LOCAL AREA NETWORK MANAGEMENT
(Case Study at Assessment and Development Information Technology Units Brawijaya University Malang)

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Abstract

The purpose of this study was to know the management local area network at Assessment and Development Information Technology units, furthermore this study focusing on network management functions that applied by Assessment and Development Information Technology Units. This study will explain about the implementation of network management functions in the local area network management. The research method employ in this research is by using descriptive qualitative method by study case approach. The results of this study was in the implementation of network management functions Assessment and Development Information Technology units already applied all five network management functions in the local area network management. Each functions represented as a network management components in managing Assessment and Development Information Technology units local area network. Since the network management functions represented as a network management components it needed improvement in each network management functions policies and measurements.

Keywords: Local Area Network Management

Abstrak

Tujuan dari penelitian ini adalah untuk mengetahui manajemen local area network di unit pengkajian dan pengembangan teknologi informasi, lebih lanjutnya penelitian ini berfokus pada fungsi manajemen jaringan yang diterapkan oleh unit pengkajian dan pengembangan teknologi informasi. Penelitian ini akan menejelaskan tentang penerapan fungsi manajemen jaringan pada manajemen local area network. Metode yang digunakan dalam penelitian ini adalah descriptive qualitative dengan pendekatan study kasus. Hasil dari penelitian ini adalah dalam penerapan fungsi manajemen jaringan unit pengkajian dan pengembangan teknologi informasi telah menerapkan kelima fungsi manajemen jaringan dalam manajemen local area network. Setiap fungsi mewakili sebagai komponen dalam mengelola local area network di unit pengkajian dan pengembangan teknologi informasi. Semenjak setiap fungsi manajemen jaringan mewakili sebagai komponen manajemen jaringan perlu untuk ditingkatkan dalam setiap kebijakan dan langkah penanggulangannya.

Kata kunci : Manajemen Local Area Network

I. INTRODUCTION

Computer networks nowadays is a critical infrastructure that must be safeguarded stability operations. The disorder occurs in operational networks will result in no small loss mainly on companies, such as banks and stock effects. Conceivably if computer networks on a stock exchange or bank effects operations and disrupted, thousands and even millions of transactions will be lost. A result of this incident is the company will suffer considerable losses. A study in the UK shows that a Local Area Network (LAN) does not operate an average of 20 times per year or more than four hours (Taufan , 2001: 1). to initial and optimization of network operation, network management is required. Network management can monitorized the conditions on your network so that the mistakes that occurred could have been avoided or minimized. Human resources also determined whether or not the performances of the network in addition, there are five functional areas of the network management must also be implemented. It was all largely determine the performances of the computer network.

Nowadays undeniable that the need of information quickly in a college has become a major priority, with a large number of terminals that access would have required a reliable network management so that the flow of information can go smoothly to the rest of the access terminal. With the existence of computer networks and good management will allow the college to manage the information integrated properly. Assessment and Development Information Technology units is one of

Brawijaya University units that engaged in the field of information technology. One of this units duty is to manage the network in the Brawijaya University. The importance of the network stability in maintain the information flow in the college encourages the researcher to discuss it further , particularly focusing on the network management functions that applied with the title "Local Area Network Management (case study at Assessment and Development Information Technology Units Brawijaya University Malang)".

II. THEORETICAL FRAMEWORK

A. Management.

Management has been around since the first human realized that the cooperate society is needed to achieve the required intentions (Murdick, 1991:26). Management comes from the word "to manage" which means to set, to organize, or to manage. Many definitions have been given by the experts related on management term. From those many definitions, there is one which can be used to understand management term better, which is : management is a process that consists of activity series, such as planning, organizing, and controlling/monitoring which are done to determine and achieve goals that have been established by functioning and other resources.

B. Computer Networks

Stated from Faisal (2008:87), computer networks is a group of many computers which are separated yet connected each other in doing some task. The network gives efficient works which can improve in returning the infestations in computer, software, and computer training. Network contributes efficient and effective works by reducing the time and help to make decision. Meanwhile, according to Oetomo (2004:7), computer network is a group of autonomous computer which are connected each other by using communication protocols through media of data and information and several software as well as hardware, such as hard disk, printer, and etc.

Computer networks can be used for various needs, which possibly make a corporation/organization more efficient in utilizing current resources. There are several benefits of using computer network which are described in the Faisal (2008:90), multi-user programs, Global database, information exchange, cost efficiency, easy data access, and communication between interconnection computers.

C. Local Area Network

To define exactly what a LAN provides in one sentences should seem impossible. The network provides many capabilities, and so much is involved. The following sums it up : Local area networking permits information and peripherals to be shared efficiently and economically (Naugle, 1991:6). In other sources sutabri defines local area network is related with data communication that is exchange information or exchange of data between two parties with each party can understand intent and purposes of other party (Sutabri, 2005:259). LAN allowed not only connection from the host terminal environment but also complete interconnection with personal computer.

The standards association known as the international standards organization developed an architectural model known as the ISO references model for open system interconnection. The model divides a local area network system into seven processing layers. Each layers performs specific functions as part of the overall task of allowing programs, on different systems, located anywhere in the world, to communicate with each other as if the programs resided in the same system (Naugle, 1991:9).

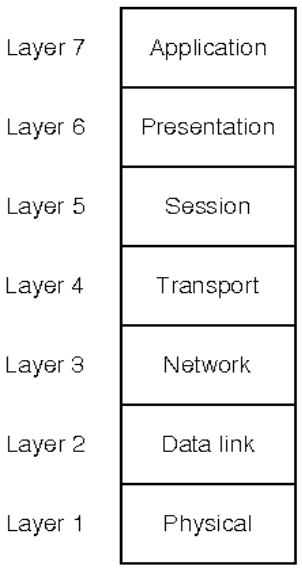

Figure 1: Management of an OSI Network

Sources: www.cisco.com

D. Network Management

Network management is a part of basic management. The definition of network management also not much different from the understanding of basic management. According to Faisal (2008:131) network management is an attempt to maintain all network resources in good condition. In other hand according to Taufan (2001 :13), definition of network management is the management that is composed of planning, organizing, monitoring, accounting, activity settings of network resources. Taufan is also explained that based on the standards of the Open System Interconnection (OSI), network management is focused only on monitoring, accounting, activity and resources settings.

E. Network Management Functions

To give solution to management task for distributed application, it should also be possible to describe the modules used. Moreover not all management requirements will be the same in each scenario, it is therefore useful to classify the total management task into functional areas and then to describe the management functions that are typical for each specific area. Even this line of approach will fundamentally produce all different kinds of classification, based on the five functional areas defined in the functional model of the Open System Interconnection (OSI) management architecture. The abbreviation FCAPS (Fault, Configuration, Accounting, Performance, Security) is often used in the literature when relating to network management functions (Abeck, 2009:13) :

1. Fault management
2. Configuration management
3. Accounting management
4. Performances management
5. Security management

III. RESEARCH METHODOLOGY

This research will use descriptive research methods with a case study approach. Due to the objectives of the study that is to provide an overview of local area network management. This study focus to observe the network management functions that applied by the Assessment and Development Information Technology units in their local area network management.

Data analysis that use in this research to meet the research objectives are data analysis spiral stated from Creswell (2007:151), as shown in figure 2. Based on the figure the data analysis spiral can divided into 4 steps :

1. Data Managing (First Loop)
   Data management is the early stages in analysis process. All the data were organized into file folders and computer files according to the type of the data, for instance interview transcripts or document.
2. Reading, Memoing (Second Loop)
   Reading and memoing is second stage after data managing in analysis process. This process is sketching ideas in the margin of filed note, writing observers comments, reflective passages, and also summarizing the materials.
3. Describing, Classifying, Interpreting (Third Loop)
   Describing, classifying, interpreting is the process consists of moving from the reading and memoing loop. Researchers describe in detail, develop themes or dimensions through some classification system, and provide interpretation in light of their own views or views of perspectives in the literature.
4. Representing, Visualizing (Fourth Loop)
   This is a final phase of the spiral. Researcher present the data, a packaging of what was found in the text, tabular, or figure form. For example creating a visual image of the information, and researcher may present a comparison table or matrix.

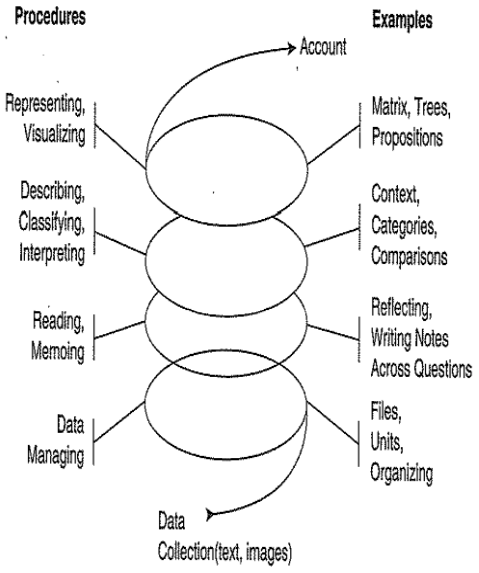

Figure 2 : Data Analysis Spiral

Source : Creswell (2007:151)

IV. RESULT AND DISCUSSION

A. Focus and Data Reduction

1. Network Management functions

There are five functional based on the ISO standardization for the local area network management. This five function area can be said as network management functions and five basic functions of management planning, organizing, actuating, and controlling. PPTI also implemented that five functions in to PPTI operational activity. The tools that used by PPTI for the operational activity also implement and support the implementation of five functions of network management in PPTI operational activity. Below is the description of the network management functions that applied by PPTI in their operational activity :

a. Fault Management
   In implement the fault management PPTI applied two kind of measures , there are reactive management and proactive management.
   Reactive management, for this measures PPTI provides helpdesk for customer assistances with this helpdesk PPTI will record the problem that reported by the user via phone call or come directly to PPTI helpdesk. After being recorded the admin who in charge in the helpdesk will continue the situation to the network administrator and the network administrator will take the necessary action to repair the problem that being reported by user via PPTI helpdesk.
   Proactive management, in implement this measures PPTI use a software for monitoring the network. The software that used by PPTI will give the realtime information about the network condition. The realtime information that provides by the tools help the implementation of proactive management measures, since the tools will indicate as soon when the network encountering the problem , so the network administrator can fix it immediately before that problem interrupt the whole network. The tools also set the periodically backup for PPTI data server.
b. Configuration Management
   In terms do this function PPTI use some application / tools in PPTI configuration management operational activity. Other configuration activity are already set in the PPTI work procedure related with configuration activity. There are several work that including the configuration activity such as web service, network maintenance, and so on. But the main activity from configuration management is done by monitoring this has purposes to get the real time information as because the configuration management is work to prevent fault in the network.
   The network administrator also did recording manually every time network configuration happen, the network administrator will record it in the book called SOP (Standard Operasi Jaringan).
c. Accounting Management
   The implementation of the accounting management is done with two ways, automated and manual. The automated way is implemented use a software this have a purposes for work efficiency, where the network monitoring applications provide a log record. In other words the automated accounting management is based on the monitoring activity while the manual is done directly by network administrator based on their daily work. Since the work of accounting management is to track the PPTI management resources , this made PPTI rely a lot in the monitoring application that used for monitoring the network. The record that gather neither from the application or from the network administrator will use by PPTI for annual evaluation or future analysis.
d. Performances Management
   Implementation of performances management in PPTI operational activity can be seen from the use of monitoring tools. The use of the monitoring tools in performances management is have purposes to monitor the network and network component directly / realtime , this make work of network administrator in managing the network more efficient. Almost all the application that use by PPTI have a purposes to monitoring the network performances, the monitoring tools that use will show the network traffic, network component conditions, and gateway status. The work procedure that exist in PPTI also use for maintain the network performances.
e. Security Management
   In maintaining the data security PPTI use the operating system that have security for the data server. In this case PPTI choose Linux as the operating system for data

server, it is because Linux have a good security rather than the other vendor. PPTI also apply multiple layer for the antivirus this have purposes to avoid the server contagious with the virus, There are a policies that PPTI only give limited authorization to enter the server room, only a few people that authorize can access the server room. The network model that use by PPTI in network also for security purposes , PPTI use client-server model for their local area network model.

2. Local Area Network Management

a. PPTI Network Model

In the local area network model PPTI use client server network model. The reason PPTI choose this model is because in order to serve the user PPTI act as a dedicated server , the purposes are to provide a good performances services and gain the high speed access. The management factor is also become a consideration the use of this model this are the advantages that PPTI got from using client-server model :

1) Centralize control, server help in administering the whole set up. Access rights and resources allocation is done by server.
2) Proper management, all files are stored at the same place. In this way, management of files becomes ease.
3) Backup and recovery possible, as all the data is stored on the server its easy to make backup of it. Also in case of some break down if data is lost, it can be recovered easily and efficiently.
4) Upgrade and scability in client server set-up, changes can be made easily by just upgrading the server. Also new resources and systems can be added by making necessary changes only in the server.
5) Security, rules defining security and access rights can be defined at the time of set-up of server.

In the terms of topology, PPTI use two kinds of topology in their local area network. The first one is STAR topology, this topology is use for the connection between the main server and the server at each faculty. Those have purposes in installation and configuration activity between server will not interrupt the other server because it each server have different line. The other topology that use by PPTI is TREE topology, PPTI use this topology for the connection between server and directly to the users. The use of this topology are because Tree topology is reliable for large scale network, due to the rupture one of the client will not affect to other because each user connect directly to switch and access point for wireless users.

b. Network Monitoring at PPTI

Network monitoring is one of the main activity in managing the network stability in the best performances. In monitoring activity there are some monitoring applications that use by PPTI. The network administrator explained the main purposes aside for help the operational activity is for the work efficiency and get the realtime information about the network condition in Brawijaya University, and also explained that the application assist PPTI to fulfill the SLA (Service Level Agreement) that applied in PPTI, the SLA are 99,9%. Here are the application that used by PPTI Brawijaya University :

1) Centreon
   Centreon is an open source software that used by PPTI for monitoring the network. Centreon can give the information through the web or directly send and email to network administrator.
2) Cacti
   Cacti is an open source software that used by PPTI for monitoring. There are three monitoring fiture that provides by cacti. There are network components monitoring, electricity voltage, and network traffic.
3) Dude
   Fiture that provide bu Dude is give a realtime notification through monitoring screen if there a network component encounter a problem and give information about the network traffic at core and distribution.
4) Nagios
   One of the PPTI monitoring applications. Nagios is have

modular characteristic, easy to use and have high stability. The fiture provides by nagios are monitoring network components and network service also make report about the SLA (Service Level Agreement).

B. Data Analysis and Interpretation

1. Data Analysis

The local area network management in this research is refer to the network management functions that applied at PPTI for managing the local area network. In this chapter will be analyze the network model that use by PPTI in order to manage the local area network and also will be analyze the network management functions that have been applied by PPTI. In this research the network functions also seen as the network management components will be explain through the matrix in this chapter.

a) Client-server model
The use of this model in the PPTI network are become a good decision, as already known PPTI are responsible for managing the whole network at Brawijaya University. In terms of managing this model make the management is become easier rather than other model, it is because the control in this model are centralized in the server. Means all the data are stored in the server so the data management is more easier and secure. The security factor from this model is also reliable since the control are centralized in the server, that make the security management more effective.

b) Local area network topology
There are two topology that use and each topology represented different task. First lets overview the star topology , Star topology use for server to server network. The decision become good decision in the management perspective , if one of the server need to be maintenance or configuration will not interrupt the other line / server. The factor that seen are from the configuration and performances, performances here is because network bandwidth that provides by this topology are big match with the server to server network.
The other topology that used are Tree topology, the best topology that exist for large scale network. This topology performances in the large scale are reliable and better that other topology, since this topology are the development from previous topology that made for large scale network.

For the monitoring activity PPTI already use some application or work tools that can be called multi layer monitoring , it called like that because there are some application that used for monitoring activity. The existence of that application made the management work in controlling the network become efficient. All the application provides realtime information about the network condition. Generally the local area network management at PPTI are already in the good management, since PPTI has already implemented all five network management functions and the network model that use by PPTI exist to support the implementation of each functions. It can be said that the network management are consist of five functions ; fault management, configuration management, accounting management, performances management, and security management. Which all this functions connected and support each other to gain the goal which is the stability of the network.
Table 1 will contain the network management functions or the network management components comperation between the theoretical framework and the empirical data that found at PPTI :

Network Management Components	Theoretical Framework	Empirical Data at PPTI
Fault Management	fault management deals with the detection, and elimination of abnormal system behavior	1.Provide helpdesk for user assistances 2.Use various network monitoring application.
Configuration Management	Initial configuration of hardware and software and make sure nothing changes in the operational characteristic.	1.Use some application in operational activity. 2. Documenting the every configuration activity that occur.

Accounting Management	Accounting management works to tracking the management resources.	Use the log record that provides by the network monitoring application and network administrator did manual record based on the activity.
Performances Management	1.Esthablishing QoS parameters and metrics 2. Monitoring all resources performances. 3. Carrying out measurements and trend analysis to predict failure.	1.Establish PPTI network SLA 99,9% 2.There are 4 monitoring application that used for monitoring the network.
Security Management	1.Monitoring system to prevent security threats 2.Defining and enforcing security policies.	1.Network monitoring 2.Multy layer firewall and antivirus. 3.Enforcing data server authorization policies

Table 1: Network Management Components.
Source : Data that processed

The description from the network management table, the gap that found in the comparation of theoretical framework and empirical data that found at PPTI are mostly each functions still lack of some policies and the measurement. Policies are important especially here when talk about the network management components that will gave an impact to the network stability. From the lack of policies the chain reaction are less measurements way from each network management functions , where that become an important part in management.

C. Proposition

In the data analysis had been explained that will be four step / fourth loop of data analysis. This chapter will be the last step or fourth loop which will be result the proposition. Proposition of this research is stated as follows :

1. If the configuration management have a system or application to handle the things about the configuration it will be more efficient rather than rely on the monitoring application, the application such as IBM-Tivoli Netcool and Solarwinds Network Configuration Manager.
2. If there is a back up server/system that apply for busy situation to avoid overload traffic in the main server will be help to maintain the network stability.
3. If there are an application that only focus on the security the work of security management will be more efficient and effective, the application such as Solarwinds SIEM (Security Information and Event Management).

V. CONCLUSION AND SUGGESTION

A. Conclusion

According to the research conducted at Assessment and Development Information Technology Units Brawijaya University, related with local network management, it is concluded that :

1. The implementation of network management functions in local area network management is bring big impact do the stability of the network. However thus must be supported with the policies and each functions measurements to maximize the capability from each functions that applied.
2. Each network management component are connected and supporting each other in the process of management local area network. The work tools is exist to maximize the network management components performances in managing the local area network management.

B. Suggestion

A suggestion that can be given in order to improve the local area network management at Assessment and Development Information Technology Units Brawijaya University are listed below :

1. In order to maintain the network performances the implementation of the network management functions is needed more improvements and also a work procedure based on each functions related with the operational activity will be make the work of each functions more effective and efficient.
2. In order to maintain the stability of the network the backup server/system to support the main server when the network traffic become so busy to avoid overload in the server.

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