DHRUV GARG 16 BCE 1190

NETWORK AND COMMUNICATION

LAB 1

AIM: To understand and implement the basic commands used in networks.

1. Ifconfig

SYNTAX: ifconfig [-v] [-a] [-s] [*interface*]

PURPOSE: Ifconfig is used to configure the kernel-resident network interfaces. It is used at boot time to set up interfaces as necessary. After that, it is usually only needed when debugging or when system tuning is needed. If no arguments are given, ifconfig displays the status of the currently active interfaces. If a single interface argument is given, it displays the status of the given interface only; if a single -a argument is given, it displays the status of all interfaces, even those that are down. Otherwise, it configures an interface.

```
lab1@vit-ThinkCentre-M710q ~ $ ifconfig
enp0s31f6 Link encap:Ethernet  HWaddr 6c:4b:90:0b:c7:09
          inet addr:172.16.11.18  Bcast:172.16.11.255  Mask:255.255.254.0
          inet6 addr: fe80::2ec7:202:be3f:2acc/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:102226 errors:0 dropped:0 overruns:0 frame:0
          TX packets:23021 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:37834933 (37.8 MB)  TX bytes:3518399 (3.5 MB)
          Interrupt:16 Memory:f7100000-f7120000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:3118 errors:0 dropped:0 overruns:0 frame:0
          TX packets:3118 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:290239 (290.2 KB)  TX bytes:290239 (290.2 KB)

vmnet1    Link encap:Ethernet  HWaddr 00:50:56:c0:00:01
          inet addr:172.16.192.1  Bcast:172.16.192.255  Mask:255.255.255.0
          inet6 addr: fe80::250:56ff:fec0:1/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:85 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

```
vmnet8    Link encap:Ethernet  HWaddr 00:50:56:c0:00:08
          inet addr:172.16.226.1  Bcast:172.16.226.255  Mask:255.255.255.0
          inet6 addr: fe80::250:56ff:fec0:8/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:85 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

wlp1s0    Link encap:Ethernet  HWaddr 3c:f8:62:a8:7d:84
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

2. Ping

SYNTAX: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS] [-r count] [-s count] [[-j host-list] | [-k host-list]] [-w timeout] [-R] [-S srcaddr] [-4] [-6 target_name]

PURPOSE: The ping command helps to verify IP-level connectivity. When troubleshooting, you can use ping to send an ICMP echo request to a target host name or IP address. Use ping whenever you need to verify that a host computer can connect to the TCP/IP network and network resources. You can also use ping to isolate network hardware problems and incompatible configurations.

```
lab1@vit-ThinkCentre-M710q ~ $ ping
Usage: ping [-aAbBdDfhLnOqrRUvV] [-c count] [-i interval] [-I interface]
            [-m mark] [-M pmtudisc_option] [-l preload] [-p pattern] [-Q tos]
            [-s packetsize] [-S sndbuf] [-t ttl] [-T timestamp_option]
            [-w deadline] [-W timeout] [hop1 ...] destination
```

3. Netstat

SYNTAX: netstat [-a] [-b] [-e] [-f] [-n] [-o] [-p proto] [-r] [-s] [-x] [-t] [interval]

PURPOSE: The netstat command provides the following information: active TCP connections on the local host, the state of all TCP/IP servers on the local host and the sockets used by them, devices and links used by TCP/IP, the IP routing tables (gateway tables) in use by this local host.

```
                                                                Terminal - lab1
 File  Edit  View  Terminal  Tabs  Help
lab1@vit-ThinkCentre-M710q ~ $ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 172.16.11.18:47540      maa03s18-in-f2.1e:https ESTABLISHED
tcp        0      0 172.16.11.18:50688      maa03s29-in-f3.1e:https ESTABLISHED
tcp        0      0 172.16.11.18:42310      maa03s23-in-f14.1:https ESTABLISHED
tcp        0      0 172.16.11.18:41164      maa03s28-in-f3.1e:https ESTABLISHED
tcp        0      0 172.16.11.18:41186      maa03s23-in-f4.1e:https ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  2      [ ]         DGRAM                    23089    /run/user/1001/system
d/notify
unix  3      [ ]         DGRAM                    530      /run/systemd/notify
unix  19     [ ]         DGRAM                    536      /run/systemd/journal/
dev-log
unix  6      [ ]         DGRAM                    540      /run/systemd/journal/
socket
unix  2      [ ]         DGRAM                    10101    /run/systemd/journal/
syslog
unix  2      [ ]         DGRAM                    19908    /run/wpa_supplicant/w
lp1s0
unix  2      [ ]         DGRAM                    21864    /run/wpa_supplicant/p
2p-dev-wlp1s0
unix  3      [ ]         STREAM     CONNECTED     25729
unix  3      [ ]         STREAM     CONNECTED     24843    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     24141    @/tmp/.ICE-unix/1902
unix  3      [ ]         STREAM     CONNECTED     26035    /run/systemd/journal/
stdout
unix  3      [ ]         STREAM     CONNECTED     25877
unix  3      [ ]         STREAM     CONNECTED     19606
unix  3      [ ]         STREAM     CONNECTED     24018
unix  3      [ ]         STREAM     CONNECTED     24162
unix  3      [ ]         STREAM     CONNECTED     25369
unix  2      [ ]         DGRAM                    27656
unix  3      [ ]         STREAM     CONNECTED     25635    @/tmp/dbus-k88ajf18xV
unix  3      [ ]         STREAM     CONNECTED     25108
unix  3      [ ]         STREAM     CONNECTED     25043    @/tmp/dbus-Xgpi8XIarS
unix  3      [ ]         STREAM     CONNECTED     24979    @/tmp/dbus-Xgpi8XIarS
unix  3      [ ]         STREAM     CONNECTED     25629    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     33771
unix  3      [ ]         STREAM     CONNECTED     26877    @/tmp/dbus-Xgpi8XIarS
unix  2      [ ]         DGRAM                    18386
unix  3      [ ]         STREAM     CONNECTED     35424    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     36131
unix  3      [ ]         STREAM     CONNECTED     20471
unix  3      [ ]         STREAM     CONNECTED     25731
unix  3      [ ]         STREAM     CONNECTED     23427
unix  3      [ ]         STREAM     CONNECTED     21461    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     25109
unix  3      [ ]         STREAM     CONNECTED     36448
unix  3      [ ]         STREAM     CONNECTED     21367    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     24568
unix  3      [ ]         STREAM     CONNECTED     24831    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     23318
```

4. Dig

SYNTAX: dig [@server] [-b *address*] [-c *class*] [-f *filename*] [-k *filename*] [-m] [-p *port#*] [-t *type*] [-x *addr*] [-y *name:key*] [-4] [-6] [name] [type] [class] [queryopt...]

PURPOSE: dig (domain information groper) is a flexible tool for interrogating DNS name servers. It performs DNS lookups and displays the answers that are returned from the name server(s) that were queried. Most DNS administrators use dig to troubleshoot DNS problems because of its flexibility, ease of use and clarity of output. Other lookup tools tend to have less functionality than dig.

```
lab1@vit-ThinkCentre-M710q ~ $ dig

; <<>> DiG 9.10.3-P4-Ubuntu <<>>
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 41250
;; flags: qr rd ra; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 14

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4000
;; QUESTION SECTION:
;.                              IN      NS

;; ANSWER SECTION:
.                       84601   IN      NS      a.root-servers.net.
.                       84601   IN      NS      b.root-servers.net.
.                       84601   IN      NS      c.root-servers.net.
.                       84601   IN      NS      d.root-servers.net.
.                       84601   IN      NS      e.root-servers.net.
.                       84601   IN      NS      f.root-servers.net.
.                       84601   IN      NS      g.root-servers.net.
.                       84601   IN      NS      h.root-servers.net.
.                       84601   IN      NS      i.root-servers.net.
.                       84601   IN      NS      j.root-servers.net.
.                       84601   IN      NS      k.root-servers.net.
.                       84601   IN      NS      l.root-servers.net.
.                       84601   IN      NS      m.root-servers.net.
```

```
;; ADDITIONAL SECTION:
a.root-servers.net.     84601   IN      A       198.41.0.4
b.root-servers.net.     85241   IN      A       199.9.14.201
c.root-servers.net.     85536   IN      A       192.33.4.12
d.root-servers.net.     85641   IN      A       199.7.91.13
e.root-servers.net.     85733   IN      A       192.203.230.10
f.root-servers.net.     86109   IN      A       192.5.5.241
g.root-servers.net.     86119   IN      A       192.112.36.4
h.root-servers.net.     10902   IN      A       198.97.190.53
i.root-servers.net.     86181   IN      A       192.36.148.17
j.root-servers.net.     20402   IN      A       192.58.128.30
k.root-servers.net.     9108    IN      A       193.0.14.129
l.root-servers.net.     86230   IN      A       199.7.83.42
m.root-servers.net.     86356   IN      A       202.12.27.33

;; Query time: 0 msec
;; SERVER: 127.0.1.1#53(127.0.1.1)
```

5. Nslookup

SYNTAX: nslookup [- option] [name | -] [server]

PURPOSE: The nslookup command queries internet domain name servers in two modes. Interactive mode allows you to query name servers for information about various hosts and domains, or to print a list of the hosts in a domain. In noninteractive mode, the names and requested information are printed for a specified host or domain.

```
lab1@vit-ThinkCentre-M710q ~ $ nslookup google.com
Server:         127.0.1.1
Address:        127.0.1.1#53

Non-authoritative answer:
Name:   google.com
Address: 216.58.197.78
```

6. Ps

SYNTAX: ps [options]

PURPOSE: The ps (i.e., process status) command is used to provide information about the currently running processes, including their process identification numbers (PIDs). A process, is an executing (i.e., running) instance of a program. When ps is used without any options, it sends to standard output, four items of information for at least two processes currently on the system: the shell and ps. The four items are labelled PID, TTY, TIME and CMD. TIME is the amount of CPU (central processing unit) time in minutes and seconds that the process has been running. CMD is the name of the command that launched the process.

```
$ ps -f -u www-data
UID        PID  PPID  C STIME TTY          TIME CMD
www-data  1329  1328  0 09:32 ?        00:00:00 nginx: worker process
www-data  1330  1328  0 09:32 ?        00:00:00 nginx: worker process
www-data  1332  1328  0 09:32 ?        00:00:00 nginx: worker process
www-data  1377  1372  0 09:32 ?        00:00:00 php-fpm: pool a.localhost
www-data  1378  1372  0 09:32 ?        00:00:00 php-fpm: pool a.localhost
www-data  4524  2359  0 10:03 ?        00:00:00 /usr/sbin/apache2 -k start
www-data  4527  2359  0 10:03 ?        00:00:00 /usr/sbin/apache2 -k start
www-data  4528  2359  0 10:03 ?        00:00:00 /usr/sbin/apache2 -k start
```

7. Bg

SYNTAX: bg [job]

PURPOSE: Specifies the job that you want to run in the background. Job number 1 is referred to as %1, job number 2 is referred to as %2, etc. “bg” is a job control command that resumes suspended jobs while keeping them running in the background. The stopped job will resume operation, but remain in the background. It will not receive any input from the terminal while it's in the background, but it will keep running, and you can continue to use the shell from the command line.

```
vmdhruv@ubuntu:~$ gedit lab1.txt &
[1] 2188
vmdhruv@ubuntu:~$ bg
bash: bg: job 1 already in background
```

8. Fg

SYNTAX: fg jobID OR fg jobID1 jobID2 ... jobIDN
PURPOSE: The fg command moves a background job in the current shell environment into the foreground. Typing fg will resume the most recently suspended or backgrounded job. For example, fg 1 will bring the job with the id 1 into the foreground, resuming it if it was suspended.

```
vmdhruv@ubuntu:~$ gedit hello.c &
[2] 2463
vmdhruv@ubuntu:~$ fg
bash: fg: job has terminated
[2]+  Done                    gedit hello.c
vmdhruv@ubuntu:~$
```

9. Passwd

SYNTAX: passwd [OPTION] [USER]
PURPOSE: The passwd command is used to change the password of a user account. A normal user can run passwd to change their own password, and a system administrator (the superuser) can use passwd to change another user's password, or define how that account's password can be used or changed. You will first be prompted to enter the account's current password, if it is correct, you will then be asked to enter a new password twice. If the new passwords match, the password will be changed.

```
lab1@vit-ThinkCentre-M710q ~ $ passwd
Changing password for lab1.
(current) UNIX password:
passwd: Authentication token manipulation error
passwd: password unchanged
```

10. Top

SYNTAX: top -hv | -bcHisS -d delay -n limit -u|U user | -p pid -w [cols]
PURPOSE: The top program provides a dynamic real-time view of a running system. It can display system summary information, as well as a list of processes or threads currently being managed by the kernel. The types of system summary information shown and the types, order and size of information displayed for tasks are all user-configurable.