FEASIBILITY STUDY

PATIENT MANAGEMENT SYSTEM FOR "DR. PET" ANIMAL CLINIC

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16/02/2017

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1. Introduction

1.1. Overview of the Project

The proposed project is to implement a Patient Management System for the "Dr. Pet" Animal Clinic, Kadawatha, to automate their current manually-driven management system. This should allow the users to maintain three main subsystems; patient details with their medical history, doctor details, and customer details.

This project will be implemented as a desktop based application which uses a cloud-based database management system.

The input of the patient management system includes the details of the doctors, the basic details of a pet and the pet owner, diagnosis of each pet, medical treatments of a pet, medicine prescribed by the doctor, reminder for the continuation of a specific treatment, and the advices given to the pet owner.

The system should provide details of a pet and its owner, medical history, follow-ups for each pet, the names of the pets who have birthdays on a day, and generate several reports for making decisions as outputs. Further, the system should be able to send messages to clients reminding special treatments on their pets on specific days, and general messages for wishing on birthdays.

1.2. Objectives of the Project

- Design and implement a complete, comprehensive integrated high volume front end Patient Management System.
- Maintain security at a high level by providing two user levels (admin and other doctors).
- Provide methods to keep the track records of the patients, pet owners, doctors, and medical records of pets.
- Provide methods for sending messages to clients reminding special treatments prearranged for pets on a given date, to wish on birthdays of pets, and other special messages to broadcast to all the clients.
- Automate the current manual patient management system.
- Automate the calculation processes.
- Provide separate interfaces for different functionalities.
- Provide a separate interface that allows the doctors to view all the follow-ups due on a date which can connect to the relevant medical record of that particular pet.
- Provide the capability of alerting the doctor of follow-ups on pets' medical treatments and birthdays due.
- Provide the facility to generate reports and graphs to make decisions.
- Provide the ability to reduce data redundancy, increase the speed of searching for specific records, store data in a reliable manner, and keep all the data in one place by using a database management system.
- Implement a crash recovery process which guarantees that each transaction is correctly executed and completely aborted.
- Provide the facility to backup data occasionally unlike a manual system.
- Provide user-friendly interfaces to ease the work of the users of the system.
- Increase the client base by providing them a better, faster and more reliable service.

1.3. The Need for the Project

"Dr. Pet" is a medium size animal clinic located in Kadawatha, which has the intention to develop into a large size clinical chain having many branches around the country. At present, the chief doctor has four other doctors as assistants, and the number of patients they have to examine is being increasing day by day. However, their current patient management system is being processed using a manual file management system and the calculations are also processed manually. Hence, it has become a difficult task for the doctors to manage such a large amount of details and the calculations manually quickly and reliably. Further, Dr. Nuwan Wickramasinghe, the chief doctor, lacks the facility to check on the files when he is away from the clinic since their management system is being managed manually using files and books.

To overcome the difficulties mentioned above, "Dr. Pet" requires an automated desktop based application to act as their patient management system, which has a cloud-based database management system. Hence, their calculations can be accurate and managing data of patients and doctors would become easier and reliable. Automating

1.4. Overview of Existing Systems and Technologies

Most of the solutions for patient management systems for animal clinics in the world are web-based or they are used for larger scale animal hospitals. However, many of these standalone systems are not for sale in Sri Lanka, or they are highly expensive.

Similar Standalone systems:

I. AHMS [5] – a larger scale system for an animal hospital
II. Cornerstone Practice Management Software [6] – not supported in Sri Lanka

Similar Web-based systems:

I. VETport [7]
II. Onward Vet [8]

Since animal clinics are not very much popular in Sri Lanka, many clinics do not have an automated management system. However, the proposed system contains some similarities with the currently existing standalone applications in functions used in Sri Lanka; such as,

- Keeping track records of pets and owners
- Medical history

Technology that will be used for implementing the proposed system:

- Frontend Design – JavaFX [1]
- Backend Design – Java
- Database – MySQL [2]
- IDE – Jet Brains IntelliJ Idea [3]
- Report generation – iReport [4]

1.5. Scope of the Project

- The proposed system contains two main user levels: administrator and doctors. Hence, separate login interfaces and two different roles are to be provided.
- The system has to have the ability to withstand the environment failures and if so the system should recover itself within a short time using a backup system.
- The patient management system should contain the details of pets, pet owners, doctors, medical records, follow-ups on pets' medical treatments, and the ability to send messages to clients.
- A few sections of this system should only be handled by the administrator. (i.e. updating client/pet details, adding/updating doctor details)
- A database system has to be used to increase the number of benefits such as crash recovery and data integrity.
- The database management system has to be cloud based to allow the admin to access data from anywhere.

1.6. Deliverables

- A standalone application for "Dr. Pet" Animal Clinic.
- GUIs created in a user-friendly manner.
- Separate interfaces for logging and different user levels.

2. Feasibility Study

2.1. Financial Feasibility

The system is proposed to be designed and developed by an individual developer, who is currently an undergraduate of the University of Moratuwa. Hence, this project will be developed and deployed for free to the client.

2.1.1. Design and Development:

Since the project is being developed for free, no external costs are expected to occur during the design and development phase. Hence, the tools used for designing, and the frameworks and the database used for development are open source/free.

Ex:

- draw.io: the tool used for creating diagrams in the designing phase – free
- Jet Brains IntelliJ IDEA: IDE used for development – the ultimate version is free for the undergraduates of the Department of Computer Science and Engineering at the University of Moratuwa.
- MySQL: the database used for the system – open source
- iReport: the report designer – open source

Further, this system requires a cloud-based database and an SMS gateway. For this matter, Heroku [10], a cloud application platform is supposed to be used. This platform supports to host MySQL database for free with a limited capacity and provides an SMS gateway as a free add-on with a limited number of SMSs. Since Dr. Pet is a medium sized individual clinic at present, the system is able to stand within the given limitations from Heroku.

Therefore, the proposed system is financially feasible in the design and development stage.

2.1.2. Testing and Deployment:

The system is proposed to be tested in two phases; alpha and beta testing.

Alpha testing will be conducted by the developer using testing frameworks designed for the Java Programming Language which are available for free.

- JUnit [11] testing for unit testing
- Arquillian [12] testing for integration testing

Beta testing will be conducted by the users of the system who are the doctors of the Dr. Pet animal clinic. Since the doctors of the clinic are beneficiaries of this system, they have agreed to perform the beta testing for free.

Currently, the clinic is not equipped with a computer. Hence, the owner has to first buy a desktop computer to deploy the patient management system. Since the hardware performance requirements are not at a higher level, a simple Desktop Computer [13] would be sufficient for this purpose and that will cost approximately 50,000 LKR.

Since the only expense for this system is the cost of the desktop computer which is affordable by the Dr. Pet animal clinic, this system can be stated as financially feasible in the testing and deployment stage.

2.2. Technical Feasibility

The proposed project is a standalone application that will be developed using the Java Programming Language with JavaFX UI package. The "Jet Brains IntelliJ IDEA" Ultimate Version is used as the IDE which is free for the Computer Science and Engineering undergraduates at the University of Moratuwa. MySQL will be the database used for this system which is an open source database management system. iReport will be used to design reports needed for the system.

Since iReport designer is well structured and understandable, it is being selected as the report designer for this project. Though the project can be developed using Java or C# languages, iReport supports only the Java language. Hence, the project will be developed using that.

The above set of software allows the developer to develop the system locally. Since the database has to be cloud based, Heroku is used to host the database as it provides a free cloud application platform with some limitations. The same platform is used to provide the SMS gateway which is also free to some extent.

Further, this system will be accessed only via two machines; the desktop computer in the clinic and the laptop computer of the administrator. Hence, no advanced networking features are needed to be implemented to deploy this system.

Moreover, no additional software is needed other than MySQL server, and that is available for free. Hence, the system can be considered as technically feasible.

2.3. Resource and Time Feasibility

Human resource is available for free in this system since all the users of the system are the doctors working in the clinic. Hence, the availability of new employers to initiate this system is unnecessary. As stated in the prior section, technological resources are also available for free as they are open source or free. Further, the system will be developed only in the laptop of the developer. Hence, the resources needed for this system can be met easily, the system is resourcefully feasible.

Task	Estimated Time (in days)
Determine the project idea	3
Study existing software	3
Determine the project scope	2
Document feasibility study	4
Gather requirements	2
Document SRS	2
Create project schedule	2
System design	20
System implementation	40
System testing and validation	10
Total	**88 (< 14 weeks)**

The project is proposed to be completed within 14 weeks. The above analysis on time estimation confirms that this system is feasible with time since additional time will not be affecting the proposed time period.

2.4. Risk Feasibility

Risk Description	Potential Impact on Project	Likelihood of Occurrence	Difficulty of timely anticipation	Overall Threat
Change of requirements	High	Low	Low	Medium
Misunderstandings of requirements	High	Low	Low	Medium
Users' negative feedback on the system	High	Medium	Medium	High
Developer's inability to complete the project on time	Very High	Very Low	Low	High
Incompatibility of the technology used with the users	High	Low	Medium	High

The proposed system is a customized product that is being developed for the Dr. Pet Animal Clinic. Since the owner is an individual, the requirements for the system are stated by him. Further, the developer conducted several meetings with Dr. Nuwan Wickramasinge, the owner and the chief doctor of the Dr. Pet clinic to gather necessary requirements. He has explained every requirement in a manner any person is able to understand. Hence, the likelihood of occurrence of misunderstandings of requirements would be low and the change of requirements would also be low.

Since the clinic does not have an automated system at present, it will be somewhat difficult for the doctors to adapt to the new system with new technology. Hence, there will be many negative feedback for this. However, user-friendly interfaces will be developed and a user manual will be provided to minimize this matter.

Further, since the schedule is roughly designed to finish the project within 88 days, taking some additional days to complete the task will not affect the timeline of the system. Hence, the likelihood of occurrence of the developer's inability to complete the project on time is stated as very low.

2.5. Social/Legal Feasibility

The key objective of this system is to automate the patient management system of the Dr. Pet animal clinic. Since this is only to be used in one clinic, it is required to be developed as a standalone system. Further, using such a system at the clinic can increase the rate of their effective work per day. Therefore, it will improve the quality as well as the reliability of the clinic.

The system is developed using free or open source tools/software except Jet Brains IntelliJ IDEA Ultimate version. However, being an undergraduate of the Department of Computer Science and Engineering of the University of Moratuwa, the developer is capable of using the ultimate version of the IntelliJ IDEA for free. Therefore, the system is legal on every aspect.

3. Considerations

2.6. Responsiveness and Performance

Since the proposed system is a standalone application, and it does not require additional parties to be involved with it, responsiveness of the system is very high. Further, the database system will be designed without any complexities, hence the system will not take a considerable amount of time to response. Since this is a standalone application, the performance would be higher.

2.7. Security

There will be two levels of users to access the system. Hence a high security is needed. To overcome this matter, a password required login interface will be developed while the password will be saved in an encrypted manner. This will ensure the security of the users.

2.8. Usability

The interfaces will be designed in a user friendly manner to enhance the usability of the system. The general package that java provides for user interface designing is the Swing package. However, to make the interfaces further user friendly, JavaFX will be used in this system. Moreover, additional features that simplifies the work of the users will also be included in this system to improve the usability.

2.9. Reliability and Availability

This system holds the most important details of the clinic, such as the details of patients and their medical records along with the drug details. Hence, the system has to be developed in a reliable manner. A method to manually backup all the data will be developed during any hardware failure to overcome this matter. Therefore, losing important information can be eliminated.

Users are required to use the desktop machine in the clinic to access this system other than the laptop computer of the admin, which is only restricted to him. Hence, the availability of the system would not be a matter with this system.

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