

Prerequisites

Cook-vms to reset configuration of virtual machines:

VirtualBox: debi

```
Command Prompt
C:\Users\brkyb\OneDrive\Masaüstü\routinglab>(
vboxmanage createvm --name vm4 --ostype Debian_64 --register
vboxmanage modifyvm vm4 --memory 384 --clipboard bidirectional --draganddrop bidirectiona
l --acpi on
vboxmanage modifyvm vm4 --vram 16 --graphicscontroller vmsvga
vboxmanage modifyvm vm4 --hwvrtex on --nestedpaging on --largepages on
vboxmanage modifyvm vm4 --boot1 disk
vboxmanage modifyvm vm4 --audio none --usb on
vboxmanage storagectl vm4 --name "IDE" --add ide --controller PIIX4 --hostiocache on
vboxmanage createmedium disk --filename "C:\Users\brkyb\OneDrive\Masaüstü\routinglab\vm4.
vhd" --diffparent "C:\Users\brkyb\OneDrive\Masaüstü\routinglab\vmhdd.vhd"
vboxmanage storageattach vm4 --storagectl "IDE" --port 0 --device 0 --type hdd --medium "
C:\Users\brkyb\OneDrive\Masaüstü\routinglab\vm4.vhd" --setuuid "" --setparentuuid 0690d8f3
-2712-49c4-9bfa-aff5b2456bf1
vboxmanage storageattach vm4 --storagectl "IDE" --port 1 --device 0 --type dvddrive --med
ium "C:\Users\brkyb\OneDrive\Masaüstü\routinglab\vm4.iso"
vboxmanage modifyvm vm4 --uart1 0x3F8 4 --uartmode1 disconnected
)
Virtual machine 'vm4' is created and registered.
UUID: 9fa028c4-b4d7-4054-a671-ab7b4dd03d1b
Settings file: 'C:\Users\brkyb\VirtualBox VMs\vm4\vm4.vbox'
0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
Medium created. UUID: 4beea995-8557-4744-bd16-f66b4869e62c

C:\Users\brkyb\OneDrive\Masaüstü\routinglab>vboxmanage modifyvm vm1 --nic1 intnet --macadd
ress1 525400000012 --cableconnected1 on --intnet1 "Network1-2"

C:\Users\brkyb\OneDrive\Masaüstü\routinglab>vboxmanage modifyvm vm2 --nic1 intnet --macadd
ress1 525400000021 --cableconnected1 on --intnet1 "Network1-2"

C:\Users\brkyb\OneDrive\Masaüstü\routinglab>vboxmanage modifyvm vm2 --nic2 intnet --macadd
ress2 525400000023 --cableconnected2 on --intnet2 "Network2-3"

C:\Users\brkyb\OneDrive\Masaüstü\routinglab>vboxmanage modifyvm vm3 --nic1 intnet --macadd
ress1 525400000032 --cableconnected1 on --intnet1 "Network2-3"

C:\Users\brkyb\OneDrive\Masaüstü\routinglab>vboxmanage modifyvm vm3 --nic2 intnet --macadd
ress2 525400000034 --cableconnected2 on --intnet2 "Network3-4"

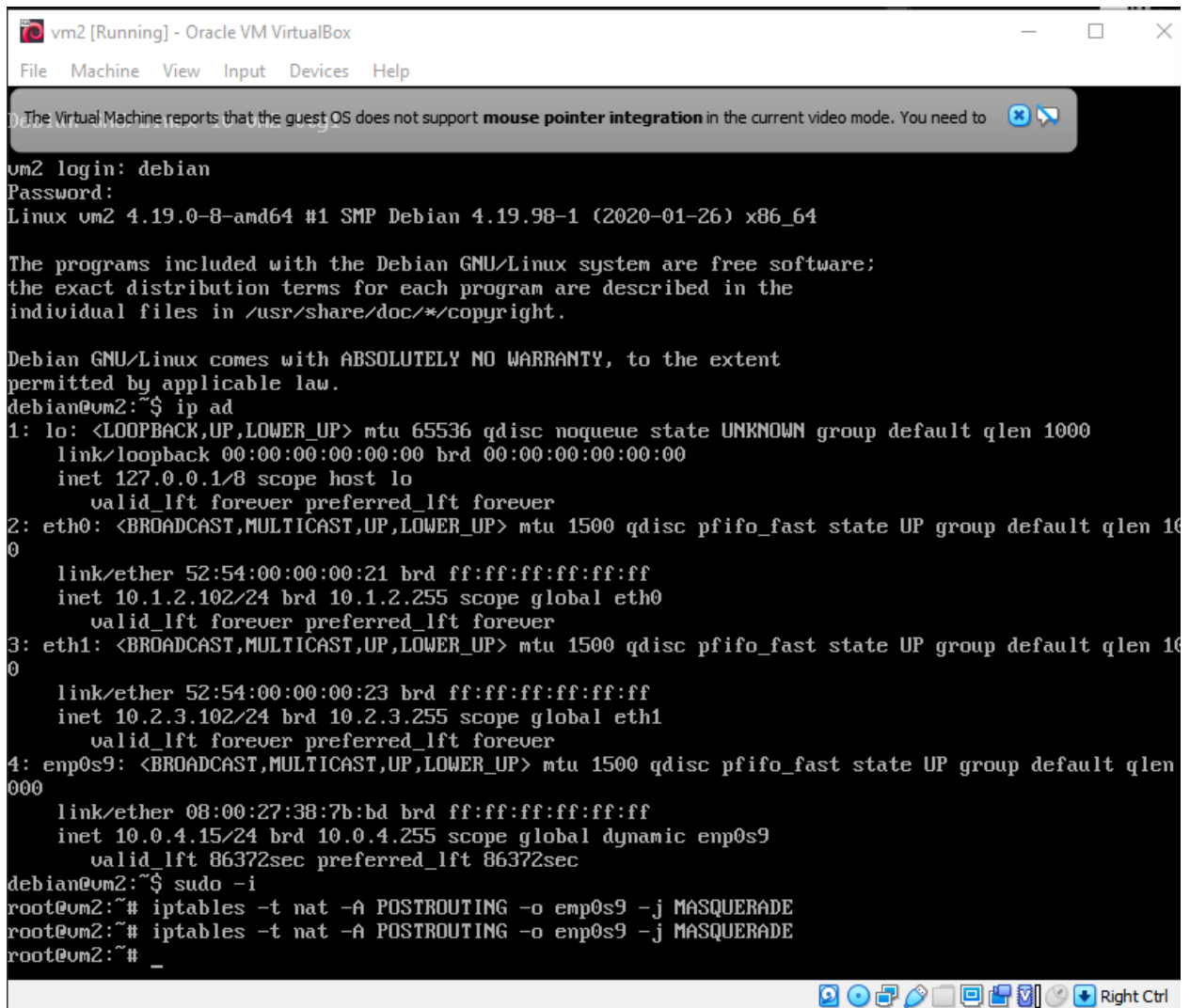
C:\Users\brkyb\OneDrive\Masaüstü\routinglab>vboxmanage modifyvm vm4 --nic1 intnet --macadd
ress1 525400000043 --cableconnected1 on --intnet1 "Network3-4"

C:\Users\brkyb\OneDrive\Masaüstü\routinglab>vboxmanage modifyvm vm2 --nic3 nat

C:\Users\brkyb\OneDrive\Masaüstü\routinglab>
```

Ip ad

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



```
vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

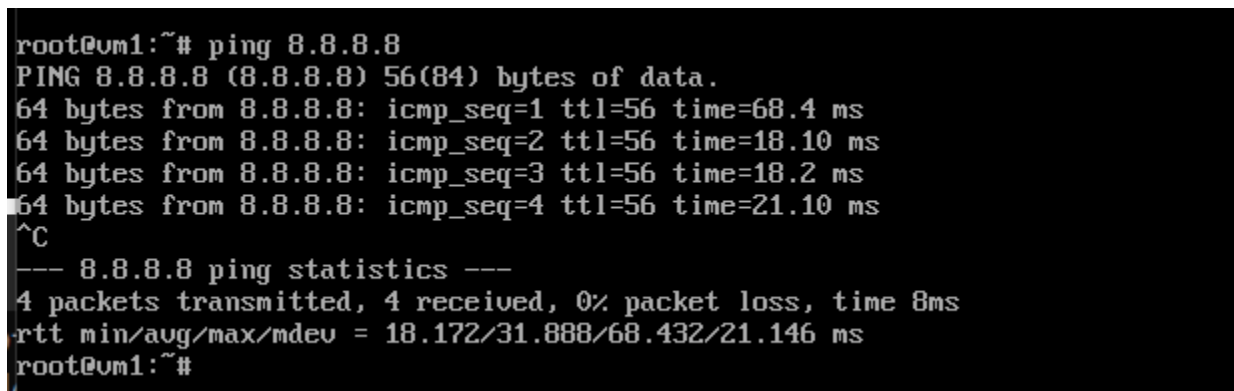
The Virtual Machine reports that the guest OS does not support mouse pointer integration in the current video mode. You need to

vm2 login: debian
Password:
Linux vm2 4.19.0-8-amd64 #1 SMP Debian 4.19.98-1 (2020-01-26) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
debian@vm2:~$ 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 1000
    link/ether 52:54:00:00:00:21 brd ff:ff:ff:ff:ff:ff
    inet 10.1.2.102/24 brd 10.1.2.255 scope global eth0
        valid_lft forever preferred_lft forever
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 52:54:00:00:00:23 brd ff:ff:ff:ff:ff:ff
    inet 10.2.3.102/24 brd 10.2.3.255 scope global eth1
        valid_lft forever preferred_lft forever
4: enp0s9: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:38:7b:bd brd ff:ff:ff:ff:ff:ff
    inet 10.0.4.15/24 brd 10.0.4.255 scope global dynamic enp0s9
        valid_lft 86372sec preferred_lft 86372sec
debian@vm2:~$ sudo -i
root@vm2:~# iptables -t nat -A POSTROUTING -o enp0s9 -j MASQUERADE
root@vm2:~# iptables -t nat -A POSTROUTING -o enp0s9 -j MASQUERADE
root@vm2:~# _
```

From vm1 ping 8.8.8.8

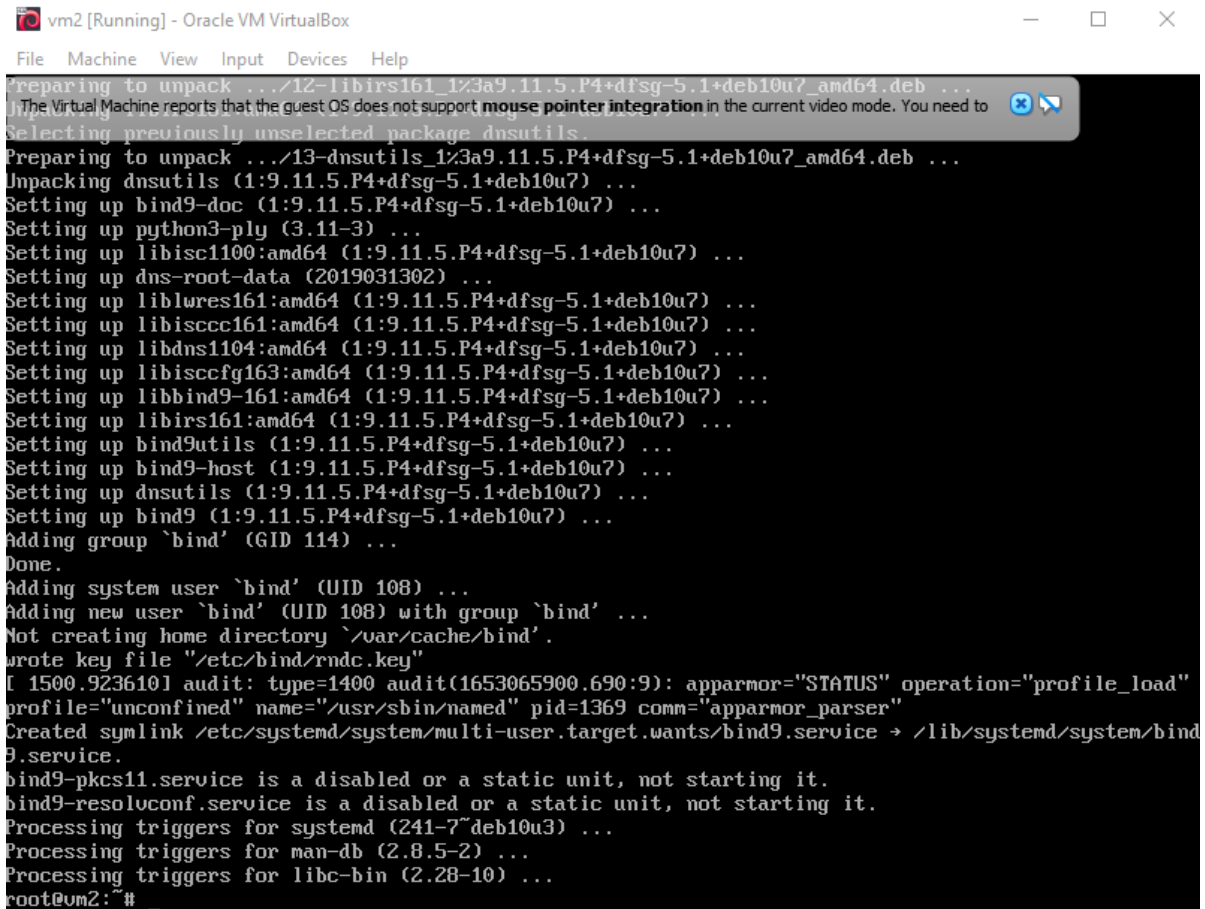


```
root@vm1:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=56 time=68.4 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=56 time=18.10 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=56 time=18.2 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=56 time=21.10 ms
^C
--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 18.172/31.888/68.432/21.146 ms
root@vm1:~#
```

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
```

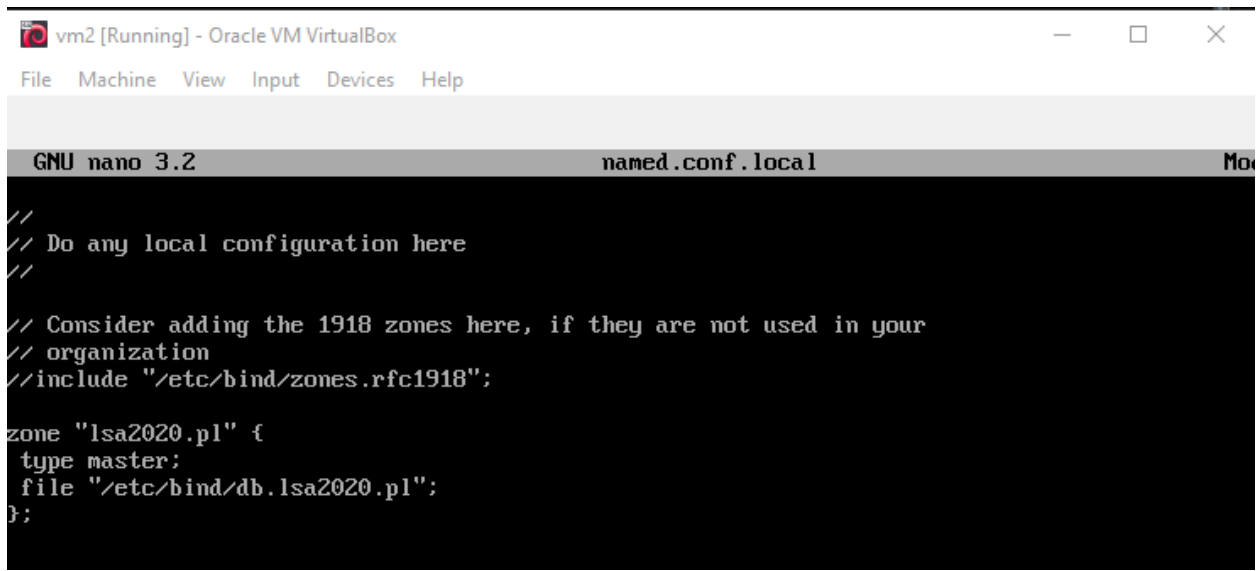


```
vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Preparing to unpack .../12-libirs161_1%3a9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
The Virtual Machine reports that the guest OS does not support mouse pointer integration in the current video mode. You need to
Selecting previously unselected package dnsutils.
Preparing to unpack .../13-dnsutils_1%3a9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking dnsutils (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up bind9-doc (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up python3-ply (3.11-3) ...
Setting up libisc1100:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up dns-root-data (2019031302) ...
Setting up liblwres161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libisccc161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libdns1104:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libiscfg163:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libbind9-161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libirs161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up bind9utils (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up bind9-host (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up dnsutils (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up bind9 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Adding group `bind' (GID 114) ...
Done.
Adding system user `bind' (UID 108) ...
Adding new user `bind' (UID 108) with group `bind' ...
Not creating home directory `/var/cache/bind'.
wrote key file "/etc/bind/rndc.key"
[ 1500.923610] audit: type=1400 audit(1653065900.690:9): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/sbin/named" pid=1369 comm="apparmor_parser"
Created symlink /etc/systemd/system/multi-user.target.wants/bind9.service -> /lib/systemd/system/bind
9.service.
bind9-pkcs11.service is a disabled or a static unit, not starting it.
bind9-resoluconf.service is a disabled or a static unit, not starting it.
Processing triggers for systemd (241-7~deb10u3) ...
Processing triggers for man-db (2.8.5-2) ...
Processing triggers for libc-bin (2.28-10) ...
root@vm2:~#
```

- 2) Change directory

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

3) *nano named.conf.local*



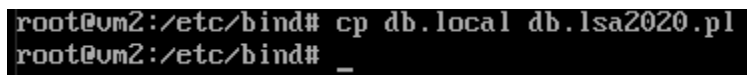
```
GNU nano 3.2 named.conf.local

//
// Do any local configuration here
//

// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";

zone "lisa2020.pl" {
    type master;
    file "/etc/bind/db.lisa2020.pl";
};
```

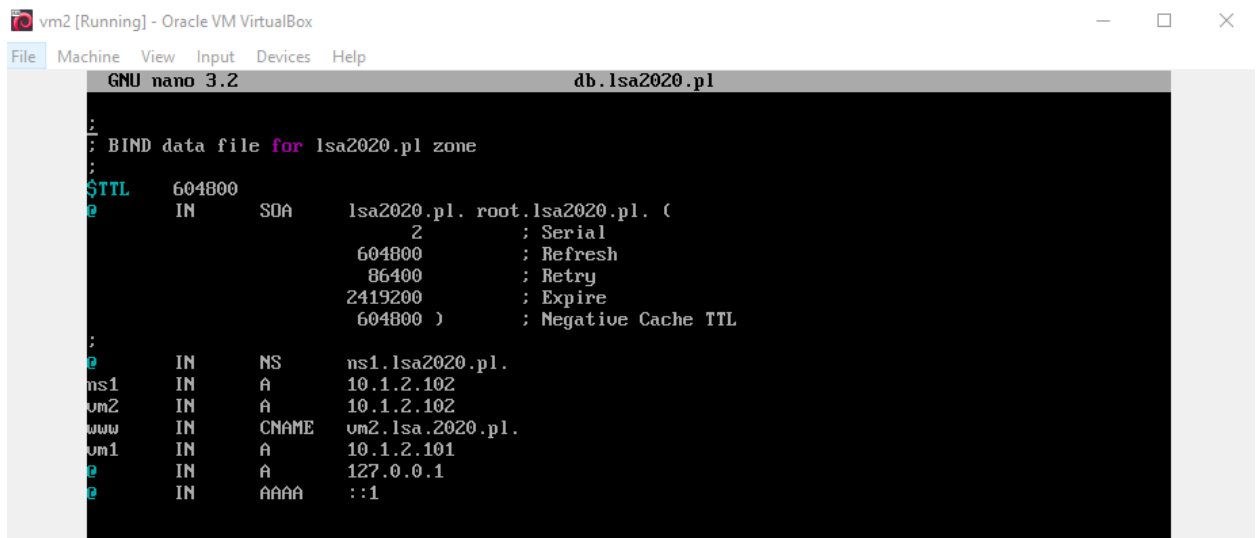
4) *cp db.local db.lisa2020.pl*



```
root@vm2:/etc/bind# cp db.local db.lisa2020.pl
root@vm2:/etc/bind# _
```

5.b) *Change lisa2020.pl zone's configuration*

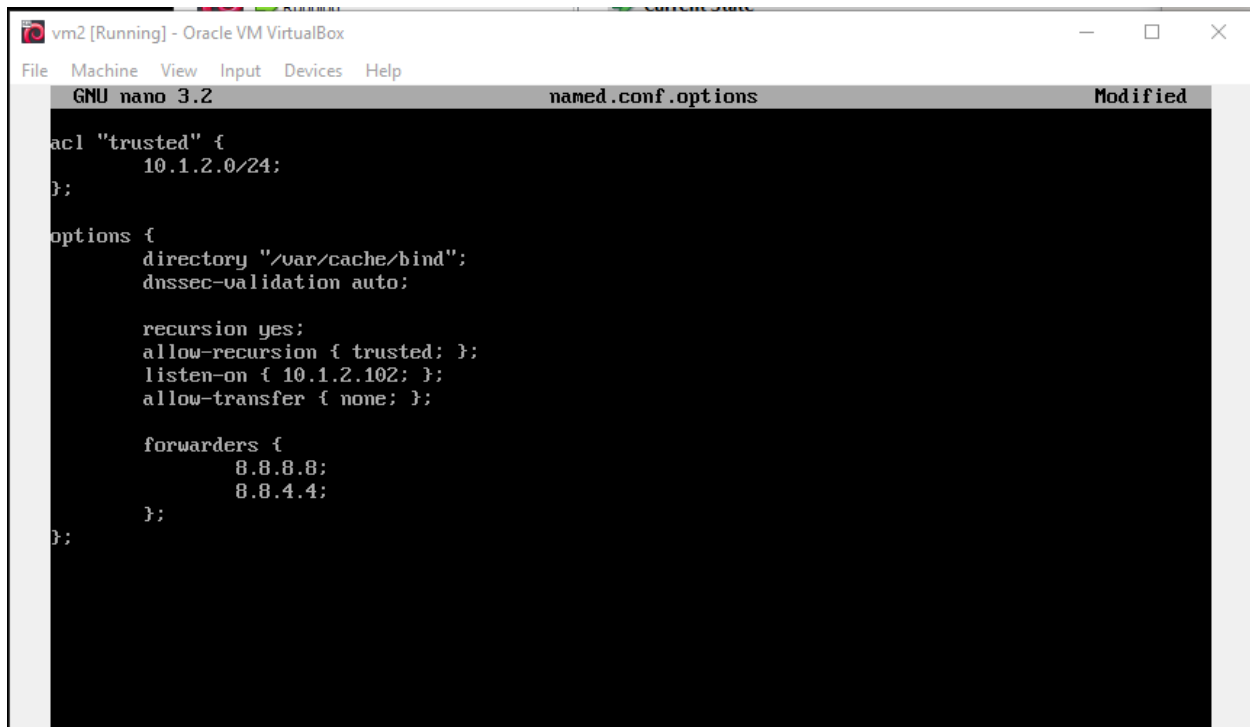
nano db.lisa2020.pl



```
GNU nano 3.2 db.lisa2020.pl

;
; BIND data file for lisa2020.pl zone
;
$TTL 604800
@ IN SOA lisa2020.pl. root.lisa2020.pl. (
    2 ; Serial
    604800 ; Refresh
    86400 ; Retry
    2419200 ; Expire
    604800 ) ; Negative Cache TTL
;
@ IN NS ns1.lisa2020.pl.
ns1 IN A 10.1.2.102
vm2 IN A 10.1.2.102
www IN CNAME vm2.lisa2020.pl.
vm1 IN A 10.1.2.101
@ IN A 127.0.0.1
@ IN AAAA ::1
```

5.c) modify bind server options:



The screenshot shows a terminal window titled "vm2 [Running] - Oracle VM VirtualBox". Inside, the GNU nano 3.2 editor is open, editing the file named.conf.options. The configuration includes an ACL for the 10.1.2.0/24 network, options for directory, dnssec-validation, recursion, listen-on, and forwarders, and a forwarders section with IP addresses 8.8.8.8 and 8.8.4.4.

```
GNU nano 3.2 named.conf.options Modified

acl "trusted" {
    10.1.2.0/24;
};

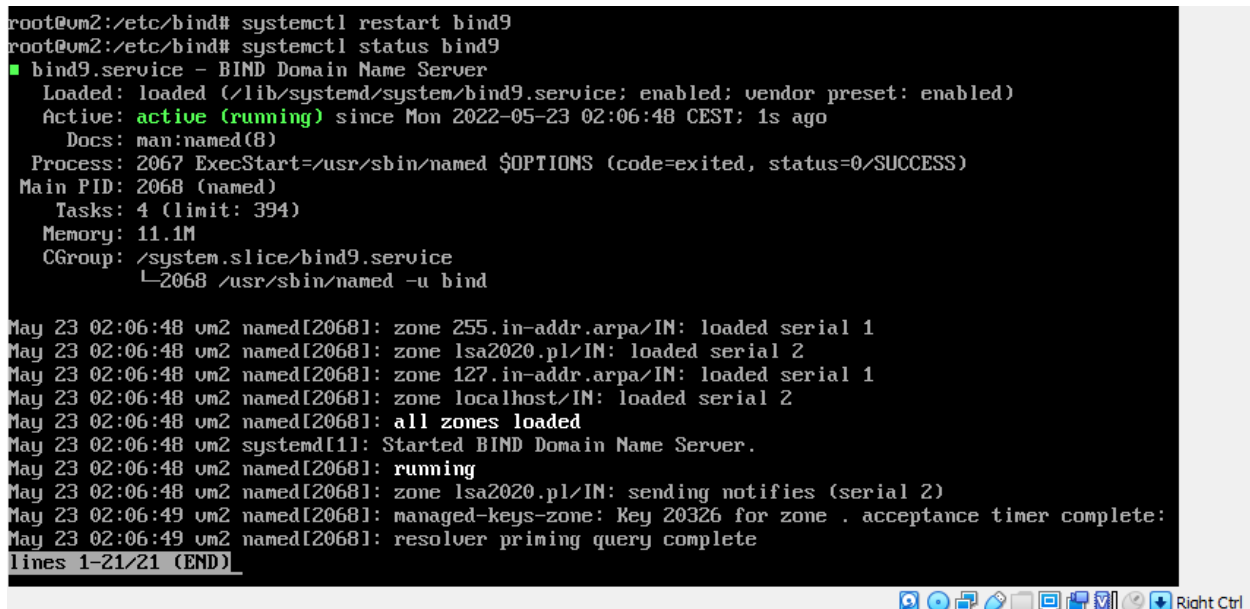
options {
    directory "/var/cache/bind";
    dnssec-validation auto;

    recursion yes;
    allow-recursion { trusted; };
    listen-on { 10.1.2.102; };
    allow-transfer { none; };

    forwarders {
        8.8.8.8;
        8.8.4.4;
    };
};
```

6. Restart DNS service: systemctl restart bind9

And verify it's state by: systemctl status bind9



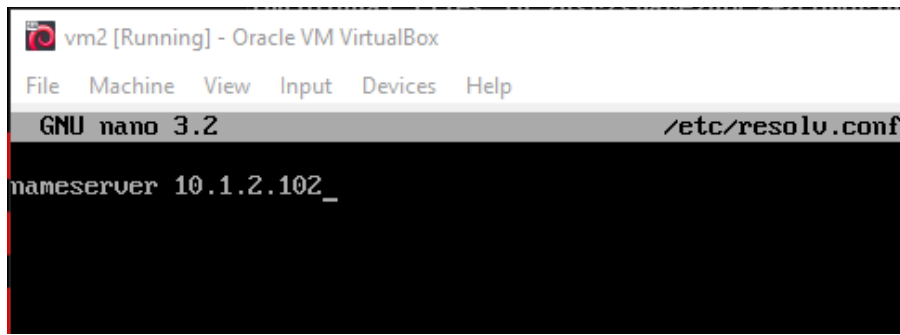
The screenshot shows a terminal window with the following commands and output:

```
root@vm2:/etc/bind# systemctl restart bind9
root@vm2:/etc/bind# systemctl status bind9
■ bind9.service - BIND Domain Name Server
   Loaded: loaded (/lib/systemd/system/bind9.service; enabled; vendor preset: enabled)
   Active: active (running) since Mon 2022-05-23 02:06:48 CEST; 1s ago
     Docs: man:named(8)
  Process: 2067 ExecStart=/usr/sbin/named $OPTIONS (code=exited, status=0/SUCCESS)
 Main PID: 2068 (named)
    Tasks: 4 (limit: 394)
   Memory: 11.1M
   CGroup: /system.slice/bind9.service
           └─2068 /usr/sbin/named -u bind

May 23 02:06:48 vm2 named[2068]: zone 255.in-addr.arpa/IN: loaded serial 1
May 23 02:06:48 vm2 named[2068]: zone 1sa2020.pl/IN: loaded serial 2
May 23 02:06:48 vm2 named[2068]: zone 127.in-addr.arpa/IN: loaded serial 1
May 23 02:06:48 vm2 named[2068]: zone localhost/IN: loaded serial 2
May 23 02:06:48 vm2 named[2068]: all zones loaded
May 23 02:06:48 vm2 systemd[1]: Started BIND Domain Name Server.
May 23 02:06:48 vm2 named[2068]: running
May 23 02:06:48 vm2 named[2068]: zone 1sa2020.pl/IN: sending notifies (serial 2)
May 23 02:06:49 vm2 named[2068]: managed-keys-zone: Key 20326 for zone . acceptance timer complete:
May 23 02:06:49 vm2 named[2068]: resolver priming query complete
lines 1-21/21 (END)
```

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:

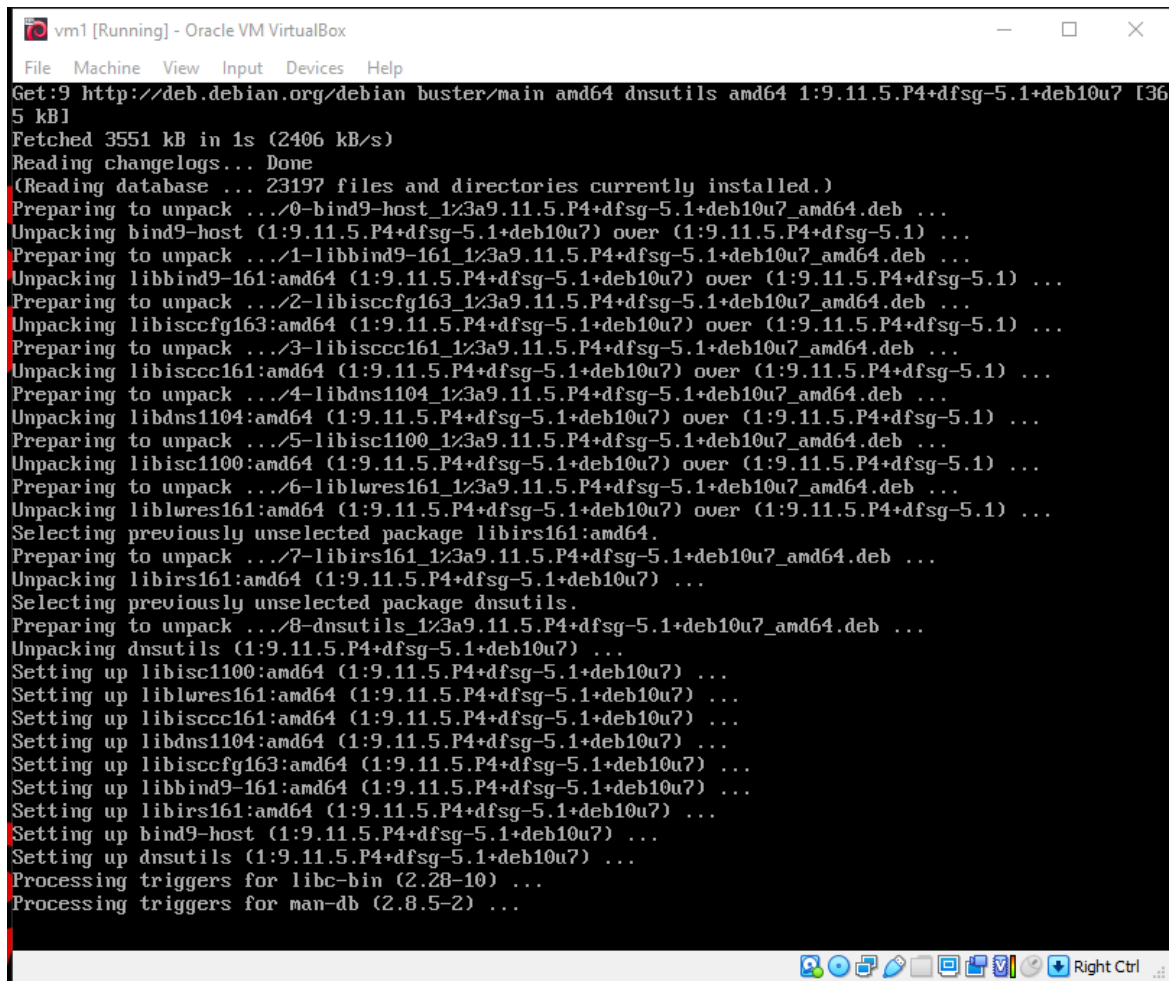


```
vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 3.2 /etc/resolv.conf
nameserver 10.1.2.102_
```

```
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:

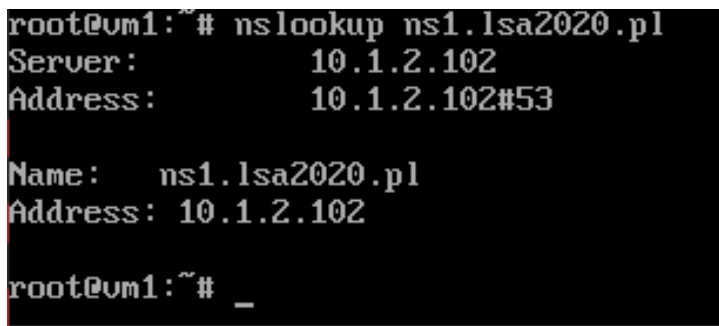
Apt-get update, apt-get install dnsutils



```
vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Get:9 http://deb.debian.org/debian buster/main amd64 dnsutils amd64 1:9.11.5.P4+dfsg-5.1+deb10u7 [365 kB]
Fetched 3551 kB in 1s (2406 kB/s)
Reading changelogs... Done
(Reading database ... 23197 files and directories currently installed.)
Preparing to unpack .../0-bind9-host_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking bind9-host (1:9.11.5.P4+dfsg-5.1+deb10u7) over (1:9.11.5.P4+dfsg-5.1) ...
Preparing to unpack .../1-libbind9-161_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking libbind9-161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) over (1:9.11.5.P4+dfsg-5.1) ...
Preparing to unpack .../2-libiscfg163_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking libiscfg163:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) over (1:9.11.5.P4+dfsg-5.1) ...
Preparing to unpack .../3-libisc161_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking libisc161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) over (1:9.11.5.P4+dfsg-5.1) ...
Preparing to unpack .../4-libdns1104_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking libdns1104:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) over (1:9.11.5.P4+dfsg-5.1) ...
Preparing to unpack .../5-libisc1100_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking libisc1100:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) over (1:9.11.5.P4+dfsg-5.1) ...
Preparing to unpack .../6-liblwres161_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking liblwres161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) over (1:9.11.5.P4+dfsg-5.1) ...
Selecting previously unselected package libirs161:amd64.
Preparing to unpack .../7-libirs161_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking libirs161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Selecting previously unselected package dnsutils.
Preparing to unpack .../8-dnsutils_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking dnsutils (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libisc1100:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up liblwres161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libisc161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libdns1104:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libiscfg163:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libbind9-161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up libirs161:amd64 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up bind9-host (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up dnsutils (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Processing triggers for libc-bin (2.28-10) ...
Processing triggers for man-db (2.8.5-2) ...
```

After installing dnsutils package on vm1:

Nslookup ns1.lsa2020.pl



```
root@vm1:~# 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@vm1:~# _
```


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: 839a2dcffa6c346ecd97c4e628aec6e8dc47b7950f4f70a (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

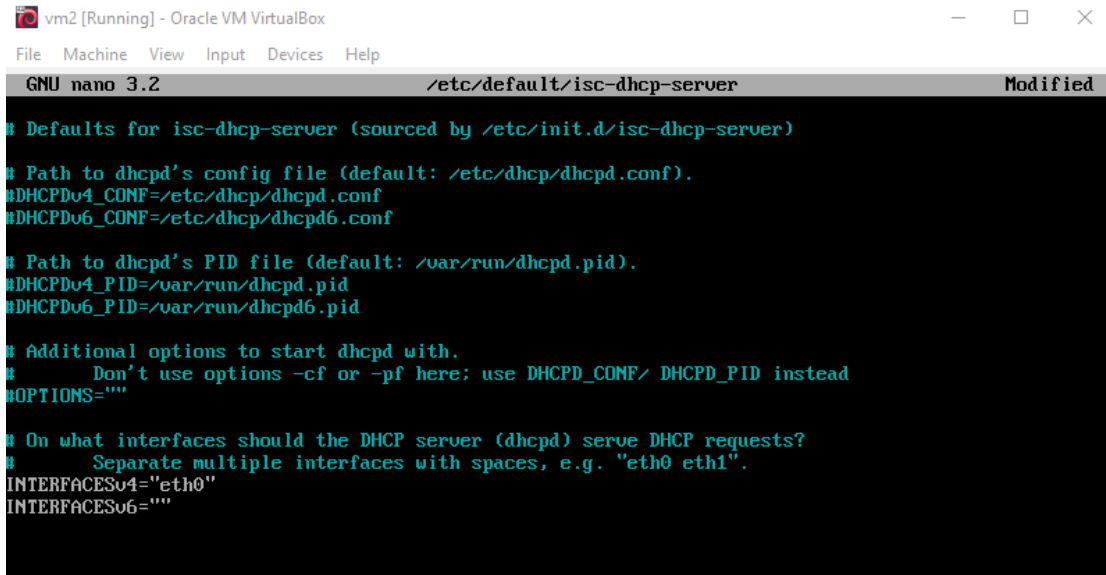
1. Install DHCP server on VM2

```
vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

deb10u7 [264 kB]
Get:3 http://deb.debian.org/debian buster/main amd64 libirs-export161 amd64 1:9.11.5.P4+dfsg-5.1+deb10u7 [237 kB]
Get:4 http://deb.debian.org/debian buster/main amd64 isc-dhcp-server amd64 4.4.1-2+deb10u1 [547 kB]
Get:5 http://deb.debian.org/debian buster/main amd64 selinux-utils amd64 2.8-1+b1 [101 kB]
Get:6 http://deb.debian.org/debian buster/main amd64 policycoreutils amd64 2.8-1 [467 kB]
Fetched 1760 kB in 1s (2011 kB/s)
Preconfiguring packages ...
Selecting previously unselected package isc-dhcp-common.
(Reading database ... 23455 files and directories currently installed.)
Preparing to unpack .../0-isc-dhcp-common_4.4.1-2+deb10u1_amd64.deb ...
Unpacking isc-dhcp-common (4.4.1-2+deb10u1) ...
Selecting previously unselected package libiscfg-export163.
Preparing to unpack .../1-libiscfg-export163_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking libiscfg-export163 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Selecting previously unselected package libirs-export161.
Preparing to unpack .../2-libirs-export161_1:9.11.5.P4+dfsg-5.1+deb10u7_amd64.deb ...
Unpacking libirs-export161 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Selecting previously unselected package isc-dhcp-server.
Preparing to unpack .../3-isc-dhcp-server_4.4.1-2+deb10u1_amd64.deb ...
Unpacking isc-dhcp-server (4.4.1-2+deb10u1) ...
Selecting previously unselected package selinux-utils.
Preparing to unpack .../4-selinux-utils_2.8-1+b1_amd64.deb ...
Unpacking selinux-utils (2.8-1+b1) ...
Selecting previously unselected package policycoreutils.
Preparing to unpack .../5-policycoreutils_2.8-1_amd64.deb ...
Unpacking policycoreutils (2.8-1) ...
Setting up selinux-utils (2.8-1+b1) ...
Setting up policycoreutils (2.8-1) ...
selinux-autorelabel-mark.service is a disabled or a static unit, not starting it.
Setting up libiscfg-export163 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up isc-dhcp-common (4.4.1-2+deb10u1) ...
Setting up libirs-export161 (1:9.11.5.P4+dfsg-5.1+deb10u7) ...
Setting up isc-dhcp-server (4.4.1-2+deb10u1) ...
Generating /etc/default/isc-dhcp-server...

Progress: [ 92%] [ .....
```

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`



```
vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 3.2 /etc/default/isc-dhcp-server Modified

# Defaults for isc-dhcp-server (sourced by /etc/init.d/isc-dhcp-server)

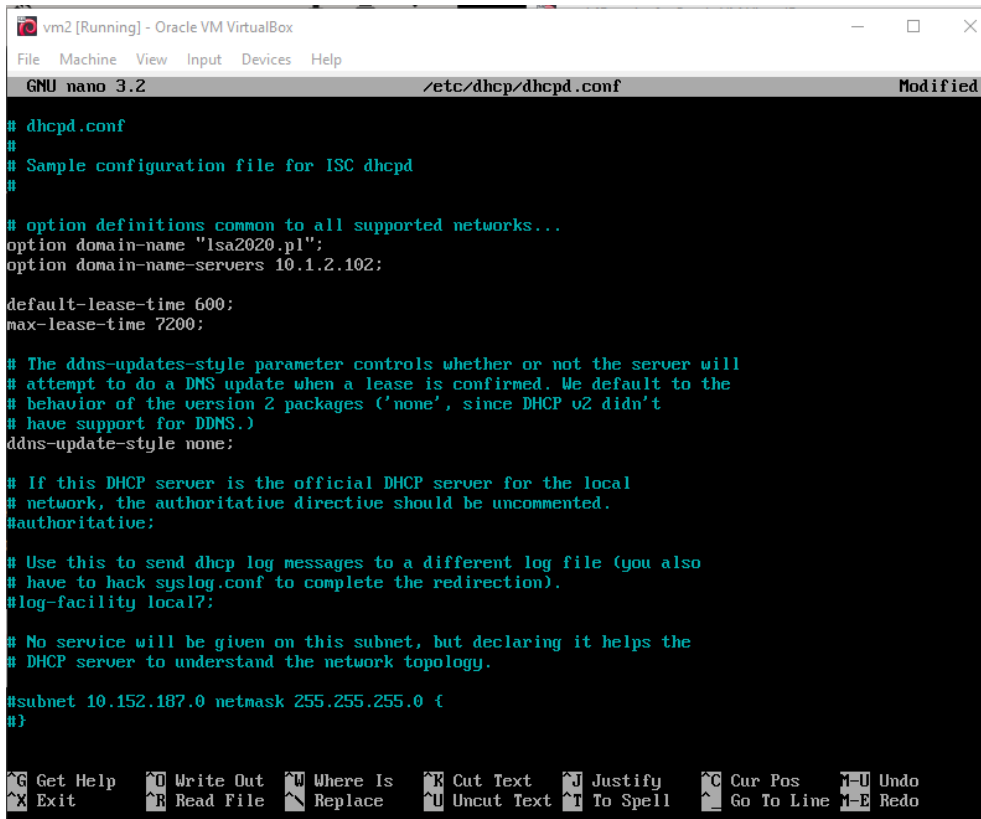
# Path to dhcpd's config file (default: /etc/dhcp/dhcpd.conf).
#DHCPDv4_CONF=/etc/dhcp/dhcpd.conf
#DHCPDv6_CONF=/etc/dhcp/dhcpd6.conf

# Path to dhcpd's PID file (default: /var/run/dhcpd.pid).
#DHCPDv4_PID=/var/run/dhcpd.pid
#DHCPDv6_PID=/var/run/dhcpd6.pid

# Additional options to start dhcpd with.
# Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
#OPTIONS=""

# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
# Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACESv4="eth0"
INTERFACESv6=""
```

b)



```
vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 3.2 /etc/dhcp/dhcpd.conf Modified

# dhcpd.conf
#
# Sample configuration file for ISC dhcpd
#
# option definitions common to all supported networks...
option domain-name "lsa2020.pl";
option domain-name-servers 10.1.2.102;

default-lease-time 600;
max-lease-time 7200;

# The ddns-updates-style parameter controls whether or not the server will
# attempt to do a DNS update when a lease is confirmed. We default to the
# behavior of the version 2 packages ('none', since DHCP v2 didn't
# have support for DDNS.)
# have support for DDNS.)
ddns-update-style none;

# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
#authoritative;

# Use this to send dhcp log messages to a different log file (you also
# have to hack syslog.conf to complete the redirection).
#log-facility local7;

# No service will be given on this subnet, but declaring it helps the
# DHCP server to understand the network topology.
#subnet 10.152.187.0 netmask 255.255.255.0 {
#}
```

b)

```
vm2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 3.2 /etc/dhcp/dhcpd.conf

#}

# You can declare a class of clients and then do address allocation
# based on that. The example below shows a case where all clients
# in a certain class get addresses on the 10.17.224/24 subnet, and all
# other clients get addresses on the 10.0.29/24 subnet.

#class "foo" {
# match if substring (option vendor-class-identifier, 0, 4) = "SUNW";
#}

#shared-network 224-29 {
# subnet 10.17.224.0 netmask 255.255.255.0 {
# option routers rtr-224.example.org;
# }
# subnet 10.0.29.0 netmask 255.255.255.0 {
# option routers rtr-29.example.org;
# }
# pool {
# allow members of "foo";
# range 10.17.224.10 10.17.224.250;
# }
# pool {
# deny members of "foo";
# range 10.0.29.10 10.0.29.230;
# }
#}
subnet 10.1.2.0 netmask 255.255.255.0 {
range 10.1.2.8 10.1.2.100;
option routers 10.1.2.102;
}

^G Get Help ^O Write Out ^W Where Is ^R Cut Text ^J Justify ^C Cur Pos ^U Undo
^X Exit ^B Read File ^E Replace ^U Uncut Text ^T To Spell ^_ Go To Line ^R Redo
```

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 1000
    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

```
vm1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 3.2 /etc/network/interfaces.d/40-network-cfg

# Network configuration
auto lo
iface lo inet loopback

auto eth0
#iface eth0 inet static
# address 10.1.2.101/24
# gateway 10.1.2.102
iface eth0 inet dhcp_
```

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 "0000000100000001*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 1000
    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 1000
    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 1000
    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:~#
```