

PAWPAl

Enhanced Pet Services Marketplace

Project Proposal Report

B.Sc. (Hons) Degree in Information Technology Specializing in
Information Technology
Science

Department of Information Technology

Sri Lanka Institute of Information Technology

Sri Lanka

January 2025

DECLARATION

I declare that this is our own work, and this proposal does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any other university or Institute of higher learning, and to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where the acknowledgment is made in the text.

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The supervisor/s should certify the proposal report with the following declaration. The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor: M. M. S L R D Date: 30/01/2025

Signature of the Co-supervisor: [Signature] Date: 30/01/2025

Abstraction

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The Enhanced Pet Services Market Platform with real-time technological adoption is a peculiar project that assists to transform the entire field of pet care. Ultimately, the project is going to introduce a full-fledged solution, including real-time service availability maps, in-app GPS tracking, dynamic scheduling, and gamification. Such a system helps pet owners and service providers interact kindly and trustfully, hence enhancing the quality and access of taking care of the pets.

Modern trends include live communication tools such as the ones used by the Uber application, flexible scheduling tools, as well as social features that target pet owners as the main audience. The platform has adopted loyalty programs, and advanced monetization schemes to safeguard continuity and expand.

Keywords: Pet care, real-time services, dynamic scheduling, gamification, GPS tracking, service marketplace.

Acknowledgment

Dear contributors who participated in the creation of the project proposal report for the Enhanced Pet Services Marketplace. I request that you allow me to express my hearty feeling of thanks through every line and word to everyone who has participated in it. It is a platform that is in the process of being developed and it is designed to transport real-time services to the online environment through technology at the same time the pets need.

There is not enough space to express my heartfelt love and respect for the work of my dear mentor, Dr. Samantha Rajapaksha, and my co-advisor, Mrs. Dinuka Wijesundara, during the early stage of this project. They are the ones that we owe our technical know-how to and they have had a part in enabling us to build the software and real-time systems and giving us a foundation in data analytics. It is because of the deep knowledge and skills that they have in the fields of software development, real-time systems, and data analytics that they have been the core that has shaped the project proposal into a serious and well-structured document.

I would like to extend my gratitude to my project team for their undivided help and for that, they deserve my respect and full support all throughout the proposal preparation stage. While the research and development phases are not yet started, their hard work, collaboration, and constructive feedback have been crucial in setting the groundwork for this project. Their additions have played an important part in the effect that they wanted and the vision of the platform.

Furthermore, I want to give my thanks to the Faculty of Computing as well as the CDAP team of the Sri Lanka Institute of Information Technology (SLIIT) for making the resources, guidance, and encouragement available to me to complete this research project. They have indeed been the ones who have stood by me and the trust that they have in me has been the driving force behind getting this proposal out.

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1. INTRODUCTION

1.1 Background and Literature Survey

Raising a pet is a major component of today's life, which is why innovative and easy services are the order of the day to maintain the well-being of pets and the satisfaction of the owners. The world of pet care is here to be, the Enhanced Pet Services Marketplace's main objective is to do away with the old style of service delivery and introduce the earthquake of technology in the pet healthcare sector through such a marketplace.

In the old days, the pet service sector, such as grooming, training, and veterinary care, would depend on manual scheduling and physical visits which were making inefficiencies and accessibility issues. Websites like Rover and Wag are existing platforms that have partial solutions but they only concentrate on one particular service rather than combining real-time tracking, dynamic scheduling, and community engagement into one integrated system, which is what every single platform should have.

Previous studies in other related fields have been dealing with the tracking and the availability of the service problems, but maybe they were not fully integrated. The research on service-marketplaces with the title "Dynamic Scheduling Algorithms for On-Demand Services" [1] underscores the significance of on-the-fly adaptability. In spite of the fact that the studies on "Community-Driven Service Platforms" [2] stress the relevance of user engagement and trust-building mechanisms, yet they are still far from being targeted specifically for the pet care industry only.

The Enhanced Pet Services Marketplace, as suggested, the application of Online Marketplaces for Pet Services, by integrating real-time mapping, dynamic scheduling, and user engagement into one application was the direction where the idea got inspiration from. In the style of Uber and PickMe, the network becomes user-friendly, accessible, and trustworthy with such features as live tracking, adaptive service availability, and gamification capabilities that are everything an owner of a pet wants. This project seeks to reform the pet care sector through the new technology and in the due course develop a dependable, user-focused market place.

1.2 Research Gap

Some progress has been noticed in the creation of on-demand service platforms, and yet the pet care industry hasn't seen a complete approach that includes all the features into one seamless application. The main gaps are as follows:

1. Incapability of Integration: The current platforms provide one of the aspects, such as, booking or tracking, but do not allow the making of a team system that is formed in real-time, that uses GPS-tracking, and dynamic scheduling.
2. Personalization Limitations: Platforms often don't have adaptive features like gamification and loyalty programs to improve user engagement and retention.
3. Lack of Community Functions: The pet care domain doesn't use enough customer trust-building tools such as AI-verified reviews and community meetups.
4. Technological Restrictions: AI technology and GPS systems, when used separately, have been successful, but not in terms of integrating the two technologies to create services that are adapted to the pet care niche.

By launching a new Pet Services Marketplace that offers all these digital experiences the gaps will be filled, the aim is to develop a seamless and smooth user experience that takes into account the following:

- Real-Time Availability Maps: Presenting the service suppliers near a user with the possibility of different filters.
- In-App GPS Tracking: Users are also able to locate the movers while they are on the way.
- Adaptive Scheduling: Live updates to service availability, as shown to be according to provider schedules will be available.
- Gamification and Community Features: User should feel rewarded and entertained in a respectful and engaging atmosphere made up often of such things as friends, and persistence.

By the introduction of these applications, the platform not only improves user convenience but also lifts pet care service levels to a higher standard, thus, it becomes a sustainable and scalable system for pet owners and service providers.

1.2 Research Gap

Research	1	2	3	4	PAWPAL
Integration of Real-Time GPS Tracking	✓	✗	✗	✗	✓
Adaptive Scheduling and Availability	✗	✓	✗	✗	✓
Comprehensive Marketplace Integration	✗	✗	✗	✗	✓
Community Engagement Features	✗	✗	✗	✗	✓
Bridging Traditional and Digital Services	✓	✗	✗	✗	✓

Previous Research

- Dynamic Scheduling Algorithms for On-Demand Services: The studies reflect on the need to have adaptive systems that can match user demands efficiently while reducing waiting times
- Community-Driven Service Platforms: The findings indicate that the most significant impact on user retention was made by the engagement, trust-building, and gamification features
- GPS Tracking Systems for Service Delivery: Although the innovation of GPS-enabled service platforms, their impact on user convenience and operational transparency has not been significantly emphasized
- On-Demand Service Marketplaces: The reports let us draw the conclusion that apart from real-time availability, bidding, and loyalty programs, other factors of mobile service systems are necessary.
-

2. RESEARCH PROBLEM

Pet care services have been facing a major problem due to the current platform's fragmented structure, which doesn't create a wholesome and real-time ecosystem. These services offered today are not yet comprehensive as most of them cover a specific service such as booking or tracking, however, they lack the feature to interact with all services in a user-friendly way.

It is clear that the pet owners are having difficulties in getting the services they need in time because they have a shortage of on-demand service providers for vets and groomers. They thus miss appointments and fail to provide consistent care. Similarly, service providers are unable to manage their schedules flexibly due to the fact that they have to be available at real-time when requested to. By the same token, there is also a mismatch between user needs and service availability, which brings into focus the demand for a transformative solution.

This study is to unite technology and bridge the gap between the users and the service providers. The solutions that the researchers are thinking of include real-time GPS tracking, AI-verified reviews, and adaptive scheduling algorithms. The project is not only about technological advances but also about the provision of a platform through which pet care can be turned into an enjoyable experience.

The platform's main idea is joining pet owners in a system where they can book services, track providers while the service is running, and become a part of the group of trusted reliable providers. By employing these innovations, the project is intended to create new standards for pet care services that are easier, affordable, and engaging.

3.OBJECTIVES

3.1 Main Objective

The primary objective is to develop a real-time pet services marketplace that integrates service availability tracking, dynamic scheduling, and user engagement to enhance accessibility, convenience, and trust in the pet care industry.

3.2 Specific Objectives

3.2.1 Integration, Preprocessing, and Structuring of Data

The aim here is to create a concrete backbone for the Enhanced Pet Services Marketplace by collecting, preprocessing, and structuring the data on services so that real-time updating of data can take place accurately. Essentially, this comprises:

Data Collection: This includes aggregation of data related to schedules, certifications, and location details of service providers.

Preprocessing: The process of filtering and standardization of data for inconsistencies, such as outdated schedules or incorrect location details.

Structuring: Organizing data into a coherent format to support dynamic scheduling and real-time tracking.

This objective acts as a backbone to realize offerings like live service availability maps and adaptive scheduling by providing clean, reliable, and structured data.

3.2.2 Real Time Service Mapping Framework

Create a real-time mapping framework for services using GPS and refreshable data to map available providers on a map. Some of the key functionalities would be

Dynamic Filters: Filtering of services according to requirement-for example, "Certified for Exotic Pets" or "Behavioral Training Experts."

Accurate Location Updates: Integrate live GPS data in order to update provider locations and availability. The above architecture will provide a very smooth and user-friendly interface that will bring the pet owners closer to service providers.

This will ensure both users and providers benefit from the flexible and efficient workings of the system.

3.2.3 Adaptive Scheduling and Optimization

This involves the design and implementation of sophisticated, dynamic scheduling algorithms based on real-time input that will dynamically update service availability. The main elements to be focused on include:

Provider Availability: The providers can dynamically change their availability.

User Notifications: Notify users of last-minute schedule changes and alternatives.

Optimization: Intelligent scheduling to minimize wait time and optimize the providers.

3.2.4 AI-driven features of Community Engagement

Introduce intelligent tools that enable trust and engagement within the community. Core features would include:

Verified Reviews-using AI to verify customers' reviews and pinpointing most important points, such as "Highly punctual," "Great with shy pets."

Event Organization-support for pet meetups, training workshops, and other community activities that help users forge personal bonds.

These will enable a creation of a trusting, engaging social network for people who take care of pets.

3.2.5 Gamification and Loyalty Ecosystem

Design a gamified system that can also reward users for being active and undertaking responsible care for their pets. Key components will include:

Pet Care Score: Points are accrued through timely grooming, training, and vaccination, enabling higher scores to unlock exclusive offers and discounts.

Referral Programs: Incentivize users to invite friends and give them credits redeemable for services or products.

This will create loyalty in the users and increase the frequency of the usage cycle.

4. Methodology

The methodology of the Enhanced Pet Services Marketplace is configured based on a series of strategic steps that leverage real-time tracking, adaptive scheduling, and user-centric design to revolutionize the experience of pet care.

1. Data Acquisition and Preprocessing

The process begins with acquiring and preprocessing large volumes of data from service providers and user interactions. These datasets include:

- Provider Data: Availability schedules, certifications, and location details.

Data sources include the following:

- User Data: Booking history, preferences, and reviews.
- Real-Time Data: GPS locations and dynamic updates.

Preprocessing: Cleaning and normalizing provider availability and user feedback; removing inconsistencies, outdated schedules, and inaccurate locations. This cleanses data and makes it reliable for structured formatting into real-time systems.

2. Real-Time Service Mapping Integration

Design a real-time mapping framework powered by GPS to showcase service providers in a dynamic manner. The highlights will be:

- Dynamic Filters: Ability for the user to filter services like "Certified for Exotic Pets."
- Real-Time Updates: Location and availability accuracy with real-time GPS-based data on provider locations.

This allows intuitive interaction by the user with live updates and transparency provided to them in the system.

3. Adaptive Scheduling Algorithms

Advanced scheduling algorithms dynamically adjust provider availability based on user demand and real-time factors. The areas of focus are:

Provider Optimization: Enable service providers to change their schedule immediately.

User Notification: Notify users of a changed schedule or available alternatives.

Efficiency: Reduction of wait times with an increased number of services covered.

Herein, adaptive scheduling ensures flexibility in operation and increases customer satisfaction.

5. Real-Time Tracking and Feedback

Integrate GPS tracking for real-time updates and a feedback mechanism for service quality. Among the features are:

- Live Tracking: The user is able to track the provider's route in real-time.
- Instant Feedback: Right after the end of service, the user can rate and review providers to enable immediate improvements.

The following process builds trust between the user and service provider because it adds transparency.

6. Advanced Monetization Strategies

Build a monetization framework with the inclusion of:

- Subscription Plans: Access to premium features, including priority bookings and discounts.
- Ad Placement: The service providers can advertise their services on the platform.

This ensures financial sustainability while increasing the visibility of services.

7. Scalability and Equitable Access

The platform should be designed to scale seamlessly with increased user demand. Features include:

- Load Balancing: Efficient management of concurrent user interactions.

Inclusive: works across varied technological skill amongst users.

Scalability: A robust system that is extensible for growth but rigid at a high level of performance in throughput.

4.1 System Architecture Diagrams

The architecture design of the enhanced pet services marketplace supports real-time service tracking and dynamic scheduling integrated with a community feature. Major components include the following:

User Application: a mobile application to search, book, and track services by a pet owner;

Service Provider Application: an app interface to manage schedules and interact with customers;

Backend Server: handles API calls, data storage, and real-time updates.

Database: Central storage of user information, provider information, reviews, and history of bookings.

Real-Time GPS Module: allows for real-time tracking of service providers.

Gamification Module: keeps track of activities of users and rewards them by loyalty programs.

Community Engagement System: allows verified reviews, event creation, and interaction with others.

4.2 Component Specific System Diagram User Workflow:

User: The user initiates a service request via a mobile application.

Service Search: The customers search for service providers in their vicinity with the help of filters, such as "Certified for Exotic Pets" or "Behavioral Training Experts."

Dynamic Display of Map: This system will dynamically display providers by accessing Live GPS.

Service Booking: The user will confirm the booking by selecting the provider and time schedule.

Live Tracking: After confirmation, the user can track the location in real time by GPS integration.

Completion and Feedback: Users review the service upon completion; this contributes to AI-verified reviews.

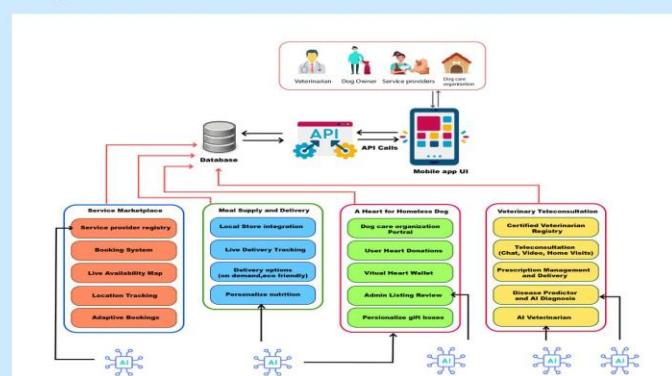
Provider Workflow:

Availability Updates: Providers dynamically update their availability on the app.

Bidding on Tasks: Providers can bid on requests posted by users with customized quotes.

Community Engagement: Providers engage in events or workshops to gain credibility and visibility.

System Diagram



.4.3 Data Gathering and Dissemination

The enhanced data collection for the marketplace will be toward making a critical mass dataset to sustain all real-time features and interactions for users and providers.

Data regarding Service Providers:

- Availability and scheduling, including history of qualifications
- Updates of live locations through GPS

Client Users Data

- Past bookings made and preferences regarding a particular kind of service.
- Community and gamification activities

Real-Time Data during Interactions:

- Dynamic Updates for Services; real-time geographic position
- Reminders and Alerts Regarding Bookings or Availability

All data collection processes are compliant with the requirements of privacy regulations and anonymize active users.

Consent is obtained prior to collecting and processing personal or sensitive data.

Daily stand-ups to review progress and clear any bottlenecks.

Collaborative teamwork with well-defined roles and responsibilities.

Important Development Practices:

4.4 Software Solution

The development methodology of the Enhanced Pet Services Marketplace follows Agile and SCRUM principles, thus ensuring flexibility, collaboration, and iterative improvement.

Agile Development:

- The development cycles will be divided into short sprints, hence enabling the team to pay attention to user feedback and changing requirements.
- Regular retrospectives for continuous improvement.

SCRUM Framework:

- Daily stand-ups to discuss progress and resolve bottlenecks.
- Collaborative teamwork with well-defined roles and responsibilities.

Key Development Practices:

- **User-Centric Design:** The app interface is kept intuitive and easy to use.
- **Frequent Testing:** Running iterative tests to find and eliminate bugs in the shortest time.
- **Stakeholder Involvement:** Active participation of service providers and users in developing the features, ensuring they meet their needs.

4.5 Requirement Gathering and Analysis

Requirement gathering is an important phase in developing PawPal, ensuring that the platform effectively serves both pet owners and service providers.

Methods of Requirement Gathering

User Interviews and Surveys

- Conducting interviews with pet owners to understand their expectations from a pet service marketplace.
- Gathering insights from pet service providers to enhance operational efficiency.

Market Research and Competitor Analysis

- Analyzing existing platforms like Rover and Wag to identify gaps and opportunities.
- Evaluating the strengths and weaknesses of current pet service apps.

Technical Consultations

- Collaborating with AI, GPS, and mobile app development experts to refine PawPal's architecture.
- Establishing clear performance and scalability benchmarks.

4.5.1 Functional Requirements

PawPal's functional requirements outline the system's key capabilities, ensuring an efficient and user-friendly experience.

Live Pet Services Marketplace

- Real-time tracking of pet groomers, trainers, and veterinarians.
- Instant booking with dynamic scheduling.

AI-Powered Service Recommendations

- Personalized service recommendations based on user preferences and history.
- Adaptive pet care suggestions powered by machine learning algorithms.

Community Engagement Features

- AI-verified user reviews and gamified loyalty reward programs.
- Coordination of pet meet-up events.

Secure Payment Integration

- Multiple payment options, including digital wallets.
- Transparent pricing with real-time cost estimations.

4.5.2 Non-Functional Requirements

PawPal's non-functional requirements focus on maintaining high performance, security, and reliability.

High Performance

- Fast response times for real-time service tracking and scheduling.
- Optimized server-side processing to support multiple users simultaneously.

Data Security and Confidentiality

- End-to-end encryption for secure transactions.
- AI-powered fraud prevention to detect fake reviews and service scams.

User-Friendly Interface

- Intuitive design suitable for pet owners with varying levels of tech proficiency.
- Simple, engaging, and visually appealing UI elements.

4.6 Tools and Technologies

Various cutting-edge development of PawPal is based on multiple tools/technologies in order to guarantee the system is going to be robust, scalable and perform well.

4.6.1 Tools

Visual Studio Code

A source code editor is intended for mobile and back-end development.

GitLab

The platform for source code and version control management will be used during collaborative coding.

Google Colab

Will be utilized in modeling development and tests- real time demand prediction on pet services among other AI

Trello

Task management and agile workflow tracking.

Microsoft Teams

Team communication and stakeholder engagement platform.

4.6.2 Technologies

Flutter

Cross-platform mobile app development framework that allows for speedy and smooth development and a responsive UI both for Android and iOS.

Dart

The programming language used in Flutter development, which guarantees high performance and maintainability.

Python

The core backend language for AI-powered service matching and predictive analytics.

TensorFlow / PyTorch

AI and machine learning frameworks used for service optimization, demand prediction, and automated recommendations.

Google Maps API

Used for real-time GPS tracking to enable accurate route navigation and service tracking for pet care providers.
Firebase

Cloud-based real-time database for storing and retrieving user profiles, service bookings, and notifications.
Flask

4.8 Deployment

To make PawPal widely available, the deployment phase will go through a number of steps with the aim to ensure smooth operability and reliability.

Deployment Process

1. App Store Submission

The mobile app will be deployed to Google Play Store and Apple App Store, awaiting approval for sale. It will be undergoing security and performance testing before official release.

2. Backend Server Deployment

Flask API and the Firebase database is to be on AWS or Google Cloud to serve real-time operation support. System handling of users running into multiple concurrent users without latency.

3. Performance Monitoring & Maintenance

Real-time performance tracking tools that monitor system performance, detect bugs, and smooth user experience. Scheduling automatic bug fixes; scheduling periodic application updates. User Onboarding & Support Comprehensive onboarding tutorials with customer support. A dedicated section for frequently asked questions and in-app chat for guiding newbies

4.9 Systems Evaluation

PawPal will be put through vigorous testing using various methods of evaluation to ascertain superior performance and satisfaction of its users.

Type of Evaluation

User Satisfaction Surveying

To be conducted amongst pet owners and service providers for feedback.

Find pain points and areas of improvement.

Performance Metrics

- Service matching accuracy: how well the AI model is suggesting providers.
- Real-time tracking response times: ensuring seamless navigation and tracking.
- System uptime: monitor server stability along with crash reports.

A/B Testing

Testing will be done with different versions of features to come up with optimal UI/UX solutions.

Expert Evaluation

Pet care professionals, veterinarians, and industry experts will validate service quality, AI-driven recommendations, and overall platform usability.

6. PERSONNEL AND FACILITIES

This PawPal-A Service-Based Pet Care Mobile Application-is supported by a highly competent and multidisciplinary team. It is under the tutelage of our designated supervisor, Dr. Samantha Rajapakse, and co-supervisor, Mrs Dinuka Wijesri, whose invaluable knowledge and mentorship are of great importance in this project to make the application a successful one.

Our supervisor, Dr Samantha Rajapakse , has extensive experience in software engineering and the development of mobile applications to ensure that PawPal follows best industry practices in cross-platform development using Flutter, AI-driven service matching, and real-time tracking technologies. Their insights help in refining the system architecture and ensuring seamless integration of core functionalities.

Similarly, our co-supervisor, Mrs Dinuka Wijesrihas specialized in artificial intelligence and data analytics, making great contributions to machine learning algorithms for service optimization, predictive analytics, and AI-powered recommendations. Their expertise helps ensure that PawPal provides accurate and efficient service matching for pet owners and providers.

Since PawPal brings together diverse domains such as real-time tracking, AI-driven personalization, and mobile payment solutions, several experts are in collaboration. The team working on the project includes:

- **Software Engineers:** Developing and maintaining the mobile application on Flutter, integrating the backend, and API functionalities.
- **AI Specialists:** Service recommendations and optimization using machine learning models.
- **Pet Care Experts:** Validating service offerings for quality assurance regarding the pet-care-related services. **UI/UX Designers:** Intuitive mobile application with a great look-and-feel.
- **Business Analysts & Marketing Experts:** Ensure PawPal meets market demand, focuses on the correct target, and has a feasible revenue model.

6.2. WORK BREAKDOWN STRUCTURE

Work Breakdown Structure, or WBS, is a hierarchical breakdown of the project tasks into smaller components that are more manageable. This helps in organizing the workflow of the project to ensure that every stage is completed systematically within the timeline.

Key Phases of the Project

Planning & Requirement Gathering

- Conduct market research and competitor analysis.
- Gather system requirements from stakeholders.

System Architecture & Design

- Define the Flutter-based mobile application framework.
- Develop wireframes and UI/UX prototypes.
- Development & Implementation

Firebase and Flask for backend API and database integration.

- Implementation of the AI model to achieve service matching and recommendation.
- Integrate the Google Maps API for real-time tracking. Testing & Quality Assurance

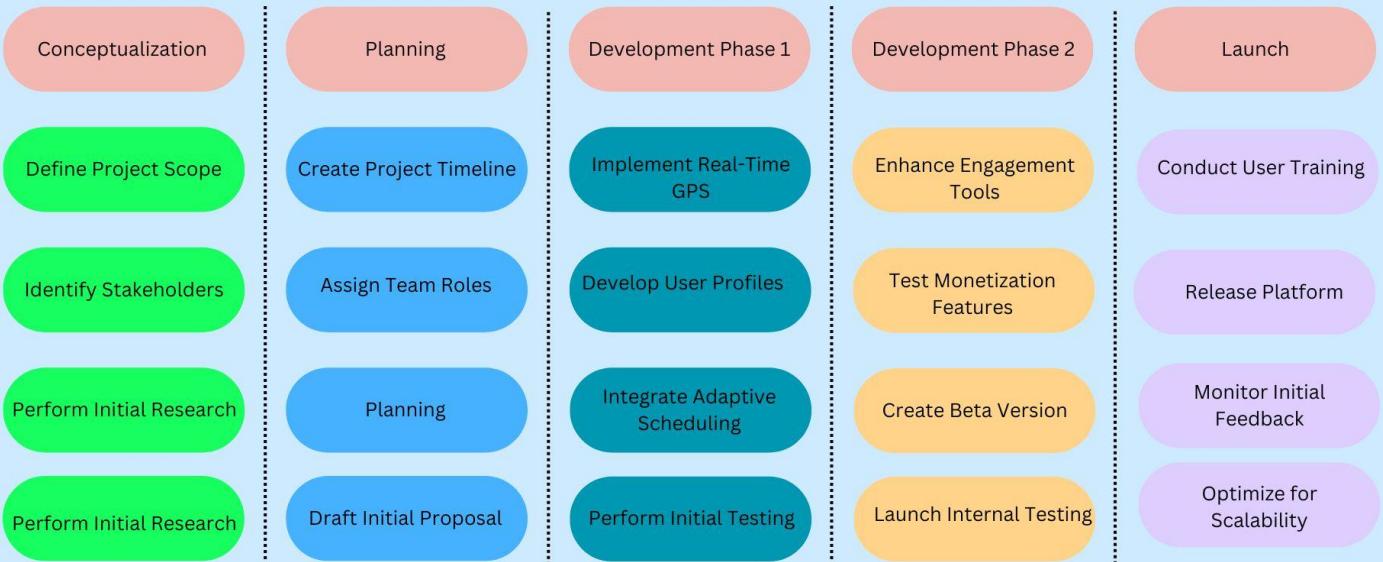
Unit testing, performance testing, bug fixing

- Beta testing: gather feedback from real users.

Deployment & Maintenance

- Launch PawPal on Google Play and Apple App Store.
- Continuous performance monitoring and security updates.

Work BreakDown



4.9 Systems Evaluation

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A/B Testing

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Expert Evaluation

Pet care professionals, veterinarians, and industry experts will validate service quality, AI-driven recommendations, and overall platform usability.

8. PRODUCT COMMERCIALIZATION

8.1 Target Market

PawPal targets the following major categories of customers:

Home Pet Owners

- Seek hassle-free, trustworthy services related to pets.
- Get real-time tracking of their pets, with trusted service providers and AI recommendations.

Pet Service Providers

- Groomers, trainers, veterinarians, pet boarding services, etc., need increased customer flow.
- Businesses that aim at auto-scheduling, better discovery of their services, and tools for customer engagement.

8.2 Competition

Currently, various pet care service platforms exist, but none offer a comprehensive solution like PawPal. A few indirect competitors:

- **Rover & Wag** - these offer pet-sitting and dog-walking services without real-time tracking and AI-powered service recommendations.
- **Local Pet Care Directories** - these allow for the listing of service providers but do not provide automated booking, live tracking, or personalized services.

How PawPal Outshines Them

AI-powered Service Recommendations

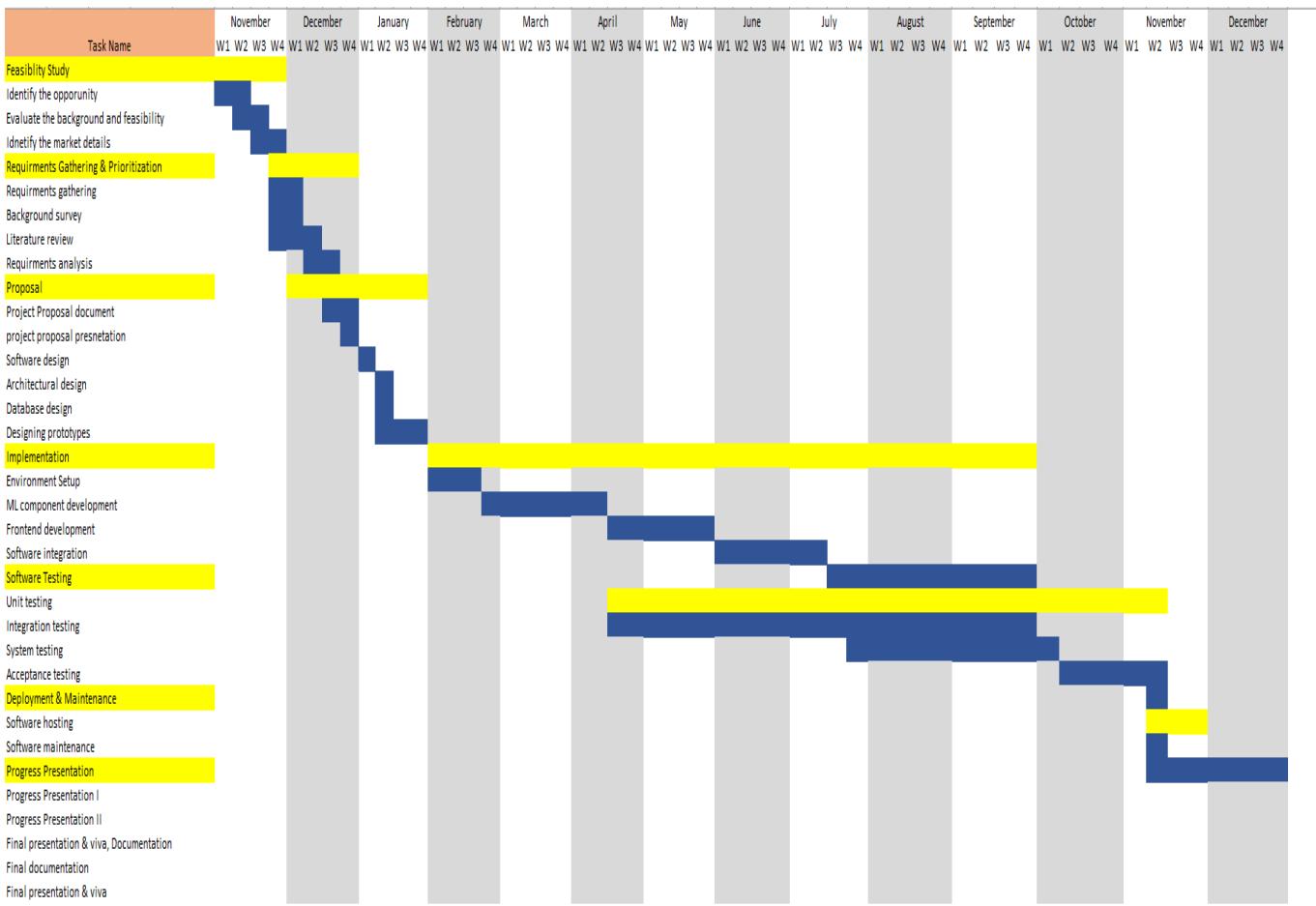
Real-time GPS Tracking

❖ Dynamic Scheduling and Bidding System for Service Providers

❖ Gamification and Community Engagement to Retain Users

PawPal consolidates the fragmented pet care services onto a single platform where one can manage all pet services with ease.

9. Grant Chart



11 Budget

Expense Category	Cost (LKR)
Internet Charges (for the entire project period)	5,000
Technical Infrastructure (Software, hosting, cloud services, etc.)	5000
Travelling Expenses (Visits to pet care organizations, pet service & product suppliers, etc.)	5000
Printing & Documentation (Reports, proposal, research materials, etc.)	2000
Miscellaneous Expenses (Unexpected costs, stationery, etc.)	2000
TOTAL	19000

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