

Lab 3: TCP/IP Services

In this lab, you learn about various TCP/IP services, files, and manually connecting to services using **telnet**. Each team will turn in answers to the questions in this lab. Turn in your completed lab by the start of the next session. Remember, the goal is to learn and understand how the system works – not to fill in the blanks below.

Configure the system

Bring the system up single-user and perform the initial network configuration.

- Step 1. Boot your system into single user mode. To accomplish this, (re)boot the system, and interrupt the Red Hat splash screen at the beginning of the boot process with Control-X. Then type **linux single** at the **boot:** prompt.
- Step 2. Configure your system with the IP address 10.0.0.N/24, where N is your system number.
- Q1. Which file do you need to modify to configure your interface? _____
- Q2. In what class does your IP address belong (careful!)? _____
- Step 3. Configure your system to automatically set the system's hostname at boot time to hostN.localdomain. Recall from lab 1 that Red Hat Linux startup scripts use a particular configuration file at boot time to configure the system's hostname.
- Q3. Which file in Red Hat Linux is used to setup the hostname on boot? _____
- Step 4. Place the correct entry in **/etc/hosts** and also include a simple hostname alias of hostN for convenience. Refer to Lab 1 if necessary – by now, you should be able to reliably configure your network in just a few minutes, and understand the relationship between the various configuration files and commands.
- Step 5. Reboot the system into single user mode. Check that the hostname was correctly set with the **hostname** command.
- Step 6. Bring your system up multi-user (init level 3). If you find that **sendmail** hangs on boot, it is because it wants a fully qualified hostname (not a simple hostname such as host4), and is trying to resolve your system's hostname via DNS. Since there is no DNS server available on the lab's private network, **sendmail** hangs waiting for some response. Let **sendmail** timeout (about 2 minutes), and go back and configure your system's hostname correctly, as described in the previous steps.

The /etc/nsswitch file

Explore the name service switch file to discover where services obtain their data.

- Step 7. Spend a few minutes examining the service switch file **/etc/nsswitch.conf**.
- Q4. Which sources are used to translate hostnames? _____
- Q5. Which sources are used for user account information? _____
- Q6. From where is RARP getting its information? _____
- Q7. Which sources are configured to provide TCP/IP port information? _____
- Step 8. Add an entry in the hosts file for your neighbor's machine, mapping their hostname to their IP address. You can use any name you chose to address their system, since it is your machine doing the hostname to IP address translation.
- Step 9. Ping their machine by the name you assigned in **/etc/hosts**, and take note of the first line of output. Ping should have been able to output the first diagnostic line providing you with a hostname/IP address pair (it does not matter if the ping actually succeeds or not).
- Step 10. Edit the service switch file **/etc/nsswitch.conf** and place **dns** before **files** on the **hosts** line. This will request that translation for hostname to IP addresses occurs via DNS first, before lookup in **/etc/hosts**. In addition, there is an older service switch file used by some applications. It is named **/etc/host.conf**, and it too needs to be changed.
- Step 11. Ping the same hostname again, as you did previously and again take note of the output.
- Q8. What is different this time? _____

- Q9. What diagnostic value does the difference in output provide? _____

Step 12. Restore the **hosts** line in the service switch file to use **files** before **dns**.

The /etc/services file

Explore and learn about the UNIX TCP/IP port name / port number mapping file /etc/services.

Step 13. Examine the port (service) name to port number file **/etc/services**.

- Q10. What is the service number for the FTP protocol? _____
- Q11. Which transport protocol (s) can be used to connect to a web server? _____
- Q12. Which port number is used to talk to the Trivial File Transfer Protocol? _____
- Q13. What is the UNIX full pathname of the network daemon program used to implement the **sunrpc** protocol? _____

The /etc/rpc file

Explore and learn about the Remote Procedure Call program name / program number mapping file /etc/rpc.

Step 14. Examine the RPC service mapping file **/etc/rpc**, which maps RPC program names to RPC program numbers.

- Q14. Which daemons/services correspond to RCP program numbers 100004, 100007, 100009, 100028, 100300, 100303?

- Q15. What general service is provided by the collection of programs above? _____

Using telnet to connect to a service

Learn about /etc/services, TCP/IP ports, and how to use telnet to manually connect to a service.

Step 15. Look up the **daytime** service port number in the services files **/etc/services**.

- Q16. What is the port number for **daytime**? _____

Step 16. Many of the TCP/IP services are defined to use plain ASCII text as the communication language between client and server. This means that if you can open a connection to the service (by supplying the correct IP address and port number), and can talk directly with the service by sending ASCII text strings. The **telnet** client and protocol allows connecting to any of ASCII-speaking services, since **telnet** is a) an ASCII-based service, b) allows opening a connection to any IP address/port number combination (recall the **socket**). Use **telnet** to open a connection to the **daytime** service. The command below will cause **telnet** to connect to your own host, using the **daytime** port number you found in the **/etc/services** file:

```
$ telnet localhost portnum
```

- Q17. Describe the result: _____

Step 17. You need to configure **xinetd** to listen for access to the **daytime** service. Enable the **daytime** service by editing the file **/etc/xinetd.d/daytime**, replacing **yes** with **no** in the **disable = yes** line, and send **xinetd** the **USR2** signal. Make sure you did not accidentally kill **xinetd**!

Step 18. Try to telnet again to the **daytime** port.

- Q18. Describe the result: _____

Step 19. For convenience, symbolic port names can be used instead of port numbers. Connect using the name **daytime** instead of its port number:

```
$ telnet localhost daytime
```

The SMTP service

Learn about SMTP by manually creating an email message (headers and body) and talking directly to the **SMTP** service. Review page 72-74 of the *TCP/IP Network Administration* book for a quick overview of **ESMTP**.

Step 20. Look up the port for the **SMTP** service.

Q19. Which port is reserved for **SMTP**? _____

Q20. Which UNIX daemon implements the **SMTP** service? _____

Step 21. Connect to the **SMTP** service using **telnet**, using the correct port. If you cannot connect to this port, maybe the daemon that provides the **SMTP** service is not running, or your system's hostname may be unset.

Step 22. Once connected to **SMTP**, enter the **ehlo** command to introduce your connection to **SMTP**. Replace *yourhostname* with the name of your host.

```
ehlo yourhostname
```

Q21. Does the server support **ESMTP** or just **SMTP**? _____

Q22. If **ESMTP**, how many extensions are supported? _____

Q23. If **ESMTP**, name the first two: _____

Q24. How does **ESMTP** feel about your connection? _____

Step 23. Tell **SMTP** who the mail is from with the **mail from:** command. Replace *from* below with your own email address.

```
mail from:<from>
```

Step 24. Tell **SMTP** who the recipient is: with the **rcpt to:** command:

```
rcpt to:<student@localhost>
```

Step 25. Now give the body of the email message with the **data** command. Enter the command below, and then enter your mail message. The **data** command ends when it sees a single . (period) on a line by itself.

```
data
your-mail-message-here
.
```

Q25. What is the message ID of the message? _____

Step 26. Terminate your connection to **SMTP** with the **quit** command.

Step 27. Now login into the student account, and read the mail with the **mail** command. Use the **h** command in **mail** to see a list of the mail messages, and enter a number to view the corresponding email message.

Q26. What is the value in the **From** header of the email? _____

Step 28. Enter the **P** command within mail to see the message again, this time with all the headers shown. Compare the **Message-Id** header with the value you recorded above in Q25.

Step 29. When you are done, don't forget to shutdown your system with the command: **shutdown -h now** or **halt** and be sure that the power is turned off after the system has halted.

The HTTP service

Learn about connecting to the WWW protocol HTTP by talking directly with a web server.

Step 30. Open a **telnet** connection to the **http** service at the IP address 10.0.0.200.

Step 31. Use the **GET** command to retrieve a document:

```
GET /cis68c2.txt HTTP/1.0
```

Step 32. Hit Enter twice to terminate and send the command.

Q27. What is the result? _____

Step 33. If the graphical environment is not already started, use the **startx** command to start it up. Then launch a browser, and enter the URL:

```
http://10.0.0.200/cis68c2.txt
```

Q28. Describe the difference in results? _____