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Automated Animal Shelter Management System for Animal Welfare Groups of Sri Lanka

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Abstract: ***Animal Shelter Management System is a web-based and mobile-based solution, which automates the existing process of the animal welfare group like "Adopt a dog in Sri Lanka", "Animal SOS Sri Lanka" and" Animal Welfare and Protection Association" etc. The groups intend to unite rescued stray dogs and cats with families who are willing to give them a kind, loving home and a safe environment to grow.***

Due to the growing popularity of the groups, the number of rescue and adoption requests hitting the group is being high day by day. Thus, it has already become a challenging task for them to manage all the records added to their existing manual process that not matured enough to handle and process a large data load. As a result, the team members of the group have to allocate extra effort to maintain an accurate data collection relevant to all the rescue missions and aftermath activities.

The Animal Shelter Management System is developed in a way to eliminate the above-mentioned limitations of the current process and enhance the productivity of the process by using sophisticated technologies. The system offers the main features including, animal profile management, adoption/rescue processing, foster allocation, animal health data tracking, Expenses tracking, vaccinations and sterilization tracking, informative dashboard views, report generations, search facility etc.

The technology stack includes the CakePHP framework, Hypertext pre-processor, Java, Android Software Development Kit, and MySQL All the data required the mobile application is exposed via Restful Services written using JavaScript Object Notation. The group uses social media networks as the primary source of sharing their welfare activities. Thus, Facebook integration is done with a web solution, which enables the publishing of automatic posts on the Facebook profile of the group. Moreover, the system is featured with a set of non-functional requirements such as security, usability, extensibility, and backups.

Using the automated Animal Shelter Management System to Adopt a Dog in Sri Lanka group, will definitely improve the productivity of their welfare activity process. Using the well-organized and informative interfaces defined for the Public, adoption process will be speedy and more convenient.

Keywords: Cake PHP, Java, MySQL

I. INTRODUCTION

Animal Welfare Groups of Sri Lanka (AWGSL) are non-profit organizations that mainly focused on finding good homes for homeless animals. It also conducts rescues, sterilization camps (a district at a time), and a feeding program.

These groups are Facebook and internet-based animal welfare groups that help unite rescued stray puppies with families who are willing to give them a kind, loving home and a safe environment to grow.

The Facebook page affords a friendly meeting ground for foster parents and those who wish to adopt animals, to meet. It was founded by a group of dog lovers and is open to all who wish to support the cause, adopt a pet, volunteer, sponsor a sterilization/meal or find homes for homeless animals.

Currently, these animal welfare groups handle all the data relevant to the process in a manual way using Google spreadsheets which share with the team members. So, implement an automated animal shelter management system for these teams which will enhance their pet management activities convenience effective way.

A. Motivation for Project

This group mainly handles pet adoption, rescue, stay dog sterilization/ free vaccination camps, foster adoption and do feeding programs. Currently, the client handles all the data relevant to the process in a manual way using Google spreadsheets which share with the team members. Due to the increase in the number of rescues and adoptions, now they are facing difficulty in managing data and referencing data relationships.

In the normal process, once an abandon pup or dog which requires a rescue is found, people can notify about the dog by sending a Facebook message to the group. Without logging to the group's Facebook account, the client wants to get the dog information instantly.

Due to the lack of proper notification and alerting process, the client faces difficulty in notifying the details of dogs for adoption to the people who wish to adopt a dog. Currently, details about the dog are published on Facebook as a post. Most of the time people missing seen this post as Facebook newsfeed section is filled with lots of other posts.

Also, when adopting a dog, people look for certain attributes of the dog-like sex, age, color, status of vaccinations, etc. In that case, notification should be given to the relevancy.

Currently, the client keeps records for owners and the attributes of the dogs that they are looking for and based on that information individual Facebook message send to the people which are time-consuming. So, the client wants an automatic notification and alerting feature to be implemented.

In the current process, there is no easy way to find pets details which available for adoption. To check the previously published pet information either people have to search through the timeline section of the Facebook page or browse photos in the album section of the page. Browsing old images and posts are really a waste of network data usage of the person who wants to adopt a dog.

B. Objectives and Scope of Proposed Project

1) Implement an automated animal shelter management system for AWGSL teams which will enhance their pet management activities convenience effective way
2) At this stage, the system is implemented to manage the dog and cat's specific data
3) The users of the system will be General Public, Registered Pet owners and foster owners Registered Veterinarians, and AWGSL administrator and AWGSL team, members
4) The system will consist of a mobile and web-based solution
5) The web application will provide all the system features and the mobile application will be provided only the selected features
6) At this stage, only the Android version of the mobile application will be developed
7) The mobile application will be used to manage pet adoption and rescue activities
8) The web application will be consisting of frontend and backend portal to manage all the records which currently handles through the manual process
9) Summarized information will be provided about the pet adoption, rescue, sterilization, vaccination, donations and other relevant details on a dashboard view
10) Notify system users via automatic push notifications, emails, and Facebook posts. This will include scheduled notification facilities as well
11) The push notification will be implemented for AWGSL team members only
12) The email server will be configured only sending emails. Receiving emails will not be implemented
13) Enable handling of historical information relevant to the pet adoption
14) Enable the public to donate for the programs via online using PayPal integration
15) Reporting facility used to provide summarize information which requires for managerial tasks and decision making

II. ANALYSIS

System analysis is one of the main phases in the software development life cycle. System analysts will help to get an overall image of the system and will be able to produce a high-level description of the system through this phase. The main objectives of this phase are what services system should provide, required performance of the system. Before analyzing the system, first, the requirements should be gathered by using fact-finding techniques, such as interviews, observations, sample documentation, etc.

A. Requirement Gathering Techniques

This is the first interaction part between the AWGSL Organizations and System developers. This was started with the collection of all the relevant data schemas regarding the current process of AWGSL Organizations through interviews, discussion and the past document reviewing, etc. Initially, several interviews and discussions were carried out with different stakeholders of the AWGSL Organization.

After interviewing and discussing with the stakeholders, the rough idea was obtained about the current process and started to document requirements collected separately for each stakeholder. The client provided some manual datasheets they used to collect data in their manual process.

The collected requirements should be provided to the client and get his confirmation.

B. Analysing the Current Manual System

The flow of the current system of the AWGSL community is as follows:

1) AWGSL teams manage a Facebook profile for publishing pet adoption and rescue activities to the public. And also, the public can reach the community via phone calls and emails
2) Public inform about an abandoned dog which required rescue to the AWGSL community via phone call or Facebook messages
3) Once dog information received, AWGSL teams call back or message back to the person who informed about the dog for verification
4) Once the verification is done, the dog is taken from the location and assigned to a foster house until it is adopted by someone
5) If any medicine required, the dog is assigned to a hospital
6) The public can view all the available dogs for adoption via Facebook posts
7) If a person wants to adopt a dog, he/she can make a request via Facebook post or over the phone to the AWGSL community
8) AWGSL community, keep track of basic information of the pet owner and assign the dog for adoption
9) The public can donate foods and money for the community
10) All the relevant information are tracked on an XSL sheet by team members

The use case diagram for the existing system is depicted by figure 1.

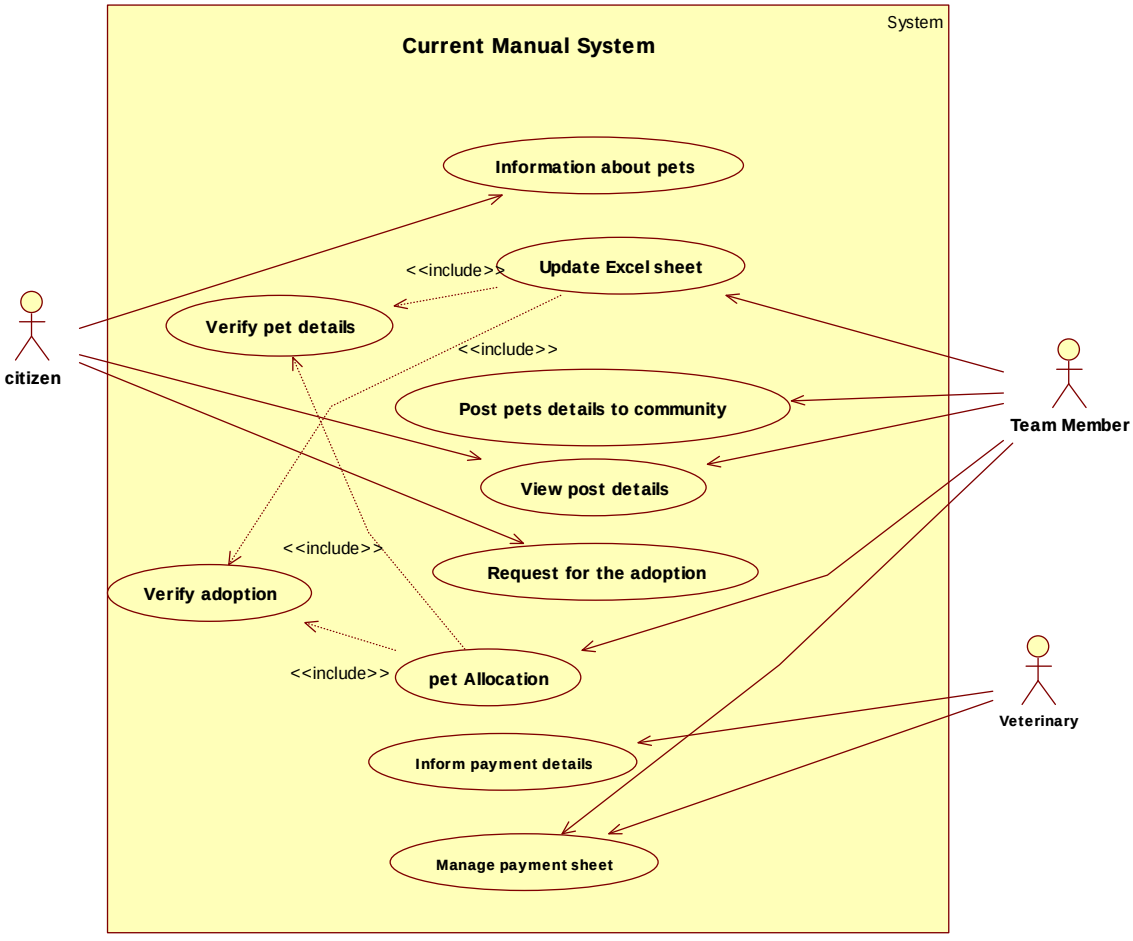

Fig. 1 Use case diagram for the current manual system

C. Analysis Requirements

Generally, the users' expectations will be user requirements. These are the function of the final system. After clarifying all the functions, the system can be easily implemented. There are two types of requirements in a system.

1) *Functional Requirements:* Functional requirement defines a function of a system and its components. A purpose is described as a set of inputs, the behavior, and outputs.

Major functional requirements of the system are listed below:

a) *Master data Management*
i) System User Management, System Role Management
ii) Pet Records Managements, Pet- Medical Records Management and Pet- Owner Records Management
iii) Vaccination types management and Sterilization types managements
iv) Foster House details managements
v) Animal Types managements (Dog, Cat, etc.)
vi) Animal Adoption types (Foster adoption, House adoption)
vii) Donation management

b) *Notifying new Dog Found Information to AWGSL Easy and Fast Way*
i) Informing about a new dog found can be done in two ways
ii) Via mobile applications
1. Only the smart phone users can publish new dog found records via the mobile application
2. Push notification will be received to all the AWGSL team members who enabled to receive new found push notifications
3. Meantime, new found record is inserted to the system automatically
4. Until the authorized user accepts, the record will remain as "pending"
iii) Via Web Application-Registered users to the system can add new found record to the backend

c) *Easy Pet Selection for Adoptions*
i) Pets available for adoption can be browsed via mobile and the web
ii) Upon the attributes of the pet, an adoption request can be created by registered pet owners
iii) Once the adoption request is accepted by the AWGSL team, an email notification will be sent to the pet-owner's email

d) *Easy Pet Adoption Management*
i) Simple work flow to manage pet found/rescue requests
ii) Simple work flow to manage pet adoption requests
iii) Allocate / Re allocate Pet allocations to the Fosters

e) *Complete Visibility About Pet and Its Adoption-All The Data Relevant To The Pet is Tracked And Can Be View On A One Place*

f) *Real time Alerts and Notifications*
i) Push notifications send to the AWGSL team members when new dog is found
ii) Publish email notifications to the registered pet-owners who wish to adopt a new dog
iii) Automatic publishing of FB posts relevant to new pet found, adoption, vaccinations and sterilization camps

g) *Donation Management*
i) Food donation management-Inventory for capturing food items
ii) Online donation via PayPal
iii) Insight visibility of how donations are expense over dogs' activities

h) *System Configuration-Capable of Parameterize The System over Various Animal Types*

i) *Generate Reports- Summarized Data Reports*

j) *System Logs*
i) Activity management log - Every change to the records will be logged is a separate table of the database
ii) System do only soft deletion of data entries over hard deletion
iii) Database backup will be taken every day 12 am via scheduled process

2) *Non-functional Requirements:* A non-functional prerequisite may be a prerequisite that indicates criteria that can be utilized to judge the operation of a framework, instead of particular behaviors. This ought to be differentiated with useful prerequisites that characterize particular behavior or capacities

a) *Security:* The system is designed to support role-based authentication methodology. Hence based on the role of the user, the user interfaces and the functionalists that can be accessed will be varied. Except for the interfaces designed for public view, it is required to login to the system to access the other functions provided by the system. Username/Password are provided to the users at the registration. Since this is a web-based application which exposed via the internet, it is required to provide transport layer security. Hence HTTPS is enabled to ensure transport layer security.

b) *Backups:* To ensure the integrity of the system from accidental or malicious damage, all system data must be backed up every 24 hours and the backup copies are stored in a secure location.

c) *Usability:* The Animal shelter management system provides more facilities for system users. It is concerned with specifying the user interface and end-user interactions with the system. The animal shelter management system has a tab facility. An also well-structured user manual, user menu navigation, search options, informative error messages help facility and consistent interfaces enhance the usability

d) *Accuracy:* All the information must be accurate unless database error can occur. Then need to apply proper validation techniques

e) *Maintainability:* The system will be developed under a specific coding standard which will be improving the maintainability of the whole system. Since the system designed with necessary class diagrams and use cases, the view of the extendibility will be cleared.

III.METHODOLOGY FOR THE PROPOSED SYSTEM

Due to the following best practices provides and it is an iterative software development process framework and it supports object-oriented development by Rational Unified Process (RUP), it is chosen as the best suites software development methodology of developing Animal Shelter Management System.

1) Develop iteratively
2) Manage requirements
3) Use components
4) Model visually
5) Verify quality
6) Control changes

A. *Alternative Solutions to the System*

Several alternative solutions were reviewed and compared to find the most suitable method to solve the problem domain and develop the system.

1) *Maintain the Existing:* Currently, the AWGSL team capture all the data relevant to the process using Google docs which some set of XSL sheets shared and published among the team members. By doing extra processing, they manage to generate some of the basic reports too. But due to the increase in the number of rescues and adoptions, sterilization programs, free vaccination and etc., they found difficulty in entering data and referencing data relationships among the data elements. Even though it is possible to enhance the existing XSL sheets using macros and functions, still they have to manually enter the data and data relationships. Considering the client requirements, they want a system that can provide not only manage data but also provides dashboard facility, search functions, workflow management, report generations, automatic alerts and notification, and Facebook integration. Also, data extraction from the XSL sheets is a tough task. Since it is obvious that doing enhancements to the current system not fulfill their set of requirements, shared XSL sheet process is marked as not suits to the long-way run of the client's work.

2) *Purchase Standalone Commercial Software:* It is possible to purchase a standalone animal shelter management software. In that case, the software has to be installed on each and every computer used by the AWGSL team members. Since the license cost of this standalone software is high, using the software on multiple computers will be costly. Not only that, if a software is installed on multiple computers, each computer will have to maintain a database. There will be no way to connect all the databases into a single location unless developing an additional plug-in to do that. Installing the software into the administrator user of the AWGSL team can resolve the above multiple database problem. In that case, each and every activity will have to be informed to the administrator user and he has to enter all the data to the system. Even the donation information has to be entered by the administrator user. The team members across the country have to update their activities to the administrator via phone calls or emails.

3) *Purchase Commercial Software:* According to the given requirements, the Animal Shelter Management system should be able to access by anywhere in the world. People should be able to view the adoptions, rescues, programs set by the team. Also, people should be able to donate to the team online. Not only that, the team is functioning all over the country as small groups. So, the team members should be able to access the system anywhere anytime. Considering the above-mentioned requirement, it is obvious that the best solution is a web-based application. So the research was carried out to find the possibility of purchasing an on-line animal shelter management system. All the animal shelter management systems found were not free and costly. Most

of those applications charge for a number of animal records stores in the database and the no of users for the system. Also, the yearly maintenance fee has to be paid. Even-though some software provides the community edition, these editions include limited features only. Since AWGSL are a non-profit organization and runs on donations collected by the public, it is very hard for them to spend such a high amount of money on shelter management software like this. According to the AWGSL team, they do will to spend money on rescue activity rather purchasing and maintaining costly Standalone software.

B. System as a Web Based Solution

According to the given requirements, the Animal Shelter Management system should be able to access by anywhere, any time of the world. Also, People should be able to view the adoption details, rescues, and other programs set by the team without any delay. Also, people should be able to donate to the team online. Since the team functions all over the country as small groups, team members should be able to update their activities instantly to the system.

Therefore, without implementing as a standalone system, the system has been proposed to implement as a web-based solution. Web-based systems are accessed through web browsers by submitting the URL of the system. It can be easily accessible by any number of users connected to the network that the system is hosted. Web-based systems have a central application server and database. Thus, the data can be easily maintained in a central location. Since each working framework includes a web browser, the application will be framework free. When comparing with standalone systems, maintaining a web system is simple.

Implementing the solution as a web application, will enable the AWGSL team to manage their pet sheltering activities very efficiently, effectively and productive way. Instant updates and notifications will increase the awareness of the public and will increase the adoption and rescue of the stare dogs while insuring their lives on secure hands.

C. System as a Mobile Based Solution

Through the mobile application, users can send new information about dog or cat to the AWGSL team. And then team can manage their pet adopting activity, effectively and productive way. Moment upgrades and notices will increment the mindfulness of the open and will increment the appropriation and protect of the gaze pooches whereas inconceivable their lives on secure hands.

D. Object Oriented Analysis and Designing

Object-oriented analysis and design (OOAD) is a program designing approach that models a framework as a gather of association objects. Each object speaks to a few substances of intrigued within the framework being demonstrated, and is characterized by its course, its state (information components), and its behavior.

1) Class Diagram for Animal Shelter Management System

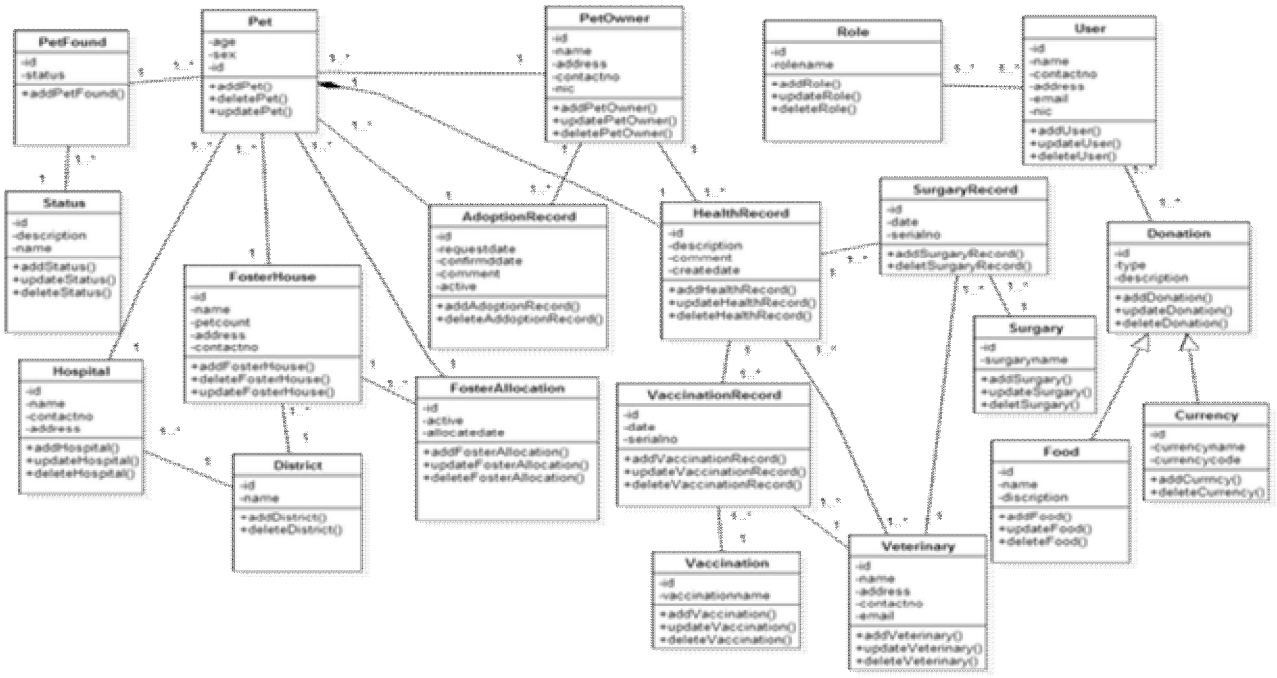

Fig. 2 High level use case diagram of the system

2) High Level Use Case Diagram for the proposed system

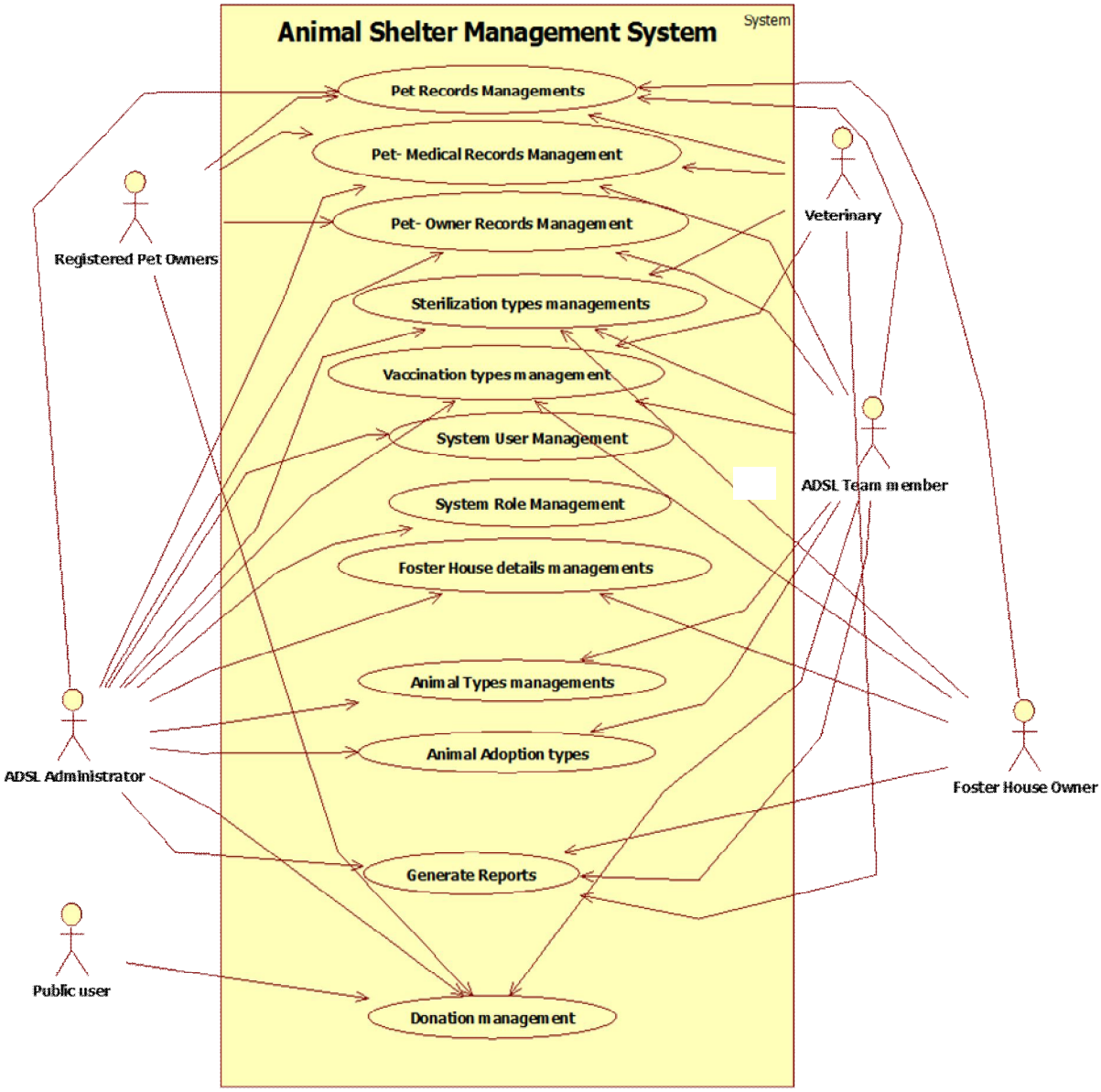

Fig. 3 high level use case diagram of the system

E. References

By studying other similar systems could be obtained more experience about how the developing system should be and how the required functionalities should be presented it was helpful to develop final system. Following are few similar systems that reviewed to build the system.

iShelters is an animal shelter management software which provides adoption and rescues with services to manage their animals for a monthly fee. No installation or maintenance (data back-ups) is required by the client side and only need is a login, password and connection to the internet.[1]

PetPal Manager is an online pet and rescue management application built using modules allowing rescues and shelters to customize their system to only use the applications that suite them best. New modules will be introduced as time goes on and new features are being developed.[2]

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IV. CONCLUSIONS

So, throughout this automated Animal Shelter Management System for Adopt a Dog in Sri Lanka groups, will definitely improve the productivity of their welfare activity process.

The modern technologies, tools, methodologists and standards were followed while the implementation to ensure the quality of the work. Latest technologies like CakePHP framework, HTML5, CSS3, Bootstrap, JQuery was used while the development to increase the usability of the system

During the implementation process, continuous testing was done to ensure the end user requirements were fulfilled and satisfied. Finally, the system was deployed for user acceptance testing.

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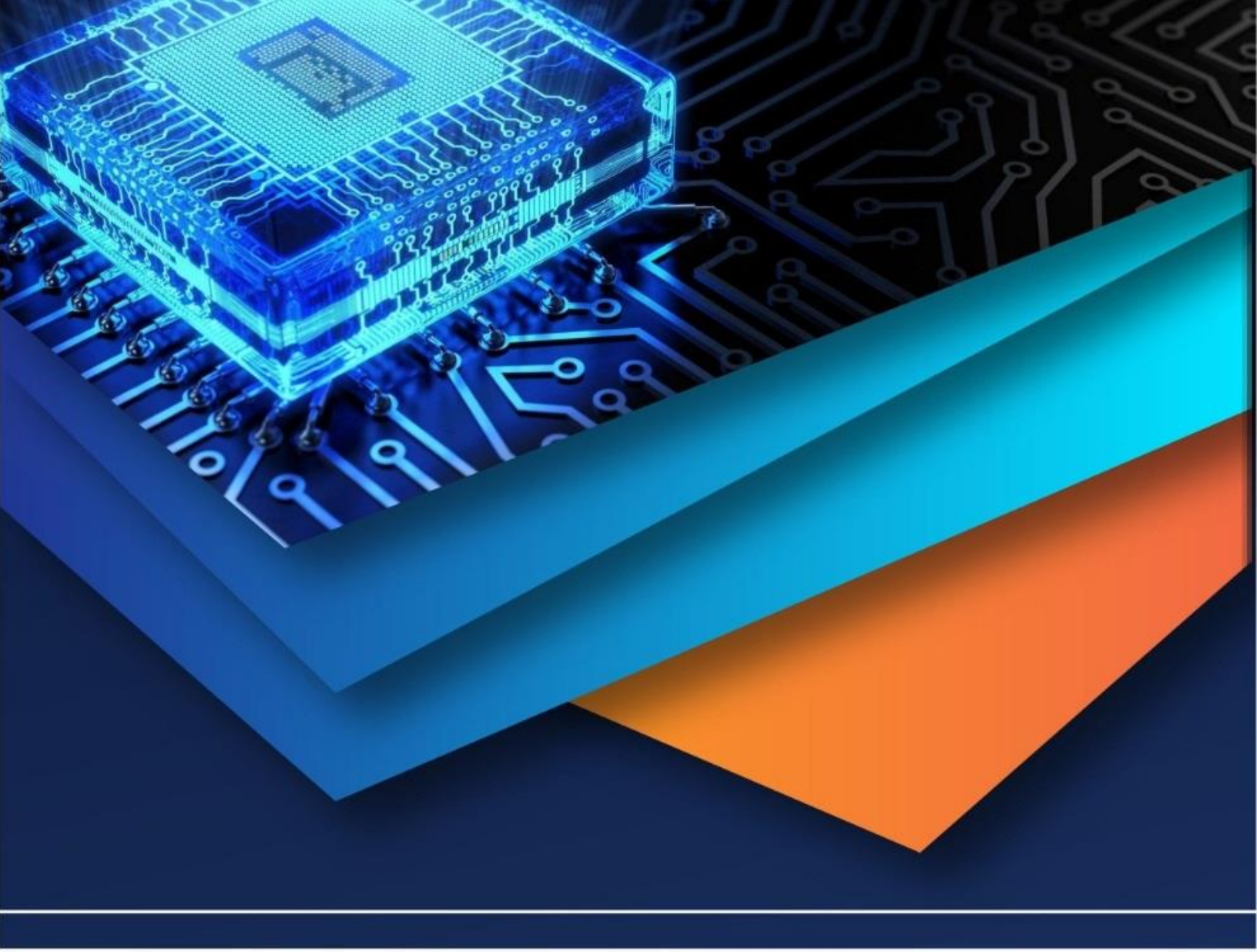

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