

# Design and Implementation of Client Server Network Management System for Ethernet LAN

Ms. MAY PAING PAING ZAW and Ms. SU MYAT MARLAR SOE

**Abstract**—Network Management Systems have played a great important role in information systems. Management is very important and essential in any fields. There are many managements such as configuration management, fault management, performance management, security management, accounting management and etc. Among them, configuration, fault and security management is more important than others. Because these are essential and useful in any fields. Configuration management is to monitor and maintain the whole system or LAN. Fault management is to detect and troubleshoot the system. Security management is to control the whole system. This paper intends to increase the network management functionalities including configuration management, fault management and security management. In configuration management system, this paper specially can support the USB ports and devices to detect and read devices configuration and solve to detect hardware port and software ports. In security management system, this paper can provide the security feature for the user account setting and user management and proxy server feature. And all of the history of the security such as user account and proxy server history are kept in the java standard serializable file. So the user can view the history of the security and proxy server anytime. If the user uses this system, the user can ping the clients from the network and the user can view the result of the message in fault management system. And this system also provides to check the network card and can show the NIC card setting. This system is used RMI (Remote Method Invocation) and JNI (Java Native Interface) technology. This paper is to implement the client/server network management system using Java 2 Standard Edition (J2SE). This system can provide more than 10 clients. And then this paper intends to show data or message structure of client/server and how to work using TCP/IP protocol.

**Keywords**—TCP/ IP based client server application

## I. INTRODUCTION

THIS paper intends to manage fault, configuration and security management, to track the client/server information, to design the system using TCP/IP protocol, to show data or message structure of client server network, to detect hardware and software port of the server, to detect USB port and how to work using TCP/IP protocol. This paper is used TCP/IP based client server application. Client/Server network uses a network operation system designed to manage the entire network from a centralized point, which is the server. Clients make requests of the server and the server responds with the information or access to a resource.

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Client/Server networks have some definite advantages over peer-to-peer networks. It is easier to find files and resources because they are stored on the server. Also have much tighter security. All usernames and passwords are stored in the same database (on the server), and individual users can't use the server as a workstation. The server holds the database of user accounts, passwords, and access rights [1].

Hardware requirements of this system are Processor P3 (Recommend), Memory 256 (Recommend), USB port and Ethernet NIC. Software requirements of these systems are Window XP / 2000 / 2003, JDK 1.5, jUSB.dll and undocumented communication API of java network. If the user wants to connect many personal computers as LAN or Enterprise LAN, the user will use interconnecting devices such as hub, switch or other devices with Ethernet NIC.

## II. METHODOLOGY

### A. Network Management System

A network management system is used to design, organize, analyze and administer computer and telecommunication networks, in order to maintain a desired level of service at all times. Network management refers to the maintenance and administration of large-scale computer networks and telecommunications networks at the top level. Network management is the execution of the set of functions required for controlling, planning, allocating, deploying, coordinating, and monitoring the resources of a network, including performing functions such as initial network planning, frequency allocation, predetermined traffic routing to support load balancing, cryptographic key distribution authorization, configuration management, fault management, security management, performance management and accounting management [2].

Network management systems include five functional areas. These are configuration management, fault management, performance management, security management and accounting management. The primary purpose of configuration management is to keep track of the configuration of the entire LAN, the connection status of the devices that make up the LAN and the transition of connection status. And configuration management is to monitor network and system configuration information so that the effects on network operation of various versions of hardware and software elements can be tracked and managed. Fault management is to detect, isolate, notify users of, and correct faults encountered in the network and automatically fix network problems to keep the network. Security management is to control access to network resources according to local guidelines so that the network cannot be sabotaged (intentionally or unintentionally)

and sensitive information cannot be accessed by those without appropriate authorization. Accounting management is to measure network utilization parameters so that individual or group uses on the network can be regulated appropriately [3].

#### A. Local Area Network (LAN)

In general terms, LAN (Local Area Network) refers to a group of computers interconnected into a network so that they are able to communicate, exchange information and share resources (e.g. printers, application programs, database etc). In other words, the same computer resources can be used by multiple users in the network, regardless of the physical location of the resources. Each computer in a LAN can effectively send and receive any information addressed to it. This information is in the form of data 'packets'. The standards followed to regularize the transmission of packets, are called LAN standards. There are many LAN standards as Ethernet, Token Ring and FDDI etc. Usually LAN standards differ due to their media access technology and the physical transmission medium [4].

#### B. Overview of the Client Server Network Communication System

The client server network communication system is implemented by using java programming language for application interface and use to detect the network feature and use java serializable interface method to store the message of the system and important data of the system. And this system use the java communication package for detecting network card and network devices and network ports and other undocumented devices and software. So this package is called as undocumented package and this system can detect the USB ports and devices [5].

Sun Micro Systems are developing this package for Linux platform and not for Microsoft platform. But this result includes the system which can detect the USB ports and devices on Microsoft platform. This package is third party package but it is open source package.

### III. TESTS AND RESULTS

In this system, there are two main components such as server program which is listening to the entire request of the clients and clients which are sending request to server. In the server program, there are three main modules which are configuration management, fault management and security management. In the configuration management, all of the message of the client's request and show how the server is sending data with how many channels and moreover from the server side, the user can detect the USB port and device and detect of the server machine ports which are software ports and hardware ports. In the fault management, this system can trace which invalid user is connecting and connected and user authentication and so on. In the security management, this system provide for the proxy feature and user management feature.

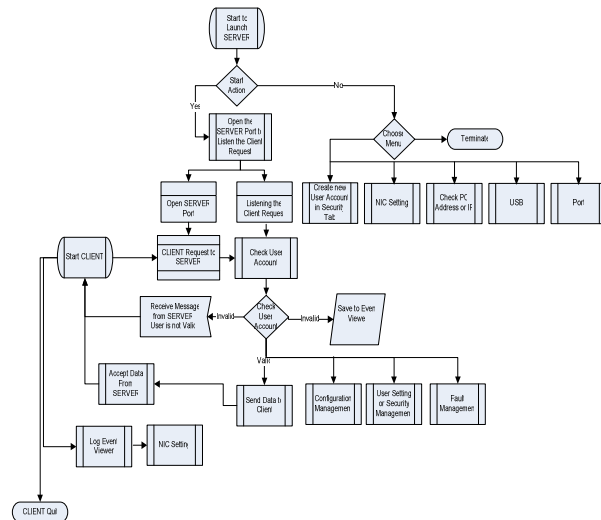


Fig. 1 Overall Flowchart of Client Server Network Management System for Ethernet LAN

When the server is start up, the system creates a server socket. There are two options, first is to detect the serial port and another is to detect USB. This system supposes to detect that USB device and port, hardware port and software ports. Some software is used on server, so the system shows which ports are used by that software and detect USB port and device. After creating a new socket, the server check client's IP address. And also check which client is on network. If the client is on network, request to client and decide should permit or not.

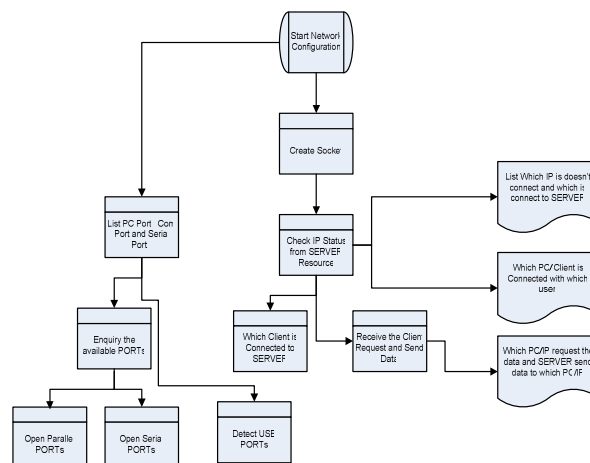


Fig. 2 Configuration Management System Design

In fault management system design, this system can track the all of the fault event of the client server network management system. In this design, provide the user authentication fault and network card fault. First this system can check the IP address of the clients from the server and it can show which IP is on the network and which is not. It can detect the network card setting, can report all of the status of the NIC card and can store of the fault data of the network

system, NIC card and IP address information. When the server pings to the client, if the client is exist on the network, this system shows the reply message of the client; all of these events are stored in the database and can view these data at anytime.

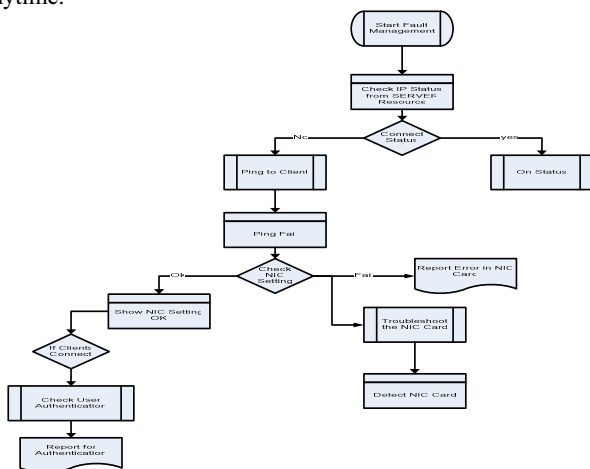


Fig. 3 Fault Management System Design

In security management system design, the system will check all of the user which will connect from the clients and if this user is valid user of the system, the server will allow to enter the server and if invalid user will connect the system cannot accept and resend to the client that the user is invalid and all of these messages are kept in the database file. Moreover, there is the user management function to disable or enable the user account in this system. If the disable user will connect from client to server, this system will send the message to the client that the client is connecting the server with the disable user. These messages will save to the data file with the detail time. So the system can view the message of the security that which client is connected to the server with which user at when. This system can provide the proxy server feature and save the track of the proxy server message in the data file.

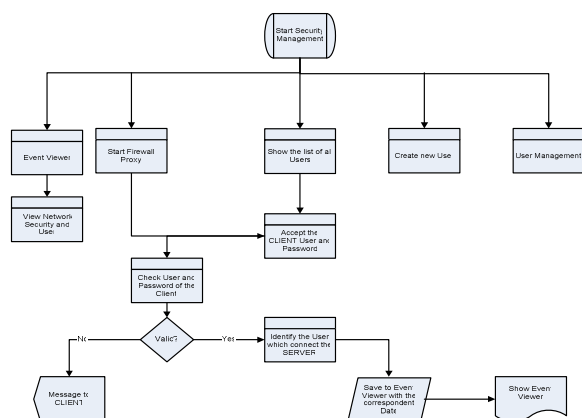


Fig. 4 Security Management system Design

The client/server network communication system can be started by lunching of the Data Server. Java program is shown in Fig.5.

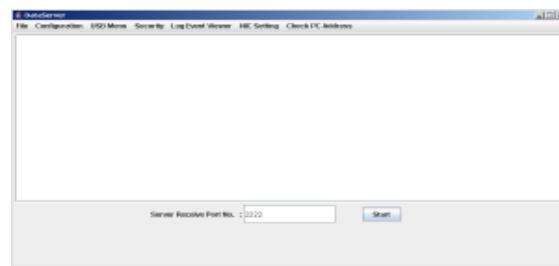


Fig.5 Data Server Screen Form

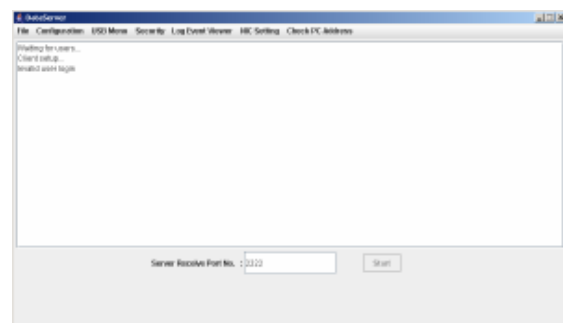


Fig.6 Starting the Server Design

In fig.5, there is a text box to enter the port number of the server to listen the connection and accepting the responses of the clients. So the user can type in this text box to open the port number which is wanted to listen. And then the server will start when the start button is pressed. In this screen, there are seven menus and in each menu there are sub menu. They are File, Configuration, USB Menu, Security, Log Event Viewer, NIC Setting and Check PC Address menu. In fig. 6, when the user want start the server, press start button and the server will start and listen all request of the client.

When the user wants to start the client program, the user must be run the client program. The client program will run shown in figure.

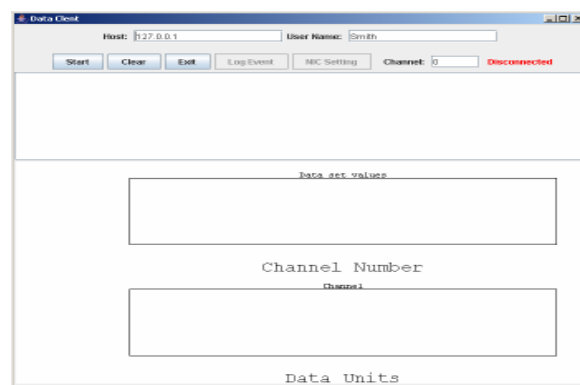


Fig. 7 Starting the Client Design

### A. Test and Result of Configuration management



Fig. 8 Configuration Management Design

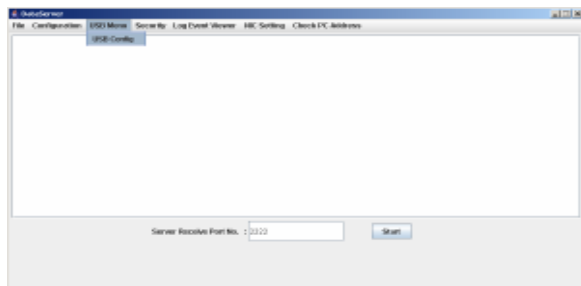


Fig.9 USB Configuration Program

In fig.8, user can check the ports of the server machine and how many ports are open in the server machine. This node shows only the serial and parallel ports at the right side of the frame. And when the lower port node is clicked, the program will scan all of the ports number from 0 to 1024 and list to show which ports are using which software and which ports are free at the right side of the screen. High port node are also displayed the ports from 1025 to 65536 which ports are used by which software. NIC node works for showing the NIC card setting of the server machine.

In fig.9, the USB port detecting program and USB configuration listing program will show when USB Configuration sub menu will be clicked.

### B. Test and Result of Fault Management

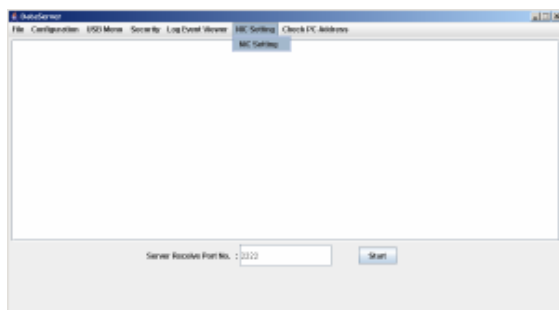


Fig. 10 NIC Card menu

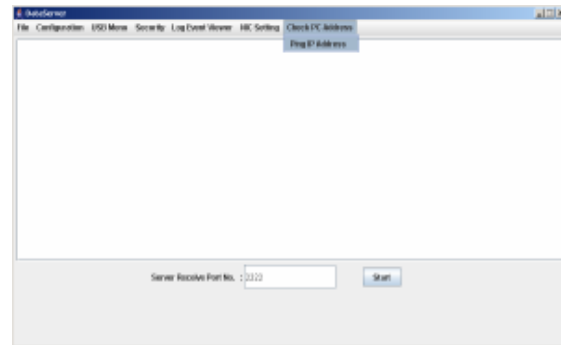


Fig. 11 IP Ping Program Menu

In fig.10, NIC setting checking program will show when the NIC setting sub menu will be clicked. In fig.11, PC address checking program will show when the Check PC Address sub menu will be clicked.

### C. Test and Result of Security Management

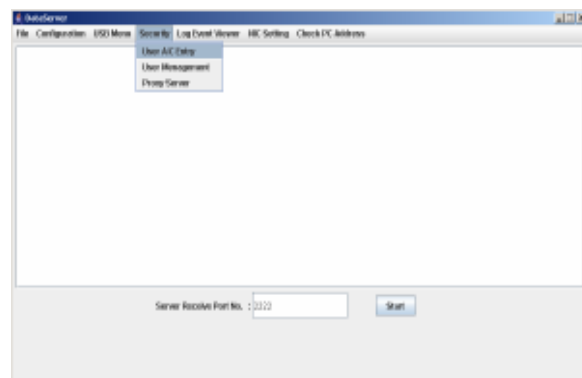


Fig.12 Security Management Menu

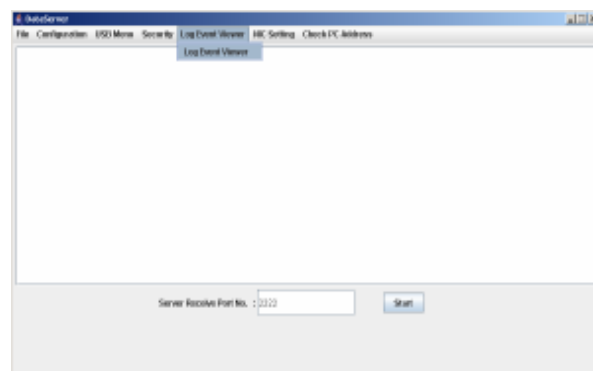


Fig.13 Log Event Viewer Menu

In fig.12, there are three sub menu of the security feature such as user Account Entry and user Management and proxy Server menu. From fig.13, log event viewer program will load and show all of the events. There are three type of the log event viewer such as Network, Security and User.

#### IV. CONCLUSION AND RECOMMENDATION

In this client server network implementation system, the server can listen all of the requests of the clients and response to the clients. And this system can provide the more than 10 clients and the server listens port can be changed easily in the port text box. It can also detect that USB device and port, hardware port and software ports. Moreover, this system can provide the security feature for the user account setting and user management and proxy server feature and all of the history of the security such as user account and proxy server history are kept in the java standard serializable file. So the user can view anytime the history of the security and proxy server. And the user who uses this system can ping the clients from the network and he/she can view the result of the message. This system also provides to check the network card and can show the NIC card setting. When the server is start up, the server listens to the client's request and can show the message about which client can connect with which user and which client cannot connect. In the client server configuration message window, the user can see which client is connecting with which client port and which client is doing how many data channels. The data channel is to send the data between the client and server. So user can see which client is requesting the data with how many data channels.

At the client program side, there are two text boxes to enter the server IP address and the user name to connect the server. This user name must be valid user name which has already been registered in the server. And when the client is started up and connected to the server, the client requests the server with the user name. If the server accepts the request, the response message of the server will show at the display area of the client. And the server also shows the message of the client is connecting with how many data channels to server. All of these network configuration messages are stored in the java file and the user can view them at anytime. This system is suited to use in the client server network system with java environment because all of the programs in the system are developed by java language and native file. So in the client server data sending environment and client server messaging environment, this system can give fully support and particularly for the USB data access, this system can support the USB ports and devices to detect and read devices configuration.

In this system, the data sending and accepting function of USB is not implemented. So the next paper should include this function and this system cannot show exactly which software or server is using which port of the server. This system show which port is using by the software and which is free. It does not show the detail of which software or server is uses the port of machine. So the next paper should include the detail of which software is using which port. In the security function, this system does not implement the function of which user has to invoke which service of the server and user level. So in the next paper, the user level function should include.

In this system, there is no function for detail of detecting the network card and if the network card fails and out of order, this system cannot remove the network card or reinstall it. So based on this paper, one can upgrade the system

which can do these two options such as reinstallation and removing the network card. In the security feature, this system cannot use the user's own security method so if there is a next project which is based on this thesis, user can add own security method and feature to be more secure. Now this system is using the java default security feature. And in the user account setting feature, this system misses adding the user role and user account setting. So in the next paper, if this feature will be upgraded, that system will be more efficient. This paper is also aimed to extend the Java USB API for the Windows Operating System. Monitoring facility of the universal serial bus with the Java USB API is working completely but the goal could not be reached a part of the jUSB project is working.

#### ACKNOWLEDGMENT

Firstly, the author would like to express her special deep gratitude to Dr. Khin Mg Aye, Rector, and West Yangon Technological University for granting to perform this thesis.

The author is greatly indebted to her chairman and supervisor Dr. Htun Htun, Lecturer and Head, Department of Information Technology, West Yangon Technological University for her supervision, suggestion and constructive advice.

The author would like to express her deep sense of gratitude to Daw Khin Kyu Kyu Win, Lecturer, Department of Electronic Engineering, and West Yangon Technological University for her kindly helpful suggestion, advice and encouragement.

The author also wishes to extend special thanks to Daw Aye Aye Tun, Lecturer, and Department of Electronic Engineering West Yangon Technological University for her helpful suggestion to complete this paper perfectly.

The author would like to express her deepest gratitude to her external examiner, Daw Lei Lei Yi, Deputy Director, Myanma Scientific and Technological Research Department, for her interest and guidance.

The author especially appreciates and thanks all her teachers for their support and guidance during theoretical study and thesis preparation.

Furthermore, the author would like to express her indebtedness and deep gratitude to her beloved parents, for their kindness, support and understanding during the whole course of this work and encouragement to attain her ambition without any trouble. Finally, the author would like to thank all people who helped directly or indirectly towards the completion of this thesis.

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