

ESE 2025 Week 2 Report

Instructor:

Student: Vy Nguyen - C0776242

Introduction:

This report explores and executes the commands from Chapter 3 Derrek Molloy's Exploring BeagleBone 2nd edition.

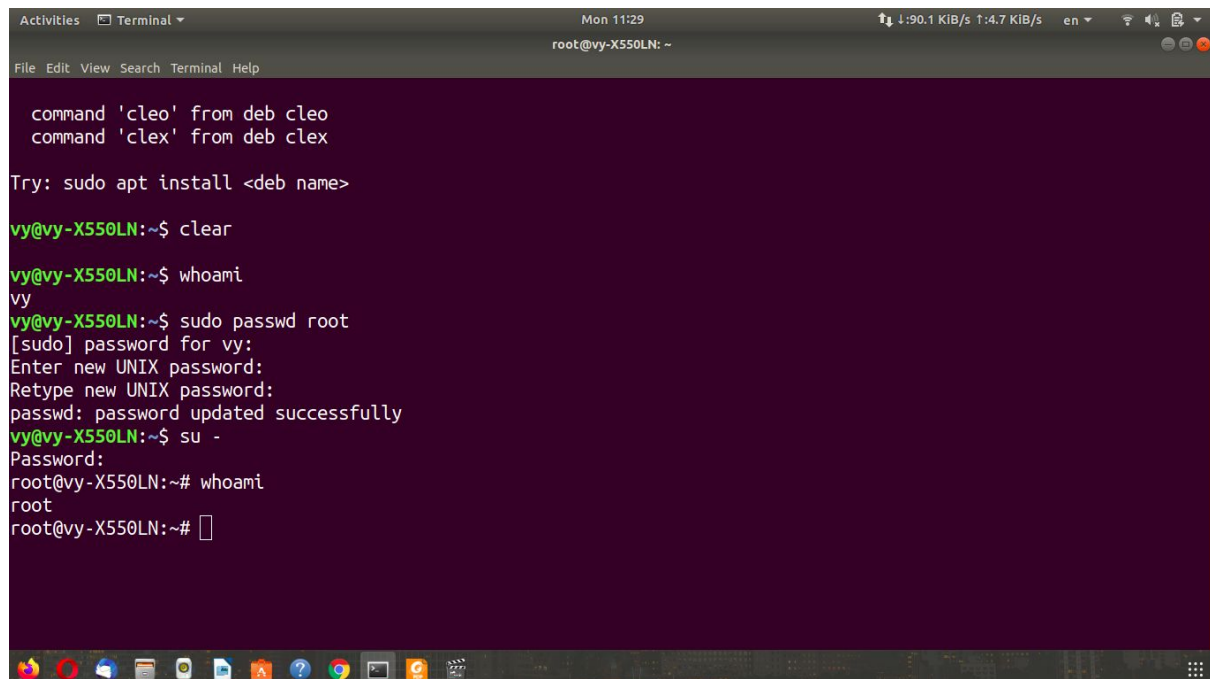
Discussion:

The superuser:

Superuser or root account is the administrator account that highest security access to all commands and files. It is in default disable, but we can enable it by using:

```
$sudo passwd root
```

After that we can run a shell with a substitute user by using (su - or su - root).



```
Activities Terminal Mon 11:29 1:90.1 KIB/s 1:4.7 KIB/s en
root@vy-X550LN: ~

command 'cleo' from deb cleo
command 'clex' from deb clex

Try: sudo apt install <deb name>

vy@vy-X550LN:~$ clear

vy@vy-X550LN:~$ whoami
vy
vy@vy-X550LN:~$ sudo passwd root
[sudo] password for vy:
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
vy@vy-X550LN:~$ su -
Password:
root@vy-X550LN:~# whoami
root
root@vy-X550LN:~#
```

Because Linux uses data structures, called inode, to represent file system objects such as files and directories. By performing a listing `$ls -ail` off the root directory, we can see the tmp directory of inodes.

By creating a temporary file (a.txt), and perform `ls -ail`, we will see that the current (.) directory has the exact same inode index:

```
$cd - aill | grep tmp
$cd tmp
$touch a.txt
$ls -ail
```

```
Activities Terminal Mon 12:15 root@vy-X550LN: /tmp
File Edit View Search Terminal Help

root@vy-X550LN:~# ls -ail | grep tmp
525315 drwxrwxrwt 18 root root 4096 Jul 20 12:13 tmp
root@vy-X550LN:~# cd /tmp
root@vy-X550LN:/tmp# touch a.txt
root@vy-X550LN:/tmp# ls -ail
total 76
525315 drwxrwxrwt 18 root root 4096 Jul 20 12:15 .
2 drwxr-xr-x 24 root root 4096 Jul 11 21:46 ..
526519 -rw-r--r-- 1 root root 0 Jul 20 12:15 a.txt
558182 drwx----- 2 vy vy 4096 Jul 19 21:35 .com.google.Chrome.w46pZI
526839 -rw----- 1 vy vy 0 Jul 19 21:34 config-err-c4YEct
558148 drwxrwxrwt 2 root root 4096 Jul 19 21:33 .font-unix
558163 drwxr-xr-x 2 vy vy 4096 Jul 19 22:34 FoxitReaderlite
558146 drwxrwxrwt 2 root root 4096 Jul 20 03:56 .ICE-unix
558159 drwx----- 2 vy vy 4096 Jul 20 02:25 lu12192u4jpus.tmp
529252 srwxrwxr-x 1 vy vy 0 Jul 20 02:24 OSL_PIPE_1000_SingleOfficeIPC_36d9f5391b42257cc6e3a6e6b64cd52
545018 srwxr-xr-x 1 vy vy 0 Jul 19 22:39 qtsingleapp-FoxitR-3664-3e8
534088 -rw-r--r-- 1 vy vy 0 Jul 19 22:34 qtsingleapp-FoxitR-3664-3e8-lockfile
558171 drwx----- 2 vy vy 4096 Jul 19 21:34 ssh-dvVwfoMpn02E
558177 drwx----- 3 root root 4096 Jul 19 21:33 systemd-private-da89ed24771b4a38a98d3562c17cce1c-bolt.service-6vJcVc
558179 drwx----- 3 root root 4096 Jul 19 21:33 systemd-private-da89ed24771b4a38a98d3562c17cce1c-colord.service-CU6yzj
558155 drwx----- 3 root root 4096 Jul 20 09:45 svstemd-private-da89ed24771b4a38a98d3562c17cce1c-fwuud.service-
```

Linking to files and directories

There are two types of links in Linux system: soft links and hard links

- A soft link (or symbolic link) is a file that refers to the location of another file or directory.
- Hard links, conversely, link directly to the inode index, but they cannot be linked to a directory.

To create a link we can use:

In /path/to/file.txt linkname

example:

```
$ ln -s /tmp/a.txt softlink
$ln /tmp/a.txt hardlink
$ls -al
```

Where “-s” to add a symbolic link.

```
Activities Terminal Mon 12:30 1:365 KiB/s 1:14.8 KiB/s en
root@vy-X550LN: /tmp
File Edit View Search Terminal Help
558147 drwxrwxrwt 2 root root 4096 Jul 19 21:33 .XIM-unix
root@vy-X550LN:/tmp# ln -s/tmp/a.txt softlink
ln: invalid option -- '/'
Try 'ln --help' for more information.
root@vy-X550LN:/tmp# ln -s /tmp/a.txt softlink
root@vy-X550LN:/tmp# ln /tmp/a.txt hardlink
root@vy-X550LN:/tmp# ls -al
total 76
drwxrwxrwt 18 root root 4096 Jul 20 12:29
drwxr-xr-x 24 root root 4096 Jul 11 21:46 ..
-rw-r--r-- 2 root root 0 Jul 20 12:15 a.txt
drwx----- 2 vy vy 4096 Jul 19 21:35 .com.google.Chrome.w46pZI
-rw----- 1 vy vy 0 Jul 19 21:34 config-err-c4YEct
drwxrwxrwt 2 root root 4096 Jul 19 21:33 .font-unix
drwxr-xr-x 2 vy vy 4096 Jul 19 22:34 FoxitReaderlite
-rw-r--r-- 2 root root 0 Jul 20 12:15 hardlink
drwxrwxrwt 2 root root 4096 Jul 20 03:56 .ICE-unix
drwx----- 2 vy vy 4096 Jul 20 02:25 lu12192u4jpus.tmp
srwxrwxr-x 1 vy vy 0 Jul 20 02:24 OSL_PIPE_1000_SingleOfficeIPC_36d9f5391b42257cc6e3a6e6b64cd52
srwxr-xr-x 1 vy vy 0 Jul 19 22:39 qtsingleapp-FoxitR-3664-3e8
-rw-r--r-- 1 vy vy 0 Jul 19 22:34 qtsingleapp-FoxitR-3664-3e8-lockfile
lrwxrwxrwx 1 root root 10 Jul 20 12:29 softlink -> /tmp/a.txt
drwx----- 2 vy vy 4096 Jul 19 21:34 ssh-dvVwfoMpn02E
drwx----- 3 root root 4096 Jul 19 21:33 systemd-private-da89ed24771b4a38a98d3562c17cce1c-bolt.service-6vJcVc
drwx----- 3 root root 4096 Jul 19 21:33 systemd-private-da89ed24771b4a38a98d3562c17cce1c-colord.service-CU6v21
```

There is a number 2 in front of a.txt file. This is the number of hard links that are associate with the file.

To check the difference between a soft link and a hard link. First, we put some content in the text file. Then display the soft link and hard link. After that we create a subdirectory, move the text file to it, and repeat the display:

```
root@vy-X550LN:/tmp# echo "testing links" >> a.txt
root@vy-X550LN:/tmp# more hardlink
root@vy-X550LN:/tmp# more softlink
root@vy-X550LN:/tmp# mkdir subdirectory
root@vy-X550LN:/tmp# mv a.txt subdirectory
root@vy-X550LN:/tmp# more hardlink
root@vy-X550LN:/tmp# more softlink
root@vy-X550LN:/tmp# clear
```

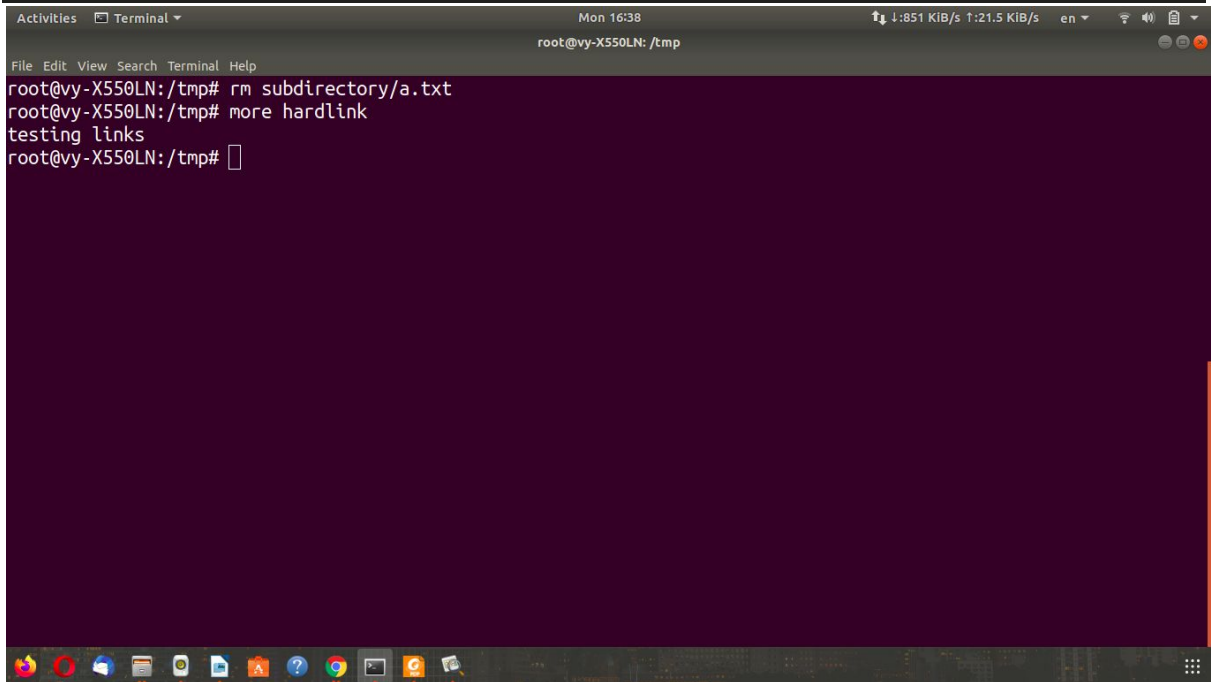
Result:

```
root@vy-X550LN:/tmp# echo "testing links" >> a.txt
root@vy-X550LN:/tmp# more hardlink
testing links
root@vy-X550LN:/tmp# more softlink
testing links
root@vy-X550LN:/tmp# mkdir subdirectory
root@vy-X550LN:/tmp# mv a.txt subdirectory
root@vy-X550LN:/tmp# more hardlink
testing links
root@vy-X550LN:/tmp# more softlink
more: stat of softlink failed: No such file or directory
root@vy-X550LN:/tmp#
```

When the a.txt file is moved, the soft link breaks but the hard link works correctly. Therefore, symbolic links are not updated when the linked file is moved, but hard-links always refer to the source, even if moved or removed.

Now trying to remove the file completely and test the hard link:

```
$rm subdirectory/a.txt
$more hardlink
```



```
Activities Terminal Mon 16:38 1:851 KIB/s 1:21.5 KIB/s en
root@vy-X550LN: /tmp
File Edit View Search Terminal Help
root@vy-X550LN: /tmp# rm subdirectory/a.txt
root@vy-X550LN: /tmp# more hardlink
testing links
root@vy-X550LN: /tmp#
```

Creating a new user account on the BBB

To creating a new user account on BBB, we can follow these steps:

1. The creation of a new user account called "userName" on the BBB
2. The retroactive addition of the account to the user's group
3. The reset of the password for the new user account
4. Verification that the account is working correctly

After login into BB as an administrator

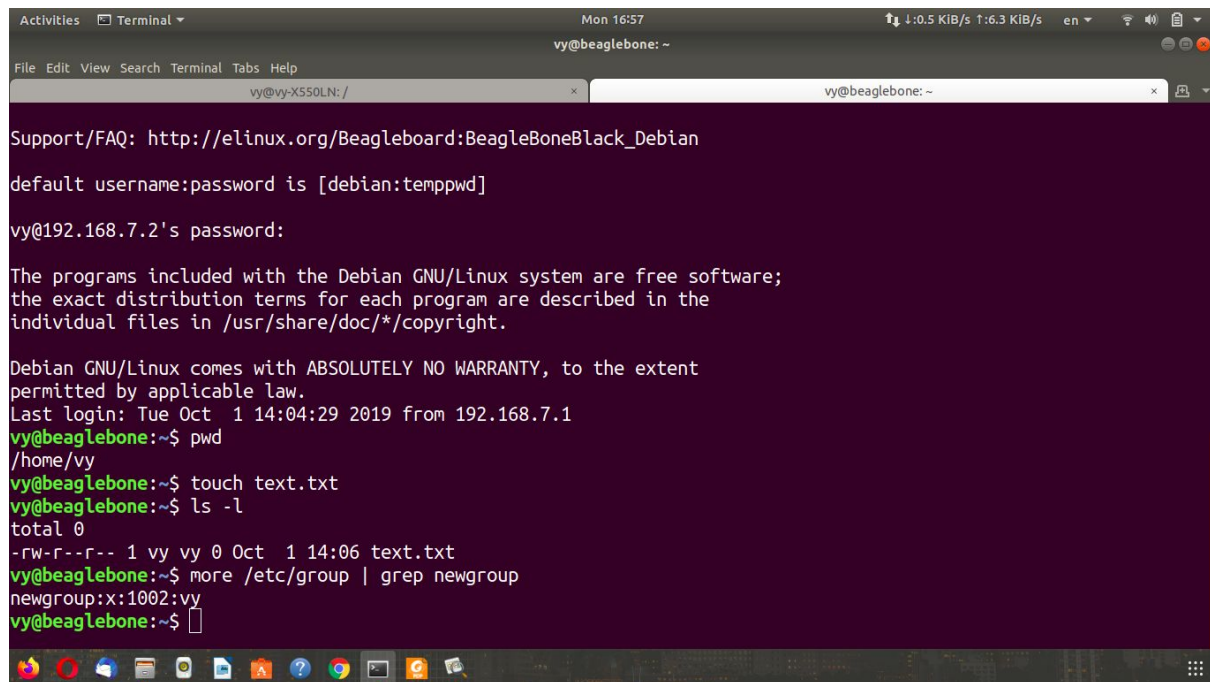
```
$ssh 192.168.7.2 -l debian
$su -
```

We can start to add a new user by following:

```
$adduser vy
$group add newgroup
$adduser vy newgroup
```

Then we can test by login into BB again with vy account

```
$pwd
$touch text.txt
$ls -l
$more /etc/group | grep newgroup
```



```
Support/FAQ: http://elinux.org/Beagleboard:BeagleBoneBlack\_Debian
default username:password is [debian:temppwd]
vy@192.168.7.2's password:
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Oct  1 14:04:29 2019 from 192.168.7.1
vy@beaglebone:~$ pwd
/home/vy
vy@beaglebone:~$ touch text.txt
vy@beaglebone:~$ ls -l
total 0
-rw-r--r-- 1 vy vy 0 Oct  1 14:06 text.txt
vy@beaglebone:~$ more /etc/group | grep newgroup
newgroup:x:1002:vy
vy@beaglebone:~$
```

After trying the commands, the correct way to close the BB is using

```
$sudo shutdown -h now
```

Summary:

There are just some of the commands that are useful from chapter 3 of the book. Recommend to explore further to understand how to manage file system in Linux