

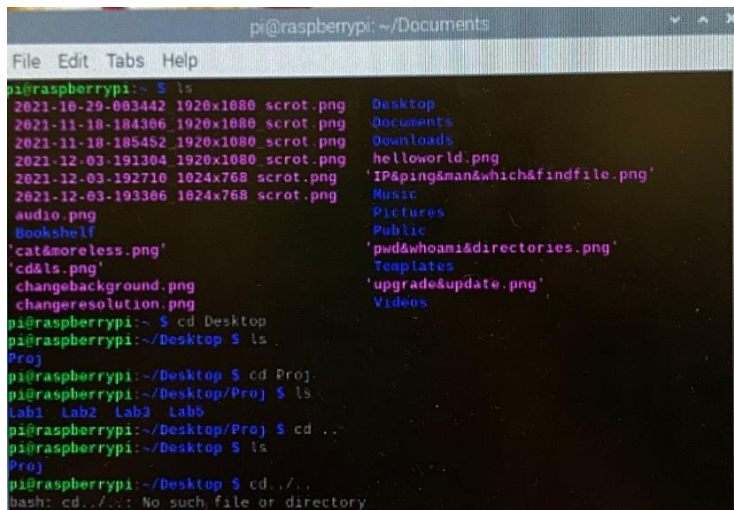
## Lab1 (section 1)– Embedded Systems

Rayan Hassan - 4511021

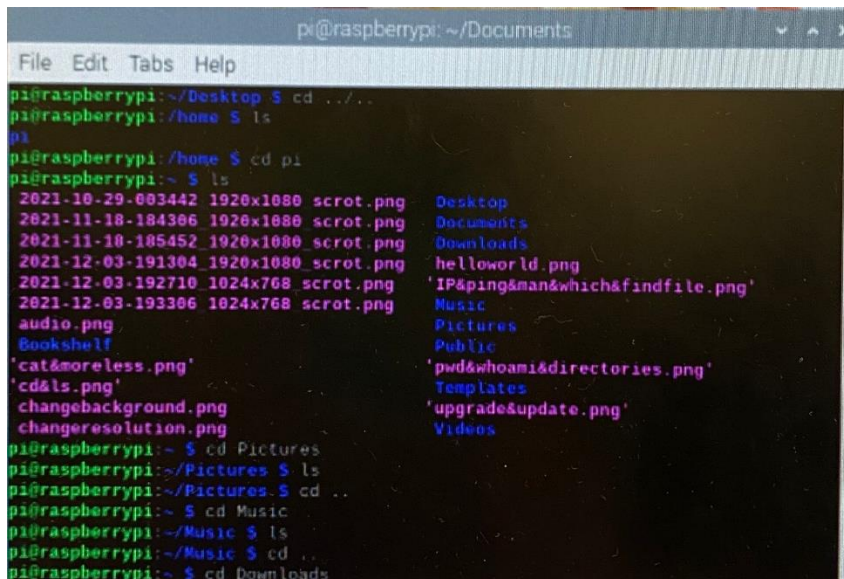
### 1. Using cd command and ls command

First I used ls command to see all the files contained in the directory (Desktop, Documents, etc.)

Then I changed directory using cd command to go to Desktop. I then used ls commands to see what is in it, turns out it only contains one file (Proj). I later visited that file using cd Proj and see what it is comprised of (using ls command again). After that I went back a directory using “cd ..” command, and went back 2 directories using “cd ../../”. Other directories and files I visited are “pi”, “Music”, “Pictures”, “Downloads” and “Documents” as shown in the pictures below.



```
pi@raspberrypi: ~/Documents
File Edit Tabs Help
pi@raspberrypi:~$ ls
2021-10-29-003442 1920x1080 scrot.png Desktop
2021-11-18-184306 1920x1080 scrot.png Documents
2021-11-18-185452 1920x1080 scrot.png Downloads
2021-12-03-191304 1920x1080 scrot.png helloworld.png
2021-12-03-192710 1024x768 scrot.png 'IP&ping&man&which&findfile.png'
2021-12-03-193306 1024x768 scrot.png Music
audio.png Pictures
Bookshelf Public
'cat&moreless.png' 'pwd&whoami&directories.png'
'cd&ls.png' Templates
changebackground.png 'upgrade&update.png'
changeresolution.png Videos
pi@raspberrypi:~$ cd Desktop
pi@raspberrypi:~/Desktop$ ls
Proj
pi@raspberrypi:~/Desktop$ cd Proj
pi@raspberrypi:~/Desktop/Proj$ ls
Lab1 Lab2 Lab3 Lab5
pi@raspberrypi:~/Desktop/Proj$ cd ..
pi@raspberrypi:~/Desktop$ ls
Proj
pi@raspberrypi:~/Desktop$ cd ../../
bash: cd ../../: No such file or directory
```



```
pi@raspberrypi: ~/Documents
File Edit Tabs Help
pi@raspberrypi:~/Desktop$ cd ../../
pi@raspberrypi:/home$ ls
pi
pi@raspberrypi:/home$ cd pi
pi@raspberrypi:~$ ls
2021-10-29-003442 1920x1080 scrot.png Desktop
2021-11-18-184306 1920x1080 scrot.png Documents
2021-11-18-185452 1920x1080 scrot.png Downloads
2021-12-03-191304 1920x1080 scrot.png helloworld.png
2021-12-03-192710 1024x768 scrot.png 'IP&ping&man&which&findfile.png'
2021-12-03-193306 1024x768 scrot.png Music
audio.png Pictures
Bookshelf Public
'cat&moreless.png' 'pwd&whoami&directories.png'
'cd&ls.png' Templates
changebackground.png 'upgrade&update.png'
changeresolution.png Videos
pi@raspberrypi:~$ cd Pictures
pi@raspberrypi:~/Pictures$ ls
pi@raspberrypi:~/Pictures$ cd ..
pi@raspberrypi:~$ cd Music
pi@raspberrypi:~/Music$ ls
pi@raspberrypi:~/Music$ cd ..
pi@raspberrypi:~$ cd Downloads
```

```
pi@raspberrypi: ~/Documents
File Edit Tabs Help
pi@raspberrypi:~/Downloads $ ls
download.jpeg          lm80-p0436-3 processor governor guide.pdf  temp.o
ECE1175_F2021_LAB3.pptx temp
ECE1175_F2021_LAB5.pptx temp.cpp
pi@raspberrypi:~/Downloads $ cd ..
pi@raspberrypi:~ $ cd Documents
pi@raspberrypi:~/Documents $ ls
file1.txt file2.txt file3.txt lab2.txt lab5.odt lab5.txt
pi@raspberrypi:~/Documents $ cd ..
pi@raspberrypi:~ $ cd ..
pi@raspberrypi:/home $ cd ..
pi@raspberrypi:/ $ ls
bin  boot.bak  etc  lib  media  newDir  proc  run  srv  tmp  var
boot  dev  home  lost+found  mnt  opt  root  sbin  sys  usr
pi@raspberrypi:/ $ cd ..
pi@raspberrypi:/ $ ls
bin  boot.bak  etc  lib  media  newDir  proc  run  srv  tmp  var
boot  dev  home  lost+found  mnt  opt  root  sbin  sys  usr
pi@raspberrypi:/ $ cd ..
pi@raspberrypi:/ $ ls
bin  boot.bak  etc  lib  media  newDir  proc  run  srv  tmp  var
boot  dev  home  lost+found  mnt  opt  root  sbin  sys  usr
pi@raspberrypi:/ $ cd Documents
bash: cd: Documents: No such file or directory
```

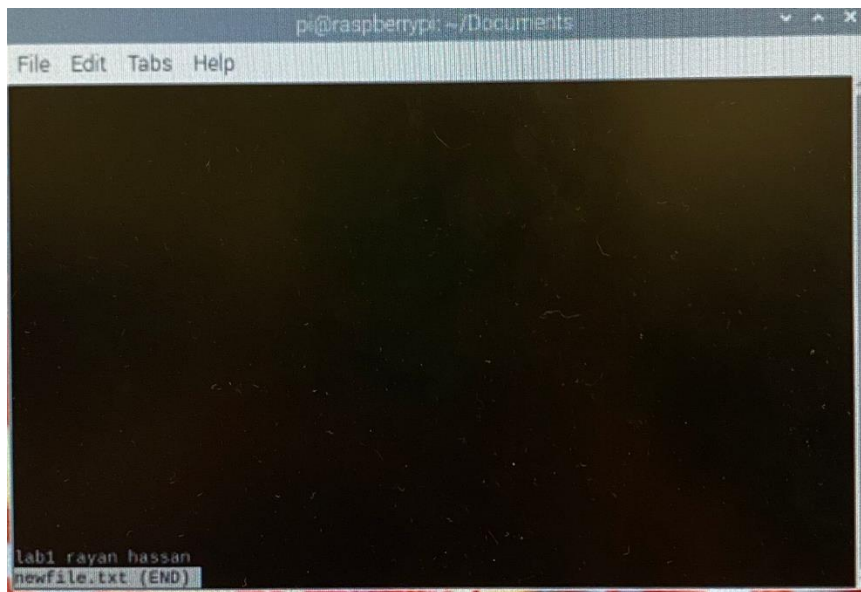
## 2. Using cat command

I created 2 files using cat command “newfile.txt” and “newfile2.txt” with their respective contents “lab1 rayan hassan” and “embedded systems” as shown in the picture below. I merged them together in a “merge.txt” file and we can see that its content is lab 1 rayan hassan embedded systems as expected.

## 3. Using more and less commands

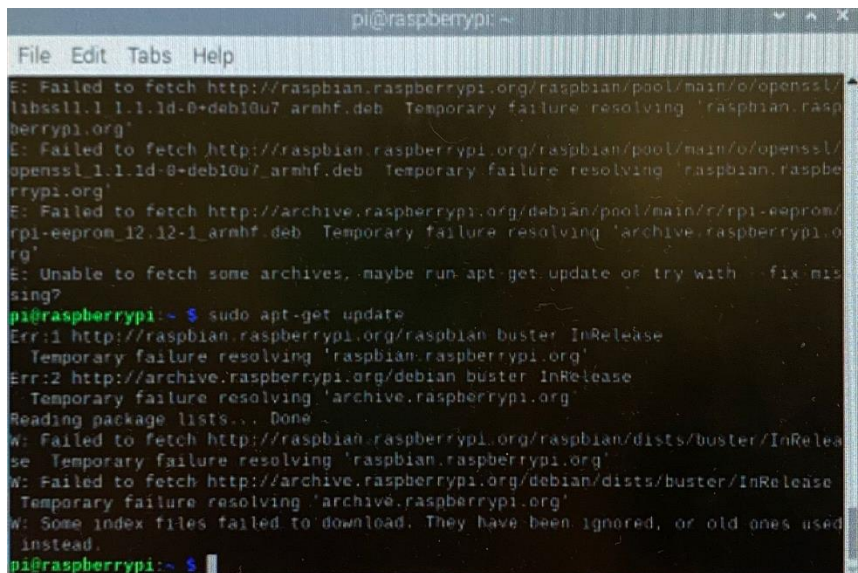
I did more newfile.txt and it showed me the content of the file in the terminal. Then I did less newfile.txt and it opened a new window showing the content of the file as showed in the picture below that one. The difference between these commands is that more allows us to view multiple files as a single one separated by lines and less shows each one individually in a separate window and so we can switch between them.

```
pi@raspberrypi: ~/Documents
File Edit Tabs Help
bin  boot.bak  etc  lib  media  newDir  proc  run  srv  tmp  var
boot  dev  home  lost+found  mnt  opt  root  sbin  sys  usr
pi@raspberrypi:/ $ cd ..
pi@raspberrypi:/ $ ls
bin  boot.bak  etc  lib  media  newDir  proc  run  srv  tmp  var
boot  dev  home  lost+found  mnt  opt  root  sbin  sys  usr
pi@raspberrypi:/ $ cd Documents
bash: cd: Documents: No such file or directory
pi@raspberrypi:/ $ cd home
pi@raspberrypi:/home $ cd pi
pi@raspberrypi:~ $ cd Documents
pi@raspberrypi:~/Documents $ cat > newfile.txt
lab1 rayan hassan
pi@raspberrypi:~/Documents $ cat > newfile2.txt
embedded systems
pi@raspberrypi:~/Documents $ cat newfile.txt
lab1 rayan hassan
pi@raspberrypi:~/Documents $ cat newfile.txt newfile2.txt merge.txt
lab1 rayan hassan
embedded systems
cat: merge.txt: No such file or directory
pi@raspberrypi:~/Documents $ more newfile.txt
lab1 rayan hassan
pi@raspberrypi:~/Documents $ less newfile.txt
```



#### 4. Using apt-get command

I used sudo apt-get update and sudo apt-get upgrade commands as shown below.





```
pi@raspberrypi: ~  
File Edit Tabs Help  
Temporary failure resolving 'archive.raspberrypi.org'  
Reading package lists... Done  
W: Failed to fetch http://raspbian.raspberrypi.org/raspbian/dists/buster/InRelease  
Temporary failure resolving 'raspbian.raspberrypi.org'  
W: Failed to fetch http://archive.raspberrypi.org/debian/dists/buster/InRelease  
Temporary failure resolving 'archive.raspberrypi.org'  
W: Some index files failed to download. They have been ignored, or old ones used instead.  
pi@raspberrypi:~$ sudo apt-get upgrade  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
Calculating upgrade... Done  
The following package was automatically installed and is no longer required:  
python-colorzero  
Use 'sudo apt autoremove' to remove it.  
The following packages will be upgraded:  
libntfs-3g083 libssl-dev libssl1.1 ntfs-3g openssl rpi-eeeprom  
8 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.  
Need to get 5,018 kB of archives.  
After this operation, 458 kB of additional disk space will be used.  
Do you want to continue? [Y/n] n  
Abort.  
pi@raspberrypi:~$
```

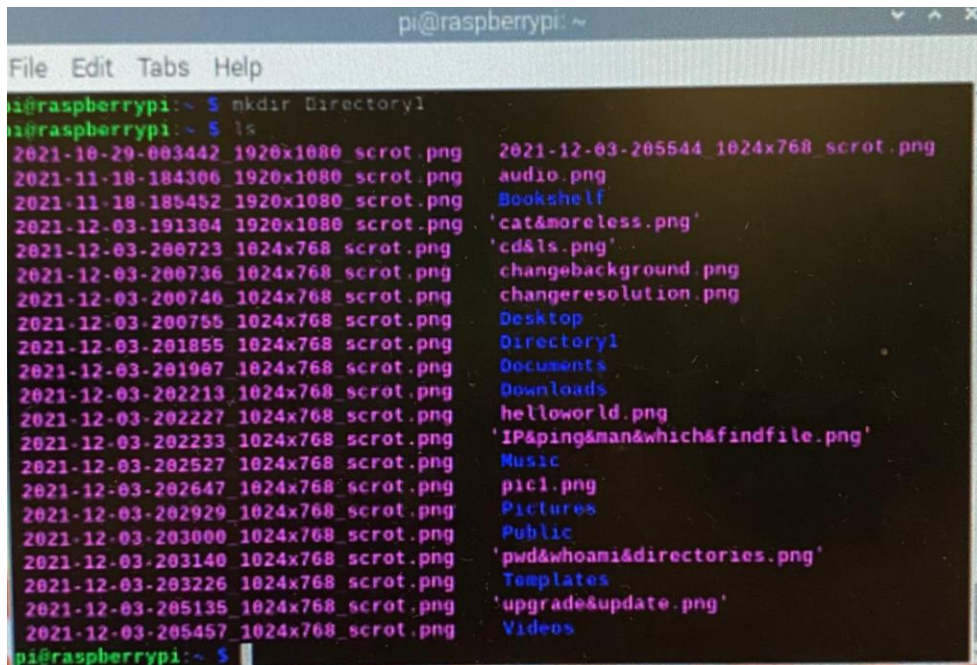
## 5. Using pwd, whoami/why commands

Pwd allows to see what is the path to the current directory (here, /home/pi). Whoami command displays who the current user is and who command displays information about user on the local system.

```
pi@raspberrypi: ~/Documents  
File Edit Tabs Help  
Abort.  
pi@raspberrypi:~$ pwd  
/home/pi  
pi@raspberrypi:~$ cd Documents  
pi@raspberrypi:~/Documents$ pwd  
/home/pi/Documents  
pi@raspberrypi:~/Documents$ whoami  
pi  
pi@raspberrypi:~/Documents$ who  
pi      tty7      2021-12-03 19:25 (:0)-  
pi      tty1      2021-12-03 19:25  
pi@raspberrypi:~/Documents$ cd ..
```

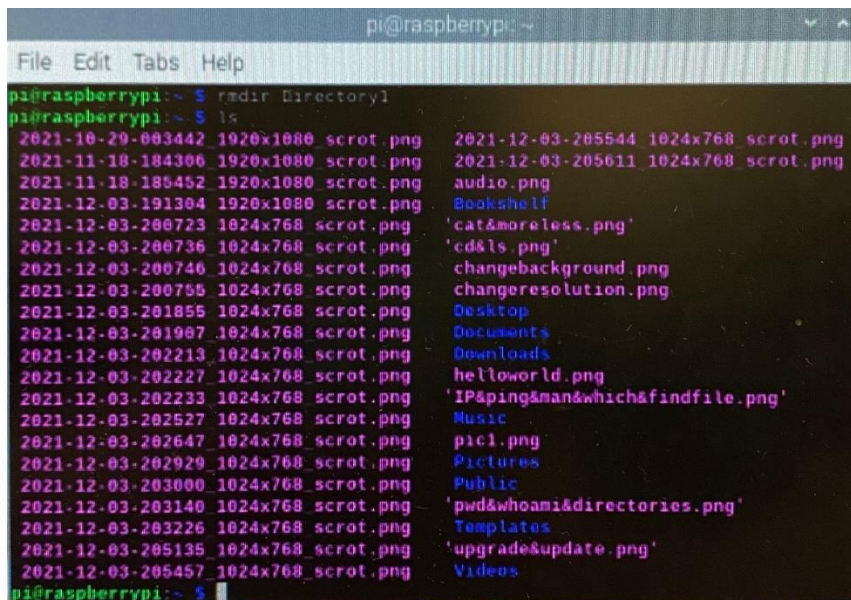
## 6. Mkdir, rmdir, cp and rm commands

I created a directory using mkdir called Directory1 as shown in picture below. I used ls command to show that it was in fact added.



```
pi@raspberrypi: ~  
File Edit Tabs Help  
pi@raspberrypi:~$ mkdir Directory1  
pi@raspberrypi:~$ ls  
2021-10-29-003442 1920x1080 scrot.png 2021-12-03-205544 1024x768 scrot.png  
2021-11-18-184306 1920x1080 scrot.png audio.png  
2021-11-18-185452 1920x1080 scrot.png Bookshelf  
2021-12-03-191304 1920x1080 scrot.png 'cat&moreless.png'  
2021-12-03-200723 1024x768 scrot.png 'cd&ls.png'  
2021-12-03-200736 1024x768 scrot.png changebackground.png  
2021-12-03-200746 1024x768 scrot.png changereresolution.png  
2021-12-03-200755 1024x768 scrot.png Desktop  
2021-12-03-201855 1024x768 scrot.png Directory1  
2021-12-03-201907 1024x768 scrot.png Documents  
2021-12-03-202213 1024x768 scrot.png Downloads  
2021-12-03-202227 1024x768 scrot.png helloworld.png  
2021-12-03-202233 1024x768 scrot.png 'IP&ping&man&which&findfile.png'  
2021-12-03-202527 1024x768 scrot.png Music  
2021-12-03-202647 1024x768 scrot.png pic1.png  
2021-12-03-202929 1024x768 scrot.png Pictures  
2021-12-03-203000 1024x768 scrot.png Public  
2021-12-03-203140 1024x768 scrot.png 'pwd&whoami&directories.png'  
2021-12-03-203226 1024x768 scrot.png Templates  
2021-12-03-205135 1024x768 scrot.png 'upgrade&update.png'  
2021-12-03-205457 1024x768 scrot.png Videos  
pi@raspberrypi:~$
```

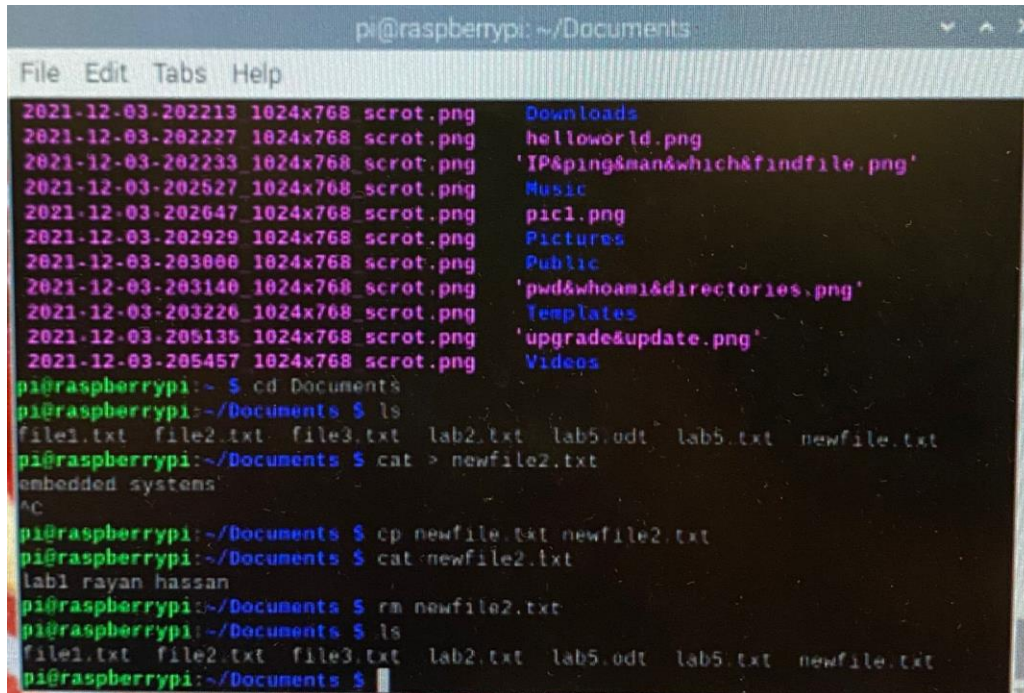
Then I removed it using rmdir as shown in picture below.



```
pi@raspberrypi: ~  
File Edit Tabs Help  
pi@raspberrypi:~$ rmdir Directory1  
pi@raspberrypi:~$ ls  
2021-10-29-003442 1920x1080 scrot.png 2021-12-03-205544 1024x768 scrot.png  
2021-11-18-184306 1920x1080 scrot.png 2021-12-03-205611 1024x768 scrot.png  
2021-11-18-185452 1920x1080 scrot.png audio.png  
2021-12-03-191304 1920x1080 scrot.png Bookshelf  
2021-12-03-200723 1024x768 scrot.png 'cat&moreless.png'  
2021-12-03-200736 1024x768 scrot.png 'cd&ls.png'  
2021-12-03-200746 1024x768 scrot.png changebackground.png  
2021-12-03-200755 1024x768 scrot.png changereresolution.png  
2021-12-03-201855 1024x768 scrot.png Desktop  
2021-12-03-201907 1024x768 scrot.png Documents  
2021-12-03-202213 1024x768 scrot.png Downloads  
2021-12-03-202227 1024x768 scrot.png helloworld.png  
2021-12-03-202233 1024x768 scrot.png 'IP&ping&man&which&findfile.png'  
2021-12-03-202527 1024x768 scrot.png Music  
2021-12-03-202647 1024x768 scrot.png pic1.png  
2021-12-03-202929 1024x768 scrot.png Pictures  
2021-12-03-203000 1024x768 scrot.png Public  
2021-12-03-203140 1024x768 scrot.png 'pwd&whoami&directories.png'  
2021-12-03-203226 1024x768 scrot.png Templates  
2021-12-03-205135 1024x768 scrot.png 'upgrade&update.png'  
2021-12-03-205457 1024x768 scrot.png Videos  
pi@raspberrypi:~$
```

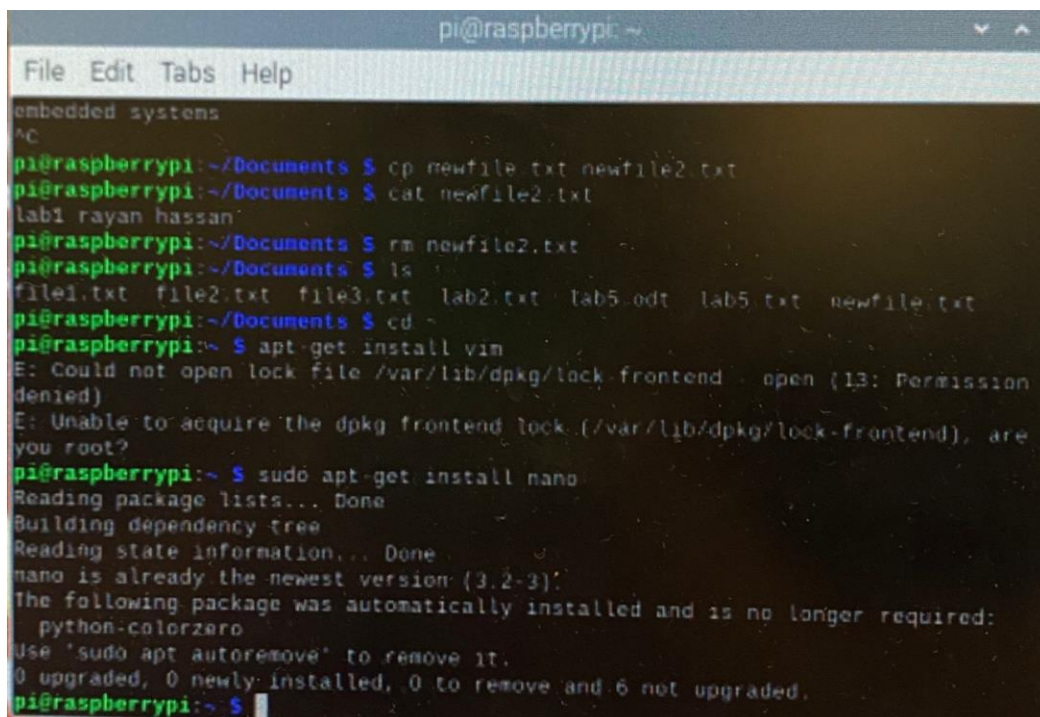


Using cp command, I copied the content of newfile.txt into newfile2.txt ("cp newfile.txt newfile2.txt"). Then using cat command I displayed the updated content of newfile2.txt which is "lab1 rayan hassan" instead of "embedded systems ^C". Then using "rm" command I removed newfile2.txt from "Documents", which I show using ls command.

A terminal window titled 'pi@raspberrypi: ~/Documents' showing a series of commands and their outputs. The window has a menu bar with 'File', 'Edit', 'Tabs', and 'Help'. The terminal output shows a directory listing of various .png files, followed by navigating to the Documents directory, listing files (including newfile.txt), displaying the content of newfile2.txt (which is 'lab1 rayan hassan'), copying newfile.txt to newfile2.txt, and finally removing newfile2.txt. The final directory listing shows newfile.txt is no longer present.

```
pi@raspberrypi:~/Documents
File Edit Tabs Help
2021-12-03-202213 1024x768 scrot.png Downloads
2021-12-03-202227 1024x768 scrot.png helloworld.png
2021-12-03-202233 1024x768 scrot.png 'IP&ping&man&which&findfile.png'
2021-12-03-202527 1024x768 scrot.png Music
2021-12-03-202647 1024x768 scrot.png pic1.png
2021-12-03-202929 1024x768 scrot.png Pictures
2021-12-03-203000 1024x768 scrot.png Public
2021-12-03-203140 1024x768 scrot.png 'pwd&whoami&directories.png'
2021-12-03-203226 1024x768 scrot.png Templates
2021-12-03-205135 1024x768 scrot.png 'upgrade&update.png'
2021-12-03-205457 1024x768 scrot.png Videos
pi@raspberrypi:~ $ cd Documents
pi@raspberrypi:~/Documents $ ls
file1.txt file2.txt file3.txt lab2.txt lab5.odt lab5.txt newfile.txt
pi@raspberrypi:~/Documents $ cat > newfile2.txt
embedded systems
^C
pi@raspberrypi:~/Documents $ cp newfile.txt newfile2.txt
pi@raspberrypi:~/Documents $ cat newfile2.txt
lab1 rayan hassan
pi@raspberrypi:~/Documents $ rm newfile2.txt
pi@raspberrypi:~/Documents $ ls
file1.txt file2.txt file3.txt lab2.txt lab5.odt lab5.txt newfile.txt
pi@raspberrypi:~/Documents $
```

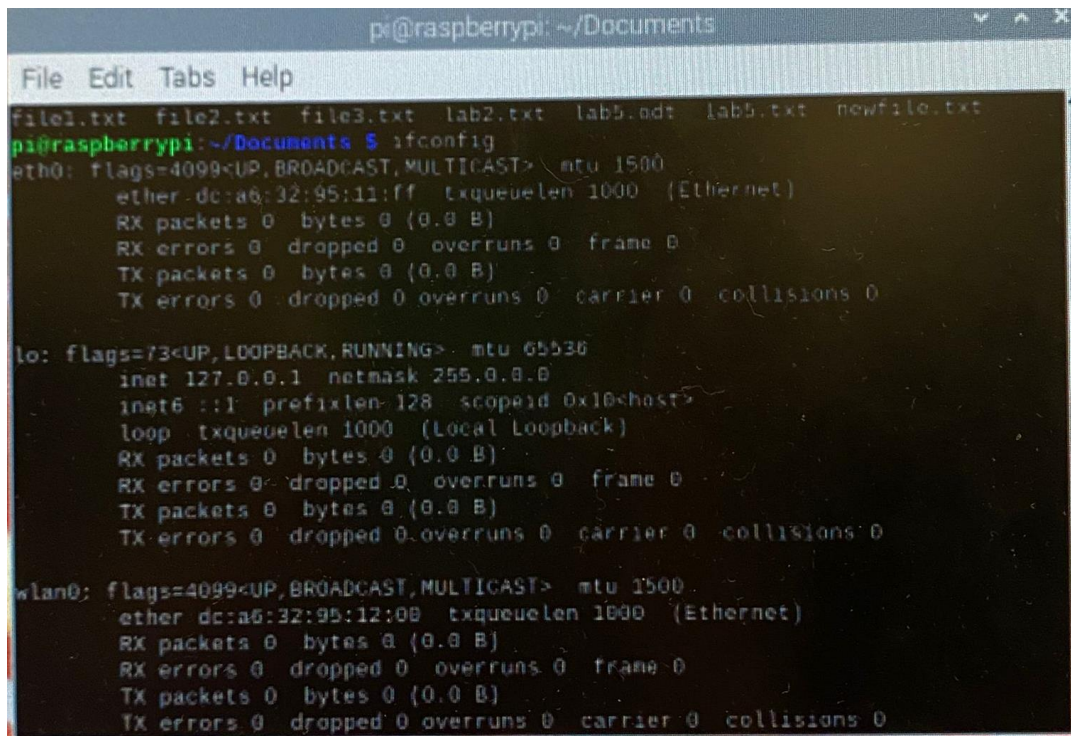
## 7. ap-get install command

A terminal window titled 'pi@raspberrypi: ~' showing the process of installing nano. The window has a menu bar with 'File', 'Edit', 'Tabs', and 'Help'. The terminal output shows the user attempting to install vim with 'apt-get install vim', which fails due to a permission error. The user then uses 'sudo apt-get install nano', which successfully installs nano. The output shows that nano is already the newest version (3.2-3) and that python-colorzero was automatically installed and is no longer required. The final prompt shows the user is back at the shell.

```
pi@raspberrypi:~
File Edit Tabs Help
embedded systems
^C
pi@raspberrypi:~/Documents $ cp newfile.txt newfile2.txt
pi@raspberrypi:~/Documents $ cat newfile2.txt
lab1 rayan hassan
pi@raspberrypi:~/Documents $ rm newfile2.txt
pi@raspberrypi:~/Documents $ ls
file1.txt file2.txt file3.txt lab2.txt lab5.odt lab5.txt newfile.txt
pi@raspberrypi:~/Documents $ cd ~
pi@raspberrypi:~ $ apt-get install vim
E: Could not open lock file /var/lib/dpkg/lock-frontent: open (13: Permission
denied)
E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontent), are
you root?
pi@raspberrypi:~ $ sudo apt-get install nano
Reading package lists... Done
Building dependency tree
Reading state information... Done
nano is already the newest version (3.2-3).
The following package was automatically installed and is no longer required:
python-colorzero
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 6 not upgraded.
pi@raspberrypi:~ $
```

## 8. ifconfig command

We can see that IP address of local host is 127.0.0.1



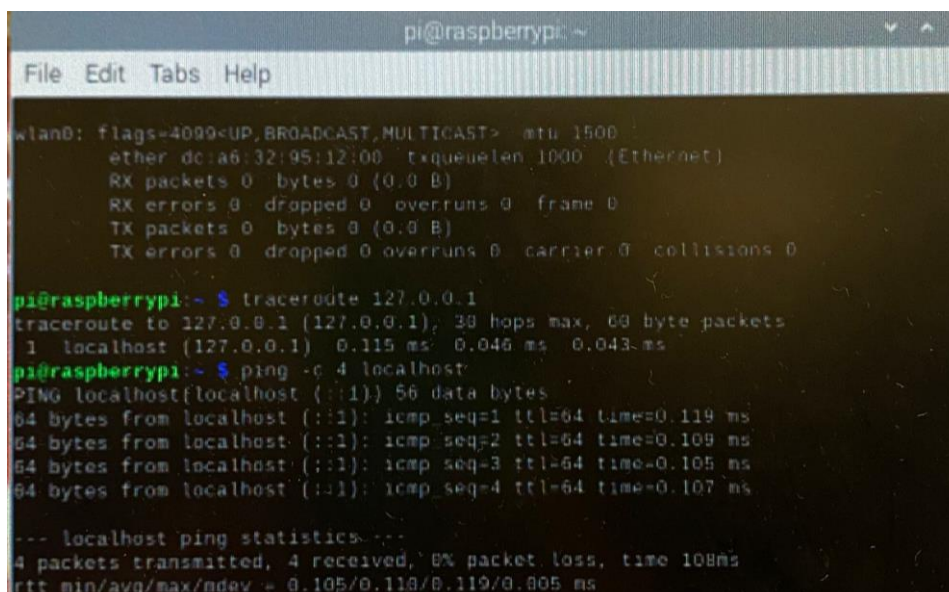
```
pi@raspberrypi: ~/Documents
File Edit Tabs Help
file1.txt file2.txt file3.txt lab2.txt lab5.odt lab5.txt newfile.txt
pi@raspberrypi:~/Documents$ ifconfig
eth0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether dc:a6:32:95:11:ff txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether dc:a6:32:95:12:00 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## 9. using ping command

I used traceroute command to see the route that a packet takes to reach the host. Then I used “ping -c 4 localhost” to ping localhost. -c 4 means that I am only limiting it to 4 transmitted packets.



```
pi@raspberrypi: ~
File Edit Tabs Help
wlan0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether dc:a6:32:95:12:00 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

pi@raspberrypi:~$ traceroute 127.0.0.1
traceroute to 127.0.0.1 (127.0.0.1): 30 hops max, 60 byte packets
 1 localhost (127.0.0.1)  0.115 ms  0.046 ms  0.043 ms

pi@raspberrypi:~$ ping -c 4 localhost
PING localhost (localhost (:::1)) 56 data bytes
64 bytes from localhost (:::1): icmp_seq=1 ttl=64 time=0.119 ms
64 bytes from localhost (:::1): icmp_seq=2 ttl=64 time=0.109 ms
64 bytes from localhost (:::1): icmp_seq=3 ttl=64 time=0.105 ms
64 bytes from localhost (:::1): icmp_seq=4 ttl=64 time=0.107 ms

--- localhost ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 108ms
rtt min/avg/max/mdev = 0.105/0.113/0.119/0.005 ms
```



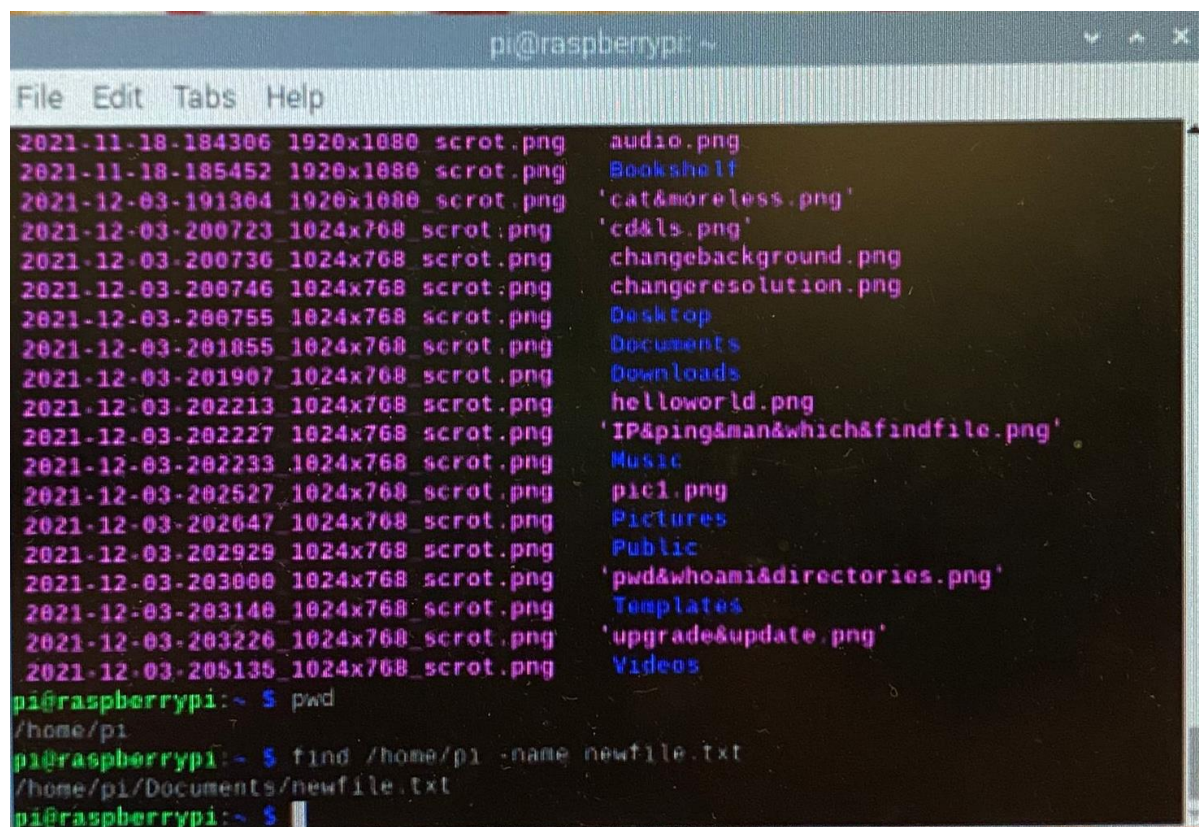
#### 10. Using which command

I tried “which ping” and it shows that ping command indeed exists. Then I did which jsowj (random letters) and we can see that this command doesn’t exist as expected.

```
pi@raspberrypi:~ $ which ping
/usr/bin/ping
pi@raspberrypi:~ $ which jsowj
pi@raspberrypi:~ $ find /Documents -name newfile.txt
find: '/Documents': No such file or directory.
pi@raspberrypi:~ $
```

#### 11. Using find command

I finally used find command to see the path to my current file as shown in the last picture.



```
pi@raspberrypi: ~
File Edit Tabs Help
2021-11-18-184306_1920x1080_scrot.png audio.png
2021-11-18-185452_1920x1080_scrot.png Bookshelf
2021-12-03-191304_1920x1080_scrot.png 'cat&moreless.png'
2021-12-03-200723_1024x768_scrot.png 'cd&ls.png'
2021-12-03-200736_1024x768_scrot.png changebackground.png
2021-12-03-200746_1024x768_scrot.png changerresolution.png
2021-12-03-200755_1024x768_scrot.png Desktop
2021-12-03-201055_1024x768_scrot.png Documents
2021-12-03-201907_1024x768_scrot.png Downloads
2021-12-03-202213_1024x768_scrot.png helloworld.png
2021-12-03-202227_1024x768_scrot.png 'IP&ping&man&which&findfile.png'
2021-12-03-202233_1024x768_scrot.png Music
2021-12-03-202527_1024x768_scrot.png pic1.png
2021-12-03-202647_1024x768_scrot.png Pictures
2021-12-03-202929_1024x768_scrot.png Public
2021-12-03-203000_1024x768_scrot.png 'pwd&whoami&directories.png'
2021-12-03-203140_1024x768_scrot.png Templates
2021-12-03-203226_1024x768_scrot.png 'upgrade&update.png'
2021-12-03-205135_1024x768_scrot.png Videos
pi@raspberrypi:~ $ pwd
/home/pi
pi@raspberrypi:~ $ find /home/pi -name newfile.txt
/home/pi/Documents/newfile.txt
pi@raspberrypi:~ $
```