

GT-Finals

Linux Command Manual

*A Comprehensive Guide to 150 Essential
Linux Commands*

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Table of Contents

Module 1: Basic Linux Commands.....	2
Module 2: Users, Groups and Permissions.....	12
Module 3: String Processing and Finding Files.....	19
Module 4: Network Configuration.....	36
Module 5: Linux Functions and Scripting.....	47
Module 6: File System Management.....	50
Additional Useful Commands.....	56

Module 1: Basic Linux Commands

1. ls

- a. Definition: List files/directories. (ls -l for details, ls -a for hidden files).
- b. Example:

```
cyril@cyril-VirtualBox:~$ ls
100loop.sh      Desktop    file3.txt      Public      testfile4.sh
argument.sh     Documents   iterateOverFiles.sh snap       testfile.sh
busTicketSim.sh Downloads   Music          Templates   testfile.txt
check_number.sh file1.txt   Pictures       testfile2.sh TestFolder
cyril.sh        file2.txt   process_files.sh testfile3.sh Videos
cyril@cyril-VirtualBox:~$
```

c.

i.

2. ls -l

- a. Definition: List files/directories with more details
- b. Example:

```
cyril@cyril-VirtualBox:~$ ls -l
total 120
-rwxrw-r-- 1 cyril  cyril      66 May  3 15:05 100loop.sh
-----w-w- 1 cyril  cyril    10240 May 17 16:06 archive.tar
-----w-w- 1 root   root      172 May 17 16:09 archive_test.zip
-rwxrwxr-x 1 cyril  cyril      29 Apr 26 14:51 argument.sh
-rwxrwxr-- 1 cyril  cyril     723 May  3 15:35 busTicketSim.sh
-rwxrwxr-- 1 cyril  cyril     218 Apr 26 15:49 check_number.sh
-rwxrwxr-- 1 cyril  cyril    1789 Apr 12 16:08 cyril.sh
drwxr-xr-x  5 cyril  cyril    4096 May 17 10:40 Desktop
drwxr-xr-x  2 cyril  cyril    4096 Feb  8 11:24 Documents
drwxr-xr-x  2 cyril  cyril    4096 May 17 10:39 Downloads
drwxr-xr-x  2 cyril  cyril    4096 May 17 11:04 dummy_dir
drwxrwxr-x  2 cyril  cyril    4096 May 17 10:59 dummy_dir2
-rw-rw-r--  1 cyril  cyril    100 May 17 11:32 dummy_file.txt
-rwxr-xr-x  1 Amber  admins     0 Mar  8 15:22 file1.txt
-rw-rw-r--  1 cyril  cyril     0 May 17 10:46 file2.txt
-rw-rw-r--  1 cyril  cyril     0 May  3 15:10 file3.txt
-rwxrwxr--  1 cyril  cyril    70 May  3 15:09 iterateOverFiles.sh
drwxr-xr-x  2 cyril  cyril    4096 Feb  8 11:24 Music
-rwxr-xr-x  1 cyril  cyril    10 May 17 10:52 notsodummy_file.txt
drwxr-xr-x  2 cyril  cyril    4096 Feb  8 11:24 Pictures
-rwxrwxr--  1 cyril  cyril    70 May  3 15:12 process_files.sh
drwxr-xr-x  2 cyril  cyril    4096 Feb  8 11:24 Public
drwx----- 7 cyril  cyril    4096 Mar  1 16:09 snap
-rwxr-xr-x+ 1 Yoimiyia administrator 106 May 17 11:41 stuff.txt
drwxr-xr-x  2 cyril  cyril    4096 Feb  8 11:24 Templates
-----w-w- 1 cyril  cyril     0 May 17 16:04 testdummy.txt
-----w-w- 1 root   root      0 May 17 16:06 testest.txt
-rwxrwxr--  1 cyril  cyril    108 Apr 26 15:02 testfile2.sh
-rwxrwxr--  1 cyril  cyril    126 Apr 26 15:10 testfile3.sh
-rwxrwxr--  1 cyril  cyril    93 Apr 26 15:19 testfile4.sh
-rwxrwxr--  1 cyril  cyril    74 Apr 26 14:49 testfile.sh
-rw-rw-r--  1 cyril  cyril     0 May  3 15:11 testfile.txt
drwxr-xr-x  2 cyril  cyril    4096 Mar  8 15:35 TestFolder
drwxr-xr-x  2 cyril  cyril    4096 Feb  8 11:24 Videos
cyril@cyril-VirtualBox:~$
```

c.

3. ls -a

a. Definition: List files/directories along with hidden files

b. Example:

```
cyril@cyril-VirtualBox:~$ ls -a
.                                .bash_history      .config      dummy_dir2      iterateOverFiles.sh  process_files.sh  .sudo_as_admin_successful  testfile4.sh
..                               .bash_logout       cyril.sh    dummy_file.txt  .lessht          .profile      Templates           testfile.sh
100loop.sh                      .bashrc        Desktop     file1.txt      .local           Public       testdummy.txt      testfile.txt
archive.tar                     busTicketSim.sh  Documents   file2.txt      Music            snap        testest.txt      TestFolder
archive_test.zip                .cache        Downloads  file3.txt      notsdummy_file.txt  .ssh        testfile2.sh      Videos
argument.sh                     check_number.sh  dummy_dir  .gnupg        Pictures         stuff.txt    testfile3.sh
cyril@cyril-VirtualBox:~$
```

C.

i.

4. cd

a. Definition: Change directory. (cd ~ for home, cd .. to move up).

b. Example:

```
cyril@cyril-VirtualBox:~$ cd Desktop
cyril@cyril-VirtualBox:~/Desktop$
```

C.

i.

5. pwd

a. Definition: Print the current working directory.

b. Example:

```
cyril@cyril-VirtualBox:~/Downloads$ pwd
c. /home/cyril/Downloads
```

i.

6. mkdir

a. Definition: Create a directory.

b. Example:

```
cyril@cyril-VirtualBox:~/Downloads$ mkdir new_directory
cyril@cyril-VirtualBox:~/Downloads$ ls
new_directory
cyril@cyril-VirtualBox:~/Downloads$
```

C.

i.

7. rmdir

a. Definition: Remove an empty directory.

- b. Example:

```
cyril@cyril-VirtualBox:~/Downloads$ rmdir new_directory
cyril@cyril-VirtualBox:~/Downloads$ ls
cyril@cyril-VirtualBox:~/Downloads$ S
```

i.

8. touch

- a. Definition: Create an empty file or update timestamps.
- b. Example:

```
cyril@cyril-VirtualBox:~$ touch new_file.txt
cyril@cyril-VirtualBox:~$ ls
100loop.sh      Desktop      file3.txt      process_files.sh  testfile3.sh  Videos
argument.sh     Documents    iterateOverFiles.sh  Public        testfile4.sh
busTicketSim.sh Downloads   Music          snap           testfile.sh
check_number.sh file1.txt   new_file.txt    Templates      testfile.txt
cyril.sh        file2.txt   Pictures       testfile2.sh   TestFolder
cyril@cyril-VirtualBox:~$
```

i.

9. rm

- a. Definition: Delete files/dirs. (rm -r for recursive deletion).
- b. Example:

```
cyril@cyril-VirtualBox:~$ rm new_file.txt
cyril@cyril-VirtualBox:~$ ls
100loop.sh      Desktop      file3.txt      Public        testfile4.sh
argument.sh     Documents    iterateOverFiles.sh  snap         testfile.sh
busTicketSim.sh Downloads   Music          Templates    testfile.txt
check_number.sh file1.txt   Pictures       testfile2.sh   TestFolder
cyril.sh        file2.txt   process_files.sh  testfile3.sh  Videos
cyril@cyril-VirtualBox:~$
```

i.

10. cp

- a. Definition: Copy files/dirs. (cp -r for directories).
- b. Example:

```
cyril@cyril-VirtualBox:~$ ls
100loop.sh      Documents      file2.txt      Public      testfile.sh
argument.sh     Downloads      file3.txt      snap       testfile.txt
busTicketSim.sh dummy_dir     iterateOverFiles.sh Templates  TestFolder
check_number.sh dummy_dir2    Music          testfile2.sh Videos
cyril.sh        dummy_file.txt Pictures      testfile3.sh
Desktop         file1.txt     process_files.sh testfile4.sh
cyril@cyril-VirtualBox:~$ cp dummy_file.txt dummy_file2.txt
cyril@cyril-VirtualBox:~$ ls
100loop.sh      Desktop      dummy_file2.txt iterateOverFiles.sh snap      testfile.sh
argument.sh     Documents    dummy_file.txt  Music      Templates  testfile.txt
busTicketSim.sh Downloads   file1.txt      Pictures    testfile2.sh TestFolder
check_number.sh dummy_dir    file2.txt      process_files.sh testfile3.sh Videos
cyril.sh        dummy_dir2   file3.txt      Public     testfile4.sh
cyril@cyril-VirtualBox:~$
```

C.

i.

11. mv

- a. Definition: Move/rename files/dirs.
- b. Example:

```
cyril@cyril-VirtualBox:~$ ls
100loop.sh      Desktop      dummy_file2.txt iterateOverFiles.sh snap      testfile.sh
argument.sh     Documents    dummy_file.txt  Music      Templates  testfile.txt
busTicketSim.sh Downloads   file1.txt      Pictures    testfile2.sh TestFolder
check_number.sh dummy_dir    file2.txt      process_files.sh testfile3.sh Videos
cyril.sh        dummy_dir2   file3.txt      Public     testfile4.sh
cyril@cyril-VirtualBox:~$ mv dummy_file2.txt notsodummy_file.txt
cyril@cyril-VirtualBox:~$ ls
100loop.sh      Documents      file2.txt      process_files.sh testfile4.sh
argument.sh     Downloads      file3.txt      Public      testfile.sh
busTicketSim.sh dummy_dir     iterateOverFiles.sh snap       testfile.txt
check_number.sh dummy_dir2    Music          Templates    TestFolder
cyril.sh        dummy_file.txt notsodummy_file.txt testfile2.sh     Videos
Desktop         file1.txt     Pictures      testfile3.sh
```

C.

i.

12. cat

- a. Definition: Display file content.
- b. Example:

```
cyril@cyril-VirtualBox:~$ cat dummy_file.txt
Hello! :D
cyril@cyril-VirtualBox:~$ █
```

C.

i.

13. less

- a. Definition: Views file contents interactively (page by page).
- b. Example:

14. more

- a. Definition: Views file contents page by page.
 - b. Example:

15. gzip

- a. Definition: Compress files (gzip file → file.gz).
 - b. Example:

```
cyril@cyril-VirtualBox:~$ sudo gzip testest.txt
cyril@cyril-VirtualBox:~$ ls
100loop.sh      cyril.sh    dummy_dir2    iterateOverFiles.sh  Public          testest.txt.gz  testfile.txt
archive.tar     Desktop     dummy_file.txt  Music            snap           testfile2.sh   TestFolder
argument.sh     Documents   file1.txt     notsodummy_file.txt stuff.txt       testfile3.sh   Videos
busTicketSim.sh Downloads   file2.txt     Pictures         Templates       testfile4.sh
check_number.sh dummy_dir  file3.txt     process_files.sh testdummy.txt  testfile.sh
cyril@cyril-VirtualBox:~$
```

c.

i.

16. gunzip

- a. Definition: Decompress .gz files.
 - b. Example:

```
cyril@cyril-VirtualBox: $ sudo gunzip testest.txt.gz
cyril@cyril-VirtualBox: $ ls
100loop.sh      cyril.sh      dummy_dir2    iterateOverFiles.sh  Public      testest.txt  testfile.txt
archive.tar     Desktop       dummy_file.txt Music        snap        testfile2.sh  TestFolder
argument.sh     Documents     file1.txt     notsodummy_file.txt stuff.txt   testfile3.sh  Videos
busTicketSim.sh Downloads    file2.txt     Pictures      Templates   testfile4.sh
check_number.sh dummy_dir     file3.txt     process_files.sh testdummy.txt testfile.sh
cyril@cyril-VirtualBox: $
```

C.

i

17. tar

- a. Definition: Archive files (`tar -cvf archive.tar dir/`).
 - b. Example:

```
c. cyril@cyril-VirtualBox:~$ sudo tar -cvf archive.tar testdummy.txt  
testdummy.txt  
c. cyril@cyril-VirtualBox:~$
```

```
cyril@cyril-VirtualBox:~$ ls
100loop.sh      cyril.sh    dummy_dir2    iterateOverFiles.sh  Public      testest.txt.gz  testfile.txt
archive.tar     Desktop     dummy_file.txt  Music        snap       testfile2.sh   TestFolder
argument.sh     Documents   file1.txt     notsodummy_file.txt stuff.txt  testfile3.sh   Videos
busTicketSim.sh Downloads   file2.txt     Pictures      Templates  testfile4.sh
check_number.sh dummy_dir   file3.txt     process_files.sh  testdummy.txt testfile.sh
d.
```

18. zip

- a. Definition: Create ZIP archives (zip archive.zip files/).
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo zip archive_test.zip testest.txt
adding: testest.txt (stored 0%)
cyril@cyril-VirtualBox:~$ ls
100loop.sh      check_number.sh  dummy_dir    file3.txt      process_files.sh  testdummy.txt  testfile.sh
archive.tar     cyril.sh        dummy_dir2   iterateOverFiles.sh  Public      testest.txt   testfile.txt
archive_test.zip Desktop        dummy_file.txt  Music        snap       testfile2.sh   TestFolder
argument.sh     Documents      file1.txt    notsodummy_file.txt stuff.txt  testfile3.sh   Videos
busTicketSim.sh Downloads     file2.txt    Pictures      Templates  testfile4.sh
cyril@cyril-VirtualBox:~$ C.
```

19. unzip

- a. Definition: Extract ZIP files.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo unzip archive_test.zip
Archive: archive_test.zip
replace testest.txt? [y]es, [n]o, [A]ll, [N]one, [r]ename: y
extracting: testest.txt
cyril@cyril-VirtualBox:~$ ls
100Loop.sh      check_number.sh  dummy_dir    file3.txt      process_files.sh  testdummy.txt  testfile.sh
archive.tar     cyril.sh        dummy_dir2   iterateOverFiles.sh  Public      testest.txt   testfile.txt
archive_test.zip Desktop        dummy_file.txt  Music        snap       testfile2.sh   TestFolder
argument.sh     Documents      file1.txt    notsodummy_file.txt stuff.txt  testfile3.sh   Videos
busTicketSim.sh Downloads     file2.txt    Pictures      Templates  testfile4.sh
cyril@cyril-VirtualBox:~$ C.
```

20. find

- a. Definition: Search for files/dirs. (find /home -name "*.txt").
- b. Example:

```
cyril@cyril-VirtualBox:~$ find /home -name dummy_file.txt
/home/cyril/dummy_file.txt
cyril@cyril-VirtualBox:~$ C.
```

i.

21. locate

- a. Definition: Quickly finds files using a prebuilt database (update with updatedb).
- b. Example:

```
cyril@cyril-VirtualBox:~$ locate dummy_file.txt
/home/cyril/dummy_file.txt
/home/cyril/notsodummy_file.txt
cyril@cyril-VirtualBox:~$ █
```

c.

i.

22. which

- a. Definition Locates a command in the user's path.
- b. Example:

```
cyril@cyril-VirtualBox:~$ which ls
/usr/bin/ls
cyril@cyril-VirtualBox:~$ █
```

c.

23. stat

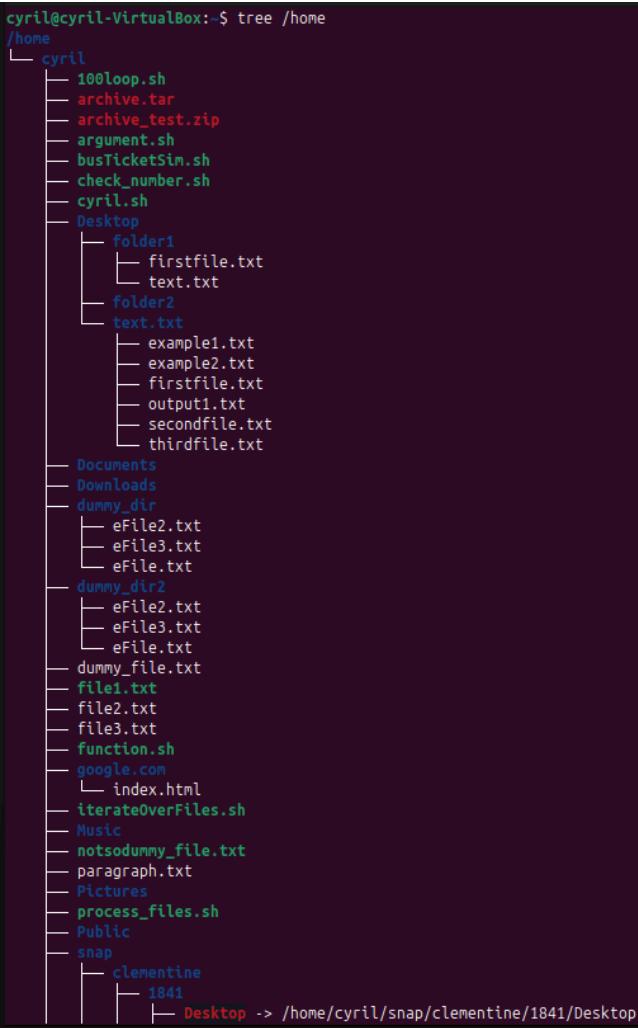
- a. Definition: Display file or filesystem status.
- b. Example:

```
cyril@cyril-VirtualBox:~$ stat testfile2.txt
  File: testfile2.txt
  Size: 107          Blocks: 8          IO Block: 4096   regular file
Device: 8,2      Inode: 524687      Links: 1
Access: (0664/-rw-rw-r--)  Uid: ( 1000/    cyril)  Gid: ( 1000/    cyril)
Access: 2025-05-24 16:53:09.729605361 +0800
Modify: 2025-05-24 16:51:00.522594969 +0800
Change: 2025-05-24 16:51:00.522594969 +0800
 Birth: 2025-05-24 16:40:37.854544885 +0800
cyril@cyril-VirtualBox:~$ █
```

c.

24. tree

- a. Definition: Display directory structure as a tree.
- b. Example:

C. A terminal window titled 'cyril@cyril-VirtualBox:' displays the output of the 'tree' command. The tree structure shows the following directory layout:

```
/home
└── cyril
    ├── 100loop.sh
    ├── archive.tar
    ├── archive_test.zip
    ├── argument.sh
    ├── busTicketSim.sh
    ├── check_number.sh
    ├── cyril.sh
    └── Desktop
        ├── folder1
        │   └── firstfile.txt
        │       └── text.txt
        ├── folder2
        │   └── text.txt
        └── text.txt
            ├── example1.txt
            ├── example2.txt
            ├── firstfile.txt
            ├── output1.txt
            ├── secondfile.txt
            └── thirdfile.txt
    ├── Documents
    ├── Downloads
    ├── dummy_dir
    │   ├── eFile2.txt
    │   ├── eFile3.txt
    │   └── eFile.txt
    ├── dummy_dir2
    │   ├── eFile2.txt
    │   ├── eFile3.txt
    │   └── eFile.txt
    └── dummy_file.txt
    ├── file1.txt
    ├── file2.txt
    ├── file3.txt
    ├── function.sh
    ├── google.com
    │   └── index.html
    ├── iterateOverFiles.sh
    ├── Music
    ├── notsodummy_file.txt
    ├── paragraph.txt
    ├── Pictures
    ├── process_files.sh
    ├── Public
    └── snap
        ├── clementine
        └── 1841
            └── Desktop -> /home/cyril/snap/clementine/1841/Desktop
```

```

Documents -> /home/cyril/snap/clementine/1841/Documents
Downloads -> /home/cyril/snap/clementine/1841/Downloads
Music -> /home/cyril/snap/clementine/1841/Music
Pictures -> /home/cyril/snap/clementine/1841/Pictures
Public -> /home/cyril/snap/clementine/1841/Public
Templates -> /home/cyril/snap/clementine/1841/Templates
Videos -> /home/cyril/snap/clementine/1841/Videos

common
current -> 1841
firefox
  6103
  6159
  common
    current -> 4793
firmware-updater
  167
  common
    current -> 167
snapd-desktop-integration
  178
  253
  common
    current -> 253
snap-store
  1248
  1270
  common
    current -> 1248
stuff.txt
Templates
testdummy.txt
testest.txt
testfile2.sh
testfile2.txt
testfile3.sh
testfile4.sh
testfile.sh
testfile.txt
TestFolder
Videos

40 directories, 49 files
cyril@cyril-VirtualBox:~$ █

```

25. file

- a. Definition: Determine file type.
- b. Example:

```

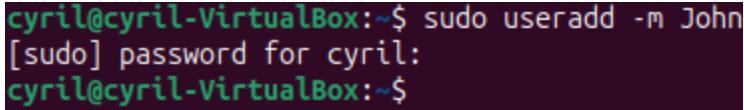
cyrill@cyril-VirtualBox:~$ file testfile2.txt
testfile2.txt: ASCII text
cyril@cyril-VirtualBox:~$ █

```

Module 2: Users, Groups and Permissions

26. useradd

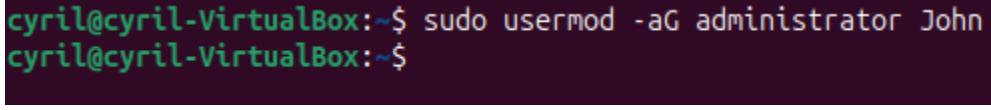
- a. Definition: Create user (useradd -m username).
- b. Example:

c. 
cyril@cyril-VirtualBox:~\$ sudo useradd -m John
[sudo] password for cyril:
cyril@cyril-VirtualBox:~\$

i.

27. usermod

- a. Definition: Modify user (usermod -aG group user).
- b. Example:

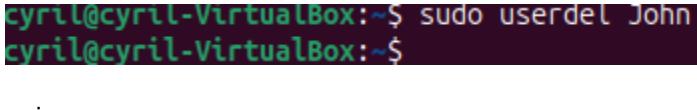
c. 
cyril@cyril-VirtualBox:~\$ sudo usermod -aG administrator John
cyril@cyril-VirtualBox:~\$

c.

i.

28. userdel

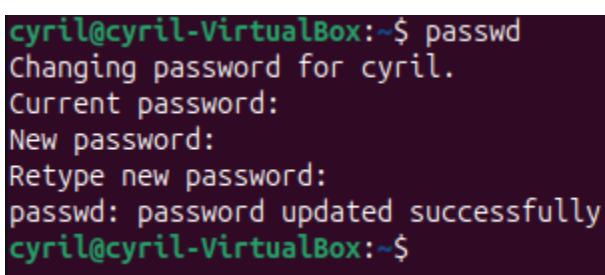
- a. Definition: Delete user (userdel -r username).
- b. Example:

c. 
cyril@cyril-VirtualBox:~\$ sudo userdel John
cyril@cyril-VirtualBox:~\$

i.

29. passwd

- a. Change password.
- b. Example:

c. 
cyril@cyril-VirtualBox:~\$ passwd
Changing password for cyril.
Current password:
New password:
Retype new password:
passwd: password updated successfully
cyril@cyril-VirtualBox:~\$

i.

30. groupadd

- a. Definition: Create group.
- b. Example:

c.

```
cyril@cyril-VirtualBox:~$ sudo groupadd modder
cyril@cyril-VirtualBox:~$
```

i.

31. groupmod

- a. Definition: Delete group.
- b. Example:

c.

```
cyril@cyril-VirtualBox:~$ sudo groupdel solder
cyril@cyril-VirtualBox:~$
```

i.

32. groupdel

- a. Definition: Modify a group (e.g., rename).
- b. Example:

c.

```
cyril@cyril-VirtualBox:~$ sudo groupmod -n solder modder
cyril@cyril-VirtualBox:~$
```

i.

33. chmod

- a. Definition: Change permissions (chmod 755 file).
- b. Example:

c.

```
cyril@cyril-VirtualBox:~$ sudo chmod 755 stuff.txt
cyril@cyril-VirtualBox:~$
```

i.

34. chown

- a. Definition: Change owner (chown user:group file).
- b. Example:

c.

```
cyril@cyril-VirtualBox:~$ sudo chown Yoimiya:administrator stuff.txt
cyril@cyril-VirtualBox:~$
```

i.

35. chgrp

- a. Definition: Change group ownership.
- b. Example:

```
cyril@cyril-VirtualBox:~$ chgrp adm stuff.txt  
cyril@cyril-VirtualBox:~$
```

- c.
- i.

36. umask

- a. Definition: Set default file permissions.
- b. Example:

```
cyril@cyril-VirtualBox:~$ umask 755  
cyril@cyril-VirtualBox:~$ S
```

- c.
- i.

37. su

- a. Definition: Switches user identity.
- b. Example:

```
cyril@cyril-VirtualBox:~$ su Yoimiya  
Password:  
$ test  
$ test  
$ ^Z  
$ su cyril  
Password:  
cyril@cyril-VirtualBox:~$ █
```

- c.

38. sudo

- a. Definition: Executes commands as superuser.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo visudo  
[sudo] password for cyril:
```

- c.

39. id

- a. Definition: Displays user and group information.
- b. Example:

C. `cyril@cyril-VirtualBox:~$ id
uid=1000(cyril) gid=1000(cyril) groups=1000(cyril),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),100(users),114(lpadmin)`

40. whoami

- a. Definition: Displays current username.
- b. Example:

C. `cyril@cyril-VirtualBox:~$ whoami
cyril
cyril@cyril-VirtualBox:~$`

41. groups

- a. Definition: Shows group memberships for a user.
- b. Example:

C. `cyril@cyril-VirtualBox:~$ groups cyril
cyril : cyril adm cdrom sudo dip plugdev users lpadmin
cyril@cyril-VirtualBox:~$`

42. visudo

- a. Definition: Safely edits sudoers file.
- b. Example:

C. `cyril@cyril-VirtualBox:~$ sudo visudo
[sudo] password for cyril:`

```

GNU nano 7.2                               /etc/sudoers.tmp *

# This preserves proxy settings from user environments of root
# equivalent users (group sudo)
Defaults:%sudo env_keep += "http_proxy https_proxy ftp_proxy all_proxy no_proxy"

# This allows running arbitrary commands, but so does ALL, and it means
# different sudoers have their choice of editor respected.
Defaults:%sudo env_keep += "EDITOR"

S# Completely harmless preservation of a user preference.
Defaults:%sudo env_keep += "GREP_COLOR"

# While you shouldn't normally run git as root, you need to with etckeeper
Defaults:%sudo env_keep += "GIT_AUTHOR_* GIT_COMMITTER_"

# Per-user preferences; root won't have sensible values for them.
Defaults:%sudo env_keep += "EMAIL DEBEMAIL DEBFULLNAME"

# "sudo scp" or "sudo rsync" should be able to use your SSH agent.
Defaults:%sudo env_keep += "SSH_AGENT_PID SSH_AUTH_SOCK"

# Ditto for GPG agent
Defaults:%sudo env_keep += "GPG_AGENT_INFO"

# Host alias specification

# User alias specification

# Cmnd alias specification

# User privilege specification
root    ALL=(ALL:ALL) ALL

# Members of the admin group may gain root privileges
%admin  ALL=(ALL) ALL

# Allow members of group sudo to execute any command
%sudo   ALL=(ALL:ALL) ALL

d. # See sudoers(5) for more information on "@include" directives:

e. @includedir /etc/sudoers.d

```

43. newgrp

- a. Definition: Logs into a new group.
- b. Example:

```

cyril@cyril-VirtualBox:~$ newgrp administrator
c. Password:

```

44. gpasswd

- a. Definition: Manage group passwords/members.
 - i. gpasswd -a username groupname (add user to group)
 - ii. gpasswd -d username groupname (remove user from group)
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo gpasswd -a John solder
Adding user John to group solder
cyril@cyril-VirtualBox:~$
```

i.

45. last

a. Definition: Shows listing of last logged in users.

b. Example:

```
cyril@cyril-VirtualBox:~$ last
cyril    tty2          tty2      Sat May 24 14:47  still logged in
cyril    seat0        login screen   Sat May 24 14:47  still logged in
reboot  system boot  6.8.0-52-generic Sat May 24 14:47  still running
cyril    tty2          tty2      Sat May 17 19:26 - crash (6+19:21)
cyril    seat0        login screen   Sat May 17 19:26 - crash (6+19:21)
reboot  system boot  6.8.0-52-generic Sat May 17 19:25  still running
cyril    tty2          tty2      Sat May 17 18:18 - down  (01:07)
cyril    seat0        login screen   Sat May 17 18:18 - down  (01:07)
reboot  system boot  6.8.0-52-generic Sat May 17 18:18 - 19:26 (01:08)
cyril    tty2          tty2      Sat May 17 14:43 - crash (03:34)
cyril    seat0        login screen   Sat May 17 14:43 - crash (03:34)
reboot  system boot  6.8.0-52-generic Sat May 17 14:43 - 19:26 (04:42)
cyril    tty2          tty2      Sat May 17 10:35 - down  (03:02)
cyril    seat0        login screen   Sat May 17 10:35 - down  (03:02)
reboot  system boot  6.8.0-52-generic Sat May 17 10:35 - 13:37 (03:02)
cyril    tty2          tty2      Sat May 17 09:03 - crash (01:31)
cyril    seat0        login screen   Sat May 17 09:03 - crash (01:31)
reboot  system boot  6.8.0-52-generic Sat May 17 09:03 - 13:37 (04:34)
cyril    tty2          tty2      Sat May  3 14:54 - crash (13+18:09)
cyril    seat0        login screen   Sat May  3 14:54 - crash (13+18:09)
reboot  system boot  6.8.0-52-generic Sat May  3 14:54 - 13:37 (13+22:43)
cyril    tty2          tty2      Sat Apr 26 15:30 - crash (6+23:23)
cyril    seat0        login screen   Sat Apr 26 15:30 - crash (6+23:23)
reboot  system boot  6.8.0-52-generic Sat Apr 26 15:30 - 13:37 (20+22:07)
cyril    tty2          tty2      Sat Apr 26 14:39 - down  (00:50)
cyril    seat0        login screen   Sat Apr 26 14:39 - down  (00:50)
reboot  system boot  6.8.0-52-generic Sat Apr 26 14:39 - 15:29 (00:50)
cyril    tty2          tty2      Sat Apr 12 14:39 - down  (01:38)
cyril    seat0        login screen   Sat Apr 12 14:39 - down  (01:38)
reboot  system boot  6.8.0-52-generic Sat Apr 12 14:39 - 16:18 (01:38)
cyril    tty2          tty2      Sat Mar 22 14:47 - down  (01:35)
cyril    seat0        login screen   Sat Mar 22 14:47 - down  (01:35)
reboot  system boot  6.8.0-52-generic Sat Mar 22 14:47 - 16:23 (01:35)
cyril    tty2          tty2      Sat Mar  8 14:47 - down  (01:25)
cyril    seat0        login screen   Sat Mar  8 14:47 - down  (01:25)
reboot  system boot  6.8.0-52-generic Sat Mar  8 14:47 - 16:12 (01:25)
cyril    tty2          tty2      Sat Mar  1 15:58 - down  (00:17)
cyril    seat0        login screen   Sat Mar  1 15:58 - down  (00:17)
reboot  system boot  6.8.0-52-generic Sat Mar  1 15:58 - 16:15 (00:17)
cyril    tty2          tty2      Sat Mar  1 12:28 - down  (00:54)
cyril    seat0        login screen   Sat Mar  1 12:28 - down  (00:54)
reboot  system boot  6.8.0-52-generic Sat Mar  1 12:28 - 13:22 (00:54)
cyril    tty2          tty2      Sat Feb 22 14:39 - down  (01:06)
cyril    seat0        login screen   Sat Feb 22 14:39 - down  (01:06)
reboot  system boot  6.8.0-52-generic Sat Feb 22 14:39 - 15:46 (01:06)
cyril    tty2          tty2      Sat Feb  8 14:59 - down  (01:48)
cyril    seat0        login screen   Sat Feb  8 14:59 - down  (01:48)
reboot  system boot  6.8.0-52-generic Sat Feb  8 14:59 - 16:48 (01:48)
cyril    tty2          tty2      Sat Feb  8 14:44 - down  (00:14)
cyril    seat0        login screen   Sat Feb  8 14:44 - down  (00:14)
reboot  system boot  6.8.0-52-generic Sat Feb  8 14:44 - 14:59 (00:14)
cyril    tty2          tty2      Sat Feb  8 14:19 - down  (00:00)
cyril    seat0        login screen   Sat Feb  8 14:19 - down  (00:00)
reboot  system boot  6.8.0-52-generic Sat Feb  8 14:18 - 14:19 (00:00)
cyril    tty2          tty2      Sat Feb  8 11:24 - down  (00:17)
cyril    seat0        login screen   Sat Feb  8 11:24 - down  (00:17)
reboot  system boot  6.8.0-52-generic Sat Feb  8 11:24 - 11:42 (00:18)

wtmp begins Sat Feb  8 11:24:27 2025
cyril@cyril-VirtualBox:~$
```

46. logname

- a. Definition: Print the user's login name.
- b. Example:

```
cyril@cyril-VirtualBox:~$ logname
cyril
c. cyril@cyril-VirtualBox:~$
```

47. who

- a. Definition: Show who is logged in.
- b. Example:

```
cyril@cyril-VirtualBox:~$ who
cyril    seat0      2025-05-25 02:09 (login screen)
cyril    tty2       2025-05-25 02:09 (tty2)
c. cyril@cyril-VirtualBox:~$
```

48. w

- a. Definition: Display who is logged in and what they are doing.
- b. Example:

```
cyril@cyril-VirtualBox:~$ w
 02:14:53 up 5 min,  1 user,  load average: 0.82, 0.54, 0.26
USER   TTY     FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
cyril  tty2   -          02:09   6:17   0.04s  0.04s /usr/libexec/gnome-session-binary --session=ubuntu
c. cyril@cyril-VirtualBox:~$
```

49. finger

- a. Definition: User information lookup.
- b. Example:

```
cyril@cyril-VirtualBox:~$ finger Amber
Login: Amber                                Name:
Directory: /home/Amber                      Shell: /bin/sh
Never logged in.
No mail.
No Plan.
c. cyril@cyril-VirtualBox:~$
```

50. getent

- a. Definition: Get entries from administrative databases.
- b. Example:

```
cyril@cyril-VirtualBox:~$ getent passwd Amber
Amber:x:1001:1001::/home/Amber:/bin/sh
c. cyril@cyril-VirtualBox:~$
```

Module 3: String Processing and Finding Files

51. head

- a. Definition: Show first 10 lines of a file (head -n 5 for 5 lines).
- b. Example:

```
cyril@cyril-VirtualBox:~$ head stuff.txt
Phone
Wallet
Book
Desktop
Laptop
iPhone
Samsung
Frame
Wall
Door
```

c.

52. head <filename> <filename>

- a. Definition: Shows the first 10 lines of **multiple files** (with headers).
- b. Example:

```
cyril@cyril-VirtualBox:~$ head dummy_file.txt testfile.txt
==> dummy_file.txt <==
Hello! :D

==> testfile.txt <=
Minecraft
JJava
Overwatch
Smash Bros
Genshin
ZZZ
HSR
WuWa
Gmod
TF2
cyril@cyril-VirtualBox:~$ █
```

53. head -n <filename>

- a. Definition: Displays the first **N** lines (replace **-n** with a number).
- b. Example:

```
cyril@cyril-VirtualBox:~$ head -n 5 testfile.txt
Minecraft
JJava
Overwatch
Smash Bros
Genshin
cyril@cyril-VirtualBox:~$
```

54. head -c <filename>

- a. Definition: Outputs the first **N bytes** of a file.
- b. Example:

```
cyril@cyril-VirtualBox:~$ head -c 5 testfile.txt
Mineccyril@cyril-VirtualBox:~$
```

55. head -v <filename>

- a. Definition: Always shows **filename headers** (even for single files).

- b. Example:

```
cyril@cyril-VirtualBox:~$ head -v testfile.txt
==> testfile.txt <==
Minecraft
JAvA
Overwatch
Smash Bros
Genshin
ZZZ
HSR
WuWa
Gmod
TF2
```

56. head -q <filename> <filename>

- a. Definition: **Quiet mode**: Suppresses filename headers for multiple files.
 - b. Example:

```
cyril@cyril-VirtualBox:~$ head -q dummy_file.txt testfile.txt
Hello! :D
Minecraft
JAvA
Overwatch
Smash Bros
Genshin
ZZZ
HSR
WuWa
Gmod
TF2
```

57. tail

- a. Definition: Show last 10 lines (tail -f for real-time logs).
 - b. Example:

```
cyril@cyril-VirtualBox:~$ tail stuff.txt
Frame
Wall
Door
Bottle
Water
Food
Nuggets
Money
Bank
Card
cyril@cyril-VirtualBox:~$
```

58. tail <filename> <filename>

- a. Definition: Shows the last 10 lines of **multiple files** (with headers).
- b. Example:

```
cyril@cyril-VirtualBox:~$ tail testfile.txt testfile2.txt
==> testfile.txt <==
Overwatch
Smash Bros
Genshin
ZZZ
HSR
WuWa
Gmod
TF2
CS2

==> testfile2.txt <==
Rosaria
Albedo
Bennett
Razor
Noelle
Barbara
Diona
Diluc
Aether
Lumine
```

59. tail -n <filename>

- a. Definition: Displays the last **N** lines (replace **-n** with a number).

- b. Example:

```
cyril@cyril-VirtualBox:~$ tail -n 5 testfile2.txt
Barbara
Diona
Diluc
Aether
Lumine
cyril@cyril-VirtualBox:~$
```

60. tail -c <filename>

- a. Definition: Outputs the last **N bytes** of a file.

- b. Example:

```
cyril@cyril-VirtualBox:~$ tail -c 5 testfile2.txt
mine
cyril@cyril-VirtualBox:~$
```

61. tail -v <filename>

- a. Definition: Always shows **filename headers** (useful with single files).

- b. Example:

```
cyril@cyril-VirtualBox:~$ tail -v testfile2.txt
==> testfile2.txt <==
Rosaria
Albedo
Bennett
Razor
Noelle
Barbara
Diona
Diluc
Aether
Lumine
cyril@cyril-VirtualBox:~$ █
```

c.

62. tail-q <filename> <filename>

- a. Definition: **Quiet mode:** Hides filename headers for multiple files.
- b. Example:

```
cyril@cyril-VirtualBox:~$ tail -q testfile.txt testfile2.txt
Overwatch
Smash Bros
Genshin
ZZZ
HSR
WuWa
Gmod
TF2
CS2

Rosaria
Albedo
Bennett
Razor
Noelle
Barbara
Diona
Diluc
Aether
Lumine
cyril@cyril-VirtualBox:~$
```

i.

63. grep

- a. Definition: Search text patterns. (grep "error" file.log).

- b. Example:

```
cyril@cyril-VirtualBox:~$ grep "error" /var/log/syslog
2025-05-17T09:03:41.994808+08:00 cyril-VirtualBox gnome-shell[2380]: MESA: error: ZINK: failed to choose pdev
2025-05-17T09:03:57.369328+08:00 cyril-VirtualBox tracker-miner-fs-3[2461]: (tracker-extract-3:2461): GLib-GIO-WARNING **:
09:03:57.368: Error creating IO channel for /proc/self/mountinfo: Invalid argument (g-io-error-quark, 13)
grep: /var/log/syslog: binary file matches
cyril@cyril-VirtualBox:~$
```

- i.

64. awk

- a. Definition: Pattern scanning and processing language.
- b. Example:

```
cyril@cyril-VirtualBox:~$ awk '/TF2/' testfile.txt
c. TF2
```

65. sed

- a. Definition: Stream editor for filtering/transforming text.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sed '/Overwatch/d' testfile.txt
Minecraft
JAvA
Smash Bros
Genshin
ZZZ
HSR
WuWa
Gmod
TF2
CS2
c.
```

66. cut

- a. Definition: Removes sections from each line of files.
- b. Example:

c.

```
cyril@cyril-VirtualBox:~$ cut -c1-3 testfile.txt
Min
JAv
Ove
Sma
Gen
ZZZ
HSR
WuW
Gmo
TF2
CS2
```

67. paste

- a. Definition: Merges lines of files.
- b. Example:

c.

```
cyril@cyril-VirtualBox:~$ paste testfile.txt testfile2.txt
Minecraft      Amber
JJava      Kaeya
Overwatch      Lisa
Smash Bros    Jean
Genshin Venti
ZZZ      Sucrose
HSR      Rosaria
WuWa     Albedo
Gmod     Bennett
TF2      Razor
CS2      Noelle
          Barbara
          Diona
          Diluc
          Aether
          Lumine
```

68. join

- a. Definition: Joins lines of two files on a common field.
- b. Example:

```
cyril@cyril-VirtualBox:~$ join -1 1 -2 1 testfile.txt testfile2.txt
join: testfile2.txt:4: is not sorted: Jean
join: testfile.txt:2: is not sorted: JAvA
join: input is not in sorted order
cyril@cyril-VirtualBox:~$ █
```

69. sort

- a. Definition: Sorts lines of text files.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sort testfile.txt

CS2
Genshin
Gmod
HSR
JAvA
Minecraft
Overwatch
Smash Bros
TF2
WuWa
ZZZ
cyril@cyril-VirtualBox:~$ █
```

C.

70. uniq

- a. Definition: Reports or omits repeated lines.
- b. Example:

```
cyril@cyril-VirtualBox:~$ uniq testfile.txt
Minecraft
JAvA
Overwatch
Smash Bros
Genshin
ZZZ
HSR
WuWa
Gmod
TF2
CS2
```

71. wc

- a. Definition: Counts lines, words, and bytes.
- b. Example:

```
cyril@cyril-VirtualBox:~$ wc testfile.txt
12 12 71 testfile.txt
cyril@cyril-VirtualBox:~$
```

72. tr

- a. Definition: Translates or deletes characters.
- b. Example:

```
cyril@cyril-VirtualBox:~$ tr 'A-Z' 'a-z' < testfile.txt
minecraft
java
overwatch
smash bros
genshin
zzz
hsr
wUwa
gmod
tf2
cs2
```

- c.

73. diff

- a. Definition: Compares files line by line.
- b. Example:

```
cyril@cyril-VirtualBox:~$ diff testfile.txt testfile2.txt
1,11c1,16
< Minecraft
< JAVA
< Overwatch
< Smash Bros
< Genshin
< ZZZ
< HSR
< WuWa
< Gmod
< TF2
< CS2
---
> Amber
> Kaeya
> Lisa
> Jean
> Venti
> Sucrose
> Rosaria
> Albedo
> Bennett
> Razor
> Noelle
> Barbara
> Diona
> Diluc
> Aether
> Lumine
C.  cyril@cyril-VirtualBox:~$
```

74. comm

- a. Definition: Compares two sorted files line by line.
- b. Example:

```
cyril@cyril-VirtualBox:~$ comm testfile.txt testfile2.txt
    Amber
    Kaeya
    Lisa
comm: file 2 is not in sorted order
    Jean
Minecraft
comm: file 1 is not in sorted order
JAvA
Overwatch
Smash Bros
Genshin
    Venti
    Sucrose
    Rosaria
    Albedo
    Bennett
    Razor
    Noelle
    Barbara
    Diana
    Diluc
    Aether
    Lumine

ZZZ
HSR
WuWa
Gmod
TF2
CS2

comm: input is not in sorted order
cyril@cyril-VirtualBox:~$
```

75. tee

- Definition: Reads from stdin and writes to stdout and files.
- Example:

```
cyril@cyril-VirtualBox:~$ echo "Hello World!" | tee output.txt
Hello World!
cyril@cyril-VirtualBox:~$ ls
100loop.sh      dummy_dir          notsodummy_file.txt  testest.txt
archive.tar     dummy_dir2         output.txt           testfile2.sh
archive_test.zip dummy_file.txt    paragraph.txt       testfile2.txt
argument.sh     file1.txt          Pictures            testfile3.sh
busTicketSim.sh file2.txt          process_files.sh  testfile4.sh
check_number.sh file3.txt          Public              testfile.sh
cyril.sh        function.sh        snap                testfile.txt
Desktop         google.com         stuff.txt          TestFolder
Documents       iterateOverFiles.sh Templates          Videos
Downloads       Music             testdummy.txt
c.   cyril@cyril-VirtualBox:~$
```

76. xargs

- a. Definition: Builds and executes command lines from stdin.
- b. Example:

```
cyril@cyril-VirtualBox:~$ echo "file1 file2 file3" | xargs touch
cyril@cyril-VirtualBox:~$ ls
100loop.sh      dummy_dir2        Music              testest.txt
archive.tar     dummy_file.txt    notsodummy_file.txt testfile2.sh
archive_test.zip file1           output.txt          testfile2.txt
argument.sh     file1.txt         paragraph.txt      testfile3.sh
busTicketSim.sh file2           Pictures            testfile4.sh
check_number.sh file2.txt        process_files.sh  testfile.sh
cyril.sh        file3           Public              testfile.txt
Desktop         file3.txt        snap                TestFolder
Documents       function.sh      Templates          Videos
Downloads       google.com       stuff.txt
dummy_dir       iterateOverFiles.sh testdummy.txt
c.   cyril@cyril-VirtualBox:~$
```

77. rev

- a. Definition: Reverses lines characterwise.
- b. Example:

```
cyril@cyril-VirtualBox:~$ rev testfile2.txt
rebmA
ayeaK
asil
naeJ
itneV
esorcus
airasoR
odebla
ttenneB
rozaR
elleoN
arabraB
anoiD
culiD
rehteA
enimul

c. cyril@cyril-VirtualBox:~$
```

78. fold

- a. Definition: Wraps each input line to fit specified width.
- b. Example:

```
cyril@cyril-VirtualBox:~$ fold -w 3 testfile2.txt
Amb
er
Kae
ya
Lis
a
Jea
n
Ven
ti
Suc
ros
e
Ros
ari
a
Alb
edo
Ben
net
t
Raz
or
Noe
lle
Bar
bar
a
Dio
na
Dil
uc
Aet
her
Lum
ine
C.  cyril@cyril-VirtualBox:~$
```

79. fmt

- a. Definition: Simple optimal text formatter.
- b. Example:

```
cyril@cyril-VirtualBox:~$ fmt -w 60 paragraph.txt
This is a paragraph test to demonstrate the optimal formal
paragraph. Don't mind the text and just look at the results
wow look at that results can't u believe how good that
is wow im so impressed color me orange and slap me on the
face look at that result.
C.  cyril@cyril-VirtualBox:~$
```

80. nl

- a. Definition: Numbers lines of files.
- b. Example:

```
cyril@cyril-VirtualBox:~$ nl -ba testfile2.txt
 1  Amber
 2  Kaeya
 3  Lisa
 4  Jean
 5  Venti
 6  Sucrose
 7  Rosaria
 8  Albedo
 9  Bennett
10  Razor
11  Noelle
12  Barbara
13  Diona
14  Diluc
15  Aether
16  Lumine
17
c.  cyril@cyril-VirtualBox:~$
```

81. **pr**

- a. **Definition:** Format files for printing.
- b. **Example:**

```
cyril@cyril-VirtualBox:$ pr testfile2.txt

2025-05-24 16:51          testfile2.txt          Page 1

Amber
Kaeya
Lisa
Jean
Venti
Sucrose
Rosaria
Albedo
Bennett
Razor
Noelle
Barbara
Diona
Diluc
Aether
Lumine

c.
```

Module 4: Network Configuration

82. ifconfig

- a. Definition: Network interfaces (use ip addr on newer systems).
- b. Example:

```
cyril@cyril-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
                inet6 fe80::a8c3:9d1:558d:2ef6  prefixlen 64  scopeid 0x20<link>
                inet6 fd00::f818:dc7:c62:e74f  prefixlen 64  scopeid 0x0<global>
                inet6 fd00::2cf8:9220:a24:57f  prefixlen 64  scopeid 0x0<global>
                ether 08:00:27:3c:7c:02  txqueuelen 1000  (Ethernet)
                    RX packets 145  bytes 66990 (66.9 KB)
                    RX errors 0  dropped 0  overruns 0  frame 0
                    TX packets 219  bytes 33740 (33.7 KB)
                    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 132  bytes 11753 (11.7 KB)
                    RX errors 0  dropped 0  overruns 0  frame 0
                    TX packets 132  bytes 11753 (11.7 KB)
                    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

c.    cyril@cyril-VirtualBox:~$
```

i.

83. Ifonfic enp0s3

- a. Definition: Show specific info of 1 interface
- b. Example:

```
cyril@cyril-VirtualBox:~$ ifconfig enp0s3
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
                inet6 fe80::a8c3:9d1:558d:2ef6  prefixlen 64  scopeid 0x20<link>
                inet6 fd00::f818:dc7:c62:e74f  prefixlen 64  scopeid 0x0<global>
                inet6 fd00::2cf8:9220:a24:57f  prefixlen 64  scopeid 0x0<global>
                ether 08:00:27:3c:7c:02  txqueuelen 1000  (Ethernet)
                    RX packets 145  bytes 66990 (66.9 KB)
                    RX errors 0  dropped 0  overruns 0  frame 0
                    TX packets 219  bytes 33740 (33.7 KB)
                    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

c.    cyril@cyril-VirtualBox:~$
```

84. sudo ifconfig [interface] [IP]

- a. Definition: Assign a static IP address to an interface.

- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo ifconfig enp0s3 103.244.193.14
cyril@cyril-VirtualBox:~$ ifconfig enp0s3
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 103.244.193.14 netmask 255.0.0.0 broadcast 103.255.255.255
              inet6 fe80::a8c3:9d1:558d:2ef6 prefixlen 64 scopeid 0x20<link>
              inet6 fd00::f818:dc7:c62:e74f prefixlen 64 scopeid 0x0<global>
              inet6 fd00::2cf8:9220:a24:57f prefixlen 64 scopeid 0x0<global>
        ether 08:00:27:3c:7c:02 txqueuelen 1000 (Ethernet)
              RX packets 147 bytes 67144 (67.1 KB)
              RX errors 0 dropped 0 overruns 0 frame 0
              TX packets 223 bytes 34084 (34.0 KB)
              TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
c.   cyril@cyril-VirtualBox:~$
```

85. sudo ifconfig [interface] down

- a. Definition: Disable a network interface.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo ifconfig enp0s3 down
cyril@cyril-VirtualBox:~$ ifconfig enp0s3
enp0s3: flags=4098<BROADCAST,MULTICAST> mtu 1500
        inet 103.244.193.14 netmask 255.0.0.0 broadcast 103.255.255.255
              inet6 fe80::a8c3:9d1:558d:2ef6 prefixlen 64 scopeid 0x20<link>
              inet6 fd00::2cf8:9220:a24:57f prefixlen 64 scopeid 0x0<global>
        ether 08:00:27:3c:7c:02 txqueuelen 1000 (Ethernet)
              RX packets 163 bytes 69222 (69.2 KB)
              RX errors 0 dropped 0 overruns 0 frame 0
              TX packets 265 bytes 39467 (39.4 KB)
              TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
c.   cyril@cyril-VirtualBox:~$
```

86. sudo ifconfig [interface] up

- a. Definition: Enable a network interface.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo ifconfig enp0s3 up
cyril@cyril-VirtualBox:~$ ifconfig enp0s3
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
      inet6 fe80::a8c3:9d1:558d:2ef6 prefixlen 64 scopeid 0x20<link>
        ether 08:00:27:3c:7c:02 txqueuelen 1000 (Ethernet)
          RX packets 170 bytes 70744 (70.7 KB)
          RX errors 0 dropped 0 overruns 0 frame 0
          TX packets 281 bytes 40988 (40.9 KB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

C. **cyril@cyril-VirtualBox:~\$**

87. ip

- a. Definition: Shows/manipulates routing, devices, policy routing.
- b. Example:

```
cyril@cyril-VirtualBox:~$ ip addr show
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 noprefixroute
        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 08:00:27:3c:7c:02 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 85731sec preferred_lft 85731sec
      inet6 fd00::14c3:23b6:8f92:a28b/64 scope global temporary dynamic
        valid_lft 86247sec preferred_lft 14247sec
      inet6 fd00::2cf8:9220:a24:57f/64 scope global dynamic mngtmpaddr noprefixroute
        valid_lft 86247sec preferred_lft 14247sec
      inet6 fe80::a8c3:9d1:558d:2ef6/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
cyril@cyril-VirtualBox:~$
```

88. ping

- a. Definition: Test connectivity ([ping google.com](http://ping.google.com)).
- b. Example:

```
cyril@cyril-VirtualBox: $ ping google.com
PING google.com (142.251.221.46) 56(84) bytes of data.
64 bytes from mnl0s03-in-f14.1e100.net (142.251.221.46): icmp_seq=1 ttl=255 time=7.61 ms
64 bytes from mnl0s03-in-f14.1e100.net (142.251.221.46): icmp_seq=2 ttl=255 time=6.56 ms
64 bytes from mnl0s03-in-f14.1e100.net (142.251.221.46): icmp_seq=3 ttl=255 time=6.22 ms
64 bytes from mnl0s03-in-f14.1e100.net (142.251.221.46): icmp_seq=4 ttl=255 time=6.38 ms
64 bytes from mnl0s03-in-f14.1e100.net (142.251.221.46): icmp_seq=5 ttl=255 time=7.74 ms
^Z
[1]+  Stopped                  ping google.com
cyril@cyril-VirtualBox:~$
```

i.

89. traceroute

- a. Definition: Trace the path packets take to a destination.
- b. Example:

```
cyril@cyril-VirtualBox:~$ traceroute 1.1.1.1
traceroute to 1.1.1.1 (1.1.1.1), 64 hops max
 1  10.0.2.2  0.310ms  0.081ms  0.071ms
  2  *  * ^Z
[2]+  Stopped                  traceroute 1.1.1.1
cyril@cyril-VirtualBox:~$
```

i.

90. netstat

- a. Definition: Displays network connections, routing tables.
- b. Example:

```
cyril@cyril-VirtualBox:~$ netstat -tuln
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 127.0.0.1:631           0.0.0.0:*
tcp      0      0 127.0.0.54:53            0.0.0.0:*
tcp      0      0 127.0.0.53:53            0.0.0.0:*
tcp6     0      0 ::1:631                 ::*:*
udp      0      0 0.0.0.0:57147           0.0.0.0:*
udp      0      0 127.0.0.54:53            0.0.0.0:*
udp      0      0 127.0.0.53:53            0.0.0.0:*
udp      0      0 0.0.0.0:5353           0.0.0.0:*
udp6     0      0 :::56748                :::*
udp6     0      0 :::5353                :::*
cyril@cyril-VirtualBox:~$
```

91. ss

- a. Definition: Another utility to investigate sockets.
- b. Example:

```
cyril@cyril-VirtualBox:~$ ss -tuln
Netid  State    Recv-Q   Send-Q      Local Address:Port      Peer Address:Port      Process
udp    UNCONN   0          0           0.0.0.0:57147        0.0.0.0:*
udp    UNCONN   0          0           127.0.0.54:53       0.0.0.0:*
udp    UNCONN   0          0           127.0.0.53%lo:53     0.0.0.0:*
udp    UNCONN   0          0           0.0.0.0:5353       0.0.0.0:*
udp    UNCONN   0          0           [::]:56748         [::]:*
udp    UNCONN   0          0           [::]:5353         [::]:*
tcp    LISTEN   0          4096        127.0.0.1:631       0.0.0.0:*
tcp    LISTEN   0          4096        127.0.0.54:53       0.0.0.0:*
tcp    LISTEN   0          4096        127.0.0.53%lo:53     0.0.0.0:*
tcp    LISTEN   0          4096        [::1]:631         [::]:*
cyril@cyril-VirtualBox:~$
```

92. dig

- a. Definition: Advanced DNS lookup tool (more detailed than nslookup).
- b. Example:

```
cyril@cyril-VirtualBox:~$ dig youtube.com

; <>> DiG 9.18.30-0ubuntu0.24.04.2-Ubuntu <>> youtube.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 15571
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;youtube.com.           IN      A

;; ANSWER SECTION:
youtube.com.        114      IN      A      142.251.220.142

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Sat May 17 18:41:31 PST 2025
;; MSG SIZE  rcvd: 56

cyril@cyril-VirtualBox:~$
```

- d.

93. nslookup

- a. Definition: Query DNS to resolve a domain to IP(s).
- b. Example:

```
cyril@cyril-VirtualBox:~$ nslookup youtube.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   youtube.com
Address: 142.251.220.142
Name:   youtube.com
Address: 2404:6800:4017:800::200e

c. cyril@cyril-VirtualBox:~$
```

i.

94. host

- a. Definition: DNS lookup utility.
- b. Example:

```
cyril@cyril-VirtualBox:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
cyril@cyril-VirtualBox:~$
```

95. whois

- a. Looks up domain registration records.
- b. Example:

```
cyril@cyril-VirtualBox:~$ whois google.com
Domain Name: GOOGLE.COM
Registry Domain ID: 2138514_DOMAIN_COM-VRSN
Registrar WHOIS Server: whois.markmonitor.com
Registrar URL: http://www.markmonitor.com
Updated Date: 2019-09-09T15:39:04Z
Creation Date: 1997-09-15T04:00:00Z
Registry Expiry Date: 2028-09-14T04:00:00Z
Registrar: MarkMonitor Inc.
Registrar IANA ID: 292
Registrar Abuse Contact Email: abusecomplaints@markmonitor.com
Registrar Abuse Contact Phone: +1.2086851750
Domain Status: clientDeleteProhibited https://icann.org/epp#clientDeleteProhibited
Domain Status: clientTransferProhibited https://icann.org/epp#clientTransferProhibited
Domain Status: clientUpdateProhibited https://icann.org/epp#clientUpdateProhibited
Domain Status: serverDeleteProhibited https://icann.org/epp#serverDeleteProhibited
Domain Status: serverTransferProhibited https://icann.org/epp#serverTransferProhibited
Domain Status: serverUpdateProhibited https://icann.org/epp#serverUpdateProhibited
Name Server: NS1.GOOGLE.COM
Name Server: NS2.GOOGLE.COM
Name Server: NS3.GOOGLE.COM
Name Server: NS4.GOOGLE.COM
DNSSEC: unsigned
URL of the ICANN Whois Inaccuracy Complaint Form: https://www.icann.org/wicf/
>>> Last update of whois database: 2025-05-24T14:21:56Z <<<

For more information on Whois status codes, please visit https://icann.org/epp

NOTICE: The expiration date displayed in this record is the date the
registrar's sponsorship of the domain name registration in the registry is
currently set to expire. This date does not necessarily reflect the expiration
date of the domain name registrant's agreement with the sponsoring
registrar. Users may consult the sponsoring registrar's Whois database to
view the registrar's reported date of expiration for this registration.
```

C.

TERMS OF USE: You are not authorized to access or query our Whois database through the use of electronic processes that are high-volume and automated except as reasonably necessary to register domain names or modify existing registrations; the Data in VeriSign Global Registry Services' ("VeriSign") Whois database is provided by VeriSign for information purposes only, and to assist persons in obtaining information about or related to a domain name registration record. VeriSign does not guarantee its accuracy. By submitting a Whois query, you agree to abide by the following terms of use: You agree that you may use this Data only for lawful purposes and that under no circumstances will you use this Data to: (1) allow, enable, or otherwise support the transmission of mass unsolicited, commercial advertising or solicitations via e-mail, telephone, or facsimile; or (2) enable high volume, automated, electronic processes that apply to VeriSign (or its computer systems). The compilation, repackaging, dissemination or other use of this Data is expressly prohibited without the prior written consent of VeriSign. You agree not to use electronic processes that are automated and high-volume to access or query the Whois database except as reasonably necessary to register domain names or modify existing registrations. VeriSign reserves the right to restrict your access to the Whois database in its sole discretion to ensure operational stability. VeriSign may restrict or terminate your access to the Whois database for failure to abide by these terms of use. VeriSign reserves the right to modify these terms at any time.

d.

The Registry database contains ONLY .COM, .NET, .EDU domains and Registrars.

Domain Name: google.com
Registry Domain ID: 2138514_DOMAIN_COM-VRSN
Registrar WHOIS Server: whois.markmonitor.com
Registrar URL: http://www.markmonitor.com
Updated Date: 2024-08-02T02:17:33+0000
Creation Date: 1997-09-15T07:00:00+0000
Registrar Registration Expiration Date: 2028-09-13T07:00:00+0000
Registrar: MarkMonitor, Inc.
Registrar IANA ID: 292
Registrar Abuse Contact Email: abusecomplaints@markmonitor.com
Registrar Abuse Contact Phone: +1.2086851750
Domain Status: clientUpdateProhibited (<https://www.icann.org/epp#clientUpdateProhibited>)
Domain Status: clientTransferProhibited (<https://www.icann.org/epp#clientTransferProhibited>)
Domain Status: clientDeleteProhibited (<https://www.icann.org/epp#clientDeleteProhibited>)
Domain Status: serverUpdateProhibited (<https://www.icann.org/epp#serverUpdateProhibited>)
Domain Status: serverTransferProhibited (<https://www.icann.org/epp#serverTransferProhibited>)
Domain Status: serverDeleteProhibited (<https://www.icann.org/epp#serverDeleteProhibited>)
Registrant Organization: Google LLC
Registrant State/Province: CA
Registrant Country: US
Registrant Email: Select Request Email Form at <https://domains.markmonitor.com/whois/google.com>
Admin Organization: Google LLC
Admin State/Province: CA
Admin Country: US
Admin Email: Select Request Email Form at <https://domains.markmonitor.com/whois/google.com>
Tech Organization: Google LLC
Tech State/Province: CA
Tech Country: US
Tech Email: Select Request Email Form at <https://domains.markmonitor.com/whois/google.com>
Name Server: ns2.google.com
Name Server: ns1.google.com
Name Server: ns3.google.com
Name Server: ns4.google.com
DNSSEC: unsigned
URL of the ICANN WHOIS Data Problem Reporting System: <http://wdprs.internic.net/>
>>> Last update of WHOIS database: 2025-05-24T14:19:17+0000 <<<

e.

For more information on WHOIS status codes, please visit:
<https://www.icann.org/resources/pages/epp-status-codes>

If you wish to contact this domain's Registrant, Administrative, or Technical contact, and such email address is not visible above, you may do so via our web form, pursuant to ICANN's Temporary Specification. To verify that you are not a robot, please enter your email address to receive a link to a page that facilitates email communication with the relevant contact(s).

Web-based WHOIS:
<https://domains.markmonitor.com/whois>

If you have a legitimate interest in viewing the non-public WHOIS details, send your request and the reasons for your request to whoisrequest@markmonitor.com and specify the domain name in the subject line. We will review that request and may ask for supporting documentation and explanation.

The data in MarkMonitor's WHOIS database is provided for information purposes, and to assist persons in obtaining information about or related to a domain name's registration record. While MarkMonitor believes the data to be accurate, the data is provided "as is" with no guarantee or warranties regarding its accuracy.

By submitting a WHOIS query, you agree that you will use this data only for lawful purposes and that, under no circumstances will you use this data to:

- (1) allow, enable, or otherwise support the transmission by email, telephone, or facsimile of mass, unsolicited, commercial advertising, or spam; or
- (2) enable high volume, automated, or electronic processes that send queries, data, or email to MarkMonitor (or its systems) or the domain name contacts (or its systems).

MarkMonitor reserves the right to modify these terms at any time.

By submitting this query, you agree to abide by this policy.

MarkMonitor Domain Management(TM)
 Protecting companies and consumers in a digital world.

Visit MarkMonitor at <https://www.markmonitor.com>
 Contact us at +1.8007459229
 In Europe, at +44.02032062220

f.

i.

96. route

- Shows/manipulates IP routing table.
- Example:

```
cyril@cyril-VirtualBox:~$ route -n
Kernel IP routing table
Destination      Gateway          Genmask        Flags Metric Ref  Use Iface
0.0.0.0          10.0.2.2        0.0.0.0       UG    100   0      0 enp0s3
10.0.2.0         0.0.0.0         255.255.255.0  U     100   0      0 enp0s3
cyril@cyril-VirtualBox:~$
```

c.

97. arp

- Manipulates system ARP cache.
- Example:

```
cyril@cyril-VirtualBox:~$ arp -a
_gateway (10.0.2.2) at 52:55:0a:00:02:02 [ether] on enp0s3
? (10.0.2.3) at 52:55:0a:00:02:03 [ether] on enp0s3
cyril@cyril-VirtualBox:~$
```

98. iwconfig

- a. Configures wireless network interfaces.
- b. Example:

```
cyril@cyril-VirtualBox:~$ iwconfig
lo      no wireless extensions.

enp0s3   no wireless extensions.

cyril@cyril-VirtualBox:~$
```

99. hostname

- a. Shows or sets system's host name.
- b. Example:

```
cyril@cyril-VirtualBox:~$ hostname
cyril-VirtualBox
cyril@cyril-VirtualBox:~$
```

100. nmcli

- a. Command-line tool for NetworkManager.
- b. Example:

```
cyril@cyril-VirtualBox:~$ nmcli device status
DEVICE  TYPE      STATE           CONNECTION
enp0s3  ethernet  connected      Profile 1
lo      loopback  connected (externally)  lo
cyril@cyril-VirtualBox:~$
```

101. tcpdump

- a. Dumps traffic on a network.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo tcpdump -i enp0s3 port 88
tcpdump: verbose output suppressed, use -v[v]... for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), snapshot length 262144 bytes
c.
```

102. wget

- a. Non-interactive network downloader.
- b. Example:

```
cyril@cyril-VirtualBox:~$ wget --mirror google.com
--2025-05-24 22:28:42-- http://google.com/
Resolving google.com (google.com)... 142.251.220.238, 2404:6800:4017:803::200e
Connecting to google.com (google.com)|142.251.220.238|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://www.google.com/ [following]
--2025-05-24 22:28:43-- http://www.google.com/
Resolving www.google.com (www.google.com)... 142.251.220.196, 2404:6800:4017:801::2004
Connecting to www.google.com (www.google.com)|142.251.220.196|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/html]
Saving to: 'google.com/index.html'

google.com/index.html      [ => ] 17.42K  ---KB/s   in 0.007s

Last-modified header missing -- time-stamps turned off.
2025-05-24 22:28:43 (2.47 MB/s) - 'google.com/index.html' saved [17840]

FINISHED --2025-05-24 22:28:43--
Total wall clock time: 1.1s
Downloaded: 1 files, 17K in 0.007s (2.47 MB/s)
C. cyril@cyril-VirtualBox:~$
```

103. curl

- a. Transfers data from or to a server.
- b. Example:

```
cyril@cyril-VirtualBox:~$ curl -I google.com
HTTP/1.1 301 Moved Permanently
Location: http://www.google.com/
Content-Type: text/html; charset=UTF-8
Content-Security-Policy-Report-Only: object-src 'none';base-uri 'self';script-src 'nonce-YIcSA6Btuq4R0yzjrQ00sw' 'strict-dynamic' 'report-sample' 'unsafe-eval' 'unsafe-inline' https: http://report-uri https://csp.withgoogle.com/csp/gws/other-hp
Date: Sat, 24 May 2025 14:29:47 GMT
Expires: Mon, 23 Jun 2025 14:29:47 GMT
Cache-Control: public, max-age=2592000
Server: gws
Content-Length: 219
X-XSS-Protection: 0
X-Frame-Options: SAMEORIGIN
C. cyril@cyril-VirtualBox:~$
```

104. ssh

- a. Secure shell client (remote login program).
- b. Example:

```
cyril@cyril-VirtualBox:~$ ssh user@192.168.1.100
C. [REDACTED]
```

105. scp

- a. Secure copy (remote file copy program).

- b. Example:

```
cyril@cyril-VirtualBox:~$ scp -r user@server:/backup ~/  
ssh: Could not resolve hostname server: Temporary failure in name resolution  
scp: Connection closed  
cyril@cyril-VirtualBox:~$
```

c.

Module 5: Linux Functions and Scripting

106. **chmod +x**

- a. Definition: Make script executable.

- b. Example:

```
cyril@cyril-VirtualBox:~$ chmod +x argument.sh  
cyril@cyril-VirtualBox:~$
```

c.

107. **./"script.sh"**

- a. Definition: Run a script.

- b. Example:

```
cyril@cyril-VirtualBox:~$ ./argument.sh  
Hello  
cyril@cyril-VirtualBox:~$
```

c.

108. **function**

- a. Defines shell functions.

- b. Example

GNU nano 7.2	function.sh
<pre>#!/bin/bash</pre>	
<pre>greet() {</pre>	
<pre> echo "Hello, \$1!"</pre>	
<pre>}</pre>	
<pre>greet "Alice"</pre>	

c.

```
cyril@cyril-VirtualBox:~$ sudo ./function.sh
```

d. Hello, Alice!

109. **local**

- a. Creates local variables in functions.

- b. Example:

```
GNU nano 7.2                               local.sh
#!/bin/bash

function demo() {
    local name="Bob"
    echo "Inside function: $name"
}

demo
echo "Outside function: $name"
```

c. **cyril@cyril-VirtualBox:~\$ sudo ./local.sh**
 Inside function: Bob
 Outside function:

110. **return**

- a. Exits function with a return value.
 b. Example:

```
GNU nano 7.2                               return.sh
#!/bin/bash

function add() {
    return $(( $1 + $2 ))
}

add 3 5
echo "Results: $?"
```

c. **cyril@cyril-VirtualBox:~\$ sudo ./return.sh**
 d. Results: 8

111. **read**

- a. Read a line from stdin.
 b. Example:

```
GNU nano 7.2                                     read.sh
#!/bin/bash

read -p "Enter your name: " name
echo "Hello! $name"
```

c.

```
cyril@cyril-VirtualBox:~$ sudo ./read.sh
Enter your name: Cyril
Hello! Cyril
```

d.

112. **echo**

- a. Definition: Displays a line of text.
- b. Example:

```
cyril@cyril-VirtualBox:~$ echo Hello :DD
Hello :DD
cyril@cyril-VirtualBox:~$
```

c.

113. **printf**

- a. Formats and prints data.
- b. Example:

```
GNU nano 7.2                                     printf.sh
#!/bin/bash

printf "Name: %s\nAge: %d\n" "Alice" 25
```

c.

```
cyril@cyril-VirtualBox:~$ sudo ./printf.sh
Name: Alice
Age: 25
```

d.

114. **test**

- a. Checks file types and compares values.
- b. Example:

```
GNU nano 7.2                                     test.sh
#!/bin/bash

test -f "/etc/passwd" && echo "File Exist!"

c. cyril@cyril-VirtualBox:~$ sudo ./test.sh
d. File Exist!
```

115. **sleep**

- a. Delays for a specified amount of time.
- b. Example:

```
GNU nano 7.2                                     sleep.sh
#!/bin/bash

echo "Starting..."
sleep 3
echo "Done!"

c.
```

Module 6: File System Management

116. **blkid**

- a. Locates/prints block device attributes.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo blkid
/dev/sda2: UUID="dbc当地-5ce3-415b-ae68-b0f62749cb0a" BLOCK_SIZE="4096" TYPE="ext4" PARTUUID="97b5
f98-733a-41f8-9140-80fc74b59104"
/dev/loop1: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop19: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop17: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop8: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/sdb1: LABEL="ESD-USB" UUID="3444-5886" BLOCK_SIZE="512" TYPE="vfat" PARTUUID="650ba82d-01"
/dev/loop15: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop6: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop13: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop4: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop11: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop2: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop0: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop18: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop9: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop16: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop7: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/sda1: PARTUUID="3c746dac-8f72-41cf-ac8d-c13e91648e69"
/dev/loop14: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop5: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop12: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop3: BLOCK_SIZE="131072" TYPE="squashfs"
/dev/loop10: BLOCK_SIZE="131072" TYPE="squashfs"
cyril@cyril-VirtualBox:~$
```

117. lsblk

- a. Lists block devices.

- b. Example:

```
cyril@cyril-VirtualBox:~$ lsblk -l
NAME   MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS
loop0    7:0     0     4K  1 loop /snap/bare/5
loop1    7:1     0 355.4M  1 loop /snap/clementine/1841
loop2    7:2     0   55.4M  1 loop /snap/core18/2855
loop3    7:3     0   73.9M  1 loop /snap/core22/1908
loop4    7:4     0   73.9M  1 loop /snap/core22/1963
loop5    7:5     0   66.8M  1 loop /snap/core24/988
loop6    7:6     0 241.5M  1 loop /snap/firefox/6103
loop7    7:7     0 241.9M  1 loop /snap/firefox/6159
loop8    7:8     0   10.7M  1 loop /snap/firmware-updater/127
loop9    7:9     0   11.1M  1 loop /snap/firmware-updater/167
loop10   7:10    0 505.1M  1 loop /snap/gnome-42-2204/176
loop11   7:11    0   516M  1 loop /snap/gnome-42-2204/202
loop12   7:12    0   91.7M  1 loop /snap/gtk-common-themes/1535
loop13   7:13    0   10.1M  1 loop /snap/htop/4853
loop14   7:14    0   10.8M  1 loop /snap/snap-store/1248
loop15   7:15    0   10.8M  1 loop /snap/snap-store/1270
loop16   7:16    0   44.4M  1 loop /snap/snapd/23771
loop17   7:17    0   50.9M  1 loop /snap/snapd/24505
loop18   7:18    0   500K  1 loop /snap/snapd-desktop-integration/178
loop19   7:19    0   568K  1 loop /snap/snapd-desktop-integration/253
sda      8:0     0   25G  0 disk
sda1     8:1     0     1M  0 part
sda2     8:2     0   25G  0 part /
sdb      8:16    1 14.9G  0 disk
sdb1     8:17    1 14.9G  0 part /media/cyril/ESD-USB
sr0     11:0    1 1024M 0 rom
cyril@cyril-VirtualBox:~$
```

118. fdisk

- a. Manipulates disk partition table.

- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo fdisk /dev/sdb

Welcome to fdisk (util-linux 2.39.3).
Changes will remain in memory only, until you decide to write them.
c. Be careful before using the write command.
```

119. parted

- a. Disk partitioning and partition resizing.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo parted
[sudo] password for cyril:
GNU Parted 3.6
Using /dev/sda
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) █
```

120. df

- a. Reports filesystem disk space usage.
- b. Example:

```
cyril@cyril-VirtualBox:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           946M  1.6M  944M   1% /run
/dev/sda2        25G   13G   11G  53% /
tmpfs           4.7G     0  4.7G   0% /dev/shm
tmpfs           5.0M   8.0K  5.0M   1% /run/lock
tmpfs           946M  132K  946M   1% /run/user/1000
/dev/sdb1        15G   32K   15G   1% /media/cyril/ESD-USB
c. cyril@cyril-VirtualBox:~$ █
```

121. du

- a. Estimates file space usage.
- b. Example:

```
cyril@cyril-VirtualBox:~$ sudo du -sh /var/log
284M    /var/log
c. cyril@cyril-VirtualBox:~$ █
```

122. quotacheck

- a. Scans filesystem for disk usage.

b. Example:

```
cyril@cyril-VirtualBox:~$ sudo quotacheck -ugm /
cyril@cyril-VirtualBox:~$ ls /
aquota.group bin usr-is-merged dev lib lost+found opt run snap sys var
aquota.user boot etc lib64 media proc sbin srv tmp
bin cdrom home lib usr-is-merged mnt root sbin usr-is-merged swap.img usr
C. cyril@cyril-VirtualBox:~$
```

123. quotaon

a. Enables disk quotas.

b. Example:

```
cyril@cyril-VirtualBox:~$ sudo quotaon -avug
quotaon: Your kernel probably supports ext4 quota feature but you are using external quota files. Please switch your filesystem to use
ext4 quota feature as external quota files on ext4 are deprecated.
/dev/sda2 [/]: group quotas turned on
/dev/sda2 [/]: user quotas turned on
C. cyril@cyril-VirtualBox:~$
```

124. quotaoff

a. Disables disk quotas.

b. Example:

```
cyril@cyril-VirtualBox:~$ sudo quotaoff -avug
quotaoff: Your kernel probably supports ext4 quota feature but you are using external quota files. Please switch your filesystem to us
e ext4 quota feature as external quota files on ext4 are deprecated.
/dev/sda2 [/]: group quotas turned off
/dev/sda2 [/]: user quotas turned off
C. cyril@cyril-VirtualBox:~$
```

125. repquota

a. Reports disk quota usage.

b. Example:

cyril@cyril-VirtualBox:~\$ sudo repquota -avug

*** Report for user quotas on device /dev/sda2

Block grace time: 7days; Inode grace time: 7days

User	used	Block limits			File limits			
		soft	hard	grace	used	soft	hard	grace
root	-- 13381200	0	0		207302	0	0	
man	-- 2120	0	0		176	0	0	
lp	-- 0	0	0		1	0	0	
_apt	-- 44	0	0		6	0	0	
systemd-network	-- 16	0	0		4	0	0	
systemd-timesync	-- 280	0	0		3	0	0	
messagebus	-- 4	0	0		1	0	0	
syslog	-- 5620	0	0		17	0	0	
systemd-resolve	-- 768	0	0		1	0	0	
uuidd	-- 4	0	0		1	0	0	
tss	-- 4	0	0		1	0	0	
dnsmasq	-- 4	0	0		1	0	0	
speech-dispatcher	-- 12	0	0		6	0	0	
fwupd-refresh	-- 4	0	0		1	0	0	
saned	-- 4	0	0		1	0	0	
geoclue	-- 4	0	0		1	0	0	
cups-browsed	-- 8	0	0		2	0	0	
hplip	-- 4	0	0		1	0	0	
gnome-remote-desktop	-- 24	0	0		7	0	0	
colord	-- 64	0	0		7	0	0	
gdm	-- 3380	0	0		206	0	0	
nm-openvpn	-- 4	0	0		1	0	0	
cyril	-- 117924	0	0		3521	0	0	
Amber	-- 0	0	0		1	0	0	
Yoimiya	-- 4	0	0		1	0	0	

C.

```

Statistics:
Total blocks: 8
Data blocks: 2
Entries: 25
Used average: 12.500000

*** Report for group quotas on device /dev/sda2
Block grace time: 7days; Inode grace time: 7days
          Block limits           File limits
Group      used   soft   hard grace   used   soft   hard grace
-----
root     -- 13003084       0       0      207155   0       0
adm      --  5924        0       0        45       0       0
lp       --   52        0       0        14       0       0
mail     --   28        0       0        2       0       0
man      --  2120        0       0      176       0       0
audio    --    8        0       0        5       0       0
dip      --  432         0       0        6       0       0
shadow   --  176        0       0        8       0       0
utmp     --   52        0       0        4       0       0
staff    --    8        0       0        2       0       0
nogroup  --    4        0       0        1       0       0
systemd-journal -- 367596       0       0        75       0       0
systemd-network --   16        0       0        4       0       0
crontab  --   44        0       0        2       0       0
systemd-timesync --    4        0       0        2       0       0
messagebus --   36        0       0        1       0       0
syslog   --    4        0       0        1       0       0
uuidd    --    4        0       0        1       0       0
_ssh    --  304         0       0        1       0       0
tss      --    4        0       0        1       0       0
ssl-cert --    8        0       0        2       0       0
d. whoopsie -- 2716        0       0        7       0       0

lpadmin   --   12        0       0        3       0       0
fwupd-refresh --    4        0       0        1       0       0
saned    --    4        0       0        1       0       0
geoclue   --    4        0       0        1       0       0
gnome-remote-desktop --  24        0       0        7       0       0
polkitd  --    8        0       0        2       0       0
colord   --   64        0       0        7       0       0
gdm      -- 3384        0       0      207       0       0
nm-openvpn --    4        0       0        1       0       0
cyril    -- 117924       0       0      3521       0       0
admins   --    0        0       0        1       0       0
administrator --    4        0       0        1       0       0
plocate   -- 7436        0       0        2       0       0

Statistics:
Total blocks: 10
Data blocks: 3
Entries: 35
Used average: 11.666667

e. cyril@cyril-VirtualBox:~$ █

```

- a. Sets disk quota limits.

- b. Example:

c. `cyril@cyril-VirtualBox:~$ sudo setquota -u Yoimiya 50000 50000 0 0 /dev/sda2`

```
Disk quotas for user Yoimiya (uid 1003):
  Filesystem      blocks    soft    hard   inodes   soft   hard
d.   /dev/sda2          4    50000    50000      1       0       0
```

127. edquota

- a. Edits user quotas.

- b. Example:

c. `cyril@cyril-VirtualBox:~$ sudo edquota -u Yoimiya`

```
Disk quotas for user Yoimiya (uid 1003):
  Filesystem      blocks    soft    hard   inodes   soft   hard
d.   /dev/sda2          4    50000    50000      1       0       0
```

Additional Useful Commands

128. man

- a. Definition: Displays manual pages.

- b. Example:

```

LS(1)                               User Commands                               LS(1)

NAME
    ls - list directory contents

SYNOPSIS
    ls [OPTION]... [FILE]...

DESCRIPTION
    List information about the FILEs (the current directory by default).
    Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

    Mandatory arguments to long options are mandatory for short options too.

-a, --all
        do not ignore entries starting with .

-A, --almost-all
        do not list implied . and ..

--author
        with -l, print the author of each file

-b, --escape
        print C-style escapes for nongraphic characters

--block-size=SIZE
        with -l, scale sizes by SIZE when printing them; e.g.,
        '--block-size=M'; see SIZE format below

-B, --ignore-backups
        do not list implied entries ending with ~

C.  Manual page ls(1) line 1 (press h for help or q to quit)

```

```

-B, --ignore-backups
        do not list implied entries ending with ~

-c
        with -lt: sort by, and show, ctime (time of last change of file
        status information); with -l: show ctime and sort by name; otherwise: sort by ctime, newest first

-C
        list entries by columns

--color[=WHEN]
        color the output WHEN; more info below

-d, --directory
        list directories themselves, not their contents

-D, --direfd
        generate output designed for Emacs' direfd mode

-f
        list all entries in directory order

-F, --classify[=WHEN]
        append indicator (one of */=>@|) to entries WHEN

--file-type
        likewise, except do not append '*'

--format=WORD
        across -x, commas -m, horizontal -x, long -l, single-column -1,
        verbose -l, vertical -C

--full-time
        like -l --time-style=full-iso

-g
        like -l, but do not list owner

d.  Manual page ls(1) line 33/249 24% (press h for help or q to quit)

```

```

-g      like -l, but do not list owner

--group-directories-first
    group directories before files; can be augmented with a --sort
    option, but any use of --sort=none (-U) disables grouping

-G, --no-group
    in a long listing, don't print group names

-h, --human-readable
    with -l and -s, print sizes like 1K 234M 2G etc.

--si   likewise, but use powers of 1000 not 1024

-H, --dereference-command-line
    follow symbolic links listed on the command line

--dereference-command-line-symlink-to-dir
    follow each command line symbolic link that points to a direc-
    tory

--hide=PATTERN
    do not list implied entries matching shell PATTERN (overridden
    by -a or -A)

--hyperlink[=WHEN]
    hyperlink file names WHEN

--indicator-style=WORD
    append indicator with style WORD to entry names: none (default),
    slash (-p), file-type (--file-type), classify (-F)

-i, --inode
    print the index number of each file
e.  Manual page ls(1) line 65/249 38% (press h for help or q to quit)

```

```

-i, --inode
    print the index number of each file

-I, --ignore=PATTERN
    do not list implied entries matching shell PATTERN

-k, --kibibytes
    default to 1024-byte blocks for file system usage; used only
    with -s and per directory totals

-l     use a long listing format

-L, --dereference
    when showing file information for a symbolic link, show informa-
    tion for the file the link references rather than for the link
    itself

-m     fill width with a comma separated list of entries

-n, --numeric-uid-gid
    like -l, but list numeric user and group IDs

-N, --literal
    print entry names without quoting

-o     like -l, but do not list group information

-p, --indicator-style=slash
    append / indicator to directories

-q, --hide-control-chars
    print ? instead of nongraphic characters

--show-control-chars
f.  Manual page ls(1) line 97/249 50% (press h for help or q to quit)

```

```

'ls' and output is a terminal)

-Q, --quote-name
    enclose entry names in double quotes

--quoting-style=WORD
    use quoting style WORD for entry names: literal, locale, shell,
    shell-always, shell-escape, shell-escape-always, c, escape
    (overrides QUOTING_STYLE environment variable)

-r, --reverse
    reverse order while sorting

-R, --recursive
    list subdirectories recursively

-s, --size
    print the allocated size of each file, in blocks

-S      sort by file size, largest first

--sort=WORD
    sort by WORD instead of name: none (-U), size (-S), time (-t),
    version (-v), extension (-X), width

--time=WORD
    select which timestamp used to display or sort; access time
    (-u): atime, access, use; metadata change time (-c): ctime, sta-
    tus; modified time (default): mtime, modification; birth time:
    birth, creation;

    with -l, WORD determines which time to show; with --sort=time,
    sort by WORD (newest first)

--time-style=TIME_STYLE

```

g. Manual page ls(1) line 133/249 66% (press h for help or q to quit)

```

        sort by WORD (newest first)

--time-style=TIME_STYLE
    time/date format with -l; see TIME_STYLE below

-t      sort by time, newest first; see --time

-T, --tabsize=COLS
    assume tab stops at each COLS instead of 8

-u      with -lt: sort by, and show, access time; with -l: show access
    time and sort by name; otherwise: sort by access time, newest
    first

-u      do not sort; list entries in directory order

-v      natural sort of (version) numbers within text

-w, --width=COLS
    set output width to COLS. 0 means no limit

-x      list entries by lines instead of by columns

-X      sort alphabetically by entry extension

-Z, --context
    print any security context of each file

--zero end each output line with NUL, not newline

-1      list one file per line

--help display this help and exit

--version

```

h. Manual page ls(1) line 165/249 77% (press h for help or q to quit)

```
--help display this help and exit
--version
    output version information and exit

The SIZE argument is an integer and optional unit (example: 10K is
10*1024). Units are K,M,G,T,P,E,Z,Y,R,Q (powers of 1024) or KB,MB, ...
(powers of 1000). Binary prefixes can be used, too: KiB=K, MiB=M, and
so on.

The TIME_STYLE argument can be full-iso, long-iso, iso, locale, or
+FORMAT. FORMAT is interpreted like in date(1). If FORMAT is FOR-
MAT1<newline>FORMAT2, then FORMAT1 applies to non-recent files and FOR-
MAT2 to recent files. TIME_STYLE prefixed with 'posix-' takes effect
only outside the POSIX locale. Also the TIME_STYLE environment vari-
able sets the default style to use.

The WHEN argument defaults to 'always' and can also be 'auto' or
'never'.

Using color to distinguish file types is disabled both by default and
with --color=never. With --color=auto, ls emits color codes only when
standard output is connected to a terminal. The LS_COLORS environment
variable can change the settings. Use the dircolors(1) command to set
it.

Exit status:
0      if OK,
1      if minor problems (e.g., cannot access subdirectory),
2      if serious trouble (e.g., cannot access command-line argument).
```

AUTHOR

Written by Richard M. Stallman and David MacKenzie.

i. Manual page ls(1) line 197/249 92% (press h for help or q to quit)

```
'never'.

Using color to distinguish file types is disabled both by default and
with --color=never. With --color=auto, ls emits color codes only when
standard output is connected to a terminal. The LS_COLORS environment
variable can change the settings. Use the dircolors(1) command to set
it.

Exit status:
 0      if OK,
 1      if minor problems (e.g., cannot access subdirectory),
 2      if serious trouble (e.g., cannot access command-line argument).

AUTHOR
Written by Richard M. Stallman and David MacKenzie.

REPORTING BUGS
GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
Report any translation bugs to <https://translationproject.org/team/>

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GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
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SEE ALSO
dircolors(1)

Full documentation <https://www.gnu.org/software/coreutils/ls>
or available locally via: info '(coreutils) ls invocation'

GNU coreutils 9.4          April 2024          LS\(1\)
j.  Manual page ls(1) line 215/249 (END) (press h for help or q to quit)
```

129. info

- a. Definition: Displays Info documents.
- b. Example:

```

File: dir,      Node: Top,      This is the top of the INFO tree.

This is the Info main menu (aka directory node).
A few useful Info commands:

'q' quits;
'H' lists all Info commands;
'h' starts the Info tutorial;
'mTexinfo RET' visits the Texinfo manual, etc.

* Menu:

Basics
* Common options: (coreutils)Common options.
* Coreutils: (coreutils).      Core GNU (file, text, shell) utilities.
* Date input formats: (coreutils)Date input formats.
* Ed: (ed).                  The GNU line editor
* File permissions: (coreutils)File permissions.
                           Access modes.
* Finding files: (find).      Operating on files matching certain criteria.
* Time: (time).               time

Compression
* Gzip: (gzip).              General (de)compression of files (lzw).

Development
* SSIP: (ssip).              Speech Synthesis Interface Protocol.
* Speech Dispatcher: (speech-dispatcher).
                           Speech Dispatcher.

Editors
* nano: (nano).              Small and friendly text editor.

GNU organization
-----Info: (dir)Top, 209 lines --Top-----
C. Welcome to Info version 7.1. Type H for help, h for tutorial.

```

130. whatis

- Definition: Displays one-line manual descriptions.
- Example:

```

cyril@cyril-VirtualBox:~$ whatis ls
ls (1)                   - list directory contents
cyril@cyril-VirtualBox:~$ 

```

131. apropos

- Definition: Searches manual page names/descriptions.
- Example:

```

cyril@cyril-VirtualBox:~$ apropos "list directory"
dir (1)                   - list directory contents
ls (1)                   - list directory contents
ntfsls (8)                - list directory contents on an NTFS filesystem
vdir (1)                  - list directory contents
cyril@cyril-VirtualBox:~$ 

```

132. help

- Definition: Displays help for shell builtins.

b. Example:

```
cyril@cyril-VirtualBox:~$ help cd
cd: cd [-L][-P [-e]] [-@] [dir]
      Change the shell working directory.

      Change the current directory to DIR.  The default DIR is the value of the
      HOME shell variable. If DIR is "-", it is converted to $OLDPWD.

      The variable CDPATH defines the search path for the directory containing
      DIR. Alternative directory names in CDPATH are separated by a colon (:).
      A null directory name is the same as the current directory. If DIR begins
      with a slash (/), then CDPATH is not used.

      If the directory is not found, and the shell option `cdable_vars' is set,
      the word is assumed to be a variable name. If that variable has a value,
      its value is used for DIR.

      Options:
        -L      force symbolic links to be followed: resolve symbolic
               links in DIR after processing instances of '...'
        -P      use the physical directory structure without following
               symbolic links: resolve symbolic links in DIR before
               processing instances of '...'
        -e      if the -P option is supplied, and the current working
               directory cannot be determined successfully, exit with
               a non-zero status
        -@      on systems that support it, present a file with extended
               attributes as a directory containing the file attributes

      The default is to follow symbolic links, as if '-L' were specified.
      '...' is processed by removing the immediately previous pathname component
      back to a slash or the beginning of DIR.

      Exit Status:
      Returns 0 if the directory is changed, and if $PWD is set successfully when
      -P is used; non-zero otherwise.

C.   cyril@cyril-VirtualBox:~$
```

133. type

a. Definition: Displays command type information.

b. Example:

```
cyril@cyril-VirtualBox:~$ type cd
cd is a shell builtin
cyril@cyril-VirtualBox:~$
```

C.

134. whereis

a. Definition: Locates binary, source, and manual pages.

b. Example:

```
cyril@cyril-VirtualBox:~$ whereis ls
ls: /usr/bin/ls /usr/share/man/man1/ls.1.gz
cyril@cyril-VirtualBox:~$
```

C.

135. history

a. Definition: Displays command history.

b. Example:

```
cyril@cyril-VirtualBox:~$ history
1 whoami
2 ls
3 tree
4 ls
5 ls-l
6 ls -l
7 man ls
8 whoami
9 whereis ls
10 whatis ls
11 tree
12 sudo apt install tree
13 tre
14 tree
15 pwd
16 cd \Desktop
17 mkdir folder1
18 mkdir folder2
19 mkdir folder3
20 rmdir folder3
21 touch firstfile.txt
22 touch secondfile.txt
23 touch thirdfile.txt
24 cut firstfile.txt
25 cat firstfile.txt
26 cp firstfile.txt secondfile.txt
27 cat secondfile.txt
28 cp -i firstfile.txt thirdfile.txt
29 cat thirdfile.txt
30 cp -f firstfile.txt thirdfile.txt
31 pwd
32 cd
33 whoami
```

C.

136. clear

a. Definition: Clears the terminal screen.

b. Example:

```
714 tcpdump -i eth0 port 88
715 sudo tcpdump -i eth0 port 88
716 ipconfig
717 iconfig
718 ifconfig
719 sudo tcpdump -i enp0s3 port 88
720 wget --mirror google.com
721 curl -I google.com
722 sudo apt install curl
723 curl -I google.com
724 ssh user@192.168.1.100
725 scp -r user@server:/backup `/
726 scp -r user@server:/backup -/
727 sudo nano function.sh
728 chmod u+x function.sh
729 sudo chmod u+x function.sh
730 ./function.sh
731 sudo ./function.sh
732 sudo nano function.sh
733 clear
734 man
735 man ls
736 info
737 whatis
738 whatis ls
739 apropos ls
740 apropos man
741 apropos
742 apropos "list directory"
743 clear
744 help cd
745 type cd
746 whereis python
747 whereis ls
748 history
cyril@cyril-VirtualBox:~$ clear
```

C.

```
cyril@cyril-VirtualBox:~$
```

d.

137. time

- a. Definition: Times command execution.

- b. Example:

```
cyril@cyril-VirtualBox:~$ time  
  
real    0m0.000s  
user    0m0.000s  
sys     0m0.000s  
cyril@cyril-VirtualBox:~$ █
```

c.

138. ps

- a. Definition: Reports process status.

- b. Example:

```
cyril@cyril-VirtualBox:~$ ps  
  PID TTY          TIME CMD  
 3398 pts/2        00:00:00 bash  
 3884 pts/2        00:00:00 ps  
cyril@cyril-VirtualBox:~$
```

c.

139. top

- a. Definition: Displays Linux processes.

- b. Example:

```
c. cyril@cyril-VirtualBox:~$ top
```

top - 01:11:56 up 1:20, 1 user, load average: 0.04, 0.10, 0.09										
Tasks: 239 total, 1 running, 237 sleeping, 1 stopped, 0 zombie										
%Cpu(s): 0.4 us, 0.7 sy, 0.0 ni, 98.9 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st										
MiB Mem : 9452.0 total, 7258.2 free, 1283.5 used, 1192.9 buff/cache										
MiB Swap: 4096.0 total, 4096.0 free, 0.0 used. 8168.5 avail Mem										
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND										
1582 cyril 20 0 5630476 486664 143128 S 11.9 5.0 3:33.01 gnome-shell										
3391 cyril 20 0 557468 55204 43948 S 2.3 0.6 0:06.67 gnome-terminal-										
3724 root 20 0 0 0 0 I 0.3 0.0 0:00.53 kworker/u16:4-events_unbou+										
3885 cyril 20 0 14524 5760 3584 R 0.3 0.1 0:00.02 top										
1 root 20 0 23328 13948 9340 S 0.0 0.1 0:02.49 systemd										
2 root 20 0 0 0 0 S 0.0 0.0 0:00.00 kthreadd										
3 root 20 0 0 0 0 S 0.0 0.0 0:00.00 pool_workqueue_release										
4 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/R-rcu_g										
5 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/R-rcu_p										
6 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/R-slub_										
7 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/R-netns										
8 root 20 0 0 0 0 I 0.0 0.0 0:00.13 kworker/0:0-events										
10 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/0:0H-events_highpri										
12 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/R-mm_pe										
13 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rCU_tasks_kthread										
14 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rCU_tasks_rude_kthread										
15 root 20 0 0 0 0 I 0.0 0.0 0:00.00 rCU_tasks_trace_kthread										
16 root 20 0 0 0 0 S 0.0 0.0 0:00.03 ksoftirqd/0										
17 root 20 0 0 0 0 I 0.0 0.0 0:00.59 rCU_preempt										
18 root rt 0 0 0 0 S 0.0 0.0 0:00.02 migration/0										
19 root 51 0 0 0 0 S 0.0 0.0 0:00.00 idle_inject/0										
20 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/0										
21 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/1										
22 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle_inject/1										
23 root rt 0 0 0 0 S 0.0 0.0 0:00.62 migration/1										
24 root 20 0 0 0 0 S 0.0 0.0 0:00.04 ksoftirqd/1										
26 root 0 -20 0 0 0 I 0.0 0.0 0:00.00 kworker/1:0H-events_highpri										
27 root 20 0 0 0 0 S 0.0 0.0 0:00.00 cpuhp/2										
28 root -51 0 0 0 0 S 0.0 0.0 0:00.00 idle_inject/2										

140. free

a. Definition: Displays memory usage.

b. Example:

```
cyril@cyril-VirtualBox:~$ free
              total        used        free      shared  buff/cache   available
Mem:       9678868     1314548     7432140      36512     1221504    8364320
Swap:      4194300          0     4194300
cyril@cyril-VirtualBox:~$
```

141. vmstat

a. Definition: Reports virtual memory statistics.

b. Example:

```
cyril@cyril-VirtualBox:~$ vmstat
procs -----memory----- swap-- io--- system-- cpu-----
 r b swpd free buff cache si so bi bo in cs us sy id wa st gu
 9 0    0 7431888 51592 1169968   0   0 214   41 975   1 0 0 99 0 0 0
cyril@cyril-VirtualBox:~$
```

142. iostat

a. Definition: Reports CPU and I/O statistics.

b. Example:

```
cyril@cyril-VirtualBox:~$ iostat
Linux 6.8.0-52-generic (cyril-VirtualBox)        05/25/2025      _x86_64_
                                         (8 CPU)

avg-cpu: %user   %nice  %system %iowait  %steal   %idle
          0.24    0.01    0.27    0.02    0.00   99.46

Device      tps   kB_read/s   kB_wrtn/s   kB_dscd/s   kB_read   kB_wrtn   kB_dscd
loop0       0.00     0.00     0.00     0.00      17        0        0
loop1       0.01     0.22     0.00     0.00    1095        0        0
loop10      0.01     0.22     0.00     0.00    1074        0        0
loop11      0.39     4.63     0.00     0.00   22659        0        0
loop12      0.35     0.87     0.00     0.00   4269        0        0
loop13      0.00     0.01     0.00     0.00      30        0        0
loop14      0.00     0.00     0.00     0.00      11        0        0
loop15      0.00     0.01     0.00     0.00      42        0        0
loop16      0.00     0.00     0.00     0.00      11        0        0
loop17      0.14     5.41     0.00     0.00  26470        0        0
loop18      0.00     0.00     0.00     0.00      10        0        0
loop19      0.00     0.06     0.00     0.00      285        0        0
loop2       0.01     0.07     0.00     0.00      364        0        0
loop20      0.00     0.00     0.00     0.00      14        0        0
loop3       0.01     0.22     0.00     0.00   1082        0        0
loop4       0.07     0.94     0.00     0.00   4582        0        0
loop5       0.01     0.22     0.00     0.00   1079        0        0
loop6       0.01     0.22     0.00     0.00   1073        0        0
loop7       0.01     0.23     0.00     0.00   1143        0        0
loop8       0.00     0.00     0.00     0.00      11        0        0
loop9       0.02     0.42     0.00     0.00   2062        0        0
sda         6.66    200.45    41.32     0.00  980101  202052        0

C. cyril@cyril-VirtualBox:~$
```

143. lsof

a. Definition: Lists open files.

b. Example:

```
47 [eventfd:354]
mutter-x1 2307 2354 gmain           cyril  9u  a_inode          0,15      0
47 [eventfd:356]
mutter-x1 2307 2354 dbus            cyril  cwd   DIR           8,2  4096
524333 /home/cyril
mutter-x1 2307 2354 dbus            cyril  rtd   DIR           8,2  4096
2 /
mutter-x1 2307 2354 dbus            cyril  txt   REG           8,2  35136
930001 /usr/libexec/mutter-x11-frames
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  30795392
929146 /usr/lib/x86_64-linux-gnu/libcudacode.so.74.2
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  128938904
927354 /usr/lib/x86_64-linux-gnu/libLLVM.so.19.1
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  327184      1
058842 /usr/share/icons/Humanity/icon-theme.cache
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  187712      1
070800 /usr/share/icons/Yaru/icon-theme.cache
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  260328
930894 /usr/lib/x86_64-linux-gnu/gvfs/libgvfscommon.so
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  207352
930608 /usr/lib/x86_64-linux-gnu/gio/modules/libgvfsdbus.so
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  435612      1
184424 /usr/share/themes/Yaru-dark/gtk-4.0/gtk.gresource
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  163613
920269 /usr/share/glib-2.0/schemas/gschemas.compiled
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  1310728
524359 /home/cyril/.cache/mesa_shader_cache_db/index
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  378680
926994 /usr/lib/x86_64-linux-gnu/libEGL_mesa.so.0.0.0
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  382064      1
189089 /var/cache/fontconfig/23000ef321c393bfd76478a5c0e95b23-le64.cache-9
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  478896      1
202641 /var/cache/fontconfig/0bd3dc0958fa2205aaaa8ebbi13e2872b-le64.cache-9
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  2140336
929151 /usr/lib/x86_64-linux-gnu/libicuuc.so.74.2
mutter-x1 2307 2354 dbus            cyril  mem   REG           8,2  1967424
```

C.

144. `uname`

- a. Definition: Prints system information.
- b. Example:

```
cyril@cyril-VirtualBox: $ uname -a
Linux cyril-VirtualBox 6.8.0-52-generic #53-Ubuntu SMP PREEMPT_DYNAMIC Sat Jan 11 00:06:25 UTC 2025
x86_64 x86_64 x86_64 GNU/Linux
c. cyril@cyril-VirtualBox: $
```

145. `shutdown`

- a. Definition: Shuts down or reboots the system.
- b. Example:

```
cyril@cyril-VirtualBox: $ uname -a
Linux cyril-VirtualBox 6.8.0-52-generic #53-Ubuntu SMP PREEMPT_DYNAMIC Sat Jan 11 00:06:25 UTC 2025
x86_64 x86_64 x86_64 GNU/Linux
cyril@cyril-VirtualBox: $ shutdown
Shutdown scheduled for Sun 2025-05-25 01:17:07 PST, use 'shutdown -c' to cancel.
c. cyril@cyril-VirtualBox: $
```

146. `cal`

- a. Definition: Display a calendar.
- b. Example:

```
cyril@cyril-VirtualBox:~$ cal 2025
      2025
      January           February          March
Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa
      1   2   3   4       1   2   3   4   5   6   7   8   1   2   3   4   5   6   7
      5   6   7   8   9 10 11   2   3   4   5   6   7   8   2   3   4   5   6   7   8
      12 13 14 15 16 17 18   9 10 11 12 13 14 15   9 10 11 12 13 14 15
      19 20 21 22 23 24 25   16 17 18 19 20 21 22   16 17 18 19 20 21 22
      26 27 28 29 30 31   23 24 25 26 27 28   23 24 25 26 27 28 29
                                30 31

      April            May              June
Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa
      1   2   3   4   5       1   2   3       1   2   3   4   5   6   7
      6   7   8   9 10 11 12   4   5   6   7   8   9 10   8   9 10 11 12 13 14
      13 14 15 16 17 18 19   11 12 13 14 15 16 17   15 16 17 18 19 20 21
      20 21 22 23 24 25 26   18 19 20 21 22 23 24   22 23 24 25 26 27 28
      27 28 29 30             25 26 27 28 29 30 31   29 30

      July             August            September
Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa
      1   2   3   4   5       1   2       1   2   3   4   5   6
      6   7   8   9 10 11 12   3   4   5   6   7   8   9   7   8   9 10 11 12 13
      13 14 15 16 17 18 19   10 11 12 13 14 15 16   14 15 16 17 18 19 20
      20 21 22 23 24 25 26   17 18 19 20 21 22 23   21 22 23 24 25 26 27
      27 28 29 30 31         24 25 26 27 28 29 30   28 29 30
                                31

      October          November          December
Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa
      1   2   3   4       1   2   3   4   5   6       1   2   3   4   5   6
      5   6   7   8   9 10 11   2   3   4   5   6   7   8   7   8   9 10 11 12 13
      12 13 14 15 16 17 18   9 10 11 12 13 14 15   14 15 16 17 18 19 20
      19 20 21 22 23 24 25   16 17 18 19 20 21 22   21 22 23 24 25 26 27
      26 27 28 29 30 31     23 24 25 26 27 28 29   28 29 30 31
                                30
c.  cyril@cyril-VirtualBox:~$
```

147. alias

- Definition:** Creates shortcuts or substitutes for commands.
- Example:

```
cyril@cyril-VirtualBox:~$ alias ll="ls -l"
cyril@cyril-VirtualBox:~$ ll
total 172
-rwxrw-r-- 1 cyril cyril      66 May  3 15:05 100loop.sh
-rwrxr--r- 1 root  root      34 May 25 02:51 alias.sh
-----w-w- 1 cyril cyril    10240 May 17 16:06 archive.tar
-----w-w- 1 root  root     172 May 17 16:09 archive_test.zip
-rwxrwxr-x 1 cyril cyril      29 Apr 26 14:51 argument.sh
-rwxrw-r-- 1 cyril cyril    723 May  3 15:35 busTicketsIn.sh
-rwxrw-r-- 1 cyril cyril   218 Apr 26 15:49 check_number.sh
-rwxrw-r-- 1 cyril cyril    1789 Apr 12 16:08 cyril.sh
-rwxr--r-- 1 root  root      41 May 25 03:00 declare.sh
drwxr-xr-x 5 cyril cyril    4096 May 17 10:40 Desktop
drwxr-xr-x 2 cyril cyril    4096 Feb  8 11:24 Documents
drwxr-xr-x 2 cyril cyril    4096 May 17 10:39 Downloads
drwxr-xr-x 2 cyril cyril    4096 May 17 11:04 dummy_dir
drwxrwxr-x 2 cyril cyril    4096 May 17 10:59 dummy_dir2
-rw-rw-r-- 1 cyril cyril    100 May 24 16:29 dummy_file.txt
-rw-rw-r-- 1 cyril cyril      0 May 25 02:31 file1
-----w-w- 1 Amber admins      0 Mar  8 15:22 file1.txt
-rw-rw-r-- 1 cyril cyril      0 May 25 02:31 file2
-----w-w- 1 cyril cyril      0 May 17 10:46 file2.txt
-rw-rw-r-- 1 cyril cyril      0 May 25 02:31 file3
-----w-w- 1 root  root      59 May 25 01:02 function.sh
drwxrwxr-x 2 cyril cyril    4096 May 24 22:28 google.com
-rwxrw-r-- 1 cyril cyril    78 May  3 15:09 iterateOverFiles.sh
-----w-w- 1 root  root     119 May 25 02:46 local.sh
drwxr-xr-x 2 cyril cyril    4096 Feb  8 11:24 Music
-----w-w- 1 cyril cyril    10 May 17 10:52 notsodummy_file.txt
-----w-w- 1 cyril cyril    13 May 25 02:30 output.txt
-----w-w- 1 cyril cyril    259 May 24 22:15 paragraph.txt
drwxr-xr-x 2 cyril cyril    4096 Feb  8 11:24 Pictures
-----w-w- 1 root  root      53 May 25 02:56 printf.sh
-----w-w- 1 cyril cyril    70 May  3 15:12 process_files.sh
drwxr-xr-x 2 cyril cyril    4096 Feb  8 11:24 Public
-----w-w- 1 root  root      66 May 25 02:53 read.sh
-----w-w- 1 root  root      81 May 25 02:49 return.sh
-----w-w- 1 root  root      53 May 25 03:01 sleep.sh
drwx----- 7 cyril cyril    4096 Mar  1 16:09 snap
-----w-w- 1 Yoimiya administrator 106 May 17 11:41 stuff.txt
drwxr-xr-x 2 cyril cyril    4096 Feb  8 11:24 Templates
-----w-w- 1 cyril cyril      0 May 17 16:04 testdummy
-----w-w- 1 root  root      0 May 17 16:06 testest
-----w-w- 1 cyril cyril    108 Apr 26 15:02 testfile2.sh
-----w-w- 1 cyril cyril    107 May 24 16:51 testfile2.txt
-----w-w- 1 cyril cyril    126 Apr 26 15:10 testfile3.sh
-----w-w- 1 cyril cyril    93 Apr 26 15:19 testfile4.sh
-----w-w- 1 cyril cyril    74 Apr 26 14:49 testfile.sh
-----w-w- 1 cyril cyril      0 May 24 22:10 testfile.txt
drwxr-xr-x 2 cyril cyril    4096 Mar  8 15:35 TestFolder
-----w-w- 1 root  root      57 May 25 02:57 test.sh
-----w-w- 2 cyril cyril    4096 Feb  8 11:24 Videos
cyril@cyril-VirtualBox:~$
```

C.

148. Unalias

- Definition: Removes an alias:
- Example

```
cyril@cyril-VirtualBox:~$ unalias ll
cyril@cyril-VirtualBox:~$ ll
ll: command not found
cyril@cyril-VirtualBox:~$ █
```

C.

149. lscpu

- Definition: Display CPU information.
- Example:

```
cyril@cyril-VirtualBox:~$ lscpu
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:         48 bits physical, 48 bits virtual
Byte Order:            Little Endian
CPU(s):                8
On-line CPU(s) list:  0-7
Vendor ID:             AuthenticAMD
Model name:            AMD Ryzen 7 5800H with Radeon Graphics
CPU family:            25
Model:                 80
Thread(s) per core:   1
Core(s) per socket:   8
Socket(s):            1
Stepping:              0
BogoMIPS:              6387.99
Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtr
                       r pge mca cmov pat pse36 clflush mmx fxsr sse s
                       se2 ht syscall nx mmxext fxsr_opt rdtscp lm con
                       stant_tsc rep_good nopl nonstop_tsc cpuid extd_
                       apicid tsc_known_freq pni pclmulqdq ssse3 fma c
                       x16 sse4_1 sse4_2 x2apic movbe popcnt aes xsave
                       avx f16c rdrand hypervisor lahf_lm cmp_legacy
                       cr8_legacy abm sse4a misalignsse 3dnowprefetch
                       vmmcall fsgsbase bmi1 avx2 bmi2 invpcid rdseed
                       adx clflushopt sha_ni arat debug_swap

Virtualization features:
  Hypervisor vendor:    KVM
  Virtualization type:  full
Caches (sum of all):
  L1d:                  256 KiB (8 instances)
  L1i:                  256 KiB (8 instances)
  L2:                   4 MiB (8 instances)
  L3:                   128 MiB (8 instances)
NUMA:
  NUMA node(s):         1
```

150. **uptime**

- a. Definition: Display memory usage in human-readable format.
- b. Example:

```
cyril@cyril-VirtualBox:~$ uptime
 09:38:54 up 15 min,  1 user,  load average: 0.09, 0.23, 0.20
```