

IP routing

1. Create virtual machines connection according to figure
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).

```
Ubuntu 14.04.3 LTS vm1 tty1

vm1 login: student
Password:
Last login: Thu Feb 17 13:55:54 UTC 2022 from 10.0.2.2 on pts/1
Welcome to Ubuntu 14.04.3 LTS (GNU/Linux 3.13.0-63-generic i686)

 * Documentation:  https://help.ubuntu.com/
New release '16.04.7 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

student@vm1:~$ sudo iptables -S
[sudo] password for student:
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
student@vm1:~$ sudo iptables -t nat -A POSTROUTING -o eth0 -j MASQUERADE
student@vm1:~$
```

```
Ubuntu 14.04.3 LTS vm2 tty1

vm2 login: student
Password:
Last login: Thu Feb 17 14:01:03 UTC 2022 on tty1
Welcome to Ubuntu 14.04.3 LTS (GNU/Linux 3.13.0-63-generic i686)

 * Documentation:  https://help.ubuntu.com/
student@vm2:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
^C
--- 8.8.8.8 ping statistics ---
8 packets transmitted, 0 received, 100% packet loss, time 7054ms

student@vm2:~$ 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=61 time=34.7 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=61 time=30.6 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=61 time=71.1 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=61 time=32.6 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=61 time=32.0 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=61 time=31.7 ms
^C
--- 8.8.8.8 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5009ms
rtt min/avg/max/mdev = 30.601/38.838/71.104/14.484 ms
student@vm2:~$ _
```

3. Check the route from VM2 to Host.

```
student@vm2:~$ traceroute 192.168.0.108
traceroute to 192.168.0.108 (192.168.0.108), 30 hops max, 60 byte packets
 1  10.10.10.1 (10.10.10.1)  0.872 ms  0.798 ms  0.758 ms
 2  10.0.2.2 (10.0.2.2)  1.082 ms  1.047 ms  1.611 ms
 3  * * *
 4  192.168.0.108 (192.168.0.108)  1.226 ms  1.184 ms  0.940 ms
student@vm2:~$
```

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

```
student@vm2:~$ 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=61 time=29.9 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=61 time=29.4 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=61 time=29.3 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=61 time=29.8 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=61 time=91.4 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=61 time=25.8 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=61 time=29.3 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=61 time=29.2 ms
^C
--- 8.8.8.8 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7012ms
rtt min/avg/max/mdev = 25.860/36.823/91.443/20.680 ms
student@vm2:~$ _
```

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

host

```
yaroslav@nitro-5:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
```

vm1

```
student@vm1:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
student@vm1:~$ _
```

vm2

```
student@vm2:~$ host 8.8.8.8
;; connection timed out; no servers could be reached
student@vm2:~$
```

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

host

```
yaroslav@nitro-5:~$ nslookup epam.com
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
Name:   epam.com
Address: 3.214.134.159
```

vm1

```
student@vm1:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
student@vm1:~$ nslookup epam.com
Server:      10.0.2.3
Address:     10.0.2.3#53

Non-authoritative answer:
Name:   epam.com
Address: 3.214.134.159

student@vm1:~$ _
```

vm2

```
student@vm2:~$ host 8.8.8.8
;; connection timed out; no servers could be reached
student@vm2:~$ nslookup epam.com
;; connection timed out; no servers could be reached

student@vm2:~$ _
```

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

```
yaroslav@nitro-5:~$ route -n
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0        192.168.0.1    0.0.0.0         UG    600    0      0 wlp7s0
169.254.0.0    0.0.0.0        255.255.0.0     U     1000   0      0 wlp7s0
172.17.0.0     0.0.0.0        255.255.0.0     U     0      0      0 docker0
172.18.0.0     0.0.0.0        255.255.0.0     U     0      0      0 br-1b8e679e31ac
172.19.0.0     0.0.0.0        255.255.0.0     U     0      0      0 br-9b48e19fd2
172.20.0.0     0.0.0.0        255.255.0.0     U     0      0      0 br-b54e83196231
172.21.0.0     0.0.0.0        255.255.0.0     U     0      0      0 br-877da4404db2
192.168.0.0    0.0.0.0        255.255.255.0   U     600    0      0 wlp7s0
```

8. Trace the route to google.com.

host

```
yaroslav@nitro-5:~$ traceroute google.com
traceroute to google.com (142.250.201.206), 30 hops max, 60 byte packets
 1 _gateway (192.168.0.1)  4.955 ms  4.923 ms  5.031 ms
 2 as01.m-x.net.ua (95.214.12.1)  6.363 ms  6.388 ms  6.496 ms
 3 10.50.10.3 (10.50.10.3)  9.549 ms  9.941 ms  10.894 ms
 4 rt-as00.kh.m-x.net.ua (95.214.15.250)  10.976 ms  11.116 ms  11.343 ms
 5 google2-ix.giganet.ua (185.1.63.152)  14.701 ms  14.948 ms  14.316 ms
 6 108.170.248.155 (108.170.248.155)  16.258 ms  9.617 ms  10.649 ms
 7 142.251.224.82 (142.251.224.82)  25.568 ms  29.102 ms  29.055 ms
 8 142.251.224.76 (142.251.224.76)  25.398 ms  74.125.242.225 (74.125.242.225)
 9 74.125.242.241 (74.125.242.241)  21.964 ms  74.125.242.225 (74.125.242.225)
10 bud02s35-in-f14.1e100.net (142.250.201.206)  28.692 ms  142.251.65.223 (142.251.65.223)  25.941 ms
```

vm1

```
student@vm1:~$ traceroute google.com
traceroute to google.com (142.250.201.206), 30 hops max, 60 byte packets
 1 10.0.2.2 (10.0.2.2)  0.318 ms  0.236 ms  0.275 ms
 2 192.168.0.1 (192.168.0.1)  5.017 ms  4.737 ms  4.669 ms
 3 as01.m-x.net.ua (95.214.12.1)  4.442 ms  4.392 ms  4.187 ms
 4 10.50.10.3 (10.50.10.3)  8.690 ms  8.493 ms  8.444 ms
 5 rt-as00.kh.m-x.net.ua (95.214.15.250)  8.227 ms  9.089 ms  9.523 ms
 6 google2-ix.giganet.ua (185.1.63.152)  12.928 ms  8.955 ms  9.043 ms
 7 108.170.248.138 (108.170.248.138)  36.437 ms  9.875 ms  9.837 ms
 8 142.251.224.82 (142.251.224.82)  24.846 ms  72.14.239.111 (72.14.239.111)  11.455 ms
 9 142.251.77.181 (142.251.77.181)  24.442 ms  142.251.224.76 (142.251.224.76)  30.628 ms
10 142.251.65.221 (142.251.65.221)  21.934 ms  74.125.242.225 (74.125.242.225)  26.595 ms
11 142.251.65.223 (142.251.65.223)  22.027 ms  142.251.65.221 (142.251.65.221)  21.971 ms
12 bud02s35-in-f14.1e100.net (142.250.201.206)  28.680 ms  26.836 ms  26.576 ms
student@vm1:~$ _
```

vm2

```
student@vm2:~$ traceroute google.com
google.com: Name or service not known
Cannot handle "host" cmdline arg `google.com' on position 1 (argc 1)
student@vm2:~$ _
```