

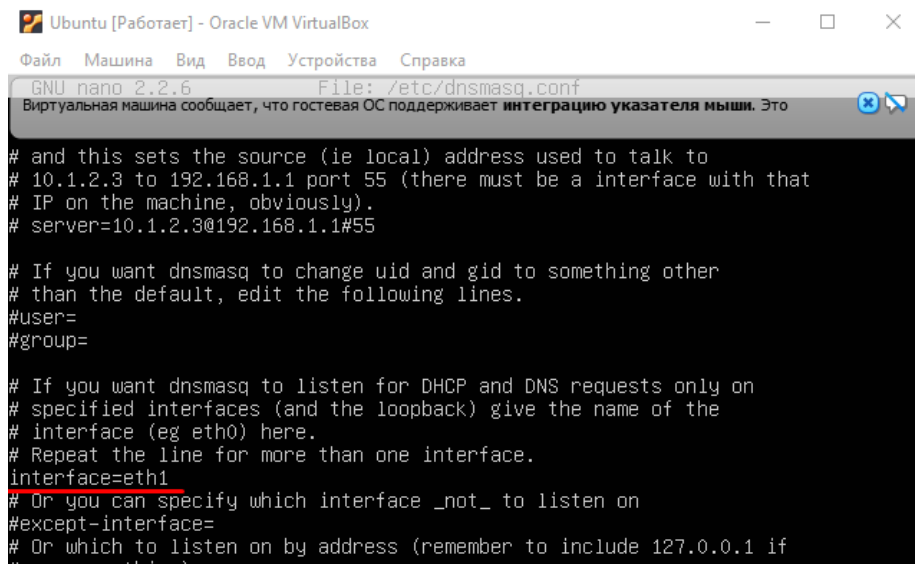
Networking. Part2

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

```
student@CsnKhai:~$ sudo apt-get install dnsmasq
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 195 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]
```

Then we go to dnsmasq config file (*/etc/dnsmasq.conf*) to set interface and dhcp-range:



```
GNU nano 2.2.6 File: /etc/dnsmasq.conf
Виртуальная машина сообщает, что гостевая ОС поддерживает интеграцию указателя мыши. Это

# 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
# Or you can specify which interface _not_ to listen on
#except-interface=
# Or which to listen on by address (remember to include 127.0.0.1 if
# you use this)
```

```
Ubuntu [Работает] - Oracle VM VirtualBox
Файл  Машина  Вид  Ввод  Устройства  Справка
GNU nano 2.2.6      File: /etc/dnsmasq.conf
Виртуальная машина сообщает, что гостевая ОС поддерживает интеграцию указателя мыши. Это
# 3) Provides the domain part for "expand-hosts"
#domain=thekelleys.org.uk

# Set a different domain for a particular subnet
#domain=wireless.thekelleys.org.uk,192.168.2.0/24

# Same idea, but range rather than subnet
#domain=reserved.thekelleys.org.uk,192.68.3.100,192.168.3.200

# Uncomment this to enable the integrated DHCP server, you need
# to supply the range of addresses available for lease and optionally
# a lease time. If you have more than one network, you will need to
# repeat this for each network on which you want to supply DHCP
# service.
#dhcp-range=192.168.1.50,192.168.1.150,12h

# This is an example of a DHCP range where the netmask is given. This
# is needed for networks we reach the dnsmasq DHCP server via a relay
# agent. If you don't know what a DHCP relay agent is, you probably
# don't need to worry about this.
#dhcp-range=192.168.0.50,192.168.0.150,255.255.255.0,12h

# This is an example of a DHCP range which sets a tag, so that
# some DHCP options may be set only for this network.
#dhcp-range=set:red,192.168.0.50,192.168.0.150

^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Page  ^K Cut Text    ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is   ^V Next Page  ^U UnCut Text ^T To Spell
```

Next we need to change VM2's interface:

```
Клон Ubuntu 1 [Работает] - Oracle VM VirtualBox
Файл  Машина  Вид  Ввод  Устройства  Справка
GNU nano 2.2.6      File: /etc/network/interfaces

# 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 192.168.1.11
#gateway 192.168.1.10
#netmask 255.255.255.0
#broadcast 192.168.1.255

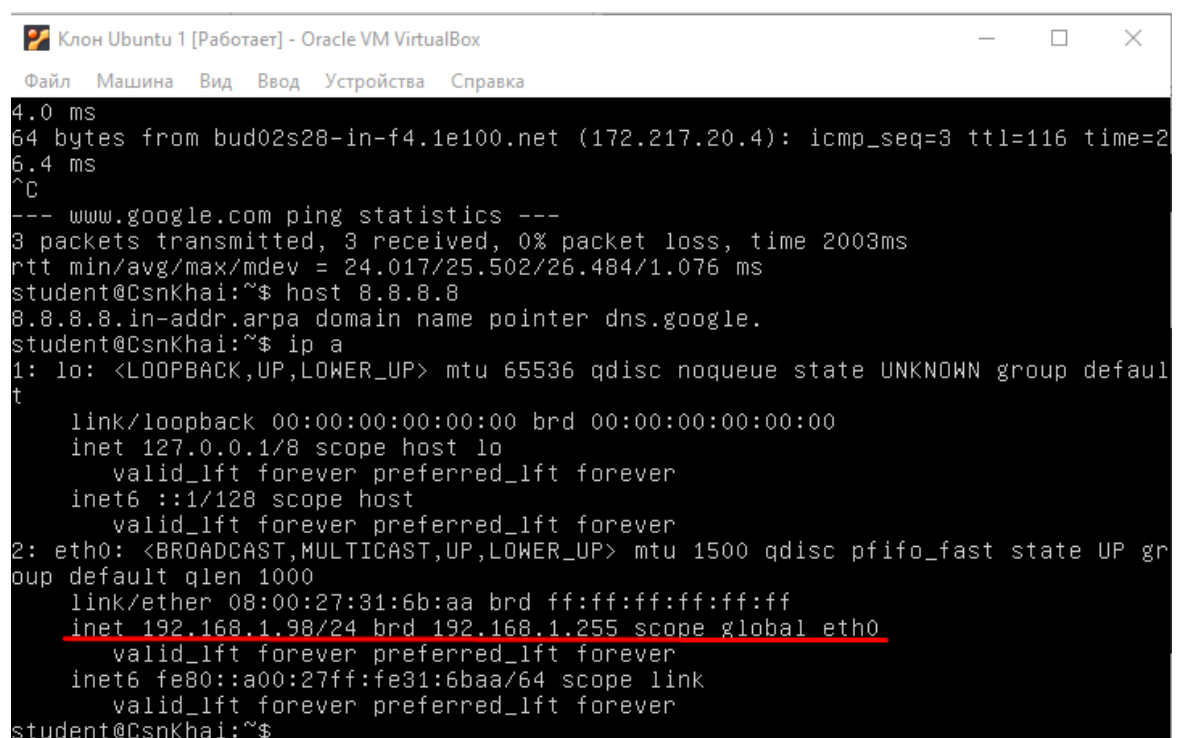
[ Read 14 lines ]
^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Page  ^K Cut Text    ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is   ^V Next Page  ^U UnCut Text  ^T To Spell
```

Reboot and see results. There is an access to the internet and also the possibility to use dns.

```
student@CsnKhai:~$ ping www.google.com
PING www.google.com (172.217.20.4) 56(84) bytes of data.
64 bytes from bud02s28-in-f4.1e100.net (172.217.20.4): icmp_seq=1 ttl=116 time=26.0 ms
64 bytes from bud02s28-in-f4.1e100.net (172.217.20.4): icmp_seq=2 ttl=116 time=24.0 ms
64 bytes from bud02s28-in-f4.1e100.net (172.217.20.4): icmp_seq=3 ttl=116 time=26.4 ms
^C
--- www.google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 24.017/25.502/26.484/1.076 ms
student@CsnKhai:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
```

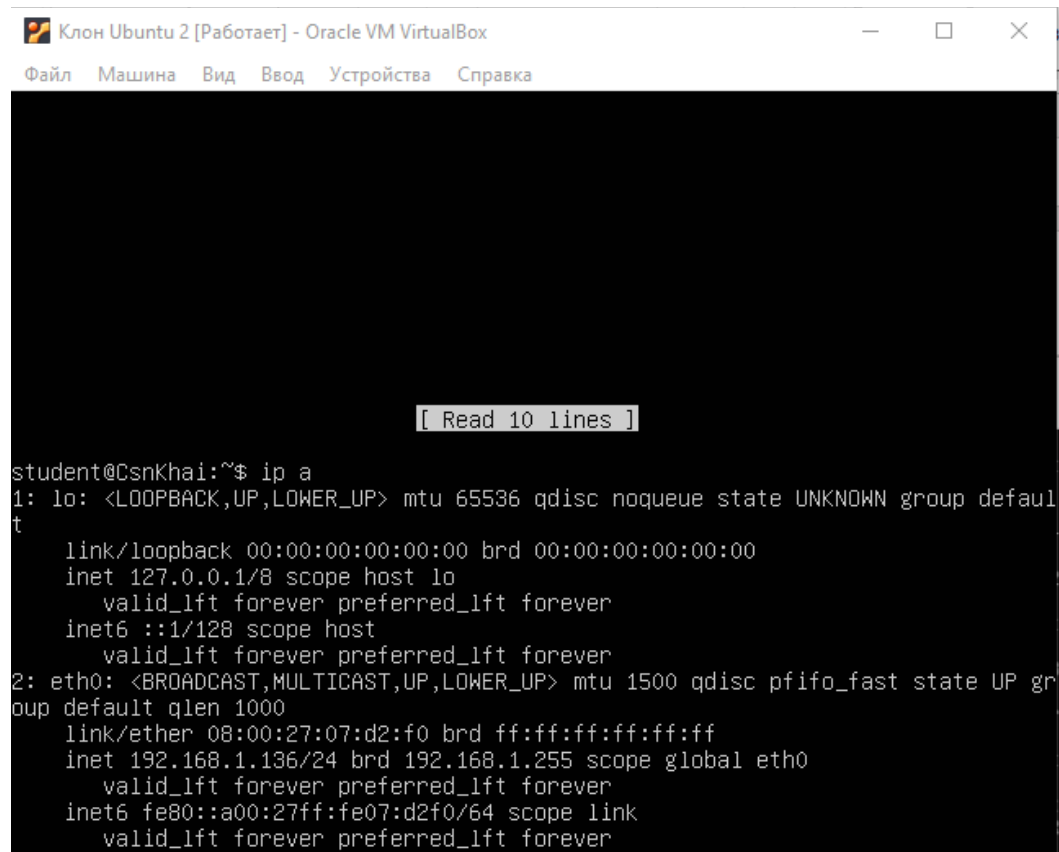
3. Check VM2 and VM3 for obtaining network addresses from DHCP server.

VM2:



```
Клон Ubuntu 1 [Работает] - Oracle VM VirtualBox
Файл  Машина  Вид  Ввод  Устройства  Справка
4.0 ms
64 bytes from bud02s28-in-f4.1e100.net (172.217.20.4): icmp_seq=3 ttl=116 time=26.4 ms
^C
--- www.google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 24.017/25.502/26.484/1.076 ms
student@CsnKhai:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
student@CsnKhai:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:31:6b:aa brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.98/24 brd 192.168.1.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe31:6baa/64 scope link
        valid_lft forever preferred_lft forever
student@CsnKhai:~$
```

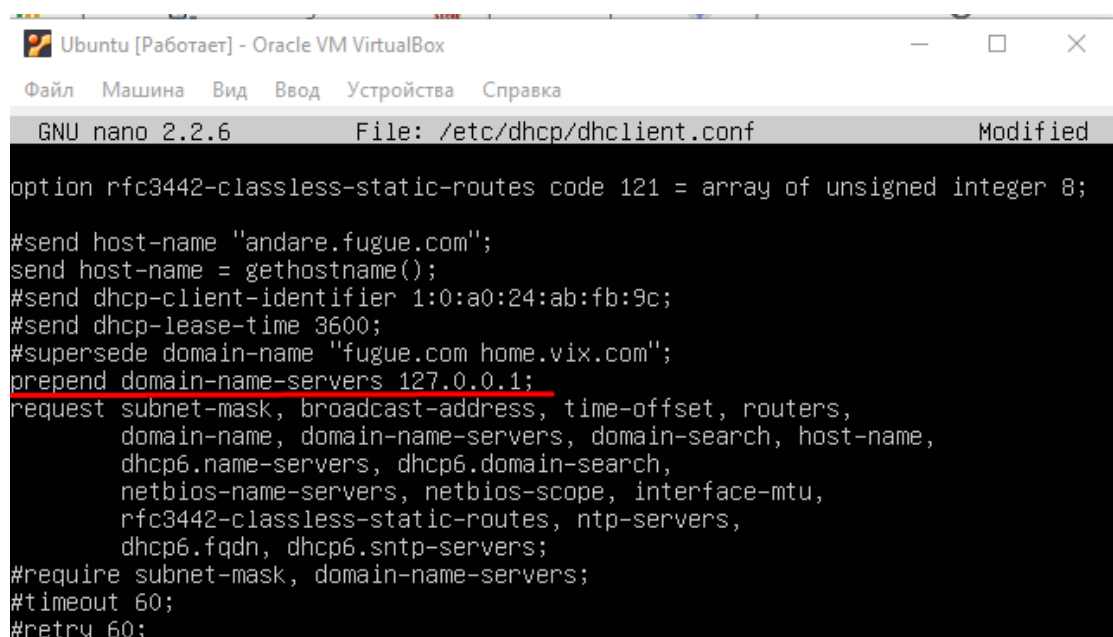
VM3:



The screenshot shows a terminal window titled "Клон Ubuntu 2 [Работает] - Oracle VM VirtualBox". The terminal displays the output of the command `ip a`. A status bar at the top indicates "[Read 10 lines]". The output shows details for the loopback interface `lo` and the ethernet interface `eth0`.

```
student@CsnKhai:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:07:d2:f0 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.136/24 brd 192.168.1.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe07:d2f0/64 scope link
        valid_lft forever preferred_lft forever
```

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).



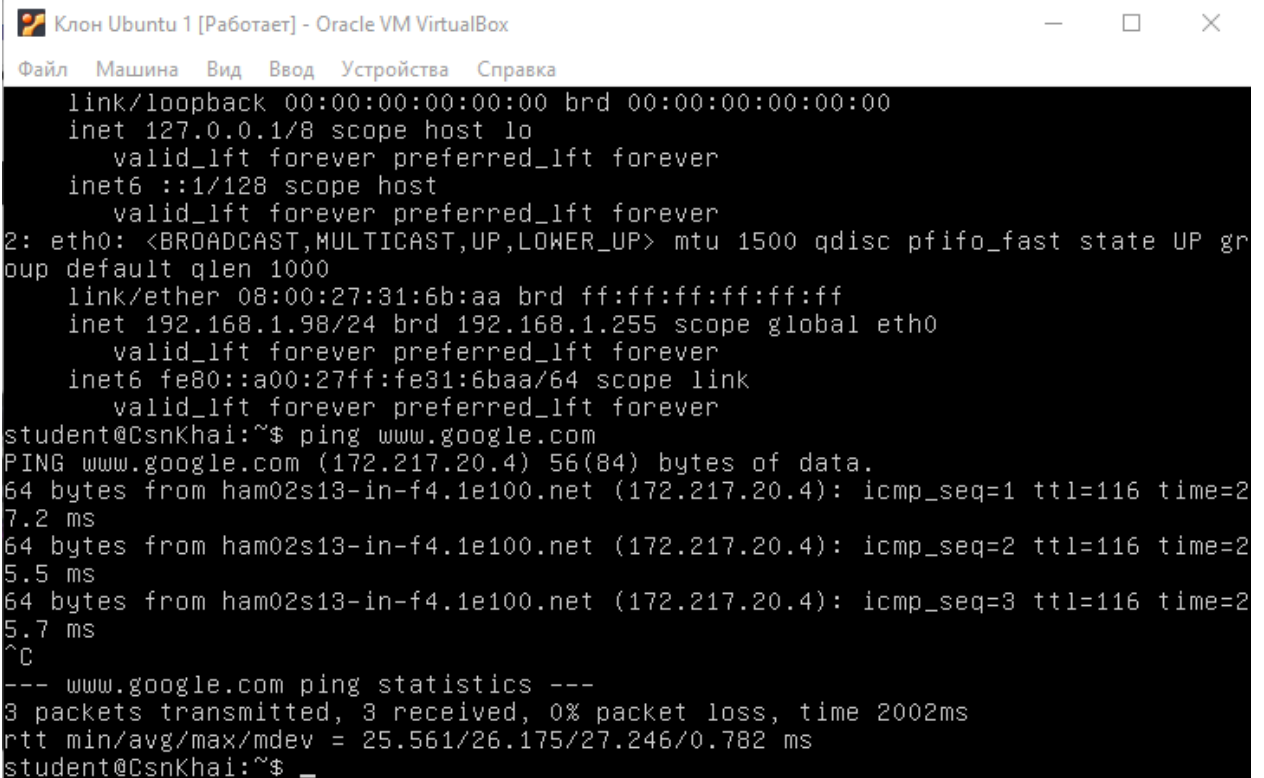
The screenshot shows a terminal window titled "Ubuntu [Работает] - Oracle VM VirtualBox". The terminal is running the `nano` text editor to edit the file `/etc/dhcp/dhclient.conf`. The configuration file contains several lines of DHCP client configuration, including options for static routes, host name, client identifier, lease time, domain name, and domain name servers. The line `prepend domain-name-servers 127.0.0.1;` is highlighted with a red underline.

```
GNU nano 2.2.6      File: /etc/dhcp/dhclient.conf      Modified
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;
request subnet-mask, broadcast-address, time-offset, routers,
       domain-name, domain-name-servers, domain-search, host-name,
       dhcp6.name-servers, dhcp6.domain-search,
       netbios-name-servers, netbios-scope, interface-mtu,
       rfc3442-classless-static-routes, ntp-servers,
       dhcp6.fqdn, dhcp6.sntp-servers;
#require subnet-mask, domain-name-servers;
#timeout 60;
#retry 60;
```

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

\$ ping www.google.com



```
Клон Ubuntu 1 [Работает] - Oracle VM VirtualBox
Файл  Машина  Вид  Ввод  Устройства  Справка
link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
inet 127.0.0.1/8 scope host lo
    valid_lft forever preferred_lft forever
inet6 ::1/128 scope host
    valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:31:6b:aa brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.98/24 brd 192.168.1.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe31:6baa/64 scope link
        valid_lft forever preferred_lft forever
student@CsnKhai:~$ ping www.google.com
PING www.google.com (172.217.20.4) 56(84) bytes of data.
64 bytes from ham02s13-in-f4.1e100.net (172.217.20.4): icmp_seq=1 ttl=116 time=27.2 ms
64 bytes from ham02s13-in-f4.1e100.net (172.217.20.4): icmp_seq=2 ttl=116 time=25.5 ms
64 bytes from ham02s13-in-f4.1e100.net (172.217.20.4): icmp_seq=3 ttl=116 time=25.7 ms
^C
--- www.google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 25.561/26.175/27.246/0.782 ms
student@CsnKhai:~$ _
```