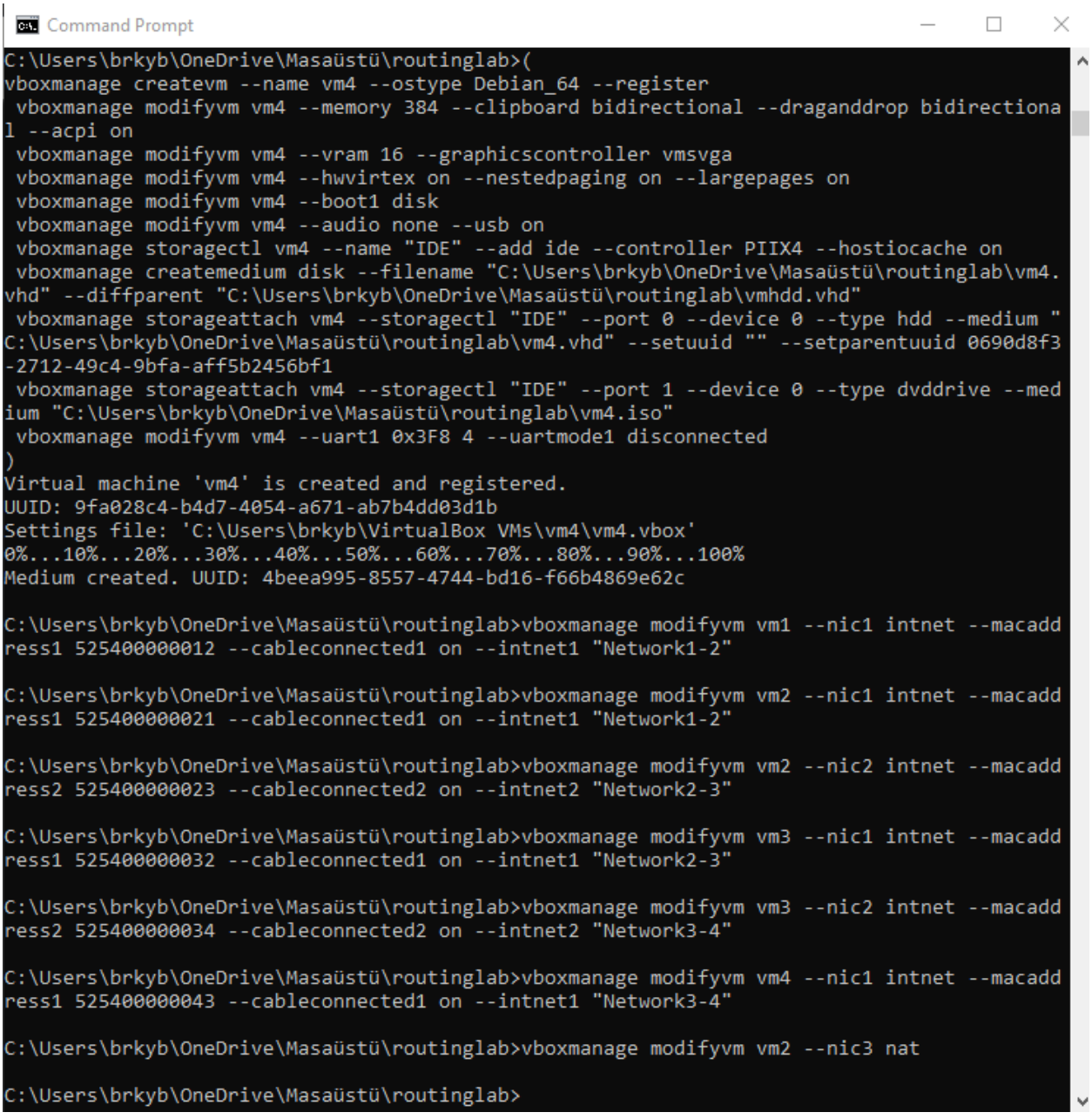
Prerequisites

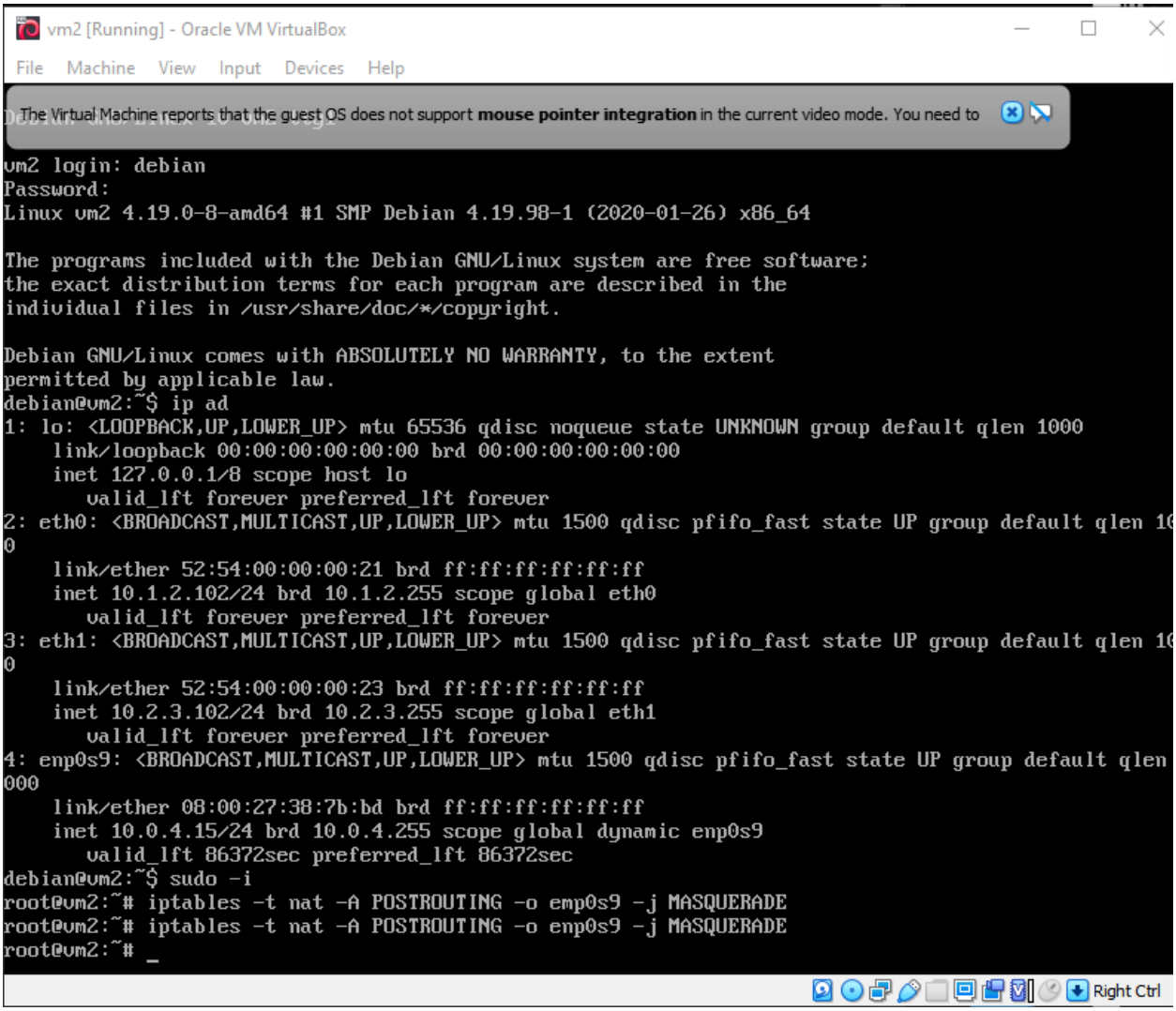
Cook-vms to reset configuration of virtual machines:

VirtualBox: debi

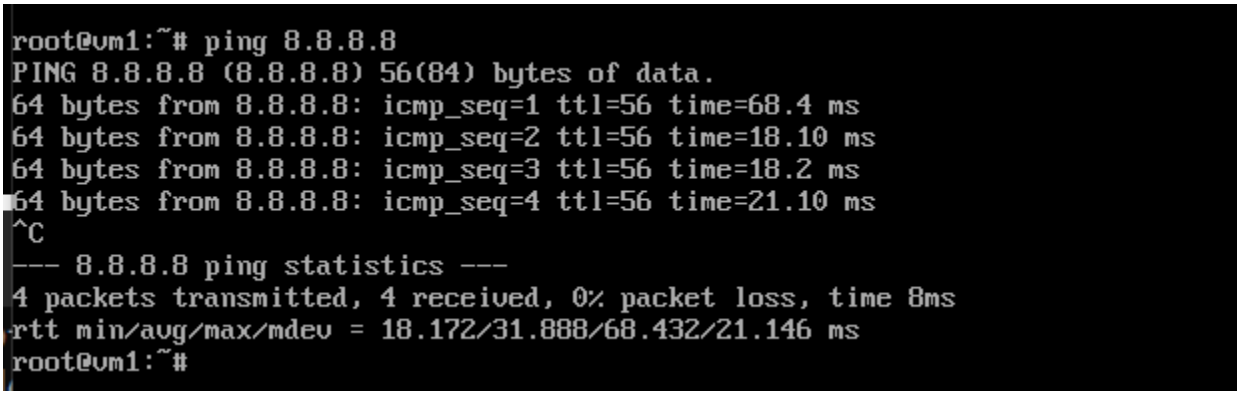


Ip ad

root@vm2:~# iptables -t nat -A POSTROUTING -o eth2 -j MASQUERADE



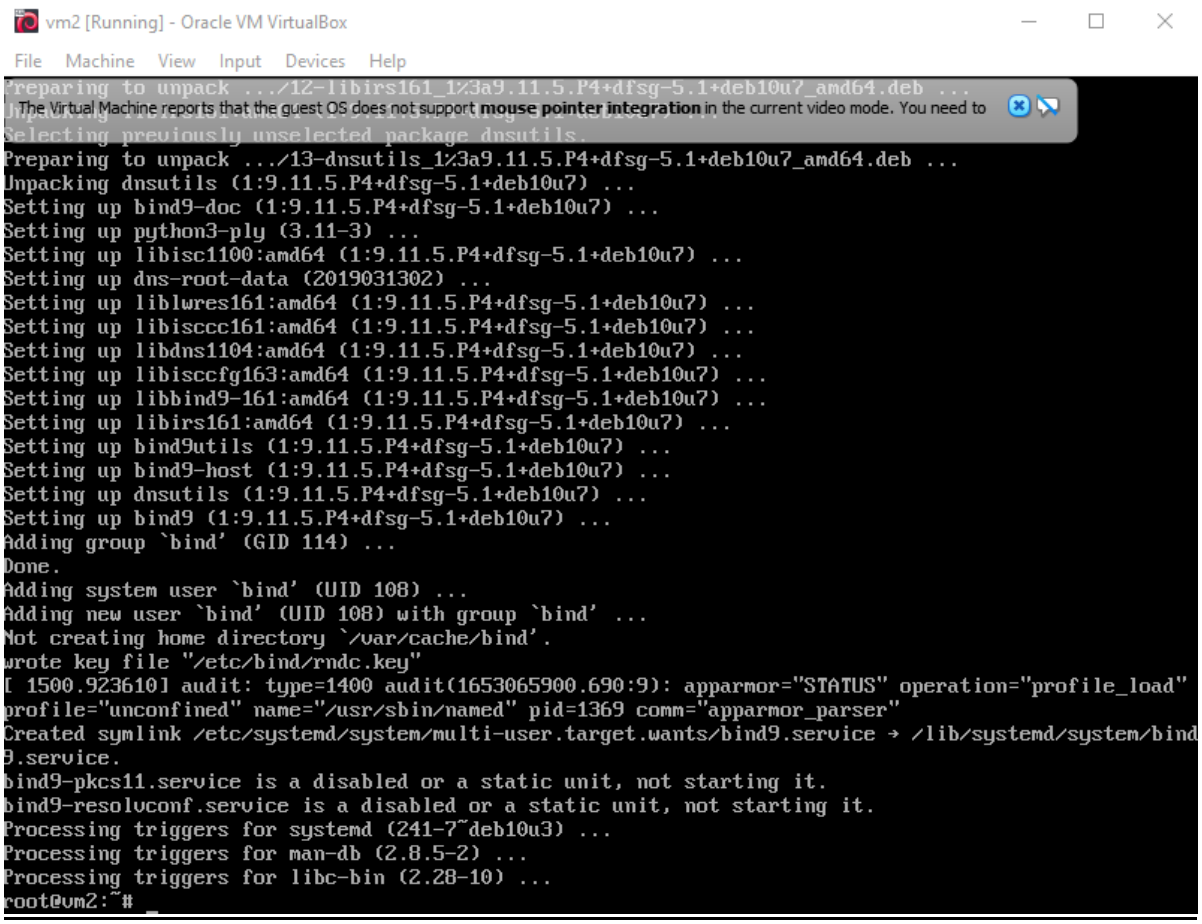
From vm1 ping 8.8.8.8



DNS server installation

1) *Had a error at the beginning while trying to install the required packages. In order to successfully complete the installation: add necessary Debian software repositories in "/etc/apt/sources.list" than "apt update"*

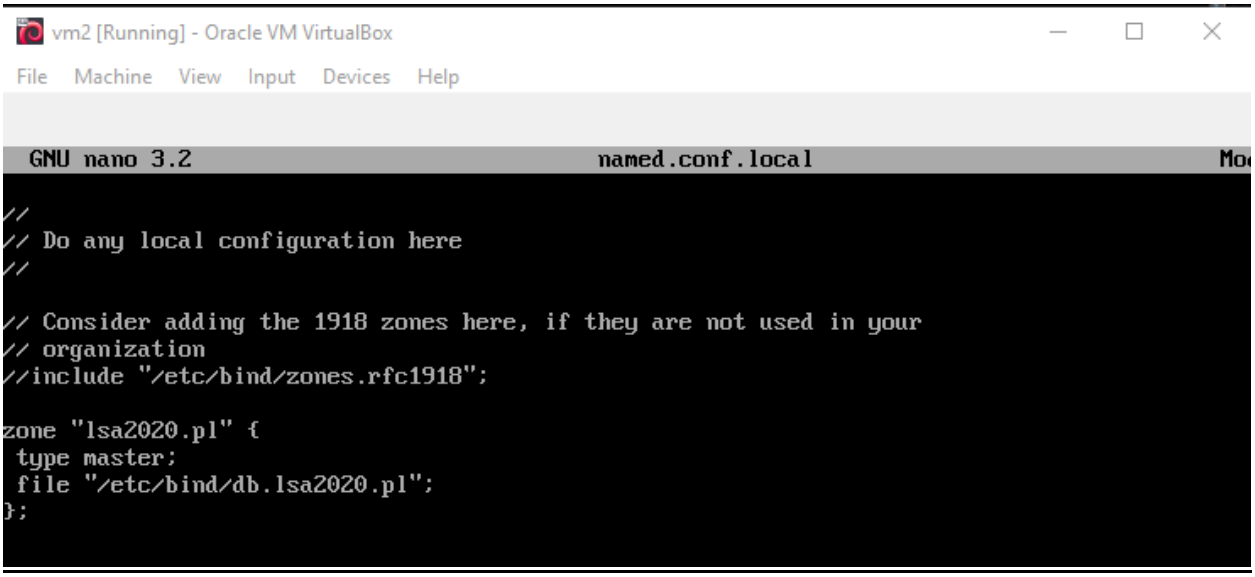
```
2) deb  http://deb.debian.org/debian  stretch main
3) deb-src  http://deb.debian.org/debian  stretch main
```



2) *Change directory*

```
root@vm2:~# cd /etc/bind
root@vm2:/etc/bind# _
```

3) *nano named.conf.local*

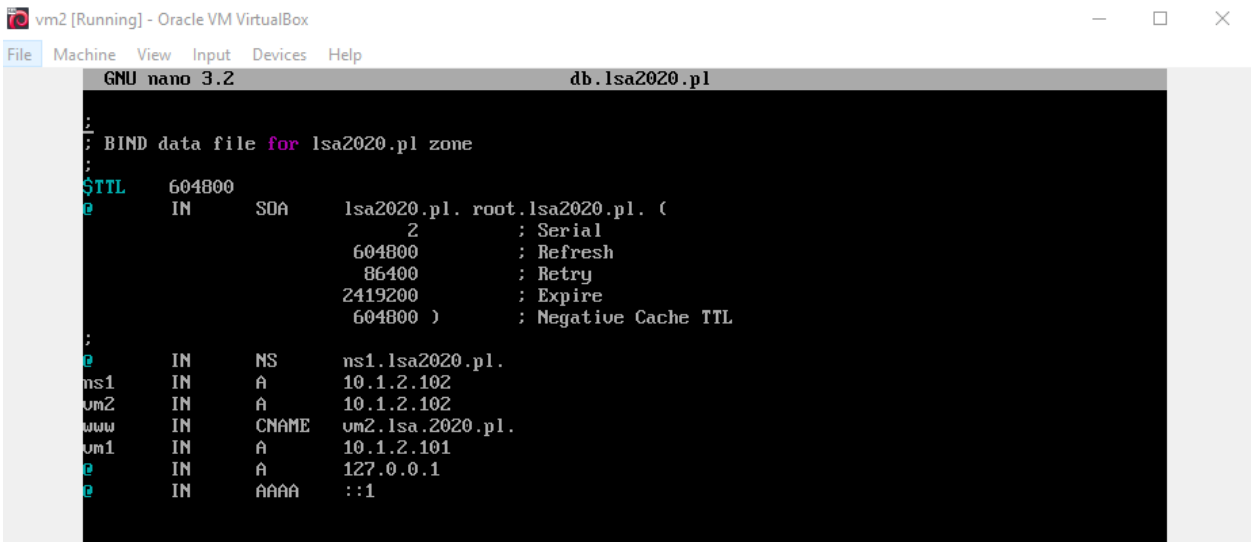


4) *cp db.local db.lsa2020.pl*

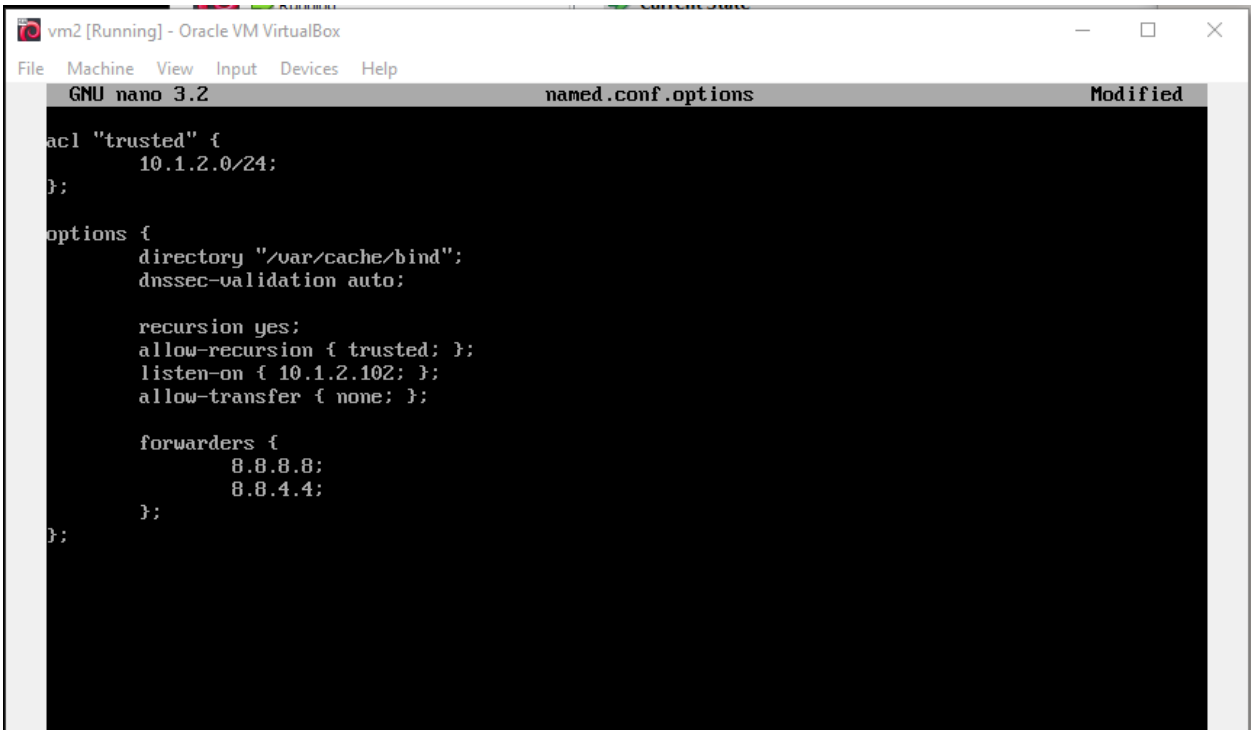
```
root@vm2:/etc/bind# cp db.local db.lsa2020.pl
root@vm2:/etc/bind# _
```

5.b) *Change lsa2020.pl zone's configuration*

nano db.lsa2020.pl

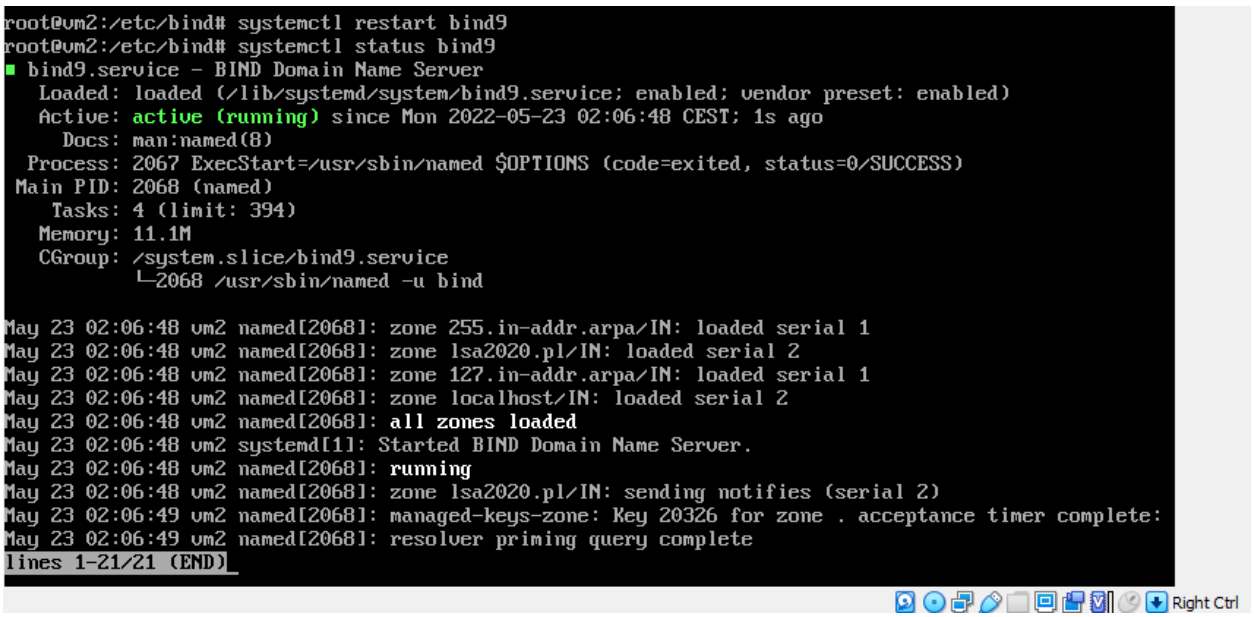


5.c) *modify bind server options:*



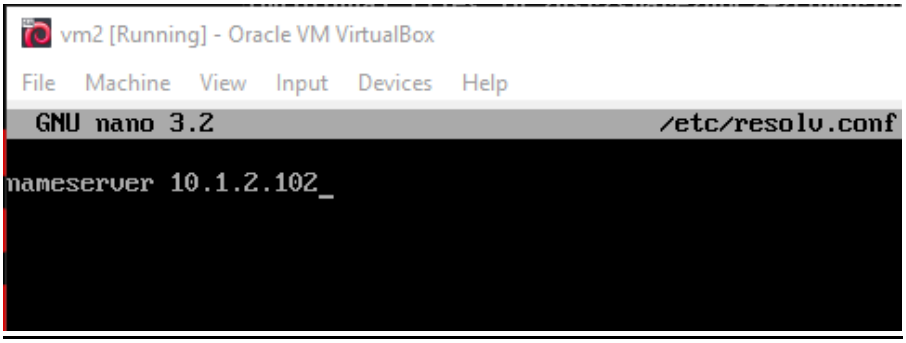
6. *Restart DNS service: systemctl restart bind9*

And verify it's state by: systemctl status bind9



7. *Configure DNS address that will answer requests from VM2:*

nano /etc/resolv.conf



8. *Test if it's working on VM2:*

nslookup ns1.lsa2020.pl

```
root@vm2:/etc/bind# nslookup ns1.lsa2020.pl
Server:         10.1.2.102
Address:        10.1.2.102#53

Name:   ns1.lsa2020.pl
Address: 10.1.2.102

root@vm2:/etc/bind#
```

dig vm1.lsa2020.pl

```
root@vm2:/etc/bind# dig vm1.lsa2020.pl

; <<>> DiG 9.11.5-P4-5.1+deb10u7-Debian <<>> vm1.lsa2020.pl
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 39513
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 2

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 1aaa0c2b8c5f93813c46fab0628ae950fb8a35a4b8d7d8ba (good)
;; QUESTION SECTION:
;vm1.lsa2020.pl.                        IN      A

;; ANSWER SECTION:
vm1.lsa2020.pl.         604800  IN      A       10.1.2.101

;; AUTHORITY SECTION:
lsa2020.pl.             604800  IN      NS      ns1.lsa2020.pl.

;; ADDITIONAL SECTION:
ns1.lsa2020.pl.         604800  IN      A       10.1.2.102

;; Query time: 0 msec
;; SERVER: 10.1.2.102#53(10.1.2.102)
;; WHEN: Mon May 23 03:54:24 CEST 2022
;; MSG SIZE  rcvd: 121

root@vm2:/etc/bind#
```

host vm2.lsa2020.pl

```
root@vm2:/etc/bind# host vm2.lsa2020.pl
vm2.lsa2020.pl has address 10.1.2.102
root@vm2:/etc/bind#
```

ping vm1.lsa2020.pl

```
root@vm2:/etc/bind# ping vm1.lsa2020.pl
PING vm1.lsa2020.pl (10.1.2.101) 56(84) bytes of data.
64 bytes from 10.1.2.101 (10.1.2.101): icmp_seq=1 ttl=64 time=0.723 ms
64 bytes from 10.1.2.101 (10.1.2.101): icmp_seq=2 ttl=64 time=0.678 ms
64 bytes from 10.1.2.101 (10.1.2.101): icmp_seq=3 ttl=64 time=0.816 ms
64 bytes from 10.1.2.101 (10.1.2.101): icmp_seq=4 ttl=64 time=0.780 ms
^C
--- vm1.lsa2020.pl ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 0.678/0.749/0.816/0.056 ms
root@vm2:/etc/bind# _
```

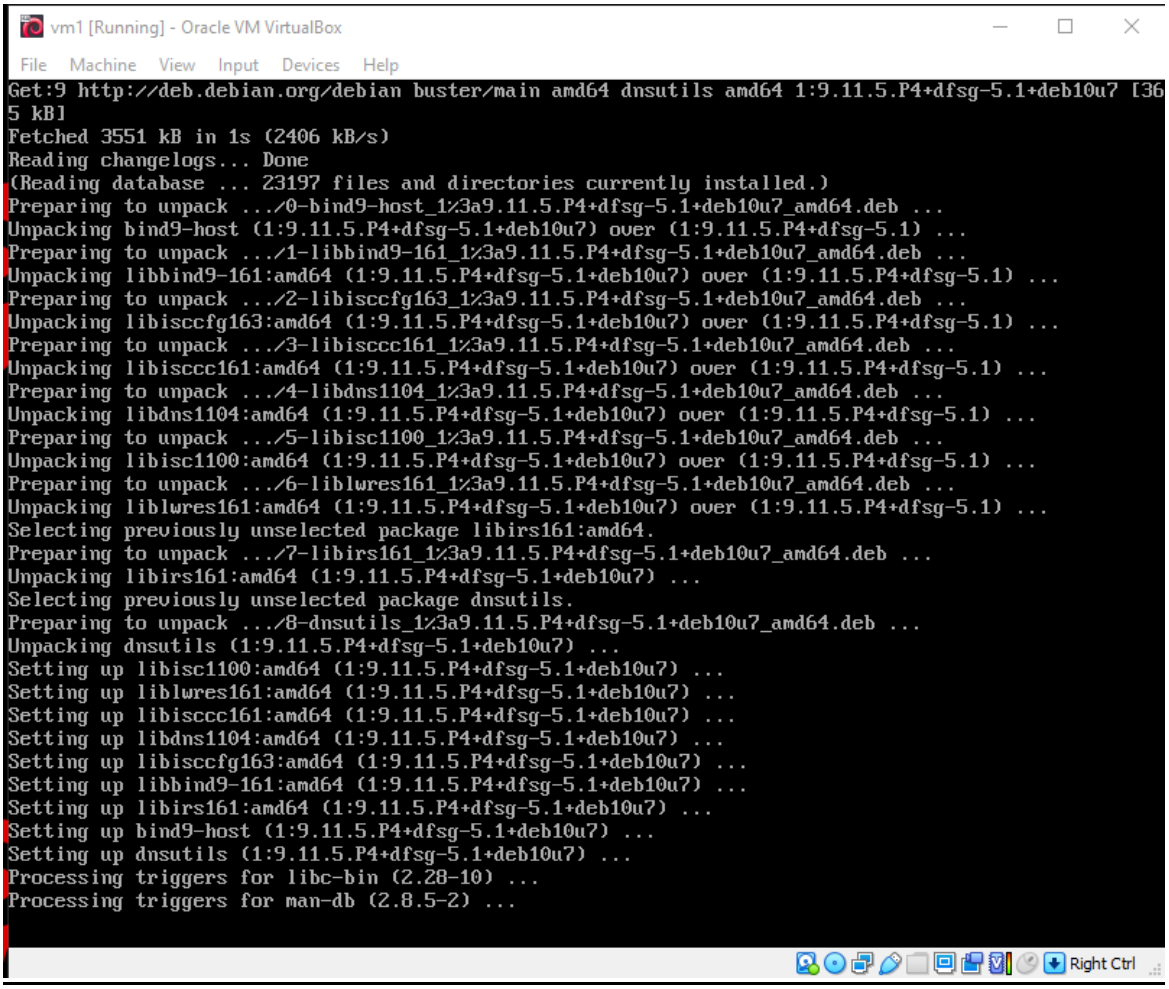
9) *Setting dns server on vm1 to vm2 in resolv.conf:*

```
vm1 [Running] - Oracle VM VirtualBox
File  Machine  View  Input  Devices  Help
 GNU nano 3.2                                  /etc/resolv.conf

nameserver 10.1.2.102_
```

```
root@vm1:~# host vm2.lsa2020.pl
vm2.lsa2020.pl has address 10.1.2.102
root@vm1:~# ping vm2.lsa2020.pl
PING vm2.lsa2020.pl (10.1.2.102) 56(84) bytes of data.
64 bytes from 10.1.2.102 (10.1.2.102): icmp_seq=1 ttl=64 time=0.563 ms
64 bytes from 10.1.2.102 (10.1.2.102): icmp_seq=2 ttl=64 time=0.520 ms
64 bytes from 10.1.2.102 (10.1.2.102): icmp_seq=3 ttl=64 time=0.560 ms
64 bytes from 10.1.2.102 (10.1.2.102): icmp_seq=4 ttl=64 time=0.661 ms
^C
--- vm2.lsa2020.pl ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 57ms
rtt min/avg/max/mdev = 0.520/0.576/0.661/0.051 ms
root@vm1:~#
```

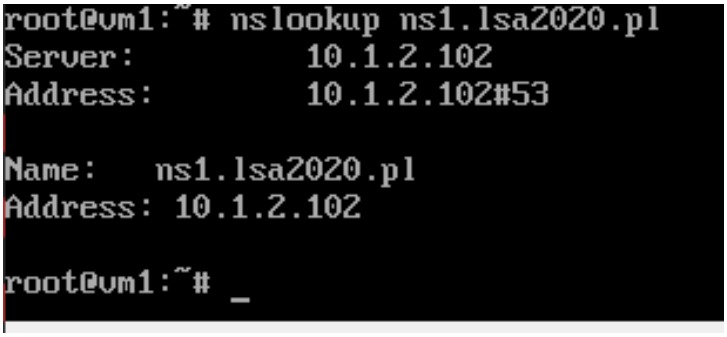
installing utils on vm1:

Apt-get update, apt-get install dnsutils



After installing dnsutils package on vm1:

Nslookup ns1.lsa2020.pl

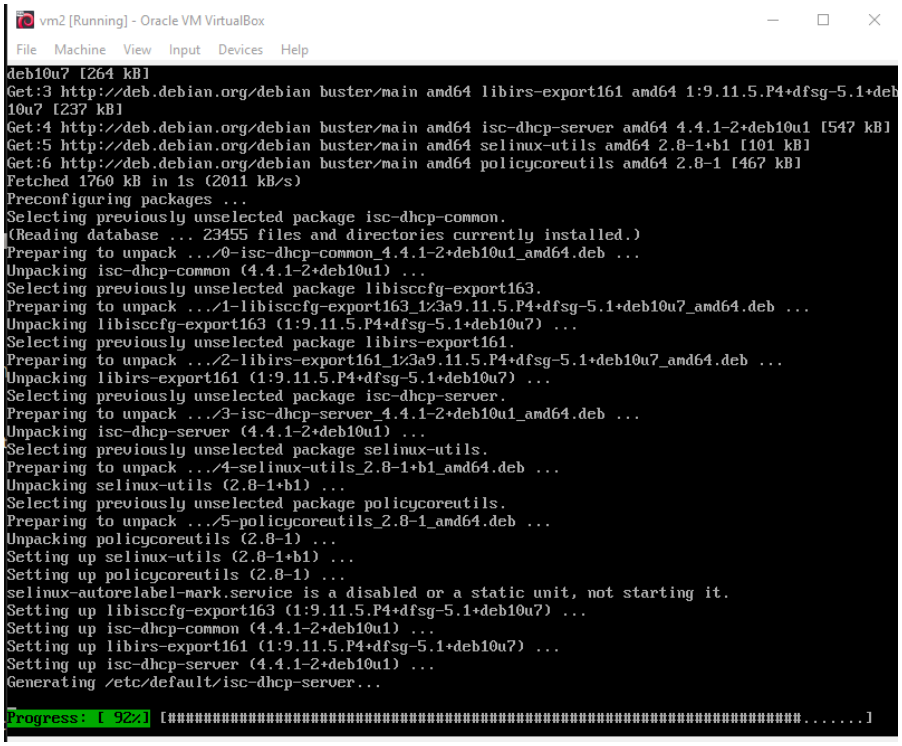


dig vm1.lsa2020.pl

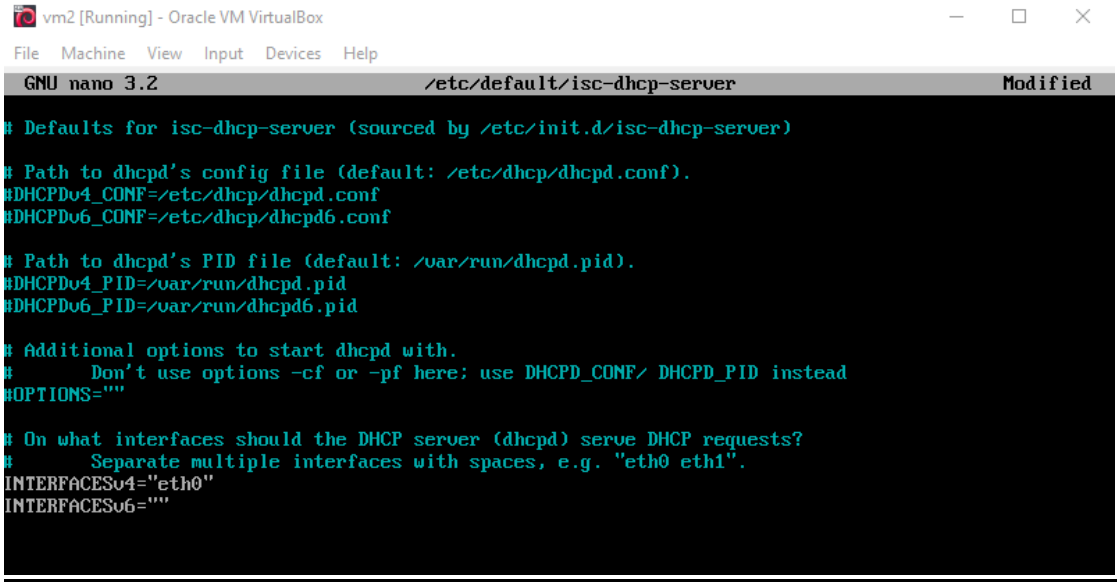
```
root@vm1:~# dig vm1.lsa2020.pl

; <<>> DiG 9.11.5-P4-5.1+deb10u7-Debian <<>> vm1.lsa2020.pl
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 6928
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 2

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 839a2dcffa6c346ecdc97c4e628aec6e8dc47b7950f4f70a (good)
;; QUESTION SECTION:
;vm1.lsa2020.pl.                        IN      A

;; ANSWER SECTION:
vm1.lsa2020.pl.         604800  IN      A       10.1.2.101

;; AUTHORITY SECTION:
lsa2020.pl.             604800  IN      NS      ns1.lsa2020.pl.

;; ADDITIONAL SECTION:
ns1.lsa2020.pl.         604800  IN      A       10.1.2.102

;; Query time: 0 msec
;; SERVER: 10.1.2.102#53(10.1.2.102)
;; WHEN: Mon May 23 05:54:18 CEST 2022
;; MSG SIZE  rcvd: 121

root@vm1:~# _
```

DHCP server installation

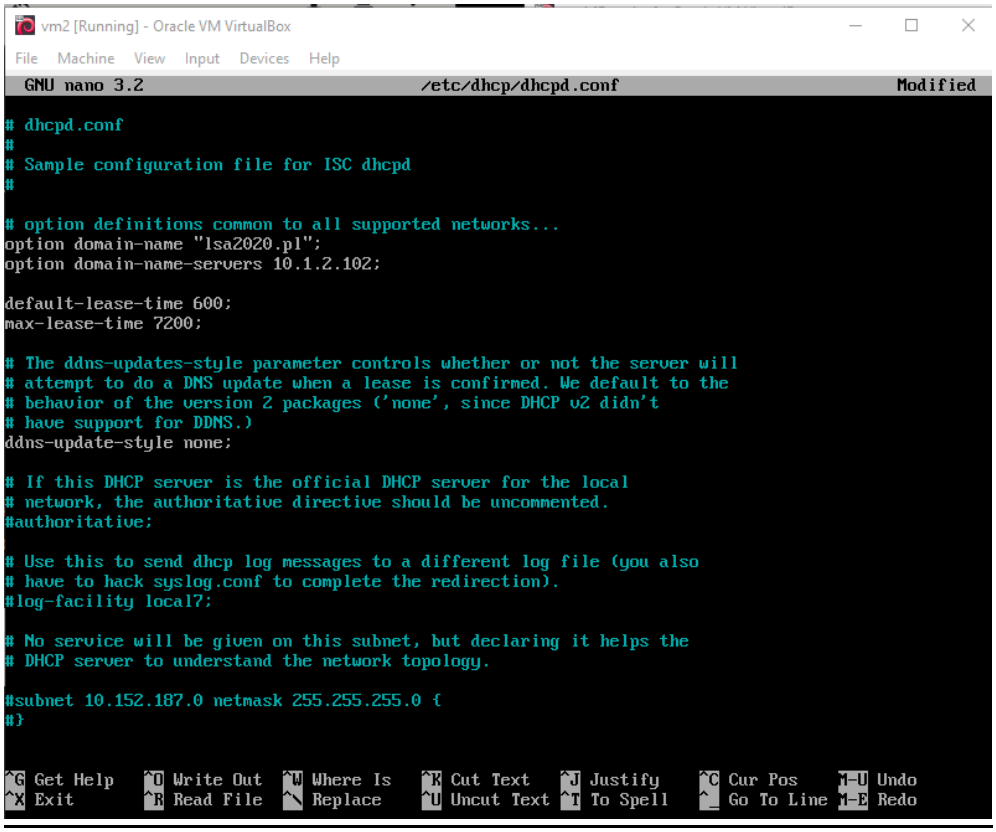
1. *Install DHCP server on VM2*



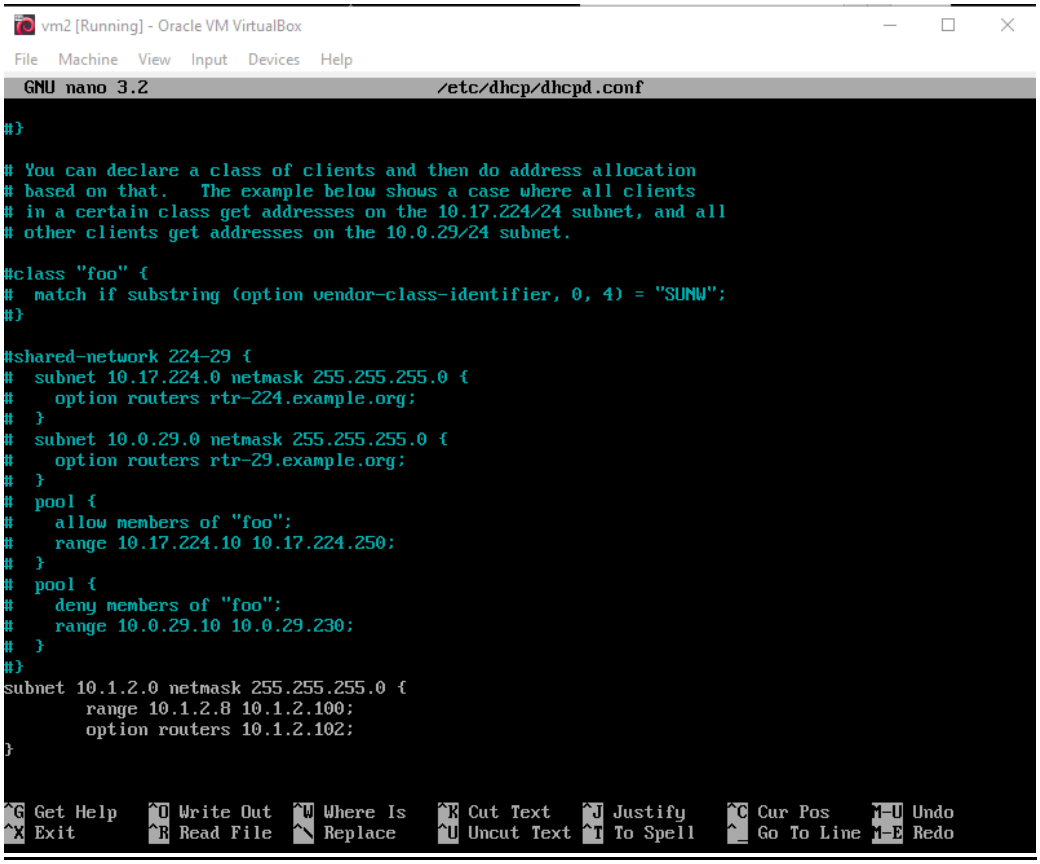
2. *Automatic service start should fail of invalid configuration. Change configuration then*
   a. Add local network interface name for DHCP server:
   nano /etc/default/isc-dhcp-server



b)



b)



3)

```
root@vm2:/etc/bind# system restart isc-dhcp-server
-bash: system: command not found
root@vm2:/etc/bind# systemctl restart isc-dhcp-server
root@vm2:/etc/bind# systemctl start isc-dhcp-server
root@vm2:/etc/bind# systemctl status isc-dhcp-server
● isc-dhcp-server.service - LSB: DHCP server
   Loaded: loaded (/etc/init.d/isc-dhcp-server; generated)
   Active: active (running) since Mon 2022-05-23 04:25:06 CEST; 18s ago
     Docs: man:systemd-sysv-generator(8)
  Process: 2654 ExecStart=/etc/init.d/isc-dhcp-server start (code=exited, status=0/SUCCESS)
    Tasks: 1 (limit: 394)
   Memory: 4.9M
   CGroup: /system.slice/isc-dhcp-server.service
           └─2666 /usr/sbin/dhcpd -4 -q -cf /etc/dhcp/dhcpd.conf eth0

May 23 04:25:04 vm2 systemd[1]: Starting LSB: DHCP server...
May 23 04:25:04 vm2 isc-dhcp-server[2654]: Launching IPv4 server only.
May 23 04:25:04 vm2 dhcpd[2666]: Wrote 0 leases to leases file.
May 23 04:25:04 vm2 dhcpd[2666]: Server starting service.
May 23 04:25:06 vm2 isc-dhcp-server[2654]: Starting ISC DHCPv4 server: dhcpd.
May 23 04:25:06 vm2 systemd[1]: Started LSB: DHCP server.
root@vm2:/etc/bind#
```

4) *Launch VM1 and identify network interface used for communication with VM2*

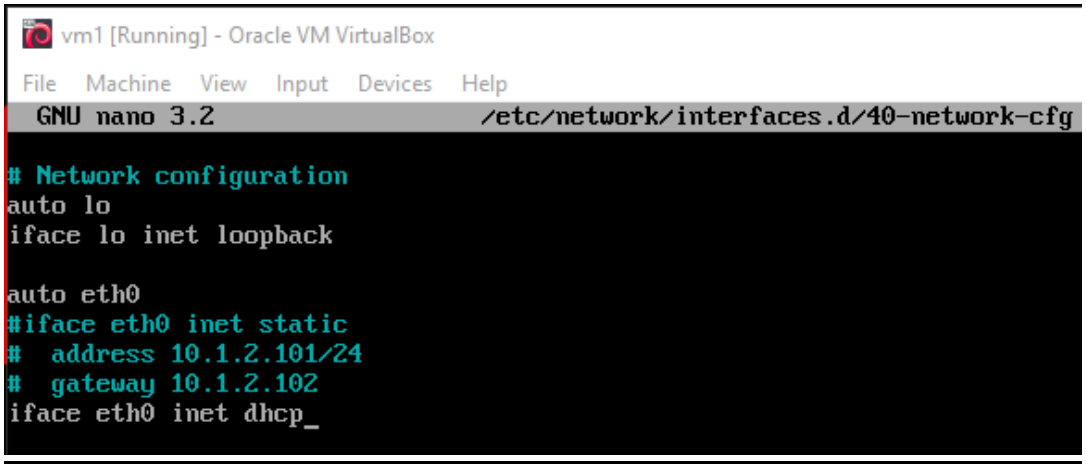
```
root@vm1:~# ip ad
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 100
0
    link/ether 52:54:00:00:00:12 brd ff:ff:ff:ff:ff:ff
    inet 10.1.2.101/24 brd 10.1.2.255 scope global eth0
       valid_lft forever preferred_lft forever
root@vm1:~# _
```

5. *Stop interface using ifdown*

```
root@vm1:~# ifdown eth0
root@vm1:~# nano /etc/network/interfaces.d/40-network-cfg_
```

6. *Modify interface's configuration changing static IP distribution to DHCP usage:*

nano /etc/network/interfaces.d/40-network-cfg



7. *Start interface using ifup:*

```
root@vm1:~# ifup eth0
Internet Systems Consortium DHCP Client 4.4.1
Copyright 2004-2018 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/

[16755.965705] e1000: eth0 NIC Link is Up 1000 Mbps Full Duplex, Flow Control: RX
Listening on LPF/eth0/52:54:00:00:00:12
Sending on   LPF/eth0/52:54:00:00:00:12
Sending on   Socket/fallback
Created duid "\000\001\000\001*\035\307\214RT\000\000\000\022".
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 8
DHCPOFFER of 10.1.2.100 from 10.1.2.102
DHCPREQUEST for 10.1.2.100 on eth0 to 255.255.255.255 port 67
DHCPACK of 10.1.2.100 from 10.1.2.102
bound to 10.1.2.100 -- renewal in 260 seconds.
root@vm1:~# _
```

and we see it acquires the ip address from dhcp server set up on vm2

8, 9) *Demand new address by dhclient eth0 Check granted address by ip ad*

```
root@vm1:~# dhclient eth0
root@vm1:~# ip ad
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
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 100
0
    link/ether 52:54:00:00:00:12 brd ff:ff:ff:ff:ff:ff
    inet 10.1.2.8/24 brd 10.1.2.255 scope global dynamic eth0
       valid_lft 599sec preferred_lft 599sec
root@vm1:~#
```

10. *Revoke the address and stop a client by dhclient -r XXX*

```
root@vm1:~# dhclient -r eth0
Killed old client process
root@vm1:~# ip ad
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
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 100
0
    link/ether 52:54:00:00:00:12 brd ff:ff:ff:ff:ff:ff
```

11. *Demand new address and check it again (8 and 9)*

```
root@vm1:~# dhclient eth0
root@vm1:~# ip ad
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
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 100
0
    link/ether 52:54:00:00:00:12 brd ff:ff:ff:ff:ff:ff
    inet 10.1.2.101/24 brd 10.1.2.255 scope global dynamic eth0
       valid_lft 598sec preferred_lft 598sec
root@vm1:~# _
```