

ADVANCED COMPUTER NETWORK ASSIGNMENT 4

Topic: - Take screenshots of basic Linux commands IV

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S2 RMCA A

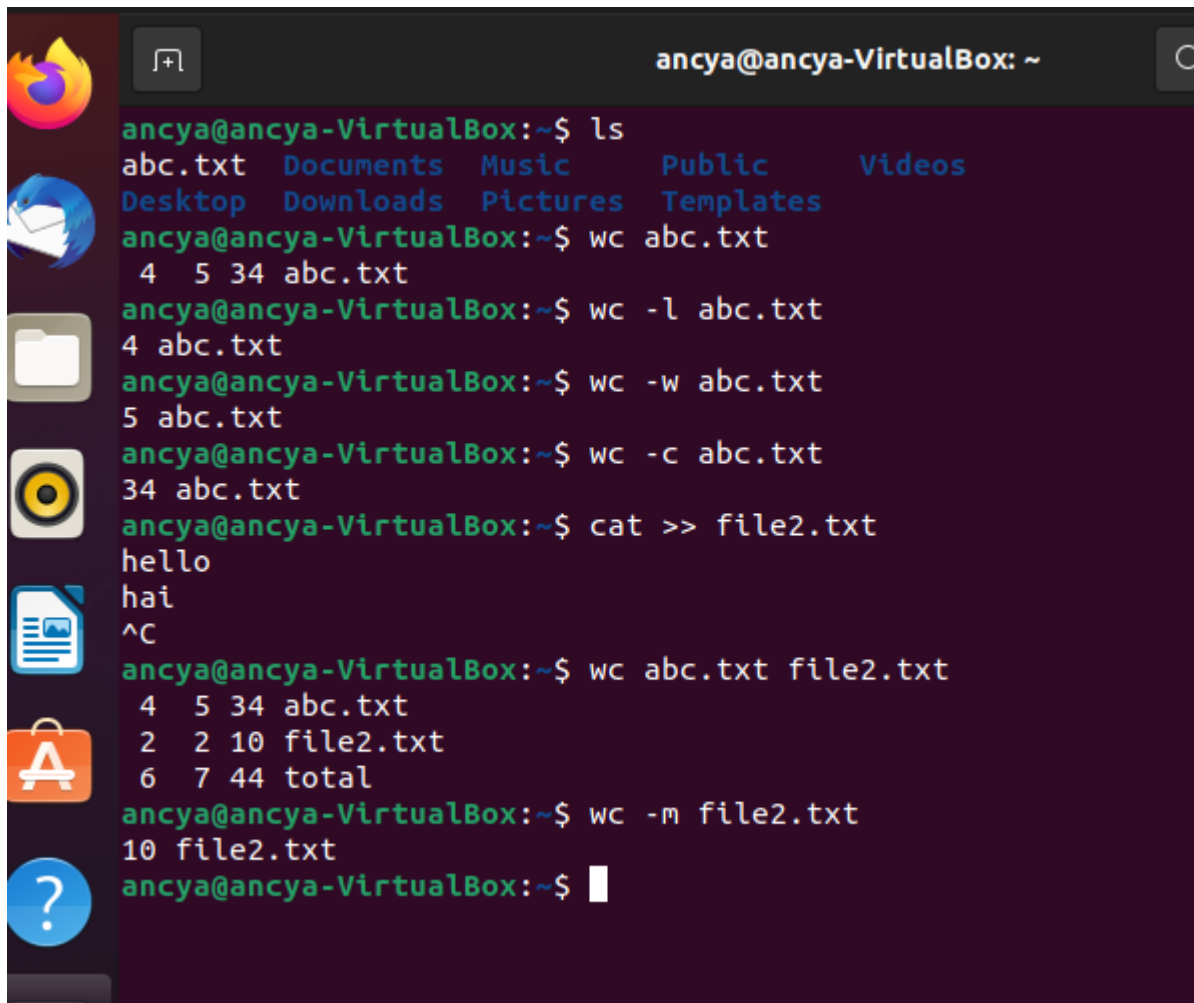
Submitted To:
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Submitted on:
11-08-2021

BASIC LINUX COMMANDS

1. wc

- wc stands for word count.
- Used for counting purpose.
- It is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.
 - #wc state.txt
 - #wc state.txt capital.txt
 - wc -l state.txt
 - wc -w state.txt capital.txt
 - wc -c state.txt
 - wc -m state.txt

A terminal window titled 'ancya@ancya-VirtualBox: ~' with a dark purple background. On the left side, there is a vertical dock with icons for Firefox, a mail client, a file manager, a music player, a document viewer, an application store, and a help icon. The terminal shows the following commands and output:

```
ancya@ancya-VirtualBox:~$ ls
abc.txt  Documents  Music      Public     Videos
Desktop  Downloads  Pictures   Templates
ancya@ancya-VirtualBox:~$ wc abc.txt
 4  5 34 abc.txt
ancya@ancya-VirtualBox:~$ wc -l abc.txt
4 abc.txt
ancya@ancya-VirtualBox:~$ wc -w abc.txt
5 abc.txt
ancya@ancya-VirtualBox:~$ wc -c abc.txt
34 abc.txt
ancya@ancya-VirtualBox:~$ cat >> file2.txt
hello
hai
^C
ancya@ancya-VirtualBox:~$ wc abc.txt file2.txt
 4  5 34 abc.txt
 2  2 10 file2.txt
 6  7 44 total
ancya@ancya-VirtualBox:~$ wc -m file2.txt
10 file2.txt
ancya@ancya-VirtualBox:~$
```

2. tar

The Linux 'tar' stands for tape archive, is used to create Archive and extract the Archive files

- Linux tar command to create compressed or uncompressed Archive files
- Options:
 - c : Creates Archive
 - x : Extract the archive
 - f : creates archive with given filename
 - t : displays or lists files in archived file
 - u : archives and adds to an existing archive file
 - v : Displays Verbose Information
 - A : Concatenates the archive files

- z : zip, tells tar command that creates tar file using gzip
- j : filter archive tar file using tbzip
- W : Verify a archive file
- r : update or add file or directory in already existed .tar file

```
#tar cf archive.tar state.txt capital.txt //create archive file
```

```
#ls archive.tar
```

```
#tar tf /archive.tar // list contents of tar archive file
```

- Extract an archive created with tar

```
#mkdir backup
```

```
#cd backup
```

```
#tar xf /home/kaj/Documents/Kaj_Linux/archive.tar
```

- Compression Types

```
gzip(z),bzip2(j), xz(J)
```

```
#tar czf /abc.tar.gz /etc
```

```
#tar cjf /abcd.tar.bz2 /etc
```

```
#tar cJf /abcde.tar.xz /etc
```

- Extract an archive

```
#mkdir backup1
```

```
#cd backup1
```

```
#tar xzf /abc.tar.gz
```

```
#mkdir backup2
```

```
#cd backup2
```

```
#tar xjf /abcd.tar.bz2
```

```
#mkdir backup3
```

```
#cd backup3
```

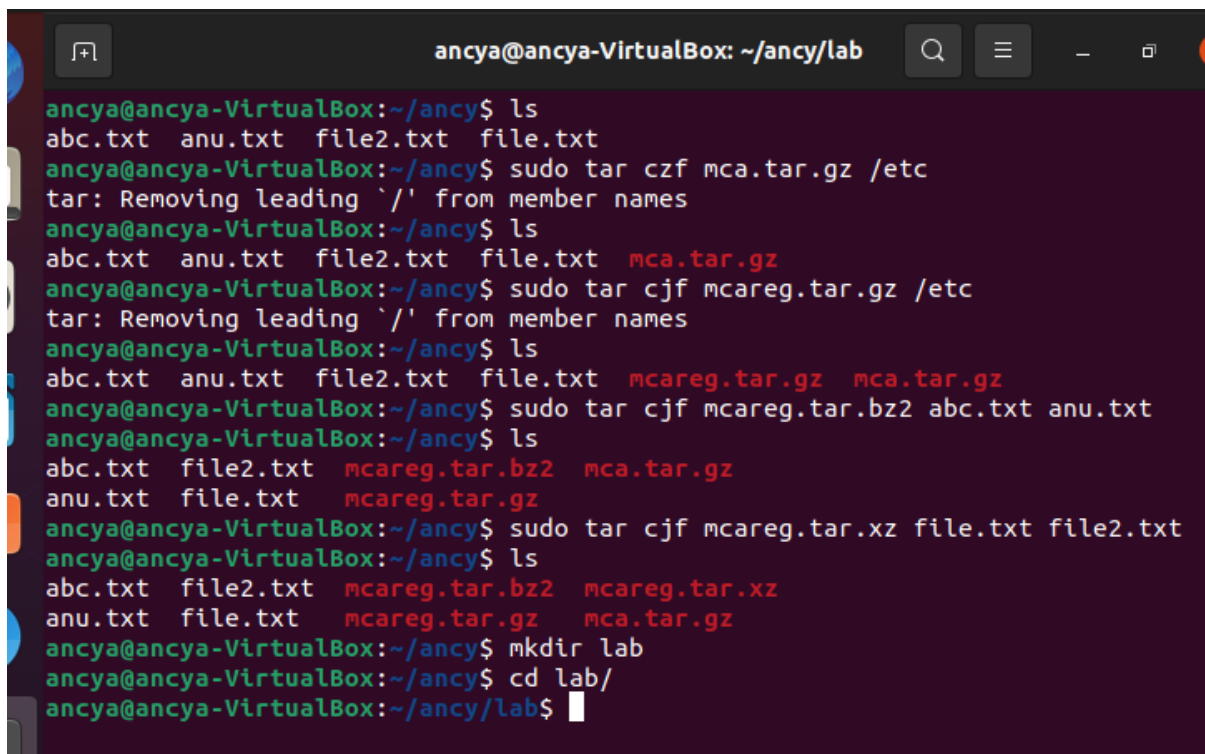
```
#tar xJf /abcde.tar.xz
```

- tar commands



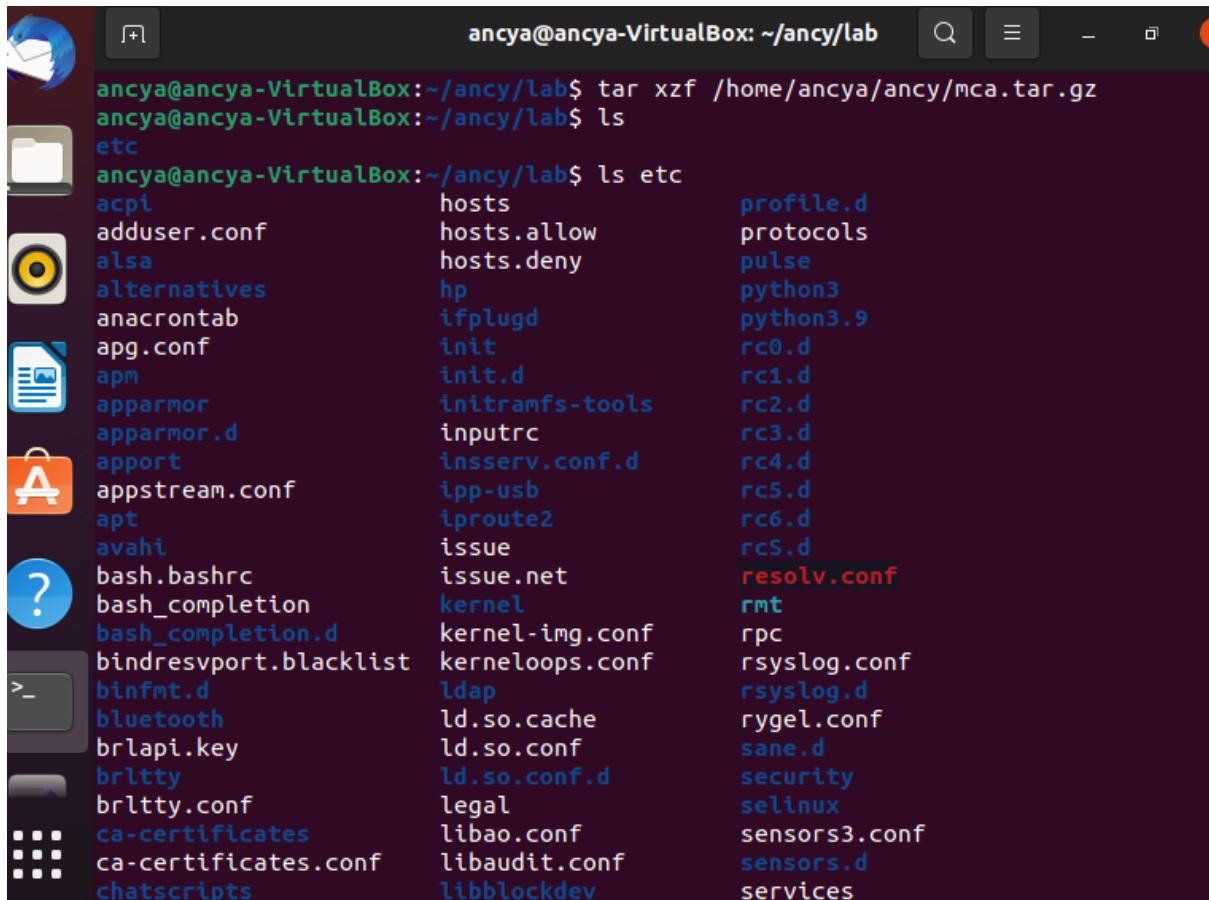
```
aneya@aneya-VirtualBox: ~/Extracted
aneya@aneya-VirtualBox:~$ tar cf archive.tar abc.txt file2.txt
aneya@aneya-VirtualBox:~$ ls archive.tar
archive.tar
aneya@aneya-VirtualBox:~$ ls
abc.txt      Desktop    Downloads  Music      Public     Videos
archive.tar  Documents file2.txt  Pictures   Templates
aneya@aneya-VirtualBox:~$ tar tf/archive.tar
tar: Old option 'f' requires an argument.
Try 'tar --help' or 'tar --usage' for more information.
aneya@aneya-VirtualBox:~$ tar tf archive.tar
abc.txt
file2.txt
aneya@aneya-VirtualBox:~$ mkdir Extracted
aneya@aneya-VirtualBox:~$ cd Extracted/
aneya@aneya-VirtualBox:~/Extracted$ pwd
/home/aneya/Extracted
aneya@aneya-VirtualBox:~/Extracted$ tar xf /home/aneya/archive.tar
aneya@aneya-VirtualBox:~/Extracted$ ls
abc.txt  file2.txt
aneya@aneya-VirtualBox:~/Extracted$
```

- Compressing using gz, bz2 and xz



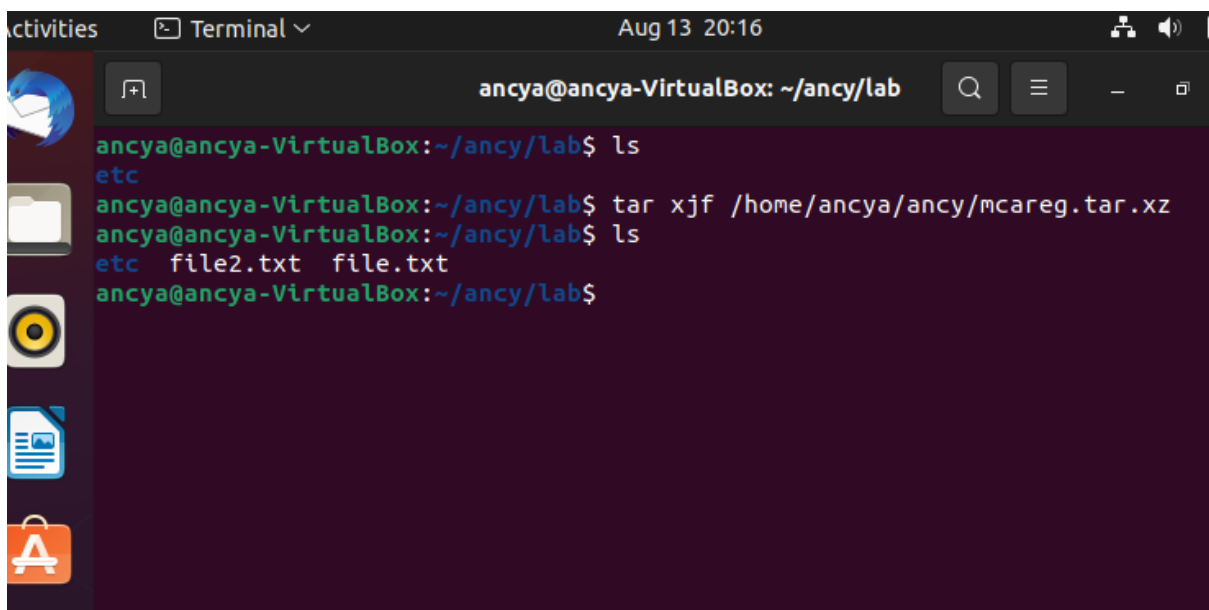
```
aneya@aneya-VirtualBox: ~/aneya/lab
aneya@aneya-VirtualBox:~/aneya$ ls
abc.txt  anu.txt  file2.txt  file.txt
aneya@aneya-VirtualBox:~/aneya$ sudo tar czf mca.tar.gz /etc
tar: Removing leading '/' from member names
aneya@aneya-VirtualBox:~/aneya$ ls
abc.txt  anu.txt  file2.txt  file.txt  mca.tar.gz
aneya@aneya-VirtualBox:~/aneya$ sudo tar cjf mcareg.tar.gz /etc
tar: Removing leading '/' from member names
aneya@aneya-VirtualBox:~/aneya$ ls
abc.txt  anu.txt  file2.txt  file.txt  mcareg.tar.gz  mca.tar.gz
aneya@aneya-VirtualBox:~/aneya$ sudo tar cjf mcareg.tar.bz2 abc.txt anu.txt
aneya@aneya-VirtualBox:~/aneya$ ls
abc.txt  file2.txt  mcareg.tar.bz2  mca.tar.gz
anu.txt  file.txt  mcareg.tar.gz
aneya@aneya-VirtualBox:~/aneya$ sudo tar cjf mcareg.tar.xz file.txt file2.txt
aneya@aneya-VirtualBox:~/aneya$ ls
abc.txt  file2.txt  mcareg.tar.bz2  mcareg.tar.xz
anu.txt  file.txt  mcareg.tar.gz  mca.tar.gz
aneya@aneya-VirtualBox:~/aneya$ mkdir lab
aneya@aneya-VirtualBox:~/aneya$ cd lab/
aneya@aneya-VirtualBox:~/aneya/lab$
```

- Extract using gzip



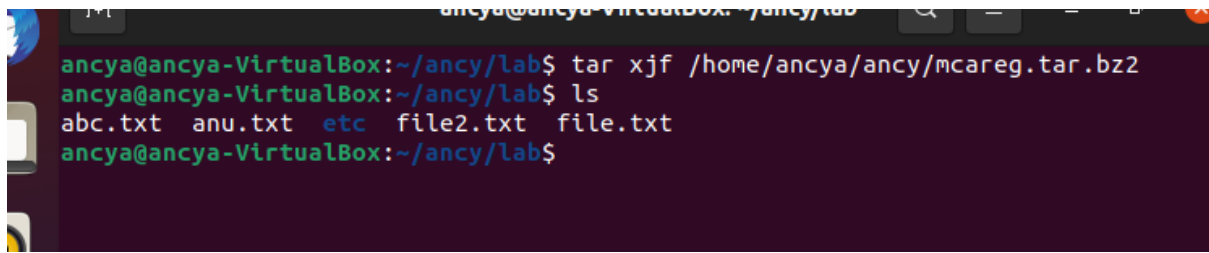
```
aneya@aneya-VirtualBox: ~/aneya/lab
aneya@aneya-VirtualBox:~/aneya/lab$ tar xzf /home/aneya/aneya/mca.tar.gz
aneya@aneya-VirtualBox:~/aneya/lab$ ls
etc
aneya@aneya-VirtualBox:~/aneya/lab$ ls etc
acpi          hosts          profile.d
adduser.conf  hosts.allow    protocols
alsa          hosts.deny     pulse
alternatives hp              python3
anacrontab    ifplugd        python3.9
apg.conf      init            rc0.d
apm           init.d          rc1.d
apparmor      initramfs-tools rc2.d
apparmor.d    inputrc         rc3.d
appport       insserv.conf.d rc4.d
appstream.conf ippp-usb        rc5.d
apt           iproute2        rc6.d
avahi         issue           rcS.d
bash.bashrc   issue.net       resolv.conf
bash_completion kernel           rmt
bash_completion.d kernel-img.conf rpc
bindresvport.blacklist kernelloops.conf rsyslog.conf
binfmt.d      ldap            rsyslog.d
bluetooth     ld.so.cache     rygel.conf
brlapi.key    ld.so.conf      sane.d
brltty        ld.so.conf.d    security
brltty.conf   legal           selinux
ca-certificates libao.conf       sensors3.conf
ca-certificates.conf libaudit.conf    sensors.d
chatscripts   libblockdev     services
```

- Extract using xz



```
activities  Terminal v  Aug 13 20:16
aneya@aneya-VirtualBox: ~/aneya/lab
aneya@aneya-VirtualBox:~/aneya/lab$ ls
etc
aneya@aneya-VirtualBox:~/aneya/lab$ tar xjf /home/aneya/aneya/mcareg.tar.xz
aneya@aneya-VirtualBox:~/aneya/lab$ ls
etc file2.txt file.txt
aneya@aneya-VirtualBox:~/aneya/lab$
```

- Extract using bz2

A terminal window titled 'ancya@ancya-VirtualBox: ~/ancy/lab' showing the execution of 'tar xjf /home/ancya/ancy/mcareg.tar.bz2' followed by 'ls', which lists 'abc.txt', 'anu.txt', 'etc', 'file2.txt', and 'file.txt'.

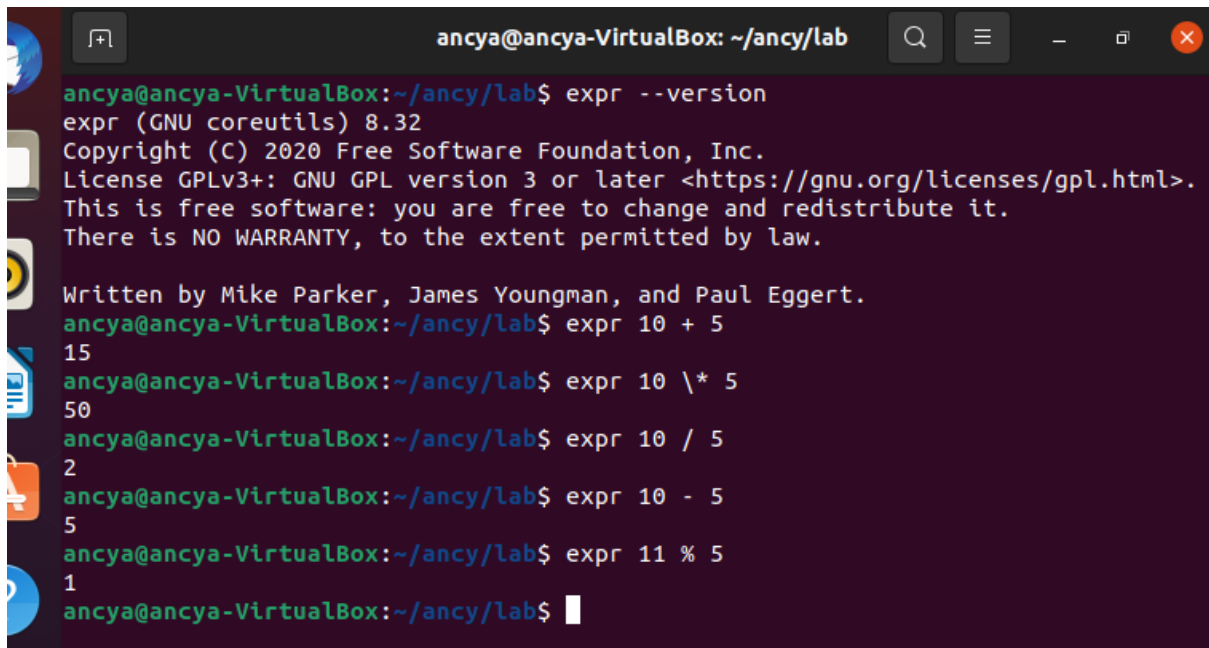
```
ancya@ancya-VirtualBox:~/ancy/lab$ tar xjf /home/ancya/ancy/mcareg.tar.bz2
ancya@ancya-VirtualBox:~/ancy/lab$ ls
abc.txt  anu.txt  etc      file2.txt  file.txt
ancya@ancya-VirtualBox:~/ancy/lab$
```

3. expr

The expr command evaluates a given expression and displays its corresponding output. It is used for:

- Basic operations like addition, subtraction, multiplication, division, and modulus on integers.
- Evaluating regular expressions, string operations like substring, length of strings etc.
- Performing operations on variables inside a shell script

```
#expr 10 + 2
```

A terminal window titled 'ancya@ancya-VirtualBox: ~/ancy/lab' showing the 'expr --version' output and several arithmetic operations: '10 + 5' (15), '10 * 5' (50), '10 / 5' (2), '10 - 5' (5), and '11 % 5' (1).

```
ancya@ancya-VirtualBox:~/ancy/lab$ expr --version
expr (GNU coreutils) 8.32
Copyright (C) 2020 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Written by Mike Parker, James Youngman, and Paul Eggert.
ancya@ancya-VirtualBox:~/ancy/lab$ expr 10 + 5
15
ancya@ancya-VirtualBox:~/ancy/lab$ expr 10 \* 5
50
ancya@ancya-VirtualBox:~/ancy/lab$ expr 10 / 5
2
ancya@ancya-VirtualBox:~/ancy/lab$ expr 10 - 5
5
ancya@ancya-VirtualBox:~/ancy/lab$ expr 11 % 5
1
ancya@ancya-VirtualBox:~/ancy/lab$
```

```
ancya@ancya-VirtualBox: ~/ancy/lab
ancya@ancya-VirtualBox:~/ancy/lab$ expr length "ancy" "<" 2 "|" 19 - 6 ">" 10
1
ancya@ancya-VirtualBox:~/ancy/lab$ expr length "ancy" "<" 2 "|" 19 - 6 ">" 20
0
ancya@ancya-VirtualBox:~/ancy/lab$
```

4. Redirections & Piping

A pipe is a form of redirection to send the output of one command/program/process to another command/program/process for further processing.

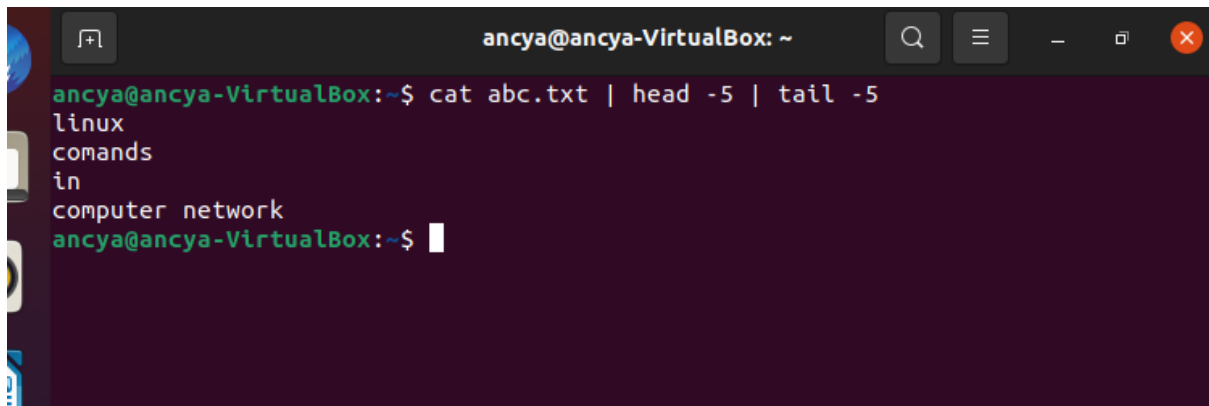
- Pipe is used to combine two or more commands, the output of one command acts as input to another command, and this command's output may act as input to the next command and so on.

```
#ls -l | wc -l
```

```
#cat /etc.passwd.txt | head -7 | tail -5
```

```
ancya@ancya-VirtualBox: ~/ancy/lab
ancya@ancya-VirtualBox:~/ancy/lab$ ls -l
total 28
-rw-rw-r-- 1 ancy ancy 34 Aug 13 19:49 abc.txt
-rw-rw-r-- 1 ancy ancy 34 Aug 13 19:49 anu.txt
drwxr-xr-x 131 ancy ancy 12288 Jun 21 23:17 etc
-rw-rw-r-- 1 ancy ancy 10 Aug 13 19:54 file2.txt
-rw-rw-r-- 1 ancy ancy 10 Aug 13 19:54 file.txt
ancya@ancya-VirtualBox:~/ancy/lab$ ls -l | wc -l
6
ancya@ancya-VirtualBox:~/ancy/lab$
```

```
ancya@ancya-VirtualBox: ~
ancya@ancya-VirtualBox:~$ ls | wc -m -w
13 112
ancya@ancya-VirtualBox:~$
```


A terminal window titled 'ancya@ancya-VirtualBox: ~' with standard window controls. The prompt is 'ancya@ancya-VirtualBox:~\$'. The command 'cat abc.txt | head -5 | tail -5' has been executed, resulting in the output: 'linux', 'comands', 'in', and 'computer network'. The prompt is now 'ancya@ancya-VirtualBox:~\$' with a cursor.

```
ancya@ancya-VirtualBox:~$ cat abc.txt | head -5 | tail -5
linux
comands
in
computer network
ancya@ancya-VirtualBox:~$
```

5. ssh

ssh stands for “**Secure Shell**”.

- It is a protocol used to securely connect to a remote server/system.
- ssh is secure in the sense that it transfers the data in encrypted form between the host and the client.
- It transfers inputs from the client to the host and relays back the output. ssh runs at TCP/IP port 22.

#ssh user_name@host(IP/Domain_name)

#ssh -X root@server1.example.com

```
activities Terminal Aug 13 20:33
ancya@ancya-VirtualBox: ~
ancya@ancya-VirtualBox:~$ sudo apt install openssh-client
[sudo] password for ancy:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
openssh-client is already the newest version (1:8.4p1-5ubuntu1).
openssh-client set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 117 not upgraded.
ancya@ancya-VirtualBox:~$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
ancya@ancya-VirtualBox:~$ sudo apt-get install openssh-server ii
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ii ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 5 newly installed, 0 to remove and 117 not upgraded.
Need to get 659 kB of archives.
After this operation, 5,973 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute/universe amd64 ii amd64 1.8-2
[15.3 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 ncurses-term all 6
.2+20201114-2build1 [249 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 openssh-sftp-serve
```

```
ancya@ancya-VirtualBox:~$ ssh localhost
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ECDSA key fingerprint is SHA256:Ha9/MHzeO4q80iVUNwERjhTp9w6bzjXNCG7654h8x
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts
ancya@localhost's password:
Welcome to Ubuntu 21.04 (GNU/Linux 5.11.0-18-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

118 updates can be installed immediately.
45 of these updates are security updates.
To see these additional updates run: apt list --upgradable

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.
```

6. scp

SCP (secure copy) is a command-line utility that allows you to securely

- copy files and directories between two locations.
- With scp, you can copy a file or directory:
- From your local system to a remote system.
- From a remote system to your local system.
- Between two remote systems from your local system.
- Remote file system locations are specified in format [user@]host:/path

Syntax:

```
scp [OPTION] [user@]SRC_HOST:]file1 [user@]DEST_HOST:]file2
```

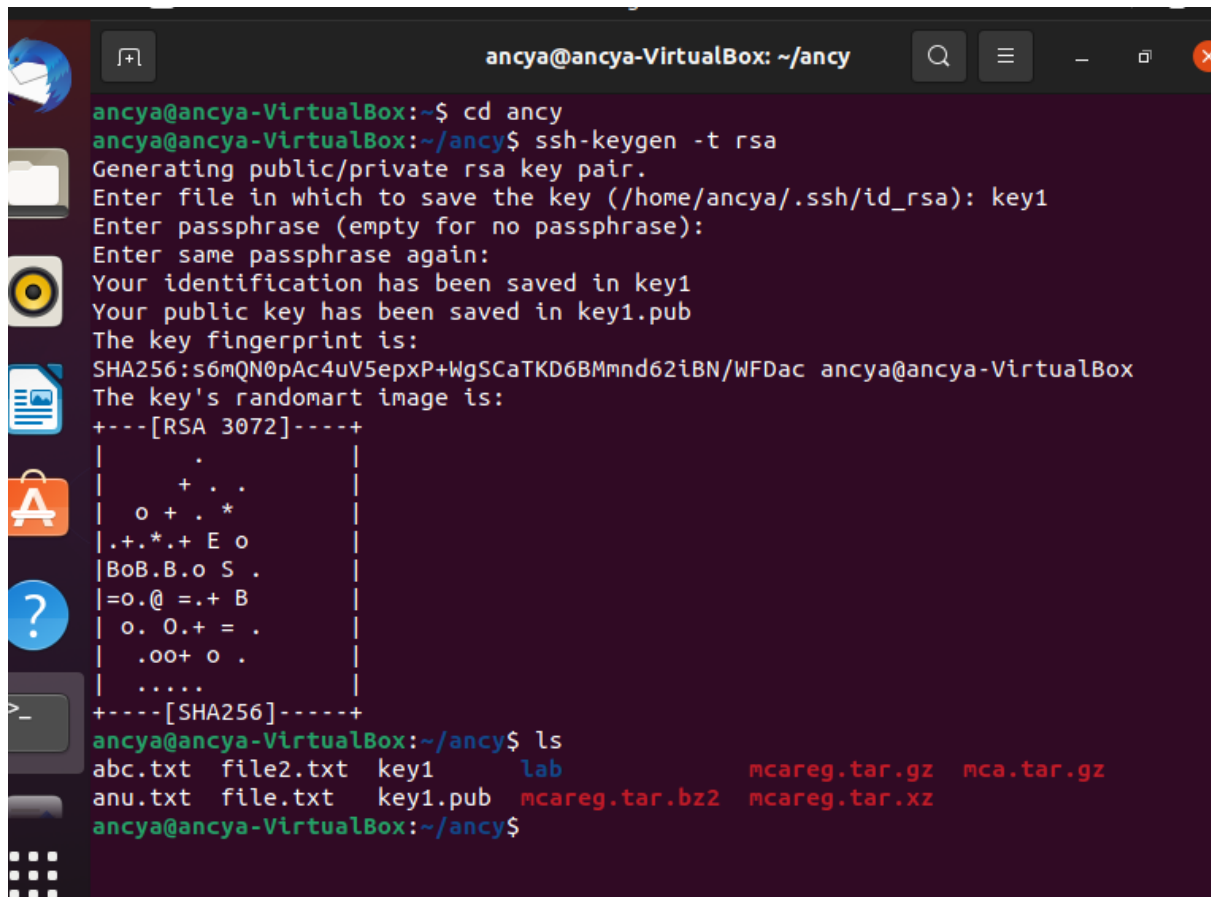
```
$scp /etc/yum.config /etc/hosts ServerX:/home/student
```

```
$scp ServerX:/etc/hostname /home/student
```

7. ssh-keygen

ssh-keygen command to generate a public/private authentication key pair. Authentication keys allow a user to connect to a remote system without supplying a password. Keys must be generated for each user separately. If you generate key pairs as the root user, only the root can use the keys.

```
$ssh-keygen -t rsa
```

A terminal window titled 'ancya@ancya-VirtualBox: ~/ancy' showing the execution of the 'ssh-keygen -t rsa' command. The user is prompted to enter a file name, a passphrase, and to confirm the passphrase. The terminal displays the key fingerprint (SHA256:s6mQN0pAc4uV5epxP+WgSCaTKD6BMnd62iBN/WFDac) and a randomart image for the RSA 3072 key. Finally, the user runs 'ls' to show the files in the current directory, including 'key1', 'key1.pub', and various tar.gz and tar.xz files.

```
ancya@ancya-VirtualBox:~$ cd ancy
ancya@ancya-VirtualBox:~/ancy$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ancya/.ssh/id_rsa): key1
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in key1
Your public key has been saved in key1.pub
The key fingerprint is:
SHA256:s6mQN0pAc4uV5epxP+WgSCaTKD6BMnd62iBN/WFDac ancy@ancya-VirtualBox
The key's randomart image is:
+---[RSA 3072]-----+
|
|  .
|  + . .
| o + . *
|+.*.+ E o
|BoB.B.o S .
|=o.@ =.+ B
| o. O.+ = .
| .oo+ o .
| .....
+-----[SHA256]-----+
ancya@ancya-VirtualBox:~/ancy$ ls
abc.txt  file2.txt  key1      lab          mcareg.tar.gz  mca.tar.gz
anu.txt  file.txt   key1.pub  mcareg.tar.bz2 mcareg.tar.xz
ancya@ancya-VirtualBox:~/ancy$
```

8. ssh-copy-id

The ssh-copy-id command allows you to install an SSH key on a remote server's authorized keys.

- This command facilitates SSH key login, which removes the need for a password for each login, thus ensuring a password-less, automatic login process.

`$ssh-copy-id username@remote_host`