

Task.Networking.2

Pashynskyi Maxim

- 1) Use already created internal-network for three VMs (VM1-VM3). VM1 has NAT and internal, VM2, VM3 – internal only interfaces.

```
VM1 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 08:00:27:ed:14:1d
        inet addr:10.0.2.15  Bcast:10.0.2.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:feed:141d/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:68 errors:0 dropped:0 overruns:0 frame:0
        TX packets:78 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:7456 (7.4 KB)  TX bytes:7296 (7.2 KB)

eth1    Link encap:Ethernet  HWaddr 08:00:27:6d:16:d3
        inet addr:10.10.10.1  Bcast:10.10.10.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:fe6d:16d3/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:8 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:0 (0.0 B)  TX bytes:648 (648.0 B)
```

```
VM2 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 08:00:27:ed:14:1d
        inet addr:10.10.10.2  Bcast:10.10.10.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:feed:141d/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:1 errors:0 dropped:0 overruns:0 frame:0
        TX packets:11 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:60 (60.0 B)  TX bytes:856 (856.0 B)
```

```
VM3 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 08:00:27:7d:a6:07
        inet addr:10.10.10.3  Bcast:10.10.10.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:fe7d:a607/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:5 errors:0 dropped:0 overruns:0 frame:0
        TX packets:21 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:414 (414.0 B)  TX bytes:1710 (1.7 KB)
```

2) Install and configure DHCP server on VM1. (3 ways: using VBoxManage, DNSMASQ and ISC-DHSPSERVER). You should use at least 2 of them.

DNSMASQ:

```
VM1 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ sudo apt install dnsmasq
[sudo] password for student:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libpvm3 libreadline-dev libreadline6-dev libtinfo-dev pvm
Use 'apt-get autoremove' to remove them.
The following extra packages will be installed:
  dnsmasq-base libmn10 libnetfilter-conntrack3
The following NEW packages will be installed:
  dnsmasq dnsmasq-base libmn10 libnetfilter-conntrack3
0 upgraded, 4 newly installed, 0 to remove and 187 not upgraded.
Need to get 325 kB of archives.
After this operation, 970 kB of additional disk space will be used.
Do you want to continue? [Y/n] ^[s
```

/etc/dnsmasq.conf:

```
# Repeat the line for more than one interface.
interface=eth1
# Or you can specify which interface not to

# service.
dhcp-range=10.10.10.10,10.10.10.20,12h
```

Restarting service:

```
VM1 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ sudo service dnsmasq status
* Checking DNS forwarder and DHCP server dnsmasq
* (running)
student@CsnKhai:~$ sudo service dnsmasq restart
* Restarting DNS forwarder and DHCP server dnsmasq
student@CsnKhai:~$ sudo service dnsmasq status
* Checking DNS forwarder and DHCP server dnsmasq
* (running)
student@CsnKhai:~$ _
```

Modifying */etc/network/interfaces* on VM2 and VM3:

```
# 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
address 10.10.10.2
netmask 255.255.255.0
broadcast 10.10.10.255
gateway 10.10.10.1
```

Checking result after interfaces restart:

```
student@CsnKhai:~$ sudo ifdown eth0
Internet Systems Consortium DHCP Client 4.2.4
Copyright 2004-2012 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/

Listening on LPF/eth0/08:00:27:ed:14:1d
Sending on   LPF/eth0/08:00:27:ed:14:1d
Sending on   Socket/fallback
DHCPRELEASE on eth0 to 192.168.0.1 port 67 (xid=0x28a9456f)
student@CsnKhai:~$ sudo ifup eth0
Internet Systems Consortium DHCP Client 4.2.4
Copyright 2004-2012 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/

Listening on LPF/eth0/08:00:27:ed:14:1d
Sending on   LPF/eth0/08:00:27:ed:14:1d
Sending on   Socket/fallback
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 3 (xid=0x6677415b)
DHCPREQUEST of 10.10.10.20 on eth0 to 255.255.255.255 port 67 (xid=0x5b417766)
DHCPOFFER of 10.10.10.20 from 10.10.10.1
DHCPACK of 10.10.10.20 from 10.10.10.1
bound to 10.10.10.20 -- renewal in 17707 seconds.
student@CsnKhai:~$ _
```

VM2 [Запущено] - Oracle VM VirtualBox

Файл	Машина	Перегляд	Введення	Пристрої	Довідка
------	--------	----------	----------	----------	---------

```
student@CsnKhai:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:ed:14:1d
          inet addr:10.10.10.20  Bcast:10.10.10.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:feed:141d/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:31 errors:0 dropped:0 overruns:0 frame:0
          TX packets:46 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3219 (3.2 KB)  TX bytes:4598 (4.5 KB)
```

```
VM3 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 08:00:27:7d:a6:07
        inet addr:10.10.10.17  Bcast:10.10.10.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:fe7d:a607/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:41 errors:0 dropped:0 overruns:0 frame:0
        TX packets:56 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:4467 (4.4 KB)  TX bytes:5452 (5.4 KB)
```

Now let's configure *ISC-DHSPSERVER*:

```
VM1 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ sudo apt install isc-dhcp-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libpvm3 libreadline-dev libreadline6-dev libtinfo-dev pvm
Use 'apt-get autoremove' to remove them.
The following extra packages will be installed:
  isc-dhcp-client isc-dhcp-common
Suggested packages:
  avahi-autoipd isc-dhcp-server-ldap
The following NEW packages will be installed:
  isc-dhcp-server
The following packages will be upgraded:
  isc-dhcp-client isc-dhcp-common
2 upgraded, 1 newly installed, 0 to remove and 185 not upgraded.
Need to get 2,066 kB of archives.
After this operation, 2,282 kB of additional disk space will be used.
Do you want to continue? [Y/n]
```

Configuring */etc/dhcp/dhcpd.conf*:

```
# DHCP server to understand the network topology.

subnet 10.10.10.0 netmask 255.255.255.0 {
    range 10.10.10.35 10.10.10.45;
    option routers 10.10.10.1;
}
```

And interface in */etc/default/isc-dhcp-server*:

```
# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
#       Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACES="eth1"
```

Restarting service:

```
VM1 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:/etc/dhcp$ sudo service isc-dhcp-server restart
^[[Aisc-dhcp-server stop/waiting
isc-dhcp-server start/running, process 2268
student@CsnKhai:/etc/dhcp$ sudo service isc-dhcp-server status
isc-dhcp-server start/running, process 2268
student@CsnKhai:/etc/dhcp$ _
```

Checking **VM2** and **VM3** for obtaining ip:

```
VM2 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 08:00:27:ed:14:1d
        inet addr:10.10.10.36  Bcast:10.10.10.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:feed:141d/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:48 errors:0 dropped:0 overruns:0 frame:0
        TX packets:58 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:5933 (5.9 KB)  TX bytes:6324 (6.3 KB)
```

```
VM3 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 08:00:27:7d:a6:07
        inet addr:10.10.10.35  Bcast:10.10.10.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:fe7d:a607/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:53 errors:0 dropped:0 overruns:0 frame:0
        TX packets:70 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:6317 (6.3 KB)  TX bytes:7308 (7.3 KB)
```

3) Check VM2 and VM3 for obtaining network addresses from the DHCP server.

```
VM2 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 08:00:27:ed:14:1d
        inet addr:10.10.10.20  Bcast:10.10.10.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:feed:141d/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:31 errors:0 dropped:0 overruns:0 frame:0
        TX packets:46 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:3219 (3.2 KB)  TX bytes:4598 (4.5 KB)
```

```
VM3 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 08:00:27:7d:a6:07
        inet addr:10.10.10.17  Bcast:10.10.10.255  Mask:255.255.255.0
        inet6 addr: fe80::a00:27ff:fe7d:a607/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:41 errors:0 dropped:0 overruns:0 frame:0
        TX packets:56 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:4467 (4.4 KB)  TX bytes:5452 (5.4 KB)
```

4) Using the existing network for three VMs (from p.1) install and configure DNS server on VM1. (You can use DNSMASQ, BIND9 or something else).

/etc/dhcp/dhclient.conf:

```
#supersede domain-name "fugue.com home.vix.com";
prepend domain-name-servers 127.0.0.1;
```

Restarting:

```
VM1 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ sudo service dnsmasq restart
* Restarting DNS forwarder and DHCP server dnsmasq
student@CsnKhai:~$ sudo service dnsmasq status
* Checking DNS forwarder and DHCP server dnsmasq
* (running)
student@CsnKhai:~$ _
```

5) Check VM2 and VM3 for gaining access to DNS servers (naming services).

```
VM2 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ dig google.com

; <<>> DiG 9.9.5-3ubuntu0.5-Ubuntu <<>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 3062
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
;; QUESTION SECTION:
;google.com.                IN      A

;; ANSWER SECTION:
google.com.                94      IN      A      216.58.215.78

;; Query time: 20 msec
;; SERVER: 10.10.10.1#53(10.10.10.1)
;; WHEN: Sun Aug 20 17:26:22 UTC 2023
;; MSG SIZE rcvd: 55
```

```
VM3 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
student@CsnKhai:~$ nslookup dou.ua
Server:          10.10.10.1
Address:         10.10.10.1#53

Non-authoritative answer:
Name:   dou.ua
Address: 104.22.52.237
Name:   dou.ua
Address: 104.22.53.237
Name:   dou.ua
Address: 172.67.21.118
```