

Austin Cupp

Professor Vatsa

Cyse 270

11/19/2023

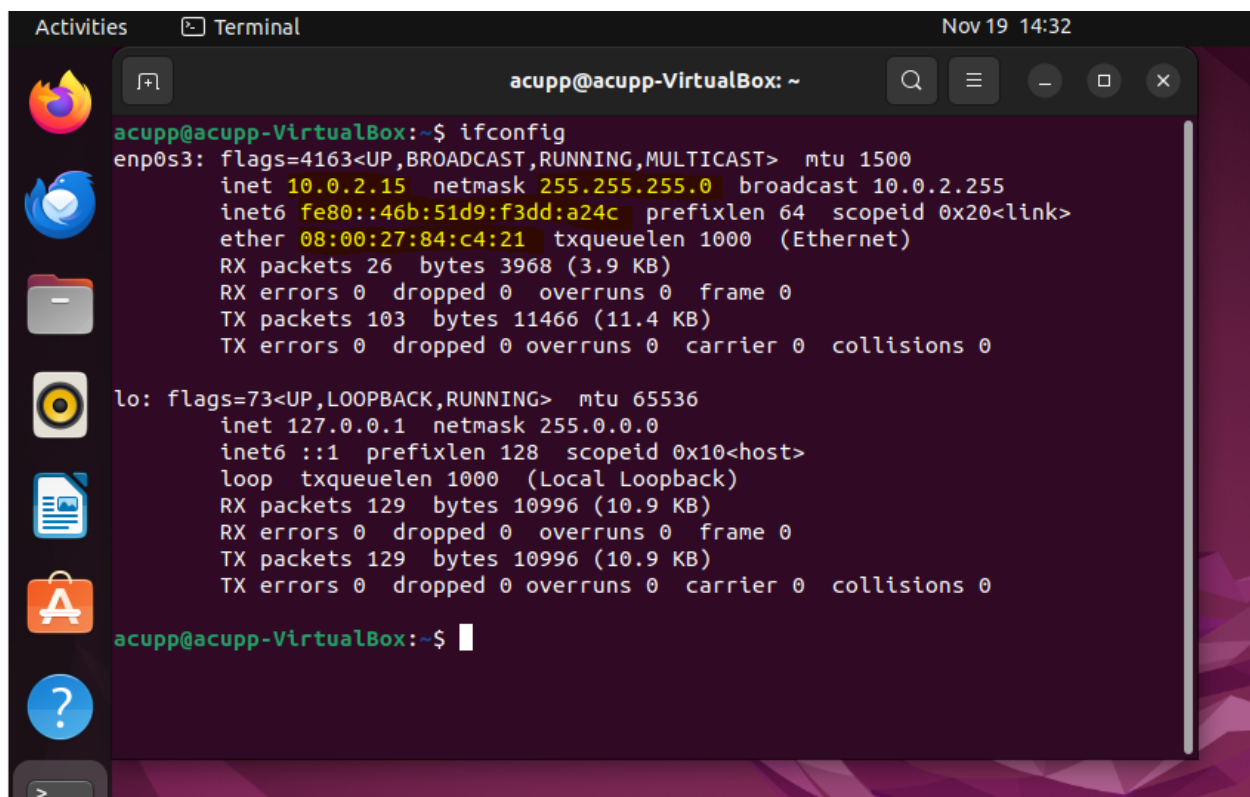
Assignment #11

You can use either Ubuntu VM or Kali Linux VM to complete the following tasks.

Task A – Explore Network Configurations (8 * 5 = 40 Points)

{{{{{{{{Connect your VM in the NAT mode}}}}}}}}

1. Use the correct ifconfig command to display the current network configuration. Highlight your IP address, MAC address, and the network mask.



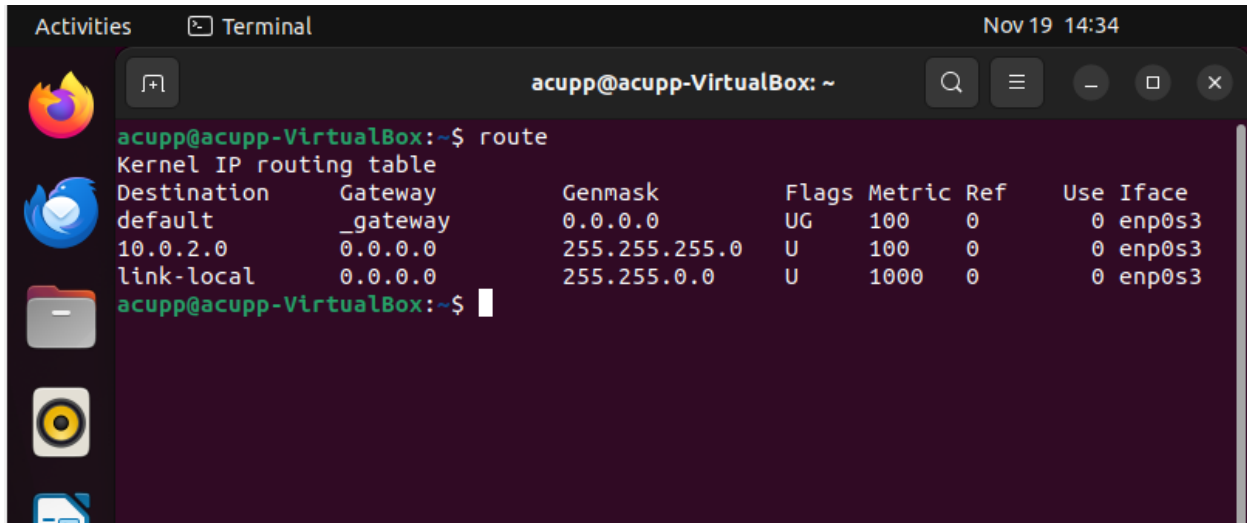
The screenshot shows a terminal window titled "acupp@acupp-VirtualBox: ~" with a search icon, menu icon, and window controls. The terminal output shows the results of the 'ifconfig' command. The first section is for the 'enp0s3' interface, which is up and running. It shows an IP address of 10.0.2.15, a netmask of 255.255.255.0, a broadcast address of 10.0.2.255, an IPv6 address of fe80::46b:51d9:f3dd:a24c, and a MAC address of 08:00:27:84:c4:21. The second section is for the 'lo' (loopback) interface, which is also up and running. It shows an IP address of 127.0.0.1, a netmask of 255.0.0.0, and an IPv6 address of ::1. The terminal prompt is acupp@acupp-VirtualBox:~\$.

```
acupp@acupp-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::46b:51d9:f3dd:a24c prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:84:c4:21 txqueuelen 1000 (Ethernet)
    RX packets 26 bytes 3968 (3.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 103 bytes 11466 (11.4 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 129 bytes 10996 (10.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 129 bytes 10996 (10.9 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

acupp@acupp-VirtualBox:~$
```

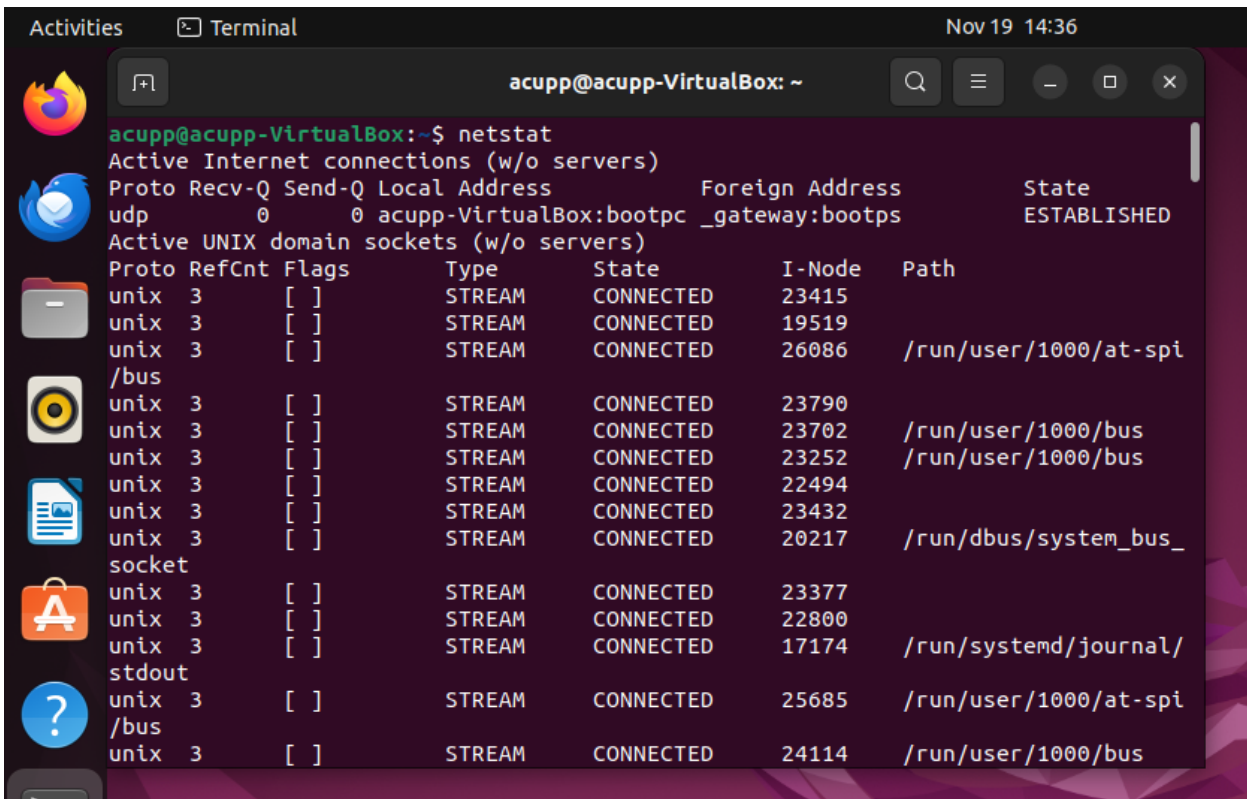
2. Use the correct route command to display the current routing table.



A terminal window titled 'acupp@acupp-VirtualBox: ~' showing the output of the 'route' command. The output displays the Kernel IP routing table with columns for Destination, Gateway, Genmask, Flags, Metric, Ref, Use, and Iface.

```
acupp@acupp-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
10.0.2.0        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
acupp@acupp-VirtualBox:~$
```

3. Use the netstat command to list current TCP connections.

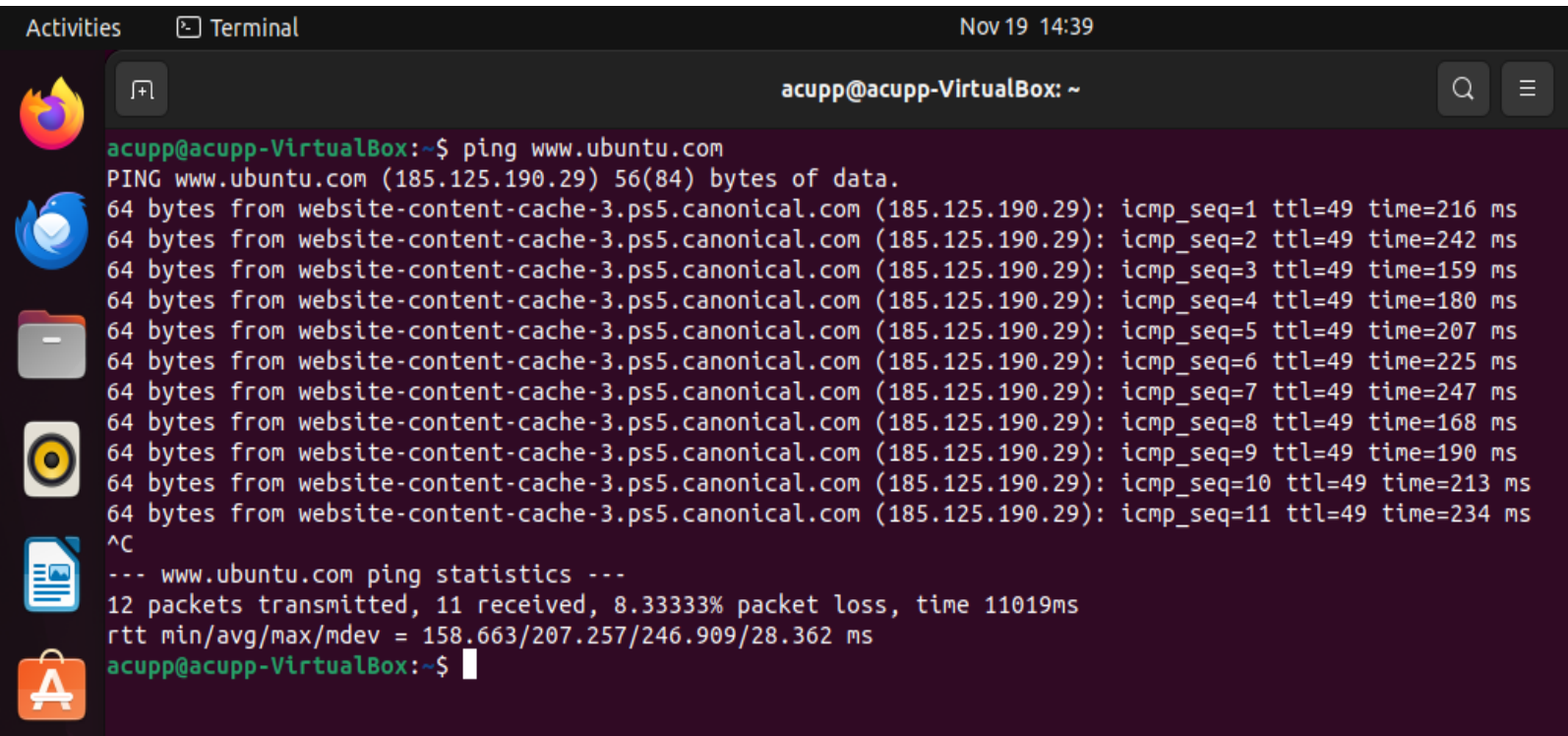


A terminal window titled 'acupp@acupp-VirtualBox: ~' showing the output of the 'netstat' command. The output is divided into two sections: 'Active Internet connections (w/o servers)' and 'Active UNIX domain sockets (w/o servers)'. The first section shows a single UDP connection to the gateway. The second section shows multiple STREAM connections to various system services.

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

Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags   Type       State         I-Node  Path
unix    3      [ ]     STREAM    CONNECTED    23415
unix    3      [ ]     STREAM    CONNECTED    19519
unix    3      [ ]     STREAM    CONNECTED    26086    /run/user/1000/at-spi
/bus
unix    3      [ ]     STREAM    CONNECTED    23790
unix    3      [ ]     STREAM    CONNECTED    23702    /run/user/1000/bus
unix    3      [ ]     STREAM    CONNECTED    23252    /run/user/1000/bus
unix    3      [ ]     STREAM    CONNECTED    22494
unix    3      [ ]     STREAM    CONNECTED    23432
unix    3      [ ]     STREAM    CONNECTED    20217    /run/dbus/system_bus_
socket
unix    3      [ ]     STREAM    CONNECTED    23377
unix    3      [ ]     STREAM    CONNECTED    22800
unix    3      [ ]     STREAM    CONNECTED    17174    /run/systemd/journal/
stdout
unix    3      [ ]     STREAM    CONNECTED    25685    /run/user/1000/at-spi
/bus
unix    3      [ ]     STREAM    CONNECTED    24114    /run/user/1000/bus
```

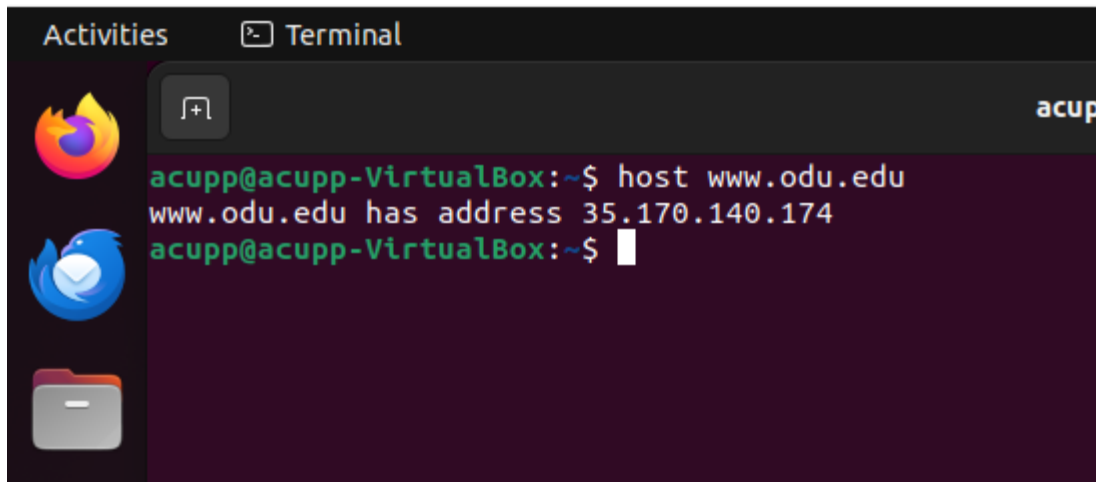
4. Use the ping command to determine if the ubuntu.com system is accessible via the network.
(Use the correct option to send 10 ping requests only.)



The image shows a terminal window titled "acupp@acupp-VirtualBox: ~" with a search icon and a menu icon in the top right. The terminal output shows a ping command being executed: `acupp@acupp-VirtualBox:~$ ping www.ubuntu.com`. The output displays 11 successful ping requests to the IP address 185.125.190.29, each receiving 64 bytes of data. The response times range from 159 ms to 247 ms. A summary line indicates 12 packets transmitted, 11 received, and an 8.33333% packet loss. The round-trip time statistics are: min/avg/max/mdev = 158.663/207.257/246.909/28.362 ms. The prompt returns to `acupp@acupp-VirtualBox:~$`.

```
acupp@acupp-VirtualBox:~$ ping www.ubuntu.com
PING www.ubuntu.com (185.125.190.29) 56(84) bytes of data.
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=1 ttl=49 time=216 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=2 ttl=49 time=242 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=3 ttl=49 time=159 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=4 ttl=49 time=180 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=5 ttl=49 time=207 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=6 ttl=49 time=225 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=7 ttl=49 time=247 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=8 ttl=49 time=168 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=9 ttl=49 time=190 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=10 ttl=49 time=213 ms
64 bytes from website-content-cache-3.ps5.canonical.com (185.125.190.29): icmp_seq=11 ttl=49 time=234 ms
^C
--- www.ubuntu.com ping statistics ---
12 packets transmitted, 11 received, 8.33333% packet loss, time 11019ms
rtt min/avg/max/mdev = 158.663/207.257/246.909/28.362 ms
acupp@acupp-VirtualBox:~$
```

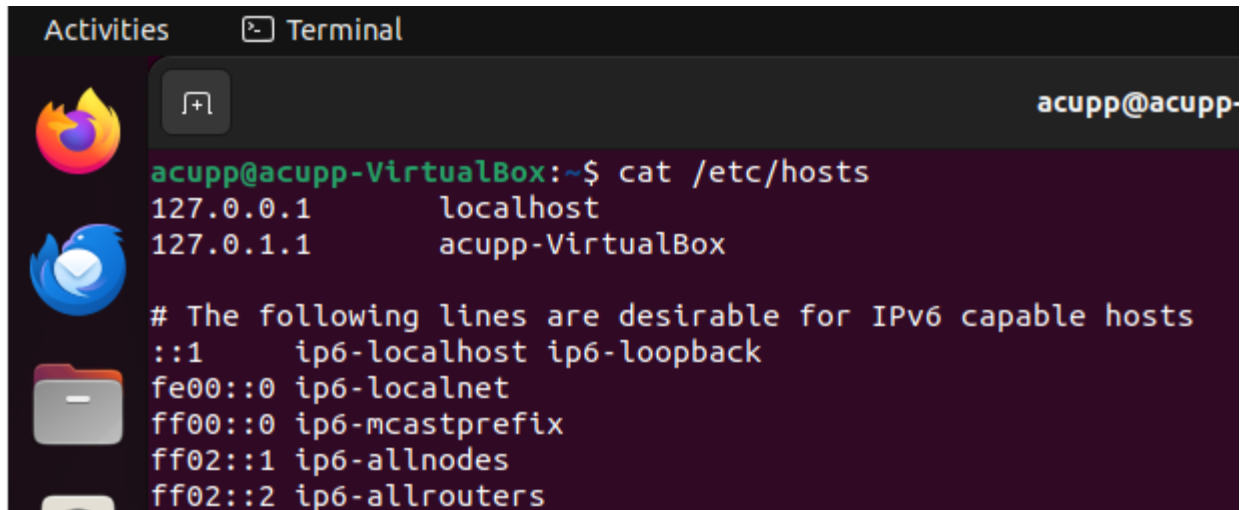
5. Use the host command to perform a DNS query on www.odu.edu



The image shows a terminal window titled "acupp@acupp-VirtualBox: ~" with a search icon and a menu icon in the top right. The terminal output shows a host command being executed: `acupp@acupp-VirtualBox:~$ host www.odu.edu`. The output displays the IP address for www.odu.edu: `www.odu.edu has address 35.170.140.174`. The prompt returns to `acupp@acupp-VirtualBox:~$`.

```
acupp@acupp-VirtualBox:~$ host www.odu.edu
www.odu.edu has address 35.170.140.174
acupp@acupp-VirtualBox:~$
```

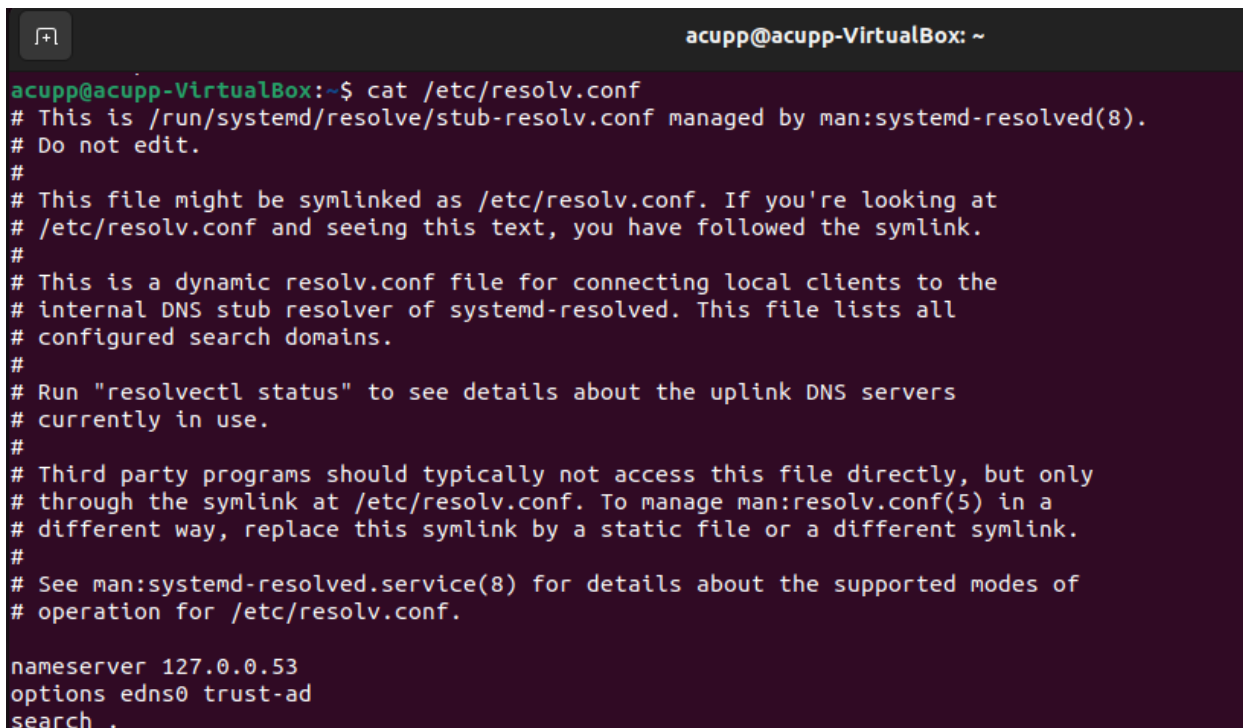
6. Use the cat command to display the contents of the file that contains the system's hostname

A terminal window titled 'Terminal' with a dark background. The prompt is 'acupp@acupp-VirtualBox:~\$'. The command 'cat /etc/hosts' has been executed, displaying the contents of the file. The output shows two entries for IPv4: '127.0.0.1 localhost' and '127.0.1.1 acupp-VirtualBox'. It also shows several IPv6 entries, including '::1 ip6-localhost ip6-loopback', 'fe00::0 ip6-localnet', 'ff00::0 ip6-mcastprefix', 'ff02::1 ip6-allnodes', and 'ff02::2 ip6-allrouters'.

```
acupp@acupp-VirtualBox:~$ cat /etc/hosts
127.0.0.1      localhost
127.0.1.1      acupp-VirtualBox

# The following lines are desirable for IPv6 capable hosts
::1           ip6-localhost ip6-loopback
fe00::0       ip6-localnet
ff00::0       ip6-mcastprefix
ff02::1       ip6-allnodes
ff02::2       ip6-allrouters
```

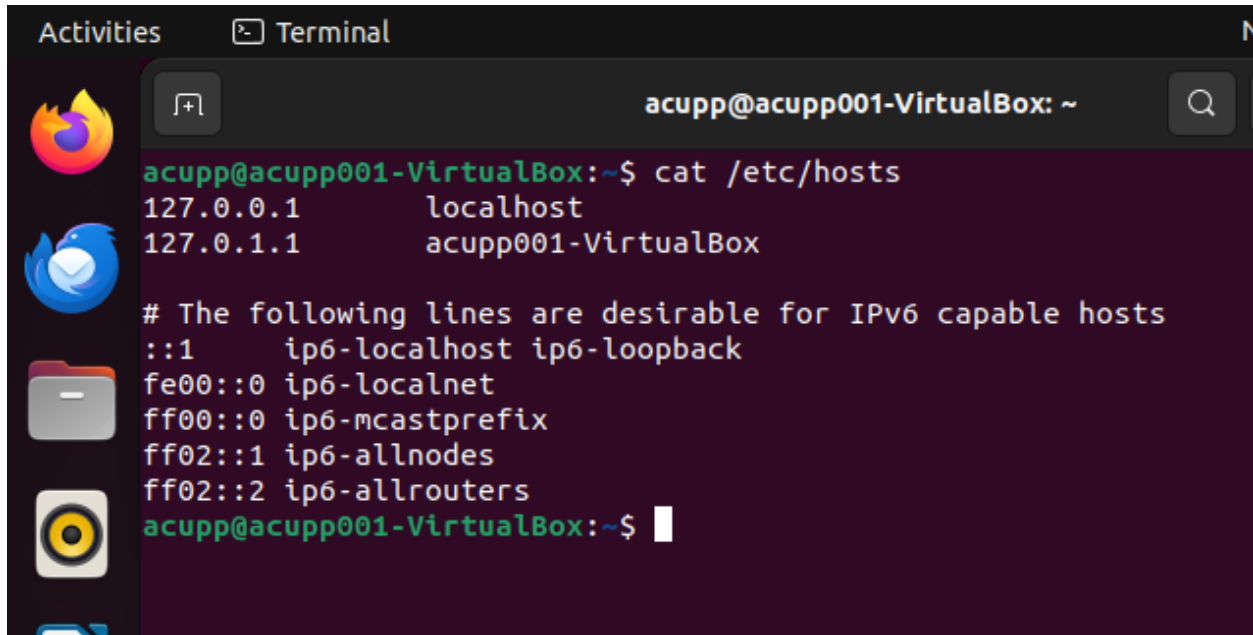
7. Use the cat command to display the contents of the file that contains the DNS servers for this system.

A terminal window titled 'acupp@acupp-VirtualBox: ~' with a dark background. The prompt is 'acupp@acupp-VirtualBox:~\$'. The command 'cat /etc/resolv.conf' has been executed, displaying the contents of the file. The output shows a series of comments explaining the file's purpose and usage, followed by the configuration: 'nameserver 127.0.0.53', 'options edns0 trust-ad', and 'search .'.

```
acupp@acupp-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 .
```

8. Edit the same file you display in the previous step, set the system's hostname to your MIDAS ID permanently. Reboot system and repeat step 6.

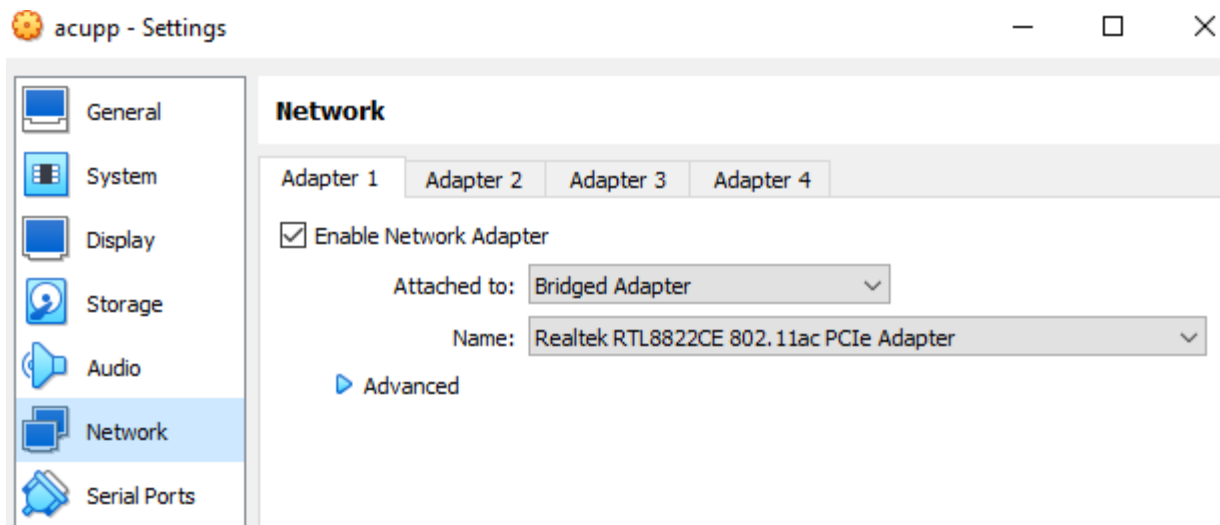
A screenshot of a Linux terminal window. The title bar shows 'Activities' and 'Terminal'. The terminal prompt is 'acupp@acupp001-VirtualBox: ~'. The user has entered the command 'cat /etc/hosts'. The output shows the contents of the /etc/hosts file, which includes mappings for 127.0.0.1 to localhost and 127.0.1.1 to acupp001-VirtualBox, followed by a comment about IPv6 and several IPv6 addresses mapped to their respective names. The terminal is dark-themed with a purple background.

```
acupp@acupp001-VirtualBox:~$ cat /etc/hosts
127.0.0.1        localhost
127.0.1.1        acupp001-VirtualBox

# The following lines are desirable for IPv6 capable hosts
::1             ip6-localhost ip6-loopback
fe00::0         ip6-localnet
ff00::0         ip6-mcastprefix
ff02::1         ip6-allnodes
ff02::2         ip6-allrouters
acupp@acupp001-VirtualBox:~$
```

Task B – A Different Network Setting (3 * 20 = 60 Points)

1. Change the VM network connection from NAT to the bridge mode (you will lose your Internet connection if you are connected to the ODU campus Wi-Fi network, but it is okay).
2. Reboot your system, then repeat Steps 1 – 7 in Task A.
3. Highlight the differences at the end of each step and discuss what do you find.



```
Activities  Terminal  Nov 19 14:57
acupp@acupp001-VirtualBox: ~
acupp@acupp001-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 192.168.0.144  netmask 255.255.255.0  broadcast 192.168.0.255
    inet6 fe80::46b:51d9:f3dd:a24c  prefixlen 64  scopeid 0x20<link>
    ether 08:00:27:84:c4:21  txqueuelen 1000  (Ethernet)
    RX packets 139  bytes 45989 (45.9 KB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 150  bytes 20904 (20.9 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 143  bytes 12547 (12.5 KB)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 143  bytes 12547 (12.5 KB)
    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

acupp@acupp001-VirtualBox:~$
```

```
Activities Terminal Nov 19 14:58
acupp@acupp001-VirtualBox: ~
acupp@acupp001-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
link-local 0.0.0.0 255.255.0.0 U 1000 0 0 enp0s3
192.168.0.0 0.0.0.0 255.255.255.0 U 100 0 0 enp0s3
acupp@acupp001-VirtualBox:~$
```

```
Activities Terminal Nov 19 15:00
acupp@acupp001-VirtualBox: ~
acupp@acupp001-VirtualBox:~$ ping www.ubuntu.com
PING www.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_s
eq=1 ttl=50 time=194 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_s
eq=2 ttl=50 time=223 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_s
eq=3 ttl=50 time=239 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_s
eq=4 ttl=50 time=244 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_s
eq=5 ttl=50 time=247 ms
64 bytes from website-content-cache-2.ps5.canonical.com (185.125.190.21): icmp_s
eq=6 ttl=50 time=164 ms
^C
--- www.ubuntu.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5048ms
rtt min/avg/max/mdev = 163.511/218.276/246.526/30.302 ms
acupp@acupp001-VirtualBox:~$
```

The differences between launching the VM Ubuntu in NAT mode and bridge mode is there is a change in the IP address, information in the routing table is changed, and when pinging www.ubuntu.com there is a 0% packet loss, compared to an 8.3333% packet loss when pinging www.ubuntu.com in NAT mode.