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Design of Computer Network Monitoring System Based on Andorid, SNMP and Dude

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ABSTRACT

As the size and number of network devices increases, the problems on the network will become more complex, this of course requires continuous monitoring of all network devices to ensure service availability. There are many difficulties faced by network administrators if they have to monitor the entire network with regard to performance, analysis and control of some components manually, especially if the network is growing. In this study, the focus of the problem developed is to determine the design of a network monitoring system based on Android, SNMP and the dude system, and the results of this study explain that the Network Management System (NMS) is an implementation of the FCAPS (Fault, Configuration, Accounting, Performance and Security) where the standard used is the Simple Network Management Protocol. The error categories that are informed on this system are errors when there is a connectivity failure on the network, CPU load increases, RAM usage starts to get high, and hard disk usage starts to get full. From the research results obtained, the Network Management System (NMS) application that was built can provide error information and solutions to network admins if an error occurs on the network. The design and implementation of an NMS application is an effective solution in finding and finding errors in a network, so that repairs or early handling can be carried out so that these problems do not result in a decrease in performance on computer devices.

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1. INTRODUCTION

The development of technology and information gives so much influence on various aspects of human life, with advances in information technology, access to available data or information can take place quickly, efficiently and accurately. The development of science and technology encourages the development of an information technology-based administrative system that demands professionalism in carrying out every organizational activity. The rapid development of telecommunications technology, both in terms of facilities and infrastructure, requires services in the telecommunications sector to develop both in quality and quantity, in order to meet the needs and satisfaction of the community [1-2].

With the development of Information technology which is increasing rapidly, there are many companies that have taken advantage of the development of computer technology, especially by

using Computer Network Technology both intranet and internet (using cable or wireless/wireless) as for the mechanism of use to improve product marketing and management of company performance. With the development of information technology, the role of the internet is increasing, basically the Internet is a series of networks of many computers that are connected to each other [4-6].

Today's advances in network and computer technology have become vital for various groups, including students, academics, and offices. For students and academics to access a system, such as a web-based learning application, of course requires a computer on a network that is connected to a web server. Meanwhile, offices will be more intensive in utilizing network and computer technology, using various types of devices connected to servers. Where each server has different service patterns and functions such as web servers, database servers, proxy servers, file servers and so on. Service facilities to users in computer networks are expected to be provided optimally so as not to interfere with existing computer network communications.

It is undeniable that the presence of the internet is able to provide benefits and offer conveniences for its users, so that many fields in this world use the internet as the main capital in carrying out activities and work, especially in the field of offices and public companies. Therefore, this technological advancement is expected to bring many changes and serious impacts, especially in terms of time and cost management. One of the information and communication technologies that is widely used today by using a computer network system as a medium for information transformation is the monitoring system [8-13].

System monitoring is a process for collecting data and conducting an analysis of data on network traffic with the aim of improving the weaknesses of existing systems on computer networks. Network Monitoring is an activity carried out to manage a network system in a certain location with a certain network topology, this network monitoring system is used to facilitate the technical team in carrying out routine maintenance and monitoring of network conditions in the field, while the stages in a monitoring system are divided into three major processes (1) the process of collecting data for monitoring (2) The process of analyzing the data obtained (3) The process of displaying processed monitoring data [3-5-10].

The monitoring process requires accuracy and consistency in its implementation, so that the information obtained from the results of monitoring or network monitoring can be obtained according to actual conditions, usually the data collected is real-time data, broadly speaking, the stages in a monitoring system are divided into three processes. , includes the process of collecting monitoring data, the process of analyzing monitoring data and finally the process of displaying the monitoring data [9-12].

The processes that occur in a monitoring system start from collecting data such as data from network traffic, hardware information, and others [7]. This monitoring system is carried out using a personal computer that is used as a server and is connected using a local network [11-14]. If one of these problems occurs, the network monitoring system will immediately notify the network administrator in the form of an alarm, the access is strictly limited from the local host terminal only. . This network monitoring needs to be done because errors or damage to the server are prone to occur which results in problems with client access, network monitoring also needs to be done to ensure there are no problems in the network topology, this is done because the network topology is a pattern of connecting structures between nodes in a network. There are several reasons for doing network monitoring on a network, including (1) To monitor events that are happening on a network without having a good monitoring tool (2) Knowing network problems before the manager asks a network administrator (3) Maintaining so that the network is always in a stable state (4) Detecting errors on the network, gateway, and server (5) Notifying the network administrator of failure problems.

2. RESEARCH METHOD

In this study the authors used the research method of Applied Research (applied research). Applied research or applied research is carried out in order to overcome real problems in life, the research seeks to find the basis and improvement steps for an aspect of life that is deemed necessary to be improved. Researchers try to find the negative side of the aspects of life under study, then try to find and formulate alternatives on how to overcome them. Data collection is carried out in two ways, namely, Library Research. Data and information collection is carried out by studying books

related to the problems being discussed which are obtained, the next researcher conducts the observation stage by collecting data and conducting direct observations of an object in the study. For a certain period, systematic recording of certain things observed, then enters the application design design stage and network topology to provide an overview of the application form to be built and the network needs of the server monitoring system [15-17].

3. RESULTS AND DISCUSSION

3.1 Server Monitoring System Using SNMP

Server is a computer system contained in a computer network to provide a service to users called clients. Behind its use, the server has carried out many processes to fulfill requests from clients, therefore the server often experiences problems because the server does not have sufficient resources to meet these needs. This causes the server service to die suddenly because the kernel decides to disable server services that require large resources. SNMP (Simple Network Management Protocol) which is a protocol used to process and monitor network devices. SNMP uses a system log that stores all the information from registered network devices. So that the advantage of using SNMP can take all the information needs of the device used and can be displayed to meet the needs of the monitoring system [16-18].

The beginning of this process starts from connecting to the database by defining the user and port used by the database. If the database connection is successful then the process of calling data from the database can be done. The data is called and displayed on the web page content that has been implemented previously so that the displayed data is ready to be presented in a better and informative form. This is the final process of the web programming logic flow. Based on the flowchart above, the following is a blackbox test.

Table 1. Blackbox Test

No	Testing Scenario	Expected results	Information
1	The program can connect with the SNMP protocol	Programs can execute commands on the SNMPv2 protocol	√
2	Program can retrieve monitoring data	The program has successfully retrieved all monitoring data	√
3	The program can store monitoring data into the database	The program has successfully saved all monitoring data into the database	√
4	The program can display monitoring data contained in the database into a web page	The program has successfully retrieved all monitoring data from the database and displayed it into a web page	√
5	Program can display time notification of server service status	The program successfully updates the server service status information by using the time every minute	√
6	The program can automate the startup of mysql, apache, and ftp server services	The program can automate the startup of mysql, apache, and ftp server services	√

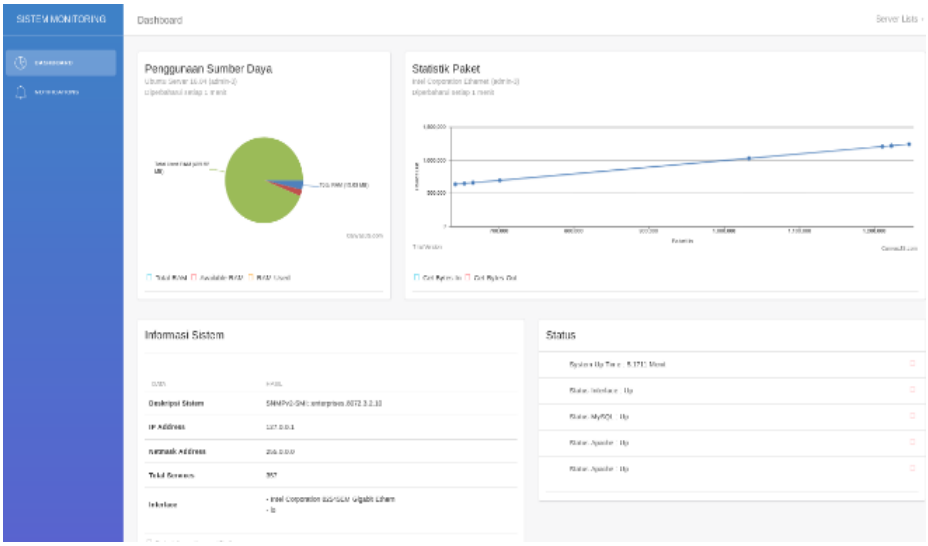

Figure 1. Main Page Display of Server Monitoring System

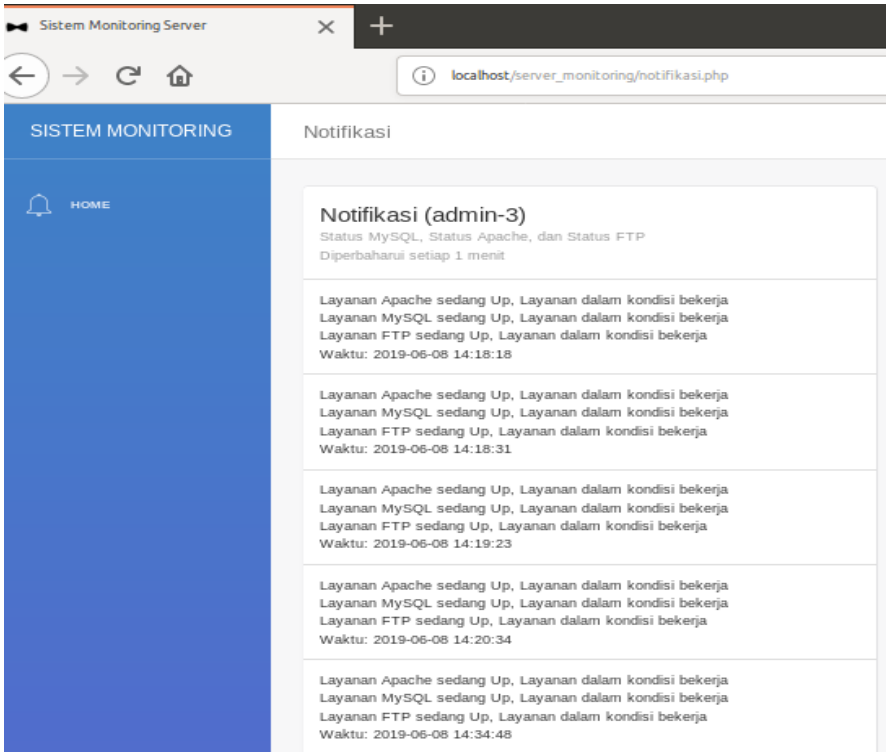

Figure 2. Display of Server Monitoring System Notification Pages

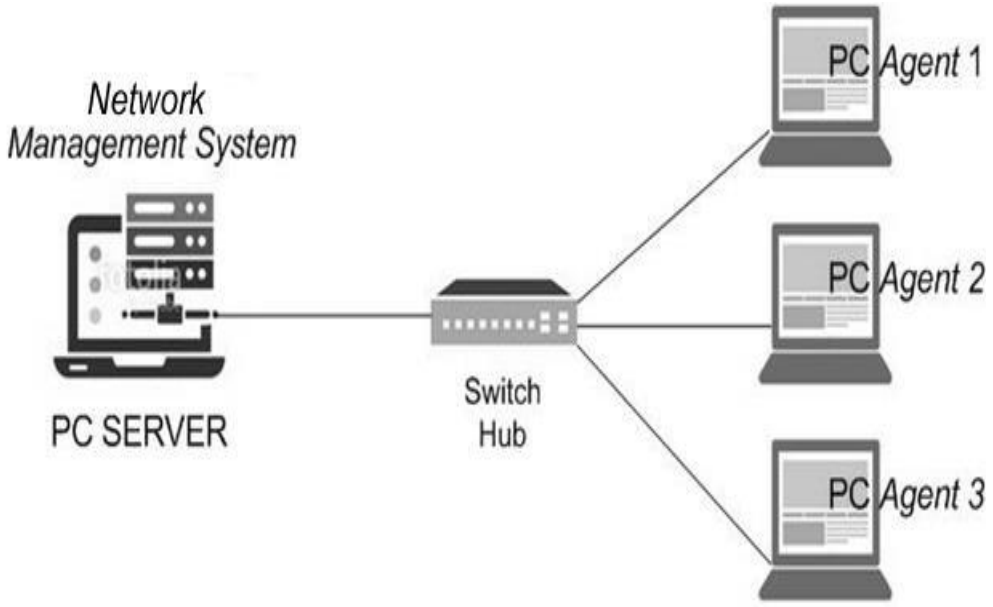

Figure 3. Monitoring Process

The network to be monitored is a client computer network device, with all client computers having an active SNMP agent service. The purpose of enabling the SNMP service on each agent computer is so that this error management system can perform network monitoring functions. Figure 1 is a network design that will be used in testing an error management system.

3.2 System Overview

This research will produce a web-based network management system, where the main function is to monitor and detect computer equipment errors on the network. Error events on the network will be stored in a special database, which will then be displayed on the network administrator interface system.

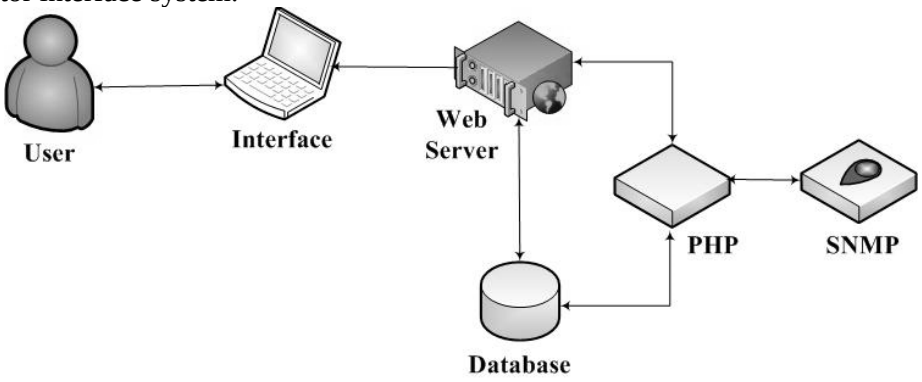

Figure 4. Overview of the SNMP Design System

3.3 Network Monitoring System The Dude

The Dude is a program with the appearance and easy use of an NMS (Network Monitoring and Management System). The Dude is designed to represent the structure of a computer network that allows users to create an existing network schema either manually or using the automatic network discovery tool, into a graphical form that is easy to monitor, no matter how complex the network. The Dude also allows for monitoring services running on each network host, and alerts each of its status changes. The Dude can also read statistics from the monitored devices and allows users to easily connect to devices via telnet or winbox and provides some basic tools and router OS configuration. The Dude's General Functions are twofold, Server and Client: Dude Server is the actual program that runs in the background. Dude does not have a graphical interface and can only be controlled by the Dude Client application on a local machine or other client anywhere on the network [19].

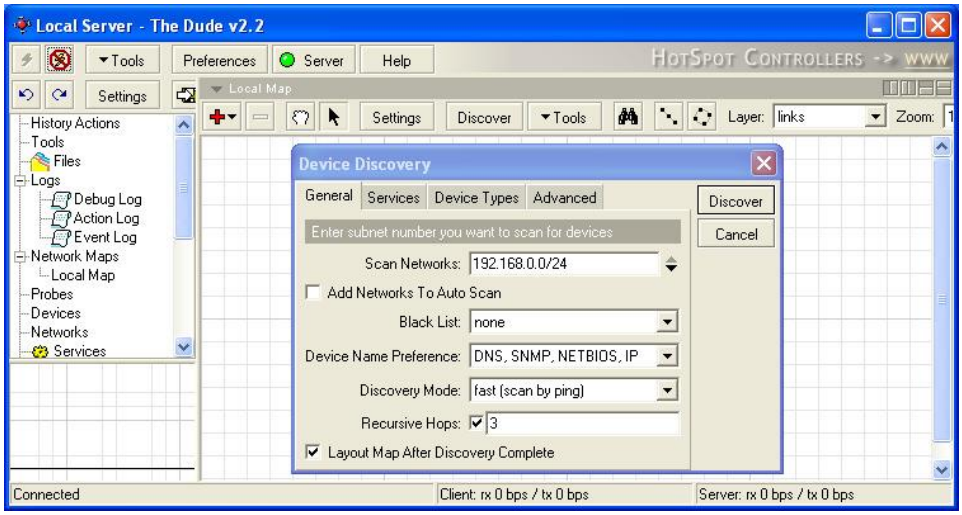

Figure 5. Initial view after installation

It can be seen that when you run The Dude for the first time, a Device Discovery form will appear, which will search for a device/computer on a network that is connected to one subnet, namely 192.168.0.0/24. The IP range sought is 192.168.0.1-192.168.0.255. in the device discovery form select fast so that you can quickly find a device/computer, only by scanning by ping so the service that will be scanned is only ping from the device/computer that is connected to a network.

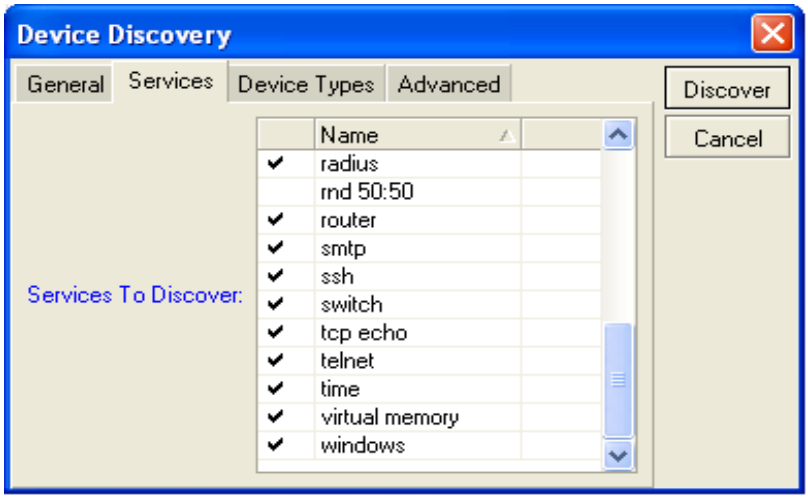

Figure 6. Discovery Network

3.4 Android Based Network Monitoring System Application

A computer network needs to be monitored in order to know the condition of the network. Monitoring in a network can be done by using a network monitoring system or Network Monitoring System (NMS). NMS is a tool for monitoring elements in computer networks such as routers, switches and servers. This monitoring system is carried out using a personal computer which is used as a server that is connected using a local network. This monitoring system application is an android-based application that is used to carry out the monitoring process of Access Point (AP) in the field to be more efficient, there are several main features in this application including (1) Select a location where the feature is used to select a location (2) monitoring Access Point (AP), in the form of choosing the name of the building and the name of the location, then selecting the floor, which is a feature used if the monitoring location is a multi-storey building, so it is necessary to select the floor when you want to carry out the monitoring process for Access Point (AP). (3) Login Bandwidth, which is a feature used to determine the bandwidth of the Access Point (AP) in real time. And there are additional features, namely (4) Export to Excel, which is a feature that is used if the operator using the application requires data in tabular form (5) Log out, which is a feature used by the operator to exit the application when the monitoring process has finished [20].

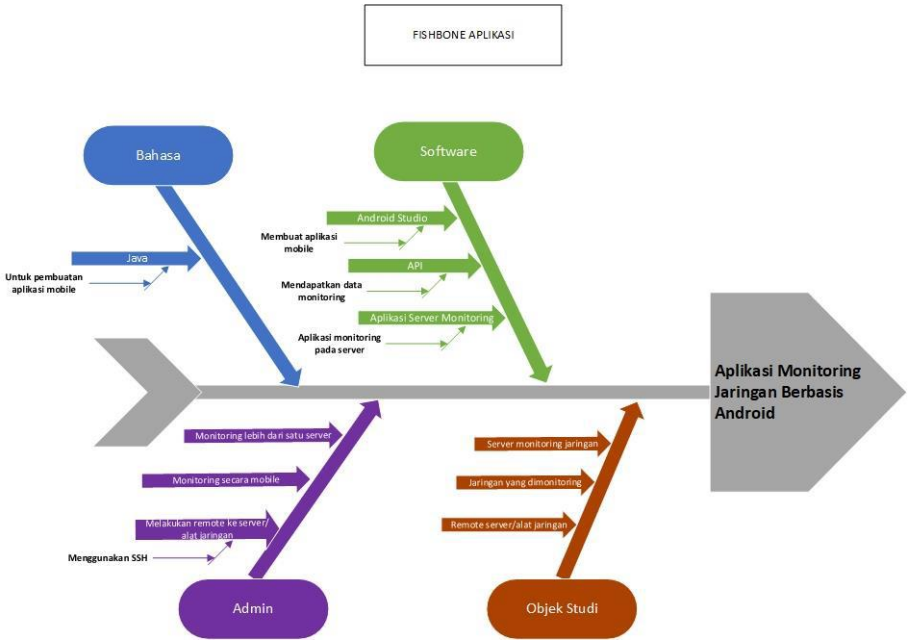

Figure 7. Fishbone Application monitoring system

An Android-based network monitoring application was created so that network administrators or technicians can monitor mobile. This application will be made using the Android Studio software using the Java language. This application will connect to the server and request data through the API from the monitoring application on the server. This application can also do remote to a server or network device. The development of this application is that the admin can monitor the network for more than 1 server. The object of study in making this application is the network monitoring server, the monitored network, and the remote server or network device.

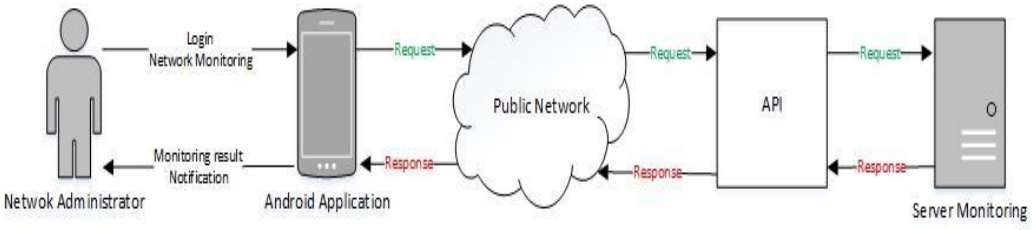

Figure 8. Monitoring Work System

Network administrator can login to Android application. Android applications that are connected to the public network will request data to the monitoring server via the API. The data provided are alarm data, network availability, event data, outages data, and data nodes connected to the network. Then when the server receives a request from the Android application, the server will determine the data according to the type of request requested. After that the server gets data from network monitoring and sends the data in JSON form to the Android application for processing. After that the user will get the results of monitoring from the network and notification in the form of an alarm if there is an error on the network.

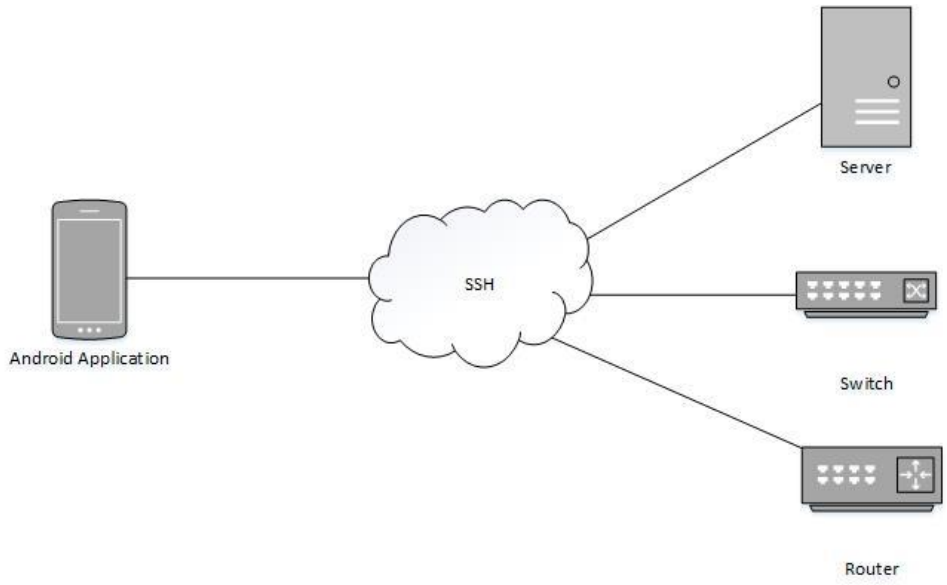

Figure 9. Remote Servers and Network Devices

4. CONCLUSION

Monitoring computer network is a set of autonomous computers that are connected to each other explicitly exchanging information and sharing with other devices, besides that a computer network is also often defined as a collection of communication terminals located in various locations and consists of more than one interconnected computer. Simple Network Management Protocol (SNMP) is a network protocol used for network management by specifying the format of packets exchanged between Manager and Agent. The SNMP protocol is also for reading and changing the state (value) of objects (variables) in SNMP packets. This protocol is designed at the application layer so that it can monitor devices from various different vendors. Then the Android-based network monitoring application is made so that network administrators or technicians can monitor mobile. This application will be made using the Android Studio software using the Java language. This application will connect to the server and request data via the API. The third network monitoring system is The Dude, this network program is designed to represent the structure of a computer network that allows users to create existing network schemas either manually or using the automatic network discovery tool, into a graphical form that is easy to monitor, no matter how complex the network. The Dude also allows for monitoring services running on each network host, and alerts each of its status changes. Basically, these three network monitoring systems have their respective advantages and disadvantages where all these programs have been running in accordance with the provisions and mechanisms required by public agencies in repairing and analyzing the weaknesses that exist in computer networks.

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