IP routing

1. Create virtual machines connection according to figure 1:


```
ubuntu-VM1 [Running] - Oracle VM VirtualBox
File   Machine   View   Input   Devices   Help
-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
anastasiia@anastasiia:~$ sudo restart
sudo: unable to resolve host anastasiia
sudo: restart: команда не найдена
anastasiia@anastasiia:~$ ifconfig
enp0s3    Link encap:Ethernet   HWaddr 08:00:27:f0:6a:86
          inet addr:10.0.2.15  Bcast:10.0.2.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:fef0:6a86/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:25922 errors:0 dropped:0 overruns:0 frame:0
          TX packets:20689 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:10283978 (10.2 MB)  TX bytes:2299861 (2.2 MB)

enp0s8    Link encap:Ethernet   HWaddr 08:00:27:bb:87:99
          inet addr:10.10.10.1  Bcast:10.10.10.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:febb:8799/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:41 errors:0 dropped:0 overruns:0 frame:0
          TX packets:34 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3752 (3.7 KB)  TX bytes:2930 (2.9 KB)

lo        Link encap:Локальная петля (Loopback)
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:232 errors:0 dropped:0 overruns:0 frame:0
          TX packets:232 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:18224 (18.2 KB)  TX bytes:18224 (18.2 KB)
```

```
root@anastasiia:/home/anastasiia# sudo iptables -S
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
root@anastasiia:/home/anastasiia# ifconfig
enp0s3     Link encap:Ethernet   HWaddr 08:00:27:f0:6a:86
           inet addr:10.10.10.2  Bcast:10.10.10.255  Mask:255.255.255.0
           inet6 addr: fe80::a00:27ff:fef0:6a86/64 Scope:Link
           UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
           RX packets:28 errors:0 dropped:0 overruns:0 frame:0
           TX packets:152 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:2402 (2.4 KB)  TX bytes:13370 (13.3 KB)

lo         Link encap:Локальная петля (Loopback)
           inet addr:127.0.0.1  Mask:255.0.0.0
           inet6 addr: ::1/128 Scope:Host
           UP LOOPBACK RUNNING  MTU:65536  Metric:1
           RX packets:68290 errors:0 dropped:0 overruns:0 frame:0
           TX packets:68290 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1
           RX bytes:5055792 (5.0 MB)  TX bytes:5055792 (5.0 MB)
```

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).

```
64 bytes from 8.8.8.8: icmp_seq=1 ttl=116 time=21.5 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=116 time=20.8 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=116 time=20.7 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=116 time=20.8 ms
^Z
[2]+  Остановлено  ping 8.8.8.8
root@anastasiia:/home/anastasiia# iptables -S
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
root@anastasiia:/home/anastasiia#
root@anastasiia:/home/anastasiia#
```

3. Check the route from VM2 to Host.

```
-P OUTPUT ACCEPT
root@anastasiia:/home/anastasiia#
root@anastasiia:/home/anastasiia# traceroute 192.168.0.104
traceroute to 192.168.0.104 (192.168.0.104), 30 hops max, 60 byte packets
 1  10.10.10.1 (10.10.10.1)  0.315 ms  0.294 ms  0.277 ms
 2  10.0.2.2 (10.0.2.2)  0.616 ms  0.605 ms  0.595 ms
 3  10.0.2.2 (10.0.2.2)  3.963 ms  3.952 ms  3.939 ms
root@anastasiia:/home/anastasiia# _
```

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

```
root@anastasiia:/home/anastasiia# 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=116 time=21.5 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=116 time=20.8 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=116 time=20.8 ms
^Z
[3]+  Остановлено  ping 8.8.8.8
root@anastasiia:/home/anastasiia#
```

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

```
root@anastasiia:~# host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
root@anastasiia:~# _
```

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

```
root@anastasiia:~# nslookup epam.com
Server:         192.168.0.1
Address:        192.168.0.1#53

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

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

```
root@anastasiia:~# route -n
Таблица маршутизации ядра протокола IP
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0         10.0.2.2        0.0.0.0         UG    0    0    0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U     0    0    0 enp0s3
10.10.10.0      0.0.0.0         255.255.255.0   U     0    0    0 enp0s8
root@anastasiia:~#
```

8. Trace the route to google.com.

```
root@anastasiia:~# traceroute google.com
traceroute to google.com (172.217.20.174), 30 hops max, 60 byte packets
 1  10.0.2.2 (10.0.2.2)  0.164 ms  0.146 ms  0.132 ms
 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  * * *
root@anastasiia:~# _
```