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Design Of Server Performance Monitoring Application Integrated Administration Service System In Electronic Engineering Department

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Abstract. The objective of this study is to make an application design to monitor server performance that can be used to monitor and inform server performance to administrators. The implementation of this server performance monitoring application is carried out on the Integrated Administrative Service System server of the Electronics Engineering Department, Faculty of Engineering, Padang State University. Server performance monitoring application built using the waterfall method. Making the application is also supported by the Script Shell programming language in retrieving information from the server, server information generated by the SNMP and SNORT applications and then reported to the administrator by the Sendemail and Gammu applications. The server performance monitoring application website is built using the Laravel framework, the LTE Admin template and the Canvas JS chart. This server performance monitoring application is able to monitor, recap and report server performance. Application reporting is done using e-mail and sms media, if a problem occurs on the server. So that the application of server performance monitoring applications on the server will be able to help the work of administrators to maintain the availability of a reliable Integrated Administrative Service System in the Electronics Engineering Department.

Keywords: Server Performance Monitoring Application, Laravel, SNMP, Snort

1. Introduction

The website has become a technology that is often used by the community, especially academics. Almost all educational institutions in Indonesia have used the website as a means to obtain information, communicate and transact. Like the education department of the Electronics Engineering Department, Faculty of Engineering, Padang State University, in the Electronics Engineering Department in matters of correspondence administration, the website has been named the Integrated Administrative Service System of the Electronics Engineering Department.

The Integrated Administrative Service System The Electronics Engineering Department is an important system for the Electronics Engineering Department because with the existence of the website, the Electronics Engineering Department is assisted in conducting correspondence administration. But besides the importance of the Integrated Administrative Services System of the Electronics Engineering Department, there are things to know that websites are technologies that use server devices. A server is a computer that stores data or programs that can be retrieved by client computers to be used [1]. The server for the website functions as a place for the web application files to be embedded, which then functions of the files will be distributed through a public server network such as the internet, so that it can be accessed by the general public.

Because the website is something that is related to the general public, of course it will not be separated from the potential threats of problems on the server such as the problem of lost connection, overflow device or attack on the server that has an impact on the website service itself. For this reason, it is necessary to monitor server performance continuously. Continuous and manual server monitoring by the administrator will find obstacles to the difficulty of identifying problems that occur on the server [2].

Based on these problems, an application is needed that is able to continuously and automatically monitor the problems that arise on the server and report it to the administrator to immediately take action. Applications that are able to monitor these problems include the Simple Network Management Protocol (SNMP) and Snort applications. Simple Network Management Protocol (SNMP) is a tool for managing and managing network devices. Which can be used to manage large networks to reach firewalls or embedded devices [3]. Whereas Snort is an open source network instruction prevention system, which is able to analyze real-time traffic and record packages on IP networks [4].

Reporting of server problems found by SNMP and Snort will be carried out by the Sendemail application via media email and Gammu via SMS media to the administrator. Sendemail is a lightweight command-line SMTP email client. SendEmail can be used in bash scripts, batch files, Perl programs and easily customizable websites [5]. Whereas Gammu is a utility that can be used to control mobile phones, which are able to carry out the information, backup and delivery of SMS [6].

The SNMP, Snort, Gammu and Sendemail applications by default are applications that run independently and are based on the command line interface (CLI). CLI-based applications will only display data in the form of text, so it will be difficult to analyze and learn from each data displayed. Therefore an application is needed that is able to combine the capabilities of SNMP, Snort, Gammu and Sendemail applications which then display them in the form of graphs that are easy to observe and study, the application is called a server performance monitoring application.

The server performance monitoring application in the manufacturing process uses the waterfall method, this is adjusted to the business analysis where the server performance monitoring application is implemented, namely the Integrated Administrative Service System server of the Electronics Engineering Department. This server performance monitoring application will help carry out server performance documentation, monitoring resources, bandwidth, visitors and threats to the server with userfriendly display along with warning messages via email or sms to the administrator if there is a problem on the server. The server performance monitoring application that has such complete features is certainly not available in server free and open source performance monitoring applications such as Cacti and MRTG, therefore web-based applications are made that are able to provide these features.

2. Research Questions and Objects

Questions in research arise from the problems that occur in the business process of the object of research. The object of research on the design of this server performance monitoring application is the Integrated Administrative Service System server of the Electronics Engineering Department, Faculty of Engineering, Padang State University. From the problems in the object of the research produce questions like the following:

- How can the Integrated Administrative Service System server of the Electronics Engineering Department be monitored continuously?
- How can problems (overflow device, lost connection and threat) on the server Integrated Administrative Service System Electronics Engineering Department be detected as early as possible and reported to the server administrator quickly?
- How to monitor the server Integrated Administrative Service System Department of Electronics Engineering can be done easily and cheaply by the administrator?

The proposed solution to answer this question is by presenting a server performance monitoring application that is in accordance with the server requirements of the Integrated Administrative Service

System of the Electronics Engineering Department which is able to periodically and continuously monitor, capture and report server performance to administrators.

3. Method

The method used in the development of server performance monitoring applications is the waterfall method, this is adjusted to the business process requirements of the Integrated Administrative Service System of the Electronic Engineering Department which is gradual.

Waterfall method is a classic model that is systematic, sequential in building software. Called the waterfall because step by step passed must wait for the completion of the previous stage and run sequentially, as shown below.
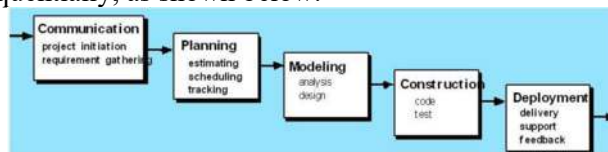

Figure 1. Waterfall model explains:

- Communication (Project Initiation & Requirements Gathering) is a step in project initialization.
- Planning (Estimating, Scheduling, Tracking) is a project planning step.
- Modeling (Analysis & Design) is the stage of designing and modeling the system architecture.
- Construction (Code & Test) is the process of translating design forms into codes or languages that can be read by machines.
- Deployment (Delivery, Support, Feedback) is the stage of implementation, maintenance, improvement of applications based on consumer feedback [7].

In the process of modeling (analysis & design) the design of this application model produces several designs as follows:

3.1 Process Analysis Design

Process analysis is carried out to analyze activities that will be developed and implemented into server performance monitoring applications. This analysis is needed to ensure that all process steps are carried out in the order specified. Flowchart analysis of the server performance monitoring application process as follows,
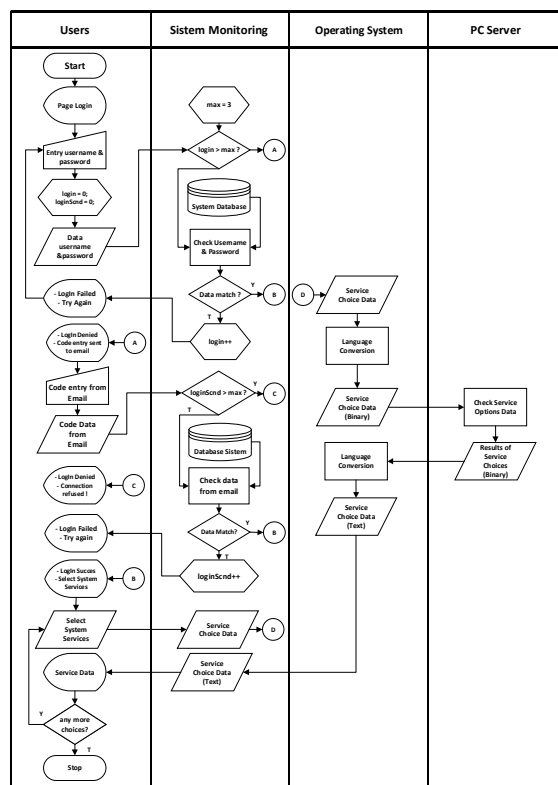
Figure 2. Flowchart application

3.2 Context Diagram Design

Context diagrams are used to describe system relations with the external world (user / terminator / actor) system, marked by incoming data flow from each user and information coming out of the system towards users. The context diagram Application Monitoring Integrated Administration Service Server Electronics Engineering Department is described in the form of data flow diagrams (DFD). The DFD data on the Application of Integrated Administrative Services Server Monitoring Electronics Engineering Department can be seen in the following picture:
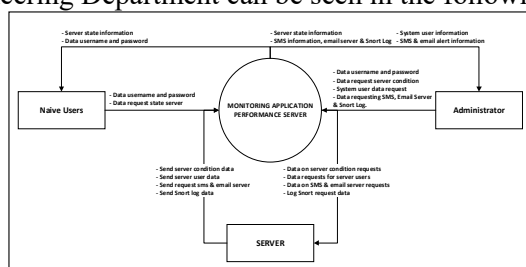

Figure 3. Draft context diagram

The design of this context diagram provides an overview of the reciprocal relationship between the user and the monitoring system of the Integrated Administrative Service Server of the Electronics Engineering Department, this reciprocal relationship in the form of data and information flow that is responded to according to their respective processes.

3.3 Use Case Diagram Design

Usage diagrams are used to describe the interaction of each actor in activities that are interesting by the system. The following are usecase diagrams in the Server Application of Integrated Administrative Services Monitoring of Electronics Engineering Department as follows:
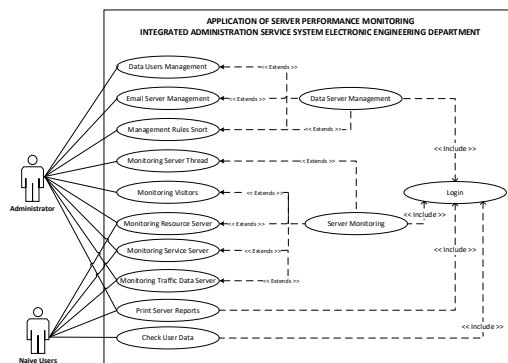
Figure 4. Design of use case diagram

3.4 Entity Relationship Diagram design

The design of entity relationship diagram (ERD) describes the relationship between each table and its entities, this relationship allows how the relationship between each data in the table and how that data moves into information in other tables. As for the ERD on the Application of Integrated Administrative Service Server Monitoring in the Electronics Engineering Department, as follows:
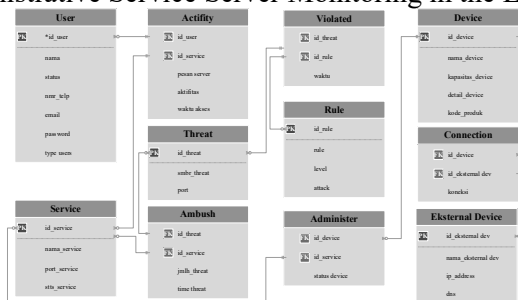

Figure 5. ERD design

Entity Relationship Diagram (ERD) is the forerunner in making a database. After the data container has been prepared then it needs to be designed what applications will manage the data, which can be seen in the design of the server application.

3.5 Server Application Design

The server application design is used to design the application requirements of the system that will be run on the server. The server application on the Integrated Administrative Service Server Monitoring Application of the Electronics Engineering Department is as follows:
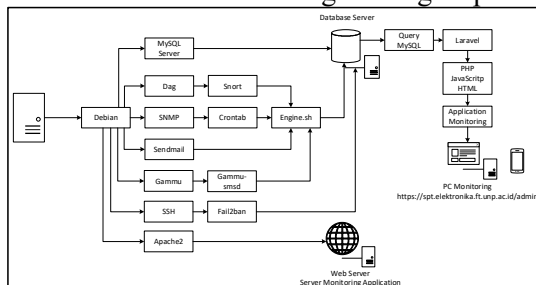

Figure 6. Server application design

The application server design will determine what data will be managed and generated by the application besides the data entrusted by users. Data generated by the server application will be displayed on the application pages.
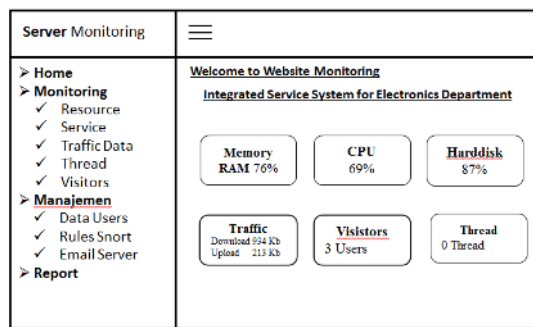
3.6 Design the Application Page

Figure 7. Design of the home page

The design of the home page displays the first page that is seen by users after the login process has been skipped. This page displays a summary of server conditions and several services that can be used by users. To display the condition of the server in detail displayed on the monitoring page, as shown below,
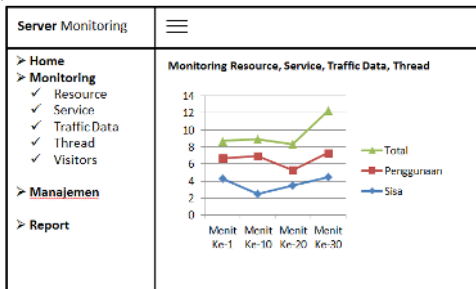

Figure 8. Design of the monitoring page

The design of the monitoring page provides a page for monitoring resources, data flow, and network servers in graphical form that makes it easy for administrators to monitor and learn about the state of the server. For data management purposes, form a data management page as follows,
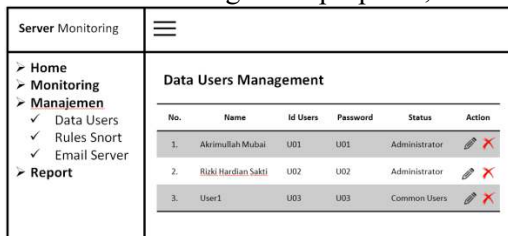

Figure 9. Design of data management pages

The draft data management page includes data users, snort rules and email servers that are displayed in table form.

4. Implementation

This discussion phase explains the implementation of application methods and design applications. Implementation of the application of methods and design in the form of features as follows:
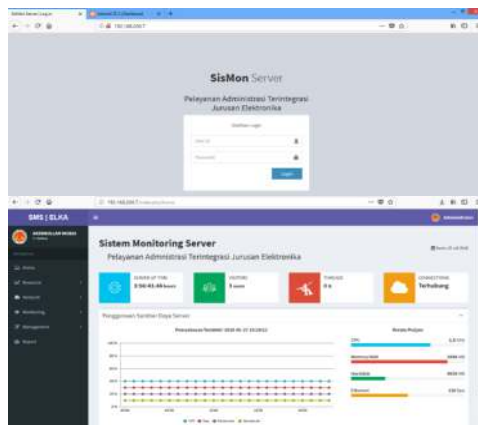
4.1 Login and Home page

Figure 10. Display of login and home pages

The login page is the page that was first encountered by each user requiring users to correctly authenticate users id and password if they want the main page, namely the home page. The home page contains information about the overall state of the server when users visit the application.
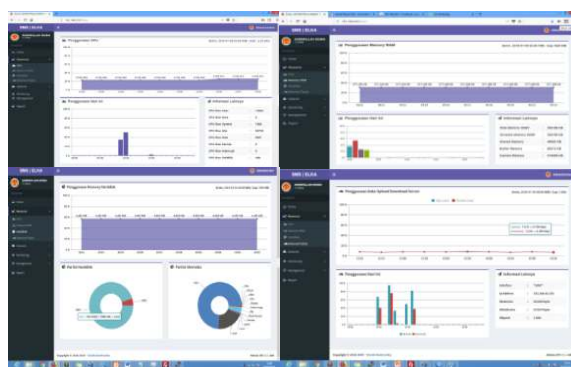
4.2Resource Monitoring Page

Figure 11. Resource monitoring page

Resource page display provides manufacturing information, capabilities and usage of PC server hardware resources including CPU, RAM Memory, Hard Drive and Ethernet every second, average usage every hour and other additional information.
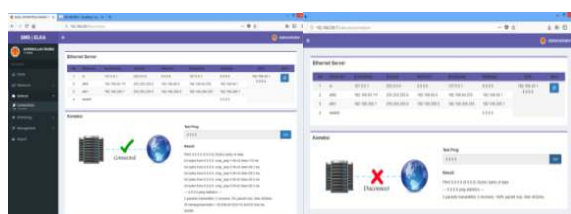
4.3Network Connections Page

Figure 12. Network connections page

The network connections page displays mac address information, ip address, subnet mask, network, broadcast and gateway for each ethernet along with the connection server whether it is connected or disconnect. Connected or disconnect is known by pinging Google's server (8.8.8.8) every 5 minutes, then calculating the percentage of lost data. If the percentage of lost data exceeds 50%, the administrator will get a warning message via media sms from the PC server that the server connection is lost and the monitoring conne page will display a red cross symbol, but if the data percentage is

smaller than 50%, the connection will connected and on the monitoring conneection page a green checklist symbol will appear.

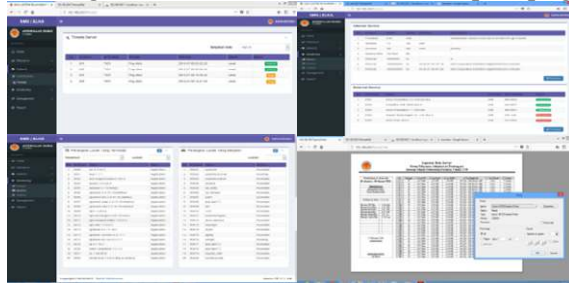### 4.4Monitoring Threat, Device, Service and Report pages

Figure 13. Pages monitoring threats, device, service and report

The network threat monitoring page provides information on threats to the PC server, the timing of events and warning messages to administrators via email, along with information about whether or not the email was sent. All information can be seen on that day, this week, this month and all.

Then the resource page provides internal device and external device server information. The internal device page provides hardware information that is on the PC server, displaying product information, abilities, units, addresses and manufacturing in table form. While the external page of the device displays information about the product, name, transmission, mac address and status in the form of a table. The status will be green if the external device is connected to the PC server and red if disconnected, to update the information can click the update button.

Furthermore, the monitoring service page displays information on server software, which is also called server service, starting from the type of application software, operating system, device drive and unknown, which this software will also provide information running or runnable. Finally, the print page displays all information on the server's state data in detail every day.
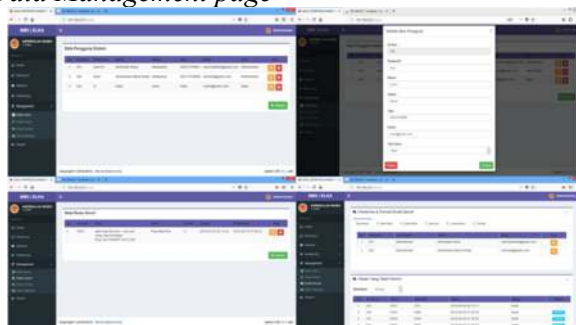
4.5Data Management page

Figure 14. Data Management page

The data management page displays data users, Snort rules and the user's recipient warning message from the server that can be updated, added and deleted.
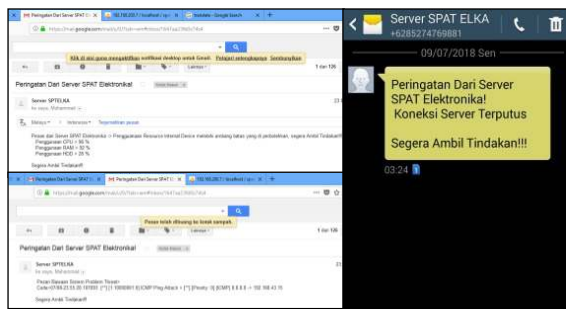
4.6 Warning Message

Figure 15. Display Message Warning

Display a warning message sent if the device overflow problem, threat and lost connection occur on the server. The message is sent to the administrator via email or sms. Media email will be used if there is a problem of device overflow and the threat occurs on the server, while the problem of the lost connection server will use SMS media.

5. Discussion

The problems that form the basis for the creation and implementation of this application are the inability of server administrators of Integrated Administrative Service Systems Electronics Engineering Department to monitor server performance at any time, overwhelmed administrators in detecting attacks on servers and the use of open source server performance monitoring applications such as Cacti and MRTG has limited features in the service.

As expected, by implementing this server performance monitoring application, administrators are very helpful in carrying out their duties to monitor the server performance of the Integrated Administrative Service System of the Electronics Engineering Department in order to remain available.

Although this application provides a fairly complete service, there are things that are the next focus in the development of this application in the future. This focus occurs on the many features that are given which result in the use of many server applications as well, so that this monitoring application is enough to confiscate existing server resources.

This server monitoring application uses 14 server applications to run the application, of course, each application will use server resources which should be given more portions to the core system, namely the Integrated Electronics Administration System.

Furthermore, handling problems that arise on the server should be able to be addressed automatically by the application as a first aid, if the problem on the server cannot be solved by the application, then the administrator must finish it. This case is like full data storage in the database, where the application should be able to do automatic backups and then empty the database space, but if this process does not work, the administrator must do it manually. For this reason, it is necessary to do research and discussion again to find ways to minimize the use of server applications and the automatic handling of server monitoring applications, so that server services can be accessed lighter and faster.

6. Conclusions and Suggestions

6.1 Conclusion

- This study produces a server performance monitoring application for the administrative service system server integrated in electronics.
- The server performance monitoring application is built using the SNMP, Snort, Sendemail and Gammu applications.

- The application of server performance monitoring application is able to help the server administrator of the Integrated Administrative Service System of the Electronics Engineering Department.

6.2 Suggestions

- Administrators must continue to maintain synchronization between monitoring applications with the main systems and maintain server reliability by always updating the Snort rule.
- For future development, the ability of the application should be in an upgarde of capabilities that are limited to monitoring, so that it is enhanced by the ability to execute server problems.

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