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Designing and Building An Application Configuration of Open DHCP Server and Proxy based on Client Server

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Abstract
Today the need for computer network access is high including in the Laboratory of Computer Network, Study Program of Informatics, State Polytechnic of Malang. Administrator has task to distribute the IP (Internet Protocol) addresses to the client computers to make connection with server/internet. The IP addresses giving to clients manually make difficult for administrator to regulate the IP addresses management and to identify the broadcasted IP address. The absence of bandwidth regulator make the bandwidth distribution to the clients is not even. The research aimed at design and build the application configurations of Open DHCP Server and Proxy Server that serve to give IP addresses automatically and bandwidth setting at the network model of client server with graphical display. The application was made by using java programming language with the support of open source software of Open DHCP Server and Squid for services file configuration. After application system trial, the application software able to replace the text commands that are inputted into configuration file become the graphical display. The application also able to give dynamic IP addresses to the clients and to regulate the bandwidth usage, view and IP block.  
Keywords : DHCP Server, Proxy, IP Addresses, Bandwidth

I. INTRODUCTION
The need of computer network access today is high including in the Laboratory of Computer Network, Study Program of Informatics, State Polytechnic of Malang. In the computer network, there is IP address distribution by administrator to the client computers to connect with the server/internet. Many network administrators distribute and give the IP addresses to the clients manually so the administrators get difficulty to regulate the IP addresses and identify the broadcasted IP addresses. The absence of bandwidth regulator make the bandwidth distribution to the clients is not even.

In the computer network, the term of DHCP (Dynamic Host Configuration Protocol) Server has been heard widely and also its incredible development. The application of DHCP Server and Proxy able to give IP automatically to the clients. By connecting the facilities of View IP and Block IP into DHCP Server that serve to know which IP that has been received by clients, to block IP, and for bandwidth setting of the network will facilitate the network administrator tasks to the server.

The research about automatic IP address giving that ever been done is the IP Addressing Concept By DHCP Server at The Microsoft Windows NT Server 4.0 that done by Heri Sismoro in 2001 (Scientific Journal of DASI, Vol. II. No.1. March 2001). Because of that, the research will make an application software with title “Designing and Building An Application Configuration of Open DHCP Server and Proxy based on Client Server”. The application is expected able to facilitate the network administrator in giving the IP addresses and to regulate the bandwidth capacity at clients.

II. LITERATURE REVIEW

Computer Network
Computer network is group of computers that interconnect one another through communication protocol and communication media so the computers able to share information, programs; to share hardware such as printer, hard disk, and etc.

Figure 1. Computer Network
teleconference or sending message or other important information.

**IP Address**
According to Agus Kurniawan (2011:10). Each host has IP address to identify host in connecting process in the TCP/IP Network. While in each IP address contains Network ID and Host ID: Network ID shows the location of the system in the IP router in the similar network.

Host ID, also known as workstation, server, router, and host of other TCP/IP in a network. An IP address consist of 32 bits that works in time series. From the 32 bits divided into 8 bits known as octet an each octet is converted into decimal between 0 to 255.

**DHCP Server**
Dynamic Host Configuration Protocol (DHCP) is client server architecture based protocol that used to facilitate the allocation of IP address in a network. A local network that does not use DHCP should give IP address to each computer manually. If DHCP is installed in the local network, then all computers that are connected to the network will get IP address automatically from the DHCP server. Beside IP address, many network parameter that can be given by DHCP, such as default gateway and DNS server.

**Work Procedure of DHCP**
Because DHCP is protocol that uses client server architecture, then in the DHCP there are two parties involved, DHCP server and DHCP client.

DHCP Server is a machine that run the service that able to “rent” IP address and other TCP/IP information to all requesting clients. Some network operation system such as Windows NT Server, Windows 2000 Server, Windows 2003, or GNU/Linux have service like this.

DHCP Client is client machine that run the DHCP client software that enable to communicate with DHCP server. Most operating system of network client (Windows NT Workstation, Windows 2000 Professional, Windows XP, Windows Vista, or GNU/Linux) have software like this.

**Open DHCP Server**
Open DHCP Server is an open source application that provides dynamic services IP address to the client.

Open DHCP Server has features as follows:
- Able to create range IP address up to 125 range IP address
- Able to create static IP address to the destined MAC address

**Proxy**
Blears Will (2008:2). Proxy is a server computer that acts as intermediary between client and internet. For analogy, proxy as intermediary between first party (client) in connecting with the second party (internet), so when client accesses internet then proxy as the intermediary that will delivery the request from client to the internet or vice versa. In here client connect indirectly with internet but by using intermediary the proxy server client able to connect with internet access.

There are three processes of Proxy Server:
1. **Sharing.** Where all clients able to interconnect simultaneously to proxy server and able to access internet simultaneously through the proxy server.
2. **Caching.** All of the client requests can be stored in long term by proxy server in the cache proxy, so when the client want to access the same site or content, proxy does not need to contact the address that provides the contents, so client able to access the content from cache in the proxy.
3. **Filtering.** Proxy can be regulated to do content filtering – undesirable contents such as porn, gamble, racist, phishing, huge bandwidth content, etc. so all clients unable to access the contents.

Proxy function is to determine which client that able to access internet, distribute, and limit the bandwidth of the client, limit the download, regulate the access to certain site in certain time.

**III. SYSTEM DESIGN**
The network model that is implemented in the application is star topological model, that refers to client server network. By adapting with the existing model in the laboratory.

**Figure 4.2. Model of Application Network**

**Explanation:**
1. There is server that regulates and distributes information to the connected clients in the network.
2. There is hub that serve to connect server with clients.
3. There is client that connect with network to get information from server

**Use Case Diagram**
Use Case is function description of system from the user perspective. Use Case works by
describing typical interaction between user of system with the system itself through a story how the system is used. The series of steps that explain between the user and system called as scenario.

Use case Diagram application of DHCP Server and Proxy.

Figure 3. Use case Diagram application of DHCP Server and Proxy

Explanation:
A. Network administrator
1. Control program: administrator able to make IP address at the DHCP Server application and configuration of bandwidth parameter at the proxy.
2. Program facilities: program facilities that integrated into DHCP server and proxy are tools to look at the broadcasted information of IP and to block the IP address.
   a. View of IP address is administrator tool that able to know the broadcasted information of IP to the client, that is the made range IP address.
   b. IP address block is administrator tool that able to block the IP address that distributed to the clients.
3. Setting bandwidth is used to regulate the required bandwidth, that will be assumed to the client computer that connect to DHCP server that has been made.

B. Client
Request IP Address: Client request IP address to server, after Range Pool IP address by administrator.
- DHCP DISCOVER: DHCP client broadcast to request to find active DHCP Server.
- DHCP OFFER: After active DHCP Server get broadcast from DHCP Client, DHCP server then offer a IP Address to DHCP client.
- DHCP REQUEST: Client request DHCP server for rent one of IP Address in range DHCP Pool to DHCP Server.
- DHCPACK: DHCP server will given the response Client by sending massage acknowledgment. The last, DHCP Server fixed a IP Address (and another TCP/IP configuration) to client Client.

Hardware dan software Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Server</th>
<th>Client</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sistem Operasi</td>
<td>Windows XP</td>
<td>Windows XP</td>
</tr>
<tr>
<td>Processor</td>
<td>Pentium 4 – 1.8 GHz</td>
<td>Pentium 4 – 1.8 GHz</td>
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<td>Memory RAM</td>
<td>1 Gb</td>
<td>128 Mb</td>
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<tr>
<td>Harddisk</td>
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<td>30 Gb</td>
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<td>VGA</td>
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<td>128 Mb</td>
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<td>LAN Card</td>
<td>LAN On-Board 100 Mbp/s</td>
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<td><strong>Software</strong></td>
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<td>Hardware</td>
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<td>NetBeans IDE 6.8, Java, Open DHCP Server, Squid 3.0</td>
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IV. RESULTS

Dinamyc IP
Before server give a IP adress to client, the first step is setting DHCP server, to input range IP, Subnet Mask, DNS Server, Gateway and time Lease, bellow is shown the result.

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Figure 5. Static IP address client from DHCP server

After squid Proxy is run successfully, then fill the bandwidth parameter that will be accumulated. The regulation is done based on Minimum Rate and Maximum Rate, then the bandwidth quota amount that will be received by client only as many as regulated by the administrator.

Block IP
To block the certain client’s IP by filling the Name ACL with the name of client computer and also...
client’s IP address. Then at the access section, there is option of Allow (permitted to access internet) and Deny (not permitted to access). Select Deny to try whether the client able to connect or not.

**Figure 11. The regulation of Block IP**

After the client’s IP is blocked, then the try to the client to open browser and open browser. The results, client unable to open the website.

**Figure 12. Results of IP blocking at the client browser**

**V. CONCLUSION**

The application design of DHCP Server and Proxy at Client Server gives benefit for the network administrator to manage client server network with graphical display that serve to give dynamic IP address to the client and regulate the bandwidth by using proxy, and block IP to the client. While for view IP, still uses command prompt.

**VI. SUGGESTIONS**

The application design of DHCP Server and Proxy at Client Server is expected can be perfected by adding other functions and features such as view IP address that still based on command prompt to make it graphical based and developed in other OS such as Linux.

**REFERENCES**


