Design and Development of Computer Network and Login Page Using Mirotic Router Universitas Oriental Timor Lorosa'e

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ABSTRACT

The design of the computer network at the Faculty of Engineering, Universitas Oriental Timor Lorosa'e (UNITAL), is established to support the system's design and development, including the Login page on the MikroTik Router. With the right infrastructure, the services used will be more optimal. The current conditions still face challenges with the network design used for the performance of the computer network. This will include an analysis of the network operating system's quality, proposing a network design that conforms to Cisco standards, and using a design plan based on Cisco standards. The research results provide a simulation or design proposal using Winbox software. The purpose of this study is to understand the performance of the computer network at the Faculty of Engineering, Universitas Oriental Timor Lorosa'e, which requires better analysis and network. Therefore, an analysis of the current computer network is necessary, and the design of a new quality system can be used for optimal results. By using a network topology that aligns with Cisco concepts and implementing it on Winbox software, better outcomes are achieved.

KEYWORDS: Design and Development, Computer Network, Mirotic Router

I. INTRODUCTION

One of the advantages of a computer network compared to a standalone computer is the presence of a network, which enhances the computer's ability to store files or access networks, potentially speeding up processes because, in practice, every computer on the network can be utilized collectively. Computer networks facilitate the management process, where important files are usually placed in a specific location with a computer that has better specifications and infrastructure support.

Network storage for users is a limited resource that must be managed properly to ensure that it remains available to all users. If network storage is not monitored and managed, it can become filled with irrelevant data, increasing the cost of network storage and, in some cases, preventing useful data from being stored in network storage when needed.

Data storage management is the process of planning, implementing, analyzing, and optimizing the methods, tools, and components used in the data storage environment at the Faculty of Engineering. Currently, the need and complexity of data are increasing. This also leads to an increased need for management of storage capacity.

To meet the data storage needs within an institution or company, it's important to know how much capacity is owned, how much is available, and how much is needed for future data storage, as well as how this data is used within an institution or company. This constitutes a service within the available network services, which can be used as a solution for network management. Several features are available that can be used effectively to manage and monitor storage capacity on a computer.

A Computer Network is a collection of computers, printers, and other equipment that are connected together. Information and data move through cables, allowing users of the Computer Network to exchange documents, data, and other information, as well as to print on the same printer and collectively use hardware and software that are connected to the Network. Each computer, printer, or peripheral connected to the Network is called a node. A Computer Network can have two, tens, thousands, or even millions of nodes. A network typically consists of two or more computers that are interconnected with each other and share resources, such as CD-ROMs, printers, file exchanges, or enable electronic communication.

II. RESEARCH METHODOLOGY

A. The History of the Establishment of Universidade Oriental Timor Lorosa'e (UNITAL)

Universidade Oriental Timor Lorosa'e (UNITAL) was established on January 1, 2000, initially named Universitas Kontinental. This name was used until 2002 when, following criticism, it was changed to Universidade Oriental Timor Lorosa'e (UNITAL) with the following intentions:

i. Hari'i (meaning this University was founded by several veteran warriors who interacted or communicated, particularly with a fundamental focus on the society of Timor Leste, to continue the existing study programs and to give the name to their University, Universidade Oriental Timor Lorosa'e (Unital), established on January 1, 2002).

ii. Hadia (meaning that in building this University, the students who graduate must have creative skills, to be able to develop objectives, especially related to the Alma Mater of the University).

iii. Haburas (meaning that since the University has been established and built according to the targeted goals, it is necessary to maintain the reputation of the University. Therefore, the skills possessed should not be doubted or questioned in society).

B. Literature Review and Data Collection

By selecting reference books relevant to the chosen title, the author gains a lot of information through reading these books. At this stage, the author collects data on locations within each Department at the Faculty of Engineering at Universitas Oriental Timor Lorosae, to be incorporated into the Network Design. Additionally,

data on distances are collected to determine the requirements for components in the development of the design and construction of computer network and login page using Mikrotik router at the faculty of engineering, universitas oriental Timor Lorosa'e (unital).

C. Evaluation

At this stage, testing is conducted on the network that has been created, and interviews are also conducted with network users to determine if there are any inputs from the users.

    i.   The Computer Network built at the Faculty of Engineering is very beneficial for the needs used in existing activities.

    ii.   The advantages of this Network are very beneficial for the structure of the Faculty of Engineering.

    iii.   The lecturers at the Faculty of Engineering find it very comfortable to use the existing Network.

    iv.   The Faculty of Engineering has 8 Departments which can now access the Network.

    v.   And all students at the Faculty of Engineering will have a better Network compared to not having one at all.

III. ANALYSIS AND DESIGN OF NETWORK

A. Needs Analysis

Analysis based on research conducted more in-depth by researchers in a field study, so that internet network users, based on the investigation, can analyze the needs existing at the research site.

Computer network users at the Faculty of Engineering, until now, are still using LAN, Modems for direct connections, and computers and laptops are still very much related to connections for accessing decent internet.

In the process of browsing for information, downloading and uploading, and also using more complete digital components with Wireless features like laptops or personal smartphones, they have not yet used internet network access, therefore have not created a Wireless LAN (WLAN) to facilitate users who access the internet network through a wireless connection.

Therefore, from the research conducted, the current internet network still does not meet the overall needs of users at the Faculty of Engineering. From the analysis, we know that the internet network used does not yet meet the needs of the users. It can be seen that the internet network is connected, implemented on the users at the Faculty of Engineering. Departments and active students who access the internet network during working hours often face challenges as users or users cannot access the internet network because they have not yet established a network with the WLAN type.

B. The Old Network System at the Research Site

Considering the condition of the old system, which is currently operational in the Faculty of Engineering, it's connected to the internet network that still uses LAN and a Modem on the computer, thereby enabling a connection to access information.
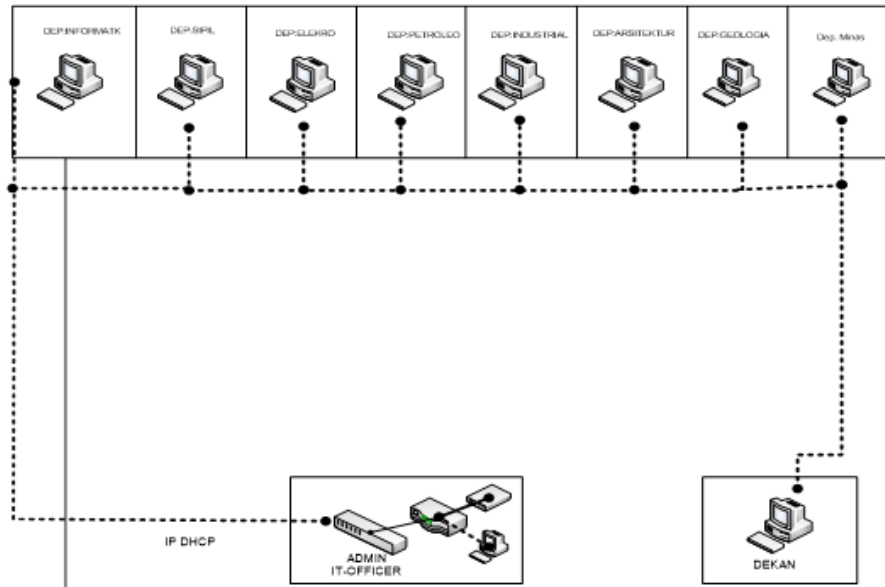

Figure 1. Layout of the Old System Location

According to researchers observed directly at the research site, especially in the Faculty of Engineering, it can be conveyed that there is a need to renovate the existing network at the level of internet network connections with better infrastructure requirements to facilitate the users of the concerned internet network. Thus, to facilitate internet network users who face problems in accessing the internet regarding wireless, the issue for researchers will be to renovate the internet network in accordance with the desires or needs of the Faculty of Engineering.

Problems with the old network system that commonly occur at the research site, according to researchers, observations about frequent issues include:

i.   For users in the Faculty of Engineering, many still have not accessed the internet network, although they already have laptops, computers, and phones equipped with wireless features that will eventually not require cables.

ii.   The internet network connection using a modem relies on a single device, with users taking turns using the device.

iii.   Lecturers in the department cannot access the existing network because it is LAN-based.

iv.   Students are also unable to access the internet.

v.   The absence of the internet is a factor causing students to be less active on campus and in campus activities.

vi.   And the internet usage by faculty members is also very high.

C. Proposal for a New Network System

Based on observations conducted by researchers at the research site, particularly in the Faculty of Engineering, regarding the old network system, researchers have found a solution to resolve the aforementioned issues. It's necessary to renovate the WLAN network to facilitate users in accessing the internet network. And have devices that are complete and more equipped with wireless features. Therefore, it can address the above problems and help users complete their work. The researchers will build a new internet network in the Faculty of Engineering, to facilitate easier access to wireless internet connections. This involves creating a new network system by the researchers, thus responding to the needs of the Faculty of Engineering. Consequently, the use of the internet network remains active during ongoing work.

New Network System Topology, researchers can renovate the old network system in the Faculty of Engineering, and researchers will immediately undertake a new design as follows.
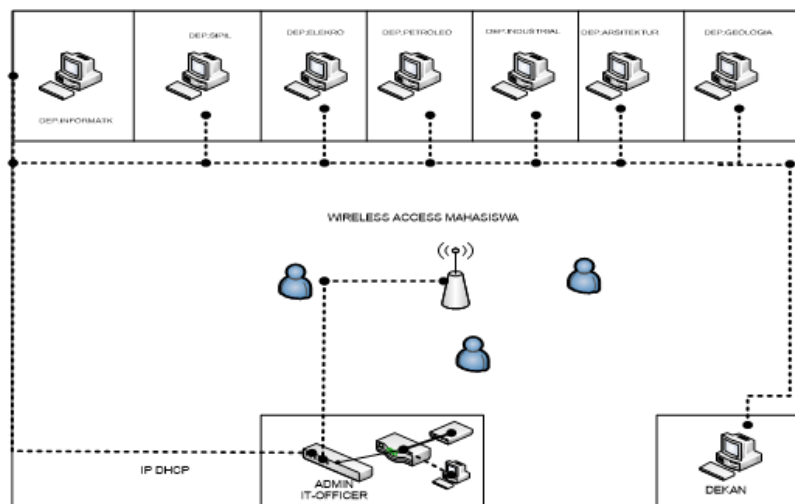

Figure 2. Design of New Network Topology for the System Login Page

The uses of hardware specifications used for network connections are as follows:

  i.   Modem, which serves as a component or tool that can receive internet from the ISP to continue to the router, and the modem itself functions to convert digital signals into analog signals.
  ii.   Mikrotik Router, which functions as a Mikrotik Router connected to the network and distributes the network to client computers or users through LAN and WLAN interfaces.
  iii. Switch, the function of the switch is to receive an Internet Connection directly so that the router's port can distribute it to clients, through a UTP cable using a straight method to computers in the local area network (LAN).
  iv.   Administrator's computer or laptop that can configure or manage the installation of the router through the Winbox application.
  v.   UTP cable, which serves as a transmission medium. For example, the UTP cable is connected from the Mikrotik router to the Admin Computer, from the Mikrotik Router to the LAN.

The use of software employed by the author to create a network with the design and construction of a login page is as follows:

i. Mikrotik OS, which functions to connect to the internet network according to the needs of users or consumers.

ii. Windows Operating System: Windows OS serves to test ping or connection to the router so that the network from the router is prepared as much as possible for users.

iii. Winbox: The Winbox application serves as a connection route to access the Router terminal in order to configure or manage the network through the router.

iv. Browser: The Web Browser functions as a level of connection test or ping to check if the connection to Internet Sites through www.speedtest.net can already connect with Upload and Download after completing the network configuration with the Winbox Application Login.

IV. SYSTEM IMPLEMENTATION

Winbox is a utility used for connectivity and configuration of Mikrotik using MAC address or IP Protocol. With Winbox, we can configure Mikrotik Router OS and RouterBoard using a fast and simple GUI mode. Winbox: The Winbox application serves as a connection path to access the Router terminal in order to configure or manage the network through the router. The initial display when opening the Winbox Application, to perform configuration levels in unifying hardware devices connected in the settings stage at the connection level.

A utility used for connectivity and configuration of Mikrotik using MAC Address or IP Protocol. With Winbox, we can configure Mikrotik Router OS and RouterBoard using a GUI mode in a fast and simple way.

Additionally, the functions of Winbox include: setting Mikrotik router in GUI mode, setting bandwidth or limiting network speed, blocking certain websites/sites, speeding up work, remotely controlling Mikrotik from a distance, and managing IP addresses and access to specific sites.

Network Address Translation, or NAT, is a method of mapping and translating a local IP address to a public address before transferring information. To access the internet broadly, you need a public address. The IP address on our private network cannot do that. Meanwhile, masquerade is a method of connecting a local IP to the internet network via a public IP intermediary. Its function is to make the IP address of the sender on each data packet that exits the Mikrotik router use the public IP address.

DNS is a system that simplifies this task for you. Now, you just need to remember the domain name and enter it into the address bar. DNS will then translate that domain into an IP Address that the computer understands. Functions and workings of DNS:

1. Finding the IP Address information of a website based on its domain name.

2. Finding the URL information of a website based on the entered IP Address.

3. Finding the correct DNS server IP to send emails.

A provider is a company that provides certain services. It also refers to a company or organization that offers services to users or customers. This term is also associated with companies that handle website creation, provide internet access and its maintenance, and manage its positioning in the cyber world.

The interface display of the IP Address of the Faculty of Engineering Network Administrator is responsible for managing users within that network. This includes granting access rights to various network resources to other users. An administrator is the one who will determine the distribution of user accounts, according to their functions and scopes.

The most primary function of an IP Address is to handle connections between sender and receiver devices through a Local Network at the Faculty of Engineering. This is achieved by assigning an IP Address.

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

The display of Network Address Translation (NAT) is a process to modify the source or destination address in the IP header of a packet while the packet is in transit. Generally, the sender and receiver of the application are unaware that the IP packet is being manipulated. NAT also limits the number of private IP addresses on the internet by activating and translating them to IP addresses that are not registered online.

V. RESULTS AND ANALYSIS

Descriptive statistics is a statistical analysis that provides a general overview of the characteristics of each research variable as seen from the average (mean), maximum, and minimum values. In this study, the discussion regarding descriptive statistical analysis is conducted for data that has been normalized. The data for the Implementation of Computer Network Design and Login Page that meets the research sample criteria involves 35 people from the Faculty of Engineering at the Oriental Timor Lorosae University (Unital) over a period of 3 months. However, from the data of 35 people in the Faculty of Engineering at the Oriental Timor Lorosae University (Unital) that have met the criteria in this study, it turns out that there are several data that did not pass the classical normality assumption test, hence some outlier data needs to be removed first for the data to become normal. The results of the descriptive statistical analysis of 35 people from the Faculty of Engineering at the Oriental Timor Lorosae University (Unital) are as follows:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
TOTAL_X2	10	18	37	32.50	5.642
TOTAL_Y1	7	18.00	30.00	24.4286	4.27618
TOTAL_X1	18	34	62	48.89	7.798
Valid N (listwise)	7				

Table 1. Descriptive Statistics

Based on table above, it can be concluded that the descriptive statistics for model 1 with a sample size of 10 people at the Faculty of Engineering, Oriental Timor Lorosae University (Unital), the performance variable (total_X2/Faculty) indicates the smallest (minimum) value is 18 and the largest (maximum) is 37. The average of the 10 samples shows a negative result of 32.50, meaning generally the samples received are negative (incurring losses). The standard deviation of the sample is 5.642 (above average), indicating that the sample has a high level of data variation.

Based on table above, it can be concluded that the descriptive statistics for model 2 with a sample size of 7 people at the Faculty of Engineering, Oriental Timor Lorosae University (Unital), the performance variable (total_Y1/Participation) indicates the smallest (minimum) value is 18.00 and the largest (maximum) is 30.00. The average of the 7 samples shows a negative result of 24.4286, meaning generally the samples received are negative (incurring losses). The standard deviation of the sample is 4.27618 (above average), indicating that the sample has a low level of data variation.

Based on table above, it can be concluded that the descriptive statistics for model 3 with a sample size of 18 people at the Faculty of Engineering, Oriental Timor Lorosae University (Unital), the performance variable (total_X1/Student) indicates the smallest (minimum) value is 34 and the largest (maximum) is 62. The average of the 18 samples shows a negative result of 48.89, meaning generally the samples received are negative (incurring losses). The standard deviation of the sample is 7.798 (above average), indicating that the sample has a low level of data variation.

Frequency Distribution of the Questionnaire Results from Students, majority of respondent answer scores are in the interval between 34 – 37, which is 5.6%. Meanwhile, the other frequency distributions are as follows: in the interval of 38 is 11.1%, between 39 – 41 is 16.7%, at 44 is 22.2%, between 45 – 46 is 33.3%, at 47 is 44.4%, at 48 is 50.0%, at 49 is 55.6%, between 50-51 is 66.7%, between 52-56 is 77.8%, between 57-58 is 83.3%, between 59-61 is 88.9%, and at 62 is 100.0%.

Frequency Data shows that the majority of respondent answer scores are in the interval between 18 – 29, which is 10.0%. Meanwhile, the other frequency distributions are as follows: in the interval of 30-32 is 30.0%, between 33 – 34 is 40.0%, at 35 is 70.0%, at 36 is 90.0%, and at 37 is 100.0%.

The majority of respondent answer scores are in the interval between 18 – 29, which is 10.0%. Meanwhile, the other frequency distributions are as follows: in the interval of 30-32 is 30.0%, between 33 – 34 is 40.0%, at 35 is 70.0%, at 36 is 90.0%, and at 37 is 100.0%.

VI. Conclusions and Recommendations

Based on the final part of this thesis, the researcher will present several conclusions and suggestions based on the findings from the research results and discussions in the previous chapters regarding the studied problem, which is a quantitative descriptive analysis study about satisfaction in accessing the internet for information searching using a login page on a Mikrotik Router, particularly by students and lecturers at the Faculty of Engineering, Oriental Timor-Lorosa'e University.

A. Conclusion

With the results of data processing and analysis, the researcher will conclude as follows:

The fulfillment of satisfaction that arises with some needs having been met by students and lecturers accessing the internet using a login page on a Mikrotik Router at the Faculty of Engineering, Oriental Timor Lorosa'e University, the benefits achieved are:

i.   Lecturers access the internet using a login page and the access rights they receive, if they want to use the internet according to the design of the new system.

ii. Students can access the internet using the access rights given to them, if they want to use the internet according to the design of the new system.

iii. The new system can meet the needs existing in the Faculty of Engineering.

iv. With the results of the new system design, it can respond to the needs of students and lecturers.

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