LAN Network Optimization to Support Practicum Activities Using Action Research Method at STMIK Jayakarta

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ABSTRACT

Keywords: computer networks; Data rate; network performance; Action Research Methods; LAN Network Optimization.

The importance of using computer networks in campus laboratories to improve the quality of education and research is also increasing. The purpose of this study was to find out the factors that affect the performance of computer networks in campus laboratories, including data transmission speed. The research methodology involves experimental data being tested, for example, the effect of communication speed on the performance of computer networks in campus laboratories. Based on the research that has been described, the results are obtained that a good network can be known by low timed-out and ping numbers. The smaller the number, the better the network quality on the computer, this is also true for other things. In conclusion, the network can be said to be good if the number indicated in the ping process or others shows a relatively low number, on the other hand, if the network shows a relatively larger number, then the network in the computer begins to be disturbed.

Introduction

The development of computer networks is currently experiencing rapid growth along with the human need to seek convenience, speed, and accuracy to obtain data (Kuspandi Putra, Sadali, & Mahpuz, 2020). The need for computer networks is increasingly important, both in education, work, and in a game. One of the important things in managing a computer network is the security of the network itself, with many accesses to the network, there will also be many opportunities for crime to occur on the network (Azharuddin & Nurhastuti, 2023). To achieve this, every part or component of the computer network must be able to receive and share services. The client plays the role of resource use while the server provides various types of services (Tangkowit, Palilingan, & Liando, 2021). In addition to the positive impact of technological developments mentioned above, it turns out that there are also many negative impacts. Science and Technology stands for Science and Technology Development, which is a study that studies the development of technology and science (I Kadek & Adi Wardana, 2023). All information in the computer network system within the University must certainly be kept

confidential or private data so that it is not used by parties who do not have the right to use the information on the server computer (Umar & Prasetyo Marsaid, 2023).

The importance of using computer networks in campus laboratories has increased in improving the quality of education and research. Students and lecturers can share information, work together, and access a wider range of resources through computer networks. However, there are several issues in the use of computer networks in campus laboratories, including low data transmission speeds, lack of network security, and limited access to resources. In this study, several factors that affect the performance of computer networks in campus laboratories will be tested, such as data transmission speed, and others.

In a peer-to-peer network, any computer connected to the network can act as either a workstation or a server. Meanwhile, in the ClientServer network, only one computer serves as a server and another computer acts as a workstation (Widiyaningrum & Awalludin, 2024). A communication network is a resource that can be used simultaneously (shared) by several end users to communicate with other users who are located far away. Not all users use the network at the same time, therefore it is logical that these very important network resources are used together (Candra Laili, 2023).

LAN Computer Network or Local Area Network is a computer network consisting of several computers that are interconnected in a relatively small area such as buildings, campuses, or offices. LANs allow these computers to communicate and share resources efficiently. This network is usually used by companies or institutions that need access to data and information quickly and easily (Aswar, Alfin, 2024). We often find that the quality of the network decreases over time, this is usually caused by the increasing number of LAN network users and is exacerbated by the lack of increased bandwidth (Baso, Hanifa A, Putri Azzahra, & Mukhtar, 2023).

WLAN or Wireless LAN is a computer network that uses radio frequency as its transmission medium, where the access point uses frequency radio ao media connected to the user as a configuration of the WLAN network (Reivaldi Kesuma Kagi, Muchammad Ficky Duskarnaen, & Hamidillah Ajie, 2020). As a wireless network that uses electromagnetic wave frequencies, the WLAN entry point is the basis in the transmitter of electromagnetic waves from two directions which works on the bandwidth of 2.4 GHz or 5 GHz (Saputra, Saryoko, Maulidah, Hidayati, & Dalis, 2023).

The initial concept of computer networks is the communication of data from one computer to another. For the first time, data communication between computers is only point-to-point, so there are only two computers that will be connected. After a long period of development, the concept was developed so that the exchange of data at that time was an exchange between 2 computers turned into a computer network. The concept of computer networks is different from the concept of ordinary data communication, where several computers will be connected by cables so that each computer can exchange data with each other (M.Kom & Khairina, 2019).

The purpose of a computer network is to achieve its goal, every part of the computer network can request and provide services. The party that requests/receives services is

called the client and the one who provides/sends services is called the server (server). This design is called a client-server system and is used in almost all computer network applications (Astuti, 2020). To connect between computers, a connecting medium is needed to connect. Media can also be interpreted as the number of arrivals of a package that has been successfully observed in a destination at a certain time interval divided by the duration of that time interval (Rofik, 2021).

STMIK Jayakarta was established to answer the challenges and rapid development in the field of information, in the early 1990s and the Jakarta Dharma Education Foundation established the Jayakarta Academy of Informatics and Computer Management (AMIK Jayakarta) which was subsequently based on the decree. Minister of Education and Culture Number 159/D/0/1993 was upgraded to the Jayakarta College of Informatics and Computer Management (STMIK Jayakarta), which has a department in Informatics Management and Informatics Engineering. STMIK Jayakarta has 3 (three) study programs, each D.3 Informatics Management, S.1 Informatics Management, and S.1 Informatics Engineering. STMIK Jayakarta already has 2 (two) buildings, called Building/Campus A on Jl. Salemba Raya No. 23 and building/Campus B consists of 3 (three) building blocks with 4 (four) floors with 40 (forty) lecture rooms with a capacity of 75 (seventy-five) students, located on Jl. Salemba I No.8-10 Central Jakarta (100 M from Campus A) which is at the level of improving the quality and quantity of the school, in this case, there is still a lack of LAN network in the computer laboratory area. So to support school facilities to students who are easy and able to provide more advantages. Having a LAN network is hoped that it will provide added value and can improve the learning process at STMIK Jayakarta.

Research Methods

In the study, the author's main focus was on how the authors concluded network testing through CMD. The author uses an action-based research method because my actions involve a lot. Thus, the author uses the action research method because the method attaches importance to reflection-based actions, evidence, and evaluation of actions that have been completed. This research was conducted in the STMIK Jayakarta computer laboratory.

In addition, action research has its characteristics, namely collective, collaborative, self-reflective, and critical, and includes people who will conduct research. The purpose of this research is to understand practice and improve the course of a practice. In the action research method, researchers can describe, interpret, and explain a social condition at the same time while carrying out interventions aimed at improvement or participation.
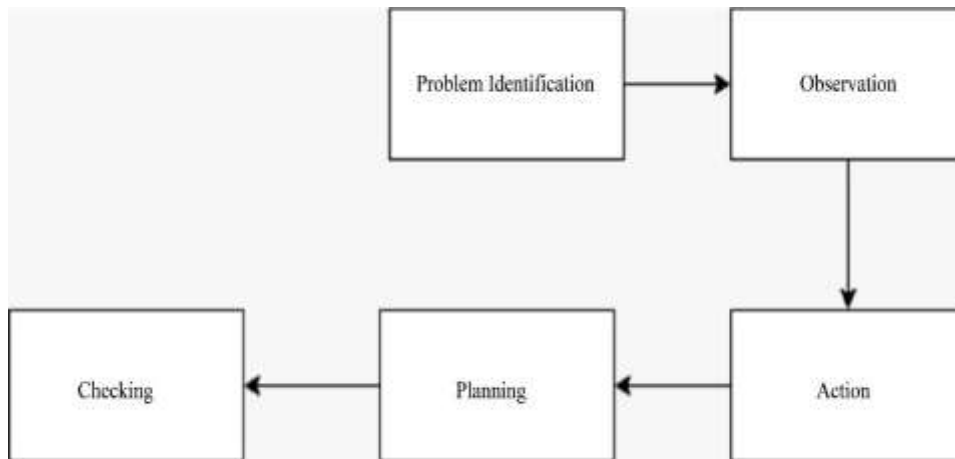
Figure 1. Research Outline

Results and Discussion

The results of this study are divided into 2, namely:

1. Results of Research Analysis

This study explores the analysis of LAN network functionality using CMD at the STMIK Jayakarta Computer Laboratory. The reason why this analysis is important is because networks play a crucial role in computer access which impacts speed and efficiency. The goal is to identify possible solutions and alternatives in facing challenges when accessing the network. The approach of this article involves leveraging the capabilities of network analysis commands through CMD. CMD acts as a diagnostic tool, allowing network measurements and checks on computer systems.

2. Results of Internet Network Analysis

Seeing the situation at STMIK Jayakarta, especially in the Laboratory, the study of LAN network analysis through CMD was carried out through several stages. However, the main focus of this article lies in network verification via Ping 192.168.01. The following are the results of the network check:

a) Ping 192.168.1.1

   1) Here are the results of the ping test on the 1st pc

Figure 2

Ping test results on 1st pc

2) Here are the results of the ping test on the 2nd PC

Figure 3 Ping test results on the 2nd pc

3) Here are the results of the ping test on the 3rd PC

Figure 4. Ping test results on 3rd pc

4) Here are the results of the ping test on the 4th PC
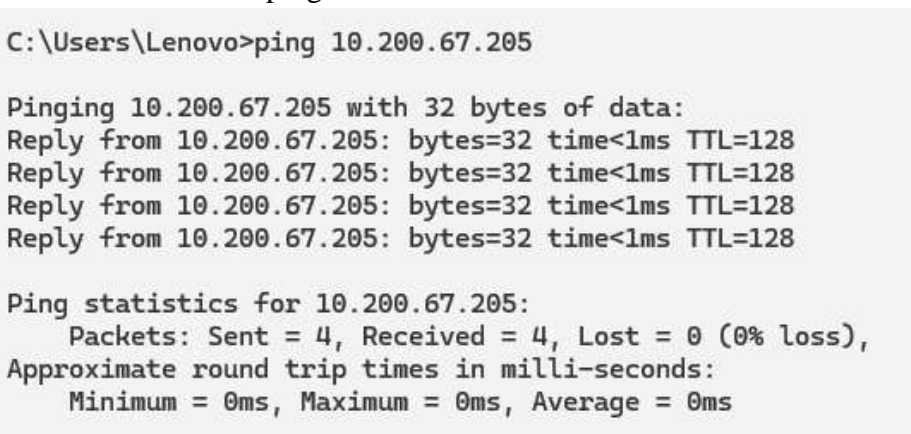
```
C:\Users\Lenovo>ping 10.200.67.205

Pinging 10.200.67.205 with 32 bytes of data:
Reply from 10.200.67.205: bytes=32 time<1ms TTL=128
Reply from 10.200.67.205: bytes=32 time<1ms TTL=128
Reply from 10.200.67.205: bytes=32 time<1ms TTL=128
Reply from 10.200.67.205: bytes=32 time<1ms TTL=128

Ping statistics for 10.200.67.205:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
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Figure 5. Ping test results on 4th pc

b) Tracert to Google testing

1) Below are the results of the tracer test on the 1st PC

Figure 6. Tracert test results on the 1st pc

2) Below are the results of the tracer test on the 2nd PC

Figure 7. Tracert test results on the 2nd pc

3) Below are the results of the tracer test on the 3rd PC

Figure 8. Tracert test results on the 3rd pc

3055

4) Below are the results of tracer testing on the 4th PC

Figure 9
Tracert test results on the 4th pc

This study explains from the results of the above analysis that on LAN and WiFi networks the access time can be regulated, in other words when ping is done through the WiFi network if it is used frequently, the network will be bad and vice versa when it is rarely used. Based on the research that has been described above, the results are obtained that good networks can be known with low timed-out and ping numbers. The smaller the number, the better the network quality on the computer will be, this also applies to other things. This study also shows that the application of the CMD analysis method in LAN network optimization in the STMIK Jayakarta computer laboratory brings several benefits. CMD enables a thorough evaluation of network performance at low cost and minimal resources required. In addition, CMD also provides a better understanding of the structure of LAN networks, detects hidden problems, and serves as a foundation for further improvement in improving the quality of network services around the academic environment. Nonetheless, CMD is only the first step in LAN network optimization, and frequent maintenance is still necessary to maintain optimal network productivity levels.

Conclusion

The network can be said to be good if the number indicated in the ping process or others shows a relatively low number, on the other hand, if the network shows a relatively larger number, then the network in a computer begins to be disturbed. Solutions in optimizing the network, Some computer network conditions experience obstacles/delays in accessing, such as disconnection of cables from the PC Client, different settings of the IP Client and server and the ping packet does not arrive. From all the results above, the author has solutions and suggestions that the author can do to keep the computer network stable. Some solutions and suggestions that the author can do are to use the CMD command by putting the "ping" command to the default gateway, delete DNS, and the Netsh command. The author can also suggest checking the hardware to see if there is any damage that requires some repairs, network checks, and so on. In addition, it can also be done by changing the internet service provider.

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