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Network Monitoring System Design with Telegram Notification at SMAN 7 Bengkulu Selatan

Ede Ilham*, Sastya Hendri Wibowo, Khairullah, A.R Walad Mahfuzhi

Universitas Muhammadiyah Bengkulu

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*Correspondence: Ede Ilham
Email: edeilham75@gmail.com

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Abstract: Currently, the use of computer networks is very necessary, such as for teaching and learning activities and work. SMAN 7 Bengkulu Selatan already has a network that is used for teaching and learning activities. Currently, the computer network in the computer laboratory of SMAN 7 Bengkulu Selatan has 24 Computer Units. The computer network in the computer laboratory of SMAN 7 Bengkulu Selatan does not yet have a system that can perform monitoring, so it is slow to find out the problems that occur on the network. One of the applications that performs network monitoring is lzabbix. Zabbix in performing network monitoring can send notifications to telegram. Zabbix can run on the Linux Ubuntu Server 20.04 operating system. The Linux Ubuntu Server 20.04 operating system is used because it is open source and does not require high hardware specifications. Because the Linux Ubuntu operating system runs network monitoring using Zabbix using small server resources. Zabbix can monitor problems that occur on each client and the time the problem occurs. Zabbix can also send real-time problem information to the network admin's telegram, so that the admin can easily find out the problems that occur on the computers connected to the network. In addition to the problem information sent to Telegram, it is also stored in the server log, so that the admin can see it later on the problems that occur.

Keywords: Designing, Networking, Zabbix, NDLC, Monitoring

Introduction

Information technology has developed very rapidly over time. One of the technologies that has developed very rapidly is computer network technology, where currently the use of computer networks is increasingly complex, such as for teaching and learning activities, trade and offices. This is directly proportional to the complexity of the network. An increasingly complex network results in complicated supervision and management of a network. Because of the complexity of this supervision, many problems arise because the operational stability of the network cannot be known directly by the network administrator. At SMAN 7 Bengkulu Selatan, the use of computer networks is already a necessity in supporting the current curriculum at SMAN 7 Bengkulu Selatan, such as computer engineering and network lessons and other subjects that use computer networks. Currently, SMAN 7 Bengkulu Selatan does not have a system that can monitor the network so that if there are problems with the network it will take time to find the disturbance that occurs.

The computer network at SMAN 7 Bengkulu Selatan has not been running optimally in terms of monitoring, quality and function. Currently, the disruption to the computer network at SMAN 7 Bengkulu Selatan was obtained by the network admin from reports from network users (students, teachers and staff) so it will take time to fix it. With the slow information received by the admin regarding the disruption that occurred on the computer network, teaching and learning activities in the laboratory were disrupted, such as computers that were not connected to the network, computers that could not access the internet or access other computers and the network became slow in accessing the internet.

There are many applications that can monitor computer networks, one of which is Zabbix. Zabbix is open source software that offers great performance for data collection and can be used for large-scale environments (Mustafid & Iqbal, 2023). This allows monitoring of servers, network devices, and applications, collecting statistics and reliable data performance. Zabbixl can display graphs very well and display very accurate data because data can be updated every second. Zabbixl with a monitoring interface in the form of a website with the help of a database, can perform network mapping and an early warning system in the form of email (Timur & Putro, 2021). The monitoring that can be done includes network performance, network interference, security and so on. Currently, SMAN 7 Bengkulu Selatan already has a computer network consisting of a computer network in the computer laboratory, library, teacher's room and administration. However, it does not yet have a system that can monitor the network, so if there is a network disruption, the staff in charge of managing and supervising the network will have difficulty finding the problem, whether it is on which computer and what the problem is. One of the tools that can perform network monitoring is Zabbix. By implementing a monitoring system using Zabbix, you can find out network conditions and problems in real time from anywhere, because Zabbix is also equipped with a notification system to Telegram.

Methodology

The research method applied in this study is the NDLCl (Network Development Life Cycle) method. The NDLC method has the following stages:

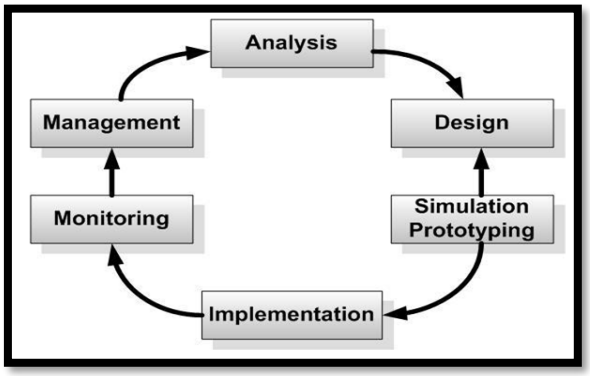

Figure 1. NDLC (Network Development Life Cycle) Method

Analysis

This initial stage is carried out by analyzing needs, analyzing emerging problems, analyzing user desires, and analyzing existing network topology. The methods commonly used at this stage include:

a. Interviews, conducted with related parties involving teachers, laboratory staff to students in order to obtain concrete and complete data.
b. Direct field survey, at the analysis stage, a direct survey is usually also carried out at the SMAN 7 Bengkulu Selatan computer laboratory to obtain actual results and a complete picture before entering the design stage.
c. Reading manuals or blueprint documentation, at this initial analysis, it is also carried out by looking for information from manuals or blueprint documentation that may have been made previously. Examining each data obtained from previous data, it is necessary to analyze the data to enter the next stage. Here are some guidelines for finding data at this analysis stage:

Design

From the data obtained previously, this design stage will create a topology design image of the interconnection network that will be built, namely by monitoring the network. It is hoped that this image will provide a complete picture of the existing needs. The design can be in the form of a topology structure design, data access design, cabling layout design, and so on which will provide a clear picture of the project to be built.

Simulation Prototype

Some network workers will make it in the form of a simulation with the help of special tools in the network field such as Boson, Packet Tracert, Netsim, and so on. This hall is intended to see the initial performance of the network to be built and as a presentation material and sharing with other team workers. However, due to the limitations of line simulation software, many network workers only use tools such as GNS3 and Cisco Packet Tracert to build the topology to be designed.

Implementation

This stage will take longer than the previous stage. In the implementation, network workers will apply everything that has been planned and designed previously. Implementation is a stage that is very decisive in determining the success/failure of the project to be built and at this stage the system that is built will be tested to solve technical and non-technical problems.

Monitoring

After the implementation of the monitoring stage is an important stage, so that the computer network and communication can run according to the wishes and initial goals of the user at the initial stage of analysis, it is necessary to carry out monitoring activities. Monitoring can be in the form of observing: Hardware infrastructure: by observing the condition of the reliability/reliability of the system that has been built in monitoring the computer network; 6. Management. At the management or regulation level, one of the

special concerns is the policy issue, especially for monitoring the computer network at SMAN 7 Bengkulu Selatan

The research methods used by the author are:

a. Observation
That is conducting direct observation or observation on the computer network through Zabbix in order to produce better network quality and utilization.
b. Interview
That is conducting a question and answer process carried out directly with Mr. Muhammad Saidi as a teacher and laboratory assistant at SMAN 7 Bengkulu Selatan.
c. Literature Study
That is a method of collecting data taken from libraries or institutions in the form of scientific works, journals, books and from the internet related to writing lines. The purpose of this literature study is to explore and obtain complete information on the object being studied.

System Design Method

System design serves as a guideline in developing a new system based on the shortcomings of the current system.

Actual System Analysis

Currently, the computer network monitoring system at SMAN 7 Bengkulu Selatan still uses a computer network that does not use a monitoring system, so that currently teachers or officers responsible for the laboratory find it very difficult to supervise student activities, especially in the use of computer networks. The computer network at SMAN 7 Bengkulu Selatan is currently running well, but does not yet have a monitoring system, which results in students still being free to access content and network access is often slow so that many other students are disturbed. The network equipment used is like the one in general, namely from the modem divided through the HUB before being distributed to all client computers in the SMAN 7 Bengkulu Selatan Computer Lab. Where the current network weakness often occurs network disruptions such as data transfer crashes, computers cannot connect to the server, heavy networks in transferring data without knowing the cause. The computer network system that is currently running at SMAN 7 Bengkulu Selatan can be seen in the image below:

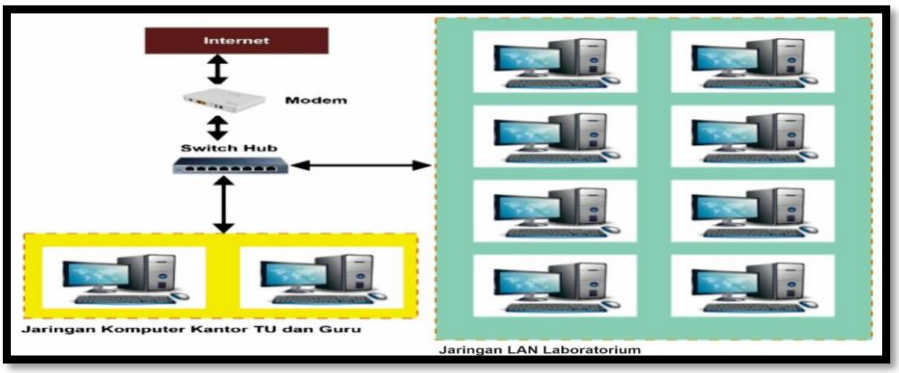

Figure 2. Actual System Block Diagram

Result and Discussion

In conducting computer network monitoring at SMAN 7 Bengkulu Selatan Using Zabbix runs very well, because Zabbix can do it in real time. And most importantly Zabbix can display details of events that occur based on the time of the incident, The results of monitoring carried out by Zabbix can be seen in the display below:

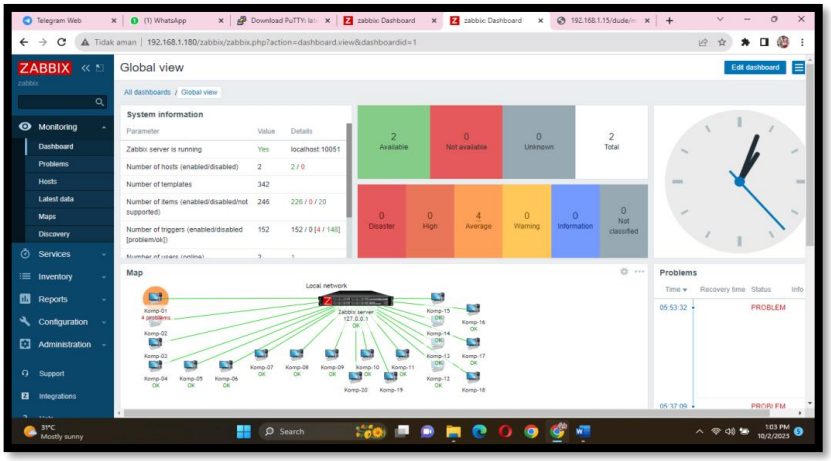

Figure 3. Zabbix Monitoring Results Display

From the image above, it can be seen that Zabbix has successfully monitored the disconnected network connection and network conditions. Meanwhile, the results of the problem detection that have been successfully detected by the Zabbix system will be sent as a notification to the specified admin telegram. The notification that was successfully sent to the telegram on the telegram application can be seen in the image below:

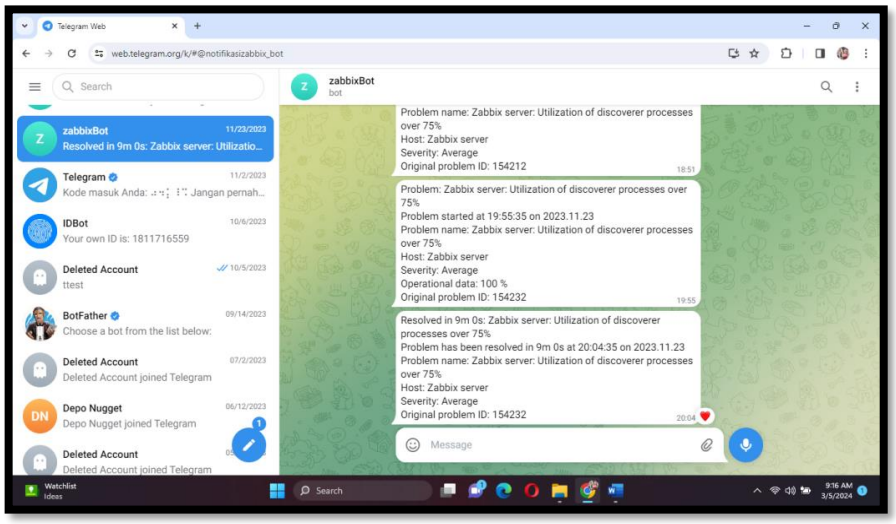

Figure 4. Notification Display on Telegram Application

From the image above, it can be seen that the Zabbix system is successful or can send notifications to Telegram. And all reports will be stored in the main Zabbix server system.

Discussion

Implementation

Hardware and Software Preparation

In conducting Analysis and Implementation of Computer Network Monitoring using Zabbix, Hardware and software are required in the form of:

Hardware

a. 1 PC Server
b. Laptop or PC used as a client.
c. Computer Network Devices such as LAN Cables, RJ 45 and so on.

Software

a. Windows 7 and Windows 10 Operating Systems for clients
b. Linux Ubuntu Server 20.04 Operating System for servers
c. As well as other applications or software needed in this study such as browsers and so on.

Install Ubuntu Server 20.04 LTS

Before doing the installation, you need to prepare the Linux installation master file. Here the author does the installation from a USB drive, so the author creates a boot CD installation using a USB drive. And after it is finished, booting from the USB drive is done. Here are some steps to install Linux Ubuntu Server, starting from the installation language selection, as shown in the image below:

Figure 5. Linux Installation Language Selection Display

until the installation process is complete, as shown in the image below:

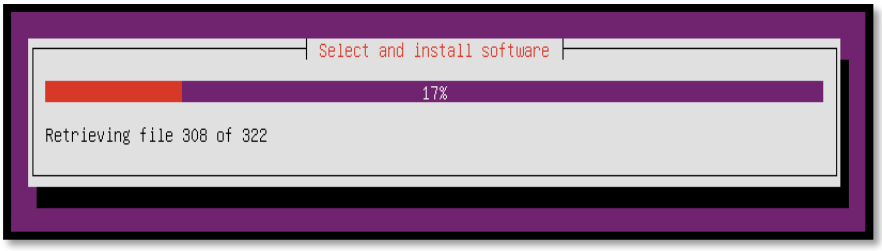

Figure 6. Linux Installation Process View

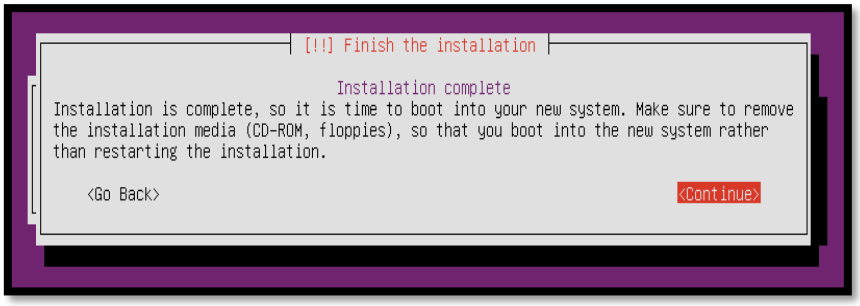

Figure 7. Linux Installation Display Completed

After all installation processes are complete, the Ubuntu Server 20.04 Linux operating system is ready to use.

Install and Configure the Required Packages

Apache2

Apache2 is a service used to run a web server. The way to install apache2 on the Linux operating system is by typing the following command in the terminal:

sudo apt-get install -y apache2

MySQL

Next, MySQL is installed, where MySQL will be used to accommodate and store data from monitoring results by zabbix. The way to install MySQL can be done by using the following command in the Linux terminal

sudo apt-get install -y mysql-server

PHP

In monitoring computer network security using zabbix, PHP is useful for displaying the GUI from zabbix so that network admins can easily configure zabbix and monitor the network. The way to install PHP can be done by typing the following command in the Linux terminal

sudo apt-get install php libapache2-mod-php php-mcrypt php-mysql

Install and Configure Zabbix

The first step that needs to be done is to update the Zabbix repository, which is done by typing the following command in the Linux terminal

wget https://repo.zabbix.com/zabbix/4.0/ubuntu/pool/main/z/zabbix-release/zabbix-release_4.0-3+xenial_all.deb

sudo dpkg -i zabbix-release_4.0-3+xenial_all.deb

Next, update the server and continue installing Zabbix by typing the following command in the Linux terminal.

sudo apt-get update

sudo apt-get install zabbix-server-mysql zabbix-frontend-php zabbix-agent

After the installation process is complete, continue to create a Zabbix database by typing the following command in the terminal

Creating databases for the Zabbix frontend installation stage

mysql -u root -p
CREATE DATABASE zabbixdb character set utf8 collate utf8_bin;
CREATE USER 'zabbix'@'localhost' IDENTIFIED BY ronni123;
GRANT ALL PRIVILEGES ON zabbixdb. TO 'zabbix'@'localhost' WITH GRANT OPTION;*
FLUSH PRIVILEGES;

Next, configure the zabbix configuration file, please look for the file /etc/zabbix/zabbix_server.conf

nano /etc/zabbix/zabbix_server.conf

make changes to the script below by typing the following command in the zabbix_server.conf file, to make it easier to search, you can do it by "Ctrl+w DBHost", make changes to the 4 sections below

DBHost=localhost
DBName=zabbix
DBUser=root
DBPassword=admin123

then the last stage of the zabbix setting process, which needs to be ensured databases, users and passwords that have been created. then open the browser, please use chrome, mozila or opera, then access our Server IP like this http://IP-SERVER/zabbix (http://192.168.1.180/zabbix) then it will come out like the picture below.

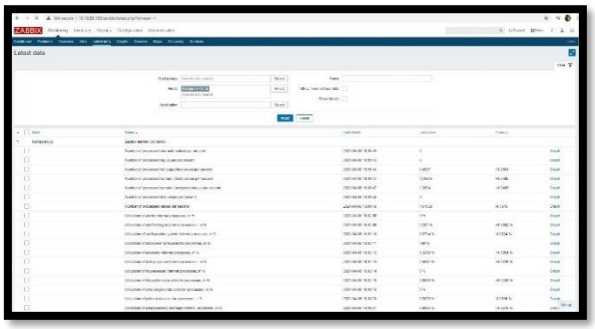

Figure 8. Zabbix Frontend Installation Process View

The menu above is the initial menu for the Zabbix Frontend installation stage. Click Next to proceed to the next menu, as can be seen in the display below:

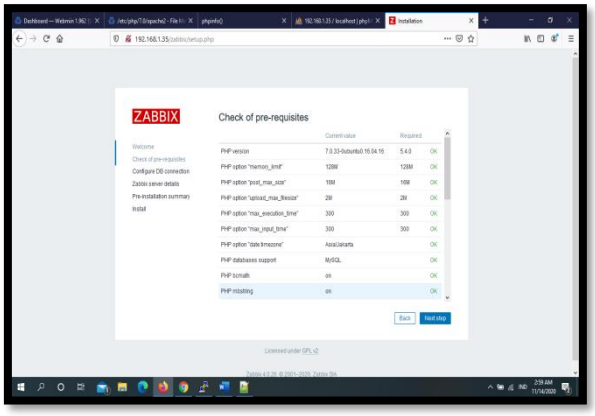

Figure 9. Zabbix Package Requirements Check Process View

The next menu in the Zabbix insFrontend stage is to check the requirements needed by Zabbix. If all statuses are OK, click next and you will proceed to the next menu, as can be seen in the display below:

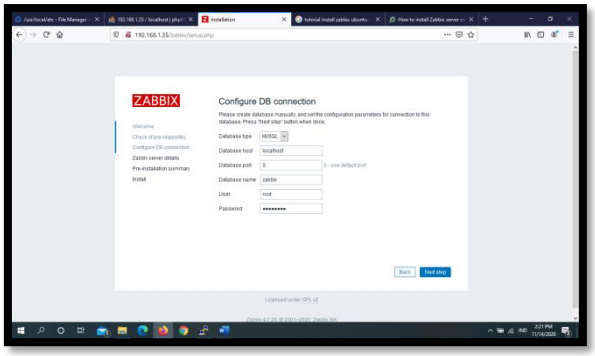

Figure 10. Zabbix Database Connection Configuration View

The menu above is a menu for making a database connection, please fill it in according to the database that was created previously, and after filling in the connection to the database correctly, click next then it will continue to the next menu, as can be seen in the display below:

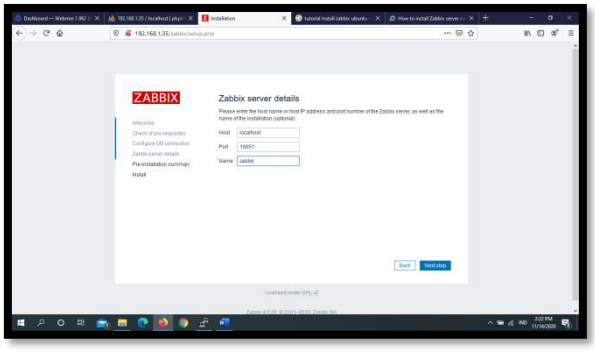

Figure 11. Zabbix Server Connection Configuration View

After all the data above is filled in correctly, click next and you will be taken to the next menu, as can be seen in the display below:

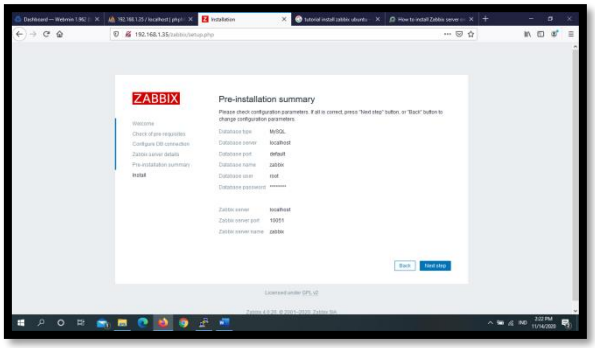

Figure 12. Zabbix Configuration Report View

The menu above is a notification menu for the Zabbix configuration that has been done and if it is correct, click next and it will continue to the next menu, as can be seen in the display below:

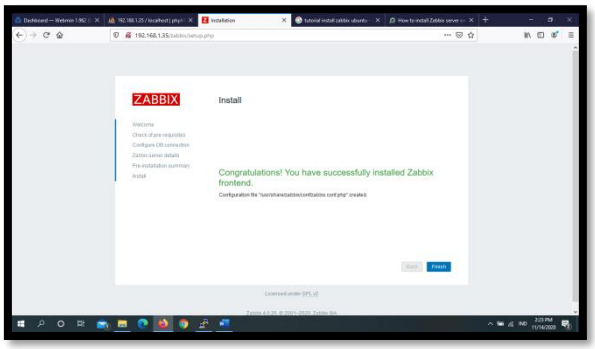

Figure 13. Zabbix Installation Display Completed

The menu above is a notification that the zabbix installation has been completed and successful. To end, click finish.

Conclusion

Based on the research that has been done, several things can be concluded as follows, namely:

1. Zabbix is very useful for monitoring networks because by implementing a computer network monitoring system at SMAN 7 Bengkulu Selatan, steps can be taken in the future to improve the network based on current conditions, so that in the future a reliable computer network can be created, especially the computer network at SMAN 7 Bengkulu Selatan.
2. In carrying out network monitoring, network monitoring can be carried out automatically and in real time based on the time and events that occur on the network and will mainly be displayed in the form of a report on the GUI based on the time of the incident and its occurrence.
3. The Linux Ubuntu Server 20.04 operating system is very good at running Zabbix to monitor networks. Because Linux Ubuntu Server 20.04 does not require high computer specifications

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