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***Research paperr***

# Design and Analysis of Expert System Based on Information System to Diagnose Computer Failures Using Forward Chaining Method

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**Abstract**

Computer damage is the most common case. Correspondingly, computer knowledge is good enough to anticipate the occurrence of computer malfunctions because computer damage problems are quite complex problems. Diagnose damage to the computer. This study aims to design an expert system designed to determine damage to a computer. The method used in designing this expert system is SDLC (System Development Life Cycle) Waterfall. This expert system design uses the UML (Unified Modeling Language) process, system requirements analysis, hardware and software analysis, and system design analysis.

***Keywords:*** *Expert System, Forward Chaining, Information System.*

## 1. Introduction

Technology is not new in the community; even the people themselves can quickly accept and understand the technology that is developing at this time. The development of technology is so rapid in society today, one of which is information technology [1]. Information technology has become a necessity and evenly distributed in every area of human life [2]. The information system is one of the advancements of information technology where all people get the information they need, one of the technologies developed in line with the development of information technology is the expert system [3].

An expert system is a computer-based system that uses knowledge, facts and reasoning techniques possessed by humans as experts stored on a computer, and used to solve problems that typically require certain experts [4]. Whereas according to other terms, expert systems are systems that attempt to evaluate human knowledge to computers, so that computers can solve problems as is usually done by experts. A good expert system is designed to solve certain problems by imitating the work of experts [5].

Expert systems arise because of problems in a specific field where the user wants a solution to the problem is solved by approaching expert ways to solve the problem [6]. The design of this expert system application uses the forward chaining method which is used to test the factors included with the rules stored in the system so that a decision can be taken [7][8].

Basically the problem of computer damage is the most common case. Correspondingly, computer knowledge is needed well enough to anticipate the occurrence of computer malfunction because the problem of computer damage is a fairly complex problem [9].

Some may only be limited to operating the computer just as much as possible, if there are computer problems it must bring it to a computer technician who is able to solve these problems, because along with the rapid development of Information Technology, all fields of life in the world are characterized by the application of technology [10]. One tangible manifestation of the technology is the application of a computerized system, with the system able to complete a job quickly, efficiently and effectively so as to minimize errors that occur [11].

The advantages of the expert system itself are: 1) It does not require a fee when not in use, whereas in human experts requires daily expenses; 2) Save time in decision making; 3) Improve the capabilities of other computerized systems. Expert system integration with other computers makes it more effective, and can include more applications [12][13].

Problems with computer damage can be broadly divided into two categories, namely damage to hardware and software damage. There are so many users who spend a lot of money just to repair the computer crunch, even though the computer failure that occurs is not necessarily complicated and may not necessarily be fixed. Therefore an application is needed that can help solve computer damage problems. This application utilizes expert system technology that functions as a substitute for someone who is an expert in their field [14][15].

Based on the background above the purpose of this study is to analyze and design in building applications that can help computer users (users) to overcome problems or damage to computer hardware (hardware) and computer software (software), so as to save time and repair costs.

## 2. Method

The method used in this study is SDLC (System Development Life Cycle) Waterfall [16]. This method has a systematic approach

starting from system requirements analysis then analysis, coding design, testing and maintained, in this approach must be done sequentially from the beginning to the end. At this stage of traffic system analysis and coding design, researchers will analyze and design expert systems based on information systems to diagnose damage to the computer.

## 3. Result and Discussion

*3.1 Analysis of Hadrware and Software that used*

System specifications needed in designing diagnostic expert systems for computer and laptop hardware damage based on this information system are as follows:

*a)* The software used to build this expert system are follows:
1. Windows 7 Ultimate.
2. HTML, PHP, JQuery, and CSS programming language
3. Web server XAMPP 1.7.3 version
4. Database server of MySQL
5. Web Browser such as Internet Explorer, Mozilla Firefox and Chrome.

*b)* The hardware used in building this expert system is minimal with the following specifications:
1. Procesor : Intel® Core™ i3 CPU M380 @ 2,53 GHz.
2. RAM : 2,00 GB
3. VGA
4. Monitor with 1366 x 768 pixel resolution
5. Optical standard and keyboard

*3.2 Analysis of System Needed*

System requirements analysis designed will be adjusted to the analysis of user requirements. System requirements analysis includes:

1. Input

The input data needed is in the form of a classification of student intelligence as well as indicators, symptoms, causes, solutions or conclusions, rules of cause and rules of solutions for computer damage. Computer damage data is needed because it is the core of knowledge that will be used as the purpose of identification. The system required as input data specifications is as follows:

a. Data on computer damage is needed because it is the core of knowledge as the purpose of identification. In computer damage data is also accompanied by a definition of computer damage.
b. Symptom or indicator data is data that will be selected by the user as input to the system.
c. Data classification of student computer damage.
d. Conclusion data is data that contains the results of identification of computer damage.

2. Output

The designed system can provide output in the form of:

a. Can display the ability of computer damage owned by the user from the results of identification.
b. Can display solutions and conclusions from the results of identification of computer damage.

*3.3 UML (Unified Modeling Language)*

The design of this expert system application uses UML (Unified Modeling Language) in its design. UML is a standard modeling language or collection of modeling techniques to specify, visualize, construct, and document work results in software development.

a) Activity diagram of user and admin

Activity diagrams describe the processes that occur when the activity starts until the activity stops. This activity diagram is similar to a flowchart diagram.

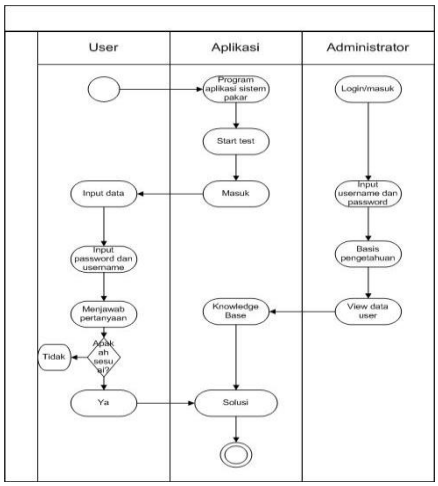


**Figure 1.** Activity Diagram of User and Admin

3. Sequence diagram of user and system

This sequence diagram serves to model system usage scenarios.

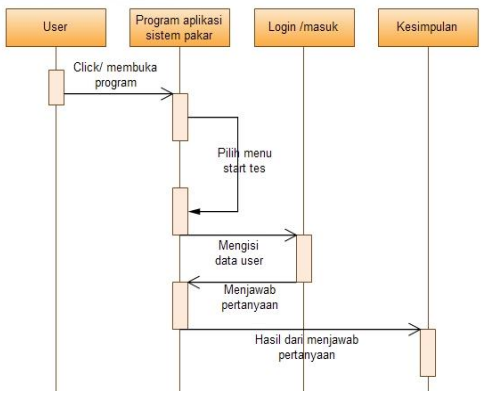


**Figure 2.** Sequence Diagrams of User and System

*3.4. Design of System*

The following is the input design of this expert system:

a) Design of Login Form

This login system form is used by users to enter the main page of the expert system. The design of the login system form can be seen in the picture below:

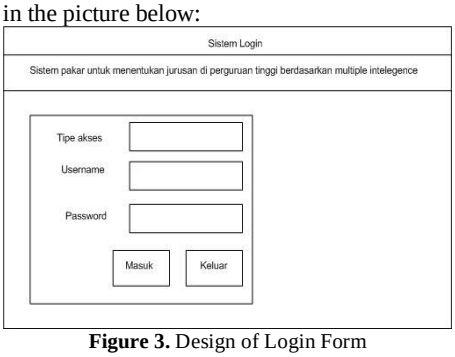


**Figure 3.** Design of Login Form

b) Design of Questions Form

The question form design is a form that is used by the user to choose the symptoms that occur to him, so the system will draw conclusions in the form of potential and solutions.

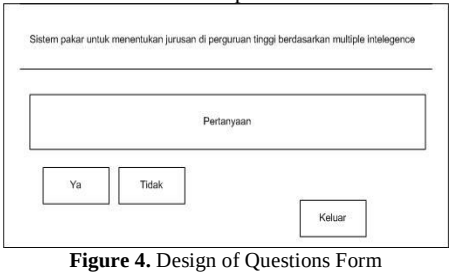


**Figure 4.** Design of Questions Form

c) Design of Diagnostic Result Form
The design of this diagnosis form is a form that displays conclusions and diagnosis results from user consultation. The design of the diagnosis form can be seen in the picture below:

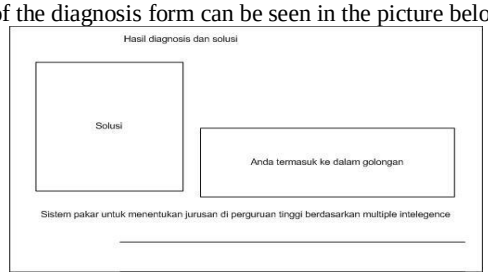


**Figure 5.** Design of Diagnostic Result Form

## 4. Conclusion

The expert system-based learning media design uses the Unified Modeling Language (UML), which consists of design activity diagrams and sequence diagrams, hardware and software analysis, system requirements analysis in terms of input and output, and system design.

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