EXPERT SYSTEM FOR TROUBLESHOOTING LAPTOP MOTHERBOARD DAMAGE USING FORWARD CHAINING METHOD AT BUDI DARMA UNIVERSITY COMPUTER LAB

Hery Sunandar, Pristiwanto, Berto Nadeak, Saidi Ramadan Siregar
Universitas Budi Darma
4nt0.82@gmail.com

Abstract

The development of laptop hardware technology in the 21st century is increasingly rapid to support information technology that is increasingly easily accessed. Laptops have an important role in helping human activities, especially in teaching and learning activities. Not infrequently a laptop or better known as a laptop as most students and lecturers and even students who sit in secondary education have started to use it. In national tertiary education, the entire campus requires both public and private universities to have laptop laboratories. Along with these developments in the case of laptop usage is getting bigger.

Keywords: Hardware, motherboards, laptops, ICs, hardware damage.

1. Introduction

In a laptop laboratory that is actively used from morning to evening or an average of about 8 hours per day. If a laptop is used regularly, there will be some undesirable things that interfere with the teaching and learning process. The use of laptops that are too long, submerged in water, or carelessness of the user or manager can reduce the life of the device, for example, it can cause software damage, damage to laptop hardware components (hardware broken) which definitely hinders or disturbs users.[1], [2]

As for software component damage, for example damage to the windows or linux operating system, the user may still be able to fix it, but if the damage occurs to the laptop hardware, there can be various kinds of problems that can be categorized, minor damage or serious damage. For minor damage problems, sometimes users can fix it themselves, for example replacing the screen, replacing the DVD-R, replacing the keyboard and parts of it, and if the problem is serious, such as damage to the VGA chipset, ethernet card, wifi card, at least the user knows in advance about the laptop problem before asking an expert to handle it and at the same time help technicians speed up diagnosis of laptop hardware damage. [3], [4]

From previous research entitled Expert System to Diagnose Laptop Mainboard Damage. In this study, it describes the design of an expert system that is built on a website so that it is easier to conduct consultations and questions about general damage to the laptop mainboard because it can be accessed anywhere during internet service. From the research entitled Expert System Troubleshooting for Web-Based Laptop Hardware Damage with the Forward Chaining Method, this expert system application for troubleshooting laptop hardware damage can make an initial diagnosis of a malfunction as well as a proposed solution to overcome the damage. [5]–[10]

On the Budi Darma University campus, there are several offices and several laptop laboratories connected to the server room with an average usage duration of 8 hours per day except for server laptops which use non-stop. The purpose of this study is to facilitate the manager / staff of laptop laboratory staff in diagnosing damage to various kinds of laptop motherboards and repairing them using expert systems or flowcharts and the motherboard scheme that is handled.

2. Method

There are several stages that will be carried out in terms of diagnosing damage to the laptop motherboard after starting with determining the place and time of implementation and the preparation stage which includes problem analysis, data collection, system design, system development and system testing as well as the stages of writing a report as shown in the figure the following
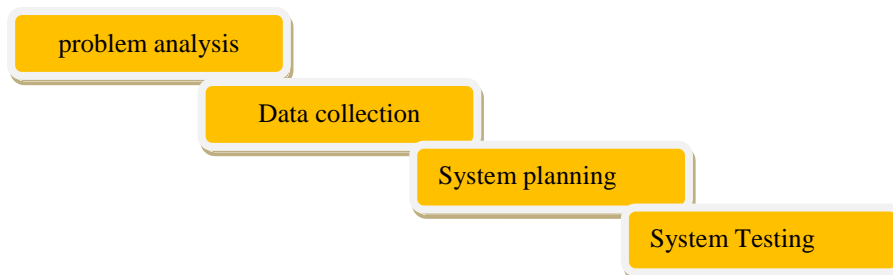

Figure 1 stages of the research method

3. RESULTS AND DISCUSSION
3.1 Problem Analysis

There are several stages that will be carried out in terms of diagnosing damage to the laptop motherboard after starting with determining the place and time of implementation and the preparation stage which includes problem analysis, data collection, system design, system development and testing.

Table 1. Distraction Problems

DISTRACTION	PROBLEMS
LAPTOP WILL NOT START	The cable is not attached Power cable broke Power supply is damaged
LAPTOP WANT TO TURN ON BUT WILL NOT BOOTING	VGA cable or loose installation Memory is damaged The current at the power supply is not sufficient
LAPTOPS OFTEN HANG	CPU overheats Insufficient memory capacity Memory is damaged Damage to the program or system Virus
KEYBOARD NOT RECOGNIZED BY LAPTOP	Keyboard is not pre-installed with correct Broken keyboard The system does not recognize additional hardware Damaged port
CLOCK AND DATE SETTINGS BIOS ALWAYS CHANGE	CMOS battery is not working properly
CRASH AFTER INSTALLING NEW RAM	RAM is not compatible with the motherboard RAM may be damaged
THE MONITOR WILL NOT BE ON	Power cable is not connected VGA cable not installed Deer VGA card

3.2 System Testing

In the display below, look for motherboard damage based on the input text, it will display a list that will be looking for.
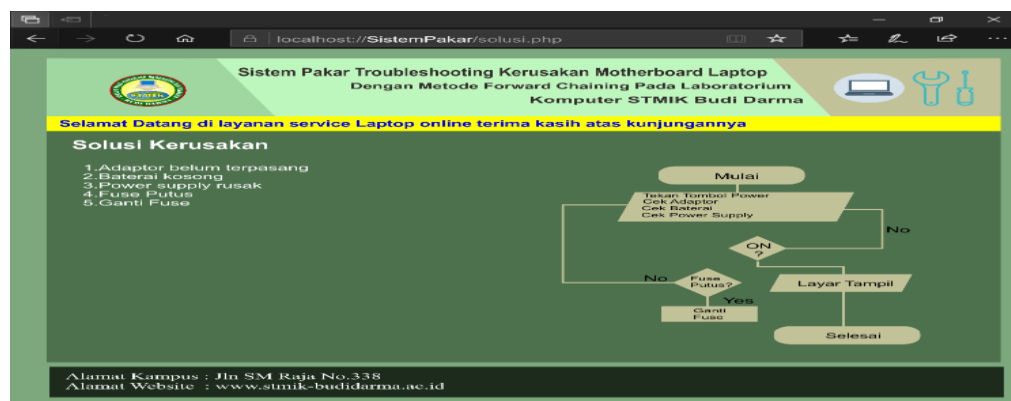

Figure 2. main course

Figure 3. System Testing Results

3.3 Discussion

Lack of sufficient knowledge in handling hardware damage causes most of the general public or an institution to be unable to identify where the damage occurred to their laptop hardware. So that there are many institutions that pay a large amount of money just to repair damage that occurs to laptop hardware to hardware troubleshooting experts. The use of this expert system does not mean eliminating the role of laptop experts or technicians, because not all laptop damage problems can be handled by laptop users independently. By using a web-based laptop hardware damage expert system application, finding information about laptop hardware damage will be easier. Web-based laptop hardware damage expert system applications can be processed optimally and faster wherever the user is using the internet network can find out the damage or symptoms of hardware damage desired by laptop users. The application of the forward chaining method for laptop damage is as follows:

Rules or regulations for laptop hardware damage

RULE 1:

IF CPU is Off

AND Laptop restarts frequently

AND The power supply fan does not turn

THEN CPU power supply problem solution: Repair the CPU

RULE 2:

IF Laptop hangs frequently

AND Laptop has become slow

AND Hard drive is not detected

AND The hard drive cannot be formatted

AND Disk capacity is abnormal

AND Hard drive has trouble reading certain areas

AND Hard drive reads hard

AND Hard disk is detected but its capacity cannot be read

THEN Hard drive Problem solution: Replace the hard drive

RULE 3:

IF Monitor indicator light is on, screen is dark

AND Monitor image curved on the left and right

AND Monitor image is dim / dark

AND Monitor image is out of focus

AND The monitor image has too much contrast

AND Draw a striped monitor

AND The monitor image is stretched to the left and right

AND The monitor image is too left or right
THEN The problem on the horizontal monitor is the solution: adjust the brightness as desired

RULE 4:

IF Monitor does not display any images

AND The monitor image vibrates

AND the monitor image is wavy

THEN monitor power supply problem

RULE 5:

IF Monitor indicator light is on, screen is dark

AND The monitor image is tilted left or right

AND The monitor image is circular

AND The monitor image is in the form of travesium

AND Raster one horizontal line monitor

AND Raster one vertical line monitor

THEN Problem with the monitor yoke

RULE 6:

IF Laptop hangs frequently

AND BIOS settings are always changing

AND The time and date on the laptop do not match

AND USB port not detected

THEN Motherboard problem is the solution: diagnose CPU components

RULE 7:

IF Laptop hangs frequently

AND Laptop restarts frequently

AND Laptop has become slow

AND Processor not detected in BIOS Check

AND Mouse not detected

THNE Processor problem

RULE 8:

IF CPU is Off

AND Laptops often hang

AND Monitor indicator light on, screen is dark

AND VGA is not recognized

AND There is a beep 1 long and 3 short beeps

AND An uninterrupted beep is heard

AND Resolution The monitor screen is unstable or changing

AND There are small dots on the screen

THEN VGA problem solution: Replace the VGA ribbon cable

RULE 9:

IF CPU is Off

AND Laptops often hang

AND Laptop has become slow

AND An uninterrupted beep is heard

AND There is a long sound beep repeatedly

THEN Memory (RAM) has a problem with the solution: clean RAM or replace

RULE 10:

IF Laptop becomes slow

AND CD / DVD Room not detected

AND The CD / DVD Room indicator light does not turn on

AND CD / DVD Room cannot read / write CD / DVD

AND CD / DVD cannot be played in the CD / DVD Room

AND CD / DVD can not go out

THEN CD / DVD ROOM has a problem

RULE 11:

IF Laptop hangs frequently

AND Sound Card not recognized

AND Laptop has no sound

THEN sound card problem solution: check the sound card for damage

RULE 12:

IF There is a message "Keyboard Failure"

AND Some keyboard keys don't work

AND Keyboard not detected
THEN Keyboard Problem solution: replace the keyboard board

4. CONCLUSION

The expert system developed can analyze damage to computers or laptops in the Budidarmar University laboratory, with the chosen method forming rules so that it makes it easier to diagnose the damage that occurs.

Reference

[1]   M. J. Isakson, *Computer Systems: A Programmers Perspective*. 2011.

[2]   J. Adachi, E. Siebrits, A. Peirce, and J. Desroches, "Computer simulation of hydraulic fractures," *Int. J. Rock Mech. Min. Sci.*, 2007.

[3]   T. F. Yurnama and N. Azman, "Perancangan Software Aplikasi Pervasive Smart Home," *Snati*, 2009.

[4]   S. Suminten and R. Rani, "Sistem Pakar Diagnosa Kerusakan Laptop Menggunakan Metode Forward Chaining," *J. RESTI (Rekayasa Sist. dan Teknol. Informasi)*, 2018.

[5]   A. Al-Ajlan, "The Comparison between Forward and Backward Chaining," *Int. J. Mach. Learn. Comput.*, 2015.

[6]   W. Verina, "Penerapan Metode Forward Chaining untuk Mendeteksi Penyakit THT," *J. Tek. Inform. Dan Sist. Inf.*, 2015.

[7]   S. M. Bache and H. Wickham, "Package `magrittr' - A Forward-Pipe Operator for R," *CRAN Repos.*, 2016.

[8]   F. N. Salisah, L. Lidya, and S. Defit, "Sistem Pakar Penentuan Bakat Anak Dengan Menggunakan Metode Forward Chaining," *J. Ilm. Rekayasa dan Manaj. Sist. Inf.*, 2015.

[9]   F. A. Nugroho, "Perancangan Sistem Pakar Diagnosa Penyakit Jantung dengan Metode Forward Chaining," *J. Inform. Univ. Pamulang*, 2018.

[10]   G. A. Kadek Tutik A., R. Delima, and U. Proboyekti, "Penerapan Forward Chaining Pada Program Diagnosa Anak Penderita Autisme," *J. Inform.*, 2011.