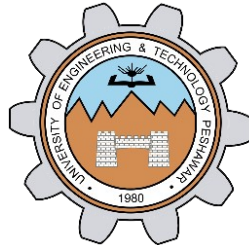


Linux Commands Overview

LAB # 01



Fall 2020

CSE302L System Programming Lab

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“On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work.”

Student Signature: _____

Submitted to:

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Wednesday, December 2nd, 2020

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Lab Objective(s):

This lab is about the different commands of Linux for personal use. Editing, compiling and executing the C programs.

Task # 01:

In your home directory create the subdirectory ~/cse302/labs/lab1 . (Use multiple mkdir commands or consult the -p option for mkdir in the man page for mkdir).

1. cd ~/cse302/labs/lab1
2. Copy or create a file named myfile into ~/cse302/labs/lab1 (if you create it, type something into it). For information on how to create a quick empty file, man touch.
3. Create a soft link soft_link and a hard link hard_link to that file.
4. Based on the output returned by stat and ls commands (using all relevant options), explain in detail (but briefly) the differences between the three files.

Output / Graphs / Plots / Results:

```
ShahRaza@ubuntu:~/Systems Programming/labs/lab1$ stat softlink
File: softlink -> myfile
Size: 6          Blocks: 0          IO Block: 4096   symbolic link
Device: 801h/2049d Inode: 1329078      Links: 1
Access: (0777/lrwxrwxrwx)  Uid: ( 1000/   shah)   Gid: ( 1000/   shah)
Access: 2020-12-01 00:47:09.573489777 -0800
Modify: 2020-11-25 08:28:59.711649883 -0800
Change: 2020-11-25 08:28:59.711649883 -0800
 Birth: -

ShahRaza@ubuntu:~/Systems Programming/labs/lab1$ stat myfile
File: myfile
Size: 6          Blocks: 8          IO Block: 4096   regular file
Device: 801h/2049d Inode: 1331642      Links: 2
Access: (0664/-rw-rw-r--)  Uid: ( 1000/   shah)   Gid: ( 1000/   shah)
Access: 2020-11-25 08:29:28.962269338 -0800
Modify: 2020-11-24 01:33:15.875500829 -0800
Change: 2020-11-25 08:29:21.438509028 -0800
 Birth: -

ShahRaza@ubuntu:~/Systems Programming/labs/lab1$ stat hardlink
File: hardlink
Size: 6          Blocks: 8          IO Block: 4096   regular file
Device: 801h/2049d Inode: 1331642      Links: 2
Access: (0664/-rw-rw-r--)  Uid: ( 1000/   shah)   Gid: ( 1000/   shah)
Access: 2020-11-25 08:29:28.962269338 -0800
Modify: 2020-11-24 01:33:15.875500829 -0800
Change: 2020-11-25 08:29:21.438509028 -0800
 Birth: -

ShahRaza@ubuntu:~/Systems Programming/labs/lab1$ ls -li
total 8
1331642 -rw-rw-r-- 2 shah shah 6 Nov 24 01:33 hardlink
1331642 -rw-rw-r-- 2 shah shah 6 Nov 24 01:33 myfile
1329078 lrwxrwxrwx 1 shah shah 6 Nov 25 08:28 softlink -> myfile
```

Discussion and Conclusion:

A soft link is an actual link to the original file, whereas a hard link is a mirror copy of the original file. If you delete the original file, the soft link has no value, because it points to a non-existent file. But in the case of hard link, it is entirely opposite. Even if you delete the original file, the hard link will still have the data of the original file. Because hard link acts as a mirror copy of the original file. As shown in the above screenshot, original file and hard link have the same inode number and permission while the inode number and permission for soft link is different.

Task # 02:

In your transcript file please show:

How many John's (first name) have user accounts on the department's computers [a single pipeline of 3 processes]. Hint: use grep, also look at wc.

Change your file permission mask such that by default your colleagues do not have read permissions for your newly created files. Please show in the transcript file the following:

- the initial mask
- how you changed it
- show that people in your user group don't have read permissions for a new file you're creating.
- Change the umask permanently by placing the umask ... command in your .bash_profile file.

List the PIDs of all processes running as root on your computer on a line, separated by commas. E.g.,: 1,2,3,4,5,657,658, ... Use pipes to create a one-line command that accomplishes this. You'll need some of the text processing tools presented in class. Hint: man ps (-a and -x flags), man tr.

Script started on 2020-12-01 23:25:29-0800

```
#[K#]0;shah@ubuntu: ~/Systems
Programming/labs/lab1/Task2##[01;32mShahRaza@ubuntu#[00m:#[01;34m~/
Systems Programming/labs/lab1/Task2#[00m$ who -u |
gre##[K##[K##[K##[K##[K | grap##[K##[Kep John | wc -l
```

0002

total 0

```
#]0;shah@ubuntu: ~/Systems
Programming/labs/lab1/Task2##[01;32mShahRaza@ubuntu#[00m:#[01;34m~/
Systems Programming/labs/lab1/Task2#[00m$ t##[Kumask -
u##[K##[Ku=+##[K##[K+##[K##[Kg-r
```

total 0

```
-rw-rw-r-- 1 shah shah 0 Dec  1 23:25 transcript.txt
```

```
#]0;shah@ubuntu: ~/Systems
Programming/labs/lab1/Task2##[01;32mShahRaza@ubuntu#[00m:#[01;34m~/
Systems Programming/labs/lab1/Task2#[00m$ ps -ax -o pid | tr -s [:space:] "," | tr -d
"PID" | tr -s "," "##"
"##[K##[K##[K##[K##[K##[K##[K##[K##[K##[K##[K##[K##[K##[K##[K
```

,,1,2,3,4,6,7,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,70,71,72,73,74,75,76,
77,78,81,82,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,10
4,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,123,12
4,134,137,150,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,21
1,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,23
0,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,24
9,250,251,252,253,254,255,256,257,258,259,288,311,312,351,364,366,367,382,51
5,555,556,558,560,566,567,569,578,580,597,605,609,610,613,617,620,621,671,69
0,699,700,714,800,814,816,1032,1039,1040,1053,1056,1074,1142,1160,1164,117
1,1175,1177,1179,1180,1184,1185,1186,1187,1193,1195,1204,1206,1207,1212,12
22,1227,1232,1235,1254,1255,1282,1288,1289,1292,1293,1294,1295,1296,1297,1
317,1324,1328,1334,1341,1342,1362,1367,1385,1403,1421,1576,1582,1586,1595,
1596,1776,1778,2229,2437,2454,2477,2522,2523,2524,

```
#]0;shah@ubuntu:~/Systems Programming/labs/lab1/Task2##[01;32mShahRaza@ubuntu#[00m:#[01;34m~/Systems Programming/labs/lab1/Task2#[00m$ exit
exit
```

Script done on 2020-12-02 05:37:30-0800

Output:

```
ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ script transcript.txt
Script started, file is transcript.txt
ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ who -u | grep John | wc -l
0
ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ umask
0002
ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ ls -l
total 0
-rw-rw-r-- 1 shah shah 0 Dec  1 23:25 transcript.txt
ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ umask g-r
ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ touch newfile.txt
ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ ls -l
total 0
-rw--w-r-- 1 shah shah 0 Dec  2 00:50 newfile.txt
-rw-rw-r-- 1 shah shah 0 Dec  1 23:25 transcript.txt
ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ ps -ax -o pid | tr -s [:space:] " " | tr -d "PID"
,,1,2,3,4,6,7,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,70,71,72,73,74,75,76,77,78,81,82,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,11
2,113,114,115,116,117,118,119,120,121,123,124,134,137,150,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,22
9,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,288,311,312,351,364,366,367,382,515,555,556,558,560,566,567,569,578,58
0,597,605,609,610,613,617,620,621,671,690,699,700,714,800,814,816,1032,1039,1040,1053,1056,1074,1142,1160,1164,1171,1175,1177,1179,1180,1184,1185,1186,1187,1193,1195,1204,1206,1207,1212,1222,1
227,1232,1235,1254,1255,1282,1288,1289,1292,1293,1294,1295,1296,1297,1317,1324,1328,1334,1341,1342,1362,1367,1385,1403,1421,1576,1582,1586,1595,1596,1776,1778,2229,2437,2454,2477,2522,2523,252
4,ShahRaza@ubuntu:~/Systems Programming/labs/lab1/Task2$ man ps
```

Task 3:

List the usernames and names of the people logged on 192.168.2.139 . (NOTE: you may find the command option of ssh helpful.) The list returned should be sorted, should not contain duplicates (e.g., same user listed multiple times) and should have the following format:

```
1 <username1> <name1>
2 <username2> <name2>
3 <username3> <name3>
...
```

Hints: use the "nl" command to number lines.

Explain what information you can get about ~/Desktop/cse302/labs/lab1 using all (and only) relevant options of ls and stat commands: (is it a file? a directory? how large? permissions? access info? etc.) Indicate the fields that reveal these pieces of information.

Output:

```
ShahRaza@ubuntu:~/cse302/labs/lab1$ ls -l
total 12
-rw-rw-r-- 2 shah shah    7 Dec  2 07:52  hardlink
-rw-rw-r-- 2 shah shah    7 Dec  2 07:52  myfile.txt
lrwxrwxrwx 1 shah shah   10 Dec  2 07:53  softlink -> myfile.txt
drwxrwxr-x 2 shah shah 4096 Dec  2 08:19  'Task 2'
ShahRaza@ubuntu:~/cse302/labs/lab1$ stat Task2
stat: cannot stat 'Task2': No such file or directory
ShahRaza@ubuntu:~/cse302/labs/lab1$ stat "Task2"
stat: cannot stat 'Task2': No such file or directory
ShahRaza@ubuntu:~/cse302/labs/lab1$ stat Task2
  File: Task2
  Size: 4096          Blocks: 8           IO Block: 4096   directory
Device: 801h/2049d   Inode: 395449        Links: 2
Access: (0775/drwxrwxr-x)  Uid: ( 1000/   shah)   Gid: ( 1000/   shah)
Access: 2020-12-02 08:20:05.503373003 -0800
Modify: 2020-12-02 08:19:58.371263067 -0800
Change: 2020-12-02 08:44:45.561042762 -0800
 Birth: -
```

Discussion:

We can see from the above screenshot that Task2 is a directory, "softlink" is a link and all the others are normal files. Permissions for directory and a normal file are different. A directory has 2 links by default and its size is also bigger than normal files. We can also see that softlink has an arrow next to it showing that it points to myfile.txt