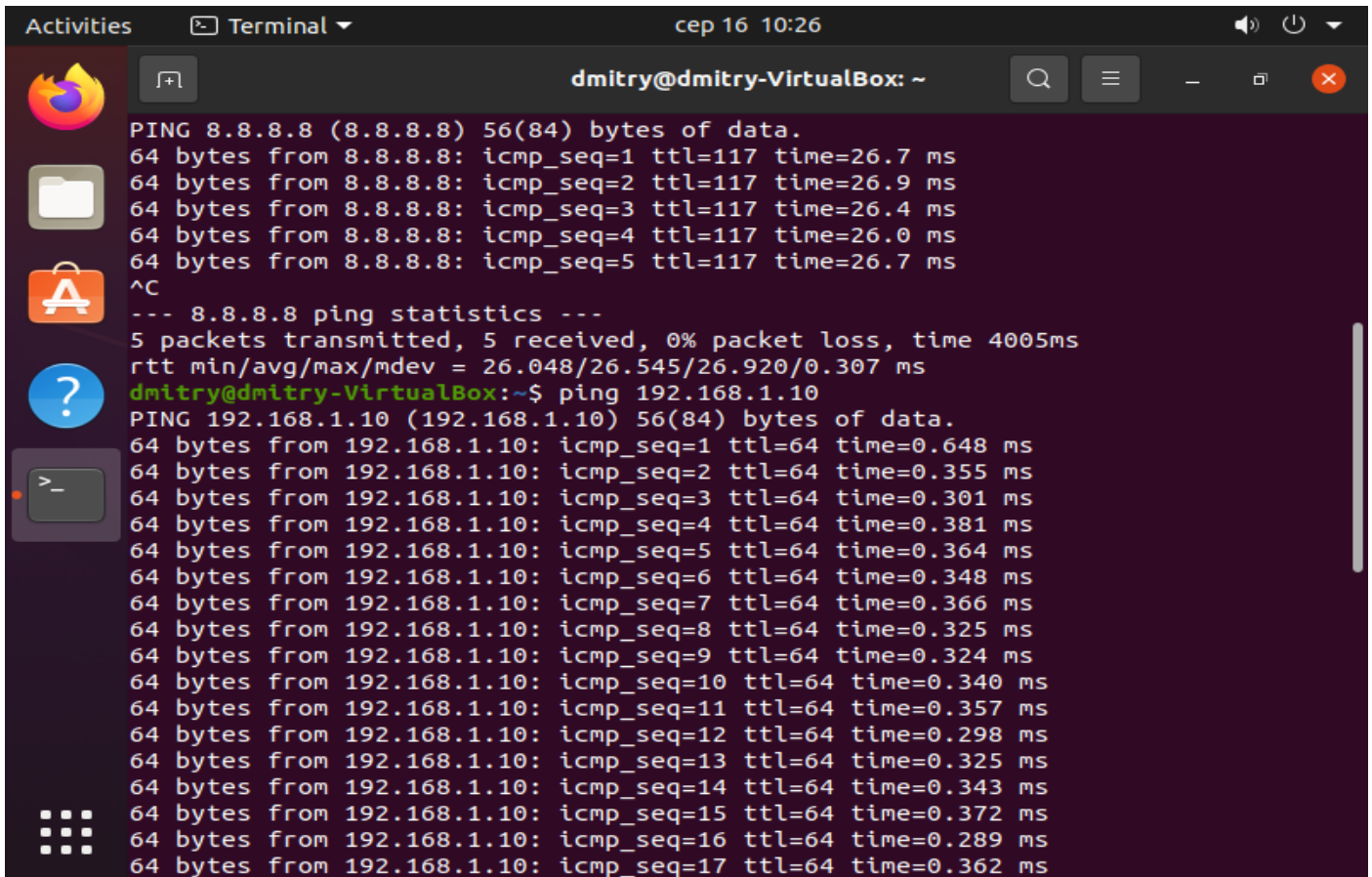


Networking with Linux

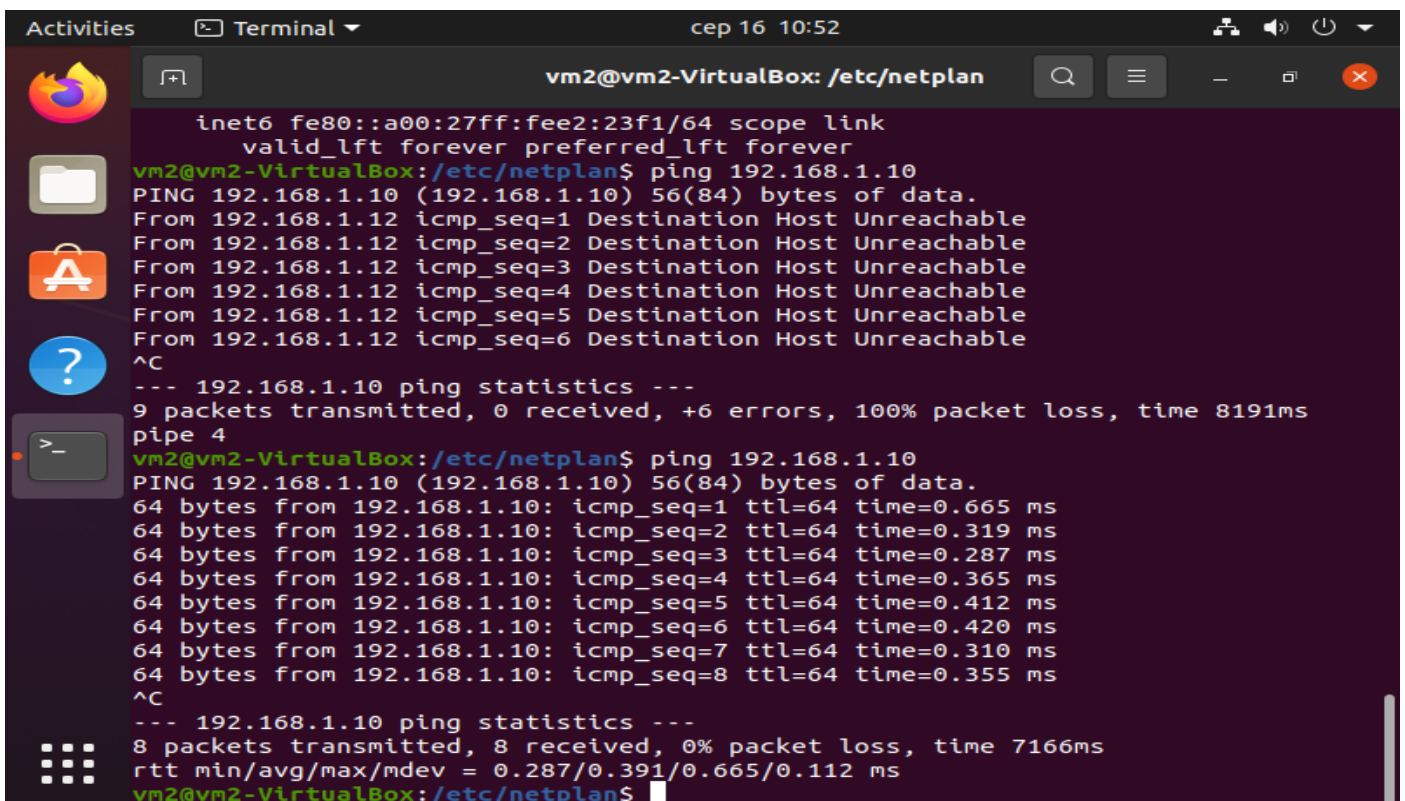
PART 1



The screenshot shows a terminal window titled "dmitry@dmitry-VirtualBox: ~". The user has executed a series of ping commands. First, they pinged 8.8.8.8, receiving five successful responses with times between 26.0 and 26.9 ms. Then, they pressed Ctrl+C to stop the process. Next, they ran "ping 192.168.1.10", which also received five successful responses with much lower times, between 0.298 and 0.648 ms.

```
Activities Terminal cep 16 10:26
dmitry@dmitry-VirtualBox: ~
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=117 time=26.7 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=117 time=26.9 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=117 time=26.4 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=117 time=26.0 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=117 time=26.7 ms
^C
--- 8.8.8.8 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 26.048/26.545/26.920/0.307 ms
dmitry@dmitry-VirtualBox:~$ ping 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
64 bytes from 192.168.1.10: icmp_seq=1 ttl=64 time=0.648 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=64 time=0.355 ms
64 bytes from 192.168.1.10: icmp_seq=3 ttl=64 time=0.301 ms
64 bytes from 192.168.1.10: icmp_seq=4 ttl=64 time=0.381 ms
64 bytes from 192.168.1.10: icmp_seq=5 ttl=64 time=0.364 ms
64 bytes from 192.168.1.10: icmp_seq=6 ttl=64 time=0.348 ms
64 bytes from 192.168.1.10: icmp_seq=7 ttl=64 time=0.366 ms
64 bytes from 192.168.1.10: icmp_seq=8 ttl=64 time=0.325 ms
64 bytes from 192.168.1.10: icmp_seq=9 ttl=64 time=0.324 ms
64 bytes from 192.168.1.10: icmp_seq=10 ttl=64 time=0.340 ms
64 bytes from 192.168.1.10: icmp_seq=11 ttl=64 time=0.357 ms
64 bytes from 192.168.1.10: icmp_seq=12 ttl=64 time=0.298 ms
64 bytes from 192.168.1.10: icmp_seq=13 ttl=64 time=0.325 ms
64 bytes from 192.168.1.10: icmp_seq=14 ttl=64 time=0.343 ms
64 bytes from 192.168.1.10: icmp_seq=15 ttl=64 time=0.372 ms
64 bytes from 192.168.1.10: icmp_seq=16 ttl=64 time=0.289 ms
64 bytes from 192.168.1.10: icmp_seq=17 ttl=64 time=0.362 ms
```

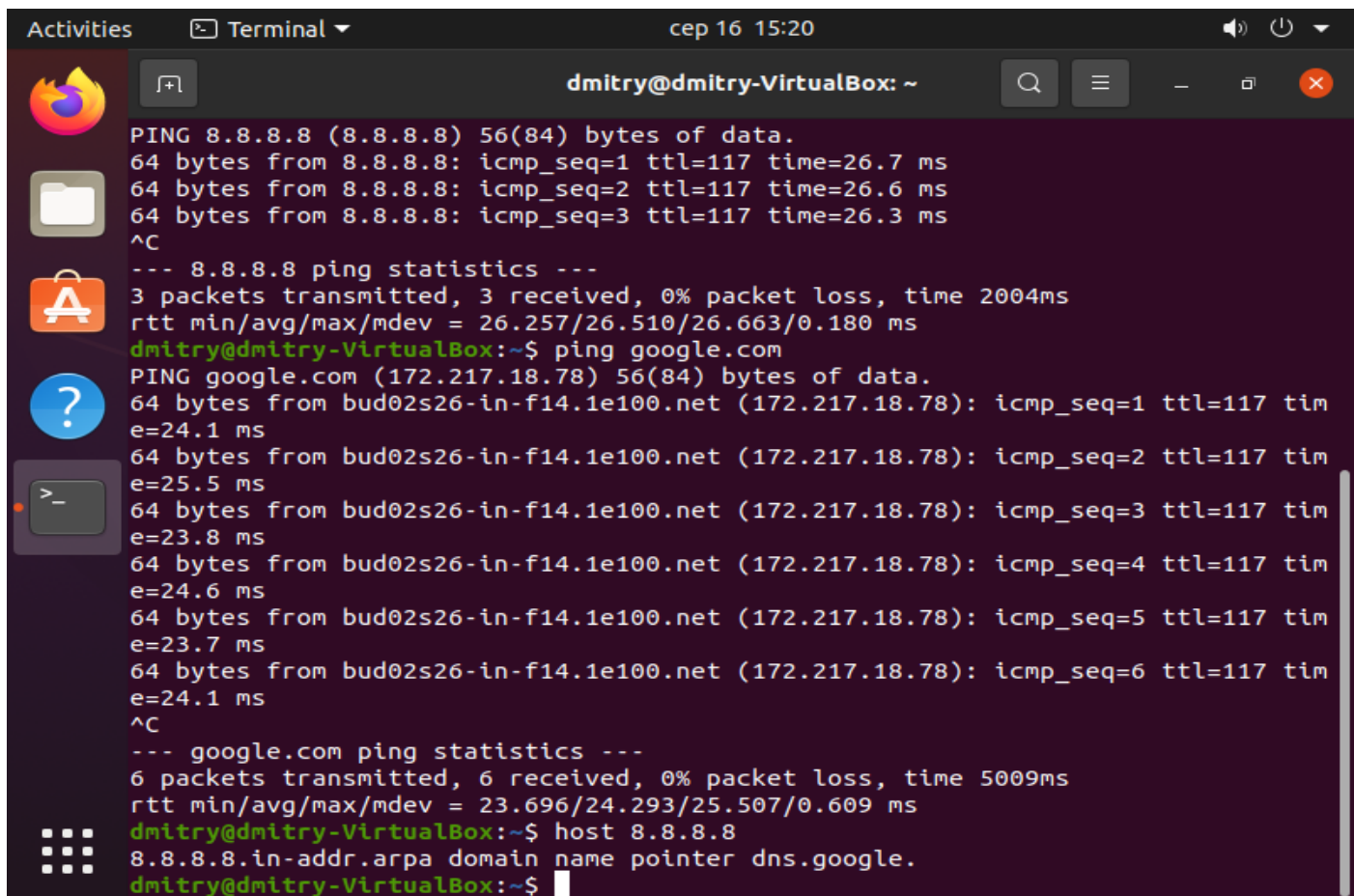
Screenshot 1 – ping HOST c VM1



The screenshot shows a terminal window titled "vm2@vm2-VirtualBox: /etc/netplan". The user has edited the netplan configuration to set the interface to "fe80::a00:27ff:fee2:23f1/64". They then ran "ping 192.168.1.10", which initially failed with "Destination Host Unreachable" for six consecutive attempts. After pressing Ctrl+C, they ran the ping command again, which then succeeded with eight responses and times between 0.287 and 0.665 ms.

```
Activities Terminal cep 16 10:52
vm2@vm2-VirtualBox: /etc/netplan
inet6 fe80::a00:27ff:fee2:23f1/64 scope link
valid_lft forever preferred_lft forever
vm2@vm2-VirtualBox:/etc/netplan$ ping 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
From 192.168.1.12 icmp_seq=1 Destination Host Unreachable
From 192.168.1.12 icmp_seq=2 Destination Host Unreachable
From 192.168.1.12 icmp_seq=3 Destination Host Unreachable
From 192.168.1.12 icmp_seq=4 Destination Host Unreachable
From 192.168.1.12 icmp_seq=5 Destination Host Unreachable
From 192.168.1.12 icmp_seq=6 Destination Host Unreachable
^C
--- 192.168.1.10 ping statistics ---
9 packets transmitted, 0 received, +6 errors, 100% packet loss, time 8191ms
pipe 4
vm2@vm2-VirtualBox:/etc/netplan$ ping 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
64 bytes from 192.168.1.10: icmp_seq=1 ttl=64 time=0.665 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=64 time=0.319 ms
64 bytes from 192.168.1.10: icmp_seq=3 ttl=64 time=0.287 ms
64 bytes from 192.168.1.10: icmp_seq=4 ttl=64 time=0.365 ms
64 bytes from 192.168.1.10: icmp_seq=5 ttl=64 time=0.412 ms
64 bytes from 192.168.1.10: icmp_seq=6 ttl=64 time=0.420 ms
64 bytes from 192.168.1.10: icmp_seq=7 ttl=64 time=0.310 ms
64 bytes from 192.168.1.10: icmp_seq=8 ttl=64 time=0.355 ms
^C
--- 192.168.1.10 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7166ms
rtt min/avg/max/mdev = 0.287/0.391/0.665/0.112 ms
vm2@vm2-VirtualBox:/etc/netplan$
```

Screenshot 2 – ping HOST c VM2

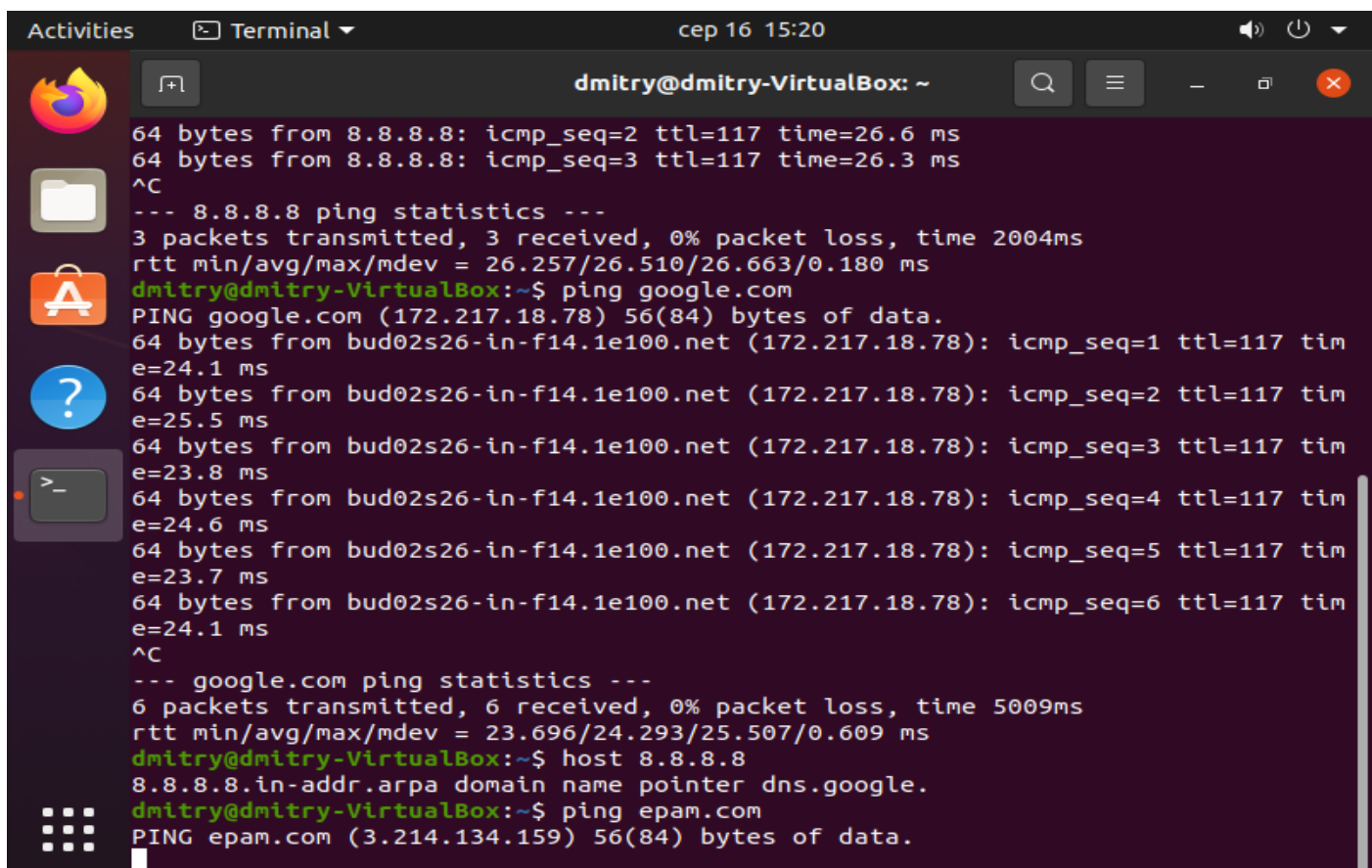


Activities Terminal cep 16 15:20

dmity@dmity-VirtualBox: ~

```
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.  
64 bytes from 8.8.8.8: icmp_seq=1 ttl=117 time=26.7 ms  
64 bytes from 8.8.8.8: icmp_seq=2 ttl=117 time=26.6 ms  
64 bytes from 8.8.8.8: icmp_seq=3 ttl=117 time=26.3 ms  
^C  
--- 8.8.8.8 ping statistics ---  
3 packets transmitted, 3 received, 0% packet loss, time 2004ms  
rtt min/avg/max/mdev = 26.257/26.510/26.663/0.180 ms  
dmity@dmity-VirtualBox:~$ ping google.com  
PING google.com (172.217.18.78) 56(84) bytes of data.  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=1 ttl=117 time=24.1 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=2 ttl=117 time=25.5 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=3 ttl=117 time=23.8 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=4 ttl=117 time=24.6 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=5 ttl=117 time=23.7 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=6 ttl=117 time=24.1 ms  
^C  
--- google.com ping statistics ---  
6 packets transmitted, 6 received, 0% packet loss, time 5009ms  
rtt min/avg/max/mdev = 23.696/24.293/25.507/0.609 ms  
dmity@dmity-VirtualBox:~$ host 8.8.8.8  
8.8.8.8.in-addr.arpa domain name pointer dns.google.  
dmity@dmity-VirtualBox:~$
```

Screenshot 3 – Вывод информации про адрес



Activities Terminal cep 16 15:20

dmity@dmity-VirtualBox: ~

```
64 bytes from 8.8.8.8: icmp_seq=2 ttl=117 time=26.6 ms  
64 bytes from 8.8.8.8: icmp_seq=3 ttl=117 time=26.3 ms  
^C  
--- 8.8.8.8 ping statistics ---  
3 packets transmitted, 3 received, 0% packet loss, time 2004ms  
rtt min/avg/max/mdev = 26.257/26.510/26.663/0.180 ms  
dmity@dmity-VirtualBox:~$ ping google.com  
PING google.com (172.217.18.78) 56(84) bytes of data.  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=1 ttl=117 time=24.1 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=2 ttl=117 time=25.5 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=3 ttl=117 time=23.8 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=4 ttl=117 time=24.6 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=5 ttl=117 time=23.7 ms  
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=6 ttl=117 time=24.1 ms  
^C  
--- google.com ping statistics ---  
6 packets transmitted, 6 received, 0% packet loss, time 5009ms  
rtt min/avg/max/mdev = 23.696/24.293/25.507/0.609 ms  
dmity@dmity-VirtualBox:~$ host 8.8.8.8  
8.8.8.8.in-addr.arpa domain name pointer dns.google.  
dmity@dmity-VirtualBox:~$ ping epam.com  
PING epam.com (3.214.134.159) 56(84) bytes of data.  
^C
```

Screenshot 4 – Определение ip адреса epam.com

```
Activities Terminal cep 16 15:21
dmitry@dmitry-VirtualBox: ~
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=3 ttl=117 time=23.8 ms
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=4 ttl=117 time=24.6 ms
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=5 ttl=117 time=23.7 ms
64 bytes from bud02s26-in-f14.1e100.net (172.217.18.78): icmp_seq=6 ttl=117 time=24.1 ms
^C
--- google.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5009ms
rtt min/avg/max/mdev = 23.696/24.293/25.507/0.609 ms
dmitry@dmitry-VirtualBox:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
dmitry@dmitry-VirtualBox:~$ ping epam.com
PING epam.com (3.214.134.159) 56(84) bytes of data.
^C
--- epam.com ping statistics ---
20 packets transmitted, 0 received, 100% packet loss, time 19444ms

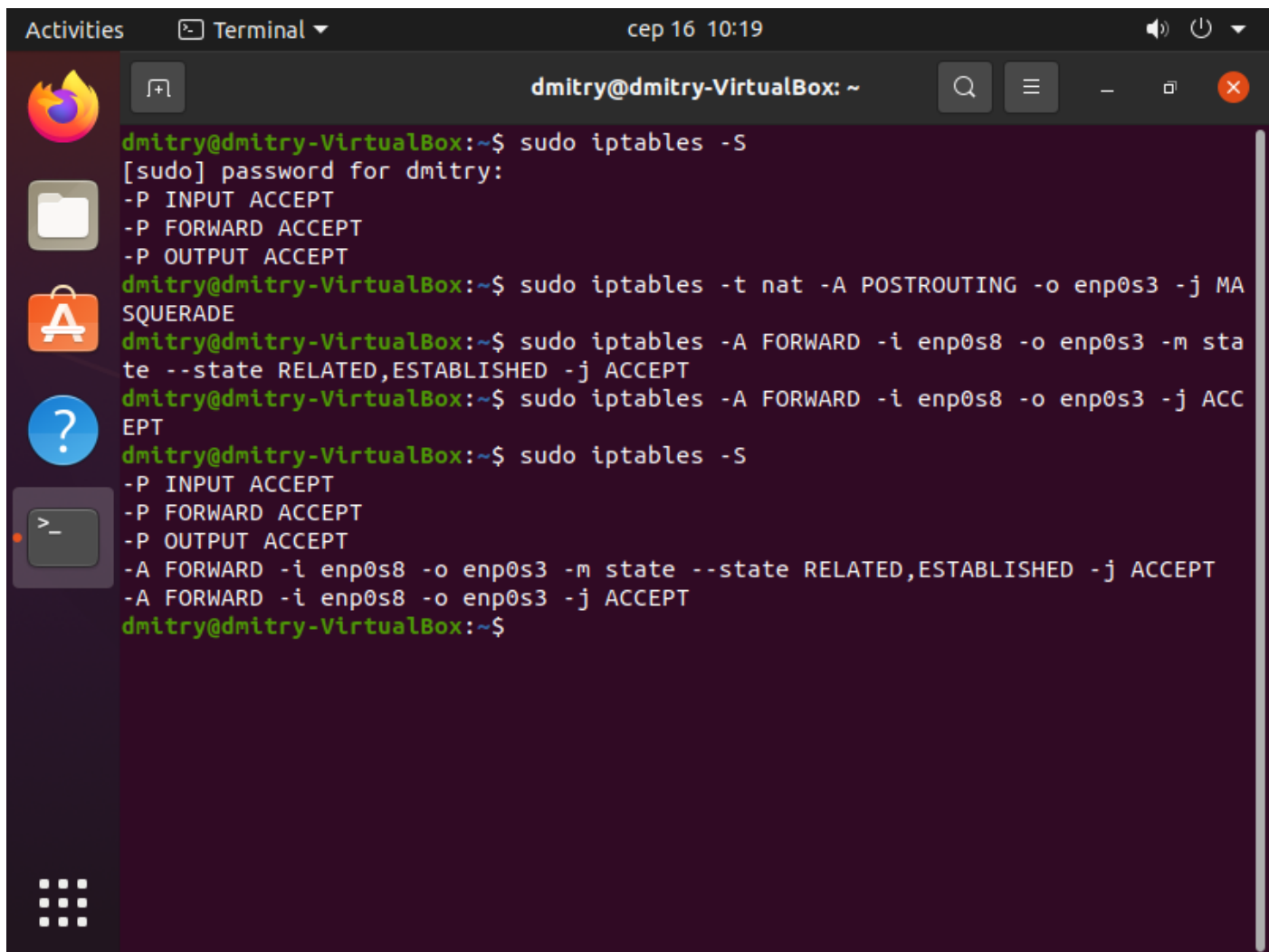
dmitry@dmitry-VirtualBox:~$ route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default _gateway 0.0.0.0 UG 100 0 0 enp0s8
10.0.3.0 0.0.0.0 255.255.255.0 U 0 0 0 enp0s8
_gateway 0.0.0.0 255.255.255.255 UH 100 0 0 enp0s8
192.168.0.0 192.168.1.1 255.255.255.0 UG 0 0 0 enp0s3
192.168.1.0 0.0.0.0 255.255.255.0 U 0 0 0 enp0s3
dmitry@dmitry-VirtualBox:~$
```

Screenshot 5 – default gateway and routing table

```
Activities Terminal cep 16 15:24
dmitry@dmitry-VirtualBox: ~
Destination Gateway Genmask Flags Metric Ref Use Iface
default _gateway 0.0.0.0 UG 100 0 0 enp0s8
10.0.3.0 0.0.0.0 255.255.255.0 U 0 0 0 enp0s8
_gateway 0.0.0.0 255.255.255.255 UH 100 0 0 enp0s8
192.168.0.0 192.168.1.1 255.255.255.0 UG 0 0 0 enp0s3
192.168.1.0 0.0.0.0 255.255.255.0 U 0 0 0 enp0s3
dmitry@dmitry-VirtualBox:~$ sudo mc
[sudo] password for dmitry:

dmitry@dmitry-VirtualBox:~$ traceroute google.com
traceroute to google.com (172.217.18.78), 30 hops max, 60 byte packets
 1 _gateway (10.0.3.2) 0.572 ms 0.442 ms 0.358 ms
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * * ^C
dmitry@dmitry-VirtualBox:~$
```

Screenshot 6 – Traceroute google com

A screenshot of a Linux terminal window titled "Terminal" with a timestamp of "sep 16 10:19". The window shows a user named "dmitry" at a host named "dmitry-VirtualBox". The terminal output shows the user running "sudo iptables -S", followed by a password prompt and the command being executed. The output lists the default policy for INPUT, FORWARD, and OUTPUT chains as ACCEPT. Then, the user runs "sudo iptables -t nat -A POSTROUTING -o enp0s3 -j MASQUERADE". Next, the user runs "sudo iptables -A FORWARD -i enp0s8 -o enp0s3 -m state --state RELATED,ESTABLISHED -j ACCEPT". Finally, the user runs "sudo iptables -A FORWARD -i enp0s8 -o enp0s3 -j ACCEPT". The terminal shows the command being executed and the resulting rules being added to the iptables configuration. The window has a sidebar on the left with icons for Activities, Files, Applications, and a help icon. The top bar shows the system status and window controls.

```
dmitry@dmitry-VirtualBox:~$ sudo iptables -S
[sudo] password for dmitry:
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
dmitry@dmitry-VirtualBox:~$ sudo iptables -t nat -A POSTROUTING -o enp0s3 -j MASQUERADE
dmitry@dmitry-VirtualBox:~$ sudo iptables -A FORWARD -i enp0s8 -o enp0s3 -m state --state RELATED,ESTABLISHED -j ACCEPT
dmitry@dmitry-VirtualBox:~$ sudo iptables -A FORWARD -i enp0s8 -o enp0s3 -j ACCEPT
dmitry@dmitry-VirtualBox:~$ sudo iptables -S
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
-A FORWARD -i enp0s8 -o enp0s3 -m state --state RELATED,ESTABLISHED -j ACCEPT
-A FORWARD -i enp0s8 -o enp0s3 -j ACCEPT
dmitry@dmitry-VirtualBox:~$
```

Screenshot 7 – iptables для HOST