BILKENT UNIVERSITY

DEPARTMENT OF COMPUTER ENGINEERING

Senior Design Project

Petriam

Analysis Report

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1.Introduction

Animal domestication has an important place in human history as it existed for a long period of human lifetime [1]. Even though it first started for mainly food and clothing purposes, later this relationship grows into a more loving and caring type of relationship between humans and other animals. In our daily lives, pets play an important role as some consider their pets as their friends while some consider their pets as part of their family. Such an intimate relationship between humans and their pets causes owners to look for products and services that help them to take good care of their pets.

As technology developed over time, such developments allowed humans to travel more often for business or entertainment purposes. However, the increased number of travels [2] creates problems for taking care of beloved pets of the pet owners. Such long-distance travel may be uncomfortable and unhealthy for the pets, also travel companies can have strict rules for this kind of pet luggage [3]. Owners can leave them at pet hotels during their travel but these hotels can be expensive and they are not available in every country or city.

Petriam aims to solve sheltering of their pet issue for pet owners during times of need such as long-distance travels. By creating a virtual environment for users to meet each other, pet owners can arrange a shelter and caregiver for their pets whenever they need to travel to a different location. By using Petriam, pet owners can look through a list of other users that are verified pet hosts and choose one of them to look after their pet for the decided price when they travel. In this way, the pet owners can find a shelter for their pets while pet hosts can earn money by hosting other users' pets. Moreover, when a pet owner leaves their pet to a pet host, they can get in contact with the pet host using Petriam to check the status of their pet or solve issues for the pet host about specific issues with the pet.

In this report, a description of the system will be provided and requirements of the system such as nonfunctional or functional requirements will be analyzed. After providing description and requirements; use cases, models such as object or class models, and UI design of the system will be provided.

3. Proposed Software Architecture

3.1 Overview

Petriam aims to solve the problems of the pet owners when they have to be far away from their pets or when they are not available for their pets. Since taking care of a pet requires a lot of caring and effort, owners need to find a shelter for their pets when they are not around because pets mostly depend on their owners. This can be a tedious task for pet owners because they do not have many options for them to choose from for sheltering their pets. The purpose of Petriam is to present an alternative choice for pet owners to find a shelter for their pet easily when they have to leave their pet for some reason like traveling.

Petriam creates a virtual environment for pet owners to help them find a host for their pets for a limited amount of time or help them to host other pet owners' pets to earn money or have fun with taking care of an animal. If a real-life pet owner wants to become a part of Petriam's virtual social environment to benefit from its advantages, first they need to register to Petriam by providing information related to them like name, surname, username, and address, etc. After pet owners register to the Petriam system, they become a user and can start using Petriam to find a shelter for their pet or they can sign up to become pet hosts for other pet owners. When a user registers to the Petriam system, they are greeted by a map of their location with pins on it. These pins represent other pet owners that registered to the system as pet hosts and are ready to arrange a time interval with other pet owners to provide a shelter for their pets with including the agreed fee. By clicking these pins, users are able to preview the profile page of the pet host and these profile pages contain information like verification status, address, and determined daily fee of the host. This helps pet owners to find a suitable pet host with the necessary skills and reasonable prices for sheltering their pets.

If users do not want to search a host by using a map view, they can list available hosts that are closer to them. Users are able to filter the list of hosts according to name, location, or what kind of pet they can host to find a suitable host for their pet. Also, this list of hosts presents more information related to the host than a pin on a map. While a map with pins provides a piece of visual information related to the location and distance of a host to a user, a list of hosts provides more detailed written information related to the hosts that are available.

Other than finding a shelter for their pet, users can also sign up to become a host to provide a shelter for pet owners' pets. To become a host, users need to provide additional

information to the system like daily fee amount, social security number, and criminal record. By requiring social security numbers and criminal records to become a host, Petriam aims to improve the accountability of the users that want to become a host. Verification of the host plays a crucial role in providing the safety of the pets that are being sheltered and such kind data will play important role in the verification process of the hosts. After being verified, any user can become a host registered in the system.

After arranging a shelter for the pet, the pet owner lends the pet and the arranged fee to the host. While the host provides shelter and care to the pet, the owner can still check the condition and status of their pet through the Petriam system. By using the messaging system, pet owners can get in contact with the host to check their pet, warn the host about specific issues or make a request to the host about their pet while being sheltered. Also, pet owners can request pictures and videos of their pet from the host to learn how their pet is doing with the host. This will be another measure to provide the safety and security of the pet during the sheltering process.

3.2 Functional Requirements

Requirements Related to the Pet Owner Users

- Pet owner users need to create an account and register to the system with a username or email and a password.
- Pet owner users need to sign in to the system with their account to use the application.
- To be able to hire a pet host, a pet owner-user needs to define at least one pet to their account.
- Pet owner users should be able to define multiple pets to their accounts.
- Pet owner users should accept the permission request related to GPS location.
- Pet owner users should be able to other host users around them with a map view that has pins on it as long as they accepted the GPS location permission.
- Pet owner users also should be able to host users that are close to them as a list of hosts with only necessary information such as rating or price.
- Pet owner users should be able to filter the list of hosts according to parameters such as city, price, rating, accepted pet type, and verification.

- Pet owner users should be able to view a pet host's profile page and get in contact with the pet host by using the messaging functionality.
- Pet owner users should not be able to view sensitive information such as social security numbers or phone numbers related to any type of user whether pet host or pet owner user.
- Pet owner users should be able to rate a pet host user after both parties completed their hosting process.
- Any pet owner should not be visible in the host list view or map view as long as they are not also a pet host user.

Requirements Related to the Pet Host Users

- Every type of user should be able to become a pet host user by registering as a pet host in the system.
- To become a pet host user, a user should be registered and signed up to the system.
- To become a pet host user, a user does not need to define any pet to their account.
- To become a pet host user, a user should accept the permission request related to GPS location.
- A user needs to provide additional information to their accounts such as social security number, phone number, price, and criminal record.
- A user needs to be verified in or to be able to become a pet host user.
- A user should be visible in the host list view and the map view after they registered as a pet host user.

General Requirements

- Any type of user should not be able to view any type of users' sensitive information such as phone number or social security number.
- Messages between pet owner users and pet host users need to be stored in a database system to constitute evidence for illegal or unwanted behavior in the future.
- Payment for the hosting should be completed among the host and owner in real life.

- Petriam should be able to locate the user and display their surroundings by using a map API.

3.3 Non-Functional Requirements

3.1.1 Usability

- The user interface of the system should be user-friendly, understandable and simple
- Users should have no confusion about how the system works
- Users should be able to easily register and sign in to the system

3.1.2 Supportability

- The system should be able to work on both IOS and Android operating systems.
- The system should be able to support the use of any APIs such as Google Maps.

3.1.3 Efficiency

- The Delay between user requests and the system providing them should not exceed 5 seconds
- Log in process should not last more than 5 seconds.

3.1.4 Scalability

- The number of pet owners and pet users registered to the system should not affect the overall performance and quality of the system. The system should be to support large numbers of users.
- The system should be to handle multiple host arrangements and messaging processes at the same time without any issues or conflicts.

3.1.5 Reliability

- The system should not crash ever during its runtime if possible. The number of crashes must be kept at a minimum and the time interval between these crashes should be long enough

- The system should be to roll-back its operations in case of failure or crash of the system or servers.

3.1.6 Security

- The system should store the user information in a database system securely by taking necessary precautions such as encryption.
- Any third-party person or organization should not be able to view any user's private and sensitive information.

3.4 Pseudo Requirements

- The application must be completed and must be in running condition until the near end of the 2021-2022 academic year.
- Completed project must run on both IOS and Android operating systems.
- The completed project should meet the previously mentioned requirements as much as possible.

3.5 System Models

3.5.1 Use Case Model

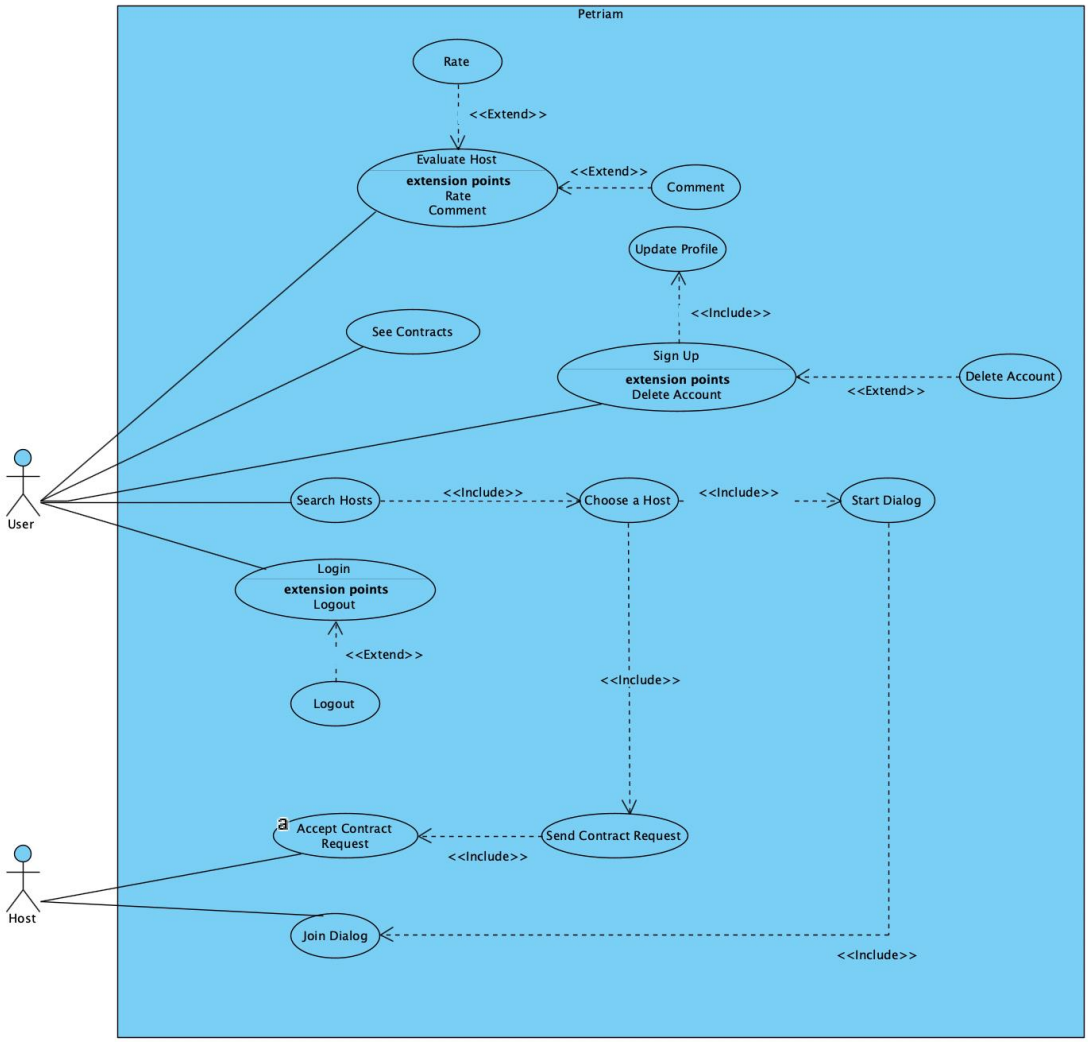

Figure 1: Use Case Model

3.5.2 Scenarios

Scenario 1 - Login

Actors: Pet Owner or Host

Entry Conditions:

- Users open the application.
- Users log out from their accounts.

Exit Conditions:

- Users are directed to the home page if their credentials are correct
- Users can close the application.
- Users can switch to the registration page.

Flow of Events:

1. Users enter their usernames and passwords.
2. Users click the “Sign In” button.
3. If the credentials are correct, the user is directed to the home page. Otherwise, there will be a sign that indicates credentials are incorrect.

Scenario 2 - Registration

Actors: Pet Owner or Host

Entry Conditions:

- Users on the “Sign In” page can click the “Sign up to Petriam” button and will be directed to the registration page.

Exit Conditions:

- Users fill the form with their credentials and will be directed to the home page.

Flow of Events:

1. Users provide necessary information for registration and click the “Sign Up” button.
2. If there are no existing users with given credentials or given information like username should not contain special characters, users will be registered, signed in and directed to the home page. If there is something wrong with the information, incorrect parts will be indicated.

Scenario 3 - Become a Host

Actors: Pet Owners

Entry Conditions:

- Users are signed in and click the hotel icon in the navigation bar.

Exit Conditions:

- Users provide the necessary information and submit the information.

Flow of Events:

1. Users sign in to their accounts.
2. Users click the hotel icon to become a host.
3. Users provide crucial information like identification numbers.
4. Users submit the form.
5. If provided information is valid, users can become a host. If it is not valid, users have to repeat the process from step 1.

Scenario 4 - Search a Host with Filters

Actors: Pet Owner or Host

Entry Conditions:

- Users need to be signed in and click on the search input box.

Exit Conditions:

- Users can select one of the listed hosts.
- Users click one of the sections in the navigation bar.

Flow of Events:

1. Users sign in to their accounts.
2. On the home page, users can click the search button on the upper side of the screen by writing a name.
3. Users can use advanced parameters like location, pet type, and more.

4. If users find an appropriate host, users can select the host.

Scenario 5 - Find a Host from Map

Actors: Pet Owner or Host

Entry Conditions:

- Users need to be logged in to their accounts.
- A logged-in user can click the home icon in the navigation bar.

Exit Conditions:

- Users can click one of the pinpoints which represents a host in the map.

Flow of Events:

1. Users need to be logged in.
2. Users can pinch the screen to zoom in or zoom out to find a host.
3. If a host is found, users can click on the pinpoint and select the host.

Scenario 6 - View Ratings

Actors: Pet Owner or Host

Entry Conditions:

- Users need to be logged in to their account and select a user in the way explained above. There will be an overall rating and a button to the direct reviews page.

Exit Conditions:

- Users can click the back icon in the right upper corner of the screen.

Flow of Events:

1. Users sign in.
2. Users select a host in two ways explained before.
3. After selecting the host, there will be a page with the information of the selected host. Users can click to view the ratings button.

4. All ratings will be listed with comments and extra information.

Scenario 7 - Send Contract

Actors: Pet Owner or Host

Entry Conditions:

- Users sign in and select a host and click the “Hire This Host” button.

Exit Conditions:

- The contract which contains information such as host, pet owner, pet and dates will be sent to the host.

Flow of Events:

1. Users log in to the system.
2. Users find and select the appropriate host according to their needs.
3. Users select the beginning and ending dates.
4. Users click the “Hire This Host” button and the contract will be sent.

Scenario 8 - Take a Pet as a Host

Actors: Host

Entry Conditions:

- Users need to be both signed in and registered to the system as a host. Then, a host can accept the contract.

Exit Conditions:

- Hosts can accept or reject the contract sent by the pet owners.

Flow of Events:

1. Users sign in to the application.
2. Users need to be registered as a host.
3. Hosts can check the contracts section in the navigation bar.

4. If there is a contract, the host can accept or reject the contract. If the host accepted the contract, contact information will be visible to both parties such as the host and pet owner.
5. A host can arrange a meeting with the pet owner and take the pet as a host.

Scenario 9 - Sending Messages

Actors: Pet Owner or Host

Entry Conditions:

- Pet owners find a host and send a message to the host.
- Users can open their inboxes and send messages to existing conversations.

Exit Conditions:

- Messages are sent successfully.

Flow of Events:

1. Users are logged in to their accounts.
2. Users can open the inbox and send messages to the people from who they have already sent or received messages. Otherwise, pet owners can find a host with the two methods explained.
3. After selecting the host, pet owners can send messages to the hosts for further clarifications.

Scenario 10 - Create a Review

Actors: Pet Owner

Entry Conditions:

- The Pet owner needs to be logged in to the system and a contract belonging to the pet owner needs to be successfully completed which means a pet is given to the host and is taken back from the host for the pet owner to create a review.

Exit Conditions:

- A review is successfully published.

Flow of Events:

1. Users need to be logged in.
2. Pet owners find an appropriate host.
3. Pet owners may send messages for further clarifications or directly send the contract to the host.
4. The host accepts the contract.
5. The pet is given to the host.
6. The host takes care of the pet between determined dates and gives back the pet to its owner.
7. The contract should be approved by two parties to be completed.
8. After the status of the contract is completed, the pet owner can create a review.

3.5.3 Object and Class Model

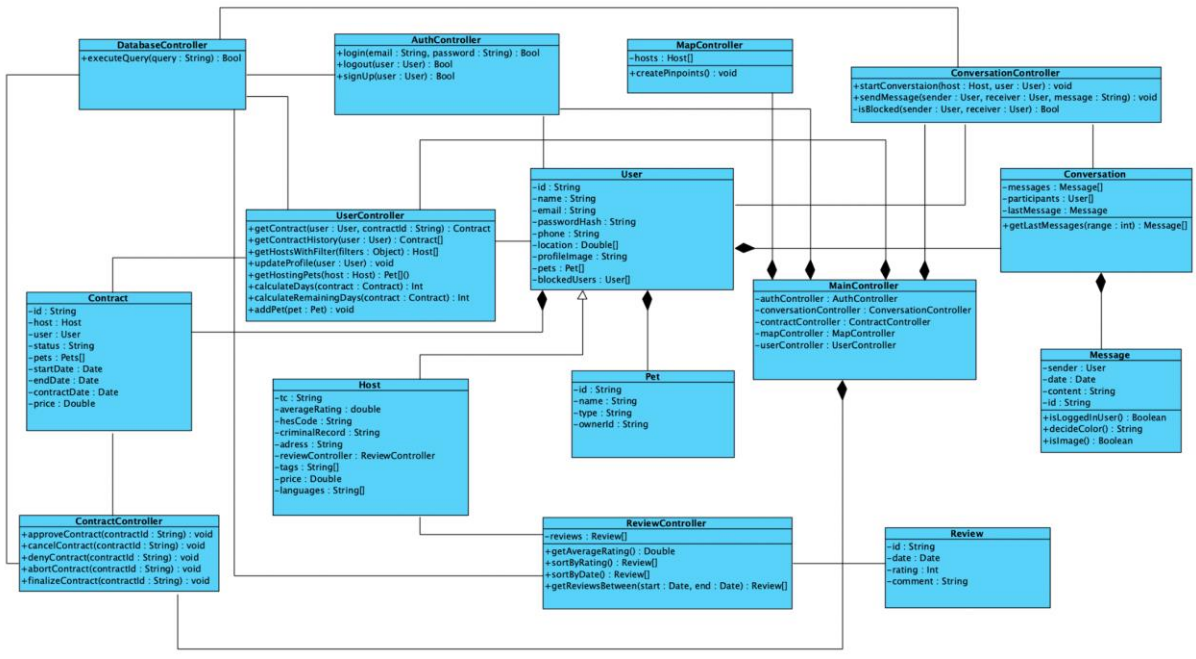

Figure 2: Object and Class Model

3.5.4 Dynamic Models

3.5.4.1 Activity Diagram

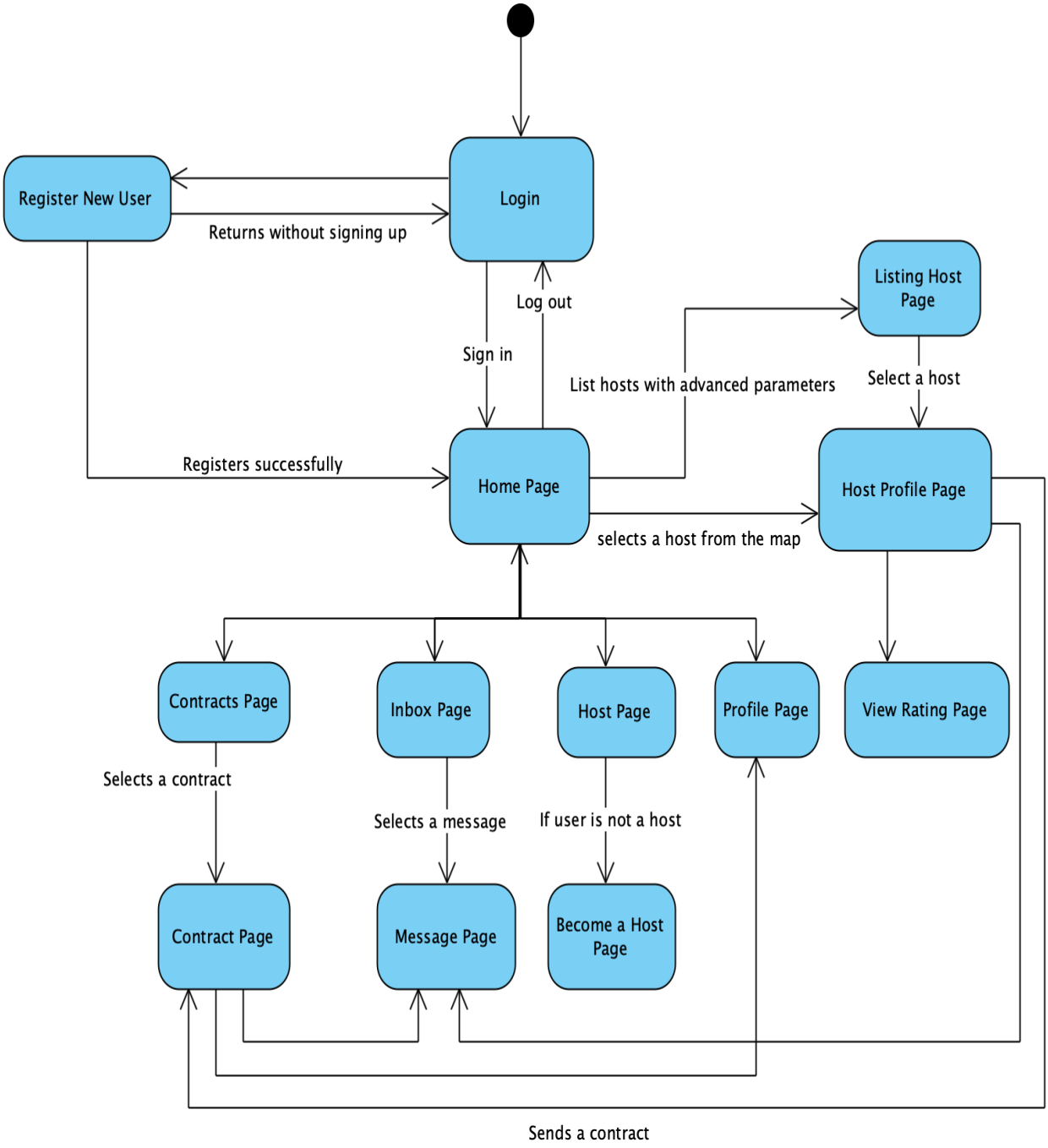

Figure 3: Activity Diagram

3.5.4.2 State Diagrams

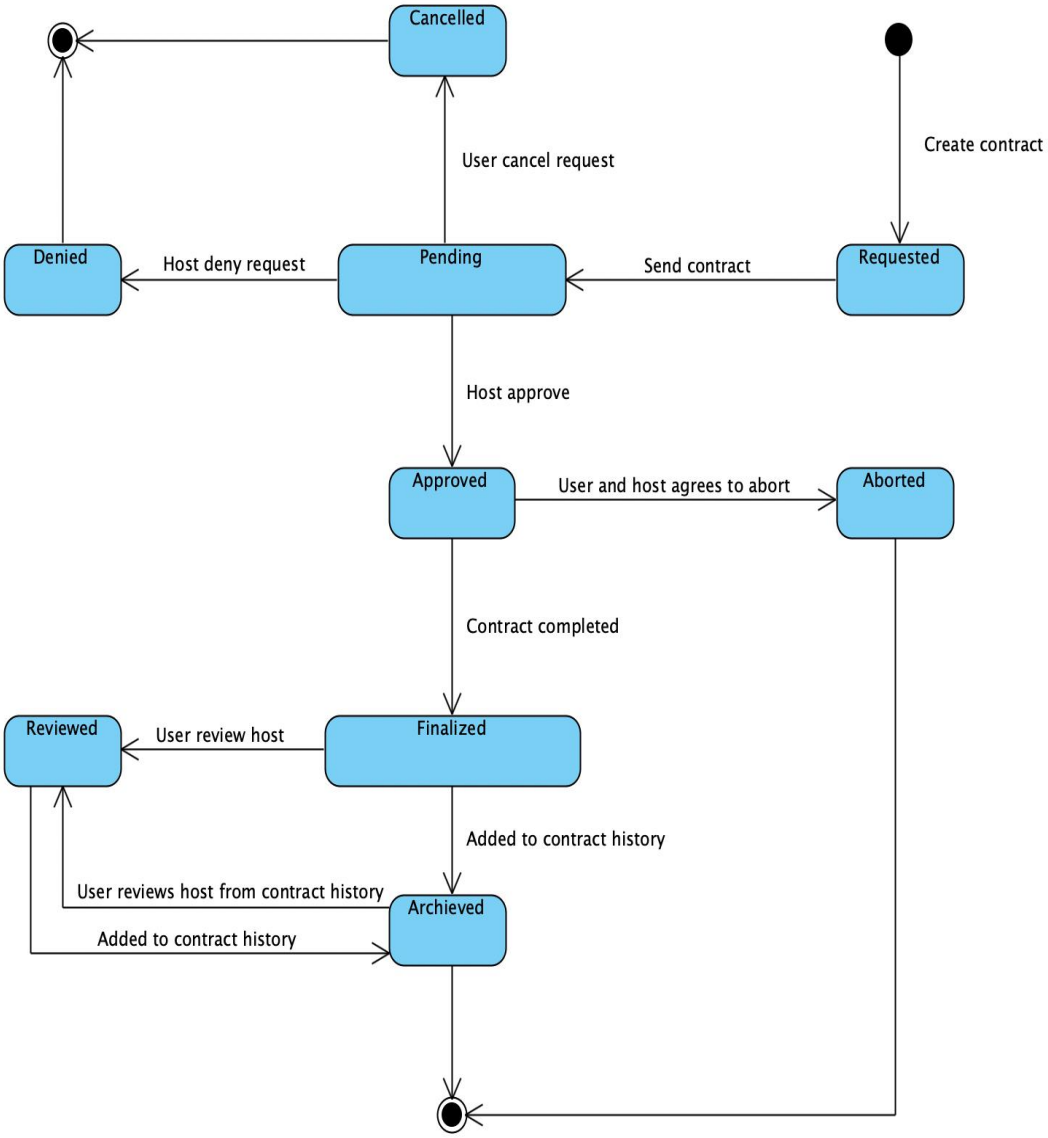

Figure 4: Contract State Diagram

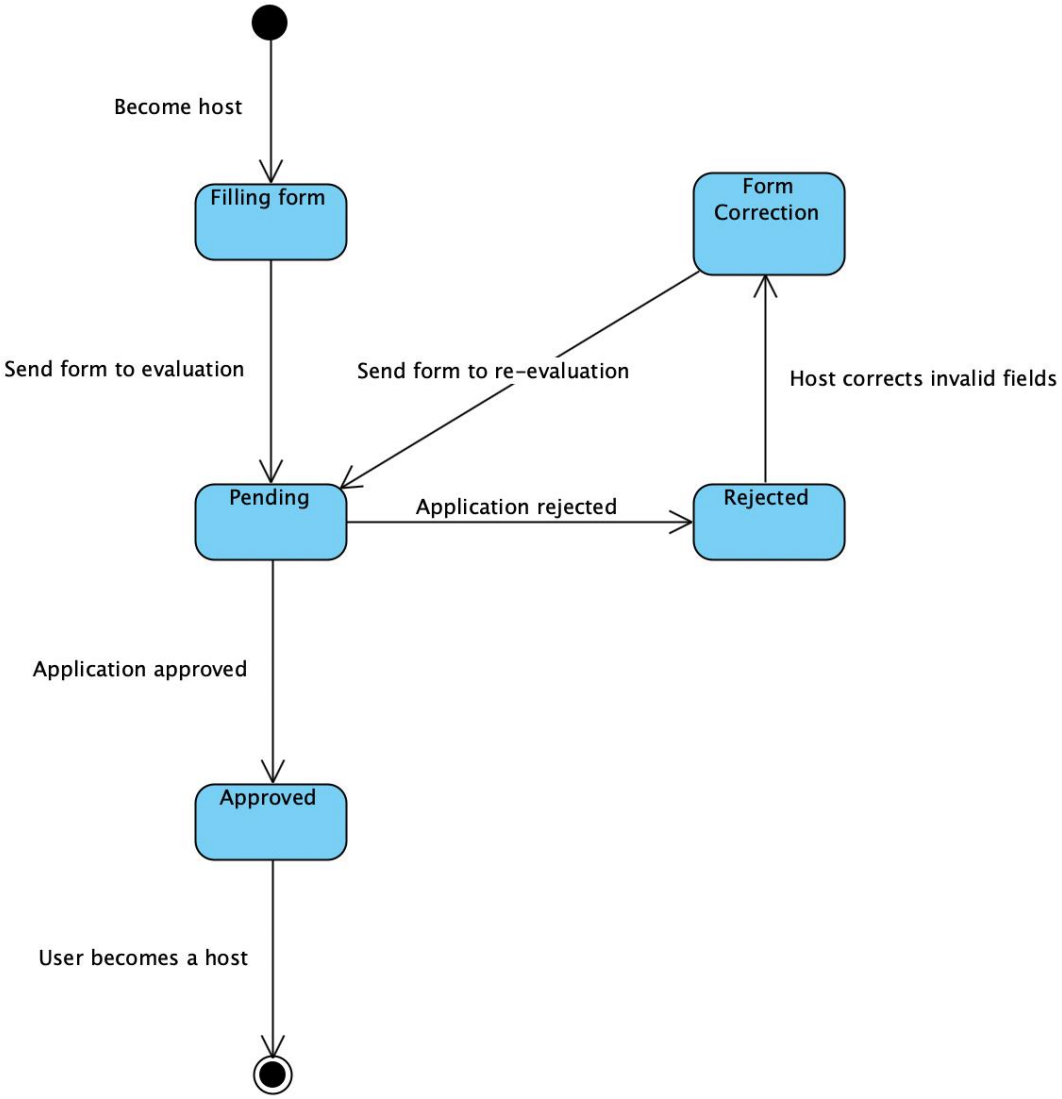

Figure 5: Become a Host Diagram

3.5.4.3 Sequence Diagrams

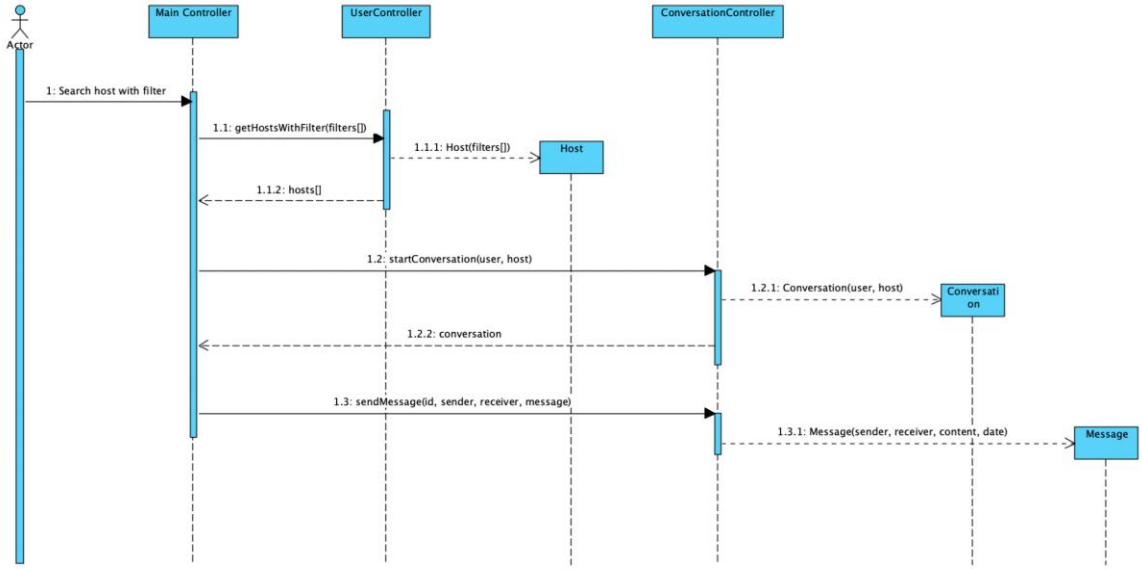

Figure 6: Start Conversation Sequence Diagram

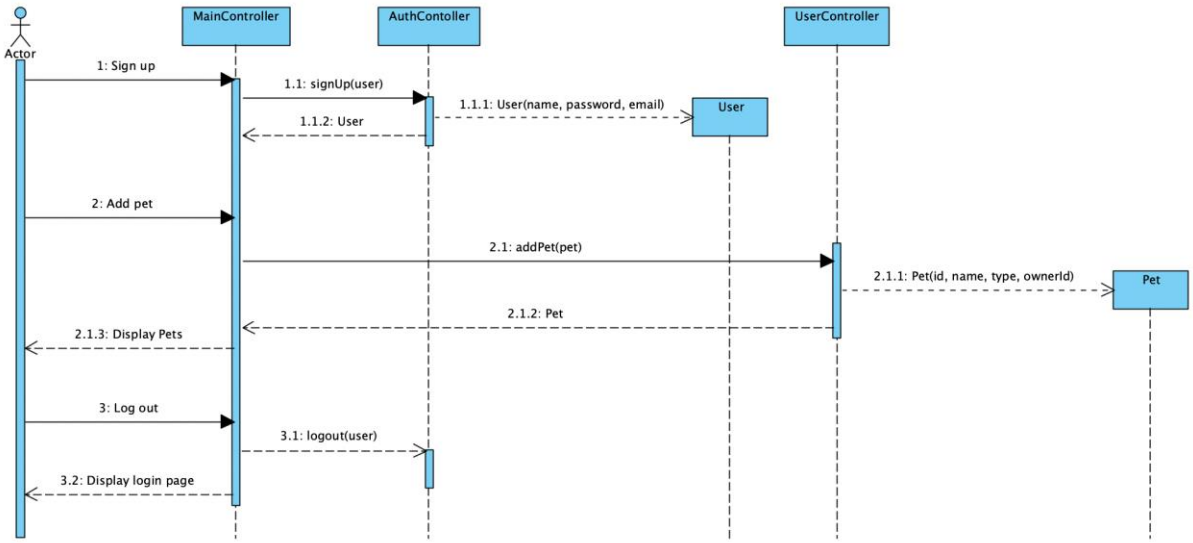

Figure 7: Sign up, Add Pet and Logout Sequence Diagram

3.6 User Interface

Petriam aims to provide a user interface that is simple and user-friendly. By providing UI designs with just the necessary amount of UI elements, users will be able to easily navigate through the Petriam application and understand its working mechanisms without requiring any prior knowledge or skill sets.

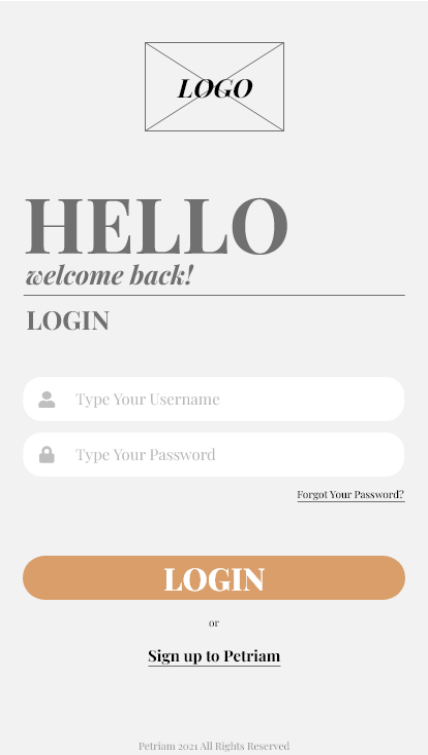

Figure 8: Petriam Login Page

This is the first page that greets users when they open the Petriam application. By providing their user name and password, they can log in to the system or if they use the Petriam application, they can choose to register to the system.

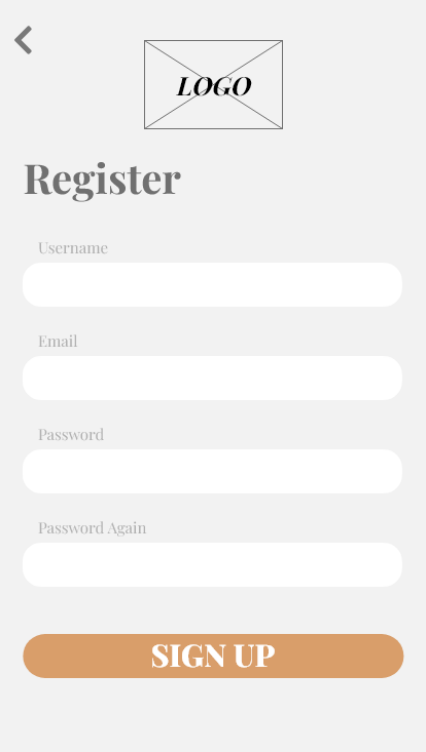

Figure 9: Petriam Sign Up Page

By providing information like username, email, and password users can register to the Petriam system and start using it. Users need to create an account to use the system, so every user visits this page at least once.

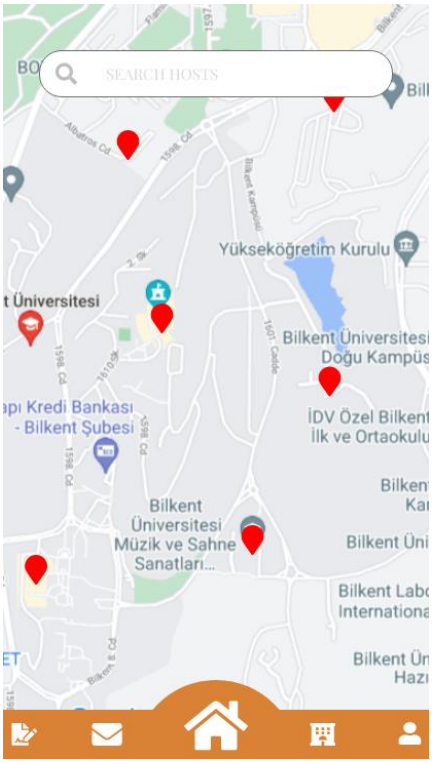

Figure 10: Petriam Main Page

This is the first the users see when they login to the Petriam system using their accounts. The bottom part is a navigation bar that stays in its place most of the page and users can navigate to the other different pages of the system like host list, inbox, become the host, and the profile page. The map view forms the background of the page and the red pins on the map represent the hosts that are close to the user. Users can use these red pins to view the host of their choice. The top part has a search bar that navigates the host list view.

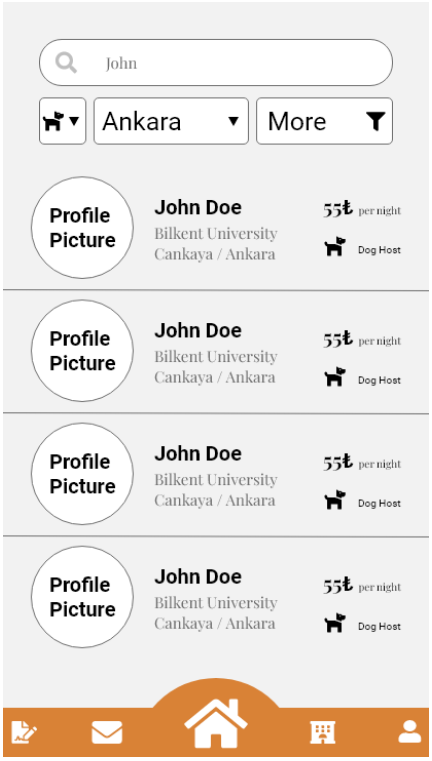

Figure 11: Petriam Host List Page

When a user uses the search bar in *figure 3* or clicks the first icon of the navigation bar, they will navigate to this page. On this page, users can view brief information about the list of pet hosts that are close to them. If they want, they use the filters in the top part of the page to filter shown results to find a suitable host for their pet.

Figure 12: Petriam Detailed Host View Page

If a user decides to click a pin on the map view in *figure 3* or a host in the host list view in *figure 4* then they are going to navigate to this page. This page shows more detailed information about the chosen host and allows users to get in contact with the host to arrange to shelter.

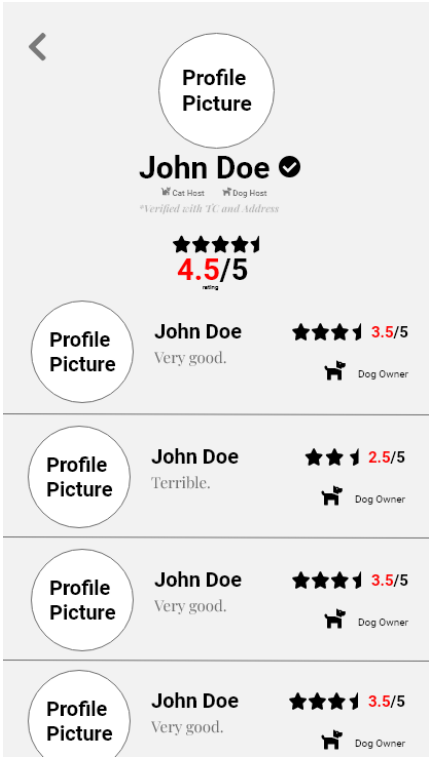

Figure 13: Petriam Detailed Ratings Page

By clicking the view rating link in the detailed host view page of *figure 5*, users' average rating of the host along with every review that was made by the other users to this host.

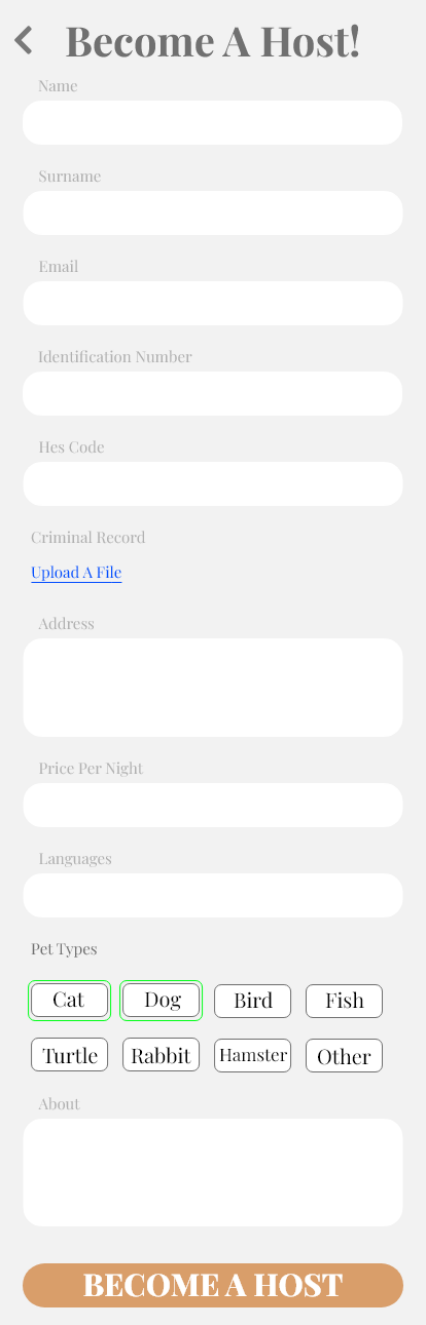

Figure 14: Petriam Become A Host Page

By using the navigation bar in *figure 3*, users can navigate this page to become registered hosts in the system. By providing some additional information like a criminal record or social security number, users can register to the system as a host.

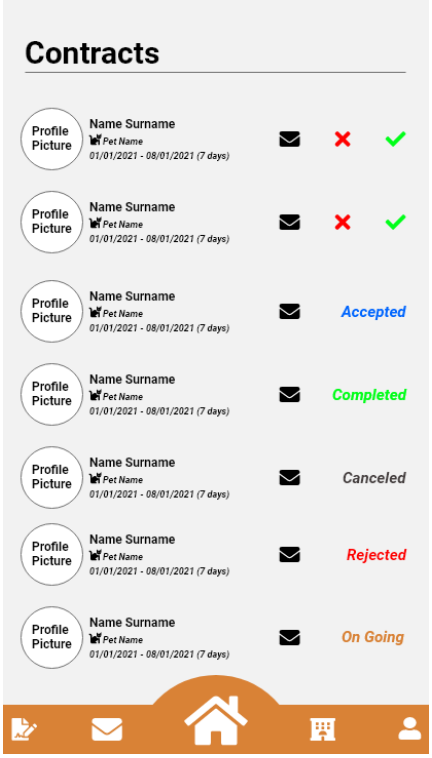

Figure 15: Petriam Contracts Page

This page shows the past and current contracts of the users along with their status. Hosts can accept or reject any offer made by the other users or they can get in contact with the requesting party. Users can view their past or current contracts in chronological order and their status.

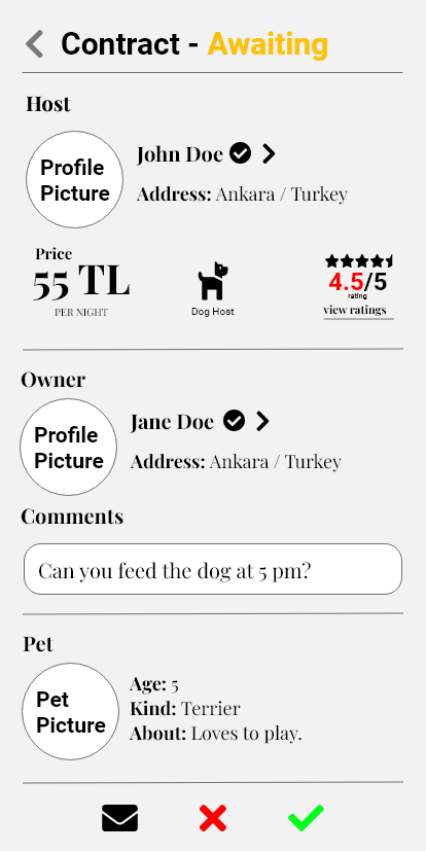

Figure 16: Petriam Detailed Contract View Page (Host Perspective)

This page shows more detailed information about a contract from the perspective of the host. A host can accept and reject the contract request. A host can also get in contact with the owner of the pet.

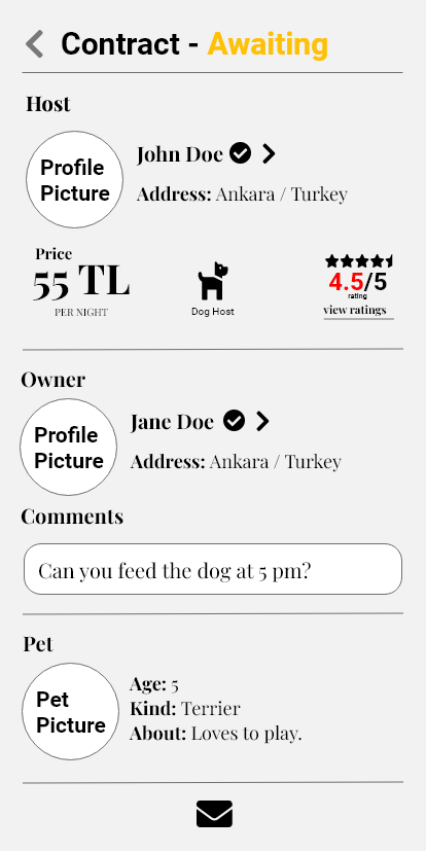

Figure 17: Petriam Detailed Contract View Page (Owner View)

This page is very similar to the previous page but shown from a pet owner's point of view. Unlike host, owners can only get in contact with the host.

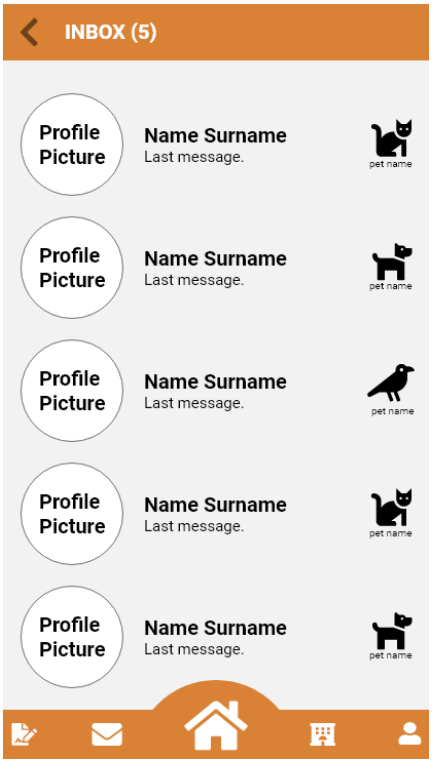

Figure 18: Petriam Inbox Page

This is the inbox page of a user. Users can view their messaging history from this page and choose one of them to continue messaging with the host. Along with host information, information related to which pet host was sheltering is also shown.

Figure 19: Petriam Message Board Page

Figure 20: Petriam Profile Page

This page shows the profile page of a user which contains information about a user and their pets. Users can type an about me section and show it on their profile page. They can also list their pets on their profile page.

4. Other Analysis Elements

4.1 Consideration of Various Factors in Engineering Design

Public Health

The human interaction in Petriam is limited to dropping off pets and getting them back from their hosts. The remaining functionalities of the application can be performed on the app which does not pose any dangers to public health. However, considering the very small window of human interaction in Petriam, there are possible threats to public health. The first and main concern is the situation created by the pandemic. A host or a user may cause the spread of the virus if they continue to use the application when they need to be quarantined. Petriam will solve this problem by requiring mandatory HES code [4] from all of its users whether they are hosts or regular users. The collected HES codes will be used to check the user's Covid-19 risk status that will decide if a user is eligible to be a part of the services given in Petriam.

There exists one other risk involving pets and humans. The guest pet or the pets belonging to the hosts may contain diseases that could cause the spread of various diseases. In Petriam, the health of the users and the pets are prioritized to ensure a healthy environment for everyone. In order to prevent any diseases among the pets, we have come up with two solutions: Mandatory submission of vaccination cards of the pets or a signed document from a veterinary that confirms the pet's availability to travel.

Public Safety

Since most of the application's services are available online, the only possible public safety concern is the human interaction which is described above. Possible public safety scenarios might occur when a user with a criminal background or mental disorders becomes a host. Although indication of such a scenario is less likely, Petriam will be requiring criminal and health reports from its users to become hosts. Users with any sort of criminal records or violent mental disorders will not be accepted to become hosts to lower the chances of having unpleasant situations.

The rating system in the app will provide a competitive environment for the hosts that will promote good service among the hosts. Any host with unpleasant behavior can easily be rated or even reported if the behavior of the host was not acceptable. If the reports are found to

be accurate and risk posing, the hosts will no longer be allowed to use the app to ensure public safety.

Public Welfare

Petriam will be a free to use application for everyone. The users will only be charged when they want to use the services of a host. Although Petriam does not decide on the host prices, since it is an open market, the prices are expected to be reasonable due to the competition between the hosts.

Global Factors

The application will be developed according to the global set of standards imposed to every application on Google Play Store and Apple App Store. The nature of the application requires personal information such as name, address, telephone number to be collected and we will be abiding to General Data Protection Regulations which are standardized by the European Union to ensure data protection. Petriam will not share or use the data of its users under any circumstances.

Cultural Factors

The cultural factors have nearly no effect on Petriam as the main focus is on animals. Considering the fact that culture is a trait specific to people and not to animals, Petriam is open to use for people from every possible national and cultural background.

Social Factors

The social interactions in the application are limited by the interaction between the users and the hosts. In order to provide an equal social environment to all users, the application will come in English and Turkish language options. The social factors could be analyzed from the pets' point of view where certain pets might require social interaction to prevent any negative psychological effects on the pets. This requirement could be indicated by the pet owners while they are negotiating with the hosts.

Factor	Importance	Possible Negative Scenario
Public Health	High	Effect on health due to the spread of diseases
Public Safety	High	Physical and psychological threat to users due to lacking background check
Public Welfare	Moderate	High host prices
Global	Moderate	A leak of personal data
Cultural	Low	Threat to highly specific cultural backgrounds
Social	Moderate	Indirect phycological threat to pets

Table 1: Summary of Various Factors and Their Status

Above is a table making a summary of the factors considered in detail before. The importance of each factor is indicated in the table to show how much each factor is affecting the design of Petriam.

4.2 Risks and Alternatives

There exist several risks after the completion of the project which are described as:

1. Possible Public Scandal Involving Damage to Users / Pets

Even a slight occurrence of a scandal involving damage to the users would affect the application negatively. In order to prevent any lawsuits, the users should agree upon an agreement where they accept the fact that Petriam is only the middle-man in this application that all of the users are responsible for their own actions.

2. Lack of Users

Since the application has no sponsors for the moment, it will be challenging to find users from scratch without any paid promotion. In order to promote the app and prevent lack of publicity, the application will first be promoted in the local areas and upon the feedback from the local areas, the application could go country-wide.

3. Lack of Trusted Hosts

Even if the application reaches an appropriate number of users, there is still the risk of finding reliable hosts. If there are no high rated hosts, then the users will be skeptical about using the app that would eventually decrease the popularity of the application. For that reason, at the launch of the application, local trusted people should be found and informed about the application to create a trusting environment in the application.

Name of the Risk	Likelihood	Solution
Public Scandal leading to Lawsuit	Less	User agreement to prevent Petriam from becoming responsible
Lack of Users	High	First local promotion of the app and then countrywide promotion
Lack of Hosts	Moderate	Finding trusted hosts before the launch of the app

Table 2: Summary of Risks and Their Solutions

4.3 Project Plan

4.3.1 Sub-Teams

In order to promote efficient teamwork, we have appointed sub-teams with their own leaders to ensure the quality of the work done in each of the sections. The appointment of the leaders was based on past experience and proficiency in each of the respected fields.

- Front-End Development: Osman Buğra Aydın (L), Doğancan Yılmazoğlu
- Back-End Development: Alperen Yalçın (L), Oğuzhan Angın, Ertuğrul Aktaş
- Database Integration: Ertuğrul Aktaş (L), Alperen Yalçın
- Documentation and Reports: Ertuğrul Aktaş (L) and everyone
- Architectural Design: Osman Buğra Aydın (L), Alperen Yalçın, Oğuzhan Angın
- Visual Design: Doğancan Yılmazoğlu

4.3.2 Milestones

The project has certain deadlines and milestones to reach to apply incremental development with proper design plans. It is crucial for the project to follow the milestones to have a healthy development process.

- Project Specification Report
- Analysis Report
- Skeletal Code Implementation
- High-Level Design Report
- Testing of Skeletal Code for Demo Presentation
- Initial Presentation & Demo
- Low-Level Design Report
- Final Report
- Final Presentation & Demo

The milestones after “Initial Presentation & Demo” are subject to change depending on the achievement of previous milestones and will be updated with the forthcoming reports.

4.3.3 Work Packages

Work Package	Leader	Members	Deliverable	Start Date	Due Date
WP-1	Osman Buğra Aydın	Everyone	Project Specification Report	23 Sep 2021	11 Oct 2021
WP-2	Ertuğrul Aktaş	Everyone	Project Analysis Report	15 Oct 2021	15 Nov 2021
WP-3	Alperen Yalçın	Osman Aydın Ertuğrul Aktaş Oğuzhan Angın	Skeletal Code Implementation	15 Nov 2021	20 Dec 2021
WP-4	Doğancan Yılmazoğlu	Osman Buğra Aydın Oğuzhan Angın	Skeletal User Interface Implementation	15 Nov 2021	20 Dec 2021
WP-5	Ertuğrul Aktaş	Everyone	High Level Design Report	1 Dec 2021	23 Dec 2021

Table 3: Work Packages for the Fall Semester

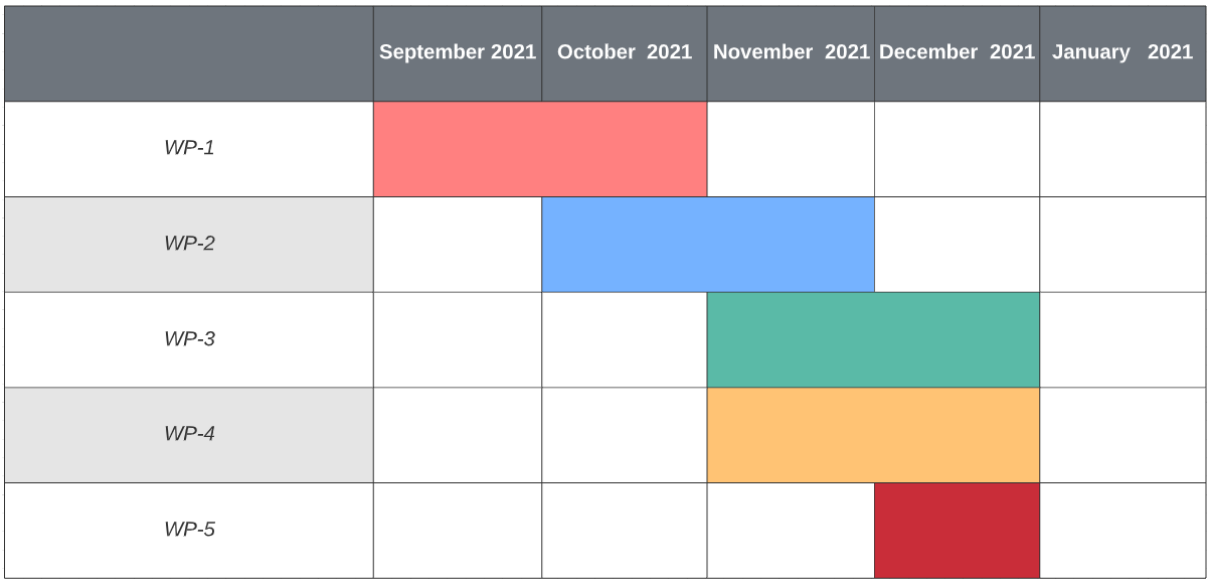

Figure 21: Gantt Chart for Fall Semester

4.4 Ensuring Proper Team Work

Apart from the unofficial meetings conducted at school, we conduct official weekly meetings online to check each other's work and plan ahead. To provide communication between the team members, we benefit from a variety of online tools which are:

- Zoom & Discord for Visual and Verbal Meetings
- WhatsApp for unofficial Meetings and Scheduling for Planned Meetings
- Slack for Planning
- Google Docs for Collaborated Written Work
- GitHub for Collaborated Coding Work
- Trello for Task Division

4.5 Ethics and Professional Responsibilities

4.5.1 Ethical Responsibilities

Due to the nature of Petriam, as the developers, user privacy and safety is the most important feature of the project. Unlike assets, pets are linked to their owners through an emotional connection. For this reason, Petriam must ensure that the applications of the hosts are examined thoroughly without any exceptions to prevent any predictable negative outcome. This is the most crucial ethical concern since failure to provide this responsibility would be highly unethical and would permanently damage the reliability of the application.

The second most important ethical concern is the preservation of personal data. The users will be sharing their home addresses, images, telephone numbers that are highly sensitive. The data should be kept in a hashed state in the database and never be shared. To prevent a scenario where the data is stolen from a third party, highly trusted APIs should be implemented in the system rather than using outdated security technologies. The developers will abide Code of Ethics [5] and General Data Protection Regulation [6] to ensure this responsibility.

4.5.2 Professional Responsibilities

The professional responsibilities of the project may be divided into two parts as internal and external professional responsibilities. The internal professional responsibilities concern the responsibilities that are related to the internal working environment of the team while the external professional responsibilities are concerned with the project code itself.

In terms of the internal professional responsibilities, the team must work in a responsible and coherent way to ensure a healthy work environment. The work appointed to the members should not be mandatory but should be voluntary based on their interests. The teammates must participate equally and must be present at all of the meetings unless there is a valid excuse. The internal professional responsibilities are determined when the team was first formed and the work done before has been done according to the given rules.

The external professional responsibilities of the project include subjects such as plagiarism and documentation. The reports and implementation of the project must not be taken from any other third-party source and in parts where there is a case of inspiration, the sources must be credited. On the other hand, teammates should post their works on their repositories and keep the source code secure in order to prevent any data breaches. Each member of the team is responsible for securing their own work whether it is on the cloud or their personal computers.

4.6 New Knowledge and Learning Strategies

The knowledge required to complete the project is yet to be learned by the team members although some project members have partial knowledge about the technologies. The most important knowledge that is to be learned by the members is Node.js which will be used by the backend and database teams. The front-end team must also learn more about React Redux [7] to fully implement the project. Although there is not a currently available mobile application development course in Bilkent, the knowledge required in this project heavily relies on practical work rather than theoretical knowledge. To ensure that the practical knowledge will be learned, the team members will work with their respective sub-team leaders and complete small tasks to test their knowledge. Some of the planned small tasks are:

- Google Map API with React-Redux
- Node.js server creation with MongoDB database

- Responsive Application Designs using React Redux
- Node.js authentication and authorization on Mobile Devices

The completed small tasks may or may not be a part of the actual project depending on the success rate and availability of the tasks.

5. References

[1] National Geographic, "Domestication," National Geographic, [Online]. Available: https://www.nationalgeographic.org/encyclopedia/domestication/. [Accessed 13 November 2021].

[2] D. Wood, "Travel Numbers to Continue Increasing for Remainder of 2021," Travel Pulse, 30 July 2021. [Online]. Available: https://www.travelpulse.com/news/impacting-travel/travel-numbers-to-continue-increasing-for-remainder-of-2021.html. [Accessed 13 November 2021].

[3] K. Lagrave, "Everything to Know About Flying With A Dog," Conde Nast Traveler, 2 November 2020. [Online]. Available: https://www.cntraveler.com/story/flying-with-a-dog-everything-you-need-to-know. [Accessed 13 November 2021].

[4] Ministery of Health, "What is HES Code?," [Online]. Available: https://hayatevesigar.saglik.gov.tr/hes-eng.html.

[5] The Institute of Internal Auditors, "Introduction to the Code of Ethics," [Online]. Available: https://global.theiia.org/standards-guidance/mandatory-guidance/pages/code-of-ethics.aspx.

[6] "General Data Protection Regulation," intersoft consulting, [Online]. Available: https://gdpr-info.eu/.

[7] D. Abramov, "React Redux," React, [Online]. Available: https://react-redux.js.org/.