

# ITB721/ITN721 Unix Network Administration

## Practical 1

### Starting Fedora Core 6 Image

To start the necessary Fedora Core 6 Image for these exercises, after the computer has booted up, click on the "721 Image" button. Log in with your QUT access username and password. Open up a terminal window to complete the practical exercises.

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### Exercise 1: Help

1. Browse the man page for "man". Read the description of the -k option. Browse the man page for "apropos".
2. Use "man -k <keyword>" to determine the commands to do the following tasks:
  - a. print the current working directory;
  - b. create a directory;
  - c. list the directory contents;
  - d. move or rename a file;
  - e. copy a file or a directory;
  - f. remove a file;
  - g. remove a directory which is empty;
  - h. search for files within a directory tree;
  - i. display lines within a file/files containing a particular pattern.
3. Search the "whatis" database for each of the commands you identified in 2. above.

### Exercise 2: Files and Directories

In order to complete Exercise 2, you will need to browse the following man pages immediately before using these commands: pwd, ls, mkdir, cp, less, rmdir, rm.

1. Use the "pwd" command to find out which directory you are in. (Change to your home directory, if you are not in this directory.) Record the full path name of your home directory. Using the "ls" command with appropriate option/s, display the names of all files and directories which currently exist within your home directory (including dotfiles).
2. Use a text editor, for example vi, to create a file "prac1file" in your home directory. Type in the commands you have used (and any other information helpful to you) to answer the practical questions so far. Continue to add to this file as you complete the practical exercises.

[To use vi, at the prompt type "vi <filename>". Then, to edit the file, type "i" followed by any text you wish to insert. Press Esc followed by ZZ to save and exit the file. To learn about Vi IMproved, at the prompt type the command "vimtutor". To use VI IMproved, at the prompt type "vim <filename>".]

For the text editor you are using, try out a few of the text editor commands to become more familiar with editing files.

3. Create a subdirectory in your home directory. Call this subdirectory "tempdir". What command line did you use? Use the "ls" command to verify that the creation succeeded.
4. Make a copy of the "prac1file" file and call it "copyprac1file". Using the "less" command, view the "copyprac1file" file to check that the contents are the same as the original file.
5. Identify and use the various options for the "ls" command to:
  - a. display a long listing of the files in the directory;
  - b. display a long listing of the files in the directory sorted by file size (largest to smallest file);
  - c. display a long listing of the files in the directory sorted by file size (smallest to largest file);
  - d. display a recursive listing of the files within the directory and its subdirectories;
  - e. display a long listing of the directory contents sorted by time of last modification, in chronological order.

6. Copy the "prac1file" file into the "tempdir" subdirectory. Use a single command line for the "ls" command to confirm that you now have the files, "prac1file" and "copyprac1file", in your home directory, and the file "prac1file" in the "tempdir" subdirectory.
7. Try to delete the "tempdir" subdirectory. What happens? Suppose you wanted to delete the "tempdir" subdirectory and the files in it. What single command line would you need to complete this task?
8. Use the "rm" command to delete the file "copyprac1file" from your home directory.

### Exercise 3: Searching

In order to complete Exercise 3, you will need to browse the following man pages immediately before using these commands: whereis, whatis, find, grep.

1. Briefly describe the function of the "whereis" and "whatis" commands.
2. Use the "find" command with appropriate options to perform the following tasks. For each task record the command line which you used:
  - a. return a list of all files in the /sbin directory that are larger than 950000 bytes;
  - b. return a list of all files of type directory;
  - c. return a list of all files that were modified in the last 72 hours;
  - d. return a list of all files that are less than 10 bytes;
  - e. return a list of all files in the /proc/net directory which are empty;
  - f. return a list of all files in the /etc directory which have the extension "conf";
  - g. return a list of all files in your home directory that contain the string "file" anywhere in the file name, and were last accessed at least 3 minutes ago.
3. Use a single "grep" command line to perform each of the following tasks:
  - a. return all lines in your "prac1file" file containing the string "find";
  - b. return all lines in your "prac1file" file containing the string "ls", together with the line above these lines;
  - c. return all lines in your "prac1file" file containing the word "whereis" and the line number of these lines.

### Exercise 4: Configuring Network Interfaces

To enable completion of Exercises 4 and 5 on a single computer, it is necessary to use a virtual machine environment. Each virtual machine will run its own copy of Linux, and has its own virtual network interface cards. The virtual machine environment chosen is Xen, and this is on the laboratory image.

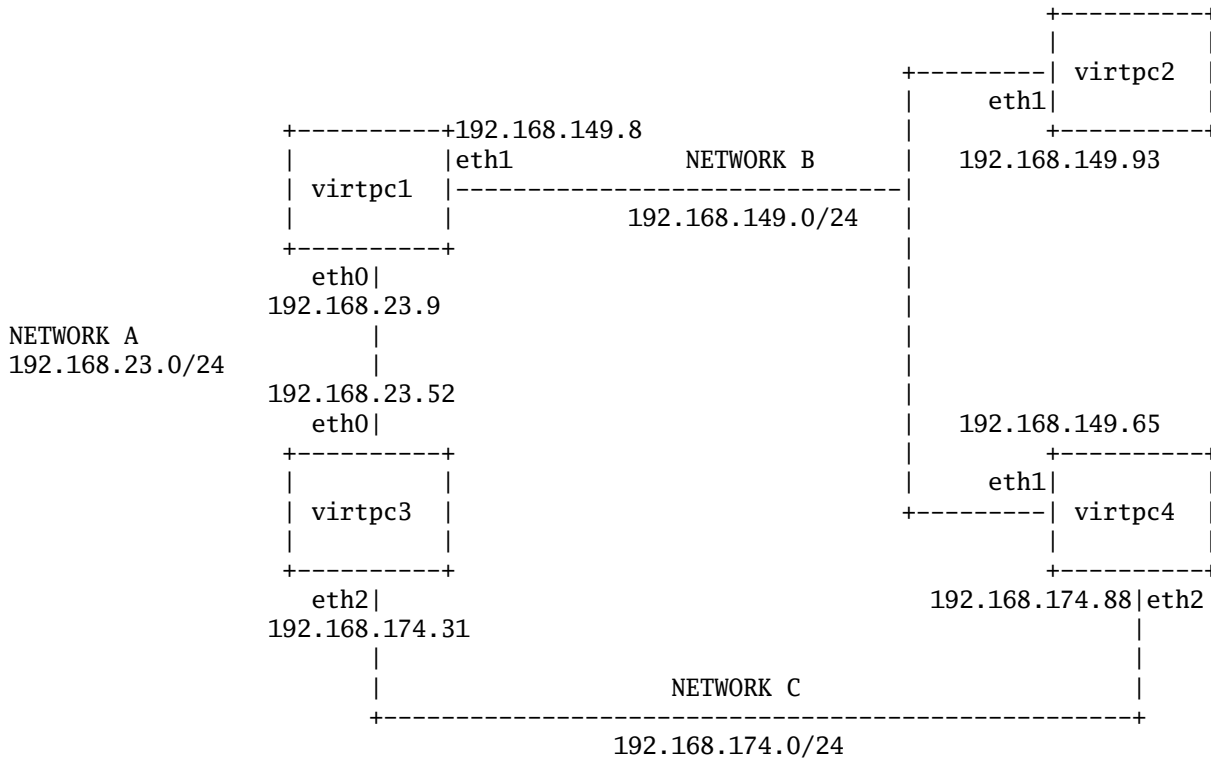
#### Using Xen

To start a virtual machine, first become the root user on the parent machine by typing "su -" (root password on parent machine **90opl;. /**). Then, as the root user on the parent machine, type "xm721 create -c <virtual machine name>" to start a virtual machine.

The normal user account on each of the virtual machines is **vmuser** (password **89iokl,.**).

To shut down a virtual machine, type "poweroff" as the root user on that virtual machine.

You are required to set up your test network as per the following network diagram. **This diagram is needed for both Exercises 4 and 5.**



- As the root user on the parent machine, start up the four virtual machines, "virtpc1", "virtpc2", "virtpc3" and "virtpc4", in this order. Log in as the user "vmuser" on each of these four virtual machines.
- Use the "ifconfig" command (root password on virtual machines is **90opl;. /**) to deactivate all ethernet interfaces (eth<number>) on each of the four virtual machines which may already be activated. Then, use the "ifconfig" command to configure and activate the relevant network interfaces in accordance with the above diagram ie on virtpc1 you will need to configure and activate eth0 and eth1; on virtpc2 you will need to configure and activate eth1; on virtpc3 you will need to configure and activate eth0 and eth2; on virtpc4 you will need to configure and activate eth1 and eth2. (Be sure to specify the broadcast address in each case.)
  - Once you have configured all relevant ethernet interfaces, check that they have been correctly configured by displaying the status of the interfaces on each virtual machine.
  - Record the IP address, broadcast address and netmask of all ethernet interfaces which are up. Check these details with the requirements of the above questions and the diagram.
- Use the "route" command with appropriate option to examine the routing table (showing numerical addresses) on each of the four virtual machines. Record the local route entries that relate to the network configuration that you have just completed.
- Use the "ping" command to test the network connectivity. Try the following ping requests:
  - From virtpc1, ping eth1 on virtpc2;  
From virtpc1, ping eth0 on virtpc3;  
From virtpc1, ping eth2 on virtpc3;  
From virtpc1, ping eth1 on virtpc4;  
From virtpc1, ping eth2 on virtpc4;
  - From virtpc2, ping eth0 on virtpc1;  
From virtpc2, ping eth1 on virtpc1;  
From virtpc2, ping eth0 on virtpc3;  
From virtpc2, ping eth2 on virtpc3;  
From virtpc2, ping eth1 on virtpc4;  
From virtpc2, ping eth2 on virtpc4;

- c. From virtpc3, ping eth0 on virtpc1;  
From virtpc3, ping eth1 on virtpc1;  
From virtpc3, ping eth1 on virtpc2;  
From virtpc3, ping eth1 on virtpc4;  
From virtpc3, ping eth2 on virtpc4;
- d. From virtpc4, ping eth0 on virtpc1;  
From virtpc4, ping eth1 on virtpc1;  
From virtpc4, ping eth1 on virtpc2;  
From virtpc4, ping eth0 on virtpc3;  
From virtpc4, ping eth2 on virtpc3.

Note that not all of these pings will work. Record which work and which don't (hint: 10 of them should work). For each of the ping command lines, explain why it does, or it does not, work.

## Exercise 5: Routing to Remote Networks

This exercise continues on from Exercise 4.

1. You are now required to fix the network connectivity problem above. Investigate the cause of the problem, and add the **remote** route entries (and **default** route entry if appropriate) in the routing tables of the virtual machines, as required, to ensure that the network is functioning fully and that communications are possible between all four virtual machines as per the network diagram provided in Exercise 4. Then use the "route" command with appropriate option to display the routing tables (showing numerical addresses) and record the default and remote route entries from the routing tables of each of the four virtual machines.
2. Once you are satisfied with all your changes from Question 1, use the "ping" command to test the connectivity as before, that is:
  - a. From virtpc1, ping eth1 on virtpc2;  
From virtpc1, ping eth0 on virtpc3;  
From virtpc1, ping eth2 on virtpc3;  
From virtpc1, ping eth1 on virtpc4;  
From virtpc1, ping eth2 on virtpc4;
  - b. From virtpc2, ping eth0 on virtpc1;  
From virtpc2, ping eth1 on virtpc1;  
From virtpc2, ping eth0 on virtpc3;  
From virtpc2, ping eth2 on virtpc3;  
From virtpc2, ping eth1 on virtpc4;  
From virtpc2, ping eth2 on virtpc4;
  - c. From virtpc3, ping eth0 on virtpc1;  
From virtpc3, ping eth1 on virtpc1;  
From virtpc3, ping eth1 on virtpc2;  
From virtpc3, ping eth1 on virtpc4;  
From virtpc3, ping eth2 on virtpc4;
  - d. From virtpc4, ping eth0 on virtpc1;  
From virtpc4, ping eth1 on virtpc1;  
From virtpc4, ping eth1 on virtpc2;  
From virtpc4, ping eth0 on virtpc3;  
From virtpc4, ping eth2 on virtpc3.

This time, all the pings should work, thus providing you with full network connectivity between the four virtual machines.

3. Use the "traceroute" command to trace the path that a packet takes between the following:
  - a. From virtpc1, traceroute eth1 on virtpc2;  
From virtpc1, traceroute eth2 on virtpc4;
  - b. From virtpc2, traceroute eth1 on virtpc4;  
From virtpc2, traceroute eth0 on virtpc3;
  - c. From virtpc3, traceroute eth1 on virtpc1;  
From virtpc3, traceroute eth1 on virtpc2;
  - d. From virtpc4, traceroute eth0 on virtpc1;  
From virtpc4, traceroute eth1 on virtpc2.

(You may wish to use an appropriate option to the "traceroute" command so that it does not attempt to first map the IP addresses to hostnames.)

4. As the root user, poweroff each of your virtual machines using the "poweroff" command within each virtual machine.

## Exercise 6: HOWTO and RFC Documents

**Exercise 6 is additionally required to be done by ITN721 students (but is optional for ITB721 students).**

1. You wish to gain knowledge about how to write a man page. (**Note that you do not need to write one for this exercise.**) Go to another workspace. Open a web browser in this new workspace. Find the correct HOWTO document that discusses man pages. In particular, find out how "apropos" and "whatis" will work if you were to write a man page. Write down the key difference between the two.
2. Find the informational RFC entitled "Users' Security Handbook". Browse this RFC and record the RFC number for future reference.

## Exercise 7: Product Lifecycle

**Exercise 7 is additionally required to be done by ITN721 students (but is optional for ITB721 students).**

Your organization uses a mix of Red Hat Linux 9, and Red Hat Enterprise Linux versions 2.1, 3 and 4. You have been asked to determine the product end-of-life dates, that is, when bug fixes and other forms of security alerts will no longer be kept current.

1. Go to another workspace. Open a web browser in this new workspace. Go to the Red Hat home page.
2. Find out which of your organization's versions are still fully supported (and what date they will be supported until).
3. Find out which versions are no longer supported.
4. Investigate, for your organization, if there have been any security vulnerabilities reported with the Firefox Web Browser package on Red Hat Enterprise Linux ES version 4 in the last 3 months. If so, record the name of the patch files (.rpm extension) that fix the vulnerabilities.

## Exercise 8: Shutting Down

1. Browse the man page for the "halt", "reboot", and "poweroff" commands. Browse the man page for the "shutdown" command. Write down the "shutdown" command lines to perform each of the following tasks (**do NOT execute these command lines**):
    - a. shutdown the system immediately;
    - b. reboot the system after shutdown;
    - c. shutdown the system in 5 minutes;
    - d. shutdown the system at 10:30pm.
  2. Once you have completed Practical 1, log out and restart the computer.
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