

Step 1

```
Activities Terminal Dec 12 03:26
jkodu001@jkodu001-VirtualBox: ~
jkodu001@jkodu001-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::dc15:a7f:937f:4a7b prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:23:c9:3a txqueuelen 1000 (Ethernet)
    RX packets 768 bytes 322446 (322.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 746 bytes 73567 (73.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 366 bytes 39410 (39.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 366 bytes 39410 (39.4 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jkodu001@jkodu001-VirtualBox:~$
```

The IPv4 address is 10.0.2.15, The IPv6 address is fe80::dc15:a7f:937f:4a7b, the MAC address is 08:00:27:23:c9:3a, and the netmask is 255.255.255.0.

Step 2-3

```
Activities Terminal Dec 12 03:29
jkodu001@jkodu001-VirtualBox: ~
jkodu001@jkodu001-VirtualBox:~$ route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use I/Face
default _gateway 0.0.0.0 UG 100 0 0 enp0s3
10.0.2.0 0.0.0.0 255.255.255.0 U 100 0 0 enp0s3
link-local 0.0.0.0 255.255.0.0 U 1000 0 0 enp0s3

jkodu001@jkodu001-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address Foreign Address State
udp 0 0 jkodu001-Virtual:bootpc _gateway:bootps ESTABLISHED

Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags Type State I-Node Path
unix 3 [ ] DGRAM CONNECTED 15665 /run/systemd/notify
unix 2 [ ] DGRAM 15679 /run/systemd/journal
/syslog
unix 17 [ ] DGRAM CONNECTED 15688 /run/systemd/journal
/dev-log
unix 9 [ ] DGRAM CONNECTED 15690 /run/systemd/journal
/socket
unix 2 [ ] DGRAM 26326 /run/user/1000/syste
md/notify
unix 3 [ ] STREAM CONNECTED 42807 /run/dbus/system_bus
_socket
unix 3 [ ] STREAM CONNECTED 28759 /run/user/1000/at-sp
i/bus
unix 3 [ ] STREAM CONNECTED 27349 /run/systemd/journal
/stdout
unix 3 [ ] STREAM CONNECTED 21122 /run/systemd/journal
/stdout
```

Step 4-5

```
Activities Terminal Dec 12 03:59
jkodu001@jkodu001-VirtualBox: ~
jkodu001@jkodu001-VirtualBox:~$ ping -c 10 ubuntu.com
PING ubuntu.com (185.125.190.21) 56(84) bytes of data.
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=1 ttl=48 time=193 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=2 ttl=48 time=112 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=3 ttl=48 time=133 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=4 ttl=48 time=155 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=5 ttl=48 time=178 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=6 ttl=48 time=98.0 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=7 ttl=48 time=120 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=8 ttl=48 time=143 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=9 ttl=48 time=268 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=10 ttl=48 time=187 ms

--- ubuntu.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9016ms
rtt min/avg/max/mdev = 98.014/158.800/267.900/47.446 ms
jkodu001@jkodu001-VirtualBox:~$ host www.odu.edu
www.odu.edu has address 35.170.140.174
jkodu001@jkodu001-VirtualBox:~$
```

Step 6-7

```
Activities Terminal Dec 12 04:02
jkodu001@jkodu001-VirtualBox: ~
www.odu.edu has address 35.170.140.174
jkodu001@jkodu001-VirtualBox:~$ cat /etc/hostname
jkodu001-VirtualBox
jkodu001@jkodu001-VirtualBox:~$ cat /etc/resolv.conf
# This is /run/systemd/resolve/stub-resolv.conf managed by man:systemd-resolved
(8).
# Do not edit.
#
# This file might be symlinked as /etc/resolv.conf. If you're looking at
# /etc/resolv.conf and seeing this text, you have followed the symlink.
#
# This is a dynamic resolv.conf file for connecting local clients to the
# internal DNS stub resolver of systemd-resolved. This file lists all
# configured search domains.
#
# Run "resolvectl status" to see details about the uplink DNS servers
# currently in use.
#
# Third party programs should typically not access this file directly, but only
# through the symlink at /etc/resolv.conf. To manage man:resolv.conf(5) in a
# different way, replace this symlink by a static file or a different symlink.
#
# See man:systemd-resolved.service(8) for details about the supported modes of
# operation for /etc/resolv.conf.

nameserver 127.0.0.53
options edns0 trust-ad
search wlan.odu.edu
jkodu001@jkodu001-VirtualBox:~$
```

Task B

```
Activities Terminal Dec 12 04:31
jkodu001@jkodu001-VirtualBox: ~
jkodu001@jkodu001-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.254.137.61 netmask 255.255.0.0 broadcast 10.254.255.255
    inet6 fe80::dc15:a7f:937f:4a7b prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:23:c9:3a txqueuelen 1000 (Ethernet)
    RX packets 30 bytes 3700 (3.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 85 bytes 10195 (10.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

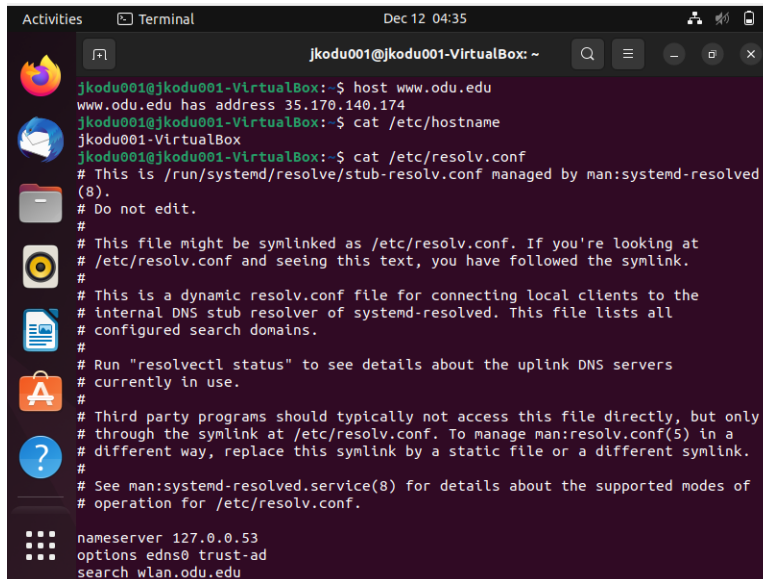
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 138 bytes 12531 (12.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 138 bytes 12531 (12.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

jkodu001@jkodu001-VirtualBox:~$ route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default _gateway 0.0.0.0 UG 100 0 0 enp0s3
10.254.0.0 0.0.0.0 255.255.0.0 U 100 0 0 enp0s3
link-local 0.0.0.0 255.255.0.0 U 1000 0 0 enp0s3

jkodu001@jkodu001-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address Foreign Address State
udp 0 0 jkodu001-Virtual:bootpc nse.odu.edu:bootps ESTABLISHED

Activities Terminal Dec 12 04:31
jkodu001@jkodu001-VirtualBox: ~
unix 3 [ ] STREAM CONNECTED 23815 /run/systemd/journal/stdout
jkodu001@jkodu001-VirtualBox:~$ ping -c 10 ubuntu.com
PING ubuntu.com (185.125.190.21) 56(84) bytes of data.
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=1 ttl=49 time=101 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=2 ttl=49 time=123 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=3 ttl=49 time=145 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=4 ttl=49 time=167 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=5 ttl=49 time=292 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=6 ttl=49 time=109 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=7 ttl=49 time=130 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=8 ttl=49 time=152 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=9 ttl=49 time=173 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_
seq=10 ttl=49 time=93.5 ms

--- ubuntu.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9019ms
rtt min/avg/max/mdev = 93.467/148.464/291.534/54.151 ms
jkodu001@jkodu001-VirtualBox:~$
```



```
Activities Terminal Dec 12 04:35
jkodu001@jkodu001-VirtualBox: ~
jkodu001@jkodu001-VirtualBox:~$ host www.odu.edu
www.odu.edu has address 35.170.140.174
jkodu001@jkodu001-VirtualBox:~$ cat /etc/hostname
jkodu001-VirtualBox
jkodu001@jkodu001-VirtualBox:~$ cat /etc/resolv.conf
# This is /run/systemd/resolve/stub-resolv.conf managed by man:systemd-resolved
(8).
# Do not edit.
#
# This file might be symlinked as /etc/resolv.conf. If you're looking at
# /etc/resolv.conf and seeing this text, you have followed the symlink.
#
# This is a dynamic resolv.conf file for connecting local clients to the
# internal DNS stub resolver of systemd-resolved. This file lists all
# configured search domains.
#
# Run "resolvectl status" to see details about the uplink DNS servers
# currently in use.
#
# Third party programs should typically not access this file directly, but only
# through the symlink at /etc/resolv.conf. To manage man:resolv.conf(5) in a
# different way, replace this symlink by a static file or a different symlink.
#
# See man:systemd-resolved.service(8) for details about the supported modes of
# operation for /etc/resolv.conf.

nameserver 127.0.0.53
options edns0 trust-ad
search wlan.odu.edu
```

A major difference I found is when changing the VM connection from NAT to bridge mode, the IPv4 address has changed from 10.0.2.15 to 10.254.137.61.