# ESE-2025 Lab 2

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## Introduction

This lab report is to get familiarised with the basic Linux commands to use in desktop as well as the BeagleBone Black.

Once we boot our BBB, we might want to add multiple users in the BBB or simply want to root privileges.

To switch between root and debian we can use the following commands:
$whoami #shows “debian”
$su - or $sudo su #gives superuser access
$whoami #now shows “root”
$exit #exit as root & get rid of responsibilities! (With great power comes great responsibilities)

Linux uses a data-structure called “inodes” to represented all the files and directories. These data-structures store information like permission-attributes, file size etc.
Inode-index is simply a reference number of the particular directory or file on the system.
To know stuff we can simply go to root directory and use the command
$ls -ail
where -i is to inode index
Now if we add any number of directory/files in this directory, the inode index remains the same. Please have a look at Appendix fig 2.

```
1567 drwxrwxrwt   9 root root  4096 Oct  1 14:21 tmp
```

1567 -- inode index
d -- stands for directory
rwx -- read/write/execute permissions for user, group and others respectively.
9 -- links
root -- file/directory owner username
root -- file/directory owner group name
4096 -- size of the directory

There are two types of links in Linux - soft links and hard links. Soft links are also called as symbolic links.
A soft link is a file that refers to the location of another file or directory whereas hard links directly to the inode index.
We can create a hard link using: $ln /path/to/file.txt linkname
We can create a soft link using: $ln -s /path/to/file.txt linkname

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Refer appendix for more clarity.

If we want to add new users and groups we can simply do it by $adduser <name> and $groupadd <name>.
To add a user a to group xyz we write $adduser a xyz
We can also reset our password by $passwd <username>

To change the ownership of the file we use chown and chgrp commands. To change the file permissions we use chmod commands
These can be very helpful for security, protection reasons. But, if we try to play around with files that are not accessible to us, Linux won't simply let us!
Linux says:

1. Respect the privacy of others
2. Think before you type
3. With great power comes great responsibility

## Conclusion

This report gives knowledge of some simple and useful commands. Linux can be quite easy and fun if we master the commands to control everything from the command terminal.

## Appendix:

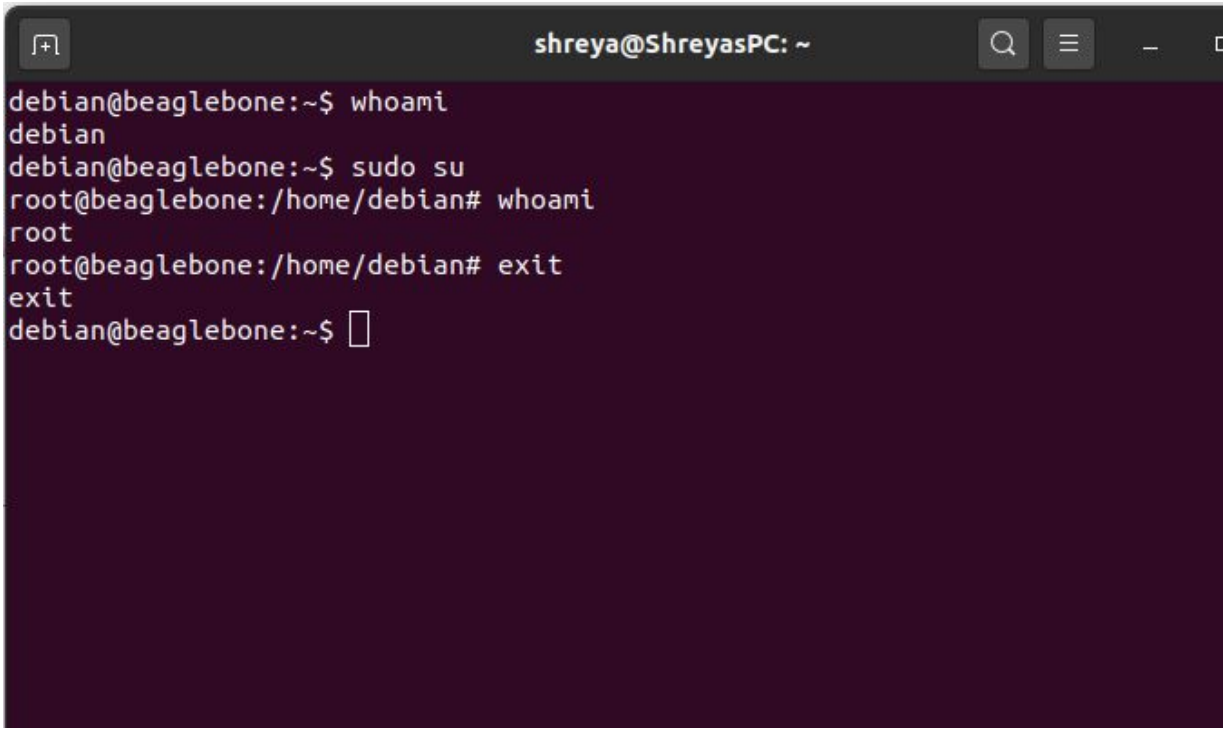


Figure 1: debian and root switching

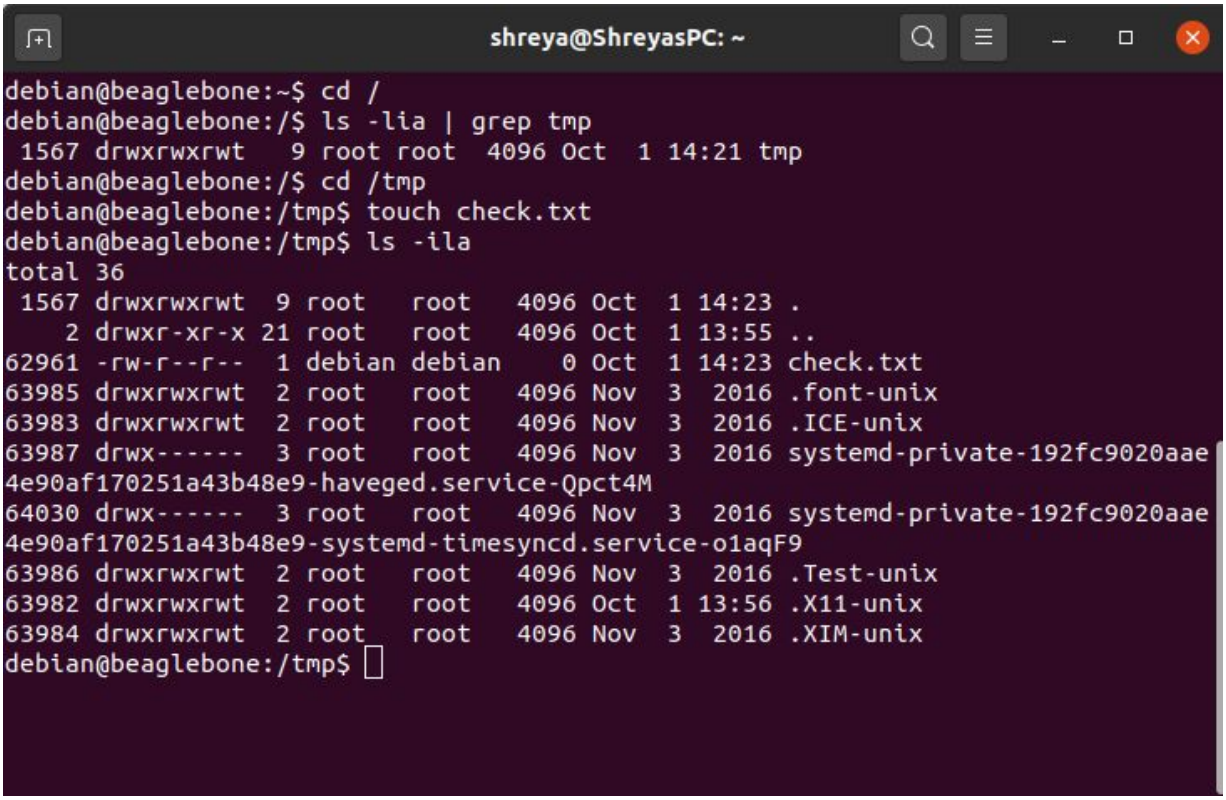


Figure 2: Inode index check

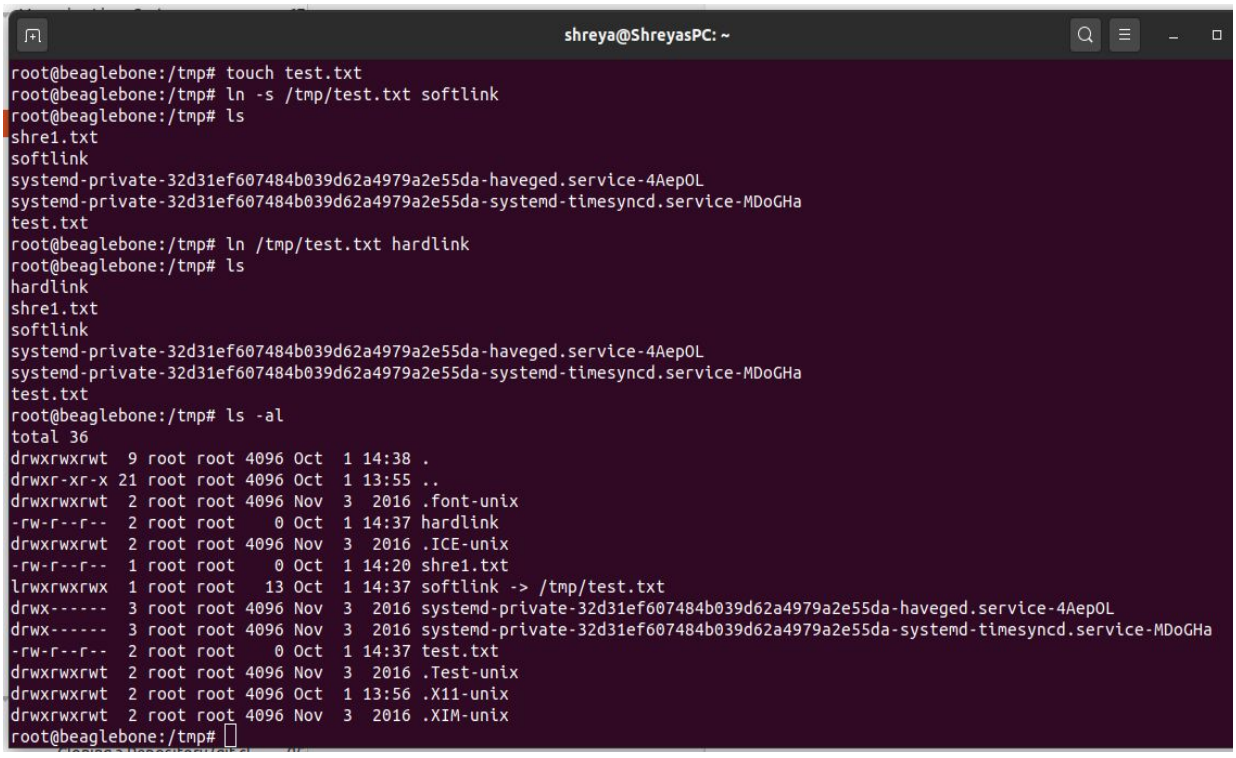


Figure 3: Softlinks and Hardlinks

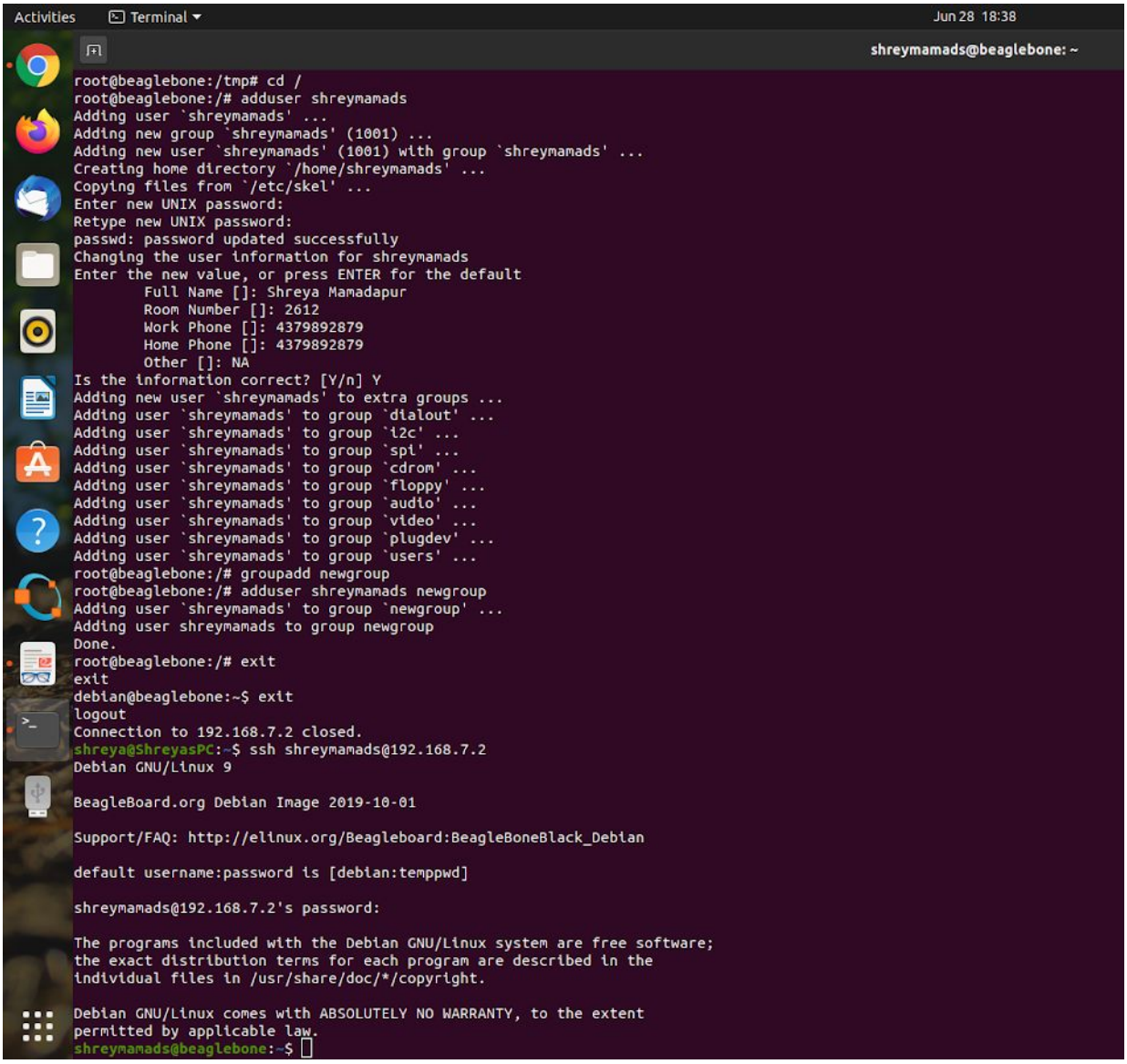


Figure 4a: adding user and group

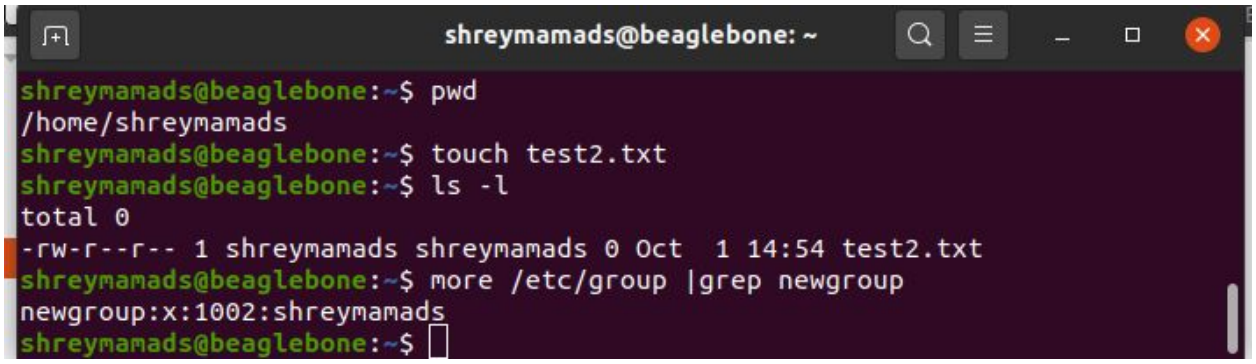


Figure 4b

```
debian@beaglebone:~$ cd /tmp/
debian@beaglebone:/tmp$ ls -l
total 8
-rw-r--r-- 1 shreymamads shreymamads    0 Oct  1 16:05 check2.txt
-rw-r--r-- 1 debian      debian         0 Oct  1 14:23 check.txt
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020
aae4e90af170251a43b48e9-haveged.service-Qpct4M
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020
aae4e90af170251a43b48e9-systemd-timesyncd.service-o1aqF9
debian@beaglebone:/tmp$ chown shreymamads check.txt
chown: changing ownership of 'check.txt': Operation not permitted
debian@beaglebone:/tmp$ sudo chown shreymamads check.txt
[sudo] password for debian:
debian@beaglebone:/tmp$ ls -l
total 8
-rw-r--r-- 1 shreymamads shreymamads    0 Oct  1 16:05 check2.txt
-rw-r--r-- 1 shreymamads debian         0 Oct  1 14:23 check.txt
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020
aae4e90af170251a43b48e9-haveged.service-Qpct4M
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020
aae4e90af170251a43b48e9-systemd-timesyncd.service-o1aqF9
debian@beaglebone:/tmp$
```

Figure 5a: changing ownership of check.txt from debian to shreymamads

```
debian@beaglebone:/tmp$ sudo chgrp shreymamads check.txt
debian@beaglebone:/tmp$ ls -l
total 8
-rw-r--r-- 1 shreymamads shreymamads    0 Oct  1 16:05 check2.txt
-rw-r--r-- 1 shreymamads shreymamads    0 Oct  1 14:23 check.txt
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020
aae4e90af170251a43b48e9-haveged.service-Qpct4M
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020
aae4e90af170251a43b48e9-systemd-timesyncd.service-o1aqF9
debian@beaglebone:/tmp$
```

Figure 5b: changing group ownership of check.txt

```
shreymamads@beaglebone:/tmp$ ls -l
total 8
-rw-r--r-- 1 shreymamads shreymamads    0 Oct  1 16:05 check2.txt
-rw-r--r-- 1 shreymamads shreymamads    0 Oct  1 14:23 check.txt
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020a
ae4e90af170251a43b48e9-haveged.service-Qpct4M
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020a
ae4e90af170251a43b48e9-systemd-timesyncd.service-o1aqF9
shreymamads@beaglebone:/tmp$ chmod 774 check.txt
shreymamads@beaglebone:/tmp$ ls -l
total 8
-rw-r--r-- 1 shreymamads shreymamads    0 Oct  1 16:05 check2.txt
-rwxrwxr-- 1 shreymamads shreymamads    0 Oct  1 14:23 check.txt
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020a
ae4e90af170251a43b48e9-haveged.service-Qpct4M
drwx------ 3 root        root        4096 Nov  3  2016 systemd-private-192fc9020a
ae4e90af170251a43b48e9-systemd-timesyncd.service-o1aqF9
shreymamads@beaglebone:/tmp$
```

Figure 5c: Changing file permissions of check.txt