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Simulation of local area network (LAN) computer network using cisco packet tracer at SMP Negeri 1 Grabagan

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ABSTRACT

Computer network, especially together with information technology, are now considered fundamental in all fields. A company's information technology infrastructure is a strategic resource that must be handled effectively. Information technology infrastructure provides continuous processing and flow of information throughout the organization. A computer network that links machines is called a local area network over short distances among two or more places. To keep the network infrastructure functioning properly network security is very important. Cisco packet tracer is one of the tools used in simulations to setup network security. To build a computer network, procedures related to the network area required. Local Area Network (LAN) is an abbreviation off Local Area Network. LAN consist of several computers connected in a network. In this network, each computer can accsess data from other computers. Additionally, computers can access data from other computers. Apart from that, computers connected to LAN can also run hardware such as printers from other computers, chat with other computer ownerm or play games together. Network simulations on cisco system Local Area Network (LAN) computers using cisco packet treacer is a program for imulatinng network device, the program is used as a learning and training tool.

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1. INTRODUCTION

Computer networks, especially with information technology, are considered fundamental in any field today. The information technology infrastructure of a company is a strategic resource that must be managed effectively. The information technology infrastructure ensures continuous data processing and information flow throughout the organization. Building an IT infrastructure requires networking. A local area network is a network that connects computers between two or more locations over short distances. Network security is essential for the proper functioning of the network infrastructure. Because a strong network infrastructure can help a business function. To reduce the gap between negligent parties, companies must maintain cybersecurity within their organizations. Cisco Packet Tracer is one of the tools used to determine network security in simulations. Building a computer network requires network-related procedures, but fewer people have these skills compared to Internet users. Therefore, it is necessary that more people are able to build computer networks so that they can be used more effectively.

Local Area Network (LAN) is short for Local Area Network. Several computers connected to the network form a local area network, or LAN. Each machine on this network has access to data from other computers. Computers can also access data from other computers. In addition,

devices on other computers can be used by computers connected to the local network such as printers, chatting, contacting other PC owners, or engaging in cooperative games. A local area network (LAN) consists of a small number of computers, such as those found in homes, internet cafes, dormitories, and many other locations where multiple computers are housed in a single building. Each computer connected to the LAN has a different IP address (Victor Haryanto, Edy, 2012). Packet Tracer Packet Tracer is a network simulation software developed by Cisco and has the function to simulate computer networks previously created and designed by users. Packet Tracer has many network protocols that can be easily used in simulation and real-time methods. (Ningsih 2016).

Network simulation on a computer Cisco Systems LAN Cisco Packet Tracer on a computer is a program for simulating network devices. Before using the actual device, the app is used as a learning and training tool. Using a simulated command line interface, Cisco Packet Tracer can be used to copy Cisco router and switch configurations. Cisco Packet Tracer is a network equipment simulation software for Cisco products that is widely used as a learning and training tool before using the original equipment.

SMP Negeri 1 Grabagan is a secondary school located in Grabagan district. This high school is one of the most popular schools in Grabagan District, and this high school also teaches technology to its students. This school has a computer laboratory in two rooms, each room has a lot of computer equipment to support learning. Once a week, students receive information about technology, including computer use. There are several obstacles behind the functioning of this IT support, such as frequent network errors and unstable internet. The purpose of this study is to minimize network testing errors in LAN design by applying these ideas to the network simulation program using Cisco Packet Tracer software to avoid errors during testing.

Based on the above background, the researchers decided to give the title to the author of “Computer Network Simulation Local Area Network (LAN) using Cisco Packet Tracer in SMP NEGERI 1 GRABAGAN”, where researchers hope to provide solutions to overcome the problems experienced.

The implication of this study is that Cisco Packet Tracer can be used to create LAN simulations that are connected to internet routers as well as to perform network maintenance and VoIP simulations. This study can be useful to improve understanding of network fundamentals and the use of Cisco Packet Tracer applications in LAN simulation.

Simulation is a system model in which the professor of arithmetic and logic presents components controlled by a computer to evaluate the dynamic characteristics of the system (Emshoff and Simon, 1970). Simulation is the imitation of atribute-attribute of a manually operated original system on a computer then discovered through observation and summarization (Banks and Carson, 1984).

Various techniques and software programs are used in simulations, which are usually performed on computers with specialized software to imitate or describe the behavior of real systems (Law and Kelton, 1991).

Simulation is an application process that involves building a model of an actual system or proposed system, testing the model to understand its behavior, analyzing its performance, or designing a new system based on desired performance (Khosnevis, 1994).

The process of designing a mathematical or logical representation of an actual system, conducting computer-based experiments to characterize, explain, and predict the behavior of the system (Hoover and Perry, 1990).

Computer networks, a computer network is a collection of separate workstations that are connected to each other by communication protocols so that they can exchange data, hardware, and software (Sukmaji and Rianto, 2008: 1). Another way to think tabout telecommunications and computer technology is combined to create computer networks. By using databases, application software, and hardware simultaneously, this combination of technologies enables remote data processing (Sopandi, 2008: 1). The use of hardware, application software and databases simultaneously (Sopandi, 2008: 2).

A group of computers, smart devices, and other devices that are connected and interconnectedare called computer networks to carry out their tasks (Binanto, 2007). A computer network is a collection of two or more computers connected to each other for data transmission using data transfer protocols over a medium (wired or wireless). Therefore the computer can send information, the computer above can send information (according to Kusanto and Daniel t Saputro

(2015: 1)). (Jafar Noor Yudianto (2007)), understanding computer networks according to the first expert is Jaar Nur Yudianto, he stated that a computer network is a system consisting of a group of computers designed to process various resources, communicate. and you can also use different information.

Local Area Network (LAN), (Arianto, 2009) LAN is a type of wireless network used to connect multiple computers and is ideal for sharing files, connecting to printers and accessing the Internet. (theorekomputer.com, 2007) local area networks, often known as LANs, connect multiple computers simultaneously so that they can all access the Internet from the same place. Computers in one area so that they can be networked to facilitate data exchange and speed up work processes.

LAN according to Madcoms (2010; 2) is a network that connects several computers located in a limited area, such as a computer. A large number of computers are concentrated in a small space, such as a room or building, a local area network can use both wired and wireless communication methods. Menurut Velaga Pavan, immadized dan A. Rama in his article Local Area Network (LAN) Technologies (2012:70) LAN is a small network that facilitates the use of other computers on the same network.

Local Area Network (LAN) LAN is short for Local Area Network. Many computers connected to the network form a local area network, or LAN. Each computer connected to this network has access to data from other machines. Computers can also access information stored on multiple machines. Computers connected to a local network can also use each other's devices, including printers, to play games, chat, or communicate with other computer owners. A local area network (LAN) consists of a small number of computers, such as those found in homes, internet cafes, dormitories, and many other locations where multiple computers are housed in a single building. Each computer connected to the LAN has a different IP address (Vicor Hariyanto, Edy, 201).

Cisco Packet Tracer, cisco Systems telah menciptakan Cisco Packet Tracer, alat simulasi multiplatform yang memungkinkan pengguna membuat topologi dan mensimulasikan jaringan komputer modern pada PC. Students understand the structure and architecture of networks using packet traces. (Mufadhol architecture, 2012) can be simulated using Cisco Packet Tracer and each individual is tracked to determine if it is an intrusion attempt or an attack. Snort is an open source program that is part of IDS. Open source applications.

Packet Tracer is a simulator program released by Cisco System that serves as a platform for education, training, and research simulation of Computer Networks, claims Dian Ariawal and Onno W Purbo (2015). Iwan Sofan (2015) stated that cisco Packet Tracer is a simulation program used to build computer networks. (Binanto (2007.13) is a collection of computers, printers, and other technological devices that are connected to each other to carry out their work. According to (Udin Syaefudin sa'ud 2005: 129) simulation is a replica or visualization of the behavior of a system, such as an educational planning, which runs at a certain period of time.

2. RESEARCH METHOD

The study techniques undertaken to complete this study are presented in this chapter. This framework is a process that is followed from the problem formulation stage to the conclusion stage to provide a strong foundation in decision making. This study uses information processed by data mining to produce information in recognizable patterns that can be used to guide book search decisions.

Research Framework

The research methodology and research framework used in this thesis is necessary for the development of this research. Figure 3.1 presents the research framework and describes the steps that must be taken to solve the problem.

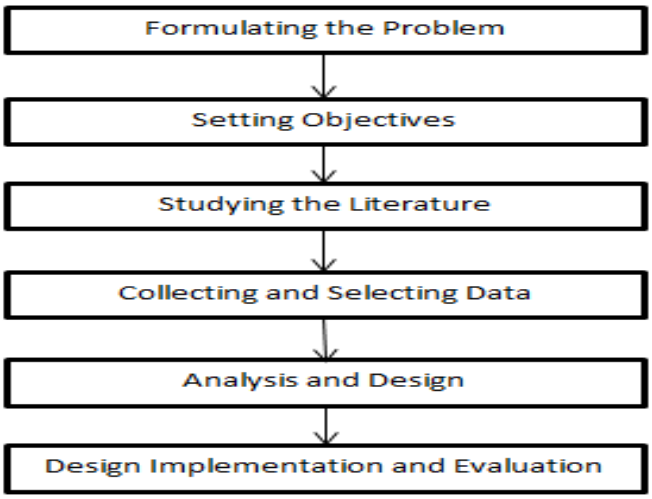

Figure 1. **Error! Bookmark not defined.**. research framework

Formulate the problem, this step is the first step in research. This step involves the formulation of a systemic problem to make the process of observation, definition and investigation more detailed and comprehensive.

Setting Goals, at the stage of goal setting it is useful to determine which activities are Cara the formulation of the problem informs the purpose of this study. The objectives of this study include to learn how to use data mining, evaluate data and create models for decision making.

Studying literature, the purpose of the literature review is to determine the approach to be used in solving the problem, and provide a strong benchmark for researchers to choose the best strategy.

Collecting and selecting data, here, data is collected through interviews with stakeholders to learn more about the issue. In addition, data on book rental events are also required for this study, and data selection is carried out in connection with this kind of data selection.

Design analysis and design, systems analysis is the process of breaking down or segmenting a larger system into smaller subsystems with the aim of facilitating the discovery of problems, opportunities, and needs so that new approaches can later be developed and implemented at the system design stage.

IPresentation and design evaluation, the information generated during the system planning and System Analysis and design stages is applied and evaluated. For book rental transactions, the implementation is done through the Tanagra application so that the results obtained in the previous step are not wrong. Next, the system processes the data to generate Association rules.

3. RESULTS AND DISCUSSIONS

Overview

Today, information technology, especially computer networks, is considered fundamental in everything. Infrastructure for tinformation technology is a strategic resource that needs to be managed and controlled effectively by the company. The information technology infrastructure of an organization continuously supports the movementand processing of information. networking is necessary when building an information technology infrastructure. A type of network that connects computers in two or more places at a predetermined distance is called a local area network (LAN).

A popular tool for teaching, studying and researching computer network simulations is the Cisco Packet Tracer network equipment simulator. Created by Cisco Systems, this curriculum is free for teachers, students, and alumni who have attended Cisco Networking Academy. The main purpose of Packet Tracer is to provide a tool for faculty to learn computer networking concepts and hone skills related to computer networking equipment. You will learn concepts and expand your knowledge pof Cisco networking equipment.

Case Study

The author makes a modelof LAN gurasi configuration in this study at SMPN 1 Grabagan. SMPN 1 Grabagan consists of 2 buildings, the distance between buildings is still within reach of the adjacent area. Client computers in each building numbered 40 pieces, while the server produced by SMPN 1 Grabagan only amounted to one server computer in the main building. However, SMPN 1 Grabagan has network problems such as frequent network errors and unstable internet connections. The author simulated the network configuration of SMPN 1 Grabagan so that the client computer in each building can be connected appropriately. The client PC can also establish a connection with the server. The author intends to solve the network problem in SMPN 1 Grabagan by defining the network.

Topology Jaringan

You can use the Cisco Packet Tracer workspace to determine which computer network tree topology to use, and then select end devices to determine which devices to connect to and a custom hub type. for your needs. When everything is already selected, connect each terminal to the choke with the connection option.

Network Simulation

Opening Cisco

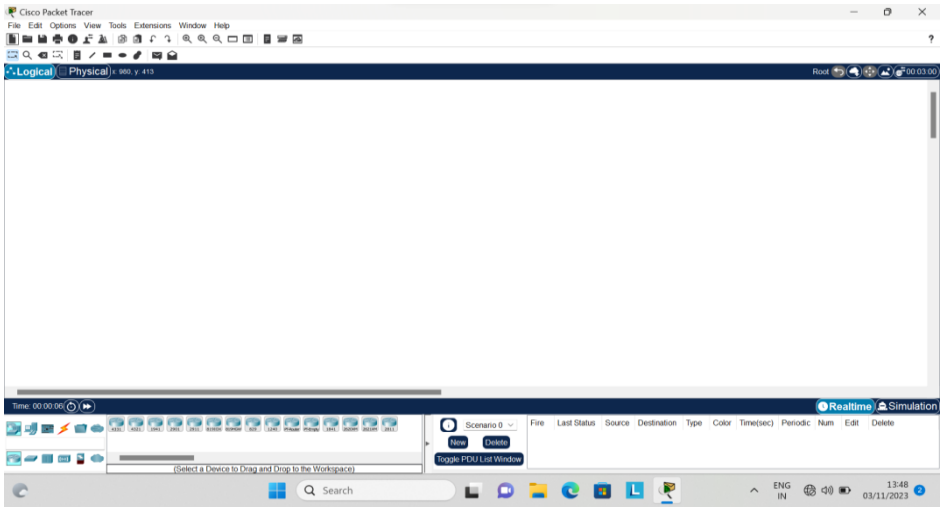

Figure 2. Cisco pasket tracer home page

In Cisco applications there are several menus, including: a) Network Devices consisting of Routers, Switches, Hubs, Wireless Devices, Security, Wan Emulation, b) End Devices consisting of End Devices, Home, Smart City, Industrial, Power Grid, c) Components consisting of Boards, Actuators, Sensors, d) Conections which consists of Conections, Structured Cabling.Miscellaneous, e) Multiuser Connections, f) Real time package, g) Bar cluster, dll.

Setting Ip on Each Client

Ip function on the client is as the identity of a computer in an internet network. Ip address serves as the sender address of data to the device used. Steps in setting ip as follows :

Figure 3. Client that will be set IP

Click client then select desktop then ip configuration, then select DHCP for automatic settings or Static for manual settings. Can be seen as the picture below.

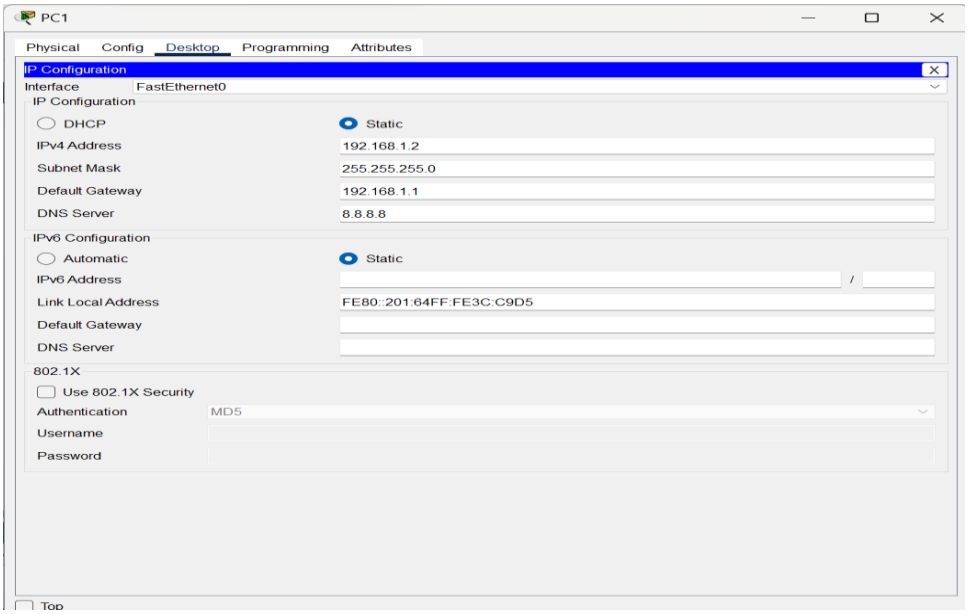

Figure 4. IP Client Configuration

On the IP configuration there are : Ipv4 Address which serves as the client's IP Address, Subnet Mask to identify the location of a host (whether it is on a local network or an external network) by separating the host ID from the network ID. Utilizing a subnet mask in testing 255.255.255.0), The Default gateway serves as a communication relay between the local network and the internet. (Default gateway is the same as the ip address used but ends with the number 1, for example ip address 192.168.1.2 then the default gateway is 192.168.1.1), The DNS Server keeps track of each IP address used in the hostname. (On testing using dns server 8.8.8.8)

Final Results

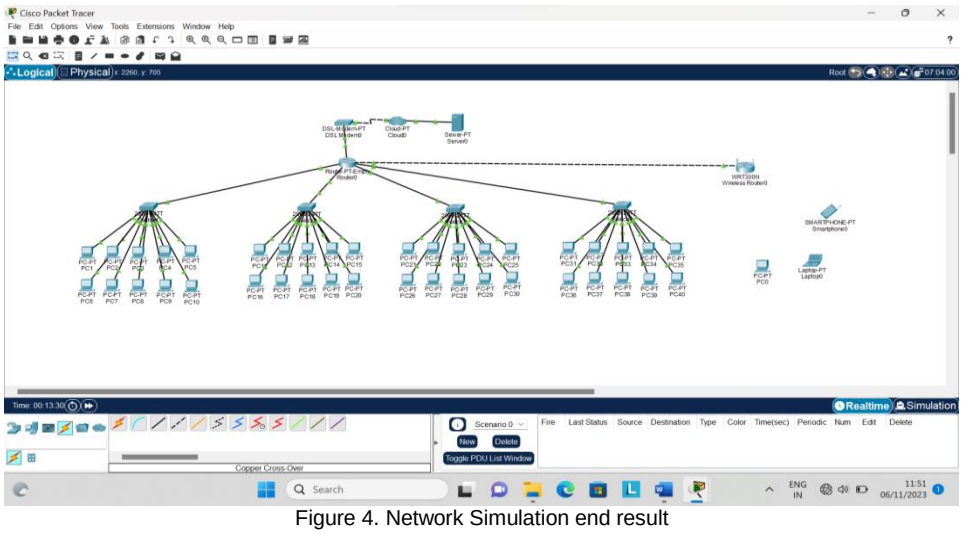

Figure 4. Network Simulation end result

If all cables are green and each client can send or receive messages, then the network simulation has been successful.

Ip address pada pc 1-10 (192.168.1.2-192.168.1.11).
Ip address pada pc 11-20 (192.168.2.2-192.168.2.11).
Ip address pada pc 21-30 (192.168.3.2-192.168.3.11).
Ip address pada pc 31-40 (192.168.4.2-192.168.4.11).

Subnet Mask (255.255.255.0) dan Dns Server (8.8.8.8) sebagai acuan konfigurasi Static. The Default Gateway is the same as the IP Address but ends with a 1.

4. CONCLUSION

Based on the results of research that has been done in the design of simulations with cisco packet tracer model using network Tree topology, the following conclusions can be drawn, where the results of the identification and analysis of the network: Designing a local area network (LAN) architecture is to some extent done using Cisco Packet Tracer, configuration simulation conducted at SMPN 1 Grabagan can be done well, computers can be effectively connected to each other even across floors and buildings.

Advice: To obtain more accurate results when implementing various architectures and when setting up Cisco Packet Tracer, this study can be expanded by utilizing various topologies and architectures, because the value of simulated test results can be different from reality, real-world network configuration application case studies are needed to begin to observe the effectiveness, efficiency, and influence of actual router configuration results, a research development plan that requires advanced researchers to conduct more focused research to build on previous findings. The scientific contribution of this research is that users can understand more about using Cisco Packet Tracer as a computer network simulation tool and develop user skills in operating Cisco devices.

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