

Documentation about Linux Command

- Chandan Gowda H S

What is command

- A command is a program that tells the operating system to perform specific work. Programs are stored as files in linux. Therefore, a command is also a file which is stored somewhere on the disk.

➔ -h or -help

It will show the <options> for that command
example: ls -help

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre$ ls --help
Usage: ls [OPTION]... [FILE]...
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                              with -lt: sort by, and show, ctime (time of last
                                modification 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]             colorize the output; WHEN can be 'always' (default
                                if omitted), 'auto', or 'never'; more info below
  -d, --directory                list directories themselves, not their contents
```

Commands for Navigating the File System

➔ pwd-print working directory

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre$ pwd
/home/chandanshankar/sre
chandanshankar@chandanshankar-Inspiron-5535:~/sre$
```

➔ cd-change directory

The cd command is used to change directory

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre$ pwd
/home/chandanshankar/sre
chandanshankar@chandanshankar-Inspiron-5535:~/sre$ ls
chandanshankar  hello  hello.txt  number.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre$ cd chandan
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$
```

➔ ls-used to list file and directory

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre$ ls
chandanshankar  hello  hello.txt  number.txt
```

Commands for Manipulating Files

→ **touch** - used to create new file

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ sudo touch file1
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ ls
file1
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$
```

→ **mkdir** to used to craete new directories

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ sudo mkdir chandan
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ ls
chandan  file1
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$
```

→ **rm** is used to delete files and directories

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ ls
chandan  file1
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ sudo rm file1
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ ls
chandan
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$
```

→ **cp** is used to copy the file or directories

syntax- cp <source path> <destination path>

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ ls
chandan  new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ sudo cp new.txt chandan
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ ls
chandan  new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ cd chandan
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls
new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

→ **mv** is used to move file or directories

syntax - mv <source path> <destination path>

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ cd ..
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ ls
chandan  new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ sudo mv new.txt chandan/
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan$ cd chandan/
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls
new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

Commands for Viewing Files

→ **Cat** is used to print content of the file

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sudo cat new.txt
hello world
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

→ **head** is used print top 10 lines of the file default

we can customize the data

syntax - head new.txt

syntax - head -n 5 new.txt

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls
new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ head new.txt
1
2
3
4
5
6
7
8
9
0
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ head -n 5 new.txt
1
2
3
4
5
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

→ **tail** is used to print last 10 lines of the file

we can customize the data

syntax - tail new.txt

syntax - tail -n 5 new.txt

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls
new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ tail new.txt
3
4
5
6
7
8
9
0
11
22
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ tail -n 5 new.txt
8
9
0
11
22
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

Text Processing Commands

- Print only the lines which contain a particular word(s)
- Replace a particular word with another word in a file
- Sort the lines in a particular order

There are three basic commands which are used frequently to process texts:

- grep
- sed
- sort

→ **grep** is used to search particular word in file
syntax - `grep <word_to_search> <file_name>`

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls
new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ grep "1" new.txt
1
11
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

→ **sed** is used to replace word in file

syntax - `sed 's/<text_to_replace>/<replacement_text>/'`
`<file_name>`

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls
new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ cat new.txt
1
2
3
4
5
6
7
8
9
0
11
22
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sed 's/1/0/' new.txt
0
2
3
4
5
6
7
8
9
0
01
22
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

→ **sort** is used to sorting in increing order

```

chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ cat new.txt
1
2
3
4
5
6
7
8
9
0
11
22
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sort new.txt
0
1
11
2
22
3
4
5
6
7
8
9
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ █

```

User/Group Management

Id command

- is used to find the uid and gid associated with an user it also lists down the groups to which user belongs to.

```

chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ id
uid=1000(chandanshankar) gid=1000(chandanshankar) groups=1000(chandanshankar),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ █

```

whoami command

- way to find out current user

```

chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ whoami
chandanshankar
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ █

```

Important commands for managing users

useradd - Creates a new user

- syntax – useradd chandan

passwd - Adds or modifies passwords for a user

- passwd chandan

usermod - Modifies attributes of an user

- The usermod command is used to modify the attributes of an user like the home directory or the shell.

userdel - Deletes an user

- userdel chandan

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sudo useradd chandan
[sudo] password for chandanshankar:
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sudo passwd chandan
New password:
Retype new password:
passwd: password updated successfully
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ userdel chandan
userdel: Permission denied.
userdel: cannot lock /etc/passwd; try again later.
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sudo userdel chandan
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

Becoming a Superuser

- Syntax - su root

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sudo su root
root@chandanshankar-Inspiron-5535:/home/chandanshankar/sre/chandan/chandan#
```

File Permissions

- **Chmod** command is used to change file or directory permissions

syntax - chmod 777 new.txt

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls
new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls -l
total 4
-rw-r--r-- 1 root root 26 Aug 26 11:50 new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sudo chmod 777 new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ls -l
total 4
-rwxrwxrwx 1 root root 26 Aug 26 11:50 new.txt
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

Permission	rwX	Binary	Decimal
Read, write and execute	rwX	111	7
Read and write	rw-	110	6

Read and execute	r-x	101	5
Read only	r--	100	4
Write and execute	-wx	011	3
Write only	-w-	010	2
Execute only	--x	001	1
none	---	000	0

Chown command

Syntax - `chown \<new_owner> \<file_name>`

Chgrp command

Syntax - `chgrp \<new_groupname> \<file_name>`

Package Management

Packaging systems	Distributions
Debian style (.deb)	Debian, Ubuntu
Red Hat style (.rpm)	Fedora, CentOS, Red Hat Enterprise Linux

- apt package for ubuntu and debian
- yum package for red hat style
- example for apt – `apt install httpd`
- example for yum – `yum install httpd`

Process Management

- Ps (process status)

The ps command is used to know the information of a process or list of processes.

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ps
  PID TTY          TIME CMD
  5626 pts/0        00:00:01 bash
 16161 pts/0        00:00:00 ps
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

- ps aux

a = show processes for all users

u = display the process's user/owner

x = also show processes not attached to a terminal

➤ list all processes and their status and resource usage

We can use grep in combination with ps command to list only specific processes.

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ps
  PID TTY          TIME CMD
  5626 pts/0        00:00:01 bash
 16791 pts/0        00:00:00 ps
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ps -p 5626
  PID TTY          TIME CMD
  5626 pts/0        00:00:01 bash
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

Top command

- The top command is used to show information about Linux processes running on the system in real time. It also shows a summary of the system information.


```
top - 12:52:09 up 3:25, 1 user, load average: 0.18, 0.30, 0.38
Tasks: 257 total, 1 running, 256 sleeping, 0 stopped, 0 zombie
%Cpu(s): 5.5 us, 1.4 sy, 0.0 ni, 91.8 id, 0.0 wa, 0.0 hi, 1.4 si, 0.0 st
MiB Mem : 5139.3 total, 289.3 free, 1797.2 used, 3052.8 buff/cache
MiB Swap: 2048.0 total, 2046.7 free, 1.3 used, 3003.3 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
17075	chandanshankar	20	0	20608	4196	3408	R	11.8	0.1	0:00.03	top
1067	tomcat	20	0	4987184	206404	33400	S	5.9	3.9	1:08.35	java
3036	chandanshankar	20	0	397464	8520	6596	S	5.9	0.2	0:56.45	ibus-daemon
3146	chandanshankar	20	0	4621208	267388	91928	S	5.9	5.1	11:09.39	gnome-shell
5615	chandanshankar	20	0	973172	51688	36080	S	5.9	1.0	0:47.27	gnome-terminal-
1	root	20	0	167616	11868	8528	S	0.0	0.2	0:15.22	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.03	kthreadd
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par_gp
8	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_percpu_wq
9	root	20	0	0	0	0	S	0.0	0.0	0:00.98	ksoftirqd/0
10	root	20	0	0	0	0	I	0.0	0.0	0:28.66	rcu_sched
11	root	rt	0	0	0	0	S	0.0	0.0	0:00.13	migration/0
12	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/0
14	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/0
15	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/1
16	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/1
17	root	rt	0	0	0	0	S	0.0	0.0	0:00.39	migration/1
18	root	20	0	0	0	0	S	0.0	0.0	0:00.63	ksoftirqd/1
21	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/2
22	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/2
23	root	rt	0	0	0	0	S	0.0	0.0	0:00.40	migration/2
24	root	20	0	0	0	0	S	0.0	0.0	0:01.00	ksoftirqd/2
27	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/3
28	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/3
29	root	rt	0	0	0	0	S	0.0	0.0	0:00.40	migration/3
30	root	20	0	0	0	0	S	0.0	0.0	0:01.18	ksoftirqd/3
33	root	20	0	0	0	0	S	0.0	0.0	0:00.01	kdevtmpfs
34	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
35	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_tasks_kthre
36	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kauditd

Memory Management

Free command

- The free command is used to display the memory usage of the system. The command displays the total free and used space available in the RAM along with space occupied by the caches/buffers.

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ free
              total        used        free      shared  buff/cache   available
Mem:          5262688      1847180       304404         43476       3111104       3084860
Swap:         2097148          1292       2095856
```

- free -h** command (in human readable)

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ free -h
              total        used        free      shared  buff/cache   available
Mem:           5.0Gi       1.8Gi       261Mi        55Mi        3.0Gi       2.9Gi
Swap:          2.0Gi        1.0Mi        2.0Gi
```

vmstat command

- The vmstat command can be used to display the memory usage along with additional information about io and cpu usage.

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ vmstat
procs -----memory----- ---swap-- -----io----- -system-- -----cpu-----
 r b swpd free buff cache si so bi bo in cs us sy id wa st
 1 0 1292 266076 420908 2704984 0 0 78 49 685 900 9 4 86 1 0
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

Checking Disk Space

Df command(disk free)

- The df command is used to display the free and available space for each mounted file system.

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ df
Filesystem      1K-blocks      Used Available Use% Mounted on
udev            2603184         0    2603184   0% /dev
tmpfs           526272        1988     524284   1% /run
/dev/sda5       719507560    261700772    421188036  39% /
tmpfs           2631344        54068     2577276   3% /dev/shm
tmpfs           5120          4         5116   1% /run/lock
tmpfs           2631344         0    2631344   0% /sys/fs/cgroup
/dev/loop1       128          128     0 100% /snap/bare/5
/dev/loop2      269568      269568     0 100% /snap/brave/173
/dev/loop2      200192      200192     0 100% /snap/arduino/70
/dev/loop3      269952      269952     0 100% /snap/brave/174
/dev/loop7      56960       56960     0 100% /snap/core18/2409
/dev/loop8      56960       56960     0 100% /snap/core18/2538
/dev/loop4      228992      228992     0 100% /snap/code/104
/dev/loop9      63488       63488     0 100% /snap/core20/1587
/dev/loop10     168832     168832     0 100% /snap/gnome-3-28-1804/161
/dev/loop13     224256     224256     0 100% /snap/gnome-3-34-1804/77
/dev/loop5      228992      228992     0 100% /snap/code/105
/dev/loop6     116736     116736     0 100% /snap/core/13425
/dev/loop11     63488       63488     0 100% /snap/core20/1611
/dev/loop15     93952       93952     0 100% /snap/gtk-common-themes/1535
/dev/loop12     261760     261760     0 100% /snap/gnome-3-34-1804/36
/dev/loop16     132992     132992     0 100% /snap/mysql-workbench-community/10
/dev/loop20     63616       63616     0 100% /snap/gtk-common-themes/1506
/dev/loop14     410496     410496     0 100% /snap/gnome-3-38-2004/112
/dev/loop18     51072       51072     0 100% /snap/snap-store/467
/dev/loop24     302848     302848     0 100% /snap/vlc/2344
/dev/loop23      512         512     0 100% /snap/utorrent/102
/dev/loop21     48128       48128     0 100% /snap/snapd/16292
/dev/loop17     55552       55552     0 100% /snap/snap-store/558
/dev/loop22     66432       66432     0 100% /snap/sublime-text/112
/dev/loop19     6144        6144     0 100% /snap/notepad-plus-plus/369
/dev/loop25     330752     330752     0 100% /snap/wine-platform-6-stable/19
/dev/loop26     355456     355456     0 100% /snap/wine-platform-runtime/315
/dev/loop27     355328     355328     0 100% /snap/wine-platform-runtime/316
/dev/sda1       523248         4     523244   1% /boot/efi
tmpfs           526268         64     526204   1% /run/user/1000
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

du command (disk usage)

- The du command is used to display disk usage of files and directories on the system.

```

chandanshankar@chandanshankar-Inspiron-5535:~$ du -h
du: cannot read directory './software/installhalyard.kGGG': Permission denied
4.0K    ./software/installhalyard.kGGG
20K     ./software
4.0K    ./cache/evolution/calendar/trash
8.0K    ./cache/evolution/calendar
4.0K    ./cache/evolution/mail/trash
8.0K    ./cache/evolution/mail
4.0K    ./cache/evolution/sources/trash
8.0K    ./cache/evolution/sources
4.0K    ./cache/evolution/tasks/trash
8.0K    ./cache/evolution/tasks
4.0K    ./cache/evolution/addressbook/trash
8.0K    ./cache/evolution/addressbook
4.0K    ./cache/evolution/memos/trash
8.0K    ./cache/evolution/memos
52K     ./cache/evolution
20K     ./cache/ibus/bus
24K     ./cache/ibus
360K    ./cache/gstreamer-1.0
8.0K    ./cache/google-chrome/Default/Code Cache/wasm/index-dir
16K     ./cache/google-chrome/Default/Code Cache/wasm
120K    ./cache/google-chrome/Default/Code Cache/js/index-dir
307M    ./cache/google-chrome/Default/Code Cache/js
307M    ./cache/google-chrome/Default/Code Cache
8.0K    ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda/def/Code Cache/wasm/index-dir
16K     ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda/def/Code Cache/wasm
8.0K    ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda/def/Code Cache/js/index-dir
16K     ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda/def/Code Cache/js
36K     ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda/def/Code Cache
4.0K    ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda/def/Cache/Cache_Data
8.0K    ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda/def/Cache
48K     ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda/def
52K     ./cache/google-chrome/Default/Storage/ext/nmmhkkegccagdldgiimedpiccgmileda
56K     ./cache/google-chrome/Default/Storage/ext
60K     ./cache/google-chrome/Default/Storage
588K    ./cache/google-chrome/Default/Cache/Cache_Data/index-dir
328M    ./cache/google-chrome/Default/Cache/Cache_Data
328M    ./cache/google-chrome/Default/Cache

```

- for example to display top largest file of disk usage
`sysntax -sudo du -h / | sort -n -r | head -n 5`

```

chandanshankar@chandanshankar-Inspiron-5535:~$ sudo du -h / | sort -n -r | head -n 5
[sudo] password for chandanshankar:
du: cannot access '/run/user/1000/doc': Permission denied
du: cannot access '/run/user/1000/gvfs': Permission denied
du: cannot access '/proc/19235/task/19235/fd/4': No such file or directory
du: cannot access '/proc/19235/task/19235/fdinfo/4': No such file or directory
du: cannot access '/proc/19235/fd/3': No such file or directory
du: cannot access '/proc/19235/fdinfo/3': No such file or directory
1022M   /home/chandanshankar/Downloads/[FreeAllCourse.Com] Udemy - MERN Stack Master Course - Building your own Instagram/9. Adding profile
& Deploy
1021K   /snap/core18/2538/usr/lib/python3.6/pydoc_data
1021K   /snap/core18/2409/usr/lib/python3.6/pydoc_data
1021K   /snap/arduino/70/hardware/tools/avr/avr/lib/avrnxmega4
1020K   /usr/share/speech-dispatcher
chandanshankar@chandanshankar-Inspiron-5535:~$

```

Systemd

- Systemd is a system and service manager for Linux operating systems. Systemd units are the building blocks of systemd. These units are represented by unit configuration files.

Command	Description
<code>systemctl start name.service</code>	To Start a service
<code>systemctl stop name.service</code>	To stop a service
<code>systemctl restart name.service</code>	To restart an service
<code>systemctl status name.service</code>	To check an status
<code>systemctl reload name.service</code>	To reload an service

- to example – systemctl start jenkins (to start jenkins)

Logs

/var/log*

- store the log related to demon process along with system logs

some important log are

- var/log/messages – contain a log related to system error, system booting, shutdown, system configuration changes etc
- var/log/authlog – containd system authoraztoion related log
- var/log/lastlog – contains a recent login information of all the users
- dmesg – contain kernel log

Linux Networking

it will contain some topics like

- DNS
- UPD
- HTTP
- TCP
- IP Routing

DNS

- Domain Names are the simple human-readable names for websites.
- The Internet understands only IP addresses, but since memorizing incoherent numbers is not practical, domain names are used instead.
- These domain names are translated into IP addresses by the DNS infrastructure. When somebody tries to open www.chandan.club in the browser,

we need to what happen inside **getipAddress** function

```
ip, err = getIPAddress(domainName)
```

```
if err:
```

```
print("unknown Host Exception while trying to resolve:%s".format(domainName))
```

- The browser would have a DNS cache of its own where it checks if there is a mapping for the domainName to an IP Address already available, in which case the browser uses that IP address.
- If no such mapping exists, the browser calls gethostbyname syscall to ask the operating system to find the IP address for the given domainName

```
def getIPAddress(domainName):
```

```
    resp, fail = lookupCache(domainName)
```

```
    If not fail:
```

```
        return resp
```

```
    else:
```

```
        resp, err = gethostbyname(domainName)
```

```
        if err:
```

```
            return null, err
```

```
        else:
```

```
            return resp
```

- operating system kernel does when the [gethostbyname](#) function is called. The Linux operating system looks at the file [/etc/nsswitch.conf](#) file which usually has a line
- This line means the OS has to look up first in file (/etc/hosts) and then use DNS protocol to do the resolution if there is no match in /etc/hosts.
- If this DNS get domain name it add into etc/hosts of format

example

199.7.83.42 [www.chandan.club](#)

we can get DNS and name server related data using this command

syntax - dig +trace chandan.club


```

chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ dig +trace chandan.club
; <<>> DiG 9.16.1-Ubuntu <<>> +trace chandan.club
;; global options: +cmd
.      80749    IN      NS      g.root-servers.net.
.      80749    IN      NS      d.root-servers.net.
.      80749    IN      NS      m.root-servers.net.
.      80749    IN      NS      i.root-servers.net.
.      80749    IN      NS      b.root-servers.net.
.      80749    IN      NS      h.root-servers.net.
.      80749    IN      NS      k.root-servers.net.
.      80749    IN      NS      j.root-servers.net.
.      80749    IN      NS      a.root-servers.net.
.      80749    IN      NS      e.root-servers.net.
.      80749    IN      NS      l.root-servers.net.
.      80749    IN      NS      c.root-servers.net.
.      80749    IN      NS      f.root-servers.net.
;; Received 262 bytes from 127.0.0.53#53(127.0.0.53) in 3 ms

club.  172800    IN      NS      a.nic.club.
club.  172800    IN      NS      b.nic.club.
club.  172800    IN      NS      c.nic.club.
club.  172800    IN      NS      ns1.dns.nic.club.
club.  172800    IN      NS      ns2.dns.nic.club.
club.  172800    IN      NS      ns3.dns.nic.club.
club.  86400     IN      DS      20392 8 2 1F1EBACD947952CE4DF8A80045EC37D088A49B72618FEB92B91229DE 4D31B7B4
club.  86400     IN      RRSIG   DS 8 1 86400 20220907200000 20220825190000 20826 . LUOTcaN+CrMs/3ocDN682xNKxAcMhKua2NT6vhBQFmQQ
UF172cTjofI ikr7qKdTCbT1as5wvvHJsMZncM2NT/PveQH+kaRKzjqGs5ZuUjUFBwND TDRzBC0nKyYbEou20N5Hnz9q0Mrqjdk04/Ka1RLfEMUN28qrw7rku2u1 XvfNspH1YiTzs/2QTz
RLyRSZ7uuZeHs0dSsNUOHZAuebzkHApqg0+565 bCB5IvG7gJg6G/YglUBPdWPhkCo6jV8M2qgLKkav8N+wbrjaTiynK3d OrHMuCZ1zeWr8CCqk+u1RQgan0u+h7JbCmPWJmtpN+Yr93bd
ldYnk3oA hb4t9Q==
;; Received 750 bytes from 199.7.83.42#53(l.root-servers.net) in 19 ms

chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ dig NS chandan.club
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ dig NS chandan.club +short
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$

```

```

;; Received 689 bytes from 37.209.196.10#53(c.nic.club) in 27 ms

chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ dig NS chandan.club +short
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$

```

- in this command we can get name server data basically my chandan.club is under domaincontrol.com i managed my DNS in Godaddy
- another way to get name server in linux
command - dig NS chandan.club +short

```

chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ dig NS chandan.club +short
ns22.domaincontrol.com.
ns21.domaincontrol.com.
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$

```

To get ip of an DNS domain name
command - dig A chandan.club +short

```

chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ dig A chandan.club +short
3.85.226.156
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$

```

- in this command i get A record of my DNS

- like this way we can get an AAAA record of a my domain
command – dig AAAA chandan.club +short
- to get an CNAME of an my domain
command - dig chandan.club CNAME +short

UDP

- UDP is a transport layer protocol.
- DNS is an application layer protocol that runs on top of UDP
- UDP is one of the simplest transport layer protocol
- And it does only multiplexing and demultiplexing.

HTTP

- The HTML page of chandan.club is served by HTTP protocol which the browser renders.
- Browser sends a HTTP request to the IP of the server determined above

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ curl chandan.club
<html>
<head><title>404 Not Found</title></head>
<body>
<center><h1>404 Not Found</h1></center>
<hr><center>nginx/1.18.0 (Ubuntu)</center>
</body>
</html>
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ curl google.com
<HTML><HEAD><meta http-equiv="content-type" content="text/html; charset=utf-8">
<TITLE>301 Moved</TITLE></HEAD><BODY>
<H1>301 Moved</H1>
The document has moved
<A HREF="http://www.google.com/">here</A>.
</BODY></HTML>
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

if we run curl with https we get all the details of ssl and host relates data

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ curl https://kandkindustry.in/ -v
* Trying 3.85.226.156:443...
* TCP_NODELAY set
* Connected to kandkindustry.in (3.85.226.156) port 443 (#0)
* ALPN, offering h2
* ALPN, offering http/1.1
* successfully set certificate verify locations:
* CAfile: /etc/ssl/certs/ca-certificates.crt
* CApath: /etc/ssl/certs
* TLSv1.3 (OUT), TLS handshake, Client hello (1):
* TLSv1.3 (IN), TLS handshake, Server hello (2):
* TLSv1.3 (IN), TLS handshake, Encrypted Extensions (8):
* TLSv1.3 (IN), TLS handshake, Certificate (11):
* TLSv1.3 (IN), TLS handshake, CERT verify (15):
* TLSv1.3 (IN), TLS handshake, Finished (20):
* TLSv1.3 (OUT), TLS change cipher, Change cipher spec (1):
* TLSv1.3 (OUT), TLS handshake, Finished (20):
* SSL connection using TLSv1.3 / TLS_AES_256_GCM_SHA384
* ALPN, server accepted to use http/1.1
```

telnet command - can be used to open a command line on a remote computer, typically a server

syntax - telnet chandan.club 80

```
</BODY></HTML>
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ telnet chandan.club 80
Trying 3.85.226.156...
Connected to chandan.club.
Escape character is '^]'.
Connection closed by foreign host.
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

terminal to see the cert details like Subject Name(domain name), Issuer details, Expiry date

syntax - curl chandan.club -v

```
Connection closed by foreign host.
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ curl chandan.club -v
* Trying 3.85.226.156:80...
* TCP_NODELAY set
* Connected to chandan.club (3.85.226.156) port 80 (#0)
> GET / HTTP/1.1
> Host: chandan.club
> User-Agent: curl/7.68.0
> Accept: */*
>
* Mark bundle as not supporting multiuse
< HTTP/1.1 404 Not Found
< Server: nginx/1.18.0 (Ubuntu)
< Date: Fri, 26 Aug 2022 09:44:43 GMT
< Content-Type: text/html
< Content-Length: 162
< X-Cache: MISS from tg41f569
< X-Cache-Lookup: MISS from tg41f569:3120
< Via: 1.1 tg41f569 (squid/4.11)
< Connection: keep-alive
<
<html>
<head><title>404 Not Found</title></head>
<body>
<center><h1>404 Not Found</h1></center>
<hr><center>nginx/1.18.0 (Ubuntu)</center>
</body>
</html>
* Connection #0 to host chandan.club left intact
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

TCP

- TCP is a transport layer protocol like UDP but it guarantees reliability, flow control and congestion control.
- TCP guarantees reliable delivery by using sequence numbers.
- A TCP connection is established by a three way handshake.

understand handshake run packet capture on one bash session

command - sudo tcpdump host 3.85.226.156 -v

```
(SIOCGIFHWADDR: No such device)
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ sudo tcpdump host 3.85.226.156 -v
tcpdump: listening on docker_gwbridge, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```

basically this is not serving that way all are zero

IP Routing and Data Link Layer

- When the packet reaches the IP layer, the transport layer populates source port, destination port. IP/Network layer populates destination IP(discovered from DNS) and then looks up the route to the destination IP on the routing table.

Command `Route -n`

gives the default routing table

```
-bash: iftop: command not found
[ec2-user@ip-12-0-0-34 ~]$ route -n
Kernel IP routing table
Destination      Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0          12.0.0.1       0.0.0.0         UG    0      0      0 eth0
12.0.0.0         0.0.0.0        255.255.255.0   U      0      0      0 eth0
169.254.169.254 0.0.0.0        255.255.255.255 UH     0      0      0 eth0
[ec2-user@ip-12-0-0-34 ~]$
```

SS Command

- The socket statistics command (ss) displays information about network sockets on the system
- command to display - `ss -ltn`

```
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$ ss -ltn
State      Recv-Q      Send-Q      Local Address:Port      Peer Address:Port      Process
LISTEN     0            4096        127.0.0.1:9323          0.0.0.0:*
LISTEN     0            4096        127.0.0.1:37675        0.0.0.0:*
LISTEN     0            4096        127.0.0.53%lo:53       0.0.0.0:*
LISTEN     0            5          127.0.0.1:631          0.0.0.0:*
LISTEN     0            10         0.0.0.0:7071           0.0.0.0:*
LISTEN     0            4096        *:2377                 **
LISTEN     0            4096        *:7946                  **
LISTEN     0            5          [:::]:631              [:::]*
LISTEN     0            4096        *:3000                  **
LISTEN     0            100        *:8090                   **
LISTEN     0            4096        *:9090                   **
chandanshankar@chandanshankar-Inspiron-5535:~/sre/chandan/chandan$
```