IP routing

1. Create virtual machines connection according to figure 1:

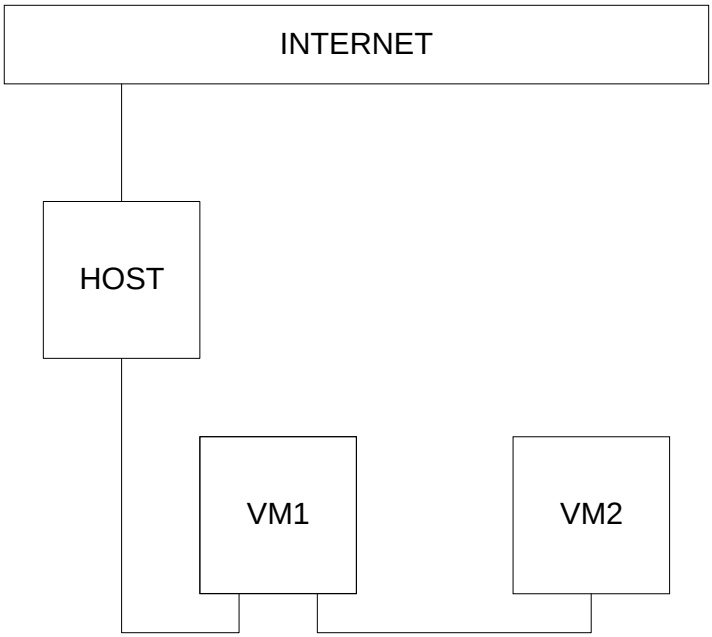
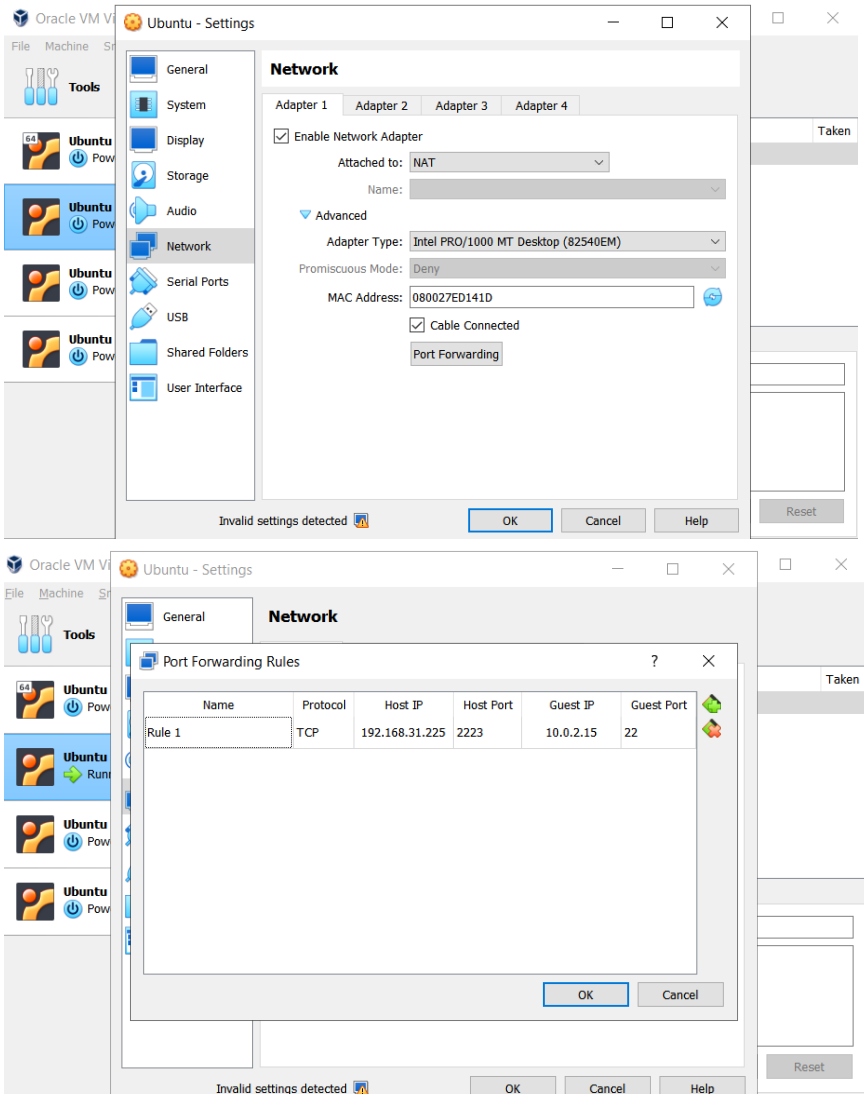
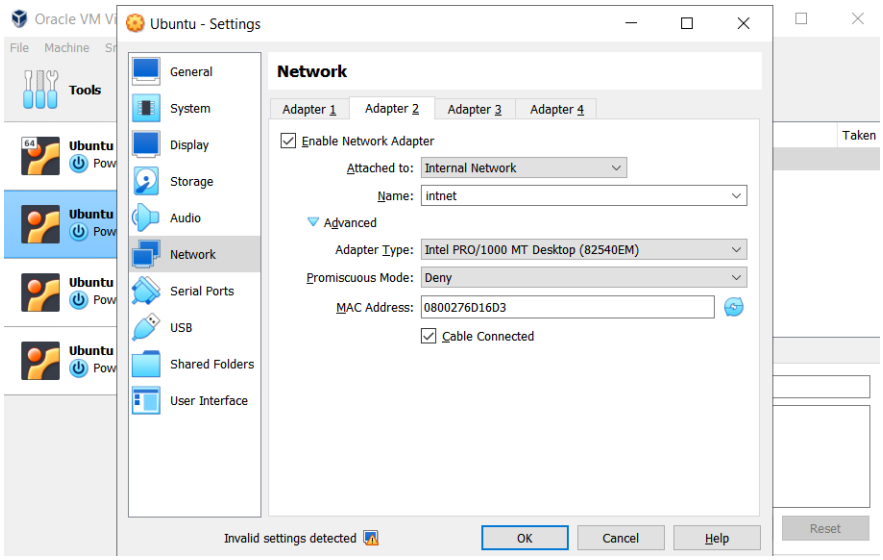


Figure 1 – VMs connection

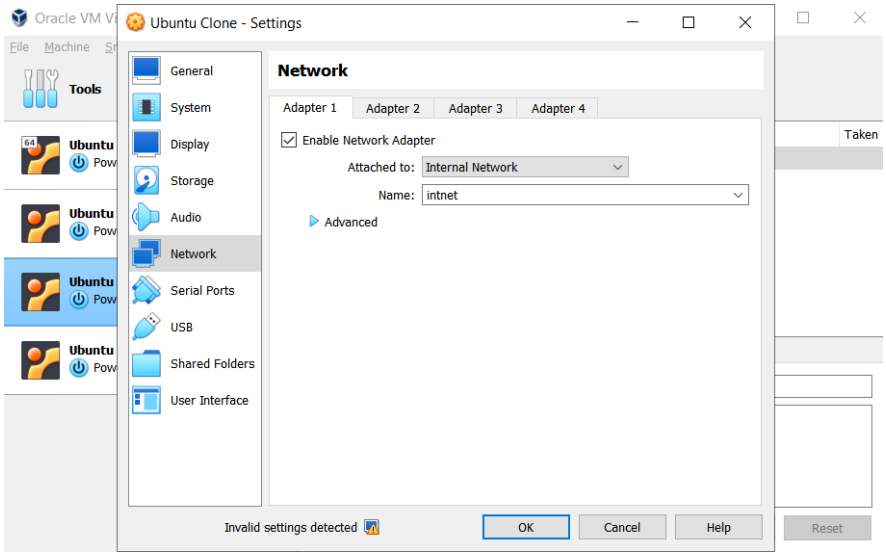
VM1 NAT:

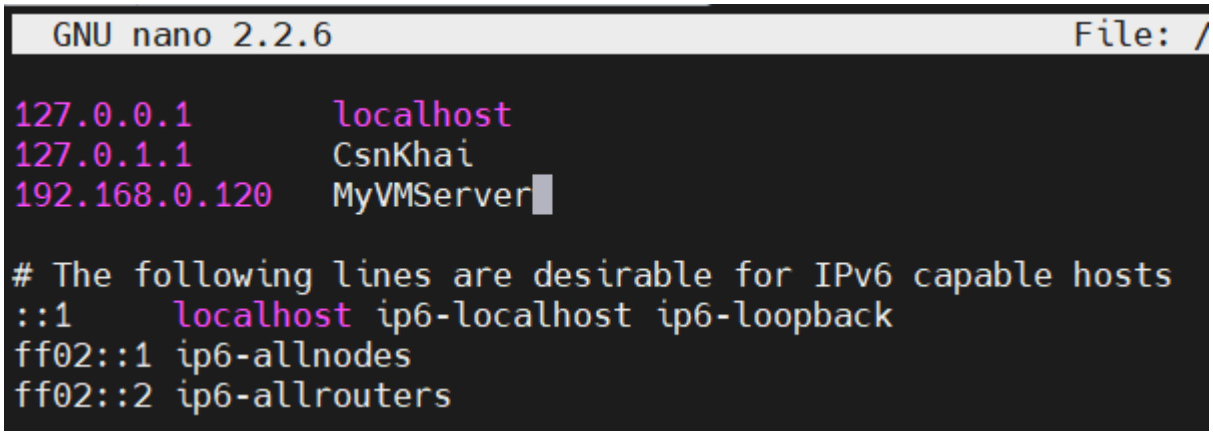


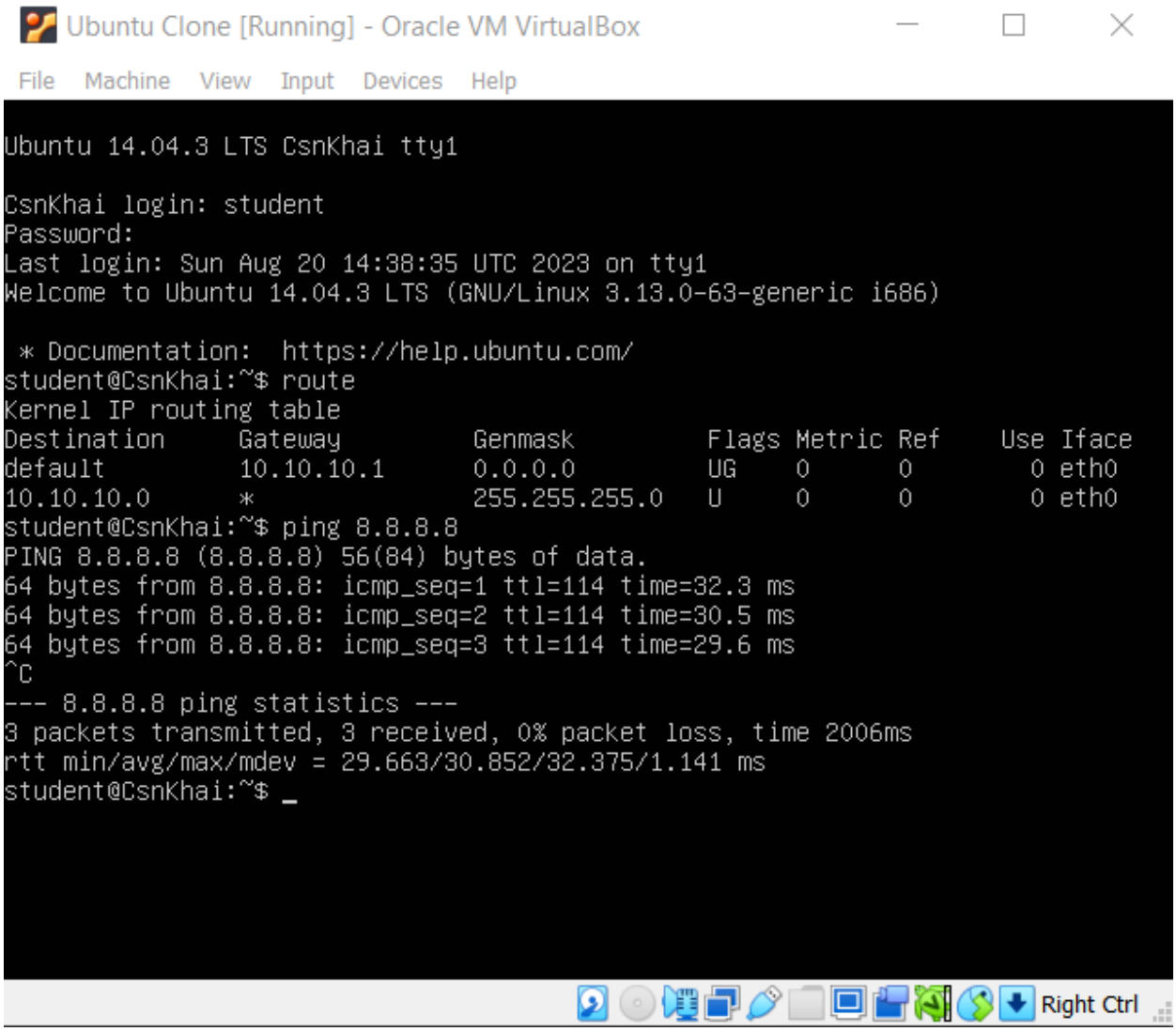
VM1 Internal Network:



VM2 Internal Network:





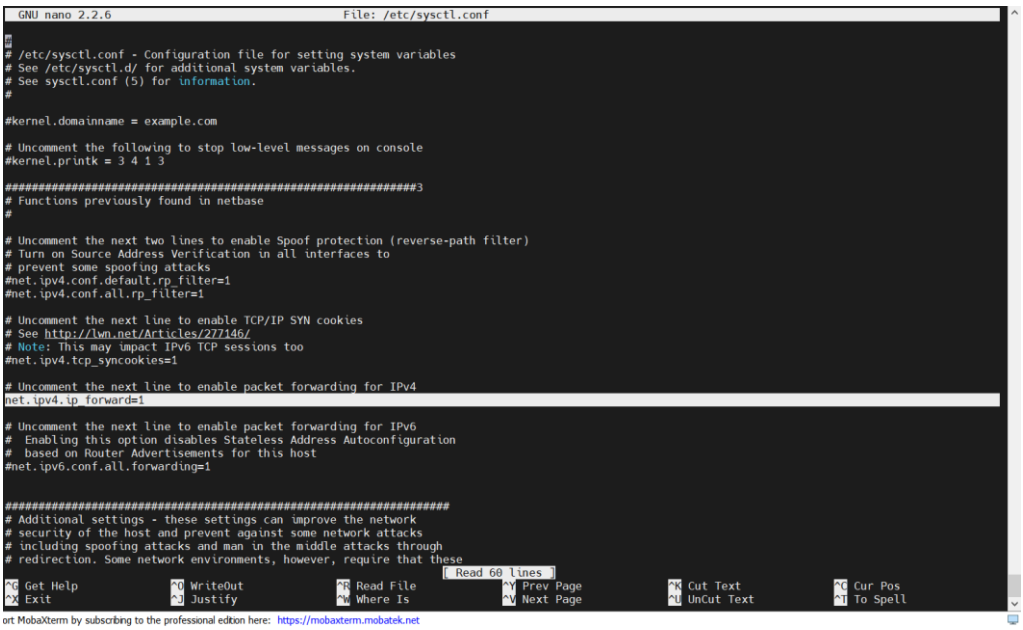


2. VM2 has one interface (internal), VM1 has 2 interfaces (NAT and internal). Configure all network interfaces in order to make VM2 has an access to the Internet (iptables, forward, masquerade).

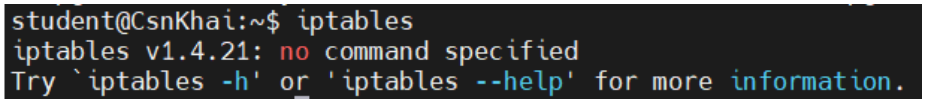
Adding Internal interface to VM1:

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
auto eth0
iface eth0 inet dhcp

# Internal
auto eth1
iface eth1 inet static
address 10.10.10.1
netmask 255.255.255.0
broadcast 10.10.10.255
```

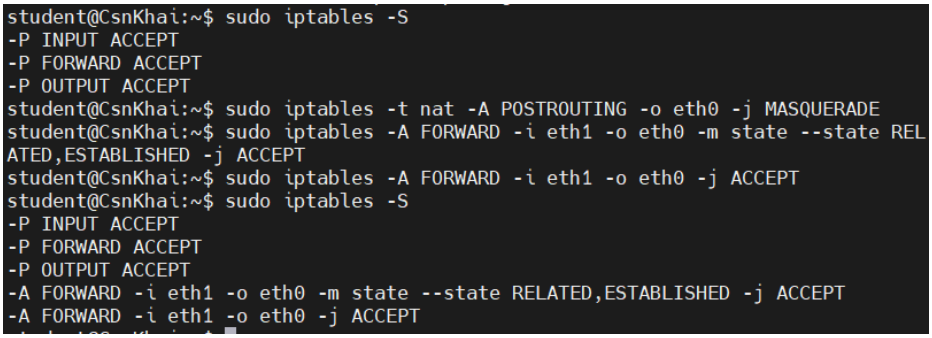
Adding ip forwarding in VM1:



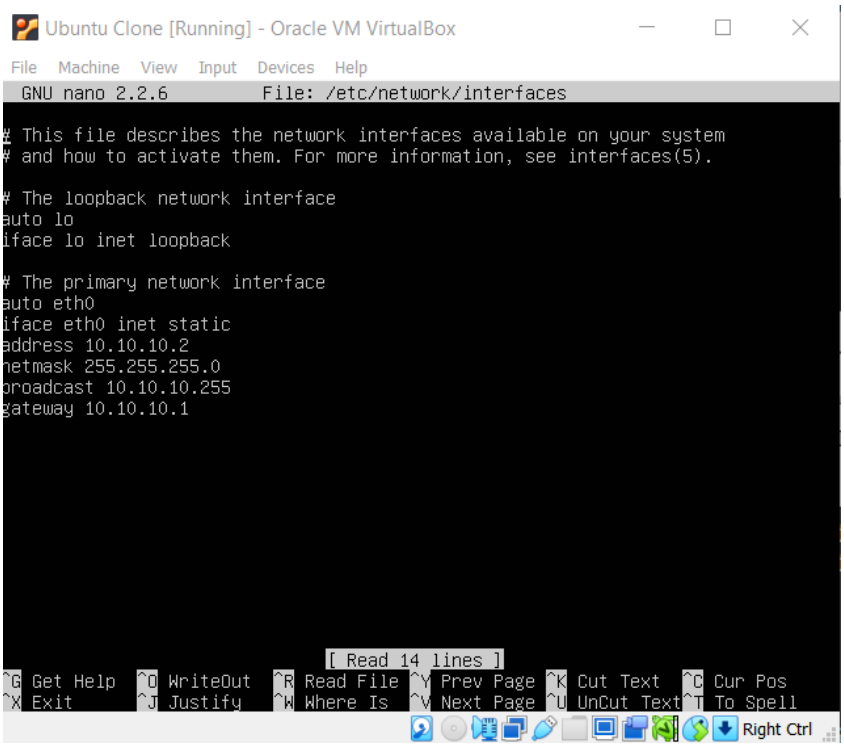
Checking availability of iptables:



Configuring interfaces with iptables:



Editing eth0 for Internal Network in VM2:



3. Check the route from VM2 to Host.

```
student@CsnKhai:~$ traceroute 192.168.31.225
traceroute to 192.168.31.225 (192.168.31.225), 30 hops max, 60 byte packets
 1  10.10.10.1 (10.10.10.1)  1.132 ms  1.145 ms  1.141 ms
 2  10.0.2.2 (10.0.2.2)  2.295 ms  1.557 ms  2.808 ms
 3  10.0.2.2 (10.0.2.2)  1.657 ms  3.666 ms  2.696 ms
```

4. Check the access to the Internet, (just ping, for example, 8.8.8.8).

VM1:

```
student@CsnKhai:~$ ping 8.8.8.8
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=115 time=29.1 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=115 time=28.4 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=115 time=29.9 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=115 time=28.6 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=115 time=31.0 ms
^C
--- 8.8.8.8 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4008ms
rtt min/avg/max/mdev = 28.433/29.439/31.056/0.966 ms
student@CsnKhai:~$
```

VM2:

```
student@CsnKhai:~$ ping 8.8.8.8
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=114 time=29.9 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=114 time=30.4 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=114 time=30.0 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=114 time=30.3 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=114 time=30.1 ms
^C
--- 8.8.8.8 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 29.993/30.192/30.474/0.258 ms
student@CsnKhai:~$
```

5. Determine, which resource has an IP address 8.8.8.8.

```
student@CsnKhai:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
```

6. Determine, which IP address belongs to resource epam.com.

```
student@CsnKhai:~$ host epam.com
epam.com has address 3.214.134.159
epam.com mail is handled by 10 mxa-0039f301.gslb.pphosted.com.
epam.com mail is handled by 10 mxb-0039f301.gslb.pphosted.com.
```

7. Determine the default gateway for your HOST and display routing table.

```
student@CsnKhai:~$ 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    0      0        0 eth0
10.0.2.0        0.0.0.0         255.255.255.0   U     0      0        0 eth0
10.10.10.0      0.0.0.0         255.255.255.0   U     0      0        0 eth1
```

8. Trace the route to google.com.

```
student@CsnKhai:~$ traceroute google.com
traceroute to google.com (142.250.75.14), 30 hops max, 60 byte packets
 1  10.10.10.1 (10.10.10.1)  1.547 ms  0.855 ms  1.392 ms
 2  10.0.2.2 (10.0.2.2)  2.427 ms  3.424 ms  3.163 ms
 3  10.0.2.2 (10.0.2.2)  4.482 ms  3.649 ms  4.398 ms
student@CsnKhai:~$
```