

# Lab – Working with Linux Command Line

## Introduction

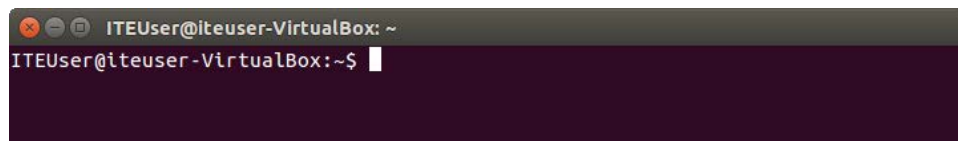
In this lab, you will use the Linux command line to manage files and folders and perform some basic administrative tasks.

## Recommended Equipment

- A computer with a Linux OS, either installed physically or in a virtual machine

### Step 1: Access the command line.

- Log on to a computer as a user with administrative privileges. The account **ITEUser** is used as the example user account throughout this lab.
- To access the command line, click **Dash**, and type **terminal** in the search field and press **Enter**. The default terminal emulator opens.

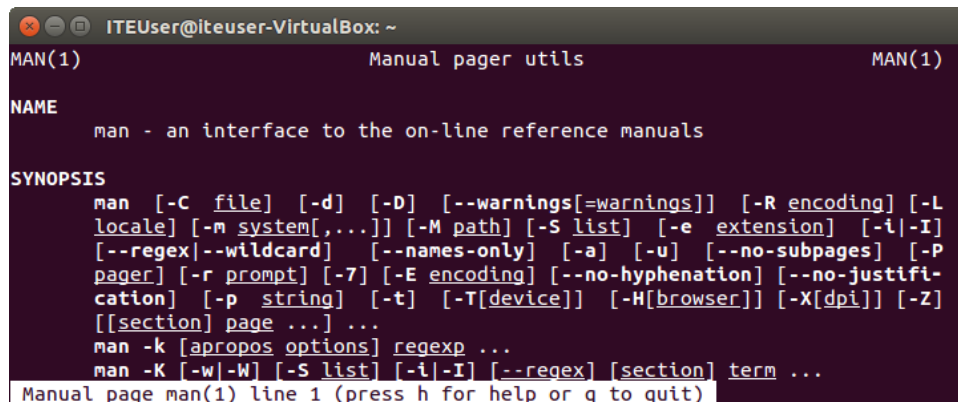


```
ITEUser@iteuser-VirtualBox: ~$
```

### Step 2: Display the man pages from the command line.

You can display command line help using the **man** command. A man page, short for manual page, is an online documentation of the Linux commands. A man page provides detailed information about a command and all the available options.

- To learn more about the man page, type **man man** at the command prompt and press **Enter**.



```
MAN(1)                                Manual pager utils                                MAN(1)

NAME
    man - an interface to the on-line reference manuals

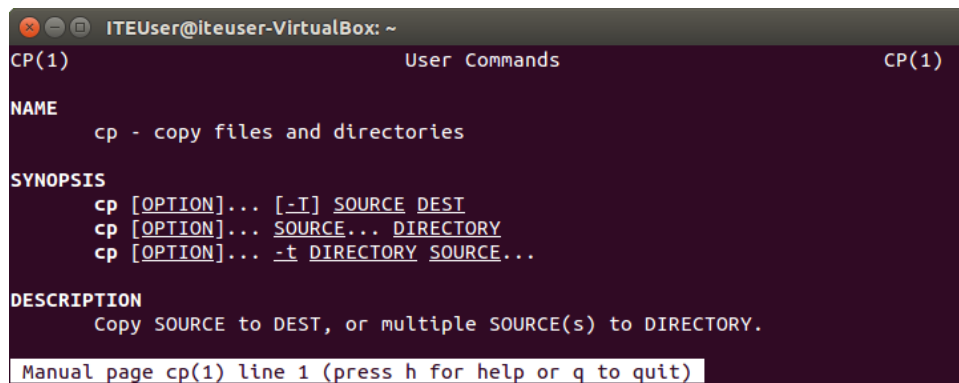
SYNOPSIS
    man [-C file] [-d] [-D] [--warnings[=warnings]] [-R encoding] [-L
    locale] [-m system,...] [-M path] [-S list] [-e extension] [-i|-I]
    [--regex|--wildcard] [--names-only] [-a] [-u] [--no-subpages] [-P
    pager] [-r prompt] [-7] [-E encoding] [--no-hyphenation] [--no-justifi-
    cation] [-p string] [-t] [-T[device]] [-H[browser]] [-X[dpi]] [-Z]
    [[section] page ...] ...
    man -k [apropos options] regexp ...
    man -K [-w|-W] [-S list] [-i|-I] [--regex] [section] term ...

Manual page man(1) line 1 (press h for help or q to quit)
```

Name a few sections that included in a man page.

- Type **q** to exit the man page.

- c. Type **man cp** at the prompt to display the information about the **cp** command.



```
ITEUser@iteuser-VirtualBox: ~
CP(1)                                User Commands                                CP(1)

NAME
    cp - copy files and directories

SYNOPSIS
    cp [OPTION]... [-I] SOURCE DEST
    cp [OPTION]... SOURCE... DIRECTORY
    cp [OPTION]... -t DIRECTORY SOURCE...

DESCRIPTION
    Copy SOURCE to DEST, or multiple SOURCE(s) to DIRECTORY.

Manual page cp(1) line 1 (press h for help or q to quit)
```

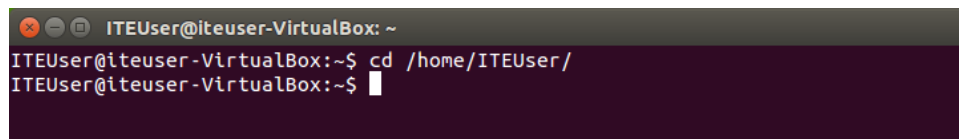
What command would you use to find out more information about the **pwd** command? What is the function of the **pwd** command?

### Step 3: Create and change directories.

In this step, you will use the change directory (**cd**), make directory (**mkdir**), and list directory (**ls**) commands.

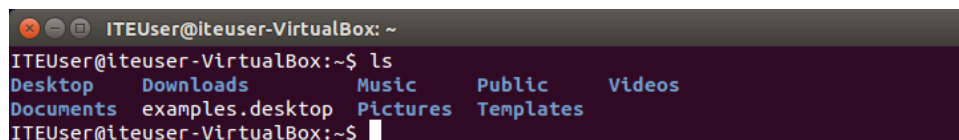
**Note:** A directory is another word for folder. The terms directory and folder are used interchangeably throughout this lab.

- a. Type **pwd** at the prompt. What is the current directory?
- b. Navigate to the `/home/ITEUser` directory if it is not your current directory. Type **cd /home/ITEUser**.



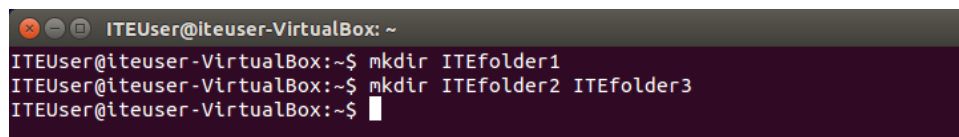
```
ITEUser@iteuser-VirtualBox: ~
ITEUser@iteuser-VirtualBox:~$ cd /home/ITEUser/
ITEUser@iteuser-VirtualBox:~$
```

- c. Type **ls** at the command prompt to list the files and folders that are in the current folder.



```
ITEUser@iteuser-VirtualBox: ~
ITEUser@iteuser-VirtualBox:~$ ls
Desktop  Downloads  Music      Public     Videos
Documents examples.desktop Pictures  Templates
```

- d. In the current directory, use the **mkdir** command to create three new folders: **ITEfolder1**, **ITEfolder2**, and **ITEfolder3**. Type **mkdir ITEfolder1** and press **Enter**. Create **ITEfolder2** and **ITEfolder3**.



```
ITEUser@iteuser-VirtualBox: ~
ITEUser@iteuser-VirtualBox:~$ mkdir ITEfolder1
ITEUser@iteuser-VirtualBox:~$ mkdir ITEfolder2 ITEfolder3
ITEUser@iteuser-VirtualBox:~$
```

- e. Type **ls** to verify the folders have been created.

- f. Type **cd ITEfolder3** at the command prompt and press **Enter**. Which folder are you in now?

Another way to determine your location in the directory tree is to looking at the prompt. In this example, the prompt, **ITEUser@iteuser-VirtualBox:~/ITEfolder3\$**, provides the name of the current user, the computer name, the current working directory, and the privilege level.



**~/ITEfolder3:** is the current working directory. The symbol **~** represents the current user's home directory. In this example, it is **/home/ITEUser**.

**\$:** indicates regular user privilege. If **#** is displayed at the prompt, this indicates elevated privilege (root).

- g. Within the **ITEfolder3** folder, create a folder named **ITEfolder4**. Type **mkdir ITEfolder4**. Use the **ls** command to verify the folder creation.
- h. Type **cd ..** to change the current directory. Each **..** is a shortcut to move up one level in the directory tree. After issuing the **cd ..** command, what is your directory now?

What would be the current directory if you issue this command at **ITEUser@iteuser-VirtualBox:~\$**?

### Step 4: Create text files.

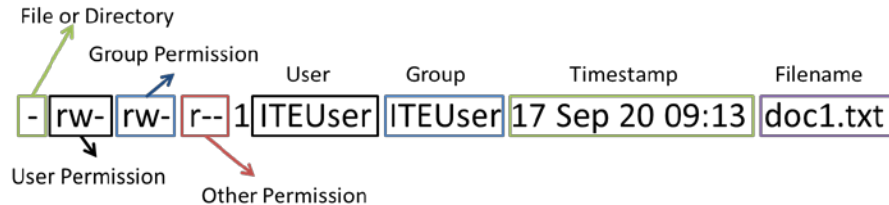
- a. Navigate to the **/home/ITEUser/ITEfolder1** (**~/ITEfolder1**) directory. Type **cd ITEfolder1** at the prompt.
- b. Type **echo This is doc1.txt > doc1.txt** at the command prompt. The **echo** command is used to display a message at the command prompt. The **>** is used to redirect the message from the screen to a file. For example, in the first line, the message **This is doc1.txt** is redirected into a new file named **doc1.txt**. Use the **echo** command and **>** redirect to create these files: **doc2.txt**, **file1.txt**, and **file2.txt**.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ echo This is doc1.txt > doc1.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ echo This is doc2.txt > doc2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ echo This is file1.txt > file1.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ echo This is file2.txt > file2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

- c. Use the **ls** command to verify the files are in the **ITEfolder1** folder. To determine the file permission and other information, type the **ls -l** command at the prompt.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ ls -l
total 16
-rw-rw-r-- 1 ITEUser ITEUser 17 Sep 21 08:58 doc1.txt
-rw-rw-r-- 1 ITEUser ITEUser 17 Sep 21 08:59 doc2.txt
-rw-rw-r-- 1 ITEUser ITEUser 18 Sep 21 08:59 file1.txt
-rw-rw-r-- 1 ITEUser ITEUser 18 Sep 21 08:59 file2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

The following figure breaks down the information provided by the **ls -l** command. The user **ITEUser** is owner of file. The user can read and write to the file. The user **ITEUser** belongs to the group name **ITEUser**. Anyone in the group **ITEUser** has the same permission. The group can read and write to the file. If the user is not the owner or in the group **ITEUser**, the user can only read the file as indicated by the permission for other.



- Type the **man ls** command at the prompt. What option would you use to list all the files in the directory, including the hidden files starting with **.**?
- Use the **cat** command to view the content of the text files. To view the content of **doc2.txt**, type **cat doc2.txt**.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ cat doc2.txt
This is doc2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

### Step 5: Copy, delete, and move files.

- At the command prompt, type **mv doc2.txt ~/ITEfolder2** to move the file **doc2.txt** to the **/home/ITEUser/ITEfolder2** directory.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ mv doc2.txt ~/ITEfolder2
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

- Type **ls** at the prompt to verify that **doc2.txt** is no longer in the current directory.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ ls
doc1.txt file1.txt file2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

- Type **cd ../ITEfolder2** to change the directory to **ITEfolder2**. Type **ls** at the prompt to verify **doc2.txt** has been moved.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder2
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ cd ../ITEfolder2
ITEUser@iteuser-VirtualBox:~/ITEfolder2$ ls
doc2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder2$
```

- d. Type **cp doc2.txt doc2\_copy.txt** to create a copy of **doc2.txt**. Type **ls** at the prompt to verify a copy of the file has been created. Use the **cat** command to look at the content of **doc2\_copy.txt**. The content in the copy should be the same as the original file.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder2
ITEUser@iteuser-VirtualBox:~/ITEfolder2$ cp doc2.txt doc2_copy.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder2$ ls
doc2_copy.txt  doc2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder2$ cat doc2_copy.txt
This is doc2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder2$
```

- e. Now use the **mv** command to move **doc2\_copy.txt** to **ITEfolder1**. Type **mv doc2\_copy.txt ../ITEfolder1**. Use the **ls** command to verify that **doc2\_copy.txt** is no longer in the directory.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder2
ITEUser@iteuser-VirtualBox:~/ITEfolder2$ mv doc2_copy.txt ../ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder2$ ls
doc2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder2$
```

- f. A copy of **doc2.txt** can be created and renamed with the **cp** command. Type **cp doc2.txt ../ITEfolder1/doc2\_new.txt** at the prompt.
- g. Type **ls ../ITEfolder1** to view the content in **ITEfolder1** without leaving the current directory.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder2
ITEUser@iteuser-VirtualBox:~/ITEfolder2$ ls ../ITEfolder1
doc1.txt  doc2_copy.txt  doc2_new.txt  file1.txt  file2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder2$
```

- h. Change the current directory to **ITEfolder1**. Type **cd ../ITEfolder1** at the prompt.
- i. Move **file1.txt** and **file2.txt** into **ITEfolder3**. To move all the files that contain the word **file** into **ITEfolder3** with one command, use a **wildcard** (\*) character to represent one or more characters. Type **mv file\*.txt ../ITEfolder3**.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ mv file*.txt ../ITEfolder3
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

- j. Now delete **doc2\_copy.txt** from the **ITEfolder1** directory. Type **rm doc2\_copy.txt**. Use the **ls** command to verify the file deletion.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ rm doc2_copy.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ ls
doc1.txt  doc2_new.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

### Step 6: Delete directories.

In this step, you will delete a directory using the **rm** command. The **rm** command can be used to delete files and directories.

- a. Navigate to the **/home/ITEUser/ITEfolder3** directory. Use the **ls** command to list the content of the directory.

- b. Use the **rm ITEfolder4** to delete the empty directory, and the message **rm: cannot remove 'ITEfodler4/': Is a directory**.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder3
ITEUser@iteuser-VirtualBox:~/ITEfolder3$ rm ITEfolder4/
rm: cannot remove 'ITEfolder4/': Is a directory
ITEUser@iteuser-VirtualBox:~/ITEfolder3$
```

- c. Use the man pages to determine what options are necessary so the **rm** command can delete directory. Type **man rm** at the prompt.

What option is needed to delete a directory?

- d. Use the **rm -d ITEfolder4** command to delete the empty directory and use the **ls** command to verify the removal of the directory.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder3
ITEUser@iteuser-VirtualBox:~/ITEfolder3$ rm -d ITEfolder4
ITEUser@iteuser-VirtualBox:~/ITEfolder3$ ls
file1.txt file2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder3$
```

- e. Navigate to **/home/ITEUser**.

- f. Now remove the folder **ITEfolder3** using the **rm -d ITEfolder3** command to delete the non-empty directory. The message indicates that the directory is not empty and cannot be deleted.

```
ITEUser@iteuser-VirtualBox: ~
ITEUser@iteuser-VirtualBox:~$ rm -d ITEfolder3
rm: cannot remove 'ITEfolder3': Directory not empty
ITEUser@iteuser-VirtualBox:~$
```

- g. Use man pages to find out more information about the **rm** command.

What option is necessary to delete a non-empty folder using the **rm** command?

- h. To remove a non-empty directory, type the **rm -r ITEfolder3** command to delete the non-empty folder. Use the **ls** command to verify that directory was deleted.

```
ITEUser@iteuser-VirtualBox: ~
ITEUser@iteuser-VirtualBox:~$ rm -r ITEfolder3
ITEUser@iteuser-VirtualBox:~$ ls
Desktop    Downloads    ITEfolder1  Music      Public     Videos
Documents  examples.desktop  ITEfolder2  Pictures   Templates
ITEUser@iteuser-VirtualBox:~$
```

### Step 7: Print lines matching a pattern.

The **cat** command is used to view the content of a text file. To search the content of a text file, you can use the **grep** command. The **grep** command can also be used to match a pattern with screen outputs.

In this step, you will create a few additional text files in the **/home/ITEUser/ITEfolder1** directory. The content and the filename are of your choosing. Three text files are used as example in this step.

- a. Navigate to **/home/ITEUser/ITEfolder1**.

- b. Use the **echo** command and redirect **>** to create a few text files **~/ITEfolder1** and verify that the files were created in **~/ITEfolder1**.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ echo This file contains some text for l
earning how to use the command grep > myfile
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ echo This doc contains some text. > my
file1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ echo This text file explain how to use
the grep command > myfile2
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ ls
doc1.txt doc2_new.txt myfile myfile1 myfile2
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

- c. To determine which files contains the word **file** within the content of all the files, type **grep file \*** to search for the word. The **wildcard** (\*) allows any filename to be included in the search. The files, **myfile** and **myfile2** have the word **file** in the content.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ grep file *
myfile:This file contains some text for learning how to use the command grep
myfile2:This text file explain how to use the grep command
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

What command would you use to search for the word **doc** in the content of the files? Which files contains the word **doc** in this example?

- d. Type **grep doc \*.txt** to search for the files with **.txt** in the filename and has the word **doc** in the content.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ grep doc *.txt
doc1.txt:This is doc1.txt
doc2_new.txt:This is doc2.txt
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ ls
```

- e. Type **grep "some text" \*** at the prompt to determine which files contain the phrase **some text**. The files, **myfile** and **myfile1** have the phrase **some text** in the content.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ grep "some text" *
myfile:This file contains some text for learning how to use the command grep
myfile1:This doc contains some text.
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

What command would you use to search for word **the** in the file with the **.txt** extension? Which files met the requirements?



- f. The search pattern is case sensitive in the **grep** command. The option **-i** or **--ignore-case** is used to ignore the case distinction. To search for all the patterns of **th**, type the **grep -i th \*** command at the prompt.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ grep -i th *
doc1.txt:This is doc1.txt
doc2_new.txt:This is doc2.txt
myfile:This file contains some text for learning how to use the command grep
myfile1:This doc contains some text.
myfile2:This text file explain how to use the grep command
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

What command would you use to search for the pattern **th** or **Th** in the file with the **.txt** extension? Which files met the requirements?

- g. To search for a certain pattern for a screen output, the vertical bar (**|**), commonly referred to as the pipe. The pipe (**|**) is used to direct the output from the first command into the input for the second command. Using the output of **ls** command as an example, type **ls | grep file** at the prompt to list all the filenames with the word **file**.

```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ ls | grep file
myfile
myfile1
myfile2
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

### Step 8: Display the IP Address.

The **ifconfig** command allows you to configure a network interface. In this step, you will use the **ifconfig** to display the IP address associated with a network interface.

At the command prompt, type **ifconfig**. In this example, the **eth0** interface has been assigned an IP address of 192.168.1.7 with a subnet mask of 255.255.255.0.

```
ITEUser@iteuser-VirtualBox: ~
ITEUser@iteuser-VirtualBox:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:35:5c:6b
          inet addr:192.168.1.7  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:fe35:5c6b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:43107 errors:0 dropped:0 overruns:0 frame:0
          TX packets:819 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3392720 (3.3 MB)  TX bytes:126835 (126.8 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:162 errors:0 dropped:0 overruns:0 frame:0
          TX packets:162 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:14250 (14.2 KB)  TX bytes:14250 (14.2 KB)

ITEUser@iteuser-VirtualBox:~$
```

### Step 9: Change your login password.

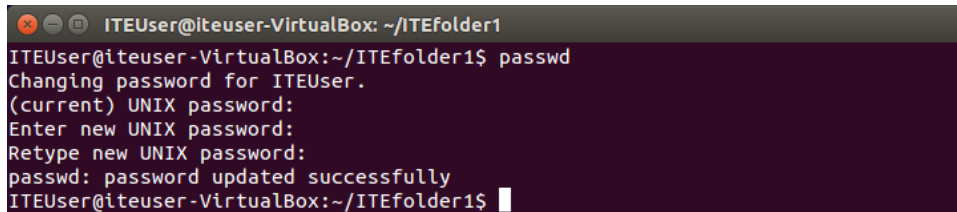
Changing your login password is a good practice in compute security and to unauthorized access to your information and your account.



## Lab – Working with Linux Command Line

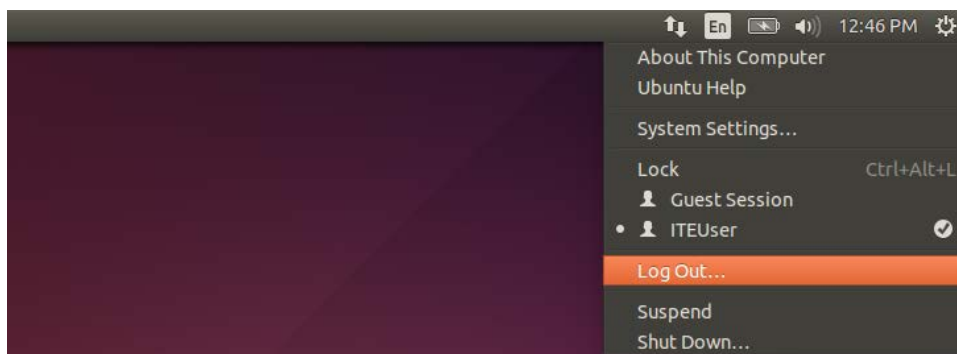
In this step, you will change your login password. You will need your current password and choose a new password to access your account.

- a. Type **passwd** at the prompt to start the process of changing your password. Enter the current password and provide your new password twice. When the message **passwd: password updated successfully** is displayed, your password has been changed.



```
ITEUser@iteuser-VirtualBox: ~/ITEfolder1
ITEUser@iteuser-VirtualBox:~/ITEfolder1$ passwd
Changing password for ITEUser.
(current) UNIX password:
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
ITEUser@iteuser-VirtualBox:~/ITEfolder1$
```

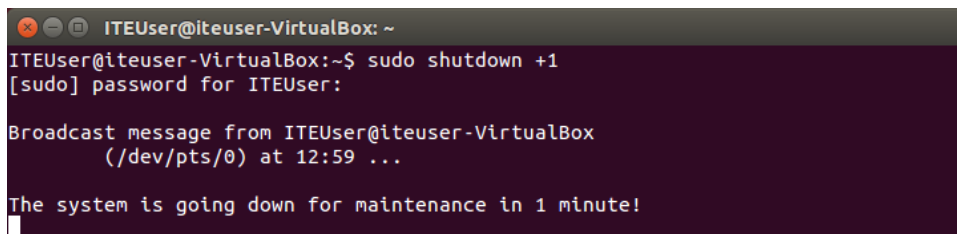
- b. Log out of the computer and use the new password to log on to the computer again.



### Step 10: Use the shutdown command.

The **shutdown** command is used to bring the computer down gracefully. It requires elevated privileges and a time parameter. Because the user ITEUser is the first user account on the computer, the **sudo** command and the password allows this user the elevated privileges. The time parameter can be now, number of minutes from now, or at a specific time, such as 13:00.

Type **sudo shutdown +1** to bring the computer down gracefully in 1 minute. When prompted, enter your password.



```
ITEUser@iteuser-VirtualBox: ~
ITEUser@iteuser-VirtualBox:~$ sudo shutdown +1
[sudo] password for ITEUser:

Broadcast message from ITEUser@iteuser-VirtualBox
(/dev/pts/0) at 12:59 ...

The system is going down for maintenance in 1 minute!
```

### Reflection

What are the advantages of using the Linux command line?