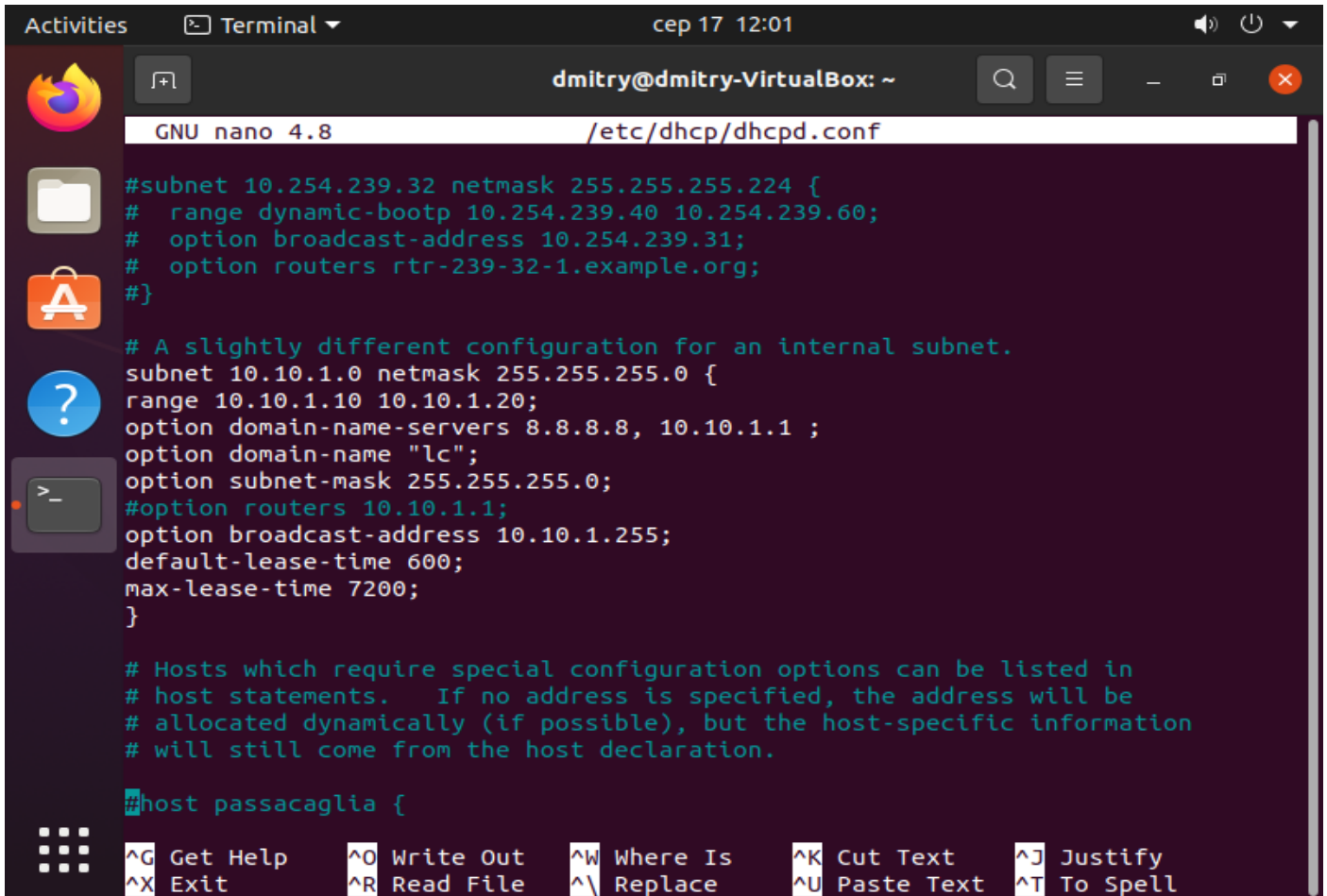


Configuring DHCP, DNS servers and dynamic routing using OSPF protocol

PART 1



```
GNU nano 4.8 /etc/dhcp/dhcpd.conf

#subnet 10.254.239.32 netmask 255.255.255.224 {
#   range dynamic-bootp 10.254.239.40 10.254.239.60;
#   option broadcast-address 10.254.239.31;
#   option routers rtr-239-32-1.example.org;
#}

# A slightly different configuration for an internal subnet.
subnet 10.10.1.0 netmask 255.255.255.0 {
range 10.10.1.10 10.10.1.20;
option domain-name-servers 8.8.8.8, 10.10.1.1 ;
option domain-name "lc";
option subnet-mask 255.255.255.0;
#option routers 10.10.1.1;
option broadcast-address 10.10.1.255;
default-lease-time 600;
max-lease-time 7200;
}

# Hosts which require special configuration options can be listed in
# host statements.  If no address is specified, the address will be
# allocated dynamically (if possible), but the host-specific information
# will still come from the host declaration.

#host passacaglia {
```

Activity icons on the left: Firefox, Files, App Store, Help, and Terminal.

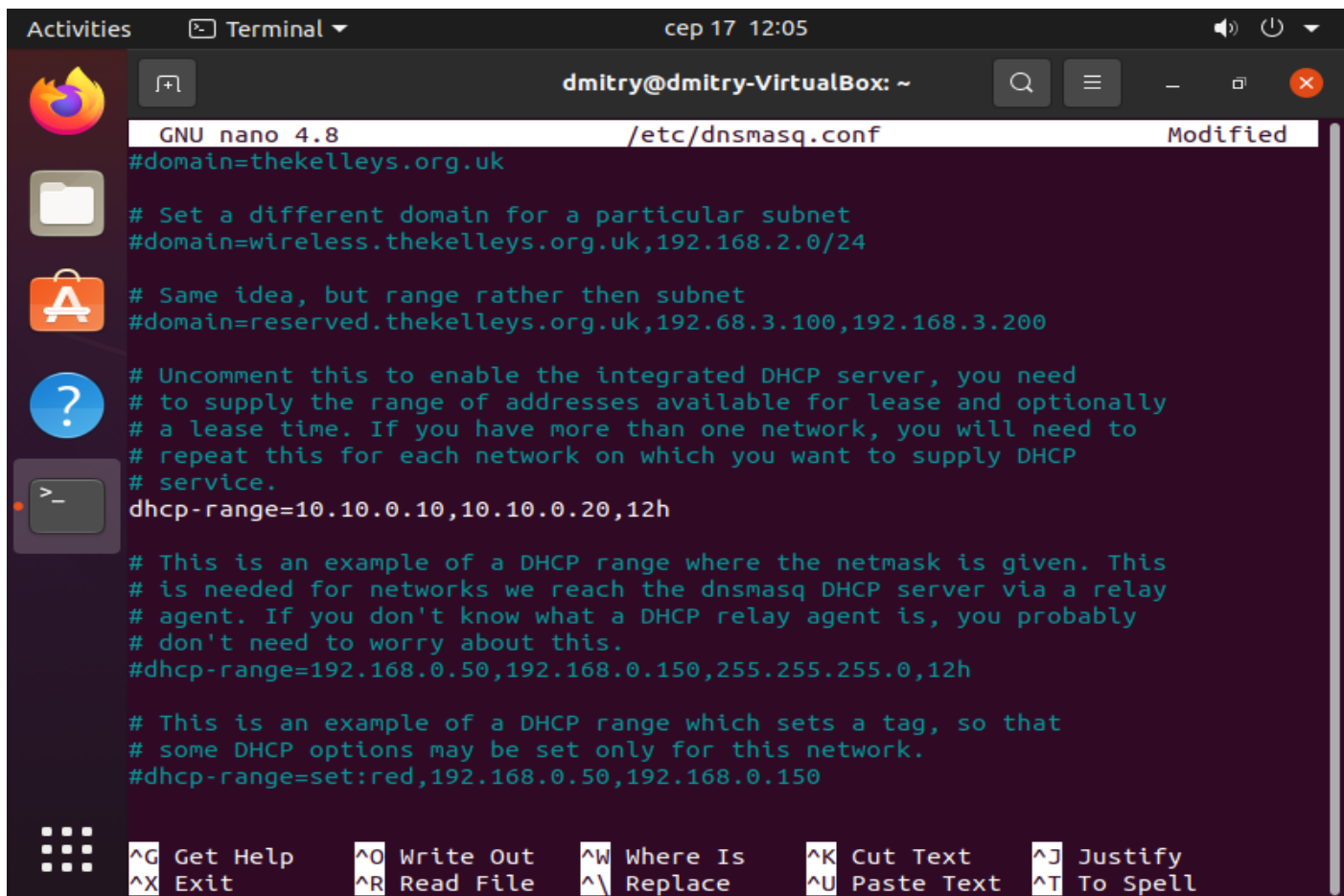
Terminal window title: dmitry@dmitry-VirtualBox: ~

Terminal window status bar: cep 17 12:01

Terminal window keyboard shortcuts:

^G Get Help	^O Write Out	^W Where Is	^K Cut Text	^J Justify
^X Exit	^R Read File	^_ Replace	^U Paste Text	^T To Spell

Screenshot 1 – dhcp.conf настройка сервера



```
GNU nano 4.8 /etc/dnsmasq.conf Modified
#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

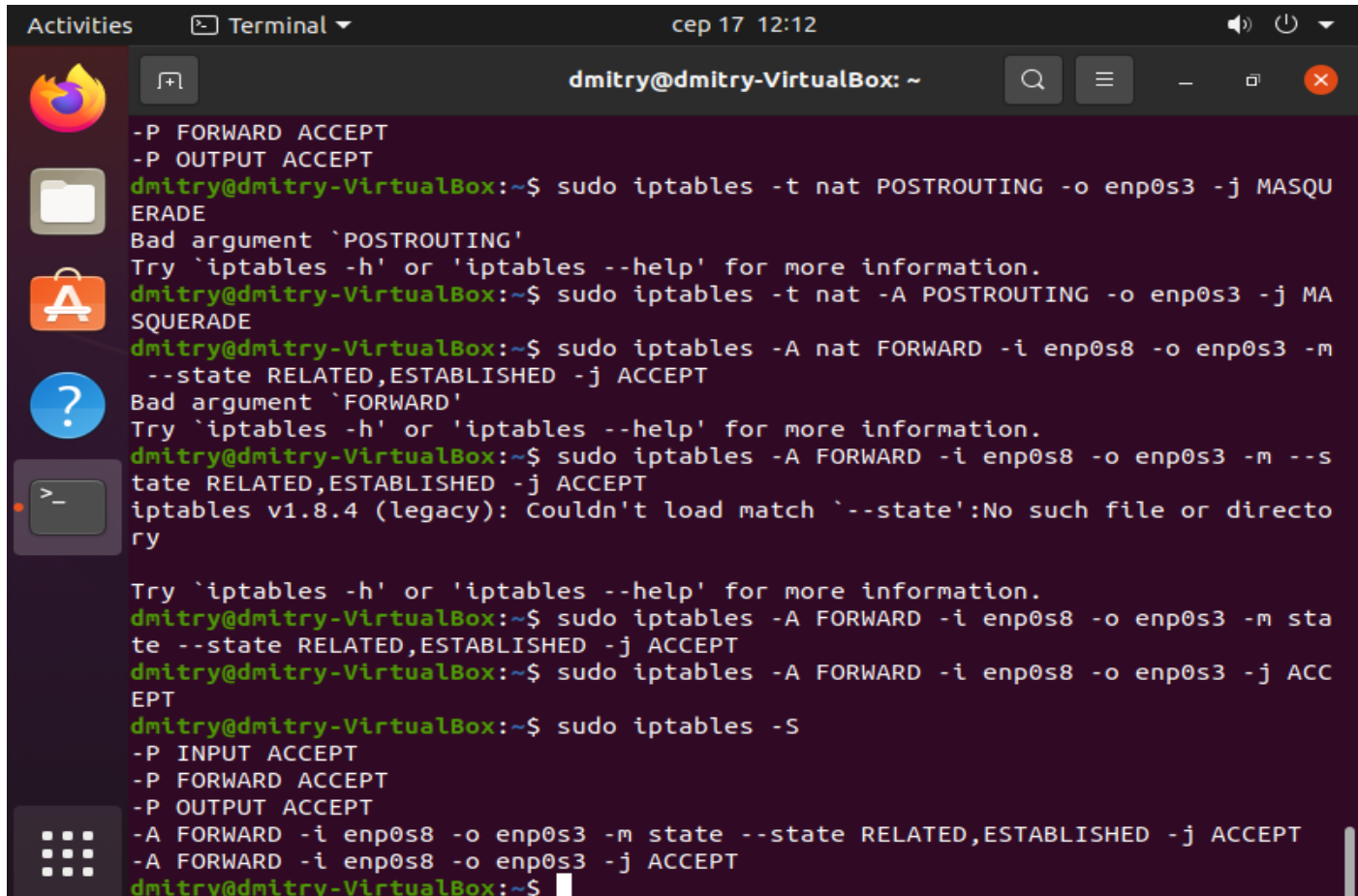
# Uncomment this to enable the integrated DHCP server, you need
# to supply the range of addresses available for lease and optionally
# a lease time. If you have more than one network, you will need to
# repeat this for each network on which you want to supply DHCP
# service.
dhcp-range=10.10.0.10,10.10.0.20,12h

# 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 Write Out    ^W Where Is     ^K Cut Text     ^J Justify
^X Exit          ^R Read File    ^_ Replace      ^U Paste Text   ^T To Spell
```

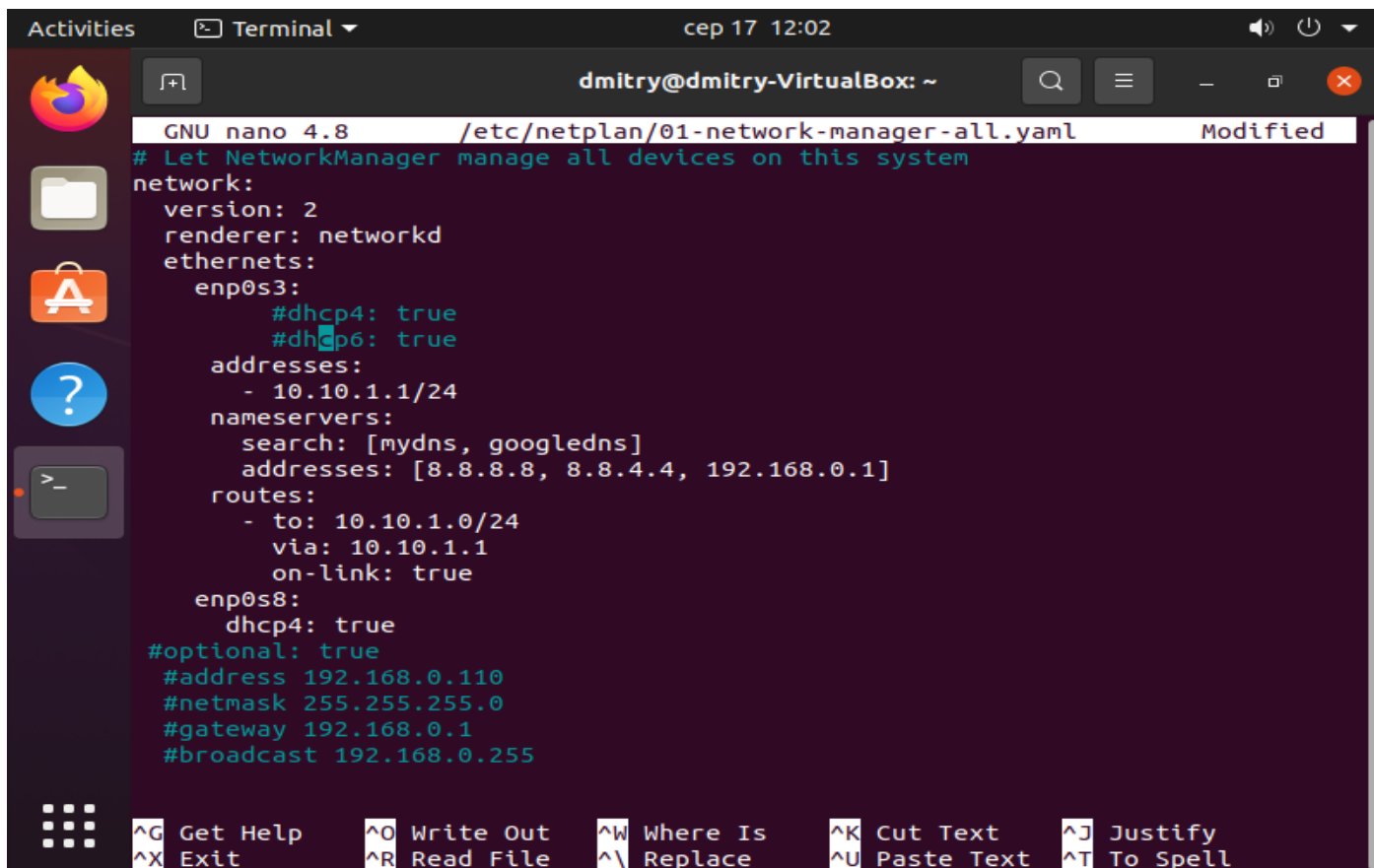
Screenshot 2 – dnsmasq.conf настройка dhcp



```
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
dmitry@dmitry-VirtualBox:~$ sudo iptables -t nat POSTROUTING -o enp0s3 -j MASQUERADE
Bad argument `POSTROUTING'
Try `iptables -h' or 'iptables --help' for more information.
dmitry@dmitry-VirtualBox:~$ sudo iptables -t nat -A POSTROUTING -o enp0s3 -j MASQUERADE
dmitry@dmitry-VirtualBox:~$ sudo iptables -A nat FORWARD -i enp0s8 -o enp0s3 -m state --state RELATED,ESTABLISHED -j ACCEPT
Bad argument `FORWARD'
Try `iptables -h' or 'iptables --help' for more information.
dmitry@dmitry-VirtualBox:~$ sudo iptables -A FORWARD -i enp0s8 -o enp0s3 -m state --state RELATED,ESTABLISHED -j ACCEPT
iptables v1.8.4 (legacy): Couldn't load match `--state':No such file or directory

Try `iptables -h' or 'iptables --help' for more information.
dmitry@dmitry-VirtualBox:~$ sudo iptables -A FORWARD -i enp0s8 -o enp0s3 -m state --state RELATED,ESTABLISHED -j ACCEPT
dmitry@dmitry-VirtualBox:~$ sudo iptables -A FORWARD -i enp0s8 -o enp0s3 -j ACCEPT
dmitry@dmitry-VirtualBox:~$ sudo iptables -S
-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
dmitry@dmitry-VirtualBox:~$
```

Screenshot 3 – настройка iptables для dhcp сервера

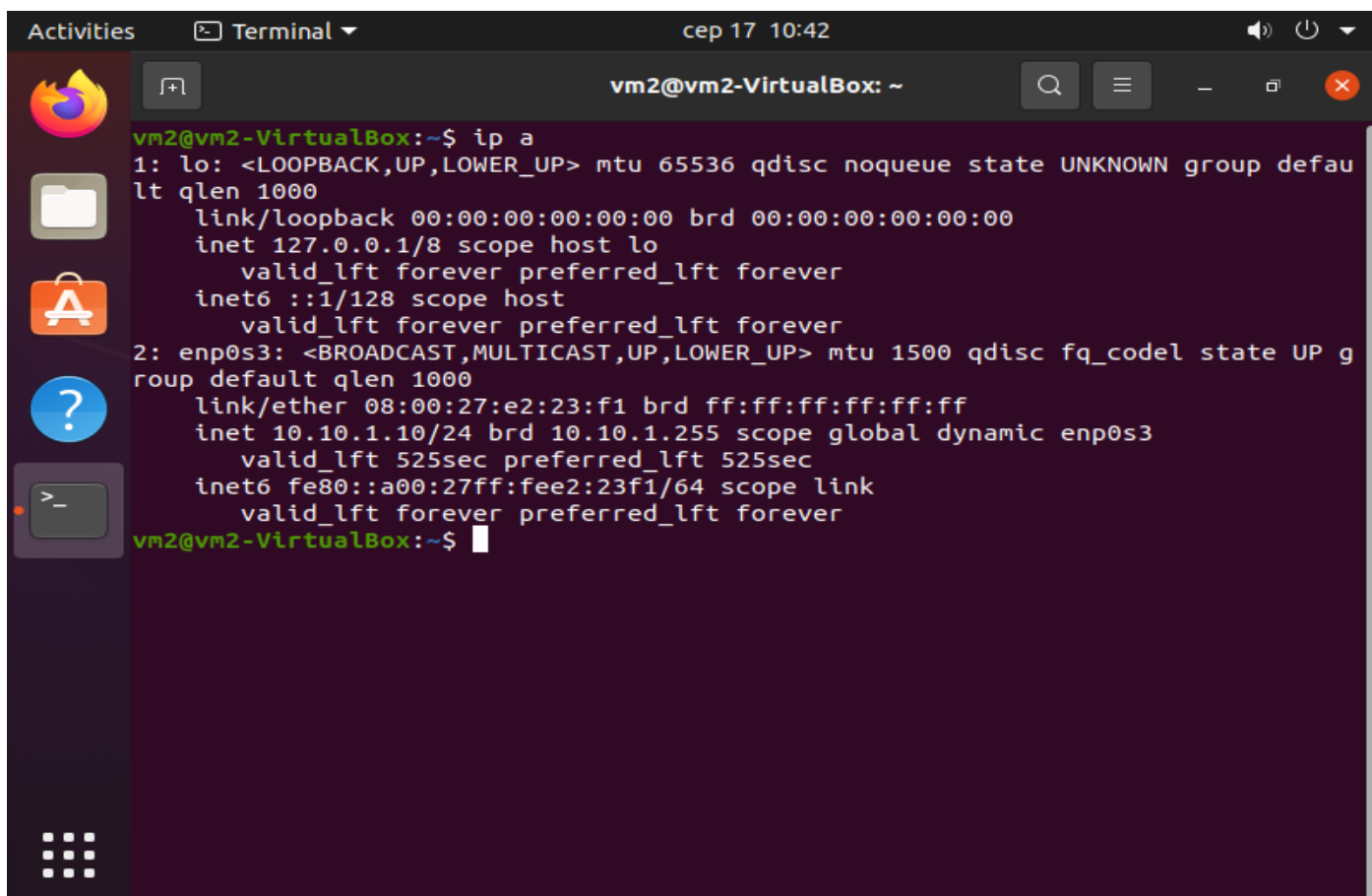


The screenshot shows a terminal window titled "dmitry@dmitry-VirtualBox: ~" with a timestamp of "cep 17 12:02". The terminal is running the GNU nano 4.8 editor, editing the file "/etc/netplan/01-network-manager-all.yaml". The file content is as follows:

```
# Let NetworkManager manage all devices on this system
network:
  version: 2
  renderer: networkd
  ethernets:
    enp0s3:
      #dhcp4: true
      #dhcp6: true
      addresses:
        - 10.10.1.1/24
      nameservers:
        search: [mydns, googledns]
        addresses: [8.8.8.8, 8.8.4.4, 192.168.0.1]
      routes:
        - to: 10.10.1.0/24
          via: 10.10.1.1
          on-link: true
    enp0s8:
      dhcp4: true
#optional: true
#address 192.168.0.110
#netmask 255.255.255.0
#gateway 192.168.0.1
#broadcast 192.168.0.255
```

The bottom of the terminal window shows a list of keyboard shortcuts: ^G Get Help, ^X Exit, ^O Write Out, ^R Read File, ^W Where Is, ^\ Replace, ^K Cut Text, ^U Paste Text, ^J Justify, and ^T To Spell.

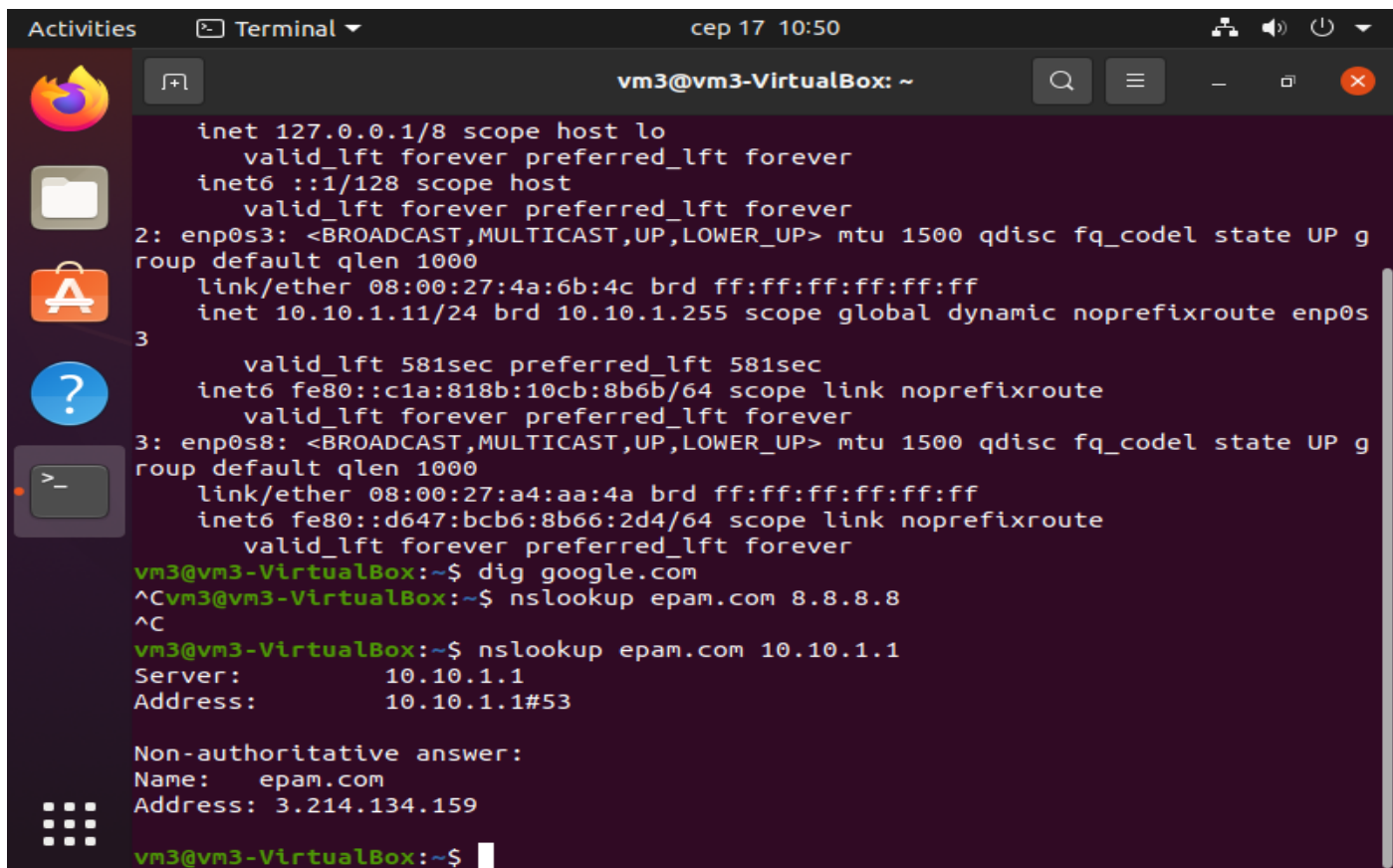
Screenshot 4 – netplan настройка dhcp сервера



The screenshot shows a terminal window titled "vm2@vm2-VirtualBox: ~" with a timestamp of "cep 17 10:42". The terminal is running the command "ip a" and the output is as follows:

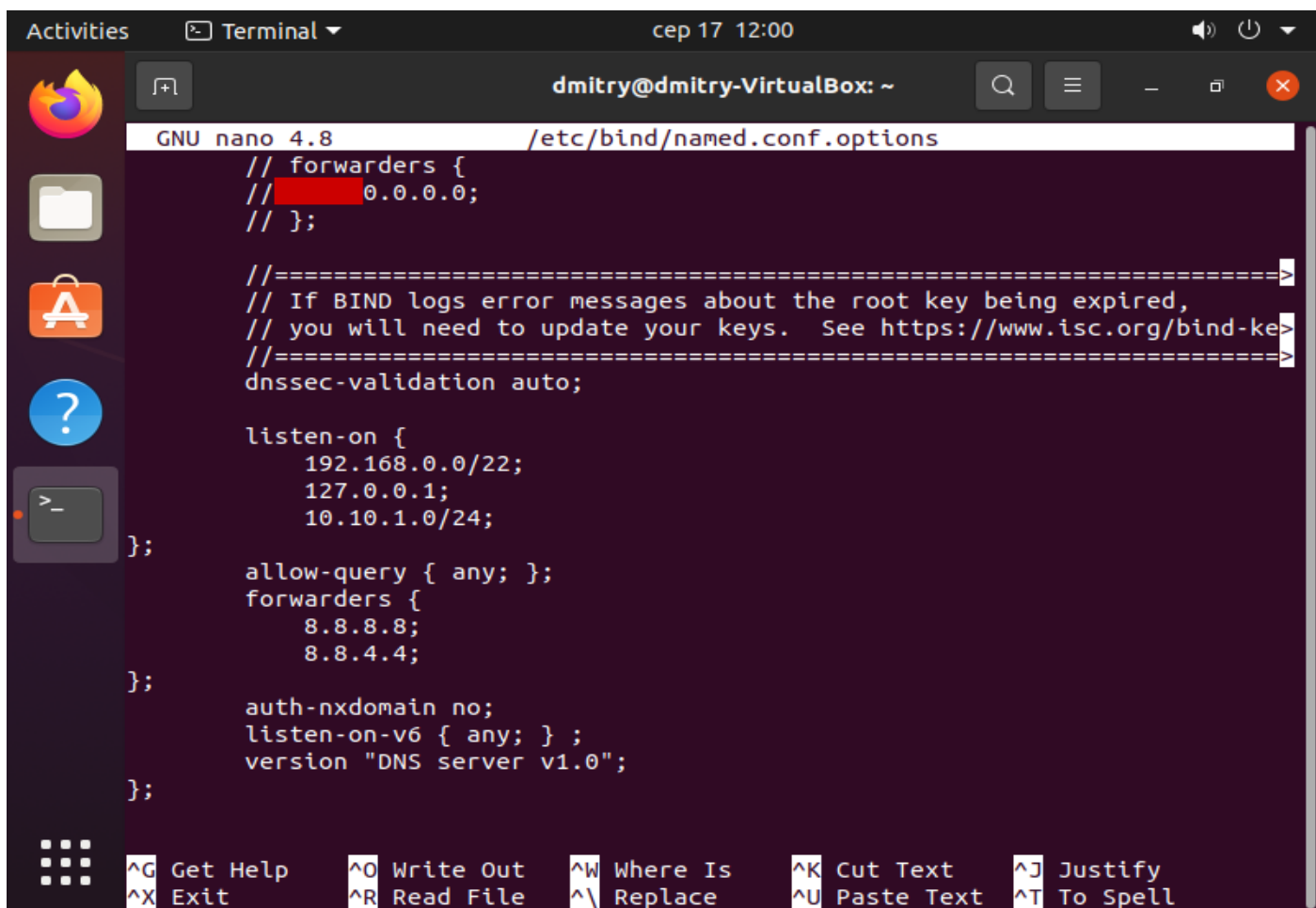
```
vm2@vm2-VirtualBox:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:e2:23:f1 brd ff:ff:ff:ff:ff:ff
    inet 10.10.1.10/24 brd 10.10.1.255 scope global dynamic enp0s3
        valid_lft 525sec preferred_lft 525sec
    inet6 fe80::a00:27ff:fee2:23f1/64 scope link
        valid_lft forever preferred_lft forever
vm2@vm2-VirtualBox:~$
```

Screenshot 5 – получение ip адреса от dhcp на vm2



```
vm3@vm3-VirtualBox: ~  
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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g  
roup default qlen 1000  
    link/ether 08:00:27:4a:6b:4c brd ff:ff:ff:ff:ff:ff  
    inet 10.10.1.11/24 brd 10.10.1.255 scope global dynamic noprefixroute enp0s  
3  
        valid_lft 581sec preferred_lft 581sec  
    inet6 fe80::c1a:818b:10cb:8b6b/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever  
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g  
roup default qlen 1000  
    link/ether 08:00:27:a4:aa:4a brd ff:ff:ff:ff:ff:ff  
    inet6 fe80::d647:bc6:8b66:2d4/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever  
vm3@vm3-VirtualBox:~$ dig google.com  
^C  
vm3@vm3-VirtualBox:~$ nslookup epam.com 8.8.8.8  
^C  
vm3@vm3-VirtualBox:~$ nslookup epam.com 10.10.1.1  
Server:      10.10.1.1  
Address:     10.10.1.1#53  
  
Non-authoritative answer:  
Name:   epam.com  
Address: 3.214.134.159  
vm3@vm3-VirtualBox:~$
```

Screenshot 6 – Получение ip от dhcp на vm3 и проверка dns



```
dmitry@dmitry-VirtualBox: ~  
GNU nano 4.8 /etc/bind/named.conf.options  
// forwarders {  
// 0.0.0.0;  
// };  
  
//===== >  
// If BIND logs error messages about the root key being expired,  
// you will need to update your keys.  See https://www.isc.org/bind-ke>  
//===== >  
dnssec-validation auto;  
  
listen-on {  
    192.168.0.0/22;  
    127.0.0.1;  
    10.10.1.0/24;  
};  
  
allow-query { any; };  
forwarders {  
    8.8.8.8;  
    8.8.4.4;  
};  
  
auth-nxdomain no;  
listen-on-v6 { any; } ;  
version "DNS server v1.0";  
};  
  
^G Get Help      ^O Write Out    ^W Where Is     ^K Cut Text     ^J Justify  
^X Exit          ^R Read File    ^_ Replace      ^U Paste Text   ^T To Spell
```

Screenshot 7- Настройка bind9 dns сервера на vm1

```
GNU nano 4.8 /etc/dhcp/dhclient.conf Modified
#
# 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 = gethostname();
request subnet-mask, broadcast-address, time-offset, routers,
domain-name, domain-name-servers, domain-search, host-name,
dhcp6.name-servers, dhcp6.domain-search, dhcp6.fqdn, dhcp6.sntp-server>
netbios-name-servers, netbios-scope, interface-mtu,
rfc3442-classless-static-routes, ntp-servers;

#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 127.0.0.53;
#require subnet-mask, domain-name-servers;

^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify
^X Exit ^R Read File ^_ Replace ^U Paste Text ^T To Spell
```

Screenshot 8- настройка dns через dhclient.conf

```
valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
roup default qlen 1000
    link/ether 08:00:27:e2:23:f1 brd ff:ff:ff:ff:ff:ff
    inet 10.10.1.10/24 brd 10.10.1.255 scope global dynamic enp0s3
        valid_lft 530sec preferred_lft 530sec
    inet6 fe80::a00:27ff:fee2:23f1/64 scope link
        valid_lft forever preferred_lft forever
vm2@vm2-VirtualBox:~$ nslookup epam.com 10.10.1.1
Server:         10.10.1.1
Address:        10.10.1.1#53

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

vm2@vm2-VirtualBox:~$ nslookup epam.com 8.8.8.8
^C
vm2@vm2-VirtualBox:~$ nslookup google.com 10.10.1.1
Server:         10.10.1.1
Address:        10.10.1.1#53

Non-authoritative answer:
Name:   google.com
Address: 172.217.18.78
Name:   google.com
Address: 2a00:1450:400d:809::200e

vm2@vm2-VirtualBox:~$
```

Screenshot 9 – проверка DNS сервера на vm2