

Assignment 0

Familiarization with Linux

Due Date: Wednesday January 24th, 2018 @ 11:59 pm, tentative

Objective

The purpose of this assignment is for everyone to create a local Linux Virtual Machine for use in future TCSS 422 projects and gain some experience using Ubuntu. Please download and install Ubuntu 16.04. During the installation please include *the Developer Tools*. Ubuntu 16.04 is debian based open source/free distribution of Linux, and is a leading commercial distribution of Linux. The most widely used open source Linux distributions in industry include Ubuntu, Red Hat/CentOS, and SUSE.

Task 1 - Install Oracle Virtual Box

Oracle VirtualBox can be downloaded from:
<https://www.virtualbox.org/wiki/Downloads>

Assuming you have access to a computer, choose the appropriate link from the list for your host operating system to download VirtualBox:

Version 5.2.4 is now available:

- Windows hosts
- OS X hosts

Once you've downloaded VirtualBox, follow the instructions to complete the installation.

If you do not have access to a computer for Virtual Box and Ubuntu, Stephen Rondeau, senior computer specialist for the Institute of Technology, is setting up Ubuntu 16.04 based VirtualBox VMs to support TCSS 422. If you haven't already requested a VM to be setup, please do so. An announcement was sent using Canvas for a Google Forms survey to request an Institute-hosted Virtual Machine.

Task 2 - Create a Ubuntu 16.04.3 LTS Virtual Box VM

Ubuntu can be downloaded from: <https://www.ubuntu.com/downloads/desktop>

If available, please install 4GB RAM (2GB minimum), 2+ CPU cores, and a minimum of 10 GB free disk space. 30-50 GB could be used if sufficient space is available. Previously students have run out of disk space near the end of the quarter leading to headaches.

Video on 64-bit Ubuntu 16.04 Installation (windows):
<https://www.youtube.com/watch?v=DPIPC25xzUM>

Video on 64-bit Ubuntu 16.04 Installation (MAC):
<https://www.youtube.com/watch?v=sNixOS6mHIU>

After installing Ubuntu, install the **Linux Guest Additions**:
<https://youtu.be/cL-avfQQ5YQ>

"Guest Additions" enable sharing of the Host OS Hard Disk (e.g. Windows, Mac) with the Virtual Machine. Guest Additions also allow sharing of the clipboard, and provide mouse pointer integration.

Task 3 - Become familiar with Linux

For this task you will use the internet, and/or a good Linux book to discover Linux commands that provide answers to each of the questions. The commands will help describe information about your Ubuntu Virtual Machine. The goal is to become familiar with common Linux commands and to provide an opportunity to gain experience using the internet and various references **to discover how** to navigate and introspect information about Linux.

50% of the credit is for determining a command to display the answer. The other 50% is for interpreting the output of the command to answer the question.

Discover a Linux command (*sequence*) that provides an answer to each question. Each question potentially has **many** valid Linux commands that **could** answer the question. You're only responsible for finding **one** possible command. Any command, or sequence of commands, is OK as long as the correct answer is obtained.

(Note: manually printing out the answer using the "echo" statement, is not sufficient. Answers must be from using Linux system commands)

Questions

Question 1 - What is the Process Identification Number (PID) of your user's shell process?

Question 2 - What is the version of the Linux kernel installed on your Ubuntu VM?

Question 3 - How many virtual CPU cores does the VM have access to?

Question 4 - What is the total memory size in MB of the VM?

Question 5 - What is the free disk space of the root disk partition in MB? In Linux, the root partition is always mounted at "/". A mount point is the directory or location in the file system where an I/O device has been mounted. The mount point is used to access the device through a file system.

Question 6 - What are the logical volume names of all logical disk volumes on your Ubuntu VM?

Question 7 - What is the total number of inodes on the root filesystem? Please look up what an inode is, and how to display the number of free/used inodes.

Question 8* - What is the average round trip time (RTT) of 10 ICMP ping packets from your Ubuntu VM to www.google.com?

Question 9 - What is the type of file system used for (1) the boot and (2) the root partitions? These will generally be the same. Please look up the definition of Linux file systems. Then determine how to discover the file system of individual disk partitions.

Question 10* - Using the lshw command, report the list of capabilities of your CPU. You may need to install lshw using apt. This will be a long list. Is the "ht" capability provided? (yes/no) Here is the wiki page describing "ht": <https://en.wikipedia.org/wiki/Hyper-threading>
Look up the meaning of one other CPU capability and include a short description in my_answers.txt.

* - These questions require networking to be configured on the Ubuntu VM.

Question 11 & 12- Look up two Linux commands you are unfamiliar with. Provide an example of using the command in your script. In the textfile that contains the answers to the questions, provide a description **in your own words** of what the command does.

What to Submit

For the assignment, you'll submit a BASH script, and two text files as described below.

How to create a simple bash script:

Create a "bash" script which provides the commands to answer each of the questions. Then, run this script file, and capture the **script output** to a text file, and submit this text file to Canvas. Also submit the **simple bash script** file to Canvas, along with its captured output file. Here is an example:

Use an editor such as "gedit", "vi", "pico", or "nano" to create the script.

Include "echo" statements to label command sequences for different questions, and to provide spacing "breaks" between commands.

Sample Question:

What is the command to show the user's current working directory?

```
# here is the command script
$ cat myscript.sh
echo ; echo "command #1: pwd"
pwd
```

```
# to run the script assign the script to have execute permission
# give the "user" "execute" permission with chmod:
$ chmod u+x myscript.sh

# Using I/O redirection, capture the script output to a text file
$ ./myscript.h > my_output.txt

$ cat my_output.txt
command #1: pwd
/home/fred
$
```

Finally create a file called "my_answers.txt" where you type the answer to each question by reading your output from my_output.txt:

```
$ gedit my_answers.txt
```

[Add text as follows]

```
1. /home/fred
```

[Save the file, Exit GEDIT.]

For this example, you'd then submit three files to Canvas:

"myscript.sh"

"my_output.txt"

"my_answers.txt"

To submit the assignment, upload the following files to Canvas:

- 1- **Simple bash script:** (e.g. myscript.sh)
Contains the list of commands to answer each of the questions
- 2- **Output of the bash script** (e.g. my_output.txt)
The output is captured by running the script, and redirecting the output using ">" to direct output to a file.
- 3- **Textfile containing a numbered list of answers** (e.g. my_answers.txt)
File provides your interpretation of the answers to each of the questions. Your answer must be derived from your bash script output. (my_output.txt).

For questions 11 and 12, include a written description of the commands you've researched. Your description should not be a copy of the man page. Your description should be **short and in your own words**. It should describe what the main functions of the command are.

Grading

This assignment will be scored out of 20 points. (20/20)=100%

Each question is worth 2 points: one point is for providing output that contains the answer, and one point for listing the answer correctly.

Two questions are bonus. Answering bonus questions allows you to still receive 100% on the assignment while skipping, or incorrectly answering up to 2 questions.