

Learning goals: Linux OS and shell - continued. You may not have seen some of the commands in the theory class, so this is the time to explore and learn! Use should learn to use the man command extensively in this lab, please resist the urge to look up Google/ChatGPT. NOTE: Please upload your work to your github account as Lab3.pdf by end of Thursday Jul 24.

EXERCISES

- (1) What does each of the following commands do? Print the output and attach it as part of your Lab3 document

(a) **cd /**:- Changes the current directory to the root directory

```
ibab@IBAB-MSc-BDB-Comp01:/home$ cd /
ibab@IBAB-MSc-BDB-Comp01:/ $ pwd
/
ibab@IBAB-MSc-BDB-Comp01:/ $
```

(b) **cd ~**:- **ch**anges the current directory to your home directory

```
ibab@IBAB-MSc-BDB-Comp01:/ $ cd ~
ibab@IBAB-MSc-BDB-Comp01:~$ pwd
/home/ibab
ibab@IBAB-MSc-BDB-Comp01:~$
```

(c) **cd** :- cd without arguments also changes to your home directory

```
ibab@IBAB-MSc-BDB-Comp01:~$ cd /
ibab@IBAB-MSc-BDB-Comp01:/ $ pwd
/
ibab@IBAB-MSc-BDB-Comp01:/ $ cd
ibab@IBAB-MSc-BDB-Comp01:~$
```

(d) **cd..** :- Changes the directory to the parent directory of the current one

```
ibab@IBAB-MSc-BDB-Comp01:~$ cd ..
ibab@IBAB-MSc-BDB-Comp01:/home$ pwd
/home
```

- (e) `cd .` Changes the directory to the current directory

```
ibab@IBAB-MSc-BDB-Comp01:~$ cd .
ibab@IBAB-MSc-BDB-Comp01:~$ pwd
/home/ibab
```

- (f) `Cd` - Switches back to the previous directory you were in before the last `cd` command.

```
ibab@IBAB-MSc-BDB-Comp01:~$ cd ..
ibab@IBAB-MSc-BDB-Comp01:/home$ pwd
/home
ibab@IBAB-MSc-BDB-Comp01:/home$ cd -
/home/ibab
```

- (2) When using the `ls` command, what is the difference between `-R` option and `-r` option?

Demonstrate the difference by typing the appropriate commands and printing the output to your Lab3 document.

- `ls -r`: Reverse order for sorting
- `ls -R`: List Subdirectory Recursively

```
ibab@IBAB-MSc-BDB-Comp01:~$ cd Downloads
ibab@IBAB-MSc-BDB-Comp01:~/Downloads$ ls -R
.:
'Fight club.jpg'                                lab2.docx
'google-chrome-stable_current_amd64 (1).deb'    lab2.pdf
google-chrome-stable_current_amd64.deb          lab3.docx
google-chrome-stable_current_x86_64.rpm         lab3.pdf
keshav                                           testdir
'Keshav Pande BDBP106- LAB 2.pdf'                testfile
'Keshav Pande BDBP106- PRACTICAL 1.pdf'

./keshav:

./testdir:
testfile
ibab@IBAB-MSc-BDB-Comp01:~/Downloads$ ls -r
testfile
testdir
lab3.pdf
lab3.docx
lab2.pdf
lab2.docx
'Keshav Pande BDBP106- PRACTICAL 1.pdf'
'Keshav Pande BDBP106- LAB 2.pdf'
keshav
google-chrome-stable_current_x86_64.rpm
google-chrome-stable_current_amd64.deb
'google-chrome-stable_current_amd64 (1).deb'
'Fight club.jpg'
```

(3) How do I find out what directory I am currently in?

```
ibab@IBAB-MSc-BDB-Comp01:~/Downloads$ pwd
/home/ibab/Downloads
```

(4) How do I list files sorted by modification time, but with oldest first? Find the correct combination of options to do this task. Print the output of your command with appropriate screenshots to demonstrate this in your Lab3 document.

- **-l:** long listing format (shows permissions, size, date, etc.)
- **-t:** sort by modification time (newest first by default)
- **--reverse:** reverses the order (so oldest comes first)

```
ibab@IBAB-MSc-BDB-Comp01:~/Downloads$ ls -lt --reverse
total 349776
-rw-rw-r-- 1 ibab ibab 118188228 Jul 17 14:24 google-chrome-stable_current_amd64.de
b
-rw-rw-r-- 1 ibab ibab 118188228 Jul 17 15:43 'google-chrome-stable_current_amd64 (1
).deb'
-rw-rw-r-- 1 ibab ibab 564478 Jul 17 16:47 'Keshav Pande BDBP106- PRACTICAL 1.pdf'
-rw-rw-r-- 1 ibab ibab 120633257 Jul 18 09:51 google-chrome-stable_current_x86_64.r
pm
-rw-rw-r-- 1 ibab ibab 47489 Jul 18 15:04 lab2.pdf
-rw-rw-r-- 1 ibab ibab 9741 Jul 18 15:05 lab2.docx
-rw-rw-r-- 1 ibab ibab 345447 Jul 18 17:01 'Keshav Pande BDBP106- LAB 2.pdf'
-rw-rw-r-- 1 ibab ibab 95249 Jul 21 08:55 'Fight club.jpg'
drwxrwxr-x 2 ibab ibab 4096 Jul 21 11:42 keshav
-rw-rw-r-- 1 ibab ibab 0 Jul 23 09:07 testfile
drwxrwxr-x 2 ibab ibab 4096 Jul 23 09:13 testdir
-rw-rw-r-- 1 ibab ibab 60773 Jul 24 14:09 lab3.pdf
-rw-rw-r-- 1 ibab ibab 11352 Jul 24 14:12 lab3.docx
```

(5) What is the difference between (explain in your own words) `ls -ltr` and `ls -l`? Demonstrate the difference with appropriate screenshot and explanations.

Answer :- `ls -l`:

- This command shows files in **long format**, listing details like permissions, size, and last modified date.
- It **sorts files alphabetically** by default.

```

ibab@IBAB-MSc-BDB-Comp01:~/Downloads$ ls -lt
total 349776
-rw-rw-r-- 1 ibab ibab      11352 Jul 24 14:12 lab3.docx
-rw-rw-r-- 1 ibab ibab      60773 Jul 24 14:09 lab3.pdf
drwxrwxr-x 2 ibab ibab       4096 Jul 23 09:13 testdir
-rw-rw-r-- 1 ibab ibab         0 Jul 23 09:07 testfile
drwxrwxr-x 2 ibab ibab       4096 Jul 21 11:42 keshav
-rw-rw-r-- 1 ibab ibab     95249 Jul 21 08:55 'Fight club.jpg'
-rw-rw-r-- 1 ibab ibab    345447 Jul 18 17:01 'Keshav Pande BDBP106- LAB 2.pdf'
-rw-rw-r-- 1 ibab ibab      9741 Jul 18 15:05 lab2.docx
-rw-rw-r-- 1 ibab ibab     47489 Jul 18 15:04 lab2.pdf
-rw-rw-r-- 1 ibab ibab 120633257 Jul 18 09:51 google-chrome-stable_current_x86_64.r
pm
-rw-rw-r-- 1 ibab ibab     564478 Jul 17 16:47 'Keshav Pande BDBP106- PRACTICAL 1.pdf'
-rw-rw-r-- 1 ibab ibab 118188228 Jul 17 15:43 'google-chrome-stable_current_amd64 (1
).deb'
-rw-rw-r-- 1 ibab ibab 118188228 Jul 17 14:24 google-chrome-stable_current_amd64.de
b

```

- **ls -ltr:**

- This command also shows files in **long format**, but it **sorts them by modification time**, showing the **oldest files first**.
- The **-t** option sorts by time (newest first), and **-r** reverses it (oldest first).

```

ibab@IBAB-MSc-BDB-Comp01:~/Downloads$ ls -l
total 349776
-rw-rw-r-- 1 ibab ibab     95249 Jul 21 08:55 'Fight club.jpg'
-rw-rw-r-- 1 ibab ibab 118188228 Jul 17 15:43 'google-chrome-stable_current_amd64 (1
).deb'
-rw-rw-r-- 1 ibab ibab 118188228 Jul 17 14:24 google-chrome-stable_current_amd64.de
b
-rw-rw-r-- 1 ibab ibab 120633257 Jul 18 09:51 google-chrome-stable_current_x86_64.r
pm
drwxrwxr-x 2 ibab ibab       4096 Jul 21 11:42 keshav
-rw-rw-r-- 1 ibab ibab    345447 Jul 18 17:01 'Keshav Pande BDBP106- LAB 2.pdf'
-rw-rw-r-- 1 ibab ibab     564478 Jul 17 16:47 'Keshav Pande BDBP106- PRACTICAL 1.pdf'
-rw-rw-r-- 1 ibab ibab      9741 Jul 18 15:05 lab2.docx
-rw-rw-r-- 1 ibab ibab     47489 Jul 18 15:04 lab2.pdf
-rw-rw-r-- 1 ibab ibab     11352 Jul 24 14:12 lab3.docx
-rw-rw-r-- 1 ibab ibab     60773 Jul 24 14:09 lab3.pdf
drwxrwxr-x 2 ibab ibab       4096 Jul 23 09:13 testdir
-rw-rw-r-- 1 ibab ibab         0 Jul 23 09:07 testfile

```

(6) What is the difference between **ls -aLF**, **ls -A** and **ls -CF**. Demonstrate the differences with appropriate examples as screenshot and explanations.

ls -aLF

- **-a**: show **all files**, including hidden ones (**.** and **..**)
- **-l**: **long format** (shows permissions, owners, size, timestamps)
- **-F**: adds a **symbol at the end** of file names:

- / for directories
- * for executables
- @ for symbolic links

```
ibab@IBAB-MSc-BDB-Comp01:~$ ls -aLF
total 112
drwxr-x--- 22 ibab ibab 4096 Jul 24 15:37 ./
drwxr-xr-x  6 root root 4096 Jul 15 15:36 ../
drwxr-xr-x  2 ibab ibab 4096 Jul 17 09:02 .anydesk/
-rw----- 1 ibab ibab 2778 Jul 23 09:56 .bash_history
-rw-r--r-- 1 ibab ibab  220 Jul 15 15:36 .bash_logout
-rw-r--r-- 1 ibab ibab 3771 Jul 15 15:36 .bashrc
drwx----- 17 ibab ibab 4096 Jul 17 15:36 .cache/
drwx----- 17 ibab ibab 4096 Jul 21 08:55 .config/
drwxr-xr-x  2 ibab ibab 4096 Jul 17 09:02 Desktop/
drwxr-xr-x  3 ibab ibab 4096 Jul 17 14:33 Documents/
drwxr-xr-x  4 ibab ibab 4096 Jul 24 14:12 Downloads/
-rw-rw-r--  2 ibab ibab   0 Jul 23 09:26 file
drwx----- 2 ibab ibab 4096 Jul 21 13:53 .gnupg/
-rw----- 1 ibab ibab  20 Jul 24 15:37 .lessht
drwxrwxr-x  2 ibab ibab 4096 Jul 21 11:30 'linux course'/
drwx----- 3 ibab ibab 4096 Jul 17 09:02 .local/
drwx----- 3 ibab ibab 4096 Jul 17 11:53 .mozilla/
drwxr-xr-x  2 ibab ibab 4096 Jul 17 09:02 Music/
drwxr-xr-x  3 ibab ibab 4096 Jul 17 14:31 Pictures/
drwx----- 3 ibab ibab 4096 Jul 17 15:36 .pki/
-rw-r--r-- 1 ibab ibab  807 Jul 15 15:36 .profile
drwxr-xr-x  2 ibab ibab 4096 Jul 17 09:02 Public/
-rw----- 1 ibab ibab  134 Jul 22 11:26 .python_history
drwx----- 5 ibab ibab 4096 Jul 17 14:27 snap/
drwx----- 2 ibab ibab 4096 Jul 17 12:41 .ssh/
-rw-r--r-- 1 ibab ibab   0 Jul 21 11:15 .sudo_as_admin_successful
drwxr-xr-x  2 ibab ibab 4096 Jul 17 09:02 Templates/
drwxrwxr-x  2 ibab ibab 4096 Jul 24 14:38 test1/
-rw-rw-r--  2 ibab ibab   0 Jul 23 09:26 testfile_hlink
lrwxrwxrwx  1 ibab ibab   4 Jul 23 09:27 testfile_slink -> file
drwx----- 6 ibab ibab 4096 Jul 17 11:53 .thunderbird/
drwxr-xr-x  2 ibab ibab 4096 Jul 17 09:02 Videos/
```

Is - A

- -A: show **all files except** . (current directory) and .. (parent directory)

```
ibab@IBAB-MSc-BDB-Comp01:~$ ls -A
.anydesk      Downloads     Pictures      Templates
.bash_history  file         .pki         test1
.bash_logout  .gnupg       .profile     testfile_hlink
.bashrc       .lessht     Public       testfile_slink
.cache        'linux course' .python_history .thunderbird
.config       .local      snap        Videos
Desktop      .mozilla   .ssh
Documents    Music     .sudo_as_admin_successful
ibab@IBAB-MSc-BDB-Comp01:~$
```

Is -CF

- -C = List entries by columns
- -F=append indicator (one of */=>@|) to entries


```
ibab@IBAB-MSc-BDB-Comp01:~$ ls -CF
Desktop/      file      Pictures/    Templates/  testfile_slink@
Documents/    'linux course'/ Public/      test1/      Videos/
Downloads/    Music/     snap/       testfile_hlink
ibab@IBAB-MSc-BDB-Comp01:~$
```

- (7) Describe how you would use a combination of color codes in the command prompt appearance. Demonstrate this using an example where you managed to combine the colors blue and green?

Color and their code

blue 34 , Green 32 , reset 0

`\[\e[34m\]`: Set text color to blue

- `\u@\h`: Shows **username@hostname**
- `\[\e[32m\]`: Switch to **green**
- `\w`: Shows **current working directory**
- `\$`: Shows the **command prompt symbol** (\$ for user, # for root)
- `\[\e[0m\]`: Resets color to default after the prompt

```
ibab@IBAB-MSc-BDB-Comp01:/home$ export PS1="\[\e[34m\]\u@\h \[\e[32m\]\w \$ \[\e[0m\]"~
ibab@IBAB-MSc-BDB-Comp01 /home $ ~
```

- (8) Find the option of ls that lists the contents of a directory in the long format, but without the primary group information. (Note: `ls -l` lists files in the long format with the primary group information)

```
[ibab@IBAB-MSc-BDB-Comp01~]$ls -lG
total 44
drwxr-xr-x 2 ibab 4096 Jul 17 09:02 Desktop
drwxr-xr-x 3 ibab 4096 Jul 17 14:33 Documents
drwxr-xr-x 4 ibab 4096 Jul 24 14:12 Downloads
-rw-rw-r-- 2 ibab  0 Jul 23 09:26 file
drwxrwxr-x 2 ibab 4096 Jul 21 11:30 'linux course'
drwxr-xr-x 2 ibab 4096 Jul 17 09:02 Music
drwxr-xr-x 3 ibab 4096 Jul 17 14:31 Pictures
drwxr-xr-x 2 ibab 4096 Jul 17 09:02 Public
drwx----- 5 ibab 4096 Jul 17 14:27 snap
drwxr-xr-x 2 ibab 4096 Jul 17 09:02 Templates
drwxrwxr-x 2 ibab 4096 Jul 24 14:38 test1
-rw-rw-r-- 2 ibab  0 Jul 23 09:26 testfile_hlink
lrwxrwxrwx 1 ibab  4 Jul 23 09:27 testfile_slink -> file
drwxr-xr-x 2 ibab 4096 Jul 17 09:02 Videos
[ibab@IBAB-MSc-BDB-Comp01~]$
```

(9) Download the etc.zip folder sent to you by email, unzip it and rename it as etc_learn. Change your directory to etc_learn. In this directory do the following using the necessary wildcards:

(a) list the files or directories starting with b

```
ibab@IBAB-MSc-BDB-Comp01Downloads]$cd etc_learn.  
ibab@IBAB-MSc-BDB-Comp01etc_learn.}$ls b*  
bash.bashrc  bash_completion  bindresvport.blacklist  brlapi.key  brltty.conf  
  
bash_completion.d:  
  
binfmt.d:  
  
bluetooth:  
  
brltty:  
  
byobu:  
ibab@IBAB-MSc-BDB-Comp01etc_learn.}$
```

(b) list the files or directories starting with any of the letters from a-k

```
ibab@IBAB-MSc-BDB-Comp01etc_learn.}$ls [a-k]*  
adduser.conf  bash_completion  ca-certificates.conf  debian_version  environment  fuse.conf  group-  host.conf  hosts.deny  kerneloops.conf  
anacrontab    bindresvport.blacklist  crontab             deluser.conf    ethertypes   gal.conf  gshadow  hostname  inputrc  
app.conf      brlapi.key         crypttab             dhcpcd.conf     fprintd.conf gprofng.rc gshadow-  hosts      issue  
bash.bashrc   brltty.conf        debconf.conf         e2scrub.conf    fstab         group     hdpam.conf  hosts.allow  issue.net  
  
alsa:  
  
alternatives:  
  
apm:  
  
apparmor:  
  
apparmor.d:  
  
appport:  
  
apt:  
  
avahi:  
  
bash_completion.d:  
  
binfmt.d:  
  
bluetooth:  
  
brltty:
```

(c) list files or directories ending with d

```
ibab@IBAB-MSc-BDB-Comp01etc_learn.}$ls *d  
machine-id  
  
apparmor.d:  
  
bash_completion.d:  
  
binfmt.d:  
  
cloud:  
  
colord:  
  
credstore.encrypted:  
  
cron.d:  
  
debuginfod:  
  
depmod.d:  
  
environment.d:  
  
fwupd:  
  
glvnd:  
  
grub.d:  
  
ifupdown.d:
```

(d) list the files or directories containing the pattern with conf. How many are there?

```
modules-load.d:
[ibab@IBAB-MSc-BDB-Comp01etc_learn.]$ls *conf*    ls *conf*
adduser.conf  brltty.conf      debconf.conf  dhcpcd.conf  fprintd.conf  gai.conf      host.conf     ld.so.conf  libaudit.conf  logrotate.conf  mke2fs.conf
apg.conf      ca-certificates.conf  deluser.conf  e2scrub.conf  fuse.conf     hdparm.conf  kerneloops.conf  libao.conf  locale.conf  manpath.config  multipath.co

dconf:

insserv.conf.d:

krb5.conf.d:

ld.so.conf.d:
[ibab@IBAB-MSc-BDB-Comp01etc_learn.]$
```

(e) Output the last three lines of the file /etc/resolv.conf

```
[ibab@IBAB-MSc-BDB-Comp01etc_learn.]$tail -n 3 /etc/resolv.conf
nameserver 127.0.0.53
options edns0 trust-ad
search ibab.ac.in
[ibab@IBAB-MSc-BDB-Comp01etc_learn.]$
```

(f) list files that begin with g or l

```
[ibab@IBAB-MSc-BDB-Comp01etc_learn.]$~ls [gl]*
Command '~ls' not found, did you mean:
  command 'rls' from snap rustup (1.27.1)
  command 'ils' from deb sleuthkit (4.11.1+dfsg-1)
  command 'fls' from deb sleuthkit (4.11.1+dfsg-1)
  command 'jls' from deb sleuthkit (4.11.1+dfsg-1)
  command 'als' from deb atool (0.39.0-11)
  command 'ls' from deb coreutils (8.32-4.1ubuntu1.2)
  command 'hls' from deb hfsutils (3.2.6-15build2)
  command 'ols' from deb speech-tools (1:2.5.0-12)
See 'snap info <snapname>' for additional versions.
[ibab@IBAB-MSc-BDB-Comp01etc_learn.]$
```

(10) Create the following directories: /home/ibab/lab3/Q10/q1 and /home/ibab/lab3/Q10/q2 using one command. Attach a screenshot of the commands and the outputs of this and below exercises in your document.

(i) Enter the q1 directory using one command


```

ibab@IBAB-MSc-BDB-Comp01:/home$ cd lab3
bash: cd: lab3: No such file or directory
ibab@IBAB-MSc-BDB-Comp01:/home$ mkdir -p ~/lab3/Q10/q1 ~/lab3/Q10/q2
ibab@IBAB-MSc-BDB-Comp01:/home$ ls ~/lab3/Q10
q1  q2
ibab@IBAB-MSc-BDB-Comp01:/home$ ^[[200~cd ~/lab3/Q10/q1
cd: command not found
ibab@IBAB-MSc-BDB-Comp01:/home$ cd ~/lab3/Q10/q1
ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10/q1$ pwd
/home/ibab/lab3/Q10/q1
ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10/q1$ █

```

(ii) Change directories from q1 to q2 using one command

```

ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10/q1$ cd ../q2
ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10/q2$ pwd
/home/ibab/lab3/Q10/q2
ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10/q2$ █

```

(iii) copy the q1 directory to q1_copy

```

ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10/q2$ cd ~/lab3/Q10
cp -r q1 q1_copy
ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10$ ls
q1  q1_copy  q2
ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10$ █

```

(iv) delete the q1_copy interactively

```

ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10$ rm -ri q1_copy
rm: remove directory 'q1_copy'? y
ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10$ ls
q1  q2
ibab@IBAB-MSc-BDB-Comp01:~/lab3/Q10$ █

```