

## Configuring DHCP, DNS servers

### and dynamic routing using OSPF protocol

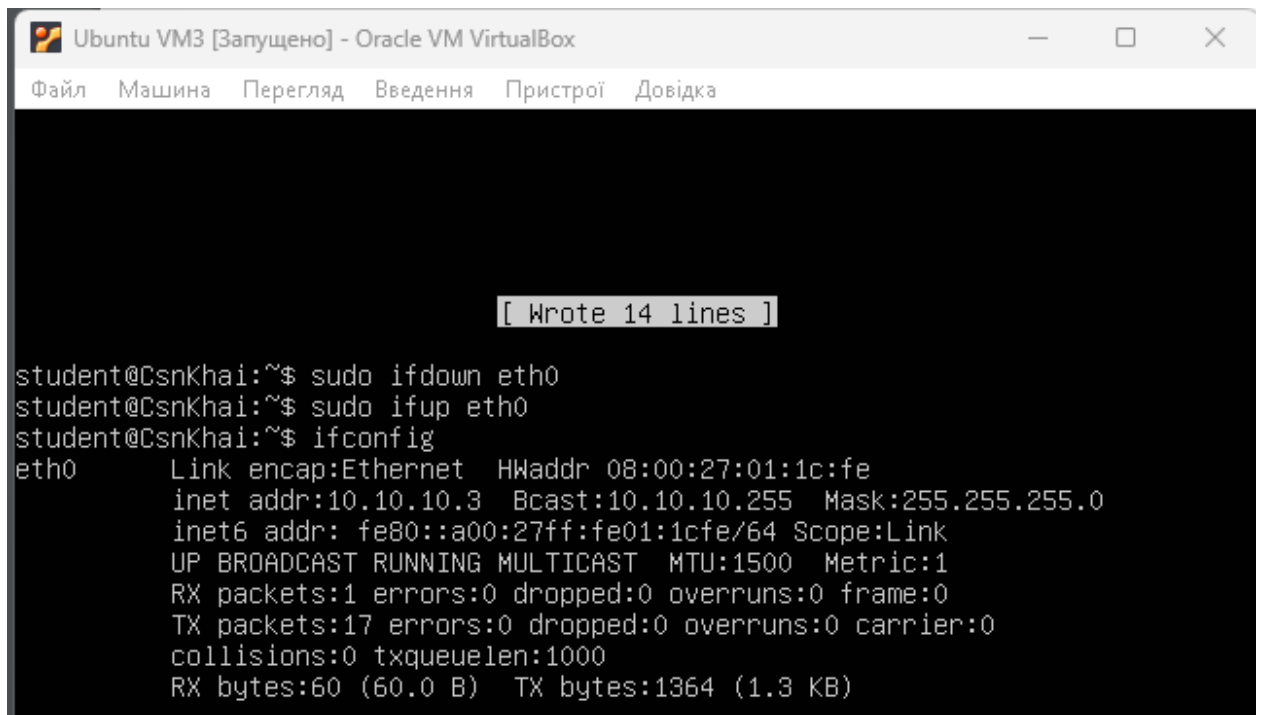
1. Use already created internal-network for three VMs (VM1-VM3). VM1 has NAT and internal, VM2, VM3 – internal only interfaces.

```
Ubuntu VM1 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
* Documentation: https://help.ubuntu.com/
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:25 errors:0 dropped:0 overruns:0 frame:0
          TX packets:33 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3352 (3.3 KB)  TX bytes:3340 (3.3 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:6 errors:0 dropped:0 overruns:0 frame:0
          TX packets:10 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:416 (416.0 B)  TX bytes:768 (768.0 B)
```

```
Ubuntu VM2 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка
Password:
Last login: Sun Aug 20 07:36:53 UTC 2023 on tty1
Welcome to Ubuntu 14.04.3 LTS (GNU/Linux 3.13.0-63-generic i686)

* Documentation: https://help.ubuntu.com/
student@CsnKhai:~$ ufconfig
No command 'ufconfig' found, did you mean:
  Command 'ifconfig' from package 'net-tools' (main)
  Command 'fconfig' from package 'redboot-tools' (universe)
ufconfig: command not found
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:2 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:120 (120.0 B)  TX bytes:856 (856.0 B)
```



```
student@CsnKhai:~$ sudo ifdown eth0
student@CsnKhai:~$ sudo ifup eth0
student@CsnKhai:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:01:1c:fe
          inet addr:10.10.10.3  Bcast:10.10.10.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:fe01:1cfe/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1 errors:0 dropped:0 overruns:0 frame:0
          TX packets:17 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:60 (60.0 B)  TX bytes:1364 (1.3 KB)
```

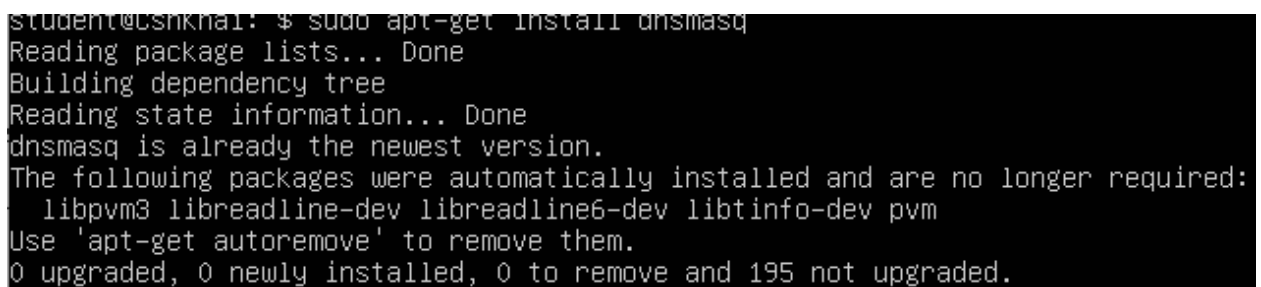
2. Install and configure DHCP server on VM1.

(3 ways: using VBoxManage, DNSMASQ and ISC-DHSPSERVER).

You should use at least 2 of them.

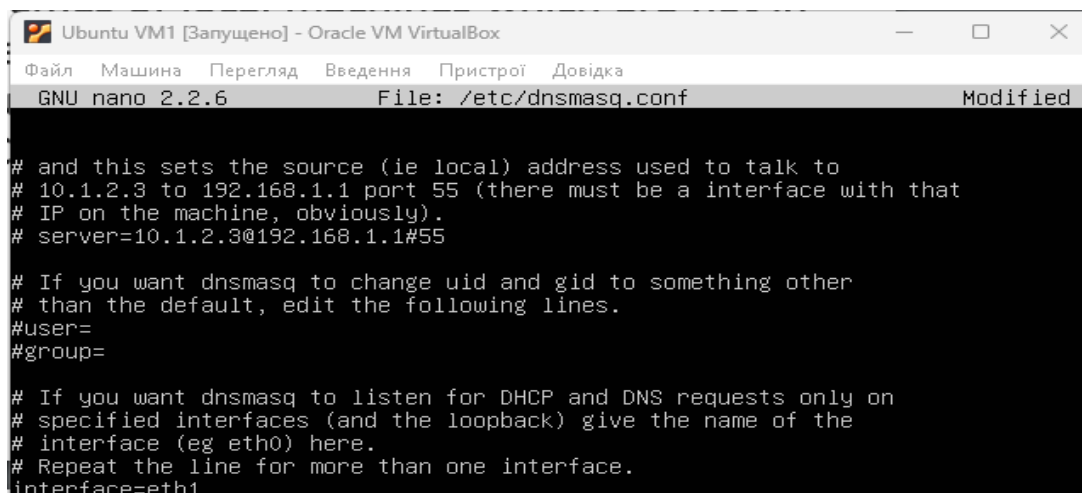
### Install and configure DNSMASQ

Install dnsmasq on the VM1



```
student@CsnKhai:~$ sudo apt-get install dnsmasq
Reading package lists... Done
Building dependency tree
Reading state information... Done
dnsmasq is already the newest version.
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.
0 upgraded, 0 newly installed, 0 to remove and 195 not upgraded.
```

Configure files



```
GNU nano 2.2.6 File: /etc/dnsmasq.conf Modified

# and this sets the source (ie local) address used to talk to
# 10.1.2.3 to 192.168.1.1 port 55 (there must be a interface with that
# IP on the machine, obviously).
# server=10.1.2.3@192.168.1.1#55

# If you want dnsmasq to change uid and gid to something other
# than the default, edit the following lines.
#user=
#group=

# If you want dnsmasq to listen for DHCP and DNS requests only on
# specified interfaces (and the loopback) give the name of the
# interface (eg eth0) here.
# Repeat the line for more than one interface.
interface=eth1
```

```
dhcp-range=10.10.10.10,10.10.10.20,12h
```

## Restart service

```
student@CsnKhai:~$ sudo service dnsmasq restart
* Restarting DNS forwarder and DHCP server dnsmasq
student@CsnKhai:~$ sudo service dnsmasq status
```

## Modify /etc/network/interfaces on VM2 and VM3

```
# 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
```

## Restart eth0

```
DHCPREQUEST of 10.10.10.20 on eth0 to 255.255.255.255 port 67 (xid=0xbe3fb5)
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 18941 seconds.
```

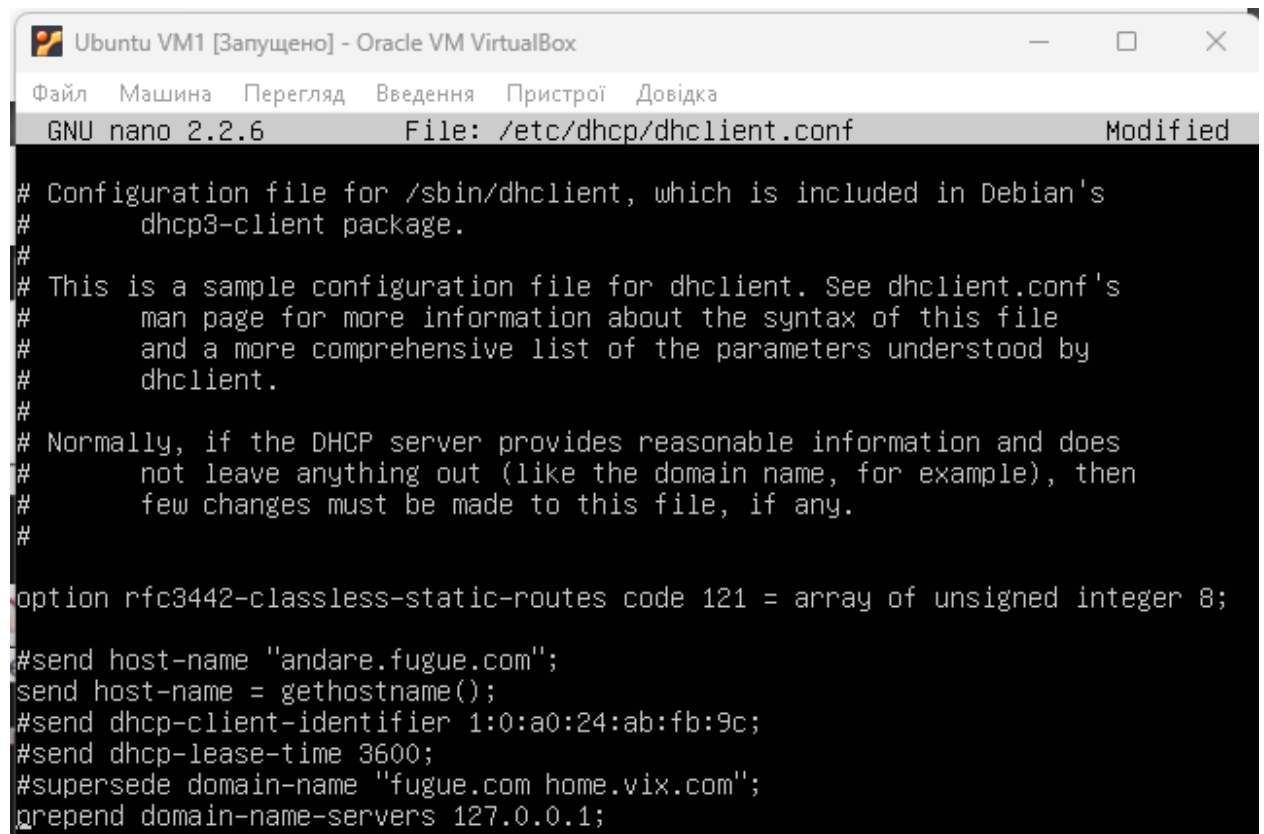
## 3. Check VM2 and VM3 for obtaining network addresses from DHCP server.

```
student@CsnKhai:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:01:1c:fe
          inet addr:10.10.10.10  Bcast:10.10.10.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:fe01:1cfe/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:36 errors:0 dropped:0 overruns:0 frame:0
          TX packets:79 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:8651 (8.6 KB)  TX bytes:12978 (12.9 KB)
```

```
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:41 errors:0 dropped:0 overruns:0 frame:0
          TX packets:64 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:9987 (9.9 KB)  TX bytes:10754 (10.7 KB)
```

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

## Configure /etc/dhcp/dhclient.conf



```
GNU nano 2.2.6      File: /etc/dhcp/dhclient.conf      Modified

# Configuration file for /sbin/dhclient, which is included in Debian's
#   dhcp3-client package.
#
# This is a sample configuration file for dhclient. See dhclient.conf's
#   man page for more information about the syntax of this file
#   and a more comprehensive list of the parameters understood by
#   dhclient.
#
# Normally, if the DHCP server provides reasonable information and does
#   not leave anything out (like the domain name, for example), then
#   few changes must be made to this file, if any.
#
option rfc3442-classless-static-routes code 121 = array of unsigned integer 8;

#send host-name "andare.fugue.com";
send host-name = gethostname();
#send dhcp-client-identifier 1:0:a0:24:ab:fb:9c;
#send dhcp-lease-time 3600;
#supersede domain-name "fugue.com home.vix.com";
prepend domain-name-servers 127.0.0.1;
```

## Restart services

```
student@CsnKhair:~$ sudo service dnsmasq restart
* Restarting DNS forwarder and DHCP server dnsmasq
```

## Iptables

```
student@CsnKhair:~$ sudo iptables -S
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
-A FORWARD -i eth1 -o eth0 -m state --state RELATED,ESTABLISHED -j ACCEPT
-A FORWARD -i eth1 -o eth0 -j ACCEPT
```

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

```
Ubuntu VM2 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка

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:44 errors:0 dropped:0 overruns:0 frame:0
TX packets:44 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:3368 (3.3 KB)  TX bytes:3368 (3.3 KB)

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: 50060
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;google.com.                IN      A

;; ANSWER SECTION:
google.com.                140     IN      A      142.250.186.206

;; Query time: 12 msec
;; SERVER: 10.10.10.1#53(10.10.10.1)
;; WHEN: Mon Aug 21 12:46:03 UTC 2023
;; MSG SIZE rcvd: 55

student@CsnKhai:~$
```

```
Ubuntu VM3 [Запущено] - Oracle VM VirtualBox
Файл  Машина  Перегляд  Введення  Пристрої  Довідка

10      Link encap:Local 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:60 errors:0 dropped:0 overruns:0 frame:0
TX packets:60 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:4552 (4.5 KB)  TX bytes:4552 (4.5 KB)

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: 32923
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;google.com.                IN      A

;; ANSWER SECTION:
google.com.                119     IN      A      142.250.186.206

;; Query time: 3 msec
;; SERVER: 10.10.10.1#53(10.10.10.1)
;; WHEN: Mon Aug 21 12:46:24 UTC 2023
;; MSG SIZE rcvd: 44

student@CsnKhai:~$
```