DEVELOPMENT OF A TECHNOLOGY-BASED ANIMAL ELECTRONIC MEDICAL RECORD INFORMATION SYSTEM FOR ANIMAL HEALTH SERVICES

Dwi Iskandar[1*], Emma Ismawatie [2], Muhammad Nur Ibrahim [3]
Politeknik Indonusa Surakarta[1], Politeknik Indonusa Surakarta [2], Politeknik Indonusa Surakarta
*Correspondence Email : dwik@poltekindonusa.ac.id

ABSTRACT

The current development of Information Technology (IT) has a huge impact on various aspects of life. This support makes it possible to send and receive information quickly without having to meet the desired person in person. The Animal Health Center (Puskeswan) is a place for providing animal health services accompanied by veterinarians and paramedics. Like humans, animals have the right to happiness in their lives. Currently, the level of animal welfare compliance remains very low. This is not only proven by government actions that have not been optimal in protecting animal rights and regulations to protect animal rights that have not been fully implemented. If patient data is recorded on a patient card, it will have negative impacts, including: Limited accessibility, possibility of data loss, human error, not environmentally friendly. An animal medical record information system is very important and useful, some of the reasons include: Efficient data management, better health care, routine care management. The research method uses the Waterfall Method system development method

KEYWORDS Electronic Medical Records, paramedics, Development of Information Technology

INTRODUCTION

The current development of Information Technology (IT) has a huge impact on various aspects of life. This support makes it possible to send and receive information quickly without having to meet the desired person in person. Having pets has become a lifestyle, especially for birds, chickens, cats, dogs and fish. Pet owners must maintain the health of

their pets by carrying out routine checks and vaccinations at a hospital or veterinary clinic. Veterinary clinic services include general examinations, ultrasound, clinical examinations, minor surgeries, and vaccinations. Patient information is recorded on the patient card and medical record information is recorded on the medical record card.

The Animal Health Center (Puskeswan) is a place for providing animal health services accompanied by veterinarians and paramedics. Like humans, animals have the right to happiness in their lives. Currently, the level of animal welfare compliance remains very low. This is not only proven by government actions that have not been optimal in protecting animal rights and regulations to protect animal rights that have not been fully implemented.

Veterinary clinics are an integral part of social and Health organizations whose mission is to provide comprehensive, curative and preventive services to their communities. Veterinary Clinic is a health facility that provides comprehensive animal health services both inpatient, outpatient and emergency care (Sry Handayani, J. Prayoga, & Hasugian, 2023).

If patient data is recorded on the patient card, it will have negative impacts, including:

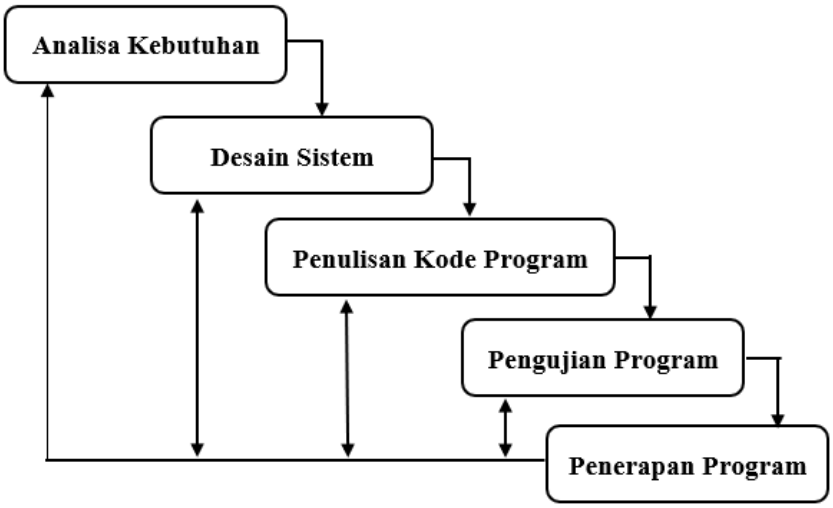
(1) Accessibility limitations: keeping records manually on paper can make it difficult to access data when needed. The veterinarian or paramedic has to find the physical records, which can take time, especially if the records are messy.
(2) Possibility of data loss: manually recorded animal health data may be lost or damaged due to factors such as fire, flood or other physical damage. Loss of data can result in loss of the animal's health history, which is important for proper care.
(3) Human error: manual paper entry increases the risk of human error, including typographical, coding, or loss of important information. These errors can lead to misdiagnosis or inappropriate treatment.
(4) Not environmentally friendly: Excessive use of paper in veterinary medical records contributes to the cutting of trees and has a negative impact on the environment.

The veterinary medical record information system is very important and useful, for some of these reasons, among others

1. Efficient data management: Animal medical record information systems help in collecting, storing and managing animal medical data efficiently. This allows veterinarians and animal health staff to easily access up-to-date information about the animal's health condition, disease history, vaccinations and previous treatments.
2. Better health care: By having access to complete and detailed animal medical records, veterinarians can make more precise diagnoses and develop more effective treatment plans. This means that the animal will receive better care according to its medical needs.
3. Routine care management: An animal medical record information system makes it easier to manage routine care, such as vaccination schedules, medication administration and periodic health checks. This helps pet owners remember and adhere to the necessary care for their pets.

RESEARCH METHOD

The research method uses the system development method, the system development method is a systematic or orderly method which aims to analyze the development of a system so that the system can meet needs. The system development method used is the waterfall method. The steps for this method are



Sumber: (Susena et al., 2021)
Figure 1. Pengembangan Sistem Metode *Waterfall*

(1) *Requirements analysis and definition*. Needs Analysis, namely collecting complete needs and then analyzing and defining the needs that must be met by the program to be built. This phase must be carried out completely to produce a complete design. All software requirements must be met in this phase, including the software usefulness that users expect and software limitations. This information can usually be obtained through interviews, surveys or discussions. This information is analyzed to obtain documentation of user needs for use at the next stage.
(2) *System and Software Design*. System design is the design carried out after the requirements have been completely collected. This stage is done before coding. This stage aims to provide an idea of what should be done and how it should look. This stage helps in specifying hardware and system requirements and defining the overall system architecture.
(3) Implemetation and Unit Testing. Writing Program Code is a program design translated into codes using a predetermined programming language. The program that was built was directly tested both on a unit basis. In this stage programming is carried out. Making software is broken down into small modules which will later be combined in the next stage. In addition, at this stage an examination is also carried out on the module that is made, whether it has fulfilled the desired function or not.
(4) Integration and Sistem Testing. Program testing is the unification of program units and then tested as a whole. At this stage, the modules that have been created are combined and tested to find out whether the software created is in accordance with the design and there are still errors or not.
(5) Operation and Maintenance. Program Implementation, namely operating the program in its environment and carrying out maintenance, such as adjustments or changes due to adaptation to the actual situation. This is the final stage in the waterfall model. The finished software is run and maintained. Maintenance includes correcting errors that were not found in the previous step. Improved implementation of system units and increased system services as new requirements.

RESULT AND DISCUSSION

(1) System Analysis. In making a new system, analysis of the current system is very important, especially to find problems and weaknesses in the previous system. This analysis is very important for subsequent system development. The purpose of this system analysis is to ensure that the system can run according to a predetermined flow, which will make it easier.

Functional Requirements: The results of the functional requirements analysis for the Puskeswan electronic medical record are shown below: JavaFX and CSS based application user interface; The system provides three registration forms: a new owner and animal form, a new animal form, and a visit form for registered owners and animals. The login form, user data, and additional users can only be accessed by users based on their individual preferences; Medical records can be processed and printed by the system; and data can be printed in PDF format.

(2) System Design

(a) Running system. Analysis of the old system is needed to be used as a guide in making a new electronic medical record system. This is done to identify problems that will arise during the process of making information systems. The results generated from the interviews are that there are problems with services, data collection, cost information, and reporting that is less effective and efficient because the data is scattered and not properly archived. The results generated from the interviews are as follows: there is not enough data recap; inaccurate information; patient data is still being written; and reports are still made using Microsoft Excel.

(b) Developed system concept. The registration admin logs into the system to enter owner data such as first name, last name, date of birth, gender, race, coat color, and photo of the owner. Owner data also includes the owner's name, date of birth, type of animal, gender, breed, fur color and photo of the owner. The medical records admin then responds to the data entered. This includes medical record data, procedures, history, diagnosis, drug prescriptions, pet information, doctor information, and owner information. After the medical record data is processed, the payment administration enters data such as services, drugs, and others. This then proceeds to the owner, pet, and Doctor data reports.

(c) Context diagram. Also known as Top Level, is a diagram that outlines the electronic medical record system along with external entities. This diagram shows the workflow carried out by each admin and clinic manager in carrying out all the tasks carried out by the system.

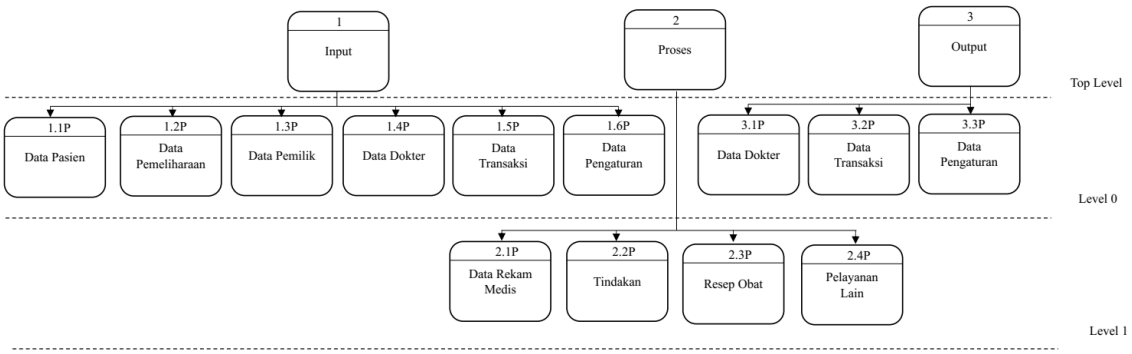


Figure 1. Multilevel Diagram Design

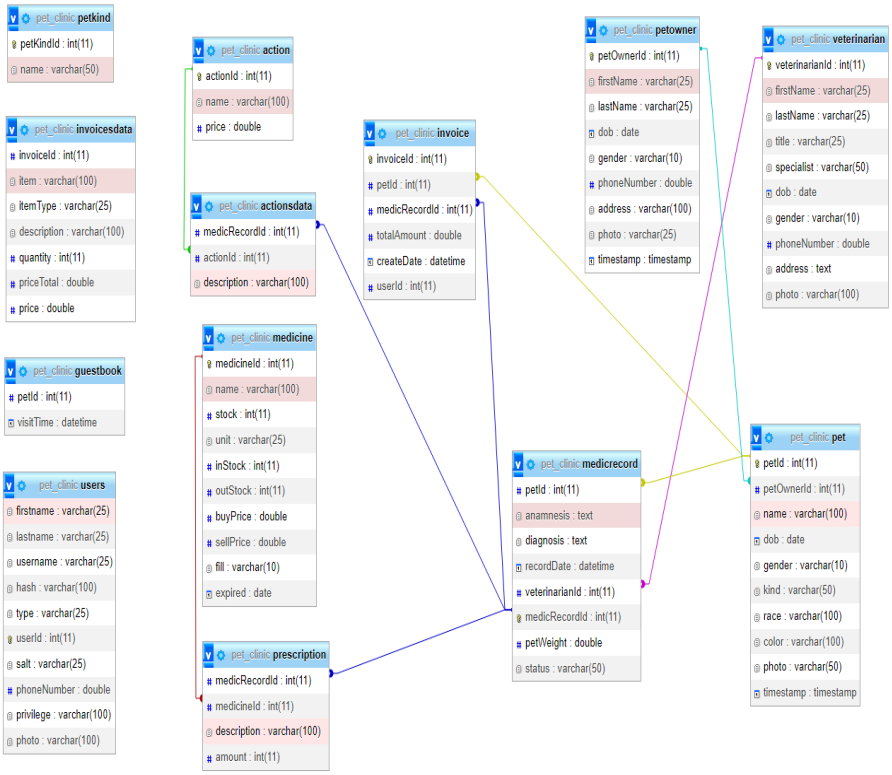


Figure 2. Table Relations

(d) Page Design. This login page design is used to enter or login into the system, both for admin and clinic management login display data. The following is the login display design :

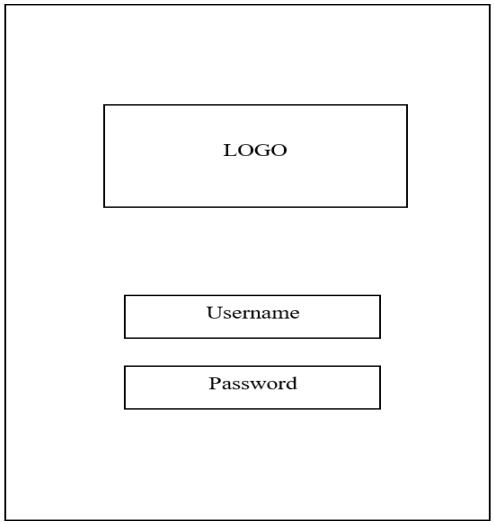


Figure 3. Login Page Display Design

(e) Login Page Display. The login page display is used to manage the identification process. This display includes the username and password that access the application

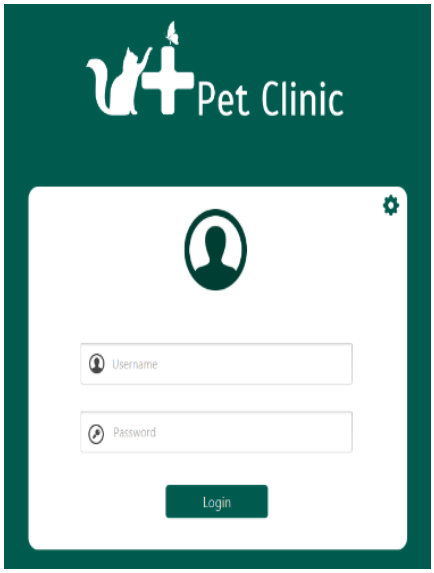


Figure 4. Login Page Display Design

(f) Admin Dashboard Page Display. The appearance of the admin dashboard page is used to make it easier for users to read data and analyze data. This view includes today's visitors, yesterday's visitors, comparison of pet breeds and running out of drug data, and you can easily view the graphs from circle graphs to bar graphs.

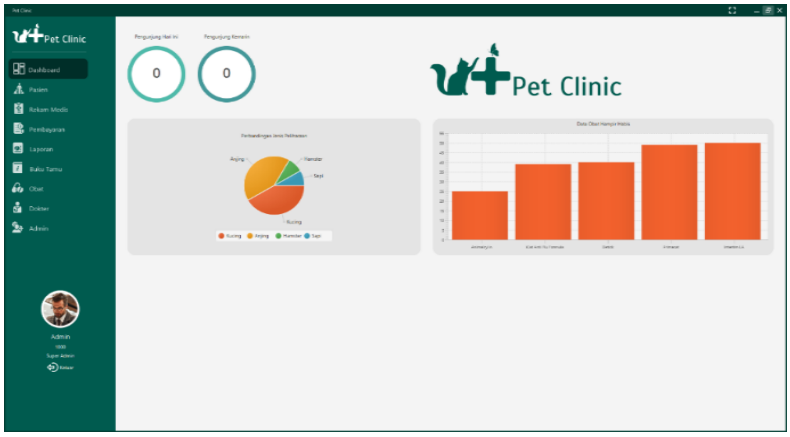


Figure 5. Admin Dashboard Page Display Design

(3) Writing program code. Writing program code is the process of translating the system design into a programming language. The application used to create the code is Visual Studio Code, while the programming language uses Java. By using a MySQL database to manage data.

Dashboard Program Code Excerpt

```
package com.pet.clinic.controller.dashboard;

import java.net.URL;
import java.text.DateFormat;
import java.util.ArrayList;
import java.util.Iterator;
```

```
import java.util.ResourceBundle;

import com.pet.clinic.model.TwoDataChart;
import com.pet.clinic.model.dao.TwoDataChartDao;
import javafx.collections.FXCollections;
import javafx.collections.ObservableList;
import javafx.fxml.FXML;
import javafx.scene.chart.*;
import javafx.scene.control.Label;

public class DashboardMainController {
```

(4) Program Testing. In testing the Electronic Medical Record System, testing is carried out using the black box method to achieve the goal that the system is suitable for use. Black box testing focuses on the functional requirements of the software. Thus black box testing makes it possible to get a series of conditions

Table 1. Program Testing

No	Interface	Testing	Results
1	Admin Login Form	Enter username: admin, and password: admin.	Success
2	Patient Registration Form	Enter owner data such as first name, last name, date of birth, gender, photo of the owner and pet data, such as pet name, date of birth, type of animal, gender, race, fur or skin color and photo of the pet.	Success
3	Pet Form	View, change and edit pet data.	Success
4	Owner Form	View, change and edit owner data.	Success
5	Medical Record Form	Displays information about medical record data, actions, drug prescriptions, diagnosis, anamnesis, pet information, doctor information, and owner information.	Success
6	Form Add Medical record data	Display and add medical record data that will be filled in.	Success
7	Form Ubah Data Rekam Medis	Medical Record Data Change Form	Success
8	Payment Form	Displays service information data, types of services, drugs, others related to costs when treating patients.	Success
9	Report Form	Displays pet data, owner data, and doctor data which will be printed in pdf format.	Success

CONCLUSION

Based on the Electronic Medical Record System that was created, the following conclusions can be drawn:

(1) The existence of an Electronic Medical Record System can help improve the performance of officers in managing medical records.
(2) The system can input the registration data intended to contain owner data and pet data.
(3) The system can input medical records which contain medical record data, actions, anamnesis, diagnosis, and drug prescriptions.
(4) The system can automatically calculate the cost of handling animal health.
(5) The system can automatically record report data, such as pet data, owner data, and doctor data which can be printed in pdf format.
(6) The system can delete expired drug data by itself.

(7) The system can view and add new Doctors.
(8) The system can fill in data automatically by just typing the ID.
(9) The system can add, manage, delete and change user data using system applications.

REFERENCES

Chiang, C. F., Villaverde, C., Chang, W. C., Fascetti, A. J., & Larsen, J. A. (2022). Prevalence, risk factors, and disease associations of overweight and obesity in cats that visited the Veterinary Medical Teaching Hospital at the University of California, Davis from January 2006 to December 2015. Topics in companion animal medicine, 47, 100620.Edy Susena, M. K. (2016). Analisis Dan Desain Sistem (ANSI) (3rd ed.). Penerbit Deepublish.

European Food Safety Authority, Brocca, D., & Salvatore, S. (2022). Report for 2020 on the results from the monitoring of veterinary medicinal product residues and other substances in live animals and animal products (Vol. 19, No. 2, p. 7143E).

Fanelli, A., Awada, L., Caceres-Soto, P., Diaz, F., Grillo, T., Gizo, I., ... & Tizzani, P. (2022). Sensitivity of an international notification system for wildlife diseases: A case study using the OIE-WAHIS data on tularemia. Zoonoses and Public Health, 69(4), 286-294.

Handayani, Sry, J. Prayoga, J. Prayoga, & Hasugian, Buyung Solihin. (2023). Sistem Informasi Klinik Hewan Monsabel Pet'S Clinic. *Device : Journal of Information System, Computer Science and Information Technology*, *4*(1), 33–43. https://doi.org/10.46576/device.v4i1.3438

Iskandar, D., Pamungkas, C. A., Puspitasari, N., & Fathoni, M. A. (2022). Design and Build Internet of Things Smart Home For Android Based Electronic Equipment Management System. Jurnal Sisfokom (Sistem Informasi dan Komputer), 11(1), 66-72.

Iskandar, Dwi, Puspitasari, Norma, & Alif Fathoni, Muh. (2022). E-Absensi Berbasis Face Recognition Di Kodekiddo Solo. Jurnal Informatika, Manajemen Dan Komputer, 14(1), 67–75.

Lustgarten, J. L., Zehnder, A., Shipman, W., Gancher, E., & Webb, T. L. (2020). Veterinary informatics: forging the future between veterinary medicine, human medicine, and One Health initiatives—a joint paper by the Association for Veterinary Informatics (AVI) and the CTSA One Health Alliance (COHA). JAMIA open, 3(2), 306-317.

Waltenburg, M. A., Shugart, A., Loy, J. D., Tewari, D., Zhang, S., Cole, S. D., ... & Nichols, M. (2022). A Survey of Current Activities and Technologies Used to Detect Carbapenem Resistance in Bacteria Isolated from Companion Animals at Veterinary Diagnostic Laboratories—United States, 2020. Journal of Clinical Microbiology, 60(3), e02154-21.