

ECE5725: Homework 1

1. Cornell academic integrity quiz result:

Recognizing and Avoiding Plagiarism



Introduction	You correctly answered 8 out of 12 questions. What would you like to do now?
Principles	
Logistics	
Exercises	
<input checked="" type="radio"/> Email my score to: <input type="text"/>	
<input type="radio"/> Let me do the exercises again.	
<input type="radio"/> Let me exit the tutorial.	
<input type="button" value="Next >"/>	

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- The SD card has been set up and backed up, I will show them to TA at Lab1.
- The principle of Linux file permission is “-d/l rwx rwx rwx”. The three group of “rwx” are for user, group, global, respectively. And the rwx is usually calculated by binary number. For example, 111 means readable, writable, executable; however, 000 means unreadable, unwritable, and un-executable.

We used Integer to represent the binary number, so 777 means 111 111 111, that this file can be read, written, executed by the user, group, as well as anyone that reaches this file. This is dangerous because all users can change the file, making it totally unsecure. 644 means 110 100 100, that the user can read and write the file, while others can only read that file. 700 means 111 000 000, that the user has all authorities for the file, while others have none.

4. Screenshot:

```
cl2228@ece5725-f21:~$ whoami
cl2228
cl2228@ece5725-f21:~$ pwd
/home/cl2228
cl2228@ece5725-f21:~$ date
Sat 04 Sep 2021 08:00:26 PM EDT
cl2228@ece5725-f21:~$ mkdir test
cl2228@ece5725-f21:~$ ls
test
cl2228@ece5725-f21:~$ cd ..
cl2228@ece5725-f21:/home$ ls
ad196  ame57  hy197  jy392  lost+found  qy237  sl2454  tz395  yl2248  yw2359
ak826  fs383  it233  jz544  mm2778  rm756  sp2544  tz422  yl3539  yy796
ap444  hh543  jd2249  kcb82  mz588  rp474  spb228  ss383  yl929  yz2723
as2537  hj323  jfs9  kh545  nt243  rz28  sr2322  xh357  yn234  yz2729
bc594  h1759  j12684  kl649  pjm329  sa754  sy664  xw586  yp284  yz483
bx83  h1778  js2828  lb632  pw434  sd925  tn629  xz598  yp387  zp74
cl2228  h1778  js2828  lb632  pw434  sd925  tn629  xz598  yp387  zp74
cq53  hw727  jw979  lf355  qs73  sl2358  tj10  vj286  vs566  zw289
cl2228@ece5725-f21:/home$ chmod 744 c12228
cl2228@ece5725-f21:/home$ ls -l
total 328
drwxrwxrwx  2 ad196  students  4096 Sep  3 12:36 ad196
drwxrwxrwx  2 ak826  students  4096 Sep  3 12:36 ak826
drwxr-xr-x  2 ap444  students  4096 Sep  1 11:13 ap444
drwxr-xr-x  2 as2537  students  4096 Sep  1 11:13 as2537
drwx---x--- 5 bc594  students  4096 Sep  4 17:10 bc594
drwxrwxrwx  3 bx83   students  4096 Sep  4 00:27 bx83
drwxr---r-- 5 cl2228  students  4096 Sep  4 20:01 cl2228
```

5. Screenshot:

```
cl2228@ece5725-f21:~$ ls
test
cl2228@ece5725-f21:~$ cd test
cl2228@ece5725-f21:~/test$ cat test.txt
cat: test.txt: No such file or directory
cl2228@ece5725-f21:~/test$ cat>test.txt
cl2228@ece5725-f21:~/test$ ls
test.txt
cl2228@ece5725-f21:~/test$ cat test.txt
cl2228@ece5725-f21:~/test$ pwd
/home/cl2228/test
cl2228@ece5725-f21:~/test$ ls -l
total 0
-rw-r--r-- 1 cl2228 students 0 Sep  4 20:06 test.txt
cl2228@ece5725-f21:~/test$ vi test.txt
cl2228@ece5725-f21:~/test$ cat test.txt
cl2228 Chenghui Li

cl2228@ece5725-f21:~/test$ chmod 700 test.txt
cl2228@ece5725-f21:~/test$ ls -l
total 4
-rwx----- 1 cl2228 students 20 Sep  4 20:08 test.txt
cl2228@ece5725-f21:~/test$
```

6. Already done that.

7. The full name of 'df' is disk free, used to show the free space of disks, the /home directory is used to store data of all students participating in ECE 5725 so it is allocated the largest space by using an external driver which is 1TB. Using 'df -h' can make display human-readable by showing B/KB/MB/GB.

Screen shots:

```
cl2228@ece5725-f21:/home $ df
Filesystem      1K-blocks    Used Available Use% Mounted on
/dev/root        14988544 3384548  10941712  24% /
devtmpfs         793684    0      793684    0% /dev
tmpfs            958548    0      958548    0% /dev/shm
tmpfs            958548    99064   859484    11% /run
tmpfs             5120      4        5116    1% /run/lock
tmpfs            958548    0      958548    0% /sys/fs/cgroup
/dev/mmcblk0p1   258095    50381   207715    20% /boot
/dev/sda1        960380648 611040 910915148    1% /home
tmpfs            191708    0      191708    0% /run/user/1000
tmpfs            191708    0      191708    0% /run/user/1029
tmpfs            191708    0      191708    0% /run/user/1023
tmpfs            191708    0      191708    0% /run/user/1062
tmpfs            191708    0      191708    0% /run/user/1036
tmpfs            191708    0      191708    0% /run/user/1016
tmpfs            191708    0      191708    0% /run/user/1047
tmpfs            191708    0      191708    0% /run/user/1046
tmpfs            191708    0      191708    0% /run/user/1028
tmpfs            191708    0      191708    0% /run/user/1011
tmpfs            191708    0      191708    0% /run/user/1014

cl2228@ece5725-f21:/home $ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       15G   3.3G   11G   24% /
devtmpfs        776M    0   776M    0% /dev
tmpfs           937M    0   937M    0% /dev/shm
tmpfs           937M   97M   840M   11% /run
tmpfs           5.0M   4.0K   5.0M    1% /run/lock
tmpfs           937M    0   937M    0% /sys/fs/cgroup
/dev/mmcblk0p1  253M   50M   203M   20% /boot
/dev/sda1       916G  597M  869G    1% /home
tmpfs           188M    0   188M    0% /run/user/1000
tmpfs           188M    0   188M    0% /run/user/1029
tmpfs           188M    0   188M    0% /run/user/1023
tmpfs           188M    0   188M    0% /run/user/1062
tmpfs           188M    0   188M    0% /run/user/1036
tmpfs           188M    0   188M    0% /run/user/1016
tmpfs           188M    0   188M    0% /run/user/1047
tmpfs           188M    0   188M    0% /run/user/1046
tmpfs           188M    0   188M    0% /run/user/1028
tmpfs           188M    0   188M    0% /run/user/1011
tmpfs           188M    0   188M    0% /run/user/1014

cl2228@ece5725-f21:/home $
```

8. Screenshots:

```
cl12228@ece5725-f21:/home $ ps -alef
F S UID      PID PPID C PRI NI ADDR SZ WCHAN  STIME TTY      TIME CMD
4 S root      1   0  0 80  0 - 8509 -      Aug31 ?    00:00:39 /sbin
1 S root      2   0  0 80  0 -      -      Aug31 ?    00:00:00 [kthr
1 I root      3   2  0 60 -20 -      -      Aug31 ?    00:00:00 [rcu_
1 I root      4   2  0 60 -20 -      -      Aug31 ?    00:00:00 [rcu_
1 I root      8   2  0 60 -20 -      -      Aug31 ?    00:00:00 [mm_p
1 S root      9   2  0 80  0 -      -      Aug31 ?    00:00:00 [rcu_
1 S root     10   2  0 80  0 -      -      Aug31 ?    00:00:00 [rcu_
1 S root     11   2  0 80  0 -      -      Aug31 ?    00:00:07 [ksof
1 I root     12   2  0 80  0 -      -      Aug31 ?    00:04:53 [rcu_
1 S root     13   2  0 -40 -      -      Aug31 ?    00:00:00 [migr
1 S root     14   2  0 80  0 -      -      Aug31 ?    00:00:00 [cpuh
1 S root     15   2  0 80  0 -      -      Aug31 ?    00:00:00 [cpuh
1 S root     16   2  0 -40 -      -      Aug31 ?    00:00:00 [migr
1 S root     17   2  0 80  0 -      -      Aug31 ?    00:00:01 [ksof
1 S root     20   2  0 80  0 -      -      Aug31 ?    00:00:00 [cpuh
1 S root     21   2  0 -40 -      -      Aug31 ?    00:00:00 [migr
1 S root     22   2  0 80  0 -      -      Aug31 ?    00:00:00 [ksof
1 S root     25   2  0 80  0 -      -      Aug31 ?    00:00:00 [cpuh
1 S root     26   2  0 -40 -      -      Aug31 ?    00:00:00 [migr
1 S root     27   2  0 80  0 -      -      Aug31 ?    00:00:03 [ksof
5 S root     30   2  0 80  0 -      -      Aug31 ?    00:00:00 [kdev
1 I root     31   2  0 60 -20 -      -      Aug31 ?    00:00:00 [netn
1 S root     34   2  0 80  0 -      -      Aug31 ?    00:00:00 [kaud
1 S root     36   2  0 80  0 -      -      Aug31 ?    00:00:00 [khun
1 S root     37   2  0 80  0 -      -      Aug31 ?    00:00:00 [oom_
1 I root     38   2  0 60 -20 -      -      Aug31 ?    00:00:00 [writ
1 S root     39   2  0 80  0 -      -      Aug31 ?    00:00:29 [kcom
1 I root     57   2  0 60 -20 -      -      Aug31 ?    00:00:00 [kblo
1 I root     58   2  0 60 -20 -      -      Aug31 ?    00:00:00 [blkc
1 S root     59   2  0  9 -      -      Aug31 ?    00:00:00 [wate
1 I root     62   2  0 60 -20 -      -      Aug31 ?    00:00:08 [kwor
1 I root     63   2  0 60 -20 -      -      Aug31 ?    00:00:00 [xpci
1 I root     64   2  0 60 -20 -      -      Aug31 ?    00:00:00 [kwor
1 I root     65   2  0 60 -20 -      -      Aug31 ?    00:00:00 [xprt
1 S root     66   2  0 80  0 -      -      Aug31 ?    00:00:00 [kswa
1 I root     67   2  0 60 -20 -      -      Aug31 ?    00:00:00 [nfsi
1 I root     68   2  0 60 -20 -      -      Aug31 ?    00:00:00 [kthr
1 I root     69   2  0 60 -20 -      -      Aug31 ?    00:00:00 [iscs
1 I root     70   2  0 60 -20 -      -      Aug31 ?    00:00:00 [iscs
1 I root     71   2  0 60 -20 -      -      Aug31 ?    00:00:00 [nvme
1 I root     72   2  0 60 -20 -      -      Aug31 ?    00:00:00 [nvme
1 I root     73   2  0 60 -20 -      -      Aug31 ?    00:00:00 [nvme
1 I root     76   2  0 60 -20 -      -      Aug31 ?    00:00:00 [DWC
1 I root     77   2  0 60 -20 -      -      Aug31 ?    00:00:00 [uas]
1 S root     78   2  0 61 -19 -      -      Aug31 ?    00:00:00 [vchi
1 S root     79   2  0 61 -19 -      -      Aug31 ?    00:00:00 [vchi
1 S root     80   2  0 60 -20 -      -      Aug31 ?    00:00:00 [vchi
1 I root     81   2  0 60 -20 -      -      Aug31 ?    00:00:00 [zswa
1 I root     86   2  0 60 -20 -      -      Aug31 ?    00:00:00 [sdhc
1 S root     87   2  0  9 -      -      Aug31 ?    00:00:00 [irq/
1 I root     89   2  0 60 -20 -      -      Aug31 ?    00:00:00 [mmc_
1 S root     90   2  0 80  0 -      -      Aug31 ?    00:00:00 [scsi
1 I root     91   2  0 60 -20 -      -      Aug31 ?    00:00:00 [scsi
1 S root     92   2  0 80  0 -      -      Aug31 ?    00:00:01 [usb-
1 I root     93   2  0 60 -20 -      -      Aug31 ?    00:00:02 [kwor
1 S root     94   2  0 80  0 -      -      Aug31 ?    00:00:07 [jbd2
1 I root     95   2  0 60 -20 -      -      Aug31 ?    00:00:00 [ext4
1 I root     97   2  0 60 -20 -      -      Aug31 ?    00:00:00 [ipv6
1 I root     99   2  0 60 -20 -      -      Aug31 ?    00:00:02 [kwor
1 I root    111   2  0 60 -20 -      -      Aug31 ?    00:00:02 [kwor
4 S root    125   1  0 80  0 - 9492 -      Aug31 ?    00:02:48 /lib/
4 S root    160   1  0 80  0 - 4657 -      Aug31 ?    00:00:01 /lib/
1 S root    183   2  0 80  0 -      -      Aug31 ?    00:00:00 [vchi
1 S root    184   2  0 70 -10 -      -      Aug31 ?    00:00:00 [SMIO
1 I root    189   2  0 60 -20 -      -      Aug31 ?    00:00:00 [mmal
1 I root    190   2  0 60 -20 -      -      Aug31 ?    00:00:00 [mmal
1 I root    191   2  0 60 -20 -      -      Aug31 ?    00:00:00 [mmal
1 I root    192   2  0 60 -20 -      -      Aug31 ?    00:00:00 [mmal

cl12228@ece5725-f21:/home $ ps -alef | grep cl12228
4 S root      1036 499  0 80  0 - 3060 -      19:59 ?    00:00:00 sshd: cl12228 [priv]
4 S cl12228    1039  1  0 80  0 - 3682 do_epo  19:59 ?    00:00:00 /lib/systemd/systemd --user
5 S cl12228    1040 1039  0 80  0 - 8894 -      19:59 ?    00:00:00 (sd-pam)
5 S cl12228    1054 1036  0 80  0 - 3060 -      19:59 ?    00:00:00 sshd: cl12228@pts/11
0 S cl12228    1055 1054  0 80  0 - 2122 do_wai  19:59 pts/11  00:00:00 -bash
0 R cl12228    1354 1055  0 80  0 - 2447 -      20:12 pts/11  00:00:00 ps -alef
0 S cl12228    1355 1055  0 80  0 - 1837 pipe_r  20:12 pts/11  00:00:00 grep --color=auto cl12228

cl12228@ece5725-f21:/home $
```

9. Components of the Raspberry Pi are quite similar to those in servers or laptops. Our SD card can be regarded as Raspberry's disk; Raspberry's core, the Raspberry Pi 4 for example, is a 1.5GHz 64-bit quad-core ARM Cortex-A7x processor, this is different from laptops, which usually use Intel or AMD or Apple M1 as CPUs. Raspberry Pi is absolutely a money saver because a server that perfectly allows all students use in the ECE5725 only costs no more than \$100, if we use a PC, it will cost more than \$1,000, much more expensive than the Raspberry Pi. But if we need to run some programs or models that need high computing resources such as deep-learning model training, then raspberry Pi cannot fulfill the needs as the task need high-performance GPUs and CPUs. In general, raspberry Pi is winner in the price, but it has capability limit.
10. The main differences between top and htop is that htop is colorful and has a nicer interface, allows users to scroll the process list, allows many operations with mouse. More importantly, htop allows us to kill a process without finding and entering PIDs. According to the above advantages, htop is a better choice to use.