Institute of Technology
University of Washington – Tacoma
Instructor: Wes Lloyd

Assignment 0

Familiarization with Linux

Due Date: Friday October 14th, 2016 @ 5:00 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 CentOS. It is recommended that you download and install CentOS 7. CentOS is an open source/free distribution of RedHat Linux- a leading commercial distribution of Linux. CentOS tends to be more stable than other Linux distros such as Fedora or Ubuntu as there are fewer updates. Consequently, release of new Linux features in CentOS tends to lag other distributions. Companies tend to use Red Hat/CentOS, SUSE, or Ubuntu.

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:

VirtualBox 5.1.6 for Windows hosts x86/amd64
VirtualBox 5.1.6 for OS X hosts amd64
VirtualBox 5.1.6 for Linux 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 CentOS, Stephen Rondeau, senior computer specialist for the Institute of Technology, will set up CentOS 7 based VirtualBox VMs to support TCSS 422. If you haven't already requested a VM to be setup, please do so. Connection information will be provided in class.

Task 2 – Create a CentOS Virtual Box VM

CentOS can be downloaded from: https://www.centos.org/download/

If you have a modern computer with sufficient RAM (>=4GB), and CPU (2+ CPU cores), I suggest going with CentOS 7. I would recommend at least 4GB of RAM and a multi-core processor. You will need ~10 GB of free disk space. Ideally it is best to have 30-50 GB or more free. If your computer does not meet these specifications, CentOS 6 could be a better option.

There are several videos online which go over the creation of a VirtualBox CentOS 6 and 7 VM.
Here are a few examples:

64-bit CentOS 6 Installation on MS Windows: https://www.youtube.com/watch?v=QUnsMb4c6eU

64-bit CentOS 7 Installation on MS Windows: https://www.youtube.com/watch?v=Eb-FetgKB6k

Task 3 – Become familiar with Linux

For this task you will use the internet, and/or a good Linux book to run a series of Linux commands to discover information about your CentOS Virtual Machine. The goal is to help familiarize yourself with some common Linux commands and to give you an opportunity to gain experience using the internet and various references to discover how to navigate and introspect information about your new Linux Virtual Machine.

There is NO C programming required. Instead, you will capture the output from a sequence on Linux commands to a file, and submit this output file to Canvas. Additionally, you should submit as a separate text file, a numbered list of commands that answers each of the questions. 50% of the credit will come from determining the command which displays the answer. The other 50% will come from interpreting the output of the Linux command to answer the question.

Frist, you must discover which Linux command provides the answer to the question. For each question, there could be more than one valid Linux command to answer the question. I will accept **any** command, or **sequence of commands**, as long as the correct answer is provided as output by the system.

(Note: you can't just print out a random answer with the "echo" statement, it has to come from using Linux system commands)

To create the output file, I suggest two possible alternatives.

Option 1 – Capture the session output with the Linux "script" command

Linux, provides a command called "script", to capture all of the I/O of a live session.
Think of this as "recording" your session. When you are done recording just type exit, and press <return>. Before recording your session which captures the sequence of Linux commands and their output, **you should first discover what the command is,** and make a note of it**.** Your script, must only execute one command, or sequence of commands that fits on a line, to generate output to answer the question. **Do not try to discover the commands in the recording!** This would be too long.

Here is an example, if the only question was to determine the present working directory of the currently logged in user:

```
$ script example.txt
Script started, file is example.txt
$ pwd
/home/fred
$ exit
exit
Script done, file is example.txt
ls -l example.txt
-rw-rw-r--. 1 fred fred 331 Sep 29 10:07 example.txt
```

Option 2 – Create a simple bash script

For Option 2, instead of "recording" your live session, simply create a "bash" script which provides the commands to the session to answer each of the questions. Then, you can run the script file, and capture its output in a text file, and submit the text file to Canvas. For this approach, instead of creating a separate text file that lists the commands, simply submit the script file to Canvas, along with its outuput. Here is an example:

```
# here is the output of the script
$ cat myscript.sh
echo ; echo "command #1: pwd"
pwd
# now lets run the script and capture its output
# assign the script so that the user account has execute permission
first
$ chmod u+x myscript.sh
# Here is an example of I/O redirection.
# The output of the script is redirected
# to the file called "example.txt"
$ ./myscript.h > example.txt
$ cat example.txt

command #1: pwd
/home/fred
$
```

Questions

Here are the questions to answer:

Question 1 – Determine the Process Identification Number (PID) of your user's shell process

Question 2 – Determine the version of the Linux kernel installed on your CentOS VM

Question 3 – Determine the number of virtual CPU cores which the VM believe it has access to

Question 4 – Determine the total memory size in GB of the VM

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

Question 6 – Determine the logical volume names of all logical disk volumes on the CentOS VM

Question 7 – Determine the total number of inodes on the root filesystem.

Question 8* – Determine the average round trip time (RTT) of 10 ICMP ping packets from your CentOS VM to www.google.com.

Question 9 – Report the name of the file system used for (1) the boot and (2) the root partitions. These will generally be the same.

Question 10* – Using the lshw command, report the serial # of the virtual hard disk of your CentOS VM

* - These questions require networking to be configured on the CentOS VM. We will cover configuration of networking for the CentOS VM in class.

What to Submit

To complete the assignment upload the following files to Canvas:

Option 1 - Script recording

Please submit:

1- A textfile containing the list of commands which answer the questions

   File naming as following: A0_commands_{lastname}.txt
   Example: A0_commands_Lloyd.txt

2- The output of these commands captured using "script"

   File naming as following: A0_output_{lastname}.out
   Example: A0_output_Lloyd.out

3- A textfile containing a numbered list of answers to each of the questions.

   File naming as following: A0_answers_{lastname}.txt
   Example: A0_answers_Lloyd.txt

Option 2 – Linux bash script

For this option submit:

1- A simple bash script containing the list of commands that answers each question

   File naming as following: A0_{lastname}.sh
   Example: A0_Lloyd.sh

2- The output of the bash script captured by running the script, and redirecting the output ">" to a file.

   File naming as following: A0_output_{lastname}.out
   Example: A0_output_Lloyd.out

3- A textfile containing a numbered list of answers to each of the questions. Each answer must appear on the captured output of the bash script.

   File naming as following: A0_answers_{lastname}.txt
   Example: A0_answers_Lloyd.txt

Grading

This assignment will be scored out of 15 points. (15/15)=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. One additional point is for properly naming and formatting files as per the file naming convention and assignment instructions.

Three questions are bonus. Answering bonus questions allows you to still receive 100% on the assignment while skipping or incorrectly answering up to 3 questions.