Computer Networks, IT-304
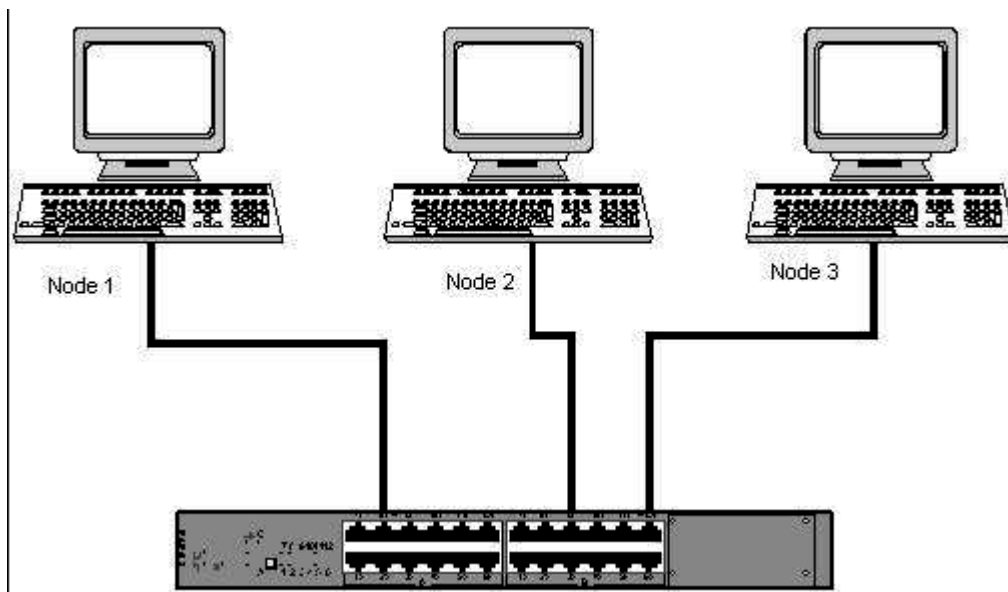
Autumn Semester 2012

Lab-3A

Dynamic Host Configuration Protocol (DHCP)

Objective: To set up DHCP and understand iptables

Resources: Linux OS, 3 PC's, Hub

DHCP Theory

IP addresses assignment

Static Address Assignment - Static IP address is assigned to the machines either during installation of the Operating Systems or later using Network Configuration tools. In case of post-installation configuration, either netconfig or ifconfig or /sbin/setup can be the possible candidates. The problem with this method is that, there is a greater probability of duplication.

Dynamic Address Assignment - DHCP enables the clients in the network to get their IP addresses as well as information about the network parameters assigned by the DHCP server on the network. In case of DHCP, the dynamic address is given when the client boots once its

configured for DHCP. This means that, every time the IP address of the machine may not be the same. DHCP assigns the IP address to the client from its pool of addresses.

The Dynamic Host Configuration Protocol (DHCP) provides configuration parameters to Internet hosts. DHCP consists of two components: a protocol for delivering host-specific configuration parameters from a DHCP server to a host and a mechanism for allocation of network addresses to hosts.

DHCP is built on a client-server model, where designated DHCP server hosts allocate network addresses and deliver configuration parameters to dynamically configured hosts.

DHCP supports three mechanisms for IP address allocation.

Automatic allocation - DHCP assigns a permanent IP address to a client.

Dynamic allocation - DHCP assigns an IP address to a client for a limited period of time (or until the client explicitly relinquishes the address).

Manual allocation – A client's IP address is assigned by the network administrator, and DHCP is used simply to convey the assigned address to the client. A particular network will use one or more of these mechanisms, depending on the policies of the network administrator.

Dynamic allocation is the only one of the three mechanisms that allows automatic reuse of an address that is no longer needed by the client to which it was assigned. Thus, dynamic allocation is particularly useful for assigning an address to a client that will be connected to the network only temporarily or for sharing a limited pool of IP addresses among a group of clients that do not need permanent IP addresses. Dynamic allocation may also be a good choice for assigning an IP address to a new client being permanently connected to a network where IP addresses are sufficiently scarce that it is important to reclaim them when old clients are retired. Manual allocation allows DHCP to be used to eliminate the error-prone process of manually configuring hosts with IP addresses in environments where (for whatever reasons) it is desirable to manage IP address assignment outside of the DHCP mechanisms.

DHCP defines mechanisms through which clients can be assigned a network address for a finite lease, allowing for serial reassignment of network addresses to different clients. Also, DHCP provides the mechanism for a client to acquire all of the IP configuration parameters that it needs in order to operate.

Configuration

Configure node2 to act as a DHCP server.

Procedure

1.Untar the tarball: tar -zxvf dhcpd-4.0.2-P1.tar.gz .
(do it in /root)

2.Read the README file

3.cd dhcpd-4.0.2-P1

4../configure

5.make

6.make install

Now you need to configure dhcpd .Search dhcp folder in /etc, if found, then edit or create dhcpd.conf in /etc/dhcp, otherwise create or edit /etc/dhcpd.conf.

Configure it by following instructions given below. Most commonly what you want to do is assign IP addresses randomly. This can be done with settings as follows:

```
# Sample /etc/dhcpd.conf or /etc/dhcp/dhcpd.conf

# (add your comments here)

default-lease-time 600;

max-lease-time 7200;

option subnet-mask 255.255.255.0;

option broadcast-address 192.168.1.255;

option routers 192.168.1.254;

option domain-name-servers 192.168.1.1,
192.168.1.2;

option domain-name "daiict.ac.in";

subnet 192.168.1.0 netmask 255.255.255.0 {

range 192.168.1.10 192.168.1.100;

range 192.168.1.150 192.168.1.200; }
```

This will result in DHCP server giving a client an IP address from the range 192.168.1.10-192.168.1.100 or 192.168.1.150-192.168.1.200. It will lease an IP address for 600 seconds if the client doesn't ask for specific time frame. Otherwise the maximum (allowed) lease will be 7200 seconds. The server will also "advise" the client that it should use 255.255.255.0 as its subnet mask, 192.168.1.255 as its broadcast address, 192.168.1.254 as the router/gateway and 192.168.1.1 and 192.168.1.2 as its DNS servers.

When client boots, it will request an IP from DHCP server. The client will request the IP again once the validity period (lease-time) ends. It will get the same old IP again. Suppose we turn off the client machine. If client boots before the validity period ends, it will get the same IP. If client machine boots after the validity period, it will get the same IP only if it is available. Otherwise, it may get a different IP. To implement automatic allocation, keep the validity period very high.

Starting the server

Create a `dhcpd.leases` files. This file is used by dhcpd to store information about current leases. .

To create `dhcpd.leases` type:

vi /var/db/dhcpd.leases

This will create an empty file (file size = 0). You do not need to make any changes to the leases file it will be manipulated by the dhcpd. If you get a message saying that file exists simply ignore it and go to the next step.

You can now invoke the DHCP server.

cd dhcpd-4.0.2-P1/server

./dhcpd eth0

This will invoke dhcpd on eth0 device. If you want to invoke it on another device simply supply it on the command line

To verify that everything is working fine you should first turn on the debugging mode and put the server in foreground. You can do this by typing

./dhcpd -d -f eth0

Then boot up one of your clients and check out the console of your server. You will see a number of debugging messages come up. If everything works out fine you are done

Quit dhcpd (Ctrl + C) and start it without the -d -f and arguments.

Lab assignment: Try configuring the dhcpd by adding the configuration options in /etc/dhcpd.conf. Check the assignment of the addresses with 1 server and 2 clients connected through a hub. Check out whether the combinations of above options and result are consistent.

Output :

1.Steps followed in setting up a DHCP.

2. Name of the file(s) you have modified (if any).

3.Note the modification(s) (if any) done to the file(s).

4.The necessary tests that you performed to check if the DHCP works.

Sample Questions:

Q1.What is the difference between static IP address and dynamic IP address.?

Q2.What do you mean by lease time of dynamically assigned IP address? How its value is governed?

Q3.How can one bind an IP address to a MAC address?

References:

- [DHCP mini-HOWTO](#)
- http://www.astahost.com/info.php/howto-setup-dhcp-server-linux_t2602.html