

Table 1: Technologies used in Application Development

Technology	Description
NextJS (front-end)	NextJS is a React framework that enables server-side rendering (SSR) and static site generation (SSG) for building SEO-friendly web applications. It provides built-in routing, automatic code splitting, and optimized performance.
Flask (back-end)	Flask is a lightweight Python web framework used to build APIs and web applications, offering flexibility and simplicity in routing and request handling, making it perfect for developing scalable, RESTful services.
PostgreSQL (database)	PostgreSQL is an open-source relational database management system (RDBMS). It supports a wide range of data types, complex queries, and ACID (Atomicity, Consistency, Isolation, Durability) compliance, making it suitable for handling large-scale applications.
Firebase (authentication)	Utilizing Firebase for authentication by leveraging OAuth 2.0 to securely manage user authentication. Firebase efficiently handles token generation, validation, and user session management, simplifying the integration of authentication. Additionally, it supports advanced features such as multi-factor authentication and real-time user account management.
Python with	Python is a versatile, high-level programming language for handling

SQLAlchemy	complex functional logic and data processing in backend systems. SQLAlchemy, an Object-Relational Mapping (ORM) library, is used alongside Python to efficiently interact with the PostgreSQL database. It also supports advanced features like relationship mapping, lazy loading, and efficient querying, making it a robust tool for managing complex database interactions.

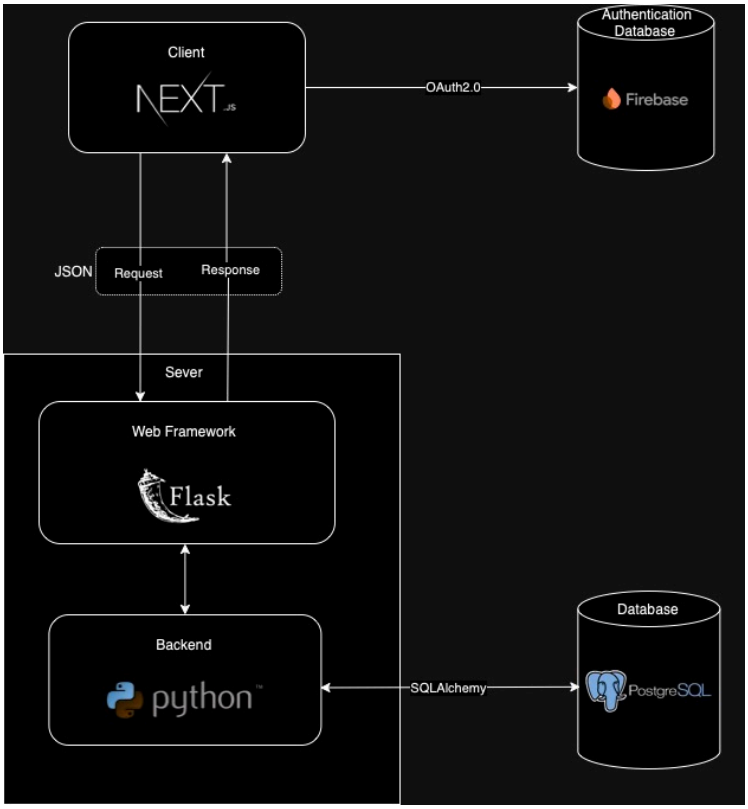


Figure 2: System Architecture

Project Management

Agile Method

The team will adopt the Agile methodology for this project to ensure a flexible, iterative development process focused on delivering user-centric features. The project will be organized into two-week sprints, each starting with a planning session to set goals, estimate task sizes, and prioritize tasks based on user stories. Trello will be used to record these tasks, track progress, and ensure deadlines are met. During each sprint, typical development tasks will be broken down into phases: **Planning and Concept Development** to define features and gather requirements, **System-Level Design** to outline architecture, **Detailed Design** for component-level development, **Testing and Refinement** to validate and improve functionalities, and finally, **Production** for deployment. Daily stand-up meetings will keep the team aligned and address any challenges. At the end of each sprint, a review will be conducted to present completed work and gather feedback from stakeholders, followed by a retrospective to reflect on the process and identify improvements. This continuous cycle of planning, execution, feedback, and refinement ensures the team can adapt quickly and consistently deliver high-quality updates that meet user needs and market demands.

Team Structure

Table 2: List of Executive Roles and the Assigned Person

Roles	Name
Project Manager	Mishra Apurva
Lead Developer	Gambhir Dhruv
Front End Developer	Nithya Hariharan
Back End Developer	Mehta Viral Sujal
QA Manager	Samantha Tan
QA Engineer	Tan Jing Jie
Release Engineer	Najah Ismail

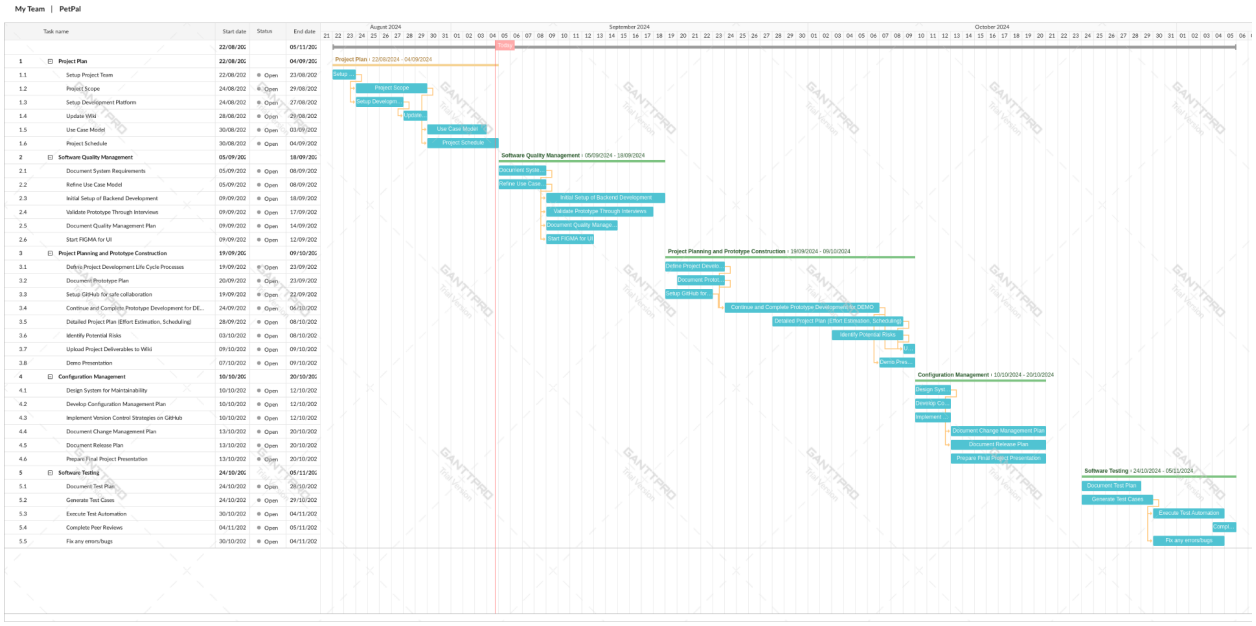
Table 3: Executive Roles and their Responsibilities

Roles	Duties
Project Manager	1. Oversee project lifecycle from planning to deployment. 2. Coordinate between teams and manage resources. 3. Ensure adherence to Agile methodology and manage sprint cycles. 4. Track progress using Trello and ensure tasks meet deadlines and budget.
Lead Developer	1. Define technical direction and architecture for the project. 2. Mentor development team and ensure code quality. 3. Ensure integration between front-end (NextJS) and back-end (Flask).

	4. Implement best practices and review code.
Front End Developer	1. Develop responsive and SEO-friendly user interface using NextJS. 2. Implement SSR and SSG for optimized performance. 3. Collaborate with QA for testing and debugging. 4. Ensure user experience aligns with project requirements.
Back End Developer	1. Develop server-side logic and APIs using Flask. 2. Manage data exchange between front-end and PostgreSQL database. 3. Implement security measures and third-party integrations. 4. Collaborate with QA for back-end testing and debugging.
QA Manager	1. Develop and manage QA strategy and test plans. 2. Coordinate with QA engineers for comprehensive testing. 3. Ensure all features are thoroughly tested in each sprint. 4. Track and report bugs in Trello for resolution.
QA Engineer	1. Perform manual and automated testing on front-end and back-end. 2. Identify defects and provide feedback to developers. 3. Document and re-test issues after fixes. 4. Utilize testing tools and frameworks effectively.
Release Engineer	1. Manage deployment process and automate CI/CD pipelines. 2. Collaborate with developers and QA for integration and delivery.

Project Schedule

Figure 3: Gantt chart showing the project schedule.



The arrow shows previous tasks that need to be done in order to start that task.

Deliverables

Table 4: Deliverables

Deliverables	Final Deadline
Project Proposal	09/05/2024 (Before Lab 2)
Use Case Model	09/05/2024 (Before Lab 2)
Wiki Link	09/05/2024 (Before Lab 2)
System Requirement Specification (SRS)	09/19/2024 (Before Lab 3)
Quality Plan	09/19/2024 (Before Lab 3)
Project Plan	10/10/2024 (Before Lab 4)
Risk Management	10/10/2024 (Before Lab 4)
Prototype Code, Documents and Slides	10/10/2024 (Before Lab 4)
Prototype Demo	10/10/2024 (Before Lab 4)
Design Report on Software Maintainability	10/24/2024 (Before Lab 5)
Configuration Management Plan	10/24/2024 (Before Lab 5)

Change Management Plan	10/24/2024 (Before Lab 5)
Release Plan	10/24/2024 (Before Lab 5)
Presentation Slides	10/24/2024 (Before Lab 5)
Test Plan	TBD
Test Cases and Requirements Test Coverage Report	TBD
Submission of the Report	TBD

Estimated deadline is 2 days before the final deadline

Budget

We have provided a detailed breakdown of the estimated monthly costs for our project in Table X below. The table includes major expenses, such as employee salaries, infrastructure costs (including equipment and office rental).

For our cloud hosting platform, we are using AWS Lambda's free tier which includes one million free requests per month and 400,000 GB-seconds of compute time per month. We estimate that the free subscription would be sufficient for our initial traffic, hence no cost is estimated for cloud hosting in this current phase.

We are also using Google Firebase for authentication, which is completely free of charge on all plans, and hence no cost is estimated.

Table 5: Monthly Estimated Costs of Project

Item	Supplier	Quantity	Unit Price (SGD)	Total
Project Manager	-	1	$8,000.00	**$8,000.00**
Software Developers	-	3	$5,000.00	**$15,000.00**
QA/Release Engineers	-	3	$4,000,00	**$12,000.00**
Computers	Dell	5	$1,000.00	**$5,000.00**
Computers	Apple	2	$1,400.00	**$2,800.00**
Office rental	NTU	1	$5,000.00	**$5,000.00**
Cloud Hosting	AWS	1	$0.00	**$0.00**
Firebase Authentication	Google	1	$0.00	**$0.00**
			TOTAL	**$47,800.00**

Communication and Coordination with Sponsor

Effective communication and coordination with our sponsors are essential to our project's success. Our Project Manager will send weekly updates to the sponsor's designated point of contact every Friday via email. In the event that a Friday falls on a holiday, the updates will be sent on the following Monday.

Team Qualifications

Table 6: List of Executive Roles and the Assigned Person

Name	Affiliation	Experience/Skills
Mishra Apurva (Project Manager)	NTU CCDS	Python, Stakeholder Management, Architecture Design
Gambhir Dhruv (Lead Developer)	NTU CCDS	Python, Next.js, Teamwork
Nithya Hariharan (Front End Developer)	NTU CCDS	Python, Next.js, Android Studio
Mehta Viral Sujal (Back End Developer)	NTU CCDS	Python, Firebase, Flask
Samantha Tan (QA Manager)	NTU CCDS	Python, QA Testing, Teamwork
Tan Jing Jie (QA Engineer)	NTU CCDS	Python, QA Testing, Teamwork
Najah Ismail (Release Engineer)	NTU CCDS	Python, Software Testing, Teamwork

Conclusion

The PetPal web app supports three main features: pet adoption search, pet events attendance, and pet sitting. The pet adoption feature allows agencies to post their listings, enabling users to interact with the listings and find the most suitable options based on criteria such as breed and age. Pet events can be hosted by either an agency or a user, and all users can search for events based on location and other factors. Users can view event details and choose to express interest in attending. The pet sitting feature allows pet owners to post details such as remuneration, hours, and tasks required — like dog walking. Anyone qualified to be a pet sitter can express their interest and contact the poster. The web app is built using Agile methodology, with a tech stack that includes Firebase, NEXT.js, the Flask web framework, Python, and PostgreSQL. In essence, PetPal is a one-stop platform that adds convenience to the lives of pets and pet lovers. In the future, the idea can be scaled to more regions, and have add-on features such as vaccine planning, pet store and agency reviews, and blog posts by users.