De La Salle University
College of Computer Studies

SYSMGMT Laboratory Manual

Name:	Samuel Gabrielle Malijan	Date:	6/22/2018
Section:	S15	Grade:	

2.0 Unix / Linux Command Line Interface (CLI) Basics – Utilities, Redirection and Pipes, vi Text Editor and Advanced File Commands
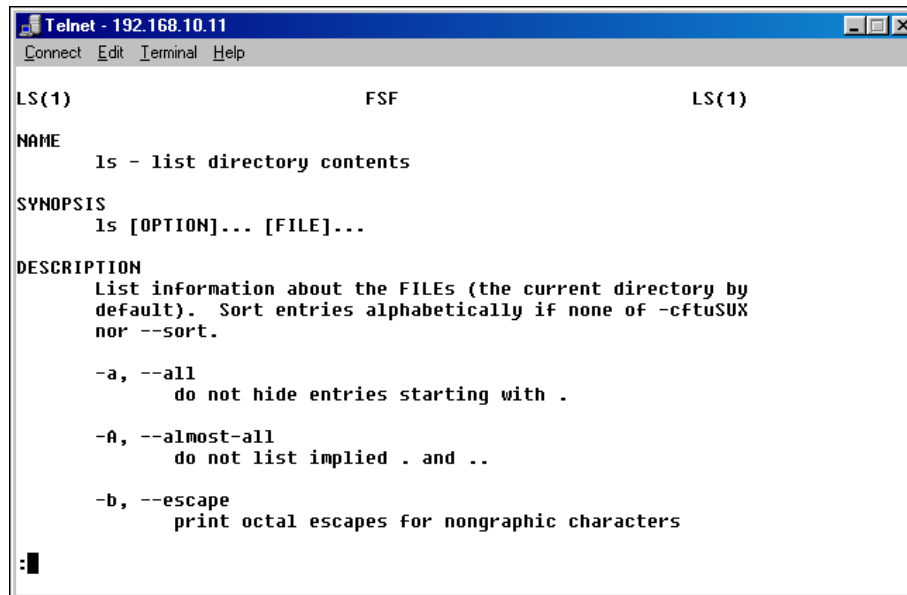
The Unix system provides a lot of utilities that one can use. Aside from utilities, the Unix system also provides facilities for redirection, pipes and file ownership, and file permissions. The Unix system also has a built-in editor called vi. Although vi may look ugly, vi is the standard text editor you can find in any Unix version and at the same time has useful features at your fingertips. No need to use the mouse. The objectives of this section are:

1.   To familiarize the student in using Unix file and disk utilities.
2.   To familiarize the student in using the vi text editor.
3.   To familiarize the student on file links.

1.1. Utilities

1.1.1. On-line Help

The Unix environment provides a simple on-line help system. The command "man" is used to browse the help pages. This help system is sometimes referred to as "man pages". Typing "man ls" at the command prompt will show you something like:

The man page most of the time will contain the following sections (different Unix versions or authors of man pages sometimes add sections): name, synopsis, description, and see also. The name section shows the name of the command and alternative commands that does the same thing. The synopsis section shows the syntax of the command while the description gives a short text on what the command does and the options that can be used. The see also section gives other related commands.

Man pages also provide help on programming libraries, utilities, file formats and other topics on the Unix environment.

Step 1   On the command prompt, type the command "man ls".
   1a.   What does the command do?

          Shows a list of user commands

   1b.   Press the spacebar key. What does it do?

         jumped from lin1 to line 37 of the manual page.

   1c.   Press the "f" key. What does it do? Is it the same as the space bar key?

          It jumps the same distance as a spacebar.

   1d.   Press the "b" key. What does it do?

          I think b stands for back, and it goes back to the previous maxline, from 73 to 37.

   1e.   Type the following "/format". What does it do?

        it jumped to the format line how do you format arguments

   1f.   Press the "q" key. What does it do?

           It stopped accepting the commands for man.

Step 2   On the command prompt, type the command "man ls". Scroll the pages and check the sections of the man page.
   2a.   Can you identify the sections mentioned? What are these sections?

         Name, Synopsis, Description, Author, reporting Bugs, Copyright, See Also

   2b.   Write down the description of the "ls" command.

    List information about the FILEs(the current directory by default). Sort entries
     alphabetically if none of -cftuvSUX nor --sort is specified.

   2c.   Write down an alternative command that you can use to view a help file on ls.
        -h

Step 3   On the command prompt, type the command "man -k dns".
   3a.   What does the command do?

         it lists down the available commands for DNS related commands.

3b. What is the "k" option for?

I think -k means it will search for the keyword that you will input in the argument.

The "k" option is for searching man pages given a keyword. The argument in the command is the keyword. In this case, the command looks for man pages that have the word "dns" in it. As a bit information, dns stands for "Domain Name Server". Domain name server is a service that allows mapping of Internet names into its IP address (There will be a section for DNS, please do not worry about it yet. ☺).

Step 4 On the command prompt, type the command "man –S1 chmod".

4a. What does the command do?

Gives information about the change file mode bits.

If you look carefully at the upper right corner of the man page, there is a "( )" after the command. This indicates in what section of the command are you viewing. Using the "s" option allows you to specify which section would you want to view. The man utility displays the lowest numbered section by default when no section number is provided from the command.

1.1.2. The "more" and "cat" Commands

The "cat" command can concatenate files and print on standard output (which is usually the screen). This is useful for checking the contents of short file, especially script files (again, will be tackled later). The command can accept more than one filenames as an argument that can be printed on the standard output.

The problem with the "cat" command is that if the file is too long, the displaying of the file will just flash by. An alternative command is the "more" command. This command displays the file on the standard output and provides scrolling capability. Commands for scrolling are the same in the "man" utility.

For this next few steps, download the file "fruits", "vegetables", and "rfc2186.txt" from the canvas file repository into your host machine. You may also opt to create a blank file called fruits containing fruit names delimited by new line same with vegetables instead with vegetable names. For rfc2186.txt, you may also download the text version from the Internet and save it as rfc2186.txt.

Use the tool pscp.exe from your host machine (assuming windows) to transfer files to your virtual server. Assuming that the pscp.exe tool and the files, fruits and vegetables, are in the same folder, open your Command Prompt and type the following commands:

```
pscp.exe -P 2222 fruits student@127.0.0.1:/home/student/
pscp.exe -P 2222 vegetables student@127.0.0.1:/home/student/
pscp.exe -P 2222 rfc2186.txt student@127.0.0.1:/home/student/
```

*Syntax is: pscp.exe <local file path> <user>@<remote machine ip>:<remote path>
*Note that we added an option -P <port num> since we are using port forwarding for the lab to forward SSH traffic on the virtual machine since we are using VirtualBox

Step 5 In your server machine, verify if you have copied the files using the "ls" command.

5a. After verifying the files were copied, enter the command "cat fruits". What did the command do?

Displayed the contents of the file fruits.

5b. Enter the command "cat vegetables". What did the command do?

displays the content of the file vegetables

5c. Enter the command "cat fruits vegetables". What did the command do?

Displays both the contents of vegetables and fruits.

5d.   Enter the command "`cat vegetables fruits`". What did the command do? Is it different from the previous command? What can you generalize?

Yep, I think it displays the contents of the first file first then move on to the next file.

5e.   Enter the command "`cat rfc2186.txt`". What did the command do? Were you able to see anything?

yes, the entire document.

Step 6   At the command prompt, enter the command "`more rfc2186.txt`" and press enter.

6a.   Are you able to view the file?

yes and it is dissected into different pages.

6b.   Press the spacebar key. What does it do?

Moves you to the next section/page of the document.

6c.   Press the "`f`" key. What does it do? Is it the same as the space bar key?

Same function with it.

6d.   Press the "`b`" key. What does it do?

Returns you to the previous sectiom

6e.   Press the "`q`" key. What does it do?

Quits the viewing of the document.

There are still other commands to scroll the screen in the "more" command. Use the man pages for the "more" command to check the scroll commands and other options.

1.1.3. The "`head`" and "`tail`" Commands

The "head" command outputs the first few lines of a few on the screen while the "tail" command outputs the last few lines of a file on the screen. The default number of line output is ten (10). These commands useful for checking log files, especially to network administrators.

Step 7   At the command prompt, type the command "`head rfc2186.txt`".

7a.   What was the output?

The header of the document.

7b.   At the command prompt, type the command "`head -c20 rfc2186.txt`". What was the output?

it displays a few lines of blank text.

7c.   At the command prompt, type the command "`head -n20 rfc2186.txt`". What was the output? How was it different from last time?

It displayed the header along with some linesof the text.

7d. At the command prompt, type the command "`tail rfc2186.txt`". What was the output?

it shows the footer of the document, ir the end of the document.

7e. At the command prompt, type the command "`tail –c20 rfc2186.txt`". What was the output?

only [Page 9] was the one that is displayed.

7f. At the command prompt, type the command "`tail –n20 rfc2186.txt`". What was the output? How was it different from last time?

It included some final lines of the texst as well as the document footer.

7g. What is the difference between options "`c`" and "`n`"?

I think that -c20 is a means of clearing text including the header and footer
to get a specific part of the document, and n inlcudes the amount of lines you input with the
footer/header.

1.1.4. The "grep" Command

The "`grep`" command searches prints the lines in a file with a matching pattern. This is useful for searching patterns in a text or binary file. Most of the time, network administrators uses this to search if a certain process is or searching for keywords in a configuration file.

Step 8 At the command prompt, enter the command "`grep apple fruits`".

8a. What was the output? Why?

A red colored text that says apple.Perhaps because the system found the word Apple in fruits.

8b. At the command prompt, enter the command "`grep brocolli fruits`". Was there an output? Why?

No result. Perhaps because there was no brocolli in fruits.

8c. At the command prompt, enter the command "`grep brocolli vegetables`". Was there an output? Why?

Yes there was, as there is a word with the same pattern with brocolli.

1.1.5. The "sort" Command

The "sort" command allows a user to sort alphanumeric text in a file. If the text file has columns, the "sort" command is able to sort by column. This is useful if you have a spreadsheet like text file.

Step 9 At the prompt, enter the command "`cat fruits`". Observe the output of the command.

9a. What was the output?

the entire list of fruits(rather it shows the entire document. and lists it per line.)

9b. At the prompt, enter the command "`sort fruits`". Observe the output of the command. What was the output?

The entire content of fruits text but in alphabetical order.

Step 10   At the prompt, enter the command "`cp fruits fruits2`".
  10a.   After copying the file, enter the command "`cat fruits2`". Observe the output of the command. What was the output?

  _____The same thing, albeit it is unsorted unlike fruits._____

  _____

  10b.   At the prompt, enter the command "sort `fruits2`". Observe the output of the command. What was the output?

  _____it is now sorted like fruits_____

  _____

  10c.   At the prompt, enter the command "`sort -r fruits2`". Observe the output of the command. What was the output? How is different from the previous command?

  _____The alphabetical order was reversed._____

  _____

  10d.   At the prompt, enter the command "`sort -k1 fruits2`". Observe the output of the command. What was the output? How is it different from the command in step 10b?

  _____IIt has the same output. Although from what I read, it is different because it will help sort_____

  _____things differently, e.g. -k1.2 will sort the first column based on the 2nd character._____

  10e.   At the prompt, enter the command "`sort -r -k1 fruits2`". Observe the output of the command. What was the output? How is it different from the command in the previous step?

  _____It has the same output. it is different because it will help sort_____

  _____things differently(in reverse), e.g. -k1.2 will sort the first column based on the 2nd character._____

1.2. Redirection and Pipes

Redirectors "redirect" the standard output of a command to a file or device file. This is useful for saving a long list of directories and files in text file for example. A redirection command looks like:

```
command > file or command > file_device
```

The ">" is the redirection symbol. Redirection symbols are:

Redirection Symbol	Description
>	Sends output of a command to another file or file device
<	Sends file or file device to a command
>>	Appends an output of a command to another file or file device.

Pipes are the same as redirection but use the output of a command as input to another command. The pipe symbol is "|".

Step 11   At the command prompt, enter the command "`ls -l > list`".
  11a.   Was the text file list created?

  _____Yep_____

  _____

  11b.   Use the "`cat`" or "`more`" command to view the "`list`" text file. What does the text file contain?

  _____it contains the details of the number of characters, owner, date accessed, and time updated/created_____

  _____

11c. At the command prompt, enter the command "`ls -l > list`". Was a new text file list created? What does the text file contain? Was it the same as before?

it was the same as before albeit the time for list has changed.

11d. At the command prompt, enter the command "`ls -l >> list`". Was a new text file list created? What does the text file contain? Was it the same as before?

11e. What is the difference between the "`>`" and the "`>>`" redirection symbol?

Step 12 At the command prompt, enter the command "`cd /etc/`". After changing to the "/etc" directory, enter the command "`ls -l`".

12a. Were you able to see all the file names? Did it just scroll by?

12b. At the command prompt, enter the command "`ls -l |more`". Were you able to see the directory listing properly?

12c. Which are the commands in the previous command? Which is the pipe symbol?

Remember that the "`more`" in the command is neither an option nor an argument. "`more`" is a command utility that is used to view a file.

Step 13 At the prompt, enter the command "`cd ~`" and "`mkdir dir1 dir2`".
13a. At the prompt, enter the command "`ls -l`". Observe the output. What was the output of the command?

13b. At the prompt, enter the command "`ls -l |sort -k1`". Observe the output. How is different from the previous command?

13c. At the prompt, enter the command "`ls -l |sort -r -k1`". Observe the output. How is different from the previous command?

13d. At the prompt, enter the command "`ls -l |sort -k8`". Observe the output. How is different from the command in step 3b?

13e. At the prompt, enter the command "`ls -l |sort -r -k8`". Observe the output. How is different from the previous command?

_____

_____

Remember that the "`sort`" in the command is neither an option nor an argument. "`sort`" is a command utility that is used to sort text in a file.

1.3. The vi Text Editor

The vi text editor is a built-in in the Unix operating system. This text editor is a standard on all Unix versions. Most people would say that vi is not user-friendly, which is very true but vi very powerful. Only the most basic command set will be tackled in this section. If you need or want to learn more, you can use the man page for vi for further reference or the suggested reference books in this course.

Vi has three modes of operation: command, entry mode and last-line mode. In the command mode, accepts command for cursor positioning, going into other modes, deleting characters or lines and searching for string patterns. The entry mode allows editing of text while the last-line mode allows saving and exiting from vi. Upon starting of vi, the program goes into the command mode. The following is a summary of the commands:

Command	Description
<esc>	Goes into command mode
:	Goes into last-line mode
I or a	Goes into entry mode. The "i" allows insertion of text before the cursor while "a" allows insertion of text after the text.
h, j, k, l	Moves cursor left, down, up, and right respectively. Can only be used in the command mode. Alternatively, cursor keys can be used as well but not standard on all Unix versions.
O	Adds a new line below the cursor. Can only be used in the command mode.
x, dw, dd	Deletes a character, a word and a line where the cursor is. Also, adding a numeric before commands dw or dd will delete the corresponding number of words or lines respectively. Can only be used in the command mode.
Yy, p, P	The command yanks a line and put into clipboard, puts the contents of the clipboard below the cursor and puts the contents of the clipboard above the cursor respectively. Can only be done in the command mode.
/string, ?string	Searches a string pattern forward in file and backward in a file. Can be only used in the command mode.
:w, :w <filename>	Saves the file
:wq	Exits vi and saves the file. Only in command mode.
:q!	Exits vi without saving the file. Only in command mode

Step 14   At the command prompt, enter the command "`vi rfc2186.txt`", lets try to edit the previous file.

14a.   In which mode are in right now?

14b.   In the command mode of vi, type "`:23`". In which line of test are you in now? (Write down the first few words of the line)

14c.   Go to the word "describes". Use the cursor keys or (h, j, k, l). Type the "`a`" command. In which mode are you in now?

14d.   Type the word "cat" and press the escape key. Where did the cursor allow you to enter text? Before or after the cursor? In which mode are you in now?

14e.   Type the "`i`" command. In which mode are you in now?

14f.   Type the word "hello" and press the escape key. Where did the cursor allow you to enter text? Before or after the cursor? In which mode are you in now?

_____

_____

14g.   Press the escape key. In which mode are you in now?

_____

_____

14h.   Type the command "x". What happened? What does the command do?

_____

_____

14i.   Type the command "2dd". What happened? What does the command do?

_____

_____

14j.   Type the command "yy". What happened? What did the command do?

_____

_____

14k.   Type the "p". What happened? What did the command do?

_____

_____

14l.   Type the command ":wq". What happened? What did the command do?

_____

_____

14m.   Enter the command "vi rfc2186.txt". Go to line 21. Did vi saved your edited file?

_____

_____

14n.   Type the command "yy". What happened? What did the command do?

_____

_____

14o.   Type the "p". What happened? What did the command do?

_____

_____

14p.   Type the command ":q!". What happened? What did the command do?

_____

_____

14q.   Enter the command "vi rfc2186.txt". Go to line 21. Did vi save your edited file?

_____

_____

There are other text editors in the Unix system. There is the Emacs text editor and pico. Emacs is standard in the Unix system while pico is not. The pico text editor is only found in the Linux version of Unix. You may refer to man pages for pico and Emacs or the suggested references in this course.

1.4. Advanced File Commands

1.4.1. Hard Links and Soft Links

A *file link* is a directory entry for a file. Each file has a file name entry with a corresponding information entry that allows access to the file. A file can have two types of links: hard link and soft link (also sometimes called symbolic link). A hard link creates a new file name entry for a file but does not create another copy of the file (this is synonymous to having two pointers point to a file) while a symbolic link creates a new file entry pointing to the original file entry. Most of the time, symbolic links are more useful since you can use it to create "short cuts" to a directory.

Step 15   At the command prompt, type the command "`du -ck`".

15a.   What is your total disk usage?

15b.   At the command prompt, type the command "`cp rfc2186.txt rfc_2186.txt`". This will create a copy the text file "`rfc2186.txt`". Verify of the file was created using the "`ls -l`" command. Was the file created?

15c.   At the command prompt, type the command "`du -ck`". What is your total disk usage? Did your disk usage increased? Why?

15d.   View the contents file "`rfc2186.txt`" by typing the command "`more rfc2186.txt`", to exit type "`q`". Also view the contents of the file "rfc_2186.txt" using the command "`more rfc_2186.txt`", to exit type "`q`". Were you able to view both files?

15e.   Delete the file "`rfc_2186.txt`" and check your disk usage using the command "`du -ck`". What is your disk usage?

15f.   At the command prompt, type the command "`ln rfc2186.txt rfc_2186.txt`". This command creates a hard link for the file "`rfc2186.txt`" text file. Verify if the hard link was created using the command "`ls -l`". Was the hard link created?

15g.   At the command prompt, type the command "`du -ck`". What is your total disk usage? Did your disk usage increased? Why?

15h.   View the contents file "`rfc2186.txt`" by typing the command "`more rfc2186.txt`", to exit type "`q`". Also view the contents of the file "`rfc_2186.txt`" using the command "`more rfc_2186.txt`", to exit type "`q`". Were you able to view both files?

15i. Delete the file "rfc2186.txt" and try to view the file "rfc_2186.txt" using the more command. Were you still able to view the file? Why do you think so?

15j. Delete the file "rfc_2186.txt" and copy the file "rfc2186.txt" using the command "cp /home/files/rfc2186.txt rfc2186.txt". Verify if the file was copied using the "ls -l" command.

15k. At the command prompt, type the command "ln -s rfc2186.txt rfc_2186.txt". This command creates a soft link (symbolic link) for the file "rfc2186.txt" text file. Verify if the hard link was created using the command "ls -l". Was the soft link created? How would you know if it were a soft link (do not use the color of the text to know the difference)?

15l. View the contents file "rfc2186.txt" by typing the command "more rfc2186.txt", to exit type "q". Also view the contents of the file "rfc_2186.txt" using the command "more rfc_2186.txt", to exit type "q". Were you able to view both files?

15m. Delete the file "rfc2186.txt" and try to view the file "rfc_2186.txt" using the more command. Were you still able to view the file? Why do you think so?

Delete the soft link created for the file "rfc2186.txt".

Step 16 At the command prompt, type the command "ln -s /home/student/dir1 test_dir".
16a. Was the soft link for the directory created?

16b. How do you know if it is a soft link by using the "ls -l" command?

Step 17 On the command prompt type the command "ls /home/student/dir1" and then type the command "ls test_dir".
17a. Were the contents of the directories the same? Why?

17b. Use the command "rmdir test_dir" to delete "test_dir". Were you successful? What was the message on the screen?

17c. Use the command "rm test_dir" to delete "test_dir". Were you successful?