Assignment Name: Linux Networking Commands.

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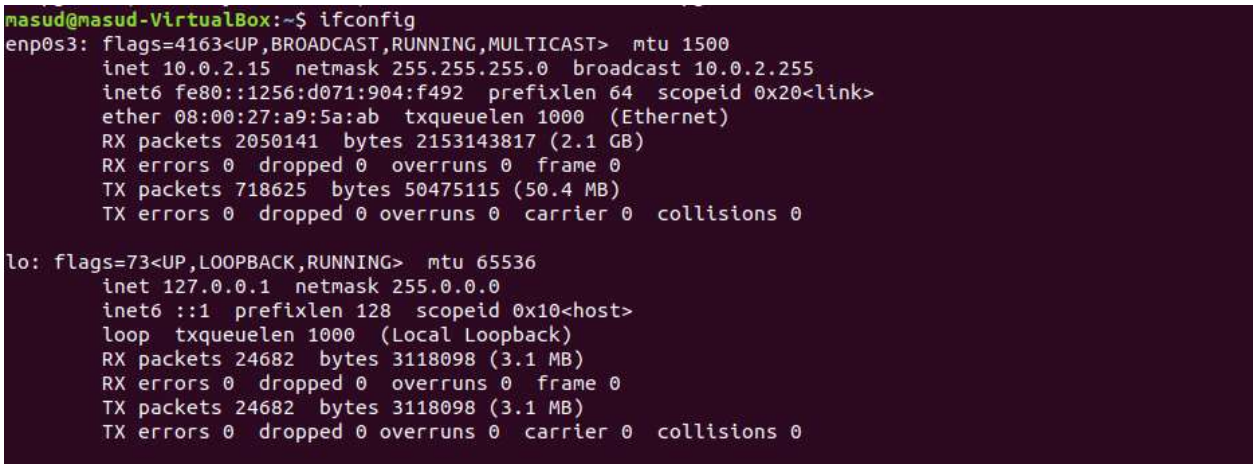
Ifconfig: This command is used to configure network interfaces, or to display their current configuration. In addition to activating and deactivating interfaces with the "up" and "down" settings, this command is necessary for setting an interface's address information if you don't have the ifcfg script.



Ping: The ping command (named after the sound of an active sonar system) sends echo requests to the host you specify on the command line, and lists the responses received their round trip time. PING (Packet INternet Groper) command is the best way to test connectivity between two nodes. Whether it is Local Area Network (LAN) or Wide Area Network (WAN). Ping use ICMP (Internet Control Message Protocol) to communicate to other devices. You can ping host name of ip address using below command.

```
masud@masud-VirtualBox:~$ ping www.google.com
PING www.google.com (216.58.200.132) 56(84) bytes of data.
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=2 ttl=116 time=198 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=3 ttl=116 time=50.3 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=4 ttl=116 time=46.5 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=5 ttl=116 time=47.8 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=6 ttl=116 time=47.2 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=7 ttl=116 time=47.3 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=8 ttl=116 time=94.2 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=9 ttl=116 time=45.0 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=10 ttl=116 time=46.9 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=11 ttl=116 time=47.8 ms
64 bytes from maa05s10-in-f4.1e100.net (216.58.200.132): icmp_seq=12 ttl=116 time=48.5 ms
```

tcpdump: This is a sniffer, a program that captures packets off a network interface and interprets them for you. It understands all basic internet protocols, and can be used to save entire packets for later inspection.

nmap: “ network exploration tool and security scanner”. nmap is a very advanced network tool used to query machines (local or remote) as to whether they are up and what ports are open on these machines.

Dig: Dig (domain information groper) query DNS related information like A Record, CNAME, MX Record etc. This command mainly use to troubleshoot DNS related query.

```
masud@masud-VirtualBox:~$ dig google.com

; <<>> DiG 9.11.3-1ubuntu1.13-Ubuntu <<>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 59949
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

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

;; ANSWER SECTION:
google.com.             61      IN      A       172.217.160.142

;; Query time: 8 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Wed Nov 04 01:21:43 +06 2020
;; MSG SIZE  rcvd: 55
```

nslookup: nslookup command also use to find out DNS related query. The following examples shows A Record (IP Address) of tecmint.com.

```
masud@masud-VirtualBox:~$ nslookup google.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 172.217.160.142
Name:   google.com
Address: 2404:6800:4007:80a::200e
```

host: host command to find name to IP or IP to name in IPv4 or IPv6 and also query DNS records.

```
masud@masud-VirtualBox:~$ host amazon.com
amazon.com has address 176.32.103.205
amazon.com has address 176.32.98.166
amazon.com has address 205.251.242.103
amazon.com mail is handled by 5 amazon-smtp.amazon.com.
```

hostname: hostname is to identify in a network. Execute hostname command to see the hostname of your box. You can set hostname permanently in /etc/sysconfig/network. Need to reboot box once set a proper hostname.

```
masud@masud-VirtualBox:~$ hostname -f
masud-VirtualBox
```

route: The route command is the tool used to display or modify the routing table. To add a gateway as the default you would type:

```
masud@masud-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
169.254.0.0     0.0.0.0         255.255.0.0     U     1000   0        0 enp0s3
```

traceroute: traceroute will show the route of a packet. It attempts to list the series of hosts through which your packets travel on their way to a given destination.

Also have a look at xtraceroute (one of several graphical equivalents of this program). traceroute is a network troubleshooting utility which shows number of hops taken to reach destination also determine packets traveling path. Below we are tracing route to global DNS server IP Address and able to reach destination also shows path of that packet is traveling.

```
masud@masud-VirtualBox:~$ traceroute google.com
traceroute to google.com (172.217.160.142), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  3.332 ms  3.154 ms  2.891 ms
 2  * * *
 3  * * *
 4  * * *
 5  * * *
```

netstat: Displays contents of /proc/net files. It works with the Linux Network Subsystem, it will tell you what the status of ports are ie. open, closed, waiting, masquerade connections. It will also display various other things. It has many different options. Netstat (Network Statistic) command display connection info, routing table information etc. To displays routing table information use option as –r.

```
masud@masud-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  2      [ ]         DGRAM                    24474    /run/user/1000/systemd/notify
unix  2      [ ]         DGRAM                    21209    /run/user/121/systemd/notify
unix  3      [ ]         DGRAM                    12705    /run/systemd/notify
unix  2      [ ]         DGRAM                    12713    /run/systemd/journal/syslog
unix  9      [ ]         DGRAM                    12718    /run/systemd/journal/socket
unix  22     [ ]         DGRAM                    12794    /run/systemd/journal/dev-log
unix  3      [ ]         STREAM     CONNECTED     24687    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     23097    /run/user/121/bus
```

```
masud@masud-VirtualBox:~$ netstat -i
Kernel Interface table
Iface      MTU    RX-OK RX-ERR RX-DRP RX-OVR    TX-OK TX-ERR TX-DRP TX-OVR Flg
enp0s3    1500  2293416      0      0 0        821211      0      0      0 BMRU
lo       65536    25016      0      0 0         25016      0      0      0 LRU
```

ss: use ss command with `-t` and `-a` flags to list all TCP sockets. This displays both listening and non-listening sockets.

```
masud@masud-VirtualBox:~$ ss -t -a
State       Recv-Q       Send-Q             Local Address:Port              Peer Address:Port
LISTEN      0            80                     127.0.0.1:mysql                0.0.0.0:*
LISTEN      0            128                127.0.0.53%lo:domain               0.0.0.0:*
LISTEN      0            5                      127.0.0.1:ipp                  0.0.0.0:*
LISTEN      0            32                             *:ftp                        *:*
LISTEN      0            5                          [::1]:ipp                    [::]:*
```

tracepath: tracepath performs a very simlar function to traceroute the main difference is that tracepath doesn't take complicated options.

```
masud@masud-VirtualBox:~$ tracepath amazon.com
 1?: [LOCALHOST]                      pmtu 1500
 1:  _gateway                                              0.618ms
 1:  _gateway                                              1.008ms
 2:  no reply
 3:  _gateway                                              0.781ms !N
     Resume: pmtu 1500
```