

OLD DOMINION UNIVERSITY

CYSE 270 LINUX SYSTEM FOR CYBERSECURITY

Assignment #2 Working on the Command Line

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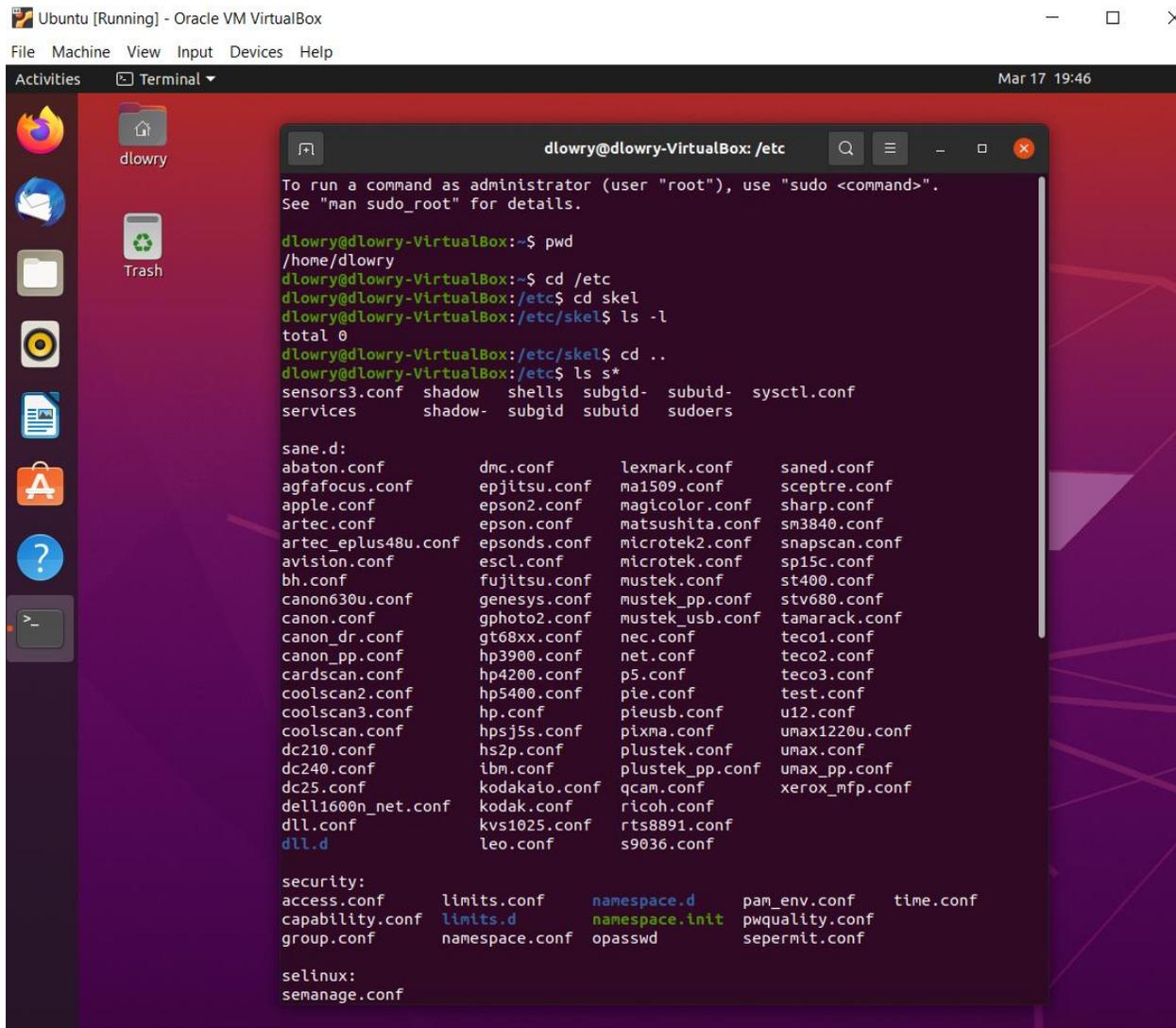
01162215

TASK A

Using Shell Features

Steps 1-5:

- Display your current directory
- Using an absolute pathname, switch to the /etc directory.
- Using a relative pathname, move to the /etc/skel directory.
- Perform a “long display” listing of the files in the current directory.
- Use relative path name to move one folder above, then list all the files that begin with letter s.



The screenshot shows a terminal window titled "dlowry@dlowry-VirtualBox: /etc" with the following content:

```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 17 19:46

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

dlowry@dlowry-VirtualBox:~$ pwd
/home/dlowry
dlowry@dlowry-VirtualBox:~$ cd /etc
dlowry@dlowry-VirtualBox:/etc$ cd skel
dlowry@dlowry-VirtualBox:/etc/skel$ ls -l
total 0
dlowry@dlowry-VirtualBox:/etc/skel$ cd ..
dlowry@dlowry-VirtualBox:/etc$ ls s*
sane.d:
abaton.conf      dmc.conf      lexmark.conf   saned.conf
agfafocus.conf  epjitsu.conf ma1509.conf    sceptre.conf
apple.conf       epon2.conf   magicolor.conf sharp.conf
artec.conf       epon.conf    matsushita.conf sm3840.conf
artec_eplus48u.conf epsonds.conf microtek2.conf snapscan.conf
avision.conf     escl.conf    microtek.conf  sp15c.conf
bh.conf          fujitsu.conf mustek.conf    st400.conf
canon630u.conf  genesys.conf mustek_pp.conf stv680.conf
canon.conf       gphoto2.conf mustek_usb.conf tamarack.conf
canon_dr.conf   gt68xx.conf  nec.conf       teco1.conf
canon_pp.conf   hp3900.conf  net.conf       teco2.conf
cardscan.conf   hp4200.conf  p5.conf        teco3.conf
coolscan2.conf  hp5400.conf  pie.conf       test.conf
coolscan3.conf  hp.conf      pieusb.conf    u12.conf
coolscan.conf   hpsj5s.conf pixma.conf     umax1220u.conf
dc210.conf      hs2p.conf   plustek.conf   umax.conf
dc240.conf      ibm.conf    plustek_pp.conf umax_pp.conf
dc25.conf       kodakaio.conf qcama.conf     xerox_mfp.conf
dell1600n_net.conf kodak.conf  ricoh.conf
dll.conf        kvs1025.conf rts8891.conf
dll.d           leo.conf    s9036.conf

security:
access.conf      limits.conf   namespace.d    pam_env.conf   time.conf
capability.conf  limits.d      namespace.init pwquality.conf
group.conf       namespace.conf opasswd        sepermit.conf

selinux:
semanage.conf
```

Here I use the pwd or “print current working directory” command to display the current directory. I then use the absolute pathname cd /etc to change directory to /etc. Because I am in the etc directory, I can use the relative pathname command “cd skel” to move to the /etc/skel directory.

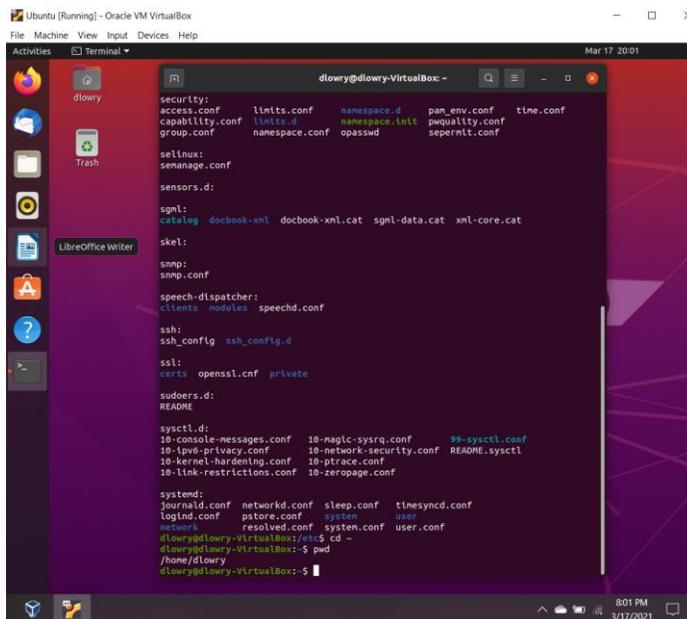
To perform a long display listing of file, we use "ls -l" which displays all the files with additional information in the current directory.

I use command “cd ..” to move one file up and then “ls s*” to display all the files that begin with letter s.

***All these steps are performed in screenshot 1.**

Step 6:

- Execute the command to return to your home directory.



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 17 20:01
dlowry@dlowry-VirtualBox: ~
security:
access.conf  llmts.conf  namespace.d  pam_env.conf  time.conf
capability.conf  limits.d  namespace.int  pequality.conf
group.conf  namespace.conf  opasswd  separat.conf

selinux:
semanage.conf

sensors.d:

sgml:
catalog  docbook.xml  docbook.xml.cat  sgml-data.cat  xnl-core.cat

skel:

snmp:
snmp.conf

speech-dispatcher:
clients  modules  speechd.conf

ssh:
ssh_config  ssh_config.d

ssl:
certs  openssl.cnf  private

sudoers.d:
README

sysctl.d:
10-console-messages.conf  10-magic.sysrq.conf  99-sysctl.conf
10-lpv-d-privacy.conf  10-network-security.conf  README.sysctl
10-kernel-hardening.conf  10-pttrace.conf
10-link-restrictions.conf  10-zero-page.conf

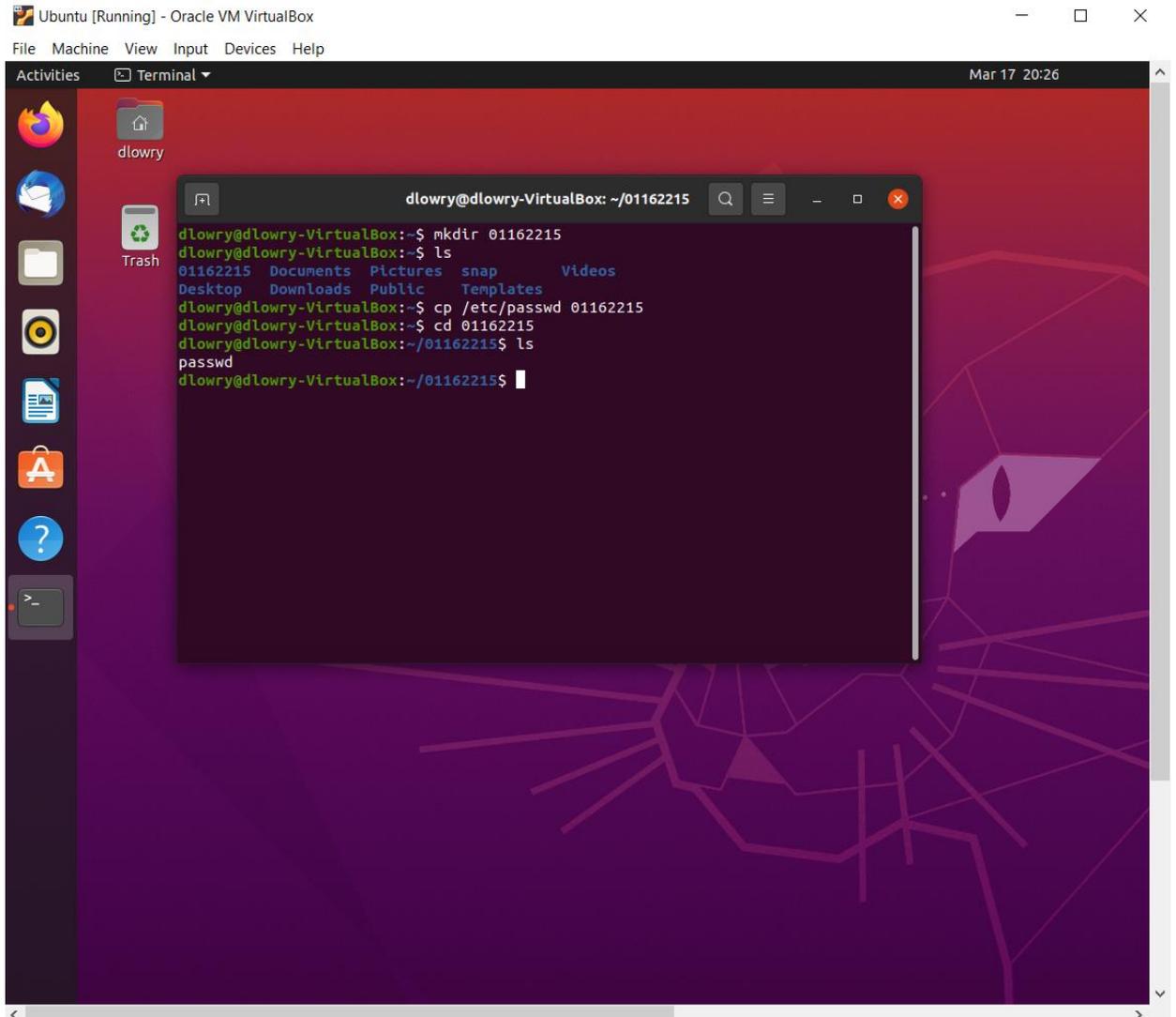
systemd:
journal.d.conf  networkd.conf  sleep.conf  timesyncd.conf
logind.conf  pstore.conf  system  user
networkd  resolved.conf  system.conf  user.conf

dlowry@dlowry-VirtualBox: /etc$ cd -
dlowry@dlowry-VirtualBox: $ pwd
/home/dlowry
dlowry@dlowry-VirtualBox: $
```

Used “cd ~” to return to home directory.

Step 7:

- Make a directory named “Your_MIDAS” in the current directory.



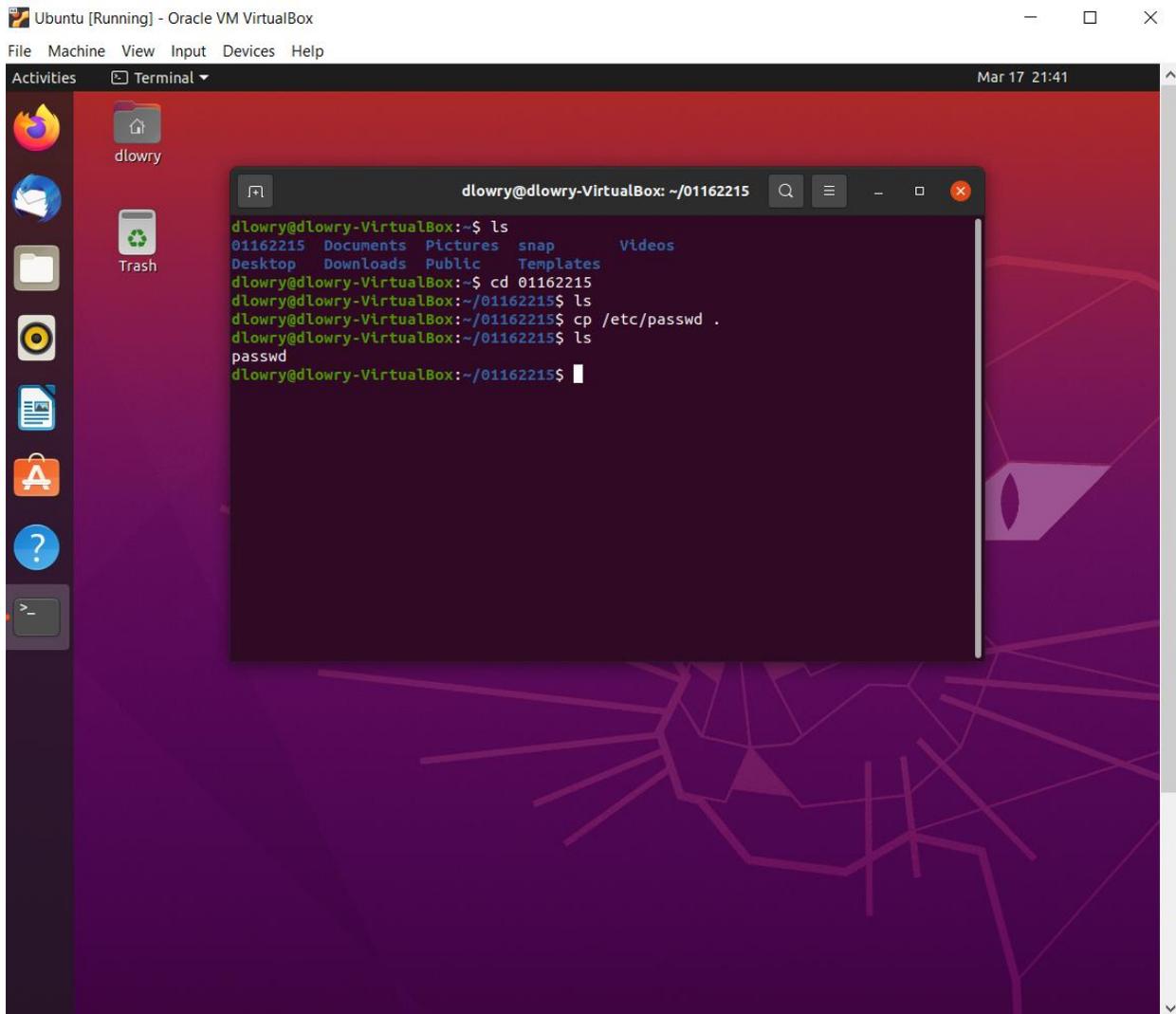
The screenshot shows a terminal window within an Ubuntu virtual machine. The terminal output is as follows:

```
dlowry@dlowry-VirtualBox: ~/$ mkdir 01162215
dlowry@dlowry-VirtualBox:~$ ls
01162215  Documents  Pictures  snap      Videos
Desktop  Downloads  Public    Templates
dlowry@dlowry-VirtualBox:~$ cp /etc/passwd 01162215
dlowry@dlowry-VirtualBox:~$ cd 01162215
dlowry@dlowry-VirtualBox:~/01162215$ ls
passwd
dlowry@dlowry-VirtualBox:~/01162215$
```

Used command “mkdir 01162215”

Step 8:

- Use two different approaches to copy the `/etc/passwd` file into the directory created in the previous step.



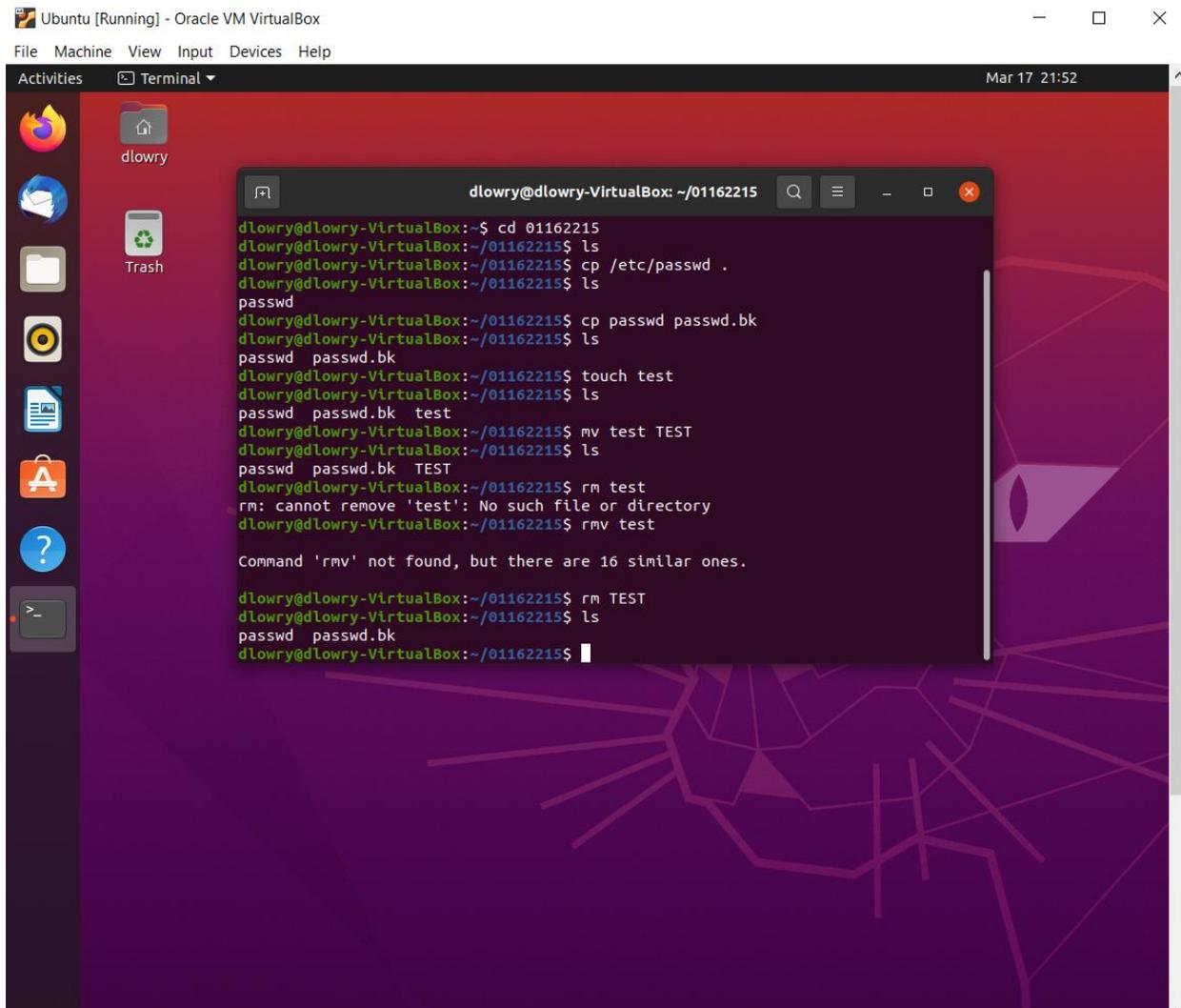
```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 17 21:41
dlowry
Trash
dlowry@dlowry-VirtualBox: ~/01162215
dlowry@dlowry-VirtualBox:~$ ls
01162215 Documents Pictures snap Videos
Desktop Downloads Public Templates
dlowry@dlowry-VirtualBox:~$ cd 01162215
dlowry@dlowry-VirtualBox:~/01162215$ ls
dlowry@dlowry-VirtualBox:~/01162215$ cp /etc/passwd .
dlowry@dlowry-VirtualBox:~/01162215$ ls
passwd
dlowry@dlowry-VirtualBox:~/01162215$
```

In the first approach I used command “`cp /etc/passwd 01162215`” to copy `/etc/passwd` file to directory 01162215 that I created in step 7.

After using command “`rm passwd`” I used another approach to copy the file. In the second approach I used “`cp /etc/passwd .`” to cp to my current (01162215) directory.

Steps 9-12:

- Create a backup for the passwd file in the directory you created in Step 8 (use cp).
- Create a new empty file named test in the directory you created in Step 8.
- Rename the test file you created in Step 11 to TEST.
- Delete the TEST file.



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 17 21:52
dlowry
Trash
dlowry@dlowry-VirtualBox: ~/01162215
dlowry@dlowry-VirtualBox:~$ cd 01162215
dlowry@dlowry-VirtualBox:~/01162215$ ls
dlowry@dlowry-VirtualBox:~/01162215$ cp /etc/passwd .
dlowry@dlowry-VirtualBox:~/01162215$ ls
passwd
dlowry@dlowry-VirtualBox:~/01162215$ cp passwd passwd.bk
dlowry@dlowry-VirtualBox:~/01162215$ ls
passwd passwd.bk
dlowry@dlowry-VirtualBox:~/01162215$ touch test
dlowry@dlowry-VirtualBox:~/01162215$ ls
passwd passwd.bk test
dlowry@dlowry-VirtualBox:~/01162215$ mv test TEST
dlowry@dlowry-VirtualBox:~/01162215$ ls
passwd passwd.bk TEST
dlowry@dlowry-VirtualBox:~/01162215$ rm test
rm: cannot remove 'test': No such file or directory
dlowry@dlowry-VirtualBox:~/01162215$ rmv test
Command 'rmv' not found, but there are 16 similar ones.
dlowry@dlowry-VirtualBox:~/01162215$ rm TEST
dlowry@dlowry-VirtualBox:~/01162215$ ls
passwd passwd.bk
dlowry@dlowry-VirtualBox:~/01162215$
```

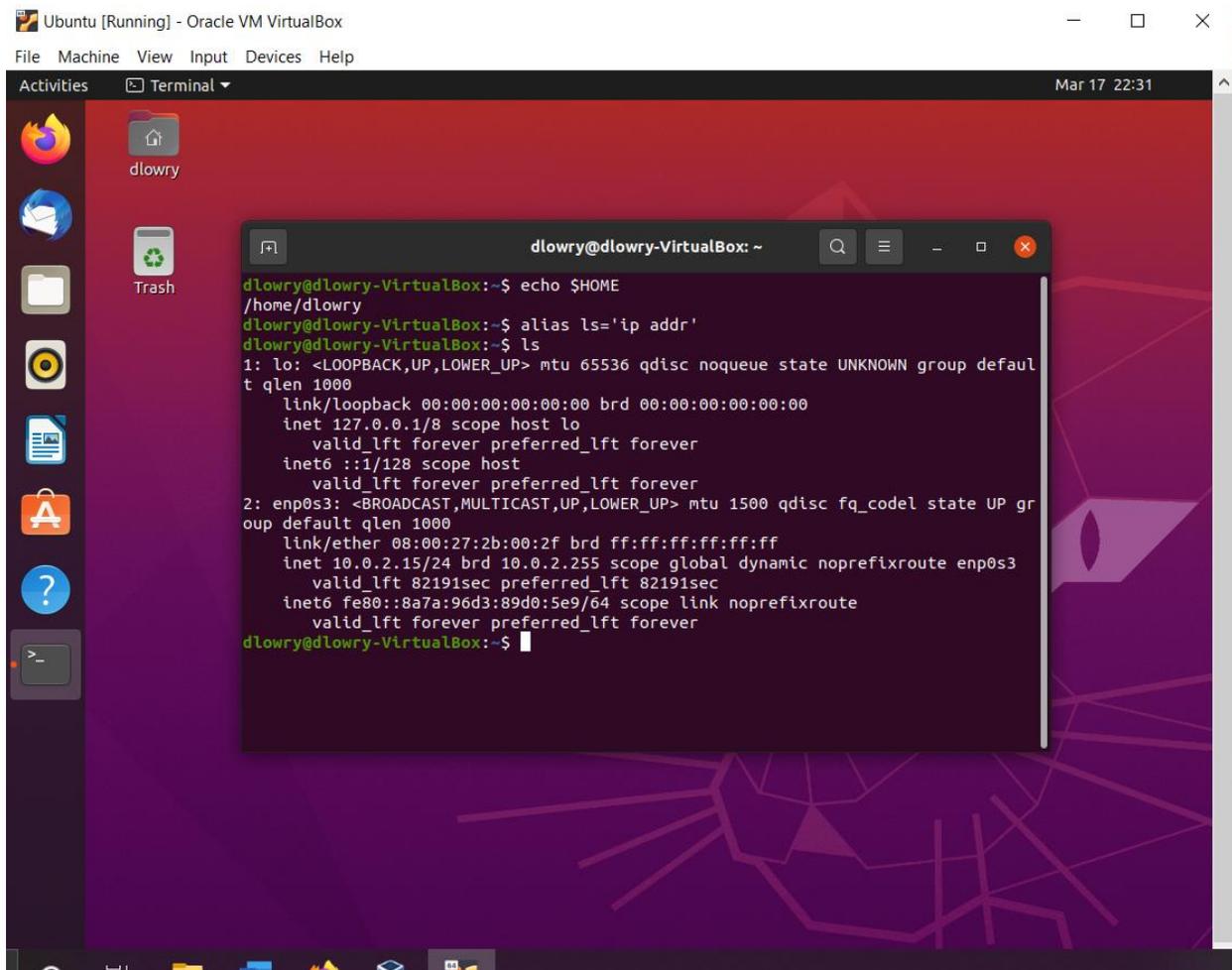
Here I started by creating a backup of passwd using “cp passwd passwd.bk” the I created the test file using the “touch” command. Next, I renamed the file by using “mv test TEST” command. I then used “rm TEST” (after realizing I was typing lower case test a few times) to remove the TEST file. I also realized at this point that the whole time I was using my university id # not my midas id. I hope this will not matter and that the lab report will prove that I get the concepts.

TASK B

Shell Features

Step 1-2:

- Display the value of the HOME variable.
- Create an alias in the current shell for the ls command so it will run the command ip addr.

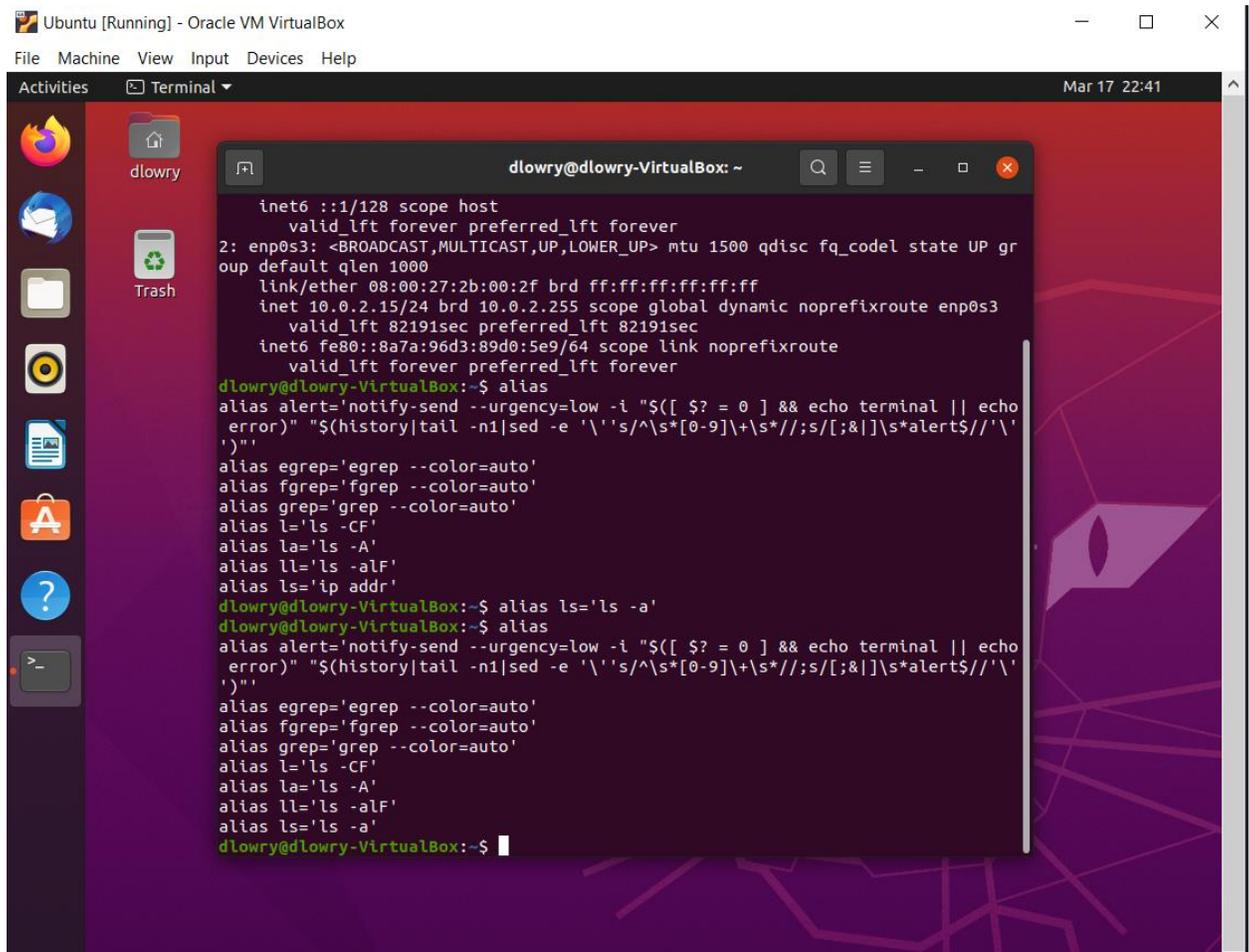


```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 17 22:31
dlowry@dlowry-VirtualBox: ~
dlowry@dlowry-VirtualBox:~$ echo $HOME
/home/dlowry
dlowry@dlowry-VirtualBox:~$ alias ls='ip addr'
dlowry@dlowry-VirtualBox:~$ ls
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:2b:00:2f brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 82191sec preferred_lft 82191sec
    inet6 fe80::8a7a:96d3:89d0:5e9/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
dlowry@dlowry-VirtualBox:~$
```

Used echo \$HOME to display the value of the HOME variable, then used “ alias ls='ip addr' ” to create a shortcut for the ls command to run the command ip addr.

Step 3-4:

- Display all the aliases for the current shell
- Change the alias in the current shell for the ls command so it will run the command ls -a.



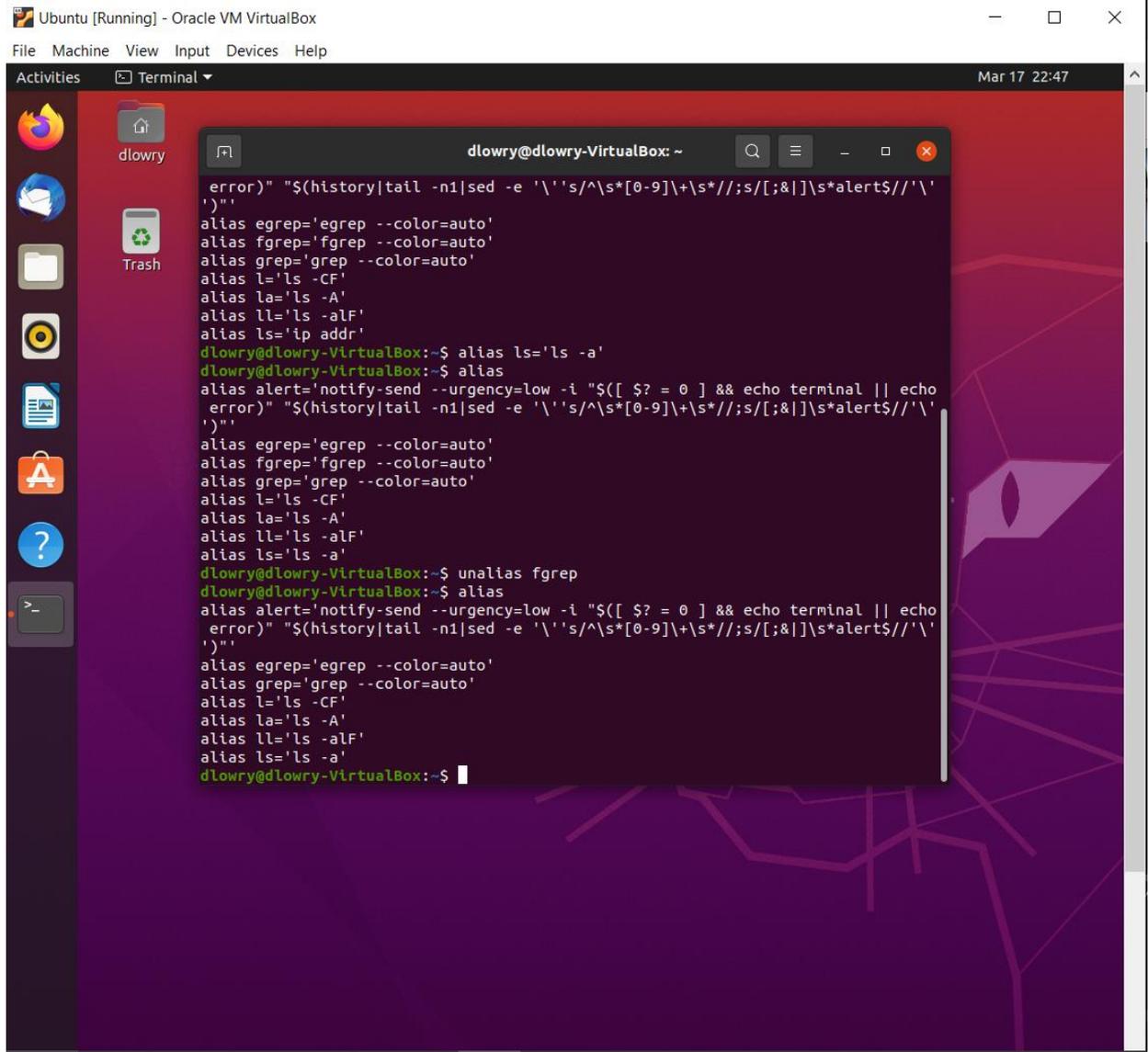
```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 17 22:41

dlowry@dlowry-VirtualBox: ~
inet6 ::1/128 scope host
    valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP gr
oup default qlen 1000
    link/ether 08:00:27:2b:00:2f brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 82191sec preferred_lft 82191sec
    inet6 fe80::8a7a:96d3:89d0:5e9/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
dlowry@dlowry-VirtualBox:~$ alias
alias alert='notify-send --urgency=low -i "[[ $? = 0 ] && echo terminal || echo
error]" "$(history|tail -n1|sed -e '\''s/^\s*[0-9]+\s*//;s/[:;&|]\s*alert$/'\''
)''
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -CF'
alias la='ls -A'
alias ll='ls -aLF'
alias ls='ip addr'
dlowry@dlowry-VirtualBox:~$ alias ls='ls -a'
dlowry@dlowry-VirtualBox:~$ alias
alias alert='notify-send --urgency=low -i "[[ $? = 0 ] && echo terminal || echo
error]" "$(history|tail -n1|sed -e '\''s/^\s*[0-9]+\s*//;s/[:;&|]\s*alert$/'\''
)''
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -CF'
alias la='ls -A'
alias ll='ls -aLF'
alias ls='ls -a'
dlowry@dlowry-VirtualBox:~$
```

Displayed all aliases and switch alias ls to equal ls -a.

Step 5:

- Remove the fgrep alias from the current shell.



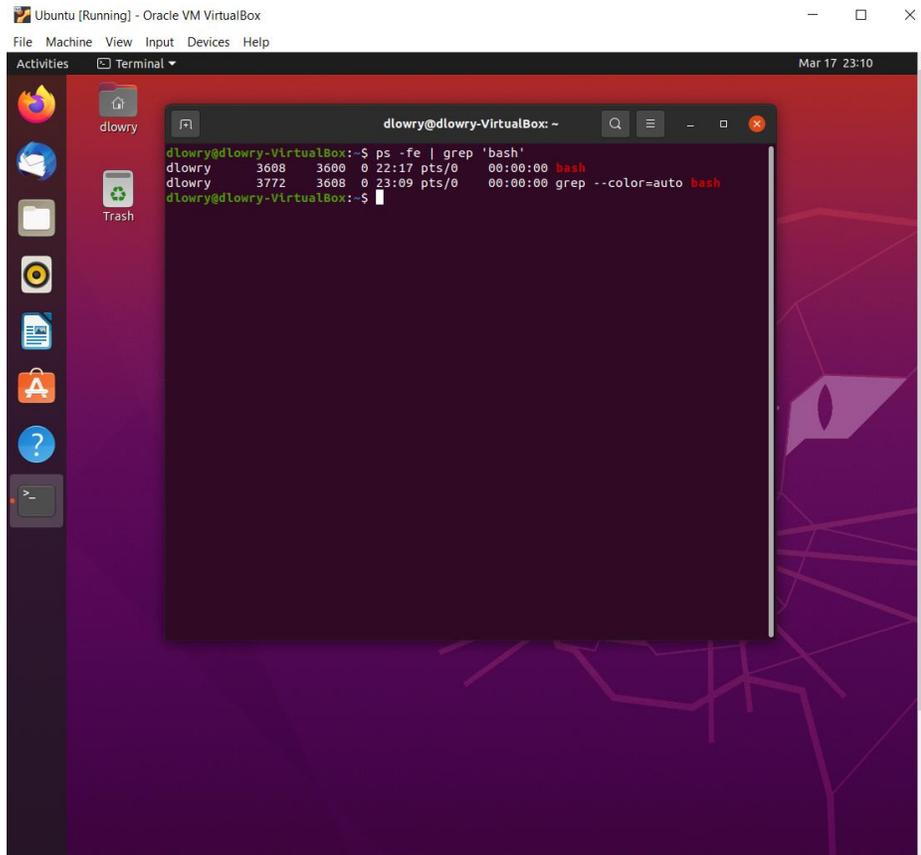
The screenshot shows a terminal window titled "dlowry@dlowry-VirtualBox: ~" with a search bar and window controls. The terminal output shows the following sequence of commands and their results:

```
dlowry@dlowry-VirtualBox:~$ alias
alias alert='notify-send --urgency=low -i "${[ $? = 0 ]} && echo terminal || echo
_error)" "${history|tail -n1|sed -e '\''s/^s*[0-9]+\s*//;s/[;|]\s*alert$/'\''
)'"
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -CF'
alias la='ls -A'
alias ll='ls -aLF'
alias ls='ip addr'
dlowry@dlowry-VirtualBox:~$ alias ls='ls -a'
dlowry@dlowry-VirtualBox:~$ alias
alias alert='notify-send --urgency=low -i "${[ $? = 0 ]} && echo terminal || echo
_error)" "${history|tail -n1|sed -e '\''s/^s*[0-9]+\s*//;s/[;|]\s*alert$/'\''
)'"
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -CF'
alias la='ls -A'
alias ll='ls -aLF'
alias ls='ls -a'
dlowry@dlowry-VirtualBox:~$ unalias fgrep
dlowry@dlowry-VirtualBox:~$ alias
alias alert='notify-send --urgency=low -i "${[ $? = 0 ]} && echo terminal || echo
_error)" "${history|tail -n1|sed -e '\''s/^s*[0-9]+\s*//;s/[;|]\s*alert$/'\''
)'"
alias egrep='egrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -CF'
alias la='ls -A'
alias ll='ls -aLF'
alias ls='ls -a'
dlowry@dlowry-VirtualBox:~$
```

Used unalias to remove the fgrep alias from the current shell.

Step 6:

- Filter the entries contain “bash” in the ps -fe command.



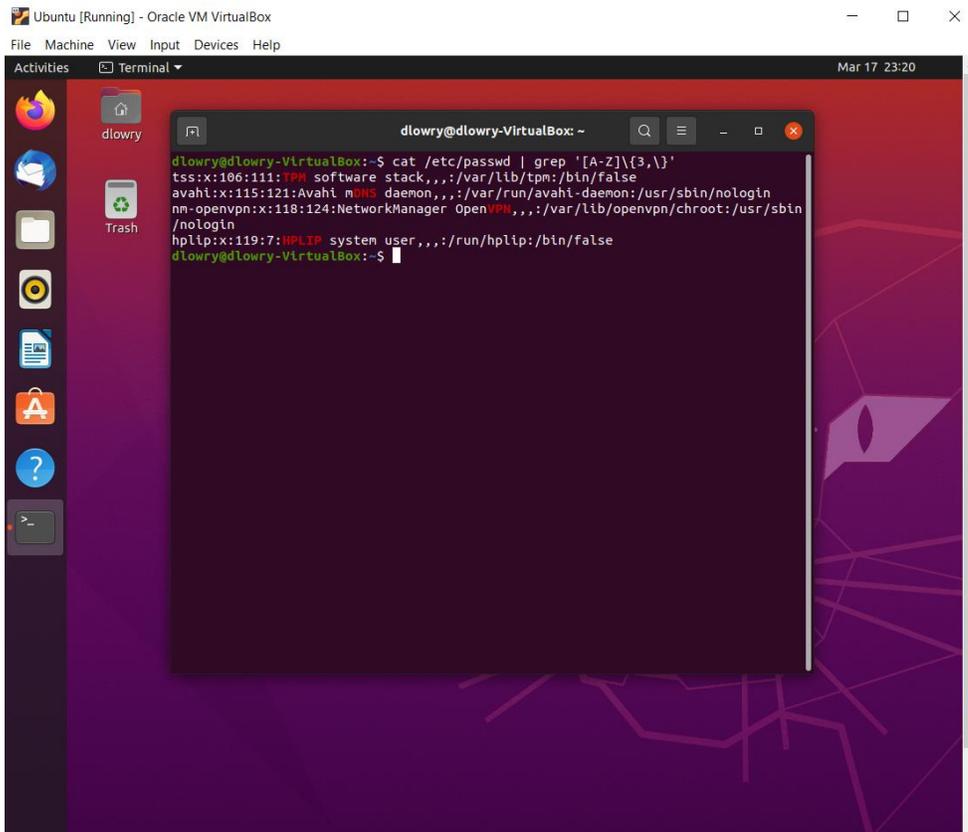
The screenshot shows a terminal window titled "dlowry@dlowry-VirtualBox: ~" with the following output:

```
dlowry@dlowry-VirtualBox:~$ ps -fe | grep 'bash'
dlowry 3608 3600 0 22:17 pts/0 00:00:00 bash
dlowry 3772 3608 0 23:09 pts/0 00:00:00 grep --color=auto bash
dlowry@dlowry-VirtualBox:~$
```

Used the grep function to filter bash.

Step 7:

- Display all the files in the /etc/passwd file that contain at least three Uppercase characters.



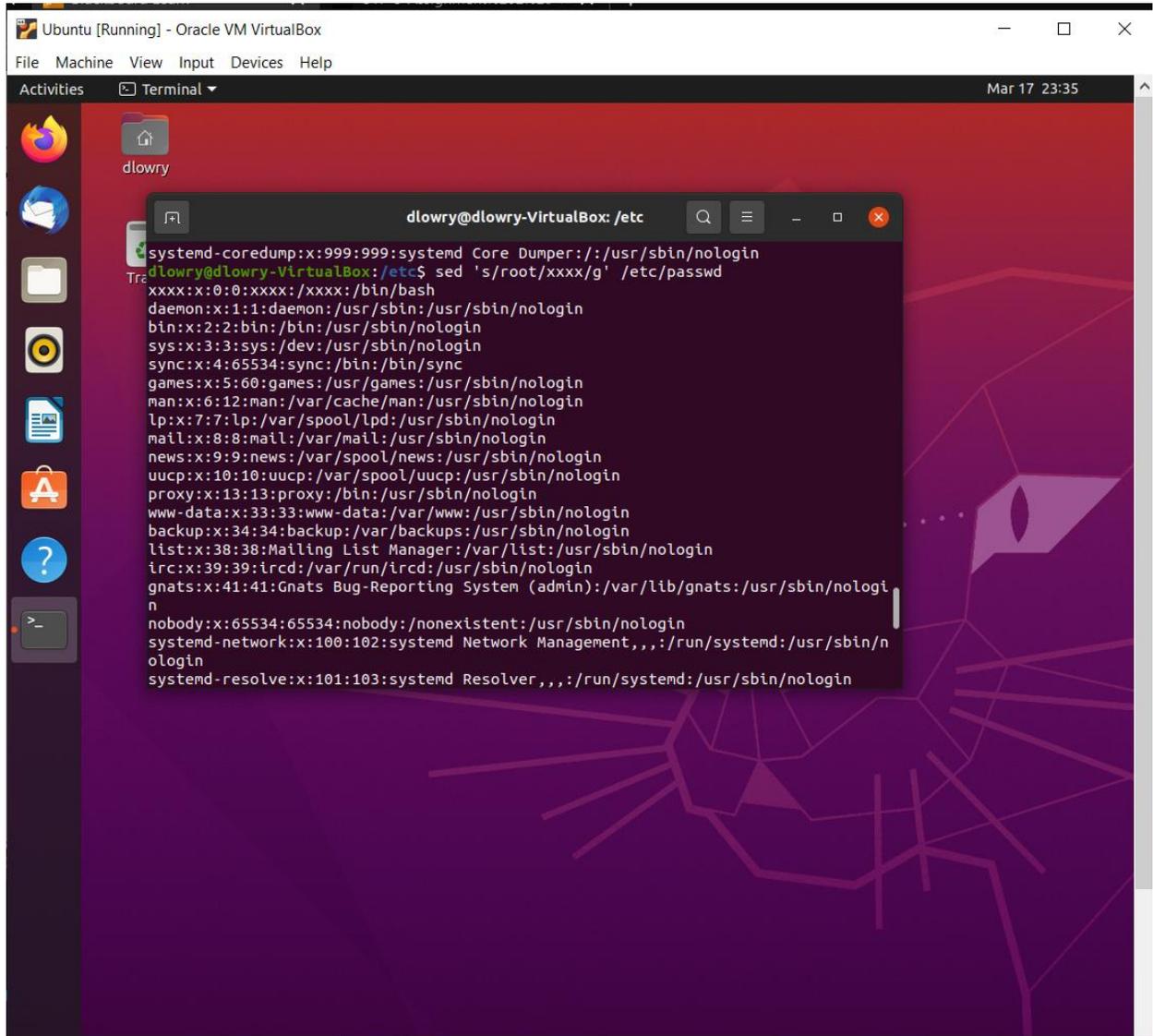
The screenshot shows a terminal window titled 'dlowry@dlowry-VirtualBox: ~' with the following command and output:

```
dlowry@dlowry-VirtualBox:~$ cat /etc/passwd | grep '[A-Z]\{3,\}'
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
avahi:x:115:121:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
nm-openvpn:x:118:124:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
dlowry@dlowry-VirtualBox:~$
```

Used “ `cat /etc/passwd | grep '[A-Z]\{3,\}'` ” to filter all content containing at least three Uppercase characters.

Step 8:

- Display the `/etc/passwd` file with all occurrences of `root` replaced with `XXXX`.



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 17 23:35
dlowry
dlowry@dlowry-VirtualBox: /etc
systemd-coredump:x:999:999:systemd Core Dumper:/:usr/sbin/nologin
dlowry@dlowry-VirtualBox: /etc$ sed 's/root/xxxx/g' /etc/passwd
xxxx:x:0:0:xxxx:/xxxx:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
```

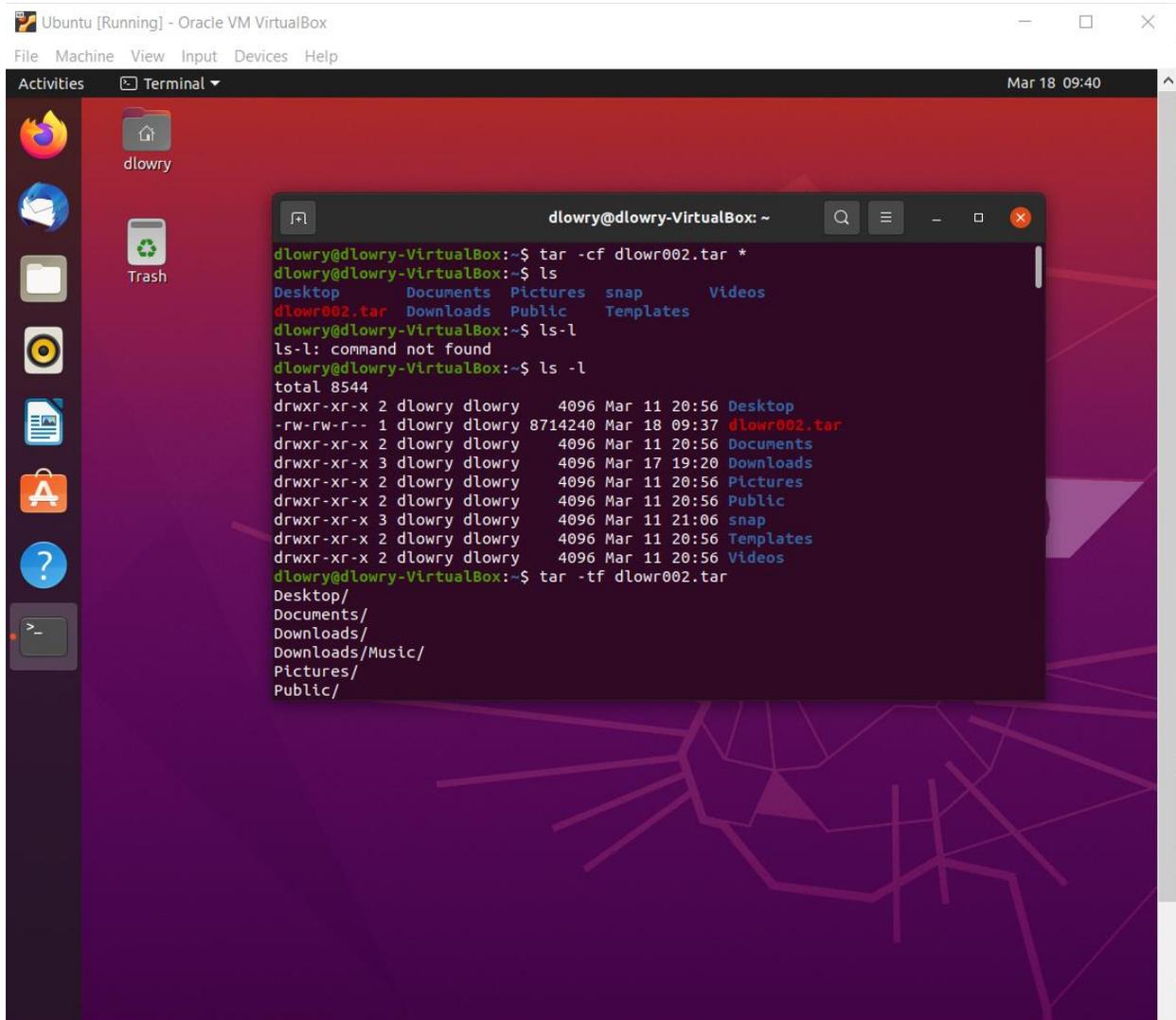
Used `sed 's/root/xxxx/g' /etc/passwd` to display file with all occurrences of `root` replaced with `XXXX`.

Task C

Compressing Files

Step 1-2:

- Create a tar file named “YourMIDAS_BK.tar” that contains everything in your home directory.
- List the contents of the tar file you created in the previous step (NOT EXTRACTING).



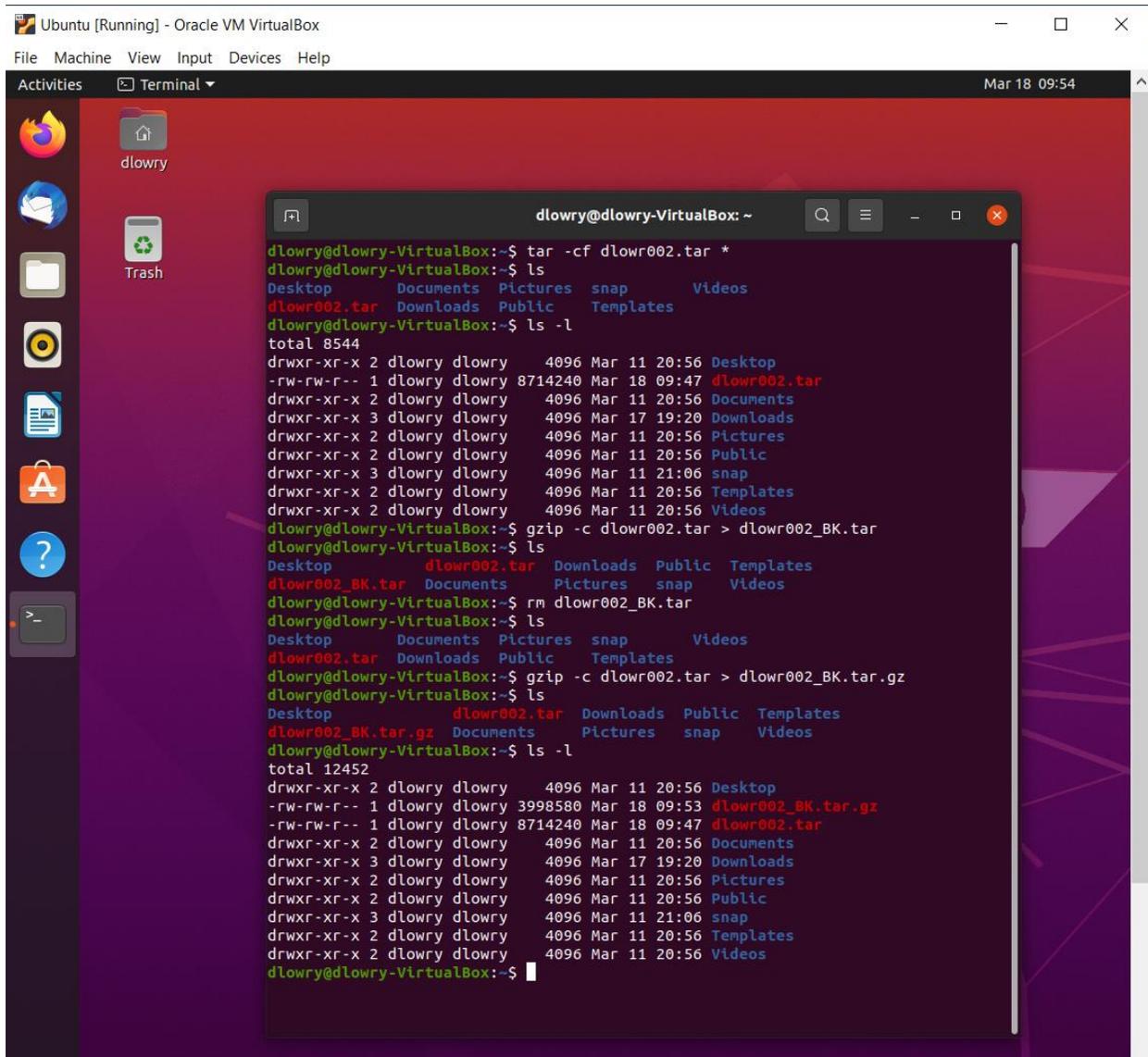
The screenshot shows a terminal window in an Ubuntu virtual machine. The user has executed the following commands and received the following output:

```
dlowry@dlowry-VirtualBox:~$ tar -cf dlowr002.tar *
dlowry@dlowry-VirtualBox:~$ ls
Desktop      Documents  Pictures   snap       Videos
dlowr002.tar Downloads  Public     Templates
dlowry@dlowry-VirtualBox:~$ ls -l
ls-l: command not found
dlowry@dlowry-VirtualBox:~$ ls -l
total 8544
drwxr-xr-x 2 dlowry dlowry   4096 Mar 11 20:56 Desktop
-rw-rw-r-- 1 dlowry dlowry 8714240 Mar 18 09:37 dlowr002.tar
drwxr-xr-x 2 dlowry dlowry   4096 Mar 11 20:56 Documents
drwxr-xr-x 3 dlowry dlowry   4096 Mar 17 19:20 Downloads
drwxr-xr-x 2 dlowry dlowry   4096 Mar 11 20:56 Pictures
drwxr-xr-x 2 dlowry dlowry   4096 Mar 11 20:56 Public
drwxr-xr-x 3 dlowry dlowry   4096 Mar 11 21:06 snap
drwxr-xr-x 2 dlowry dlowry   4096 Mar 11 20:56 Templates
drwxr-xr-x 2 dlowry dlowry   4096 Mar 11 20:56 Videos
dlowry@dlowry-VirtualBox:~$ tar -tf dlowr002.tar
Desktop/
Documents/
Downloads/
Downloads/Music/
Pictures/
Public/
```

Created tar file dlowr002.tar and used * to contain everything in home directory. Listed contents of file.

Step 3:

Compress the .tar file by using the gzip command but do not overwrite the existing .tar file; rather, create a new file named “YourMIDAS_BK.tar.gz”.



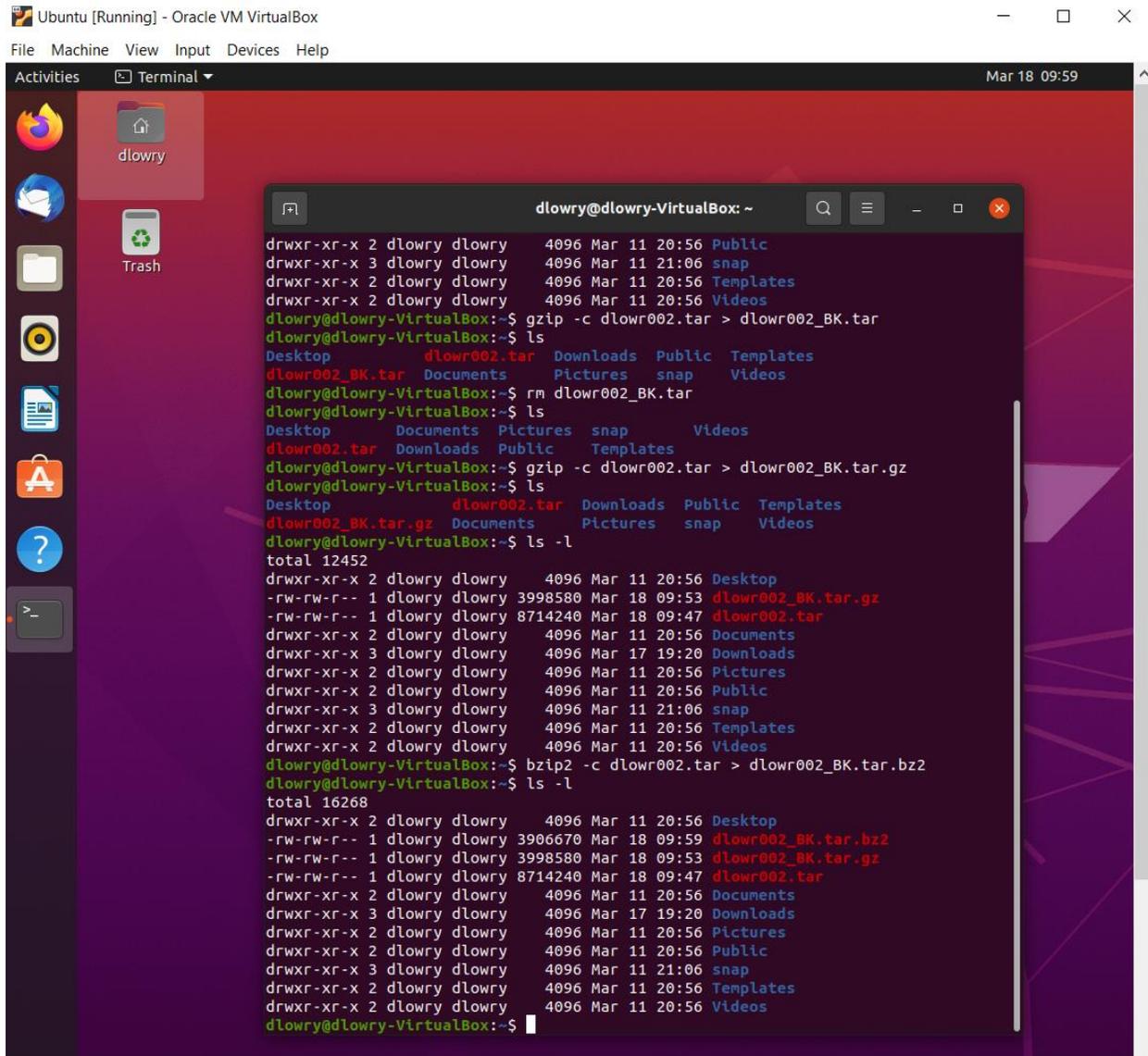
```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 18 09:54

dlowry@dlowry-VirtualBox: ~
dlowry@dlowry-VirtualBox:~$ tar -cf dlowr002.tar *
dlowry@dlowry-VirtualBox:~$ ls
Desktop Documents Pictures snap Videos
dlowr002.tar Downloads Public Templates
dlowry@dlowry-VirtualBox:~$ ls -l
total 8544
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Desktop
-rw-rw-r-- 1 dlowry dlowry 8714240 Mar 18 09:47 dlowr002.tar
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Documents
drwxr-xr-x 3 dlowry dlowry 4096 Mar 17 19:20 Downloads
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Pictures
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Public
drwxr-xr-x 3 dlowry dlowry 4096 Mar 11 21:06 snap
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Templates
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Videos
dlowry@dlowry-VirtualBox:~$ gzip -c dlowr002.tar > dlowr002_BK.tar
dlowry@dlowry-VirtualBox:~$ ls
Desktop dlowr002.tar Downloads Public Templates
dlowr002_BK.tar Documents Pictures snap Videos
dlowry@dlowry-VirtualBox:~$ rm dlowr002_BK.tar
dlowry@dlowry-VirtualBox:~$ ls
Desktop dlowr002.tar Downloads Public Templates
dlowr002_BK.tar.gz Documents Pictures snap Videos
dlowry@dlowry-VirtualBox:~$ ls -l
total 12452
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Desktop
-rw-rw-r-- 1 dlowry dlowry 3998580 Mar 18 09:53 dlowr002_BK.tar.gz
-rw-rw-r-- 1 dlowry dlowry 8714240 Mar 18 09:47 dlowr002.tar
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Documents
drwxr-xr-x 3 dlowry dlowry 4096 Mar 17 19:20 Downloads
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Pictures
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Public
drwxr-xr-x 3 dlowry dlowry 4096 Mar 11 21:06 snap
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Templates
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Videos
dlowry@dlowry-VirtualBox:~$
```

Used -c to create a new file named dlowr002_BK.tar.gz instead of overwriting the existing tar file, and compressed the file with gzip command.

Step 4-5:

- Compress the .tar file with the bzip2 command but do not overwrite the existing .tar file; rather, create a new file named “YourMIDAS_BK.tar.bz2”.
- Compare the size of the YourMIDAS_BK.tar.gz and YourMIDAS_BK.tar.bz2 files to determine which one is smaller.



```
Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Mar 18 09:59

dlowry@dlowry-VirtualBox: ~
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Public
drwxr-xr-x 3 dlowry dlowry 4096 Mar 11 21:06 snap
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Templates
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Videos
dlowry@dlowry-VirtualBox:~$ gzip -c dlowr002.tar > dlowr002_BK.tar
dlowry@dlowry-VirtualBox:~$ ls
Desktop dlowr002.tar Downloads Public Templates
dlowr002_BK.tar Documents Pictures snap Videos
dlowry@dlowry-VirtualBox:~$ rm dlowr002_BK.tar
dlowry@dlowry-VirtualBox:~$ ls
Desktop Documents Pictures snap Videos
dlowr002.tar Downloads Public Templates
dlowry@dlowry-VirtualBox:~$ gzip -c dlowr002.tar > dlowr002_BK.tar.gz
dlowry@dlowry-VirtualBox:~$ ls
Desktop dlowr002.tar Downloads Public Templates
dlowr002_BK.tar.gz Documents Pictures snap Videos
dlowry@dlowry-VirtualBox:~$ ls -l
total 12452
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Desktop
-rw-rw-r-- 1 dlowry dlowry 3998580 Mar 18 09:53 dlowr002_BK.tar.gz
-rw-rw-r-- 1 dlowry dlowry 8714240 Mar 18 09:47 dlowr002.tar
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Documents
drwxr-xr-x 3 dlowry dlowry 4096 Mar 17 19:20 Downloads
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Pictures
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Public
drwxr-xr-x 3 dlowry dlowry 4096 Mar 11 21:06 snap
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Templates
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Videos
dlowry@dlowry-VirtualBox:~$ bzip2 -c dlowr002_BK.tar > dlowr002_BK.tar.bz2
dlowry@dlowry-VirtualBox:~$ ls -l
total 16268
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Desktop
-rw-rw-r-- 1 dlowry dlowry 3906670 Mar 18 09:59 dlowr002_BK.tar.bz2
-rw-rw-r-- 1 dlowry dlowry 3998580 Mar 18 09:53 dlowr002_BK.tar.gz
-rw-rw-r-- 1 dlowry dlowry 8714240 Mar 18 09:47 dlowr002.tar
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Documents
drwxr-xr-x 3 dlowry dlowry 4096 Mar 17 19:20 Downloads
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Pictures
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Public
drwxr-xr-x 3 dlowry dlowry 4096 Mar 11 21:06 snap
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Templates
drwxr-xr-x 2 dlowry dlowry 4096 Mar 11 20:56 Videos
dlowry@dlowry-VirtualBox:~$
```

Again, created file dlowr002_BK.tar.bz2 using -c as to not overwrite the existing tar file. As we can see when we compare the dlowr002_BK.tar.gz and the dlowr002_BK.tar.bz2 files, the dlowr002_BK.tar.bz2 file is smaller.

