**CS 345 Week 2 Homework**

Answers in yellow

Make sure your answers are in numerical order!

1. Explain the difference between relative and absolute pathing. Show me an example of each type of path.

Absolute pathing is specified from the root down, whereas relative pathing specifies how to get to another location from wherever the user is currently at in the filesystem.

Relative - /home/test > cd abc > /home/test/abc

Absolute - /home/test > cd /home/test/abc > /home/test/abc

2) Create 5 new files in root’s home directory. Use touch to create them. Using the editor of your choice, add at least one line of text to each file. Copy at least 5 other files into this directory from elsewhere on the system. (Run the commands and show the output – no screenshots)

root@CS345:~# touch file1.txt

root@CS345:~# touch file2.txt

root@CS345:~# touch file3.txt

root@CS345:~# touch file4.txt

root@CS345:~# touch file5.txt

root@CS345:~# ls -a

. .bashrc .elementary file3.txt .local untitled

.. .cache file1.txt file4.txt .profile

.bash\_history .dbus file2.txt file5.txt .run

root@CS345:~# pico file1.txt

root@CS345:~# pico file2.txt

root@CS345:~# pico file3.txt

root@CS345:~# pico file4.txt

root@CS345:~# pico file5.txt

root@CS345:~# file file1.txt

file1.txt: ASCII text

root@CS345:~#

root@CS345:~# ls files

copy1 copy2 copy3 copy4 copy5

root@CS345:~# pico copy1

root@CS345:~# cp copy1 /home/

root@CS345:~# pico copy2

root@CS345:~# pico copy3

root@CS345:~# pico copy4

root@CS345:~# pico copy5

root@CS345:~# cp copy2 /home/

root@CS345:~# cp copy3 /home/

root@CS345:~# cp copy4 /home/

root@CS345:~# cp copy5 /home/

root@CS345:~# ls

copy1 copy3 copy5 file1.txt file3.txt file5.txt

copy2 copy4 copyspot file2.txt file4.txt files

3) Use the tar command to place all 10 files into one tape archive file. Once you have the archive file created, compress it using gzip. (Run the commands and show the output – no screenshots)

I accidentally cleared the outputs after doing Tar -cvf hw2.tar copyspot and i wasn't sure how to get the results back. I tried getting most of the commands back

root@CS345:~# cd copyspot

root@CS345:~/copyspot# ls

copy1 copy3 copy5 file2.txt file4.txt hw2.tar

copy2 copy4 file1.txt file3.txt file5.txt

root@CS345:~/copyspot# cd ..

root@CS345:~# ls

copyspot files hw2.tar

root@CS345:~# gzip hw2.tar

root@CS345:~# ls

copyspot files hw2.tar.gz

root@CS345:~#

4) Delete all files in root’s home directory other than the compressed archive file. Once you have done this, show how to uncompress and unarchive the files. (Run the commands and show the output – no screenshots)

root@CS345:~# rmdir copyspot

root@CS345:~# ls

files hw2.tar.gz

root@CS345:~#

root@CS345:~# rmdir files

root@CS345:~# ls

hw2.tar.gz

root@CS345:~#

root@CS345:~# ls

hw2.tar.gz

root@CS345:~# ^C

root@CS345:~# tar xvf hw2.tar.gz

copyspot/

copyspot/file1.txt

.

.

copyspot/file2.txt

root@CS345:~# gunzip hw2.tar.gz

root@CS345:~# ls

copyspot hw2.tar

root@CS345:~#

5) Determine if the telnet package is loaded (run the command and show the output – no screenshots). Explain the process to install an apt-type package on the system.

root@CS345:~# apt telenet

E: Invalid operation telenet

root@CS345:~# apt list --installed

Listing... Done

accountsservice/now 0.6.55-0ubuntu12~20.04.4 amd64 [installed,upgradable to: 0.6.55-0ubuntu12~20.04.5]

acl/focal,now 2.2.53-6 amd64 [installed]

.

.

tasksel/focal,focal,now 3.34ubuntu16 all [installed]

terminology-data/now 1.9.0-1 all [installed,upgradable to: 1.11.0-1]

terminology/now 1.9.0-1 amd64 [installed,upgradable to: 1.11.0-1]

thermald/now 1.9.1-1ubuntu0.4 amd64 [installed,upgradable to: 1.9.1-1ubuntu0.6]

.

.

zerofree/focal,now 1.1.1-1 amd64 [installed]

zlib1g/now 1:1.2.11.dfsg-2ubuntu1.2 amd64 [installed,upgradable to: 1:1.2.11.dfsg-2ubuntu1.3]

root@CS345:~#

To install an APT package on the system, the user must first enter apt list –installed, to see what they currently have. If they don’t see the one their looking for, the user can type apt install *packagename* to install the desired package. They can also show details of a package with apt show *packagename*

6) Explain how chmod permissions work. Show the meaning of 755, 700 and 644 and why those particular permissions are commonly set. We know that a user can incorrectly set his or her rights and make things basically unusable. Consider whether or not this can happen to root…carefully test and prove your theory by running some commands and showing the output (no screenshots).

Chmod permission works in two different forms. The user types in the correct commands to change the permissions of users. They can change world, group, owner permissions and gain/revoke access to files.

-rw-r--r-- (644) -- Only user has read and write permissions; the group and others can read only.

-rwx------ (700) -- Only the user has read, write and execute permissions.

-rwxr-xr-x (755) -- The user has read, write and execute permissions; the group and others can only read and execute.

root@CS345:~/copyspot# cd ..

root@CS345:~# chown reguser copyspot

root@CS345:~# cd copyspot

root@CS345:~/copyspot# ls

copy1 copy3 copy5 file2.txt file4.txt hw2.tar

copy2 copy4 file1.txt file3.txt file5.txt

root@CS345:~/copyspot#

After changing the owner of a folder to reguser, I was still able to access the folder as root. I believe that since root is admin it will always have permissions to folders/directories.

7) Describe how would you start a Linux system up in maintenance/single user mode? Why would you need to do this?

Hold down space bar while starting up the linux machine puts the user into the GRUB menu. From there the user presses *e* to edit the boot command. They must then put the word *single* between generic and root=. Also, the user must press Crtl-X to boot the system. Following this the user logs in with root in single-user mode, which is rescue.target mode. They can then perform any maintenance that was needed. Maintenance/single user mode is needed because in this mode Linux blocks network traffic and only allows a minimum amount of services to start.

8) Explain the commonly-used correct way to shut the system down (just show the command). List three other commands/techniques that can also be used to shut the system down (just list the commands).

The commonly-used way to shutdown the system is *shutdown -h now*.

Three other ways to shutdown the system: *reboot, halt, shutdown -r*

9) Show some daemons that are running on the system via an appropriate ps command. (Run the command and show the output – no screenshots)

root@CS345:~# ps -ef | grep root

root 1 0 0 20:29 ? 00:00:00 /sbin/init splash

root 2 0 0 20:29 ? 00:00:00 [kthreadd]

root 3 2 0 20:29 ? 00:00:00 [rcu\_gp]

root 4 2 0 20:29 ? 00:00:00 [rcu\_par\_gp]

root 6 2 0 20:29 ? 00:00:00 [kworker/0:0H-kblockd]

root 9 2 0 20:29 ? 00:00:00 [mm\_percpu\_wq]

root 10 2 0 20:29 ? 00:00:00 [ksoftirqd/0]

root 11 2 0 20:29 ? 00:00:00 [rcu\_sched]

.

.

root 1065 1040 0 20:47 pts/0 00:00:00 -bash

root 1238 2 0 21:41 ? 00:00:00 [kworker/u2:1-events\_unbound]

root 1244 2 0 21:46 ? 00:00:00 [kworker/u2:2-events\_power\_efficient]

root 1255 2 0 21:51 ? 00:00:00 [kworker/u2:0-events\_power\_efficient]

root 1256 1065 0 21:51 pts/0 00:00:00 ps -ef

root 1257 1065 0 21:51 pts/0 00:00:00 grep --color=auto root

root@CS345:~#

10) Explain what a PID number is. Why do we need them?

A PID number is a process ID number for running processes. Each process on a UNIX system is given a unique PID within the process table. We need them because it allows us to stop a specific process and helps keep track of all the processes.

11) Explain how do you know if a system library is a static or dynamic library? Why do we care, in other words, which library type is more efficient?

Static libraries have “.a” extension and Dynamic libraries tend to have a “.so” extension.

Static libraries are more efficient because they copy the library function directly into the application itself. Dynamic libraries require loading into memory for the application to run.

12) Show which modules are loaded into the kernel by running the appropriate command and showing the output (no screenshots). Comment on some of the dependencies that you see, if there are any.

root@CS345:~# lsmod

Module Size Used by

joydev 24576 0

hid\_generic 16384 0

crct10dif\_pclmul 16384 1

.

.

.

i2c\_piix4 28672 0

e1000 147456 0

pata\_acpi 16384 0

video 49152 0

root@CS345:~#

It shows that aesni\_intel is used by lots of models, including crypto\_simd, and glue\_helper.

13) Show what services get started at the SysV compatibility runlevel 3. Now show what’s in the location where services get started the “modern” way. Are all the same services that get started in the SysV location also found in the “modern” location? (Run the commands and show the output – no screenshots)

Full multi-user text mode gets started at runlevel 3. In the modern way, systemd init daemon is in the startup location for services. All the services are found in the modern location.

root@CS345:~# systemctl show --property "Requires" multi-user.target

Requires=basic.target

root@CS345:~# systemctl show --property "wants" multi-user.target | fmt -10

root@CS345:~# systemctl show --property "Wants" multi-user.target | fmt -10

Wants=getty.target

wpa\_supplicant.service

systemd-ask-password-wall.path

grub-initrd-fallback.service

secureboot-db.service

ufw.service

ubuntu-system-adjustments.service

cron.service

grub-common.service

e2scrub\_reap.service

remote-fs.target

.

.

ondemand.service

irqbalance.service

systemd-logind.service

root@CS345:~#

14) Determine the version and timestamp of the current kernel in place on the UNIX system. (Run the command and show the output – no screenshots)

root@CS345:~# uname -r

5.4.0-72-generic

root@CS345:~# uname -v

#80-Ubuntu SMP Mon Apr 12 17:35:00 UTC 2021

root@CS345:~#

15) Compare and contrast the Windows configuration method of storing system settings as binary data in a registry versus the UNIX method of keeping everything in text files. Is one better than the other in your opinion? Why?

Unix storing has them in text files because it’s portable and protects against dead data unlike windows. Text is also the most common format allowing for most people to easily be able to use it or convert it. Text files are also easier to read and edit than binary files. Windows stores data in binary data because when writing complex programs, binary files allows to hold data in forms such as arrays, dictionaries, and lists.

I personally think that using text files is more efficient because it makes it a lot more universal, which overall helps the industry and others potentially using the code.