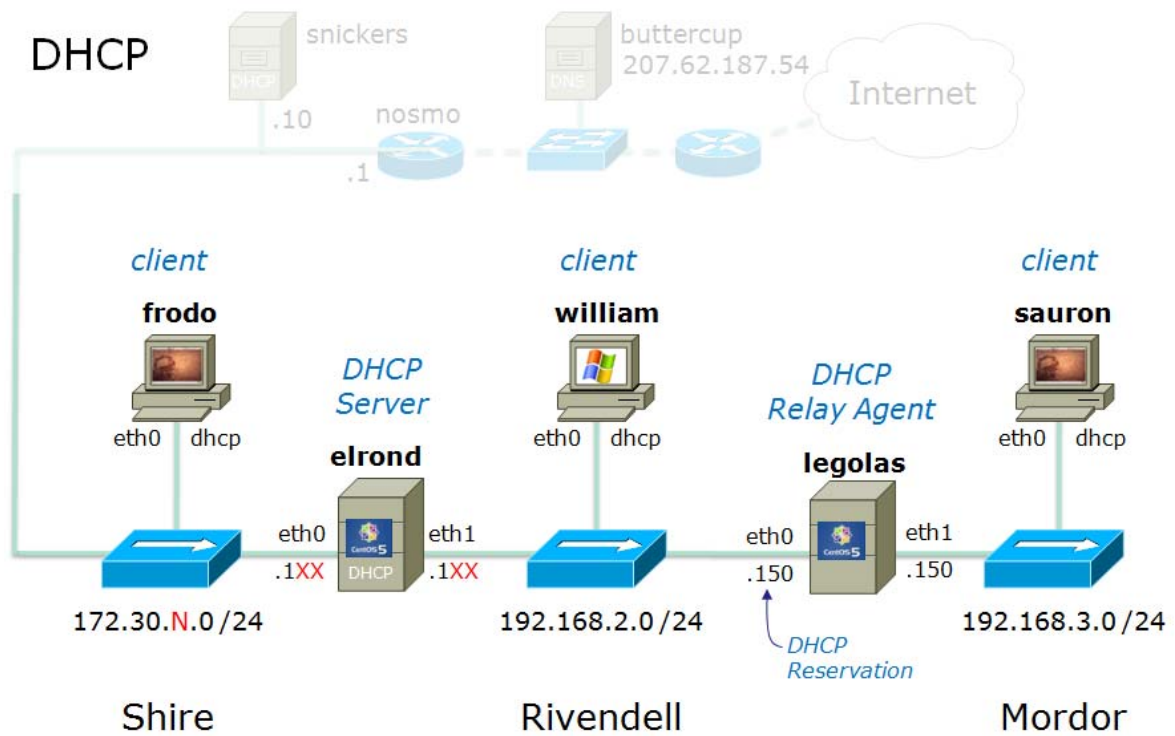


CIS 192 Linux Lab Exercise

Lab 6: Dynamic Host Configuration Protocol Spring 2009

Lab 6: Dynamic Host Configuration Protocol

The purpose of this lab is to configure a DHCP server for several subnets. You will configure additional options along with an IP address and netmask, and you will configure a host reservation to guarantee that a particular host will always get a specific IP address. You will also configure a relay agent for relaying IP addresses from your server to clients in Mordor, the 192.168.2.0 network.



.1XX is based on your station number and the IP Table in the appendix
 N=1 for the classroom and N=4 for the CIS lab or CTC

Supplies

- VMWare Server 1.08 or higher
- 192 VMs shown above

Preconfiguration

- Original versions of all VMs. Note, this will set the network configurations back to down or DHCP settings.
- You will need access to a DHCP server to assign addresses for the 172.30.N.0/24 network. This is already configured if the lab is done using the CIS VMware Stations in the CIS Lab (room 2504) or the CTC. If you plan to do this lab at home see: <http://simms-teach.com/howtos/129-working-at-home.pdf>

Forum

Use the forum to ask and answer questions, collaborate, and report any equipment issues. Post tips and any lessons learned when you have finished. Forum is at: <http://simms-teach.com/forum/viewforum.php?f=18>

Procedure

Read through the entire lab before proceeding with the individual steps so that you know what your objective is. You may decide which VMnets to use for this lab. Draw a picture of the network.

The new commands/daemons we will be using for this lab are:

- dhcpd
- dhclient
- dhcrelay

The configuration of the DHCP service will require root access.

Setup

1. Revert VMs back to the original state.
2. Permanently join Elrond to the Shire network using a static IP address based on your station number from the IP table in the appendix.
3. Install the dhcp package on Elrond with: **yum install dhcp**
4. Temporarily join Legolas to the Shire network and install dhcp as you did with Elrond.
5. After the DHCP service has been installed on Elrond and Legolas, cable the VMs according to the diagram above.
6. Configure Legolas eth0 for DHCP and eth1 as shown in the diagram.
7. Frodo, Sauron, and William should be configured for DHCP. You can power them back down for now. They will be used to test getting addresses from the DHCP server.

Part I

Choose Elrond as your Rivendell-Shire router and DHCP server.

1. Configure Elrond to forward packets between the Shire and Rivendell networks.
2. Choose Legolas as your reservation client. This client will be configured as the router/relay agent into Mordor in Part III.
3. Now, use the **ifconfig** command to obtain Legolas' eth0 hardware (MAC) address. Record this address.

8. On Elrond, verify that the dhcp package is installed:
rpm -qi dhcp
 You should see that dhcp-3.0.5-13.el5 or later is installed.
9. Now copy the file /usr/share/doc/dhcp*/dhcpd.conf.sample to the /etc directory renaming it to dhcpd.conf
10. You will now edit this configuration file; be careful not to lose any of the terminating semicolons.
11. You will create two subnet scopes: one for Rivendell and one for the Shire.
12. Update the following fields in these scopes:
 - the subnets you are working on are 192.168.2.0/24 and 172.30.N.0/24
 - default gateway (option routers) = 172.30.4.1 for the Shire and 192.168.2.1XX for Rivendell.
 - Comment out the NIS Domain entry
 - the option domain-name = Shire and Rivendell
 - the option domain-name-servers = 207.62.187.54
 - Update the option time-offset to reflect Pacific Standard Time (or Daylight Savings Time)
 - For Rivendell, make the range of IP addresses from 50 to 99.
 - For Shire, make the range of IP addresses **using the DHCP IP allocation pools table in the appendix so conflicting IP addresses are not assigned.**
 - Edit the reservation in the Rivendell subnet of the /etc/dhcpd.conf file:

```

host legolas {
    hardware ethernet 00:0c:29:xx:xx:xx;
    fixed-address 192.168.2.150;
}

```

13. Save the above changes to /etc/dhcpd.conf.
14. Check for the existence of the DHCP Server's database dhcpd.leases file in the /var/lib/dhcpd directory. If not present, create it with:
touch /var/lib/dhcpd/dhcpd.leases

Part II

You are now ready to start your DHCP server.

1. Start the DHCP service with
/etc/init.d/dhcpd start
 or **service dhcpd start**
2. If this command FAILS, then review the /var/log/messages file. You must re-edit /etc/dhcpd.conf, fix any mistakes, and try again.
3. If the DHCP daemon starts up successfully, you are ready to test the service.
4. Power on Frodo, what IP address did you get? Note: there is another DHCP server on the 172.30.4.0 subnet, so Frodo may obtain an address from the other DHCP server. How will you know? (Hint: the other DHCP server's pool of addresses is from 150 - 199).
5. On Frodo, release the current DHCP address with **dhclient -r**, then request again with **dhclient**.
6. On Frodo, use **ifconfig**, **route -n** and **cat /etc/resolv.conf** to verify IP settings, default gateway and DNS have been set up properly.
7. Power on William, use **ipconfig /all** to see the IP address you got. Use **ipconfig /release** and **ipconfig /renew** to release and then request a new DHCP address.

8. On William, use **ipconfig /all** to verify IP settings, default gateway and DNS have been set up properly.
9. On Legolas, do a service network restart. Does Legolas get it's reserved IP address?
10. On Legolas, do a **dhclient -r eth0** followed by a **ifconfig eth0** to release then request a new DHCP address.
11. On Legolas, use **ifconfig**, **route -n** and **cat /etc/resolv.conf** to verify IP settings, default gateway and DNS have been set up properly.
12. On the clients, the lease and reservation will be recorded in the client database file:
 Frodo (Ubuntu 8.10): /var/lib/dhcp3/dhclient.leases
 Legolas (CentOS 5.1) /var/lib/dhclient/dhclient.leases
 Note that this information records the address of the DHCP server that handed them out.
13. You should also look at the DHCP Server's database file for a recording of the leases and their expiration dates. Note the comment about UTC and Greenwich Mean Time.

Part III

Add a third subnet to your DHCP Server and configure Legolas as a DHCP Relay agent allowing the clients on the Mordor network to obtain IP addresses from your DHCP Server.

Note: a Relay agent is a router service and cannot also be the DHCP server.

1. Add a subnet for the 192.168.3.0 addresses to your DHCP server's dhcpd.conf file.
 - Use the range: 192.168.3.50 to 192.168.3.99
 - The domain-name option should be Mordor
 - The router option should be: 192.168.3.150
 - You do not need to specify a reservation for this subnet.
2. Before restarting your DHCP server, add a static route for the Mordor network to Elrond's routing table. Your relay agent will be your gateway into Mordor.
3. Restart your DHCP server.
4. Setup Legolas to be the Rivendell-Mordor router. Use 192.168.3.150 as its eth1 address to Mordor. (It already has its reservation for eth0.)
Don't forget to turn on IP forwarding.
5. Before starting your dhcrelay server, you will need to edit the dhcrelay configuration file:
 /etc/sysconfig/dhcrelay
 assign the two shell variables in this file:
 INTERFACES="eth0 eth1"
 DHCPSEVERERS=192.168.2.1XX
 The DHCPRelay agent needs to listen on the interface with which it will talk to the DHCP server as well as the interface on which it will listen for client requests.
6. Start the dhcrelay service:
service dhcrelay start
7. Power on the Mordor client sauron and verify it got a correct address.

To turn in

Your *lab06* **text** file should contain the following sections.

- Standard boilerplate information:
 - CIS 192 Lab XX

- *Name*
- *Date*
- TBA hours: *X.X*
- Station number: CIS-Lab-*XX*
- From Elrond: /etc/dhcpd.conf and /var/lib/dhcpd/dhcpd.leases
- From Legolas: /etc/sysconfig/dhcrelay and /var/lib/dhclient/dhclient.leases
- From Frodo: /var/lib/dhcp3/dhclient.leases
- From Sauron: /var/lib/dhcp3/dhclient.leases
- From William: output from ipconfig /all
- Command summary (your cheat sheet for future reference)

Having done the lab, can you answer the following questions?

1. Is a reservation the same as a lease, that is, does it expire?
(Hint: check the DHCP server's database file, *dhcpd.leases* for the reservation.)
2. Why did you have to add the static route to Mordor in the DHCP server's routing table?

Check your work for completeness then submit as many times as you wish up until the due date deadline. Remember, **late work is not accepted**, so start early, plan ahead for things to go wrong and use the forum to ask questions.

[p]scp lab06 cis192@opus.cabrillo.edu:lab06.*lastname*

Grading rubric (30 points)

- 3 points for complete submittal, professional appearance and quality
- 8 points for correctly configuring the DHCP server
- 8 points for correctly configuring the DHCP relay agent
- 8 points for Frodo, William and Sauron getting correct settings
- 3 points for concise and useful command summary

Appendix

Static IP address table by station number

Station	IP	Static 1	Static 2
CIS-Lab-01	172.30.4.101	172.30.4.121	172.30.4.122
CIS-Lab-02	172.30.4.102	172.30.4.123	172.30.4.124
CIS-Lab-03	172.30.4.103	172.30.4.125	172.30.4.126
CIS-Lab-04	172.30.4.104	172.30.4.127	172.30.4.128
CIS-Lab-05	172.30.4.105	172.30.4.129	172.30.4.130
CIS-Lab-06	172.30.4.106	172.30.4.131	172.30.4.132
CIS-Lab-07	172.30.4.107	172.30.4.133	172.30.4.134

CIS-Lab-08	172.30.4.108	172.30.4.135	172.30.4.136
CIS-Lab-09	172.30.4.109	172.30.4.137	172.30.4.138
CIS-Lab-10	172.30.4.110	172.30.4.139	172.30.4.140
CIS-Lab-11	172.30.4.111	172.30.4.141	172.30.4.142
CIS-Lab-12	172.30.4.112	172.30.4.143	172.30.4.144
Pod 1		172.30.4.113	172.30.4.145
Pod 2		172.30.4.114	172.30.4.146
Pod 3		172.30.4.115	172.30.4.147
Pod 4		172.30.4.116	172.30.4.148

DHCP IP allocation pools table by station number

Station	IP	Start	End
CIS-Lab-01	172.30.4.101	172.30.4.50	172.30.4.54
CIS-Lab-02	172.30.4.102	172.30.4.55	172.30.4.59
CIS-Lab-03	172.30.4.103	172.30.4.60	172.30.4.64
CIS-Lab-04	172.30.4.104	172.30.4.65	172.30.4.69
CIS-Lab-05	172.30.4.105	172.30.4.70	172.30.4.74
CIS-Lab-06	172.30.4.106	172.30.4.75	172.30.4.79
CIS-Lab-07	172.30.4.107	172.30.4.80	172.30.4.84
CIS-Lab-08	172.30.4.108	172.30.4.85	172.30.4.89
CIS-Lab-09	172.30.4.109	172.30.4.90	172.30.4.94
CIS-Lab-10	172.30.4.110	172.30.4.95	172.30.4.99
CIS-Lab-11	172.30.4.111	172.30.4.200	172.30.4.204
CIS-Lab-12	172.30.4.112	172.30.4.205	172.30.4.209
Pod 1		172.30.4.210	172.30.4.214
Pod 2		172.30.4.215	172.30.4.219
Pod 3		172.30.4.220	172.30.4.224
Pod 4		172.30.4.225	172.30.4.229