# .ı|ı.ı|ı. Networking
# CISCO. Academy

# Lab - Linux Review

**\*\*\* MODIFIED FOR NETLAB+ \*\*\***

## Objectives

**Part 1: Review Command Syntax Navigation**

**Part 2: Review File Management**

**Part 3: Review Regular Expressions**

**Part 4: Review System Administration**

## Background / Scenario

In this lab, you review basic Linux skills including command navigation, file management, regular expressions, and system administration. This lab is not meant as a substitute for prior Linux experience and does not necessarily cover all the Linux skills you need for this course. However, this lab should serve as a good measure of your Linux skills and help direct you to where you may need more review.

## Required Resources

- DEVASC Virtual Machine

## Instructions

## Part 1: Review Command Syntax Navigation

In this part, you will use the **ls, pwd**, **cd**, and **sudo** commands to review basic command syntax navigation.

### Step 1: Open a terminal in the DEVASC-LABVM.

a. Double-click the Terminal Emulator icon on the desktop to open a terminal window.

### Step 2: Navigate directories.

a. Use the **ls** command to display a listing of the current directory. Remember that commands are case-sensitive.

```
devasc@labvm:~$ ls
Desktop    Documents    Downloads    labs    snap
devasc@labvm:~$
```

b. Use the **ls** command with the **labs** argument to display the contents of the labs folder.

```
devasc@labvm:~$ ls labs
devnet-src
devasc@labvm:~$
```

c.  Use the **ls** command with the **-l** option to display a "long display" of the contents of the current directory.

```
devasc@labvm:~$ ls -l
total 20
drwxr-xr-x 2 devasc devasc 4096 Mar 30 21:25 Desktop
drwxr-xr-x 2 devasc devasc 4096 Apr 15 19:09 Documents
drwxr-xr-x 2 devasc devasc 4096 Apr 15 19:09 Downloads
drwxr-xr-x 3 devasc devasc 4096 Mar 30 21:21 labs
drwxr-xr-x 5 devasc devasc 4096 Mar 30 21:24 snap
devasc@labvm:~$
```

d.  Use the **ls** command with the **-r** option to display the contents of the current directory in reverse alphabetical order.

```
devasc@labvm:~$ ls -r
snap    labs    Downloads    Documents    Desktop
devasc@labvm:~$
```

e.  Multiple options can be used at the same time. Use the **ls** command with both the **-l** and **-r** options to display the contents of the current directory both in long and reverse order.

```
devasc@labvm:~$ ls -lr
total 20
drwxr-xr-x 5 devasc devasc 4096 Mar 30 21:24 snap
drwxr-xr-x 3 devasc devasc 4096 Mar 30 21:21 labs
drwxr-xr-x 2 devasc devasc 4096 Apr 15 19:09 Downloads
drwxr-xr-x 2 devasc devasc 4096 Apr 15 19:09 Documents
drwxr-xr-x 2 devasc devasc 4096 Mar 30 21:25 Desktop
devasc@labvm:~$
```

f.  There are many more options that can be used with the **ls** command. Use the **man** command with the argument **ls** to see all of the possibilities in the manual. The **man** command can be used to look up any command within the system. Use the space bar to advance to subsequent screens. Press **q** to quit.

```
devasc@labvm:~$ man ls
(The command line disappears and the manual page for ls opens.)
LS(1)                         User Commands                         LS(1)

NAME
       ls - list directory contents

SYNOPSIS
       ls [OPTION]... [FILE]...

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

       Mandatory  arguments  to  long  options are mandatory for short options
       too.

       -a, --all
              do not ignore entries starting with .
                              --- OUTPUT OMMITED ---
Manual page ls(1) line 1 (press h for help or q to quit)
```

g. Close the man pages by pressing the **q** key.

h. You can also use **--help** argument after most commands to see a shorter summary of all the available command options.

```
devasc@labvm:~$ ls --help
Usage: ls [OPTION]... [FILE]...
List information about the FILEs (the current directory by default).
Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.
  -a, --all               do not ignore entries starting with .
  -A, --almost-all        do not list implied . and ..
                              --- OUTPUT OMMITED ---
devasc@labvm:~$
```

i. Use the **pwd** command to display the current working directory.

```
devasc@labvm:~$ pwd
/home/devasc
devasc@labvm:~$
```

j. Use the **cd** command to change the directory to /home/devasc/Documents.

```
devasc@labvm:~$ cd Documents
devasc@labvm:~/Documents$
```

k. Use the **cd** command with the **/** symbol to change directories to the root directory. Use **pwd** again to see that you are now in the root directory.

```
devasc@labvm:~/Documents$ cd /
devasc@labvm:/$ pwd
/
devasc@labvm:/$
```

l. Return to the **/home/devasc/Documents** directory. Tip: You can move one directory at a time or all the way to a destination. To quickly enter the command, type the first few letters of the directory name and press **Tab** for the system to automatically enter the rest of the name. Remember that names are case-sensitive.

```
devasc@labvm:/$ cd /home/devasc/Documents/
devasc@labvm:~/Documents$
```

m. Use the **..** characters to move up a single directory. Use **pwd** again to see you are back in the user's home directory.

```
devasc@labvm:~/Documents$ cd ..
devasc@labvm:~$ pwd
/home/devasc
devasc@labvm:~$
```

**Step 3: Use super user commands for administrative access.**

a. Use the **sudo** command to issue a single command as the root user. A new terminal will not be created. Use the **sudo apt-get update** command to update to refresh the list of available packages installed on the VM. This command will not work without using the **sudo** command.

**Note**: Your output will most likely be different.

```
devasc@labvm:~$ sudo apt-get update
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [97.9 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease [89.1 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease [89.2 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu focal/main i386 Packages [723 kB]
Get:6 http://us.archive.ubuntu.com/ubuntu focal/main amd64 Packages [981 kB]
(Output Omitted)
Fetched 677 kB in 2s (346 kB/s)
Reading package lists... Done
devasc@labvm:~$
```

# Part 2: Review File Management

In this part, you will review file permissions, change file permissions and ownership, move files, copy files, remove files, and view files.

**Step 1: Review file permissions.**

a. Use the **ls Desktop -l** to display the contents of the Desktop folder.

```
devasc@labvm:~$ ls Desktop -l
total 28
-rwxr-xr-x 1 devasc devasc 1095 Mar 30 21:24 chromium_chromium.desktop
-rwxr-xr-x 1 devasc devasc  401 Mar 30 21:25 cisco-pt7.desktop
-rwxr-xr-x 1 devasc devasc  776 Mar 30 21:23 code.desktop
-rwxr-xr-x 1 devasc devasc  373 Mar 30 21:25 drawio_drawio.desktop
-rwxr-xr-x 1 devasc devasc   99 Mar 30 21:21 labs.desktop
-rwxr-xr-x 1 devasc devasc  334 Mar 30 21:24 postman_postman.desktop
-rwxr-xr-x 1 devasc devasc  250 Mar 30 21:21 Terminal.desktop
devasc@labvm:~$
```

b. Answer the following questions about the output above. If necessary, search the internet for information of Linux file permission shown in the output of the **ls** command.

What does the initial dash represent in the permission information?

What would be in the place of the dash if the item was a directory?

What do the next three letters or dashes represent in the permission information?

What do the middle three letters or dashes represent in the permission information?

What do the last three letters or dashes represent in the permission information?

What does the first instance of "devasc" in the permission information indicate?

What does the second instance of "devasc" in the permission information indicate?

What does a permission type of "r" mean?

What does a permission type of "w" mean?

What does a permission type of "x" mean?

## Step 2: Change file permissions and ownership.

a. Use the command **cd** to change to the Documents directory.

```
devasc@labvm:~$ cd Documents/
devasc@labvm:~/Documents$
```

b. Use the command **echo** to create a shell script file, that will have the command **ls ../Desktop** inside the file. Remember that the greater than (>) character redirects command output to a file.

```
devasc@labvm:~/Documents$ echo "ls ../Desktop" > myfile.sh
devasc@labvm:~/Documents$
```

c. The **myfile.sh** script is stored in the **/Documents** directory. Use the **cat** command to view the only command in the script. This file will be used as an example to modify permissions and ownership.

```
devasc@labvm:~/Documents$ cat myfile.sh
ls ../Desktop
devasc@labvm:~/Documents$
```

d. Use the command **./myfile.sh** to run the script. Access is denied because you must set the permission of executable on the file.

```
devasc@labvm:~/Documents$ ./myfile.sh
bash: ./myfile.sh: Permission denied
devasc@labvm:~/Documents$
```

e. Use the command **ls -l myfile.sh** to view the current file permissions.

```
devasc@labvm:~/Documents$ ls -l myfile.sh
-rw-rw-r-- 1 devasc devasc 14 Apr 16 12:46 myfile.sh
devasc@labvm:~/Documents$
```

f. Use the command **chmod +x myfile.sh** to allow you to execute the file.

```
devasc@labvm:~/Documents$ chmod +x myfile.sh
devasc@labvm:~/Documents$
```

g.  Use the command **./myfile.sh** to run the script.

```
devasc@labvm:~/Documents$ ./myfile.sh
chromium_chromium.desktop  code.desktop  labs.desktop  Terminal.desktop
cisco-pt7.desktop  drawio_drawio.desktop  postman_postman.desktop
devasc@labvm:~/Documents$
```

h.  Use the command **sudo chown root myfile.sh** to change the ownership of the file to "root".

```
devasc@labvm:~/Documents$ sudo chown root myfile.sh
devasc@labvm:~/Documents$
```

i.  Display the permissions of the myfile.sh file.

```
devasc@labvm:~/Documents$ ls -l
total 4
-rwxrwxr-x 1 root devasc 14 Apr 16 21:28 myfile.sh
devasc@labvm:~/Documents$
```

### Step 3: Use the move files command.

a.  Use the command **mv** to move the myfile.sh file to the desktop.

```
devasc@labvm:~/Documents$ mv myfile.sh /home/devasc/Desktop/
devasc@labvm:~/Documents$
```

b.  Display the contents of the Desktop folder.

```
devasc@labvm:~/Documents$ ls ../Desktop/
chromium_chromium.desktop  code.desktop  labs.desktop  postman_postman.desktop
cisco-pt7.desktop  drawio_drawio.desktop  myfile.sh  Terminal.desktop
devasc@labvm:~/Documents$
```

c.  Return the file to the Documents folder.

```
devasc@labvm:~/Documents$ mv ../Desktop/myfile.sh myfile.sh
devasc@labvm:~/Documents$
```

d.  Use the command **mv** to rename myfile.sh to myfile_renamed.sh.

```
devasc@labvm:~/Documents$ mv myfile.sh myfile_renamed.sh
devasc@labvm:~/Documents$ ls
myfile_renamed.sh
devasc@labvm:~/Documents$
```

### Step 4: Use the copy files command.

a.  Use the command **cp** to make a copy of the myfile_renamed.sh file.

```
devasc@labvm:~/Documents$ cp myfile_renamed.sh myfile_renamed_and_copied.sh
devasc@labvm:~/Documents$ ls
myfile_renamed_and_copied.sh  myfile_renamed.sh
devasc@labvm:~/Documents$
```

### Step 5: Use the remove files command.

Use the **rm** command to remove the **myfile_renamed_and_copied.sh** file.

```
devasc@labvm:~/Documents$ rm myfile_renamed_and_copied.sh
devasc@labvm:~/Documents$ ls
myfile_renamed.sh
devasc@labvm:~/Documents$
```

### Step 6: Use the standard output redirect.

a.  Use the redirect (**>**) to place text into a new file called **linux.txt**.

```
devasc@labvm:~$ echo "Linux is AWESOME!" > linux.txt
devasc@labvm:~$
```

b.  Use the command **cat** to redirect the contents of **linux.txt** to another file.

```
devasc@labvm:~$ cat linux.txt > linux2.txt
devasc@labvm:~$
```

**c.** Use the command **cat** to view the contents of **linux2.txt**.

```
devasc@labvm:~$ cat linux2.txt
Linux is AWESOME!
devasc@labvm:~$
```

d.  Use the **echo** command to append text to the **linux2.txt** file.

```
devasc@labvm:~$ echo "I LOVE Linux!" >> linux2.txt
devasc@labvm:~$
```

e.  Use the **cat** command to view the contents of the **linux2.txt** file.

```
devasc@labvm:~$ cat linux2.txt
Linux is AWESOME!
I LOVE Linux!
devasc@labvm:~$
```

f.  Use the **echo** command to overwrite the contents of a file using the single angle bracket.

```
devasc@labvm:~$ echo "Linux is POWERFUL!" > linux.txt
devasc@labvm:~$
```

g.  Use the **cat** command to view the contents of the **linux.txt** file. Notice that the previous state "Linux is AWESOME!" was overwritten.

```
devasc@labvm:~$ cat linux.txt
Linux is POWERFUL!
devasc@labvm:~$
```

### Step 7: Use the vi text editor.

a.  Use the following command to start the **vi** text editor and open a text file.

```
devasc@labvm:~$ vi linux2.txt
(The following content is shown in the editor window:)
Linux is AWESOME!
I LOVE Linux!
```

b.  Use the text editor to change the content to the following:

```
Linux is Linux
I am AWESOME!
```

The **a** key will allow you to enter edit mode, appending after the cursor's position, while the **i** key will allow you to enter edit mode, inserting at the cursor's position. You will need to use the **Esc** key to enter command mode to move around. Remember that **d** will delete (cut), **y** will yank (copy), and **p** will put (paste) the current line with the cursor.

c.  Save the text to a new file called "linux3.txt". Remember that you will need to be in the command mode and type a colon ( **:** ) to enter ex mode so that you can write (save) the document ( **:w linux3.txt**). You can then use the quit (exit) command ( **:q**) to exit the vi editor.

d.  Use the **cat** command to view the contents of the linux3.txt file.

```
devasc@labvm:~$ cat linux3.txt
Linux is Linux
I am AWESOME!
devasc@labvm:~$
```

## Part 3: Review Regular Expressions

In this part, you use the **grep** command to review how you can use regular expressions for filtering.

**Note**: Your output may differ than the output shown below as the state of the VM is based on the most recent iteration that you downloaded as well as any changes you may have made. However, you should get some output from the **passwd** file but your highlighted output will differ.

a.  Use the **grep** command to filter the contents of the passwd file to display the line from the passwd file containing **devasc**. Notice that the two instances of **devasc** are highlighted. Also notice that the **grep** command is case-sensitive. The instance of **DEVASC** is not highlighted.

```
devasc@labvm:~$ grep devasc /etc/passwd
devasc:x:900:900:DevNet Associate,,,:/home/devasc:/bin/bash
devasc@labvm:~$
```

b.  Use the **grep** command to show how many times **root** appears in the passwd file. Notice that all three instances of root are highlighted.

```
devasc@labvm:~$ grep root /etc/passwd
root:x:0:0:root:/root:/bin/bash
devasc@labvm:~$
```

c.  Use the **grep** command with the anchor character **^** to find the word, but only at the beginning of the line. Notice that only the word at the beginning of the line is highlighted.

```
devasc@labvm:~$ grep '^root' /etc/passwd
root:x:0:0:root:/root:/bin/bash
devasc@labvm:~$
```

d.  Use the **grep** command with the anchor character **$** to find a word at the end of a line.

```
devasc@labvm:~$ grep 'false$' /etc/passwd
tss:x:109:116:TPM software stack,,,:/var/lib/tpm:/bin/false
lightdm:x:110:120:Light Display Manager:/var/lib/lightdm:/bin/false
whoopsie:x:116:124::/nonexistent:/bin/false
speech-dispatcher:x:120:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
hplip:x:122:7:HPLIP system user,,,:/run/hplip:/bin/false
vboxadd:x:998:1::/var/run/vboxadd:/bin/false
devasc@labvm:~$
```

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e.  Use the **grep** command with the anchor character **.** to match specific length words with different letters in them. Notice that not only is **daem** highlighted, but also **dnsm** is highlighted.

```
devasc@labvm:~$ grep 'd..m' /etc/passwd
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
dnsmasq:x:109:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
avahi-autoipd:x:110:121:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:111:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
avahi:x:113:122:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
colord:x:116:125:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
pulse:x:117:126:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
devasc@labvm:~$
```

f.  Use the **grep** command to find lines where only the numbers 8 or 9 are present. Notice that only the lines containing an 8, a 9, or both are returned.

```
devasc@labvm:~$ grep '[8-9]' /etc/passwd
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
uuidd:x:103:109::/run/uuidd:/usr/sbin/nologin
devasc:x:900:900:DEVASC,,,:/home/devasc:/bin/bash
systemd-network:x:999:999:systemd Network Management:/:/usr/sbin/nologin
systemd-resolve:x:998:998:systemd Resolver:/:/usr/sbin/nologin
systemd-timesync:x:997:997:systemd Time Synchronization:/:/usr/sbin/nologin
systemd-coredump:x:996:996:systemd Core Dumper:/:/usr/sbin/nologin
rtkit:x:108:119:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:109:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
devasc@labvm:~$
```

g.  Use the **grep** command to find literal characters. Notice that only the lines containing a comma are returned.

```
devasc@labvm:~$ grep '[,]' /etc/passwd
devasc:x:900:900:DEVASC,,,:/home/devasc:/bin/bash
tss:x:106:114:TPM software stack,,,:/var/lib/tpm:/bin/false
rtkit:x:108:119:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:109:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
avahi-autoipd:x:110:121:Avahi autoip daemon,,,:/var/lib/avahi-
autoipd:/usr/sbin/nologin
usbmux:x:111:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
kernoops:x:112:65534:Kernel Oops Tracking Daemon,,,:/:/usr/sbin/nologin
avahi:x:113:122:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
hplip:x:115:7:HPLIP system user,,,:/run/hplip:/bin/false
colord:x:116:125:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
pulse:x:117:126:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
devasc@labvm:~$
```

h. Use the **grep** command to find occurrences of zero or more of the pattern preceding it. Notice that only the lines with either **new** and **ne** are returned.

```
devasc@labvm:~$ grep 'new*' /etc/passwd
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
messagebus:x:100:103::/nonexistent:/usr/sbin/nologin
_apt:x:102:65534::/nonexistent:/usr/sbin/nologin
tcpdump:x:104:110::/nonexistent:/usr/sbin/nologin
systemd-network:x:999:999:systemd Network Management:/:/usr/sbin/nologin
kernoops:x:112:65534:Kernel Oops Tracking Daemon,,,:/:/usr/sbin/nologin
saned:x:114:124::/var/lib/saned:/usr/sbin/nologin
devasc@labvm:~$
```

# Part 4: Review System Administration

In this part, you will review basic Linux system administration tasks including shutting down the computer, viewing and testing the network configuration, viewing processes, managing installation packages, updating user passwords, adding content to files, and using text editors.

## Step 1: Shut down the computer.

a. Use the command **shutdown now** to initiate a shutdown of the OS (and the VM) immediately. You do not have to perform this action as the VM will shut down and you will need to restart it manually. Formats of this time argument can be the word **now**, a time of day in the format **hh:mm** or the number of minutes to delay in the format **+minutes**.

```
devasc@labvm:~$ shutdown now
```

b. Use the command **date** to check set date of the OS.

```
devasc@labvm:~$ date
Wed 3 Feb 13:13:46 GMT 2021
devasc@labvm:~$
```

c. Use the command **shutdown +1 "Come back soon!"** to shut down the OS in 1 minute and display the message "Come back soon!". Be sure to cancel or your VM will shut down.

```
devasc@labvm:~$ shutdown +1 "Come back soon!"
Shutdown scheduled for Fri 2020-04-17 20:57:13 UTC, use 'shutdown -c' to cancel.
devasc@labvm:~$ shutdown -c
devasc@labvm:~$
```

## Step 2: View and test the network configuration.

a. Use the `ip address` command to display the network configuration. The output is a bit more detailed. For example, notice that five IPv4 addresses are shown for the **dummy0** interface.

```
devasc@labvm:~$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen
1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: ens160: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group
default qlen 1000
    link/ether 00:50:56:99:21:56 brd ff:ff:ff:ff:ff:ff
    inet 192.168.56.30/24 brd 10.0.2.255 scope global dynamic ens160
       valid_lft forever preferred_lft forever
    inet6 fe80::250:56ff:fe99:2156/64 scope link
       valid_lft forever preferred_lft forever
3: dummy0: <BROADCAST,NOARP,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN group
default qlen 1000
    link/ether 46:8b:41:b5:de:aa brd ff:ff:ff:ff:ff:ff
    inet 192.0.2.1/32 scope global dummy0
       valid_lft forever preferred_lft forever
    inet 192.0.2.2/32 scope global dummy0
       valid_lft forever preferred_lft forever
    inet 192.0.2.3/32 scope global dummy0
       valid_lft forever preferred_lft forever
    inet 192.0.2.4/32 scope global dummy0
       valid_lft forever preferred_lft forever
    inet 192.0.2.5/32 scope global dummy0
       valid_lft forever preferred_lft forever
    inet6 fe80::448b:41ff:feb5:deaa/64 scope link
       valid_lft forever preferred_lft forever
devasc@labvm:~$
```

b. Use the command **ping** with the options **-c 4** to ping a computer on your local network four times. You must use a valid IP address of a device on your local network. The following example is using 192.168.1.1, but your network will most likely have different IPv4 addresses.

```
devasc@labvm:~$ ping -c 4 192.168.56.254
PING 192.168. 56.254 (192.168.56.254) 56(84) bytes of data.
64 bytes from 192.168.56.254: icmp_seq=1 ttl=63 time=1.13 ms
64 bytes from 192.168.56.254: icmp_seq=2 ttl=63 time=2.30 ms
64 bytes from 192.168.56.254: icmp_seq=3 ttl=63 time=1.31 ms
64 bytes from 192.168.56.254: icmp_seq=4 ttl=63 time=2.49 ms

--- 192.168.56.254 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 1.130/1.809/2.492/0.594 ms
devasc@labvm:~$
```

c. You can also ping a name and Domain Name System (DNS) will resolve the name to an IP address. For example, ping Cisco's website. Your VM will send out a DNS request first to get the IP address and then send the ping packets. The DNS process is not shown in the ping output.

```
devasc@labvm:~$ ping -c 4 www.cisco.com
PING e2867.dsca.akamaiedge.net (104.84.247.6) 56(84) bytes of data.
64 bytes from 104.84.247.6 (104.84.247.6): icmp_seq=1 ttl=58 time=185 ms
64 bytes from 104.84.247.6 (104.84.247.6): icmp_seq=2 ttl=58 time=28.8 ms
64 bytes from 104.84.247.6 (104.84.247.6): icmp_seq=3 ttl=58 time=28.8 ms
64 bytes from 104.84.247.6 (104.84.247.6): icmp_seq=4 ttl=58 time=26.4 ms

--- e2867.dsca.akamaiedge.net ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3007ms
rtt min/avg/max/mdev = 26.443/67.339/185.363/68.147 ms
devasc@labvm:~$
```

## Step 3: View Processes

a. Use the **ps** command to display the processes that are running in the current terminal.

```
devasc@labvm:~$ ps
    PID TTY          TIME CMD
   1416 pts/0    00:00:00 bash
   1453 pts/0    00:00:00 ps
devasc@labvm:~$
```

b. Use the **ps** with the **-e** option to display all the processes that are running on the computer.

```
devasc@labvm:~$ ps -e
    PID TTY          TIME CMD
      1 ?        00:00:01 systemd
      2 ?        00:00:00 kthreadd
      3 ?        00:00:00 rcu_gp
      4 ?        00:00:00 rcu_par_gp
      6 ?        00:00:00 kworker/0:0H-kblockd
      7 ?        00:00:00 kworker/0:1-events
      9 ?        00:00:00 mm_percpu_wq
                         --- OUTPUT OMMITED ---
```

c. You can pipe any command output to one screen at a time by adding **| more**. One screen of output displays with the **--more--** shown at the bottom. You can now use the **Enter** key to display one line at a time, the **space bar** to display one screen at a time, or Ctrl+C to exit and return to the command prompt.

```
devasc@labvm:~$ ps -e | more
    PID TTY          TIME CMD
      1 ?        00:00:01 systemd
      2 ?        00:00:00 kthreadd
      3 ?        00:00:00 rcu_gp
      4 ?        00:00:00 rcu_par_gp
      6 ?        00:00:00 kworker/0:0H-kblockd
      9 ?        00:00:00 mm_percpu_wq
     10 ?        00:00:00 ksoftirqd/0
--More--
```

d.  Use the **ps** with the **-ef** option to display all the processes that are running on the computer with more detail.

```
devasc@labvm:~$ ps -ef
UID          PID    PPID  C STIME TTY          TIME CMD
root           1       0  0 20:57 ?        00:00:01 /sbin/init
root           2       0  0 20:57 ?        00:00:00 [kthreadd]
root           3       2  0 20:57 ?        00:00:00 [rcu_gp]
root           4       2  0 20:57 ?        00:00:00 [rcu_par_gp]
root           6       2  0 20:57 ?        00:00:00 [kworker/0:0H-kblockd]
root           9       2  0 20:57 ?        00:00:00 [mm_percpu_wq]
root          10       2  0 20:57 ?        00:00:00 [ksoftirqd/0]
root          11       2  0 20:57 ?        00:00:01 [rcu_sched]
                             --- OUTPUT OMMITED ---
```

## Step 4: Manage packages.

a.  Use the command **apt-get update** to refresh the list of available packages in the OS, as shown previously in Part 1 of this lab. You must use administrative level permissions to use this command.

```
devasc@labvm:~$ sudo apt-get update
Hit:1 http://security.ubuntu.com/ubuntu focal-security InRelease
Get:2 http://us.archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Hit:3 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:4 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease
Get:5 http://us.archive.ubuntu.com/ubuntu focal/main i386 Packages [721 kB]
Get:6 http://us.archive.ubuntu.com/ubuntu focal/main amd64 Packages [974 kB]
Get:7 http://us.archive.ubuntu.com/ubuntu focal/main Translation-en [506 kB]
                             --- OUTPUT OMMITED ---
```

b.  Use the command **apt-cache search** to find a specific package.

```
devasc@labvm:~$ apt-cache search speed test
                             --- OUTPUT OMMITED ---
smalt-examples - Sequence Mapping and Alignment Tool (examples)
speedtest-cli - Command line interface for testing internet bandwidth using
speedtest.net
sup - Software Upgrade Protocol implementation
                             --- OUTPUT OMMITED ---
```

c.  Use the command **apt-get install** to install a package.

```
devasc@labvm:~$ sudo apt-get install speedtest-cli
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  speedtest-cli
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 23.9 kB of archives.
After this operation, 106 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu focal/universe amd64 speedtest-cli all 2.1.2-2
[23.9 kB]
Fetched 23.9 kB in 1s (43.9 kB/s)
                             --- OUTPUT OMMITED ---
```

d.  Now you can use the **speedtest-cli** command to test your current Internet connection speed.

```
devasc@labvm:~$ speedtest-cli
Retrieving speedtest.net configuration...
Testing from Cable Company (192.168.100.21)...
Retrieving speedtest.net server list...
Selecting best server based on ping...
Hosted by Comcast (Albuquerque, NM) [494.76 km]: 48.636 ms
Testing download
speed................................................................................
Download: 90.87 Mbit/s
Testing upload
speed................................................................................
....................
Upload: 17.87 Mbit/s
devasc@labvm:~$
```

e.  Use the command **apt-get upgrade** to update all packages and dependencies on the computer, however select **n** so we don't actually install the updates.

```
devasc@labvm:~$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages have been kept back:
  libnss-systemd libpam-systemd libsystemd0 libyelp0 linux-generic linux-headers-
generic
                          --- OUTPUT OMMITED ---
Do you want to continue? [Y/n] n
Abort.
devasc@labvm:~$
```

f.  Use the command **apt-get purge** to completely remove a package from the computer.

```
devasc@labvm:~$ sudo apt-get purge speedtest-cli
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages will be REMOVED:
  speedtest-cli*
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
After this operation, 106 kB disk space will be freed.
Do you want to continue? [Y/n] Y
(Reading database ... 211937 files and directories currently installed.)
Removing speedtest-cli (2.1.2-2) ...
Processing triggers for man-db (2.9.1-1) ...
devasc@labvm:~$
```

### Step 5: Update Passwords

a.  Use the command **passwd** to update your password.

    **Note**: If you actually change the password for your devasc user, make sure you remember it.

```
devasc@labvm:~$ passwd
Changing password for devasc.
Current password:
New password:
Retype new password:
passwd: password updated successfully
devasc@labvm:~$
```

b.  Use the command **passwd** with the option **-S** to view the status of your password.

```
devasc@labvm:~$ passwd -S
devasc P 06/17/2020 0 99999 7 -1
devasc@labvm:~$
```

c.  Use the manual pages for the **passwd** command (**man passwd**) to research the **-S** option and find the answer the following questions.

    What is the current status of the password?


    What is the minimum number of days that must pass before the password can be changed?


    What is the number of days after password expiration that the account remains active?