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EX NO :1B

Linux Networking Commands

Every computer is connected to some other computer through a network whether internally or externally to exchange some information. This network can be small as some computers connected in your home or office, or can be large or complicated as in large University or the entire Internet.

Maintaining a system's network is a task of System/Network administrator. Their task includes network configuration and troubleshooting.

Here is a list of Networking and Troubleshooting commands:

<u>ifconfig</u>	Display and manipulate route and network interfaces.
<u>ip</u>	It is a replacement of ifconfig command.
<u>traceroute</u>	Network troubleshooting utility.
<u>tracpath</u>	Similar to traceroute but doesn't require root privileges.
<u>ping</u>	To check connectivity between two nodes.
<u>netstat</u>	Display connection information.
<u>ss</u>	It is a replacement of netstat.
<u>dig</u>	Query DNS related information.
<u>nslookup</u>	Find DNS related query.
<u>route</u>	Shows and manipulate IP routing table.

<u>host</u>	Performs DNS lookups.
<u>arp</u>	View or add contents of the kernel's ARP table.
<u>iwconfig</u>	Used to configure wireless network interface.

<u>hostname</u>	To identify a network name.
<u>curl or wget</u>	To download a file from internet.
<u>mtr</u>	Combines ping and tracepath into a single command.
<u>whois</u>	Will tell you about the website's whois.
<u>ifplugstatus</u>	Tells whether a cable is plugged in or not.

Explanation of the above commands:

1.ifconfig: ifconfig is short for interface configurator. This command is utilized in network inspection, initializing the interface, enabling or disabling an IP address, and configuring an interface with an IP address. Also, it is used to show the network and route interface.

The basic details shown with ifconfig are:

- MTU
- MAC address
- IP address

Syntax:

Ifconfig

```

root@ip-10-10-38-111:~# ifconfig
docker0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.17.0.1 netmask 255.255.0.0 broadcast 172.17.255.255
    inet6 fe80::42:16ff:fec8:24d5 prefixlen 64 scopeid 0x20<link>
    ether 02:42:16:c8:24:d5 txqueuelen 0 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 35 bytes 4761 (4.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ens5: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 9001
    inet 10.10.38.111 netmask 255.255.0.0 broadcast 10.10.255.255
    inet6 fe80::4a:89ff:fe31:79dd prefixlen 64 scopeid 0x20<link>
    ether 02:4a:89:31:79:dd txqueuelen 1000 (Ethernet)
    RX packets 8987 bytes 715564 (715.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 6758 bytes 4150010 (4.1 MB)
    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 15766 bytes 4686708 (4.6 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 15766 bytes 4686708 (4.6 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

veth9ddb7c8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet6 fe80::540c:a4ff:fe12:a53b prefixlen 64 scopeid 0x20<link>
    ether 56:0c:a4:12:a5:3b txqueuelen 0 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 57 bytes 7476 (7.4 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

vethf098cf2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet6 fe80::10a6:daff:fe84:d9f2 prefixlen 64 scopeid 0x20<link>
    ether 12:a6:da:84:d9:f2 txqueuelen 0 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 58 bytes 7566 (7.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

2. ip: It is the updated and latest edition of ifconfig command. The command provides the information of every network, such as ifconfig. Also, it can be used to get information about a particular interface.

Syntax:

1. ip a
2. ip addr

```
File Edit View Search Terminal Help
veth9ddb7c8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> ntu 1500
  inet6 fe80::540c:a4ff:fe12:a53b prefixlen 64 scopeid 0x20<link>
  ether 56:0c:a4:12:a5:3b txqueuelen 0 (Ethernet)
  RX packets 0 bytes 0 (0.0 B)
  RX errors 0 dropped 0 overruns 0 frame 0
  TX packets 57 bytes 7476 (7.4 KB)
  TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

vethf090cf2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> ntu 1500
  inet6 fe80::10a6:daff:fe84:d9f2 prefixlen 64 scopeid 0x20<link>
  ether 12:a6:da:84:d9:f2 txqueuelen 0 (Ethernet)
  RX packets 0 bytes 0 (0.0 B)
  RX errors 0 dropped 0 overruns 0 frame 0
  TX packets 58 bytes 7566 (7.5 KB)
  TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@ip-10-10-30-111:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> ntu 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
    valid_lft forever preferred_lft forever
2: ens5: <BROADCAST,MULTICAST,UP,LOWER_UP> ntu 9001 qdisc mq state UP group default qlen 1000
  link/ether 02:4a:89:31:79:dd brd ff:ff:ff:ff:ff:ff
  inet 10.10.30.111/16 brd 10.10.255.255 scope global dynamic ens5
    valid_lft 2768sec preferred_lft 2768sec
  inet6 fe80::4a:89ff:fe31:79dd/64 scope link
    valid_lft forever preferred_lft forever
3: docker0: <BROADCAST,MULTICAST,UP,LOWER_UP> ntu 1500 qdisc noqueue state UP group default
  link/ether 02:42:10:c8:24:d5 brd ff:ff:ff:ff:ff:ff
  inet 172.17.0.1/16 brd 172.17.255.255 scope global docker0
    valid_lft forever preferred_lft forever
  inet6 fe80::42:16ff:fec8:24d5/64 scope link
    valid_lft forever preferred_lft forever
5: vethf090cf2@if4: <BROADCAST,MULTICAST,UP,LOWER_UP> ntu 1500 qdisc noqueue master docker0 state UP group default
  link/ether 12:a6:da:84:d9:f2 brd ff:ff:ff:ff:ff:ff link-netnsid 0
  inet6 fe80::10a6:daff:fe84:d9f2/64 scope link
    valid_lft forever preferred_lft forever
7: veth9ddb7c8@if6: <BROADCAST,MULTICAST,UP,LOWER_UP> ntu 1500 qdisc noqueue master docker0 state UP group default
  link/ether 56:0c:a4:12:a5:3b brd ff:ff:ff:ff:ff:ff link-netnsid 1
  inet6 fe80::540c:a4ff:fe12:a53b/64 scope link
    valid_lft forever preferred_lft forever
root@ip-10-10-30-111:~#
```

3.traceroute: The traceroute command is one of the most helpful commands in the networking field. It's used to balance the network. It identifies the delay and decides the pathway to our target. Basically, it aids in the below ways:

- It determines the location of the network latency and informs it.
- It follows the path to the destination.
- It gives the names and recognizes all devices on the path.

Syntax:

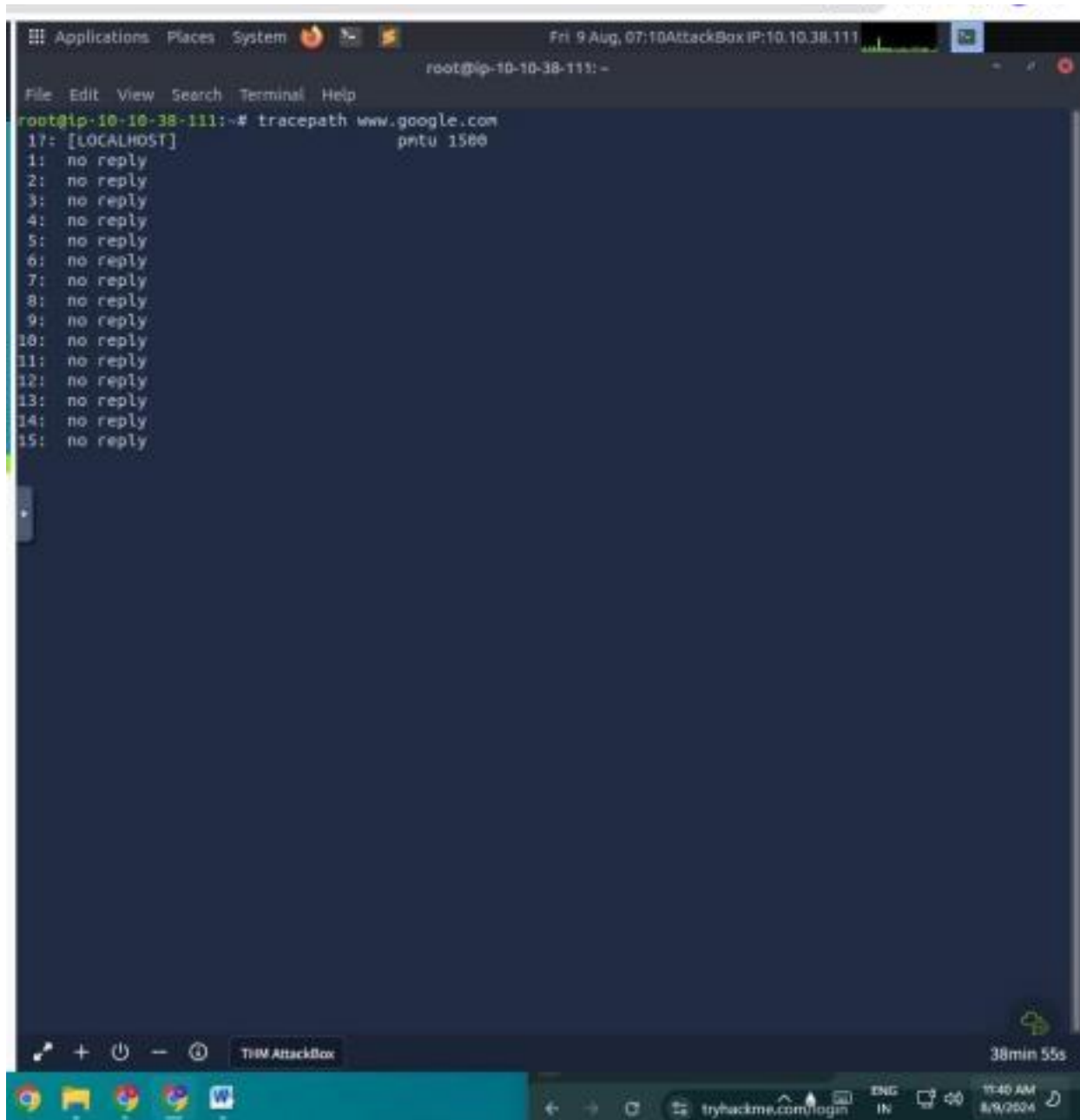
traceroute <destination>

```
root@tp-10-10-38-111:~# traceroute www.google.com
traceroute to www.google.com (209.85.202.104), 30 hops max, 60 byte packets
 1  * * *
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
```

4. **tracpath:** The tracpath command is the same as the traceroute command, and it is used to find network delays. Besides, it does not need root privileges. By default, it comes pre-installed in Ubuntu. It traces the path to the destination and recognizes all hops in it. It identifies the point at which the network is weak if our network is not strong enough.

Syntax:

tracpath <destination>

A screenshot of a Kali Linux terminal window. The window title bar shows 'Applications Places System' and the date 'Fri 9 Aug, 07:10'. The terminal prompt is 'root@ip-10-10-38-111: ~'. The command 'tracepath www.google.com' has been executed. The output shows the path from the local host to the destination, with 15 hops. All hops from 1 to 15 are marked as 'no reply'. The terminal window has a menu bar with 'File Edit View Search Terminal Help' and a taskbar at the bottom with various application icons and system status indicators.

```
root@ip-10-10-38-111:~# tracepath www.google.com
17: [LOCALHOST] pmtu 1500
 1: no reply
 2: no reply
 3: no reply
 4: no reply
 5: no reply
 6: no reply
 7: no reply
 8: no reply
 9: no reply
10: no reply
11: no reply
12: no reply
13: no reply
14: no reply
15: no reply
```

5. **ping:** It is short for Packet Internet Groper. The ping command is one of the widely used commands for network troubleshooting. Basically, it inspects the network connectivity between two different nodes.

Syntax:

ping <destination>


```
root@ip-10-10-38-111:~# ping 10.10.38.
ping: 10.10.38.: Name or service not known
root@ip-10-10-38-111:~# ping 10.10.38.111
PING 10.10.38.111 (10.10.38.111) 56(84) bytes of data:
64 bytes from 10.10.38.111: icmp_seq=1 ttl=64 time=0.042 ms
64 bytes from 10.10.38.111: icmp_seq=2 ttl=64 time=0.037 ms
64 bytes from 10.10.38.111: icmp_seq=3 ttl=64 time=0.027 ms
64 bytes from 10.10.38.111: icmp_seq=4 ttl=64 time=0.029 ms
64 bytes from 10.10.38.111: icmp_seq=5 ttl=64 time=0.023 ms
64 bytes from 10.10.38.111: icmp_seq=6 ttl=64 time=0.044 ms
64 bytes from 10.10.38.111: icmp_seq=7 ttl=64 time=0.025 ms
64 bytes from 10.10.38.111: icmp_seq=8 ttl=64 time=0.027 ms
64 bytes from 10.10.38.111: icmp_seq=9 ttl=64 time=0.032 ms
64 bytes from 10.10.38.111: icmp_seq=10 ttl=64 time=0.025 ms
64 bytes from 10.10.38.111: icmp_seq=11 ttl=64 time=0.035 ms
64 bytes from 10.10.38.111: icmp_seq=12 ttl=64 time=0.029 ms
64 bytes from 10.10.38.111: icmp_seq=13 ttl=64 time=0.041 ms
64 bytes from 10.10.38.111: icmp_seq=14 ttl=64 time=0.044 ms
64 bytes from 10.10.38.111: icmp_seq=15 ttl=64 time=0.039 ms
64 bytes from 10.10.38.111: icmp_seq=16 ttl=64 time=0.030 ms
64 bytes from 10.10.38.111: icmp_seq=17 ttl=64 time=0.040 ms
64 bytes from 10.10.38.111: icmp_seq=18 ttl=64 time=0.027 ms
64 bytes from 10.10.38.111: icmp_seq=19 ttl=64 time=0.042 ms
64 bytes from 10.10.38.111: icmp_seq=20 ttl=64 time=0.042 ms
64 bytes from 10.10.38.111: icmp_seq=21 ttl=64 time=0.027 ms
64 bytes from 10.10.38.111: icmp_seq=22 ttl=64 time=0.025 ms
64 bytes from 10.10.38.111: icmp_seq=23 ttl=64 time=0.037 ms
64 bytes from 10.10.38.111: icmp_seq=24 ttl=64 time=0.042 ms
64 bytes from 10.10.38.111: icmp_seq=25 ttl=64 time=0.101 ms
64 bytes from 10.10.38.111: icmp_seq=26 ttl=64 time=0.028 ms
64 bytes from 10.10.38.111: icmp_seq=27 ttl=64 time=0.043 ms
64 bytes from 10.10.38.111: icmp_seq=28 ttl=64 time=0.025 ms
64 bytes from 10.10.38.111: icmp_seq=29 ttl=64 time=0.032 ms
64 bytes from 10.10.38.111: icmp_seq=30 ttl=64 time=0.031 ms
64 bytes from 10.10.38.111: icmp_seq=31 ttl=64 time=0.047 ms
^C
--- 10.10.38.111 ping statistics ---
31 packets transmitted, 31 received, 0% packet loss, time 30723ms
rtt min/avg/max/mdev = 0.023/0.038/0.101/0.027 ms
root@ip-10-10-38-111:~#
```

6.

netstat: It is short for network statistics. It gives statistical figures of many interfaces, which contain open sockets, connection information, and routing tables.

Syntax:

Netstat

```

root@ip-10-10-38-111: ~
File Edit View Search Terminal Help
unix 3 [ ] STREAM CONNECTED 30757 @/tmp/dbus-syGt6L3FW9
unix 3 [ ] STREAM CONNECTED 29383 /run/systemd/journal/stdout
unix 3 [ ] STREAM CONNECTED 28959 /run/systemd/journal/stdout
unix 3 [ ] STREAM CONNECTED 63562
unix 3 [ ] STREAM CONNECTED 36129
unix 3 [ ] STREAM CONNECTED 25464 /var/run/dbus/system_bus_socket
unix 3 [ ] STREAM CONNECTED 27535
unix 3 [ ] STREAM CONNECTED 29397 /run/systemd/journal/stdout
unix 2 [ ] DGRAM 32416
unix 3 [ ] STREAM CONNECTED 29811
unix 3 [ ] STREAM CONNECTED 29148
unix 3 [ ] STREAM CONNECTED 24921
unix 3 [ ] STREAM CONNECTED 25382
unix 3 [ ] STREAM CONNECTED 27080
unix 3 [ ] STREAM CONNECTED 27351
unix 2 [ ] DGRAM 22833
unix 3 [ ] STREAM CONNECTED 30767 @/tmp/dbus-syGt6L3FW9
unix 3 [ ] STREAM CONNECTED 29605
unix 3 [ ] STREAM CONNECTED 27138
unix 2 [ ] DGRAM 25476
unix 3 [ ] STREAM CONNECTED 19423 /var/run/dbus/system_bus_socket
unix 3 [ ] STREAM CONNECTED 32978
unix 3 [ ] STREAM CONNECTED 29381
unix 3 [ ] STREAM CONNECTED 34353
unix 3 [ ] STREAM CONNECTED 30112 /run/systemd/journal/stdout
unix 3 [ ] STREAM CONNECTED 29382 /run/systemd/journal/stdout
unix 3 [ ] STREAM CONNECTED 27022 /run/systemd/journal/stdout
unix 3 [ ] STREAM CONNECTED 18837 /var/run/dbus/system_bus_socket
unix 3 [ ] STREAM CONNECTED 29776 @/tmp/dbus-syGt6L3FW9
unix 3 [ ] STREAM CONNECTED 27866 @/tmp/dbus-syGt6L3FW9
unix 3 [ ] DGRAM 17050
unix 3 [ ] SEQPACKET CONNECTED 63556
unix 3 [ ] STREAM CONNECTED 30734
unix 3 [ ] STREAM CONNECTED 29785
unix 3 [ ] STREAM CONNECTED 29150 @/tmp/dbus-syGt6L3FW9
unix 3 [ ] STREAM CONNECTED 27005
unix 3 [ ] STREAM CONNECTED 17677
unix 3 [ ] STREAM CONNECTED 33137
unix 3 [ ] STREAM CONNECTED 28112 @/tmp/dbus-SetFr4GY3I
unix 3 [ ] STREAM CONNECTED 30012 @/tmp/.X11-unix/X1
unix 3 [ ] STREAM CONNECTED 26893 @/tmp/.X11-unix/X1
unix 2 [ ] DGRAM 881
unix 3 [ ] STREAM CONNECTED 45152
unix 3 [ ] STREAM CONNECTED 31428
unix 3 [ ] STREAM CONNECTED 28557 @/tmp/dbus-SetFr4GY3I
unix 3 [ ] STREAM CONNECTED 27071

```

7. **ss**: This command is the substitution for the netstat command. The **ss** command is more informative and much faster than netstat. The **ss** command's faster response is possible because it fetches every information from inside the kernel userspace.

Syntax:

Ss


```
root@ip-10-10-38-111: ~
File Edit View Search Terminal Help
68180 * 68181
u_str ESTAB 0 0
63443 * 63444
u_str ESTAB 0 0
45154 * 44635
u_str ESTAB 0 0
29772 /var/run/dbus/system_bus_socket
u_str ESTAB 0 0
62417 @/tmp/.ICE-unix/1471
u_str ESTAB 0 0
24854 /run/systemd/journal/stdout
u_str ESTAB 0 0
62776 @/tmp/dbus-syGt6LJFW9
u_str ESTAB 0 0
25679 * 30095
u_str ESTAB 0 0
29856 * 30868
u_str ESTAB 0 0
19962 * 18852
u_str ESTAB 0 0
27917 /run/systemd/journal/stdout
u_str ESTAB 64 0
26859 * 25446
u_str ESTAB 0 0
28978 * 28369
u_str ESTAB 0 0
28317 * 28906
u_str ESTAB 0 0
63898 * 63866
u_str ESTAB 0 0
32451 * 33491
```

8. **nslookup**: The nslookup command is an older edition of the dig command. Also, it is utilized for DNS related problems.

The screenshot shows a Kali Linux terminal window with a dark blue background. At the top, there's a window title bar with standard Linux window controls. Below it, a menu bar includes 'Applications', 'Places', 'System', and a search icon. The terminal prompt is 'root@ip-10-10-38-111: ~'. The main content of the terminal is a list of network connections, likely from the 'ss' command, showing various TCP and HTTP connections with their states (SYN-SENT, ESTAB) and remote addresses. Below this, the user has entered the command 'nslookup' followed by 'www.google.com'. The output shows the IP address 127.0.0.53 and a list of non-authoritative answers for www.google.com, including several IP addresses and IPv6 addresses. At the bottom of the terminal, there's a taskbar with icons for a web browser, file manager, and other applications. The system tray at the very bottom shows the date and time as 'Fri 9 Aug, 07:16' and '11:46 AM 8/9/2024'.

```
File Edit View Search Terminal Help
tcp          SYN-SENT      0          1          10.10.38.111:
44124        34.117.180.166:https 1          10.10.38.111:
tcp          SYN-SENT      0          1          10.10.38.111:
59546        34.120.208.123:https 0          127.0.0.1:
5981         127.0.0.1:54532      1          10.10.38.111:
50484        34.107.221.82:http   0          10.10.38.111:
tcp          ESTAB         0          0          10.10.38.111:
http         10.100.2.28:52654    0          127.0.0.1:
tcp          ESTAB         0          0          127.0.0.1:
54532        127.0.0.1:5901
root@ip-10-10-38-111:~# nslookup
* www.google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   www.google.com
Address: 209.85.282.104
Name:   www.google.com
Address: 209.85.282.103
Name:   www.google.com
Address: 209.85.282.106
Name:   www.google.com
Address: 209.85.282.99
Name:   www.google.com
Address: 209.85.282.147
Name:   www.google.com
Address: 209.85.282.105
Name:   www.google.com
Address: 2a00:1450:400b:c00::68
Name:   www.google.com
Address: 2a00:1450:400b:c00::6a
Name:   www.google.com
Address: 2a00:1450:400b:c00::63
Name:   www.google.com
Address: 2a00:1450:400b:c00::67
>
```

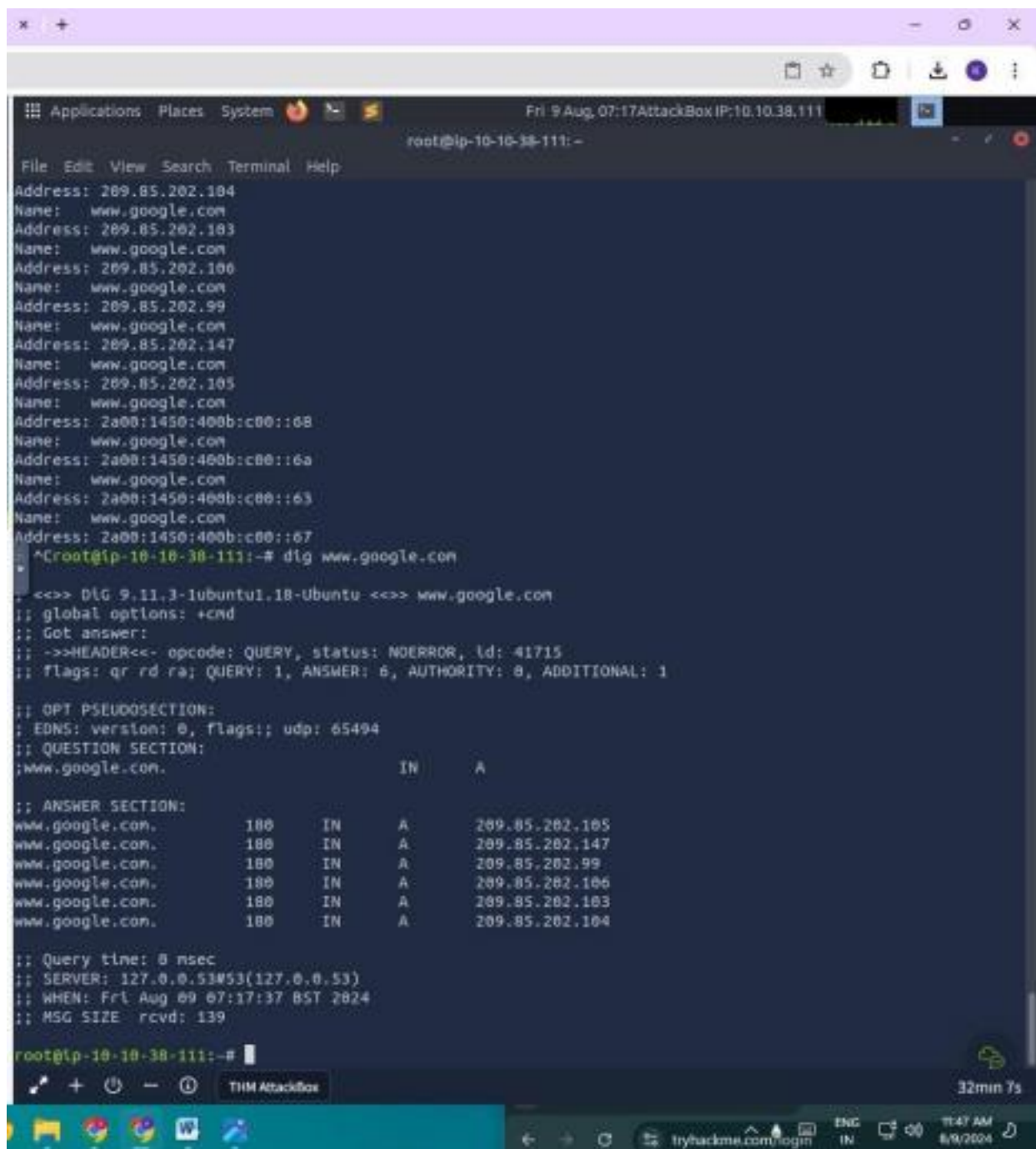
Syntax:

nslookup <domainname>

9. **dig:** dig is short for Domain Information Groper. The dig command is an improvised edition of the nslookup command. It is utilized in DNS lookup to reserve the DNS name server. Also, it is used to balance DNS related problems. Mainly, it is used to authorize DNS mappings, host addresses, MX records, and every other DNS record for the best DNS topography understanding.

Syntax:

dig <domainname>



```
root@ip-10-10-38-111:~# dig www.google.com

<<>> DiG 9.11.3-1ubuntu1.18-Ubuntu <<>> www.google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 41715
;; flags: qr rd ra; QUERY: 1, ANSWER: 6, AUTHORITY: 0, ADDITIONAL: 1

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

;; ANSWER SECTION:
www.google.com.                180     IN      A      209.85.202.105
www.google.com.                180     IN      A      209.85.202.147
www.google.com.                180     IN      A      209.85.202.99
www.google.com.                180     IN      A      209.85.202.106
www.google.com.                180     IN      A      209.85.202.103
www.google.com.                180     IN      A      209.85.202.104

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Aug 09 07:17:37 BST 2024
;; MSG SIZE rcvd: 139

root@ip-10-10-38-111:~#
```

10. **route:** The route command shows and employs the routing table available for our system. Basically, a router is used to detect a better way to transfer the packets around a destination.

Syntax:

Route

11. **host:** The host command shows the IP address for a hostname and the domain name for an IP address. Also, it is used to get DNS lookup for DNS related issues.

Syntax:

host -t <resourceName>

12. **arp:** The arp command is short for Address Resolution Protocol. This command is used to see and include content in the ARP table of the kernel.

Syntax:

1. Arp

13. **iwconfig:** It is a simple command which is used to see and set the system's hostname.

Syntax:

Hostname

14. **curl and wget:** These commands are used to download files from CLI from the internet. curl must be specified with the "O" option to get the file, while wget is directly used.

curl Syntax:

1. curl -O <fileLink>

15. wget

Syntax

:

1. wget <fileLink>

16. **mtr:** The mtr command is a mix of the traceroute and ping commands. It regularly shows information related to the packets transferred using the ping time of all hops. Also, it is used to see network problems.

Syntax:

1. mtr <path>

17. **whois:** The whois command fetches every website related information. We can get every information of a website, such as an owner and the registration information.

Syntax:

1. mtr <websiteName>

18. **ifplugstatus:** The ifplugstatus command checks whether a cable is currently plugged into a network interface. It is not available in Ubuntu directly. We can install it with the help of the below command:

1. sudo apt-get install ifplugd

Syntax:

1. Ifplugstatus

iftop: The iftop command is utilized in traffic monitoring.

tcpdump: The tcpdump command is widely used in network analysis with other commands of the Linux network. It analyses the traffic passing from the network interface and shows it. When balancing the network, this type of packet access will be crucial.

Syntax:

1. \$ tcpdump -i **<network_device>**