LAB 4

CONSTRUCT A SIMPLE NETWORK

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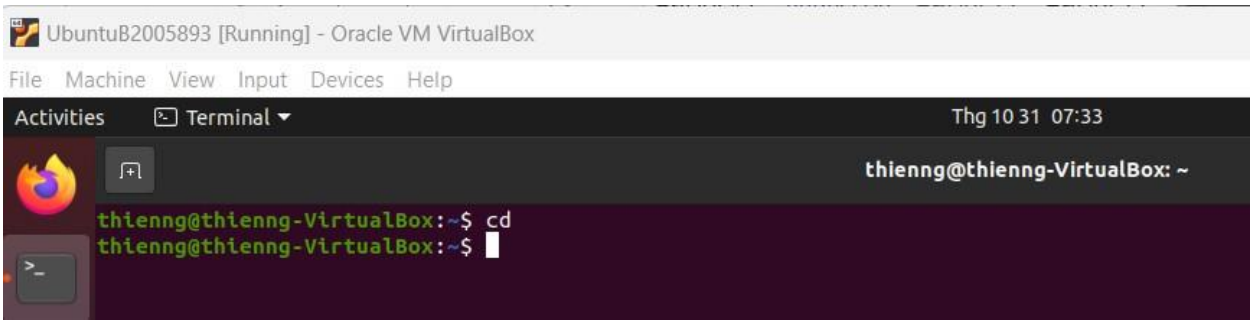
Group: M01

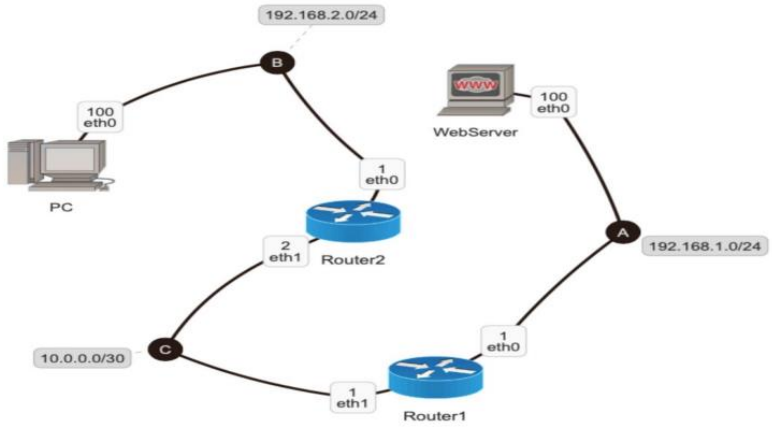
Submission: an ID_NAME_Lab04.pdf file describes clearly how did you solve the problem

Exercise 0: change the directory to your home directory

Answer: $cd

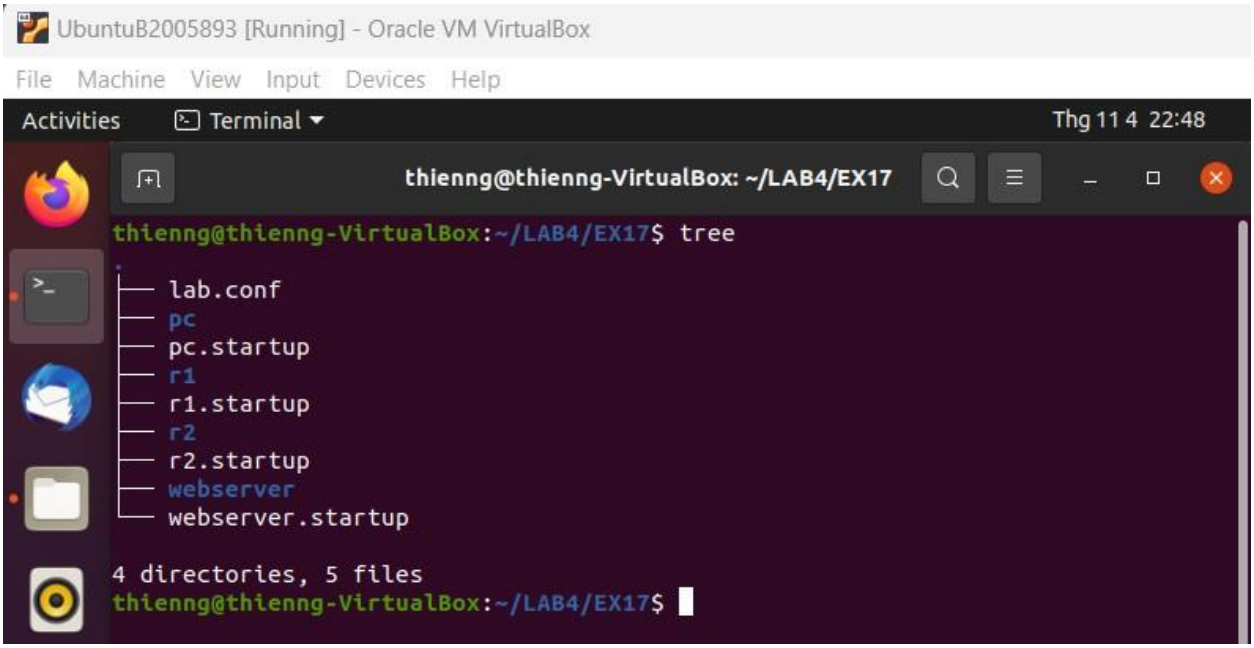


Exercise 17: Construct the following network

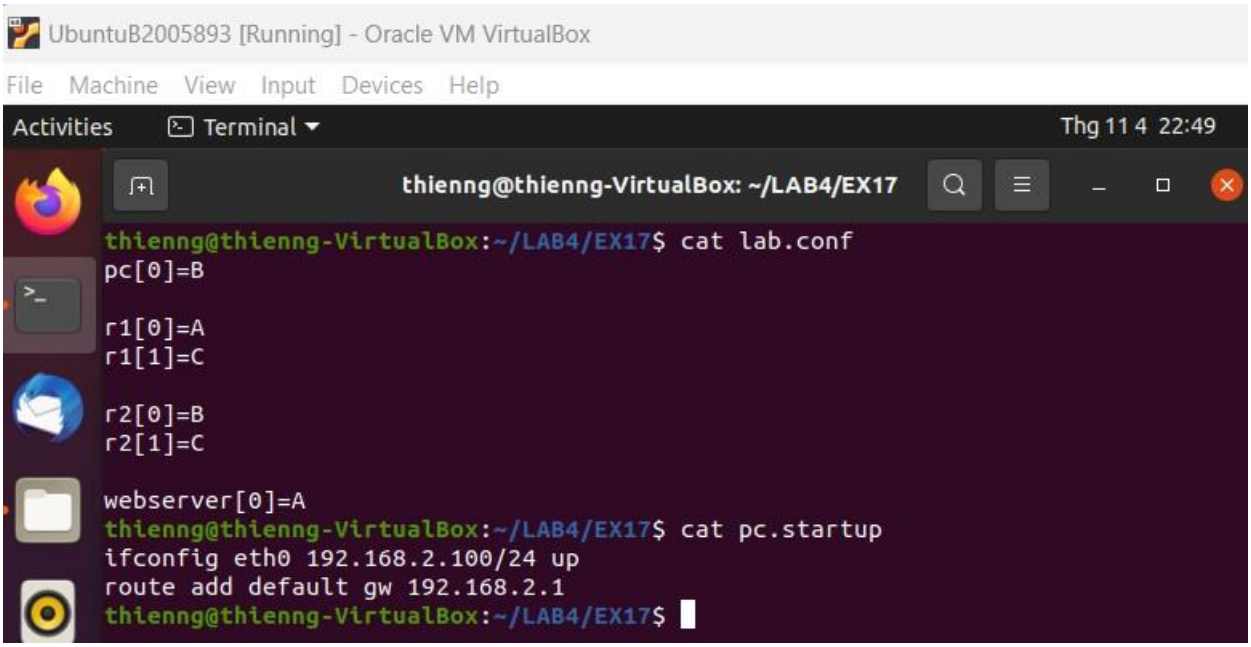


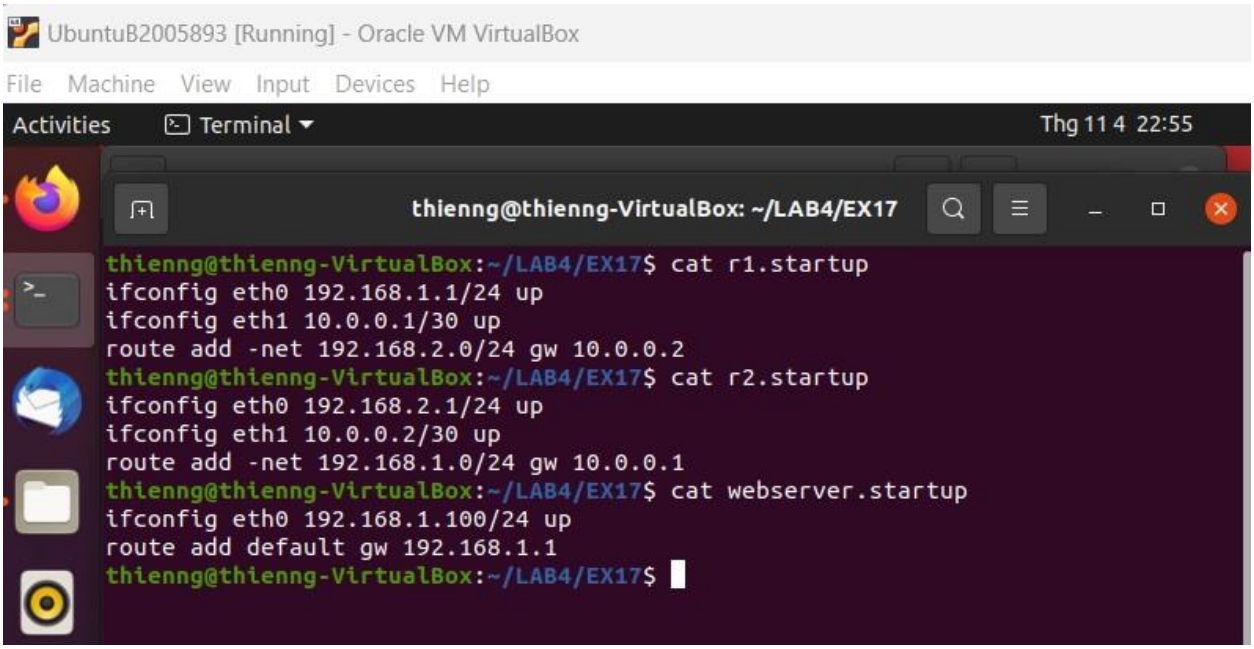
Answer:

1. Files and Folders
   $ tree

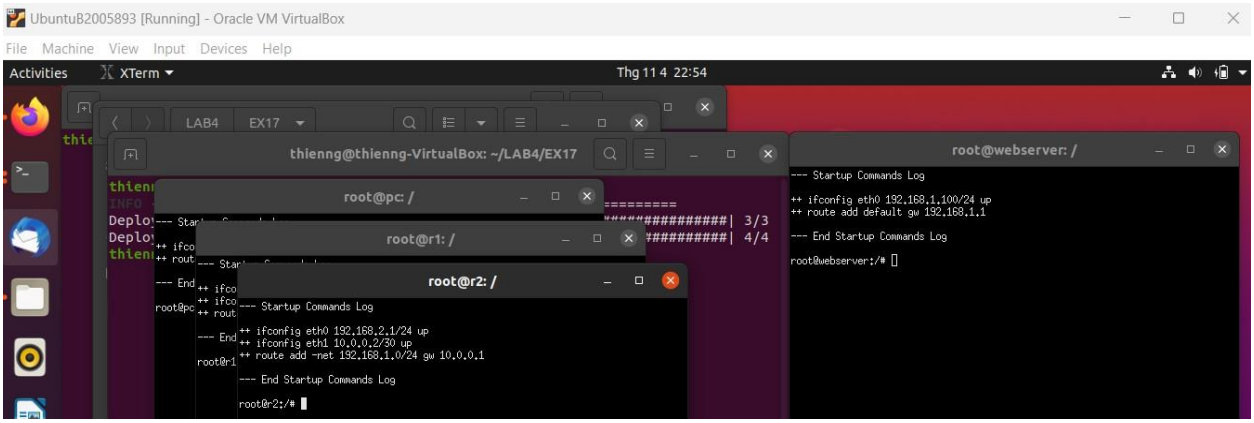


2. File configurations
   $ cat lab.conf
   $ cat pc.startup
   $ cat r1.startup
   $ cat r2.startup
   $ cat webserver.startup



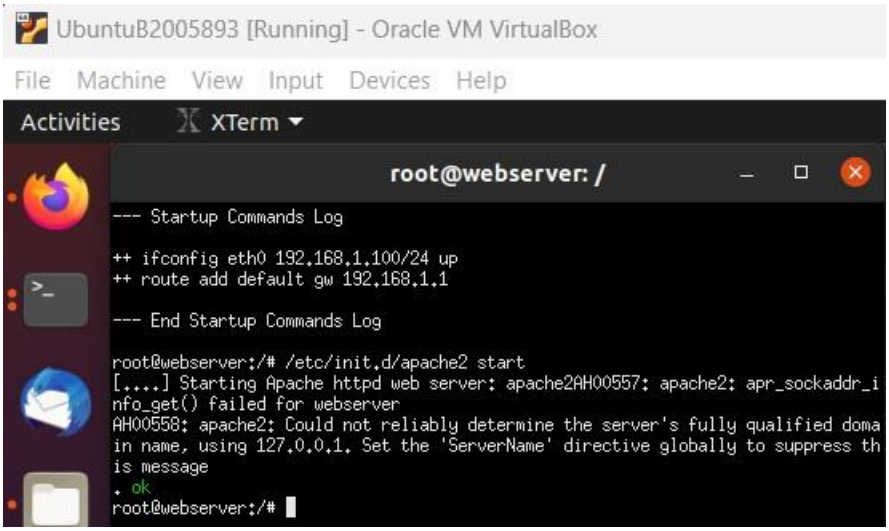


3. Start Kathara
   $ kathara lstart

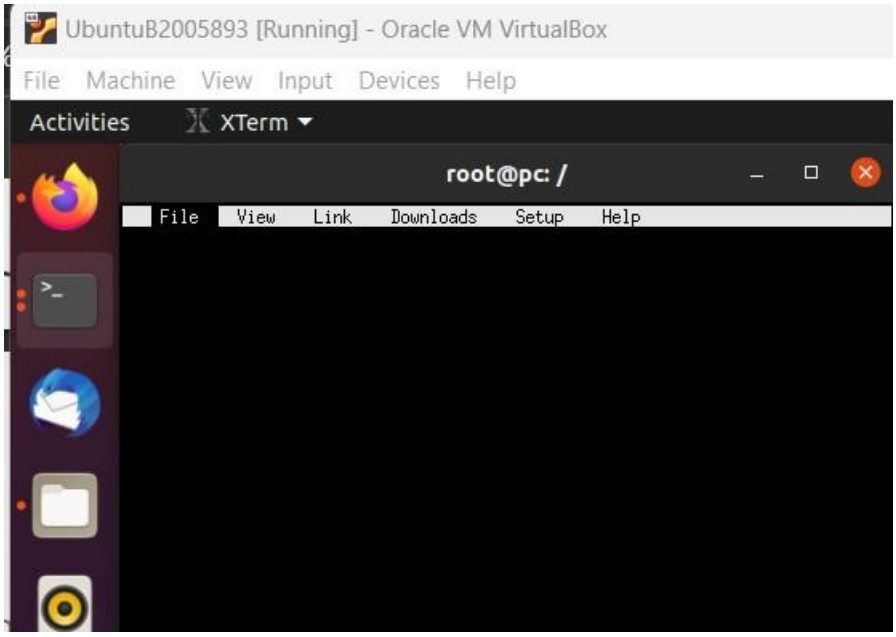


4. On the server, start *apache2* using the following command

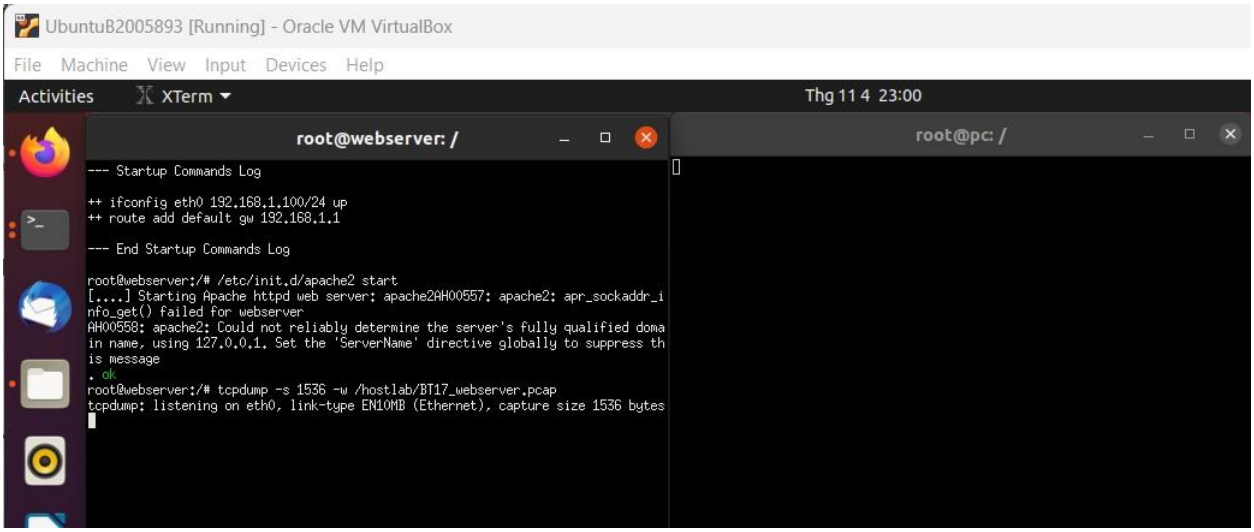
   # /etc/init.d/apache2 start



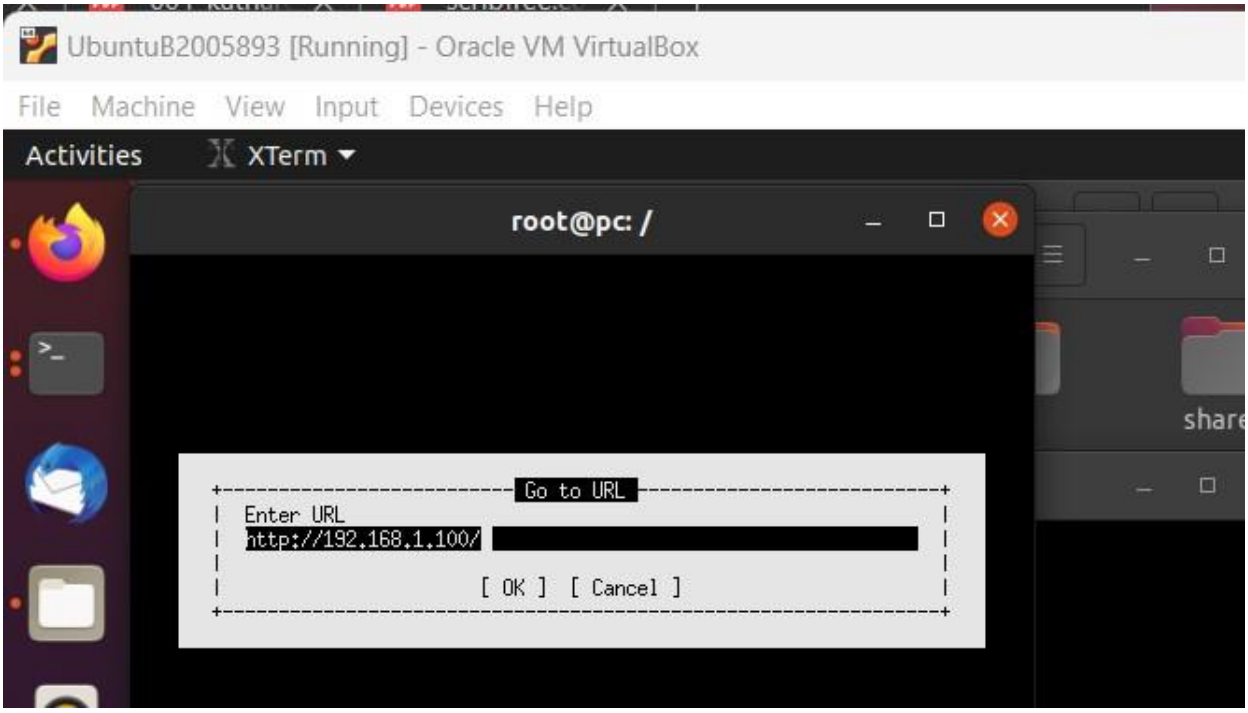
5. On the PC, open a web browser using the *links* command
   # links

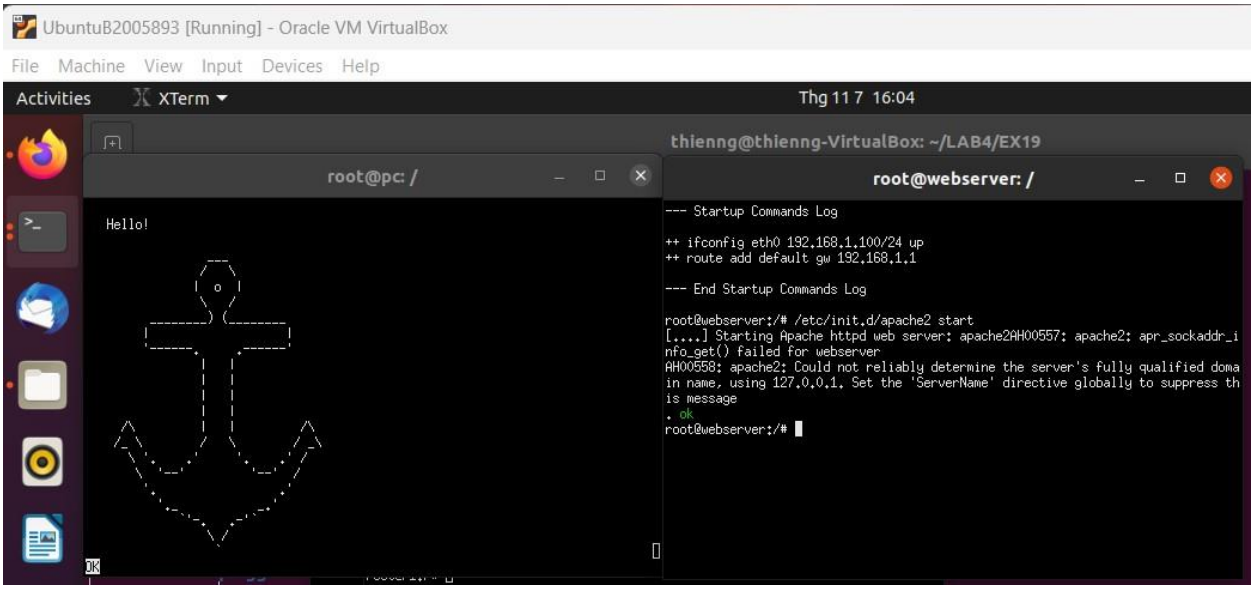


6. On the server, capture the packages sending from the PC
   # tcpdump –s 1536 –w /hostlab/BT17_webserver.pcap

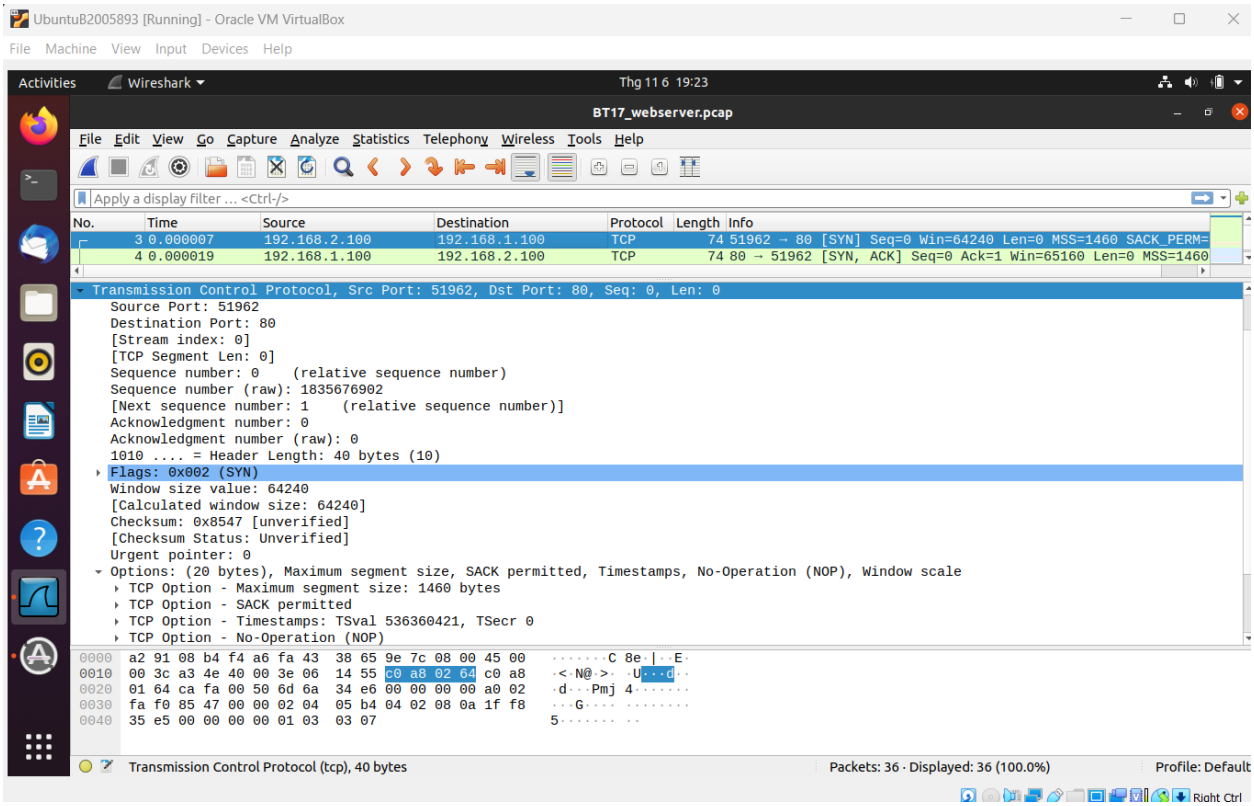


7. On the Pc, access the website provided by the server:
   Press *F10* to get into the Menu bar, then select *Go to URL* and type *http://192.168.1.100/*



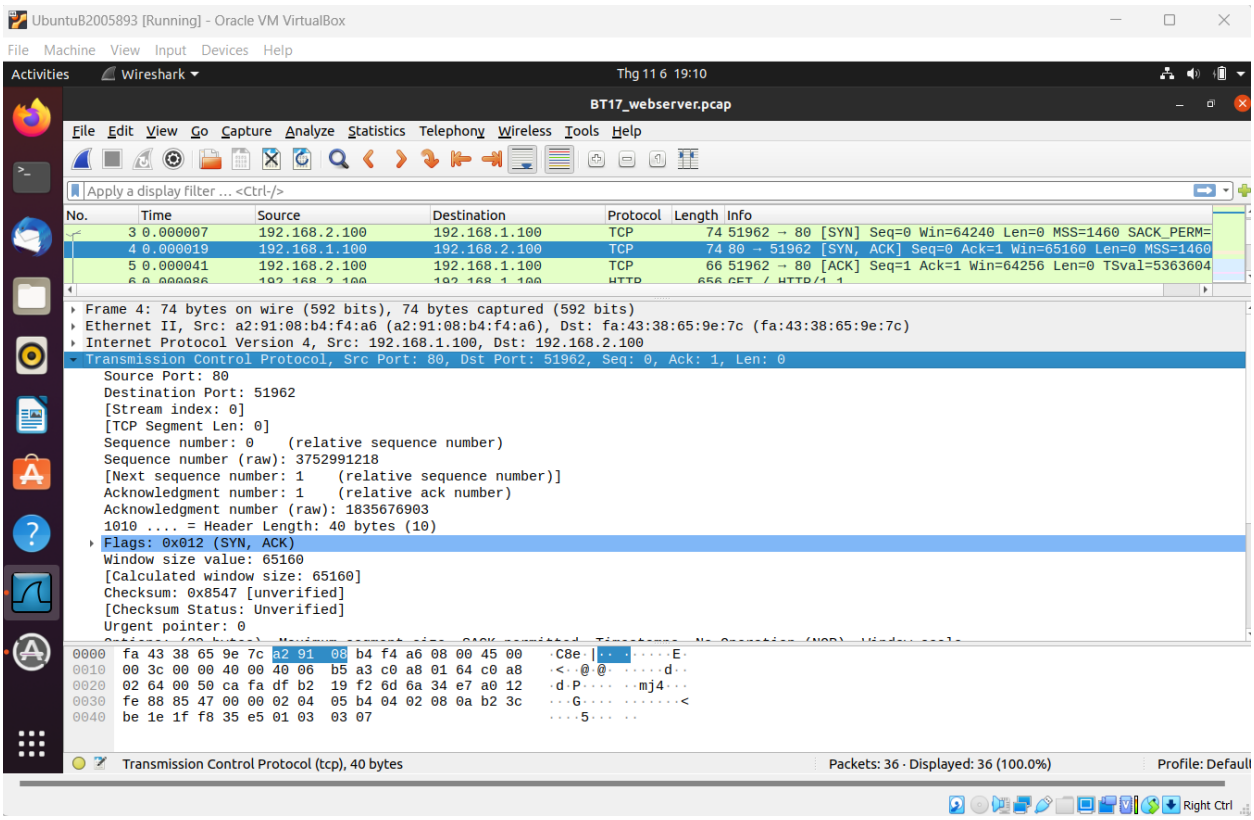


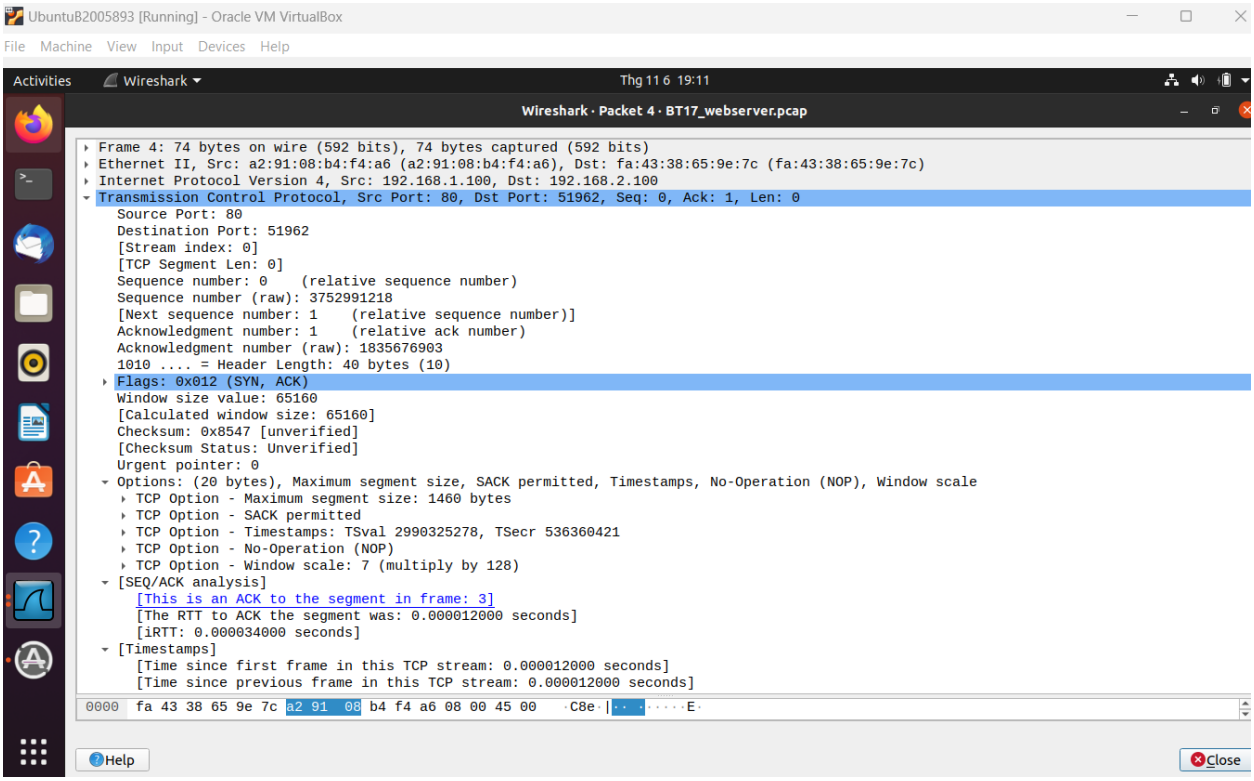
8. Open the BT17_webserver.pcap using Wireshark. Discover the Transmission Control Protocol Header



- ➔ The browser is working on port *51962*
- ➔ Apache2 of the webserver is working at port *80*
- ➔ The SYN flag is being turned on. SYN (synchronisation) - Flag used as a the first step in establishing a three-way handshake between two servers. Just the first of both the sender and the receiver is allowed to set this flag. Client request to open service gateway by sending a SYN packet (TCP packet) to the server, in this packet, the sequence number parameter is assigned as a random value X

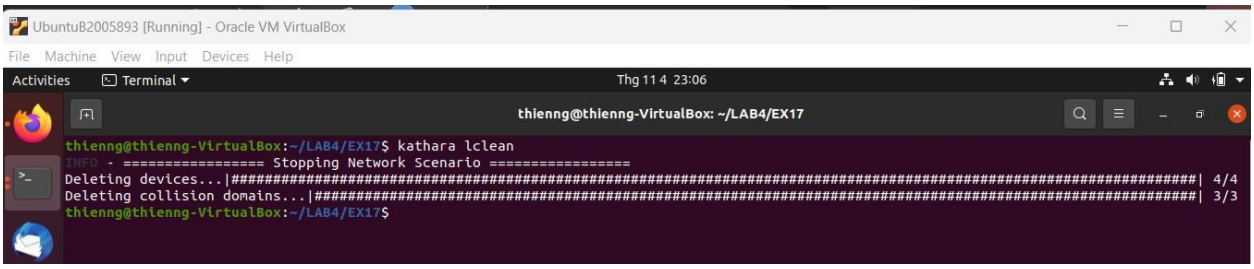
On frame 4:


UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Wireshark
Thg 11 6 19:10
BT17_webserver.pcap
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
No. Time Source Destination Protocol Length Info
3 0.000007 192.168.2.100 192.168.1.100 TCP 74 51962 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=
4 0.000019 192.168.1.100 192.168.2.100 TCP 74 80 → 51962 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460
5 0.000041 192.168.2.100 192.168.1.100 TCP 66 51962 → 80 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=5363604
Frame 4: 74 bytes on wire (592 bits), 74 bytes captured (592 bits)
Ethernet II, Src: a2:91:08:b4:f4:a6 (a2:91:08:b4:f4:a6), Dst: fa:43:38:65:9e:7c (fa:43:38:65:9e:7c)
Internet Protocol Version 4, Src: 192.168.1.100, Dst: 192.168.2.100
Transmission Control Protocol, Src Port: 80, Dst Port: 51962, Seq: 0, Ack: 1, Len: 0
Source Port: 80
Destination Port: 51962
[Stream index: 0]
[TCP Segment Len: 0]
Sequence number: 0 (relative sequence number)
Sequence number (raw): 3752991218
[Next sequence number: 1 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
Acknowledgment number (raw): 1835676903
1010 .... = Header Length: 40 bytes (10)
Flags: 0x012 (SYN, ACK)
Window size value: 65160
[Calculated window size: 65160]
Checksum: 0x8547 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
0000 fa 43 38 65 9e 7c a2 91 08 b4 f4 a6 08 00 45 00
0010 00 3c 00 00 40 00 40 06 b5 a3 c0 a8 01 64 c0 a8
0020 02 64 00 50 ca fa df b2 19 f2 6d 6a 34 e7 a0 12
0030 fe 88 85 47 00 00 02 04 05 b4 04 02 08 0a b2 3c
0040 be 1e 1f f8 35 e5 01 03 03 07
Transmission Control Protocol (tcp), 40 bytes
Packets: 36 · Displayed: 36 (100.0%)
Profile: Defaul
Right Ctrl

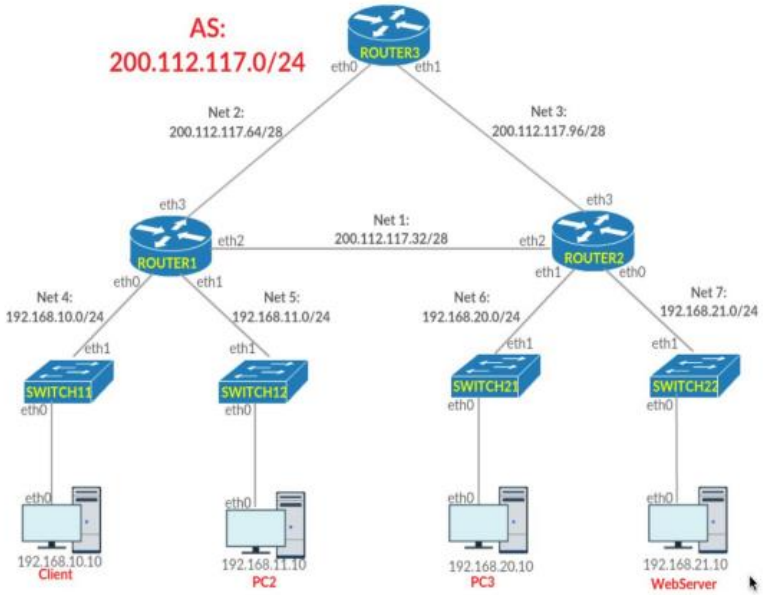

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Wireshark
Thg 11 6 19:11
Wireshark · Packet 4 · BT17_webserver.pcap
Frame 4: 74 bytes on wire (592 bits), 74 bytes captured (592 bits)
Ethernet II, Src: a2:91:08:b4:f4:a6 (a2:91:08:b4:f4:a6), Dst: fa:43:38:65:9e:7c (fa:43:38:65:9e:7c)
Internet Protocol Version 4, Src: 192.168.1.100, Dst: 192.168.2.100
Transmission Control Protocol, Src Port: 80, Dst Port: 51962, Seq: 0, Ack: 1, Len: 0
Source Port: 80
Destination Port: 51962
[Stream index: 0]
[TCP Segment Len: 0]
Sequence number: 0 (relative sequence number)
Sequence number (raw): 3752991218
[Next sequence number: 1 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
Acknowledgment number (raw): 1835676903
1010 .... = Header Length: 40 bytes (10)
Flags: 0x012 (SYN, ACK)
Window size value: 65160
[Calculated window size: 65160]
Checksum: 0x8547 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
Options: (20 bytes), Maximum segment size, SACK permitted, Timestamps, No-Operation (NOP), Window scale
TCP Option - Maximum segment size: 1460 bytes
TCP Option - SACK permitted
TCP Option - Timestamps: TSval 2990325278, TSecr 536360421
TCP Option - No-Operation (NOP)
TCP Option - Window scale: 7 (multiply by 128)
[SEQ/ACK analysis]
[This is an ACK to the segment in frame: 3]
[The RTT to ACK the segment was: 0.000012000 seconds]
[iRTT: 0.000034000 seconds]
[Timestamps]
[Time since first frame in this TCP stream: 0.000012000 seconds]
[Time since previous frame in this TCP stream: 0.000012000 seconds]
0000 fa 43 38 65 9e 7c a2 91 08 b4 f4 a6 08 00 45 00
Help
Close

➔ Flag SYN and Flag ACK are both being turned on to notice this is the second send. A segment that has both SYN and ACK will be the second segement on the same connection. The server will respond by sending back to the client with SYN-ACK message. In this packet, the parameter acknowledgement number is assaigned the value of x + 1, the parameter sequence number randomly assigned a value Y

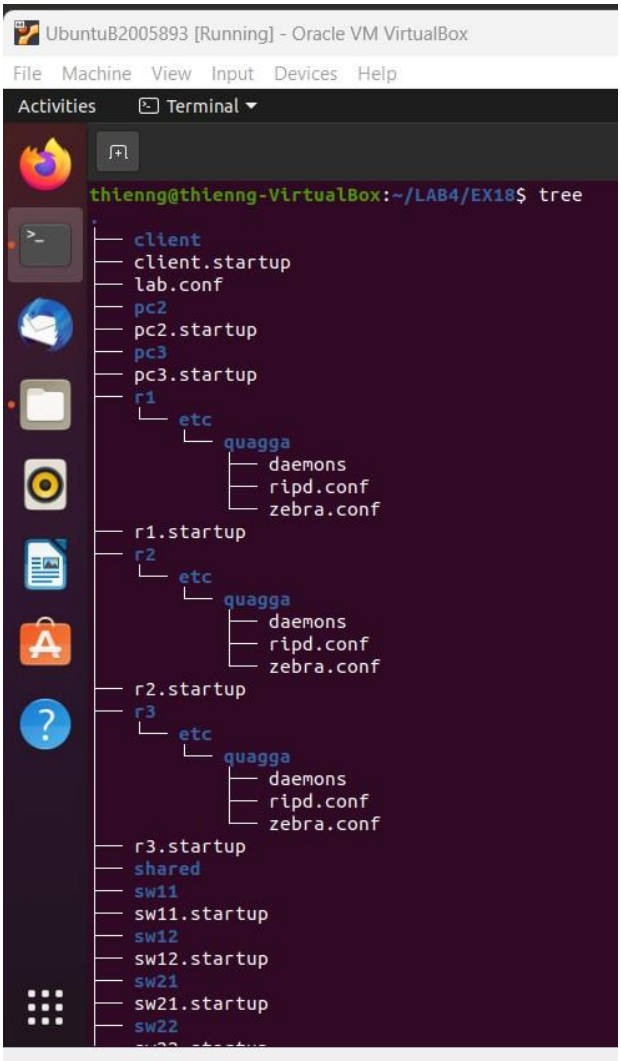
9. Delete VMs
   $ kathara lclean

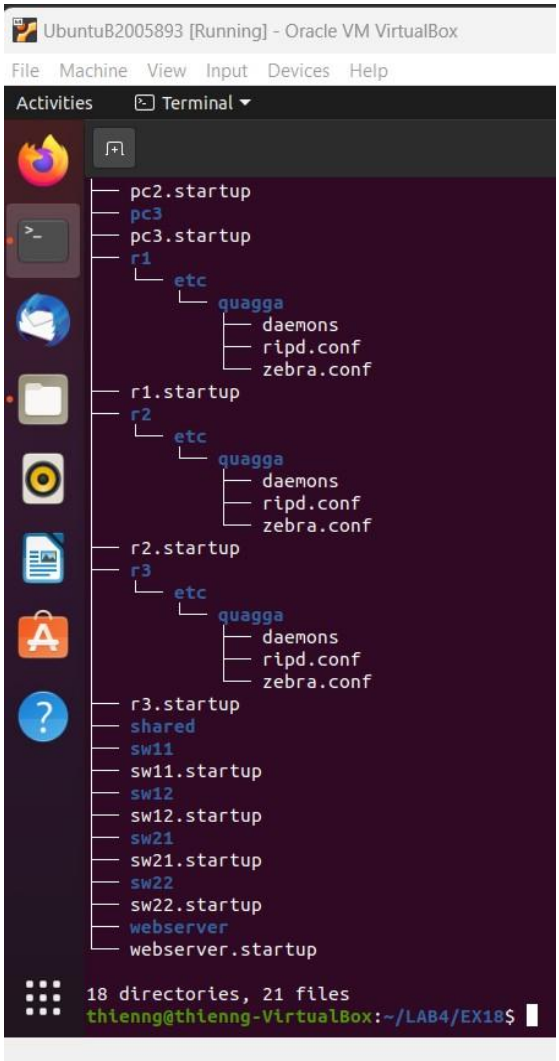


Exercise 18: Construct the following network. All router use the RIPv2 protocol



1. Files and Folders
   $ tree



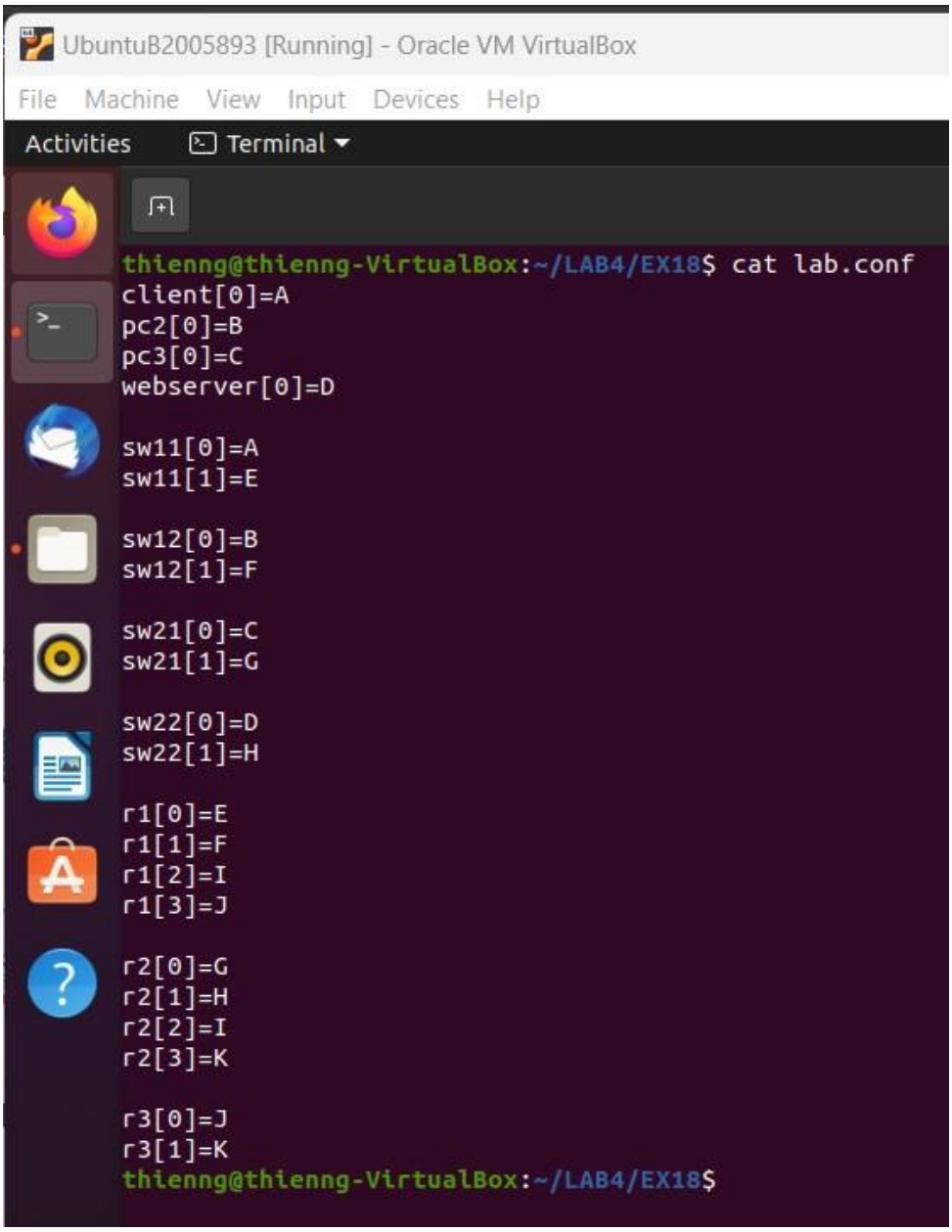


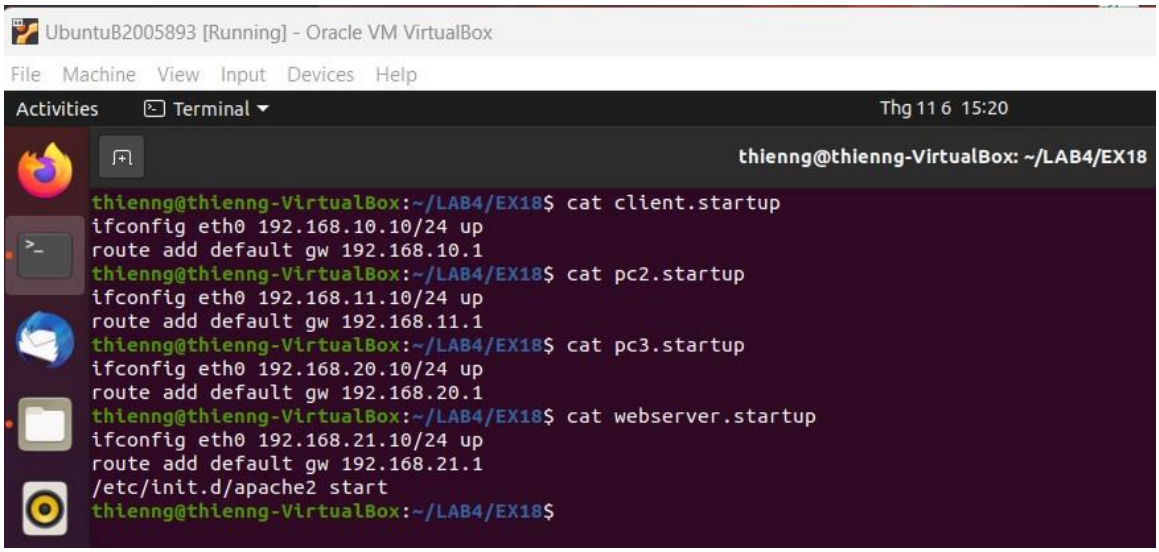
2. File configurations

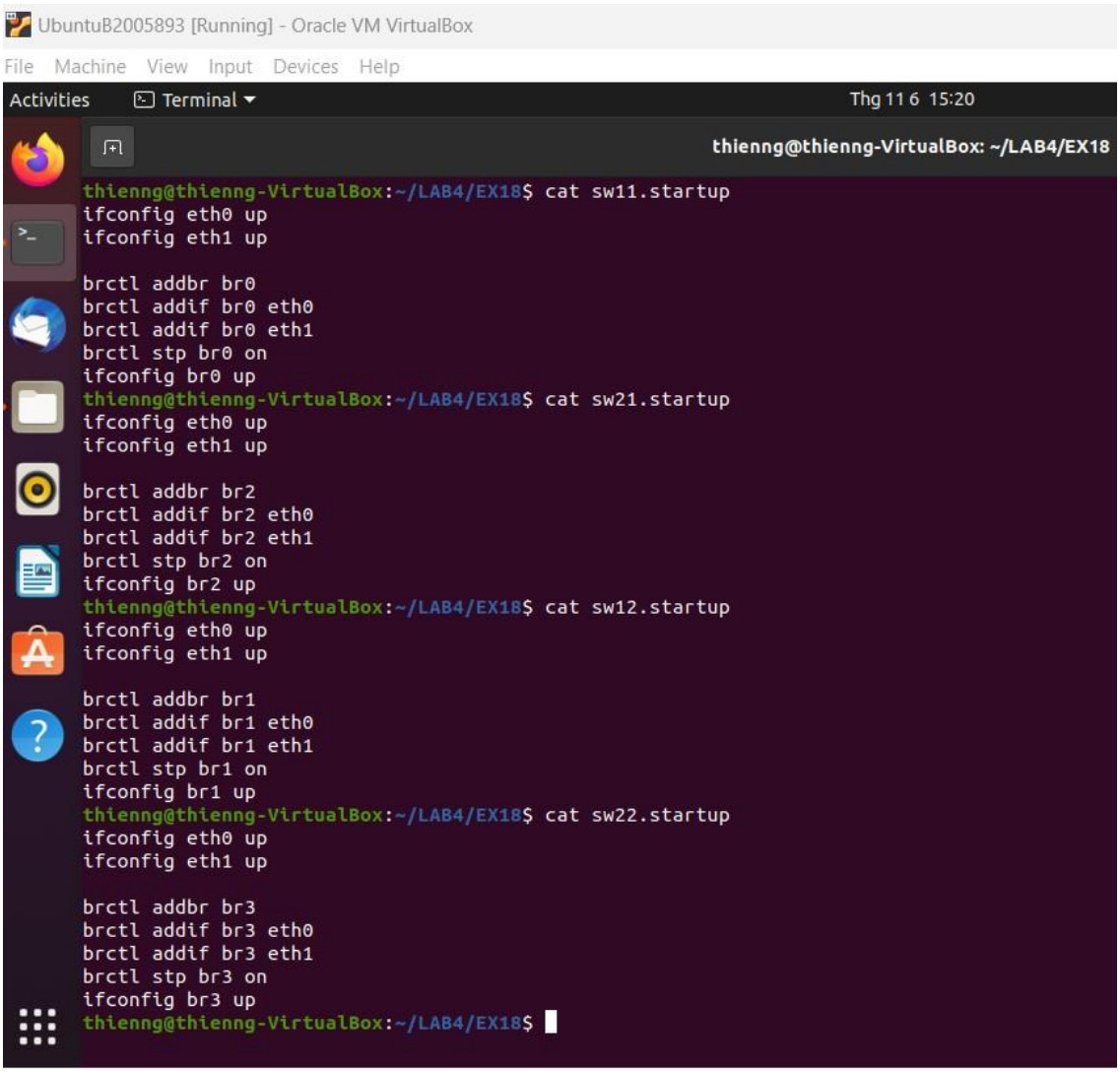
$ cat client.startup
$ cat pc2.startup
$ cat pc3.startup
$ cat webserver.startup
$ cat sw11.startup
$ cat sw12.startup
$ cat sw21.startup
$ cat sw22.startup

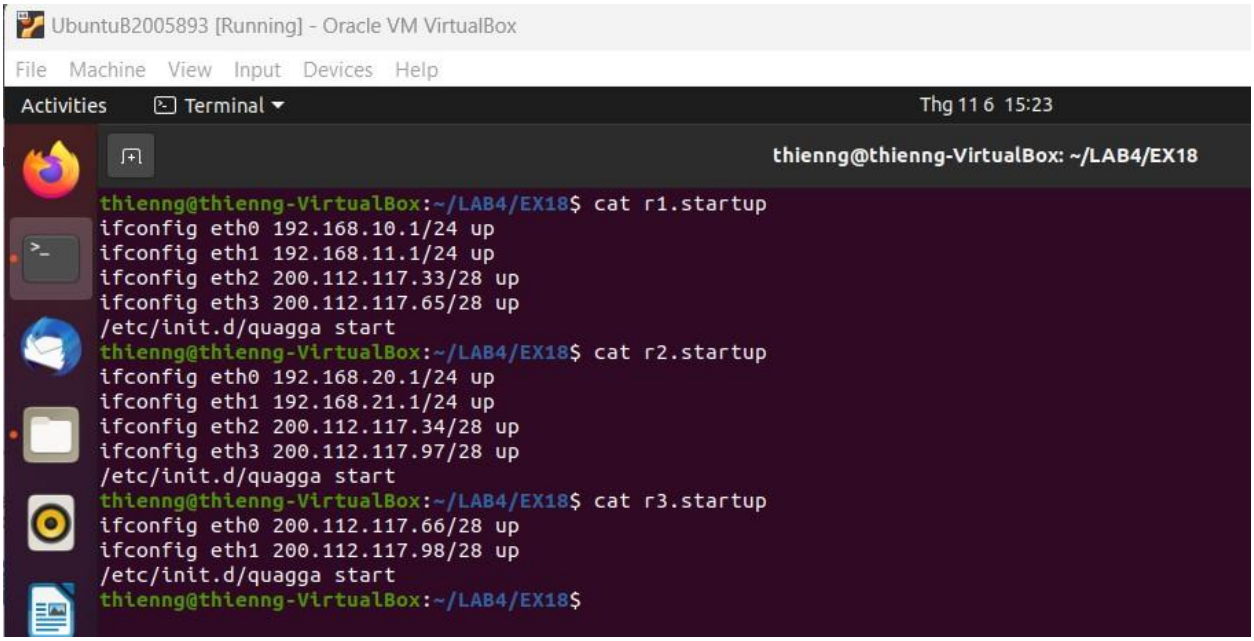
$ cat r1.startup
$ cat r2.startup
$ cat r3.startup

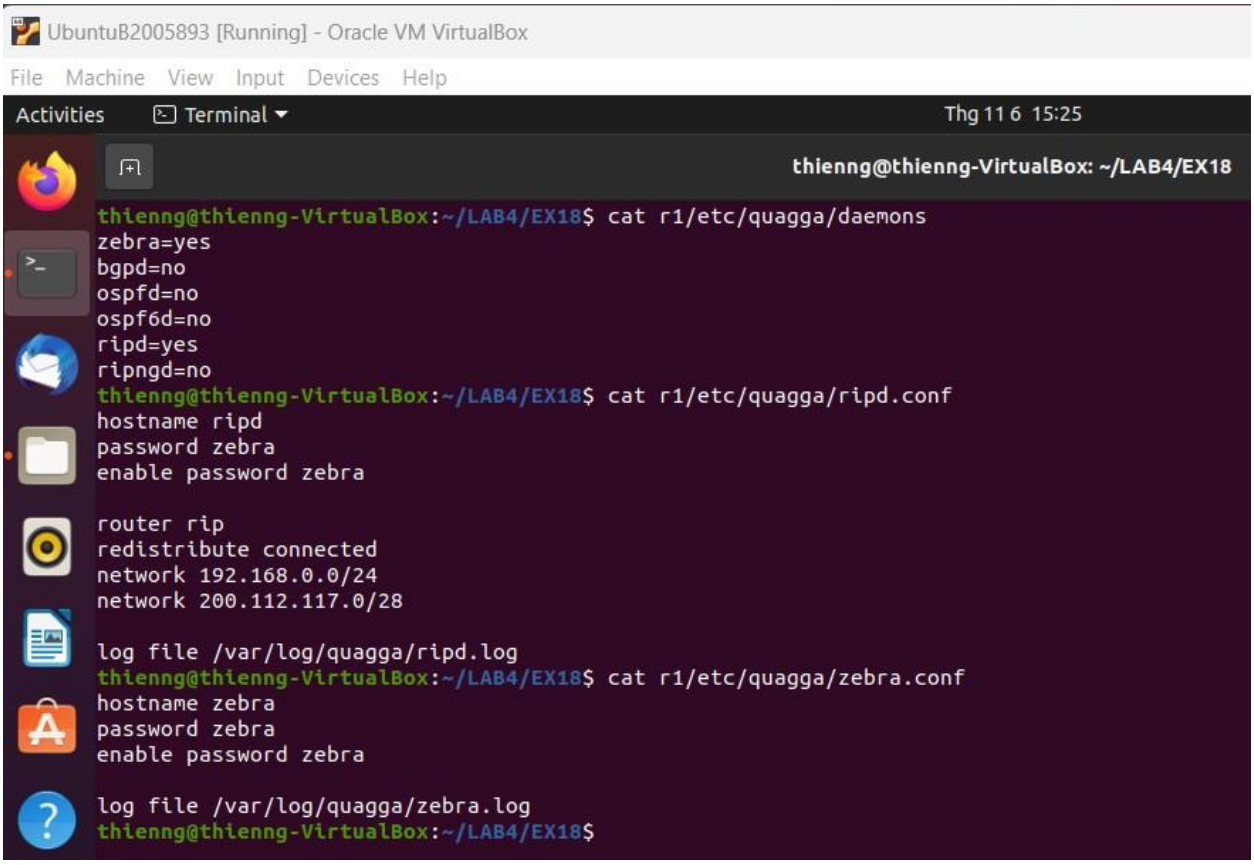
$ cat r1/etc/quagga/daemons
$ cat r1/etc/quagga/ripd.conf
$ cat r1/etc/quagga/zebra.conf

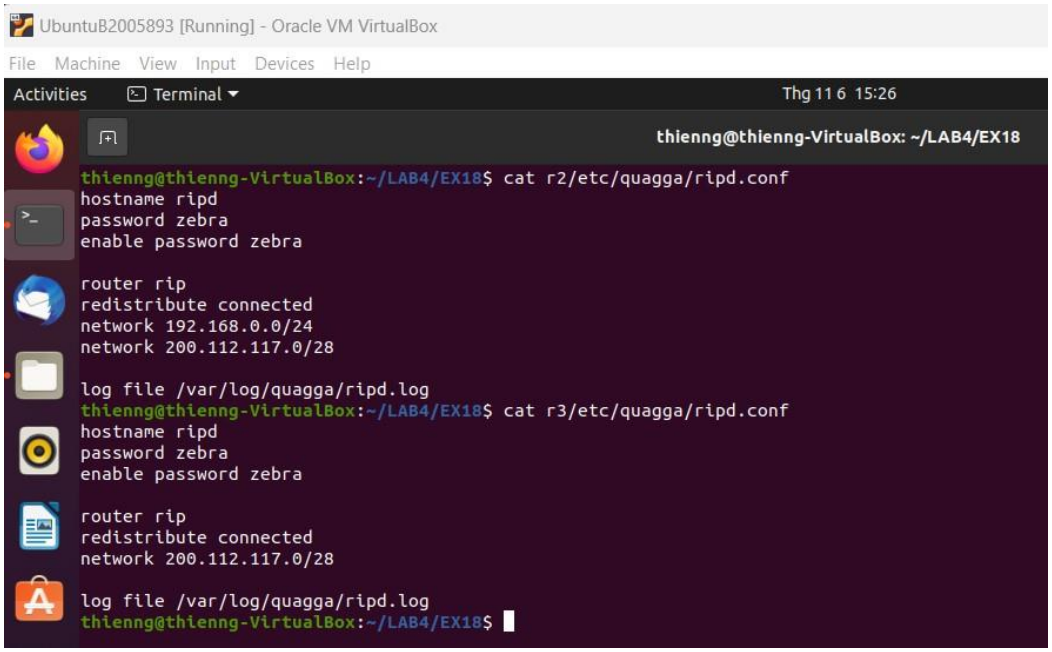



UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 6 15:20
thienng@thienng-VirtualBox: ~/LAB4/EX18
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat client.startup
ifconfig eth0 192.168.10.10/24 up
route add default gw 192.168.10.1
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat pc2.startup
ifconfig eth0 192.168.11.10/24 up
route add default gw 192.168.11.1
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat pc3.startup
ifconfig eth0 192.168.20.10/24 up
route add default gw 192.168.20.1
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat webserver.startup
ifconfig eth0 192.168.21.10/24 up
route add default gw 192.168.21.1
/etc/init.d/apache2 start
thienng@thienng-VirtualBox:~/LAB4/EX18$

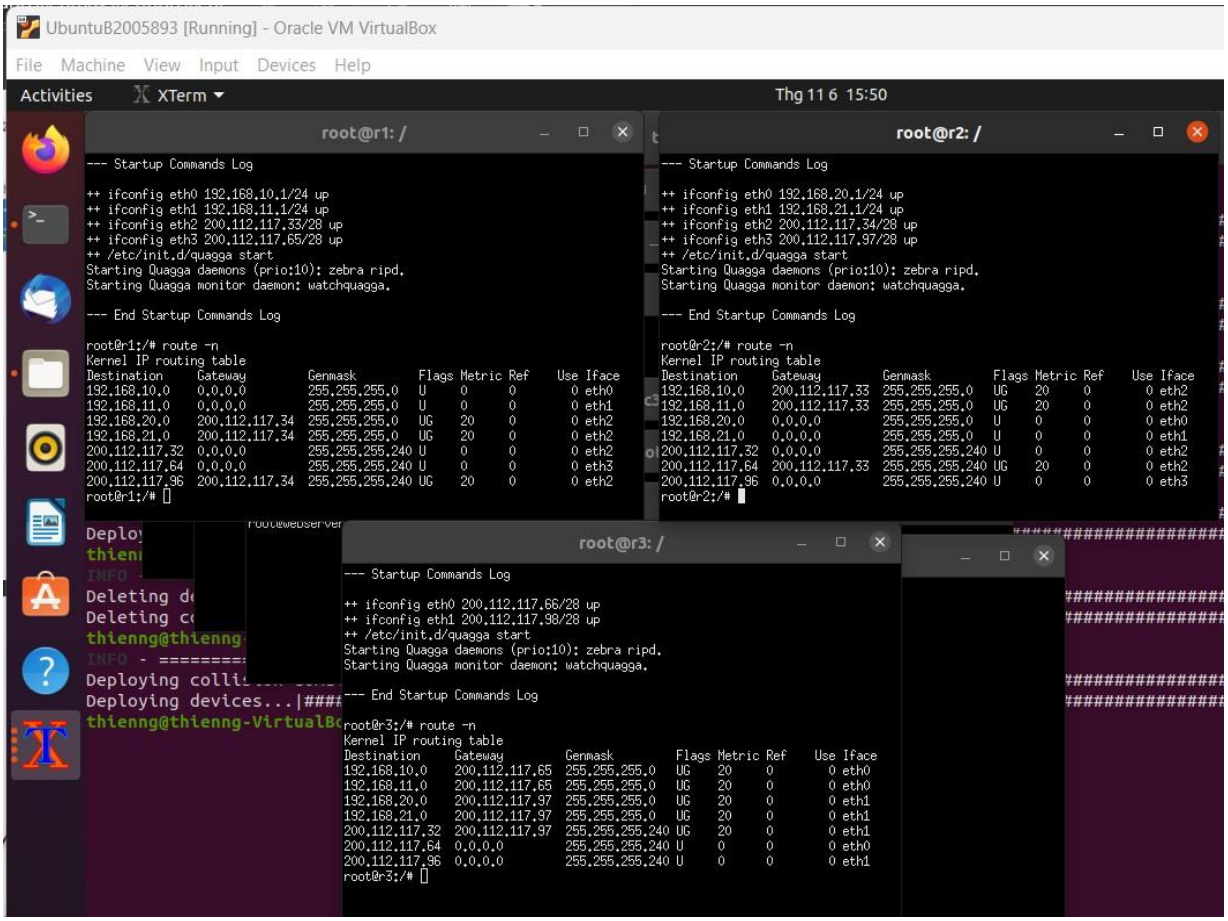

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 6 15:20
thienng@thienng-VirtualBox: ~/LAB4/EX18
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat sw11.startup
ifconfig eth0 up
ifconfig eth1 up
brctl addbr br0
brctl addif br0 eth0
brctl addif br0 eth1
brctl stp br0 on
ifconfig br0 up
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat sw21.startup
ifconfig eth0 up
ifconfig eth1 up
brctl addbr br2
brctl addif br2 eth0
brctl addif br2 eth1
brctl stp br2 on
ifconfig br2 up
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat sw12.startup
ifconfig eth0 up
ifconfig eth1 up
brctl addbr br1
brctl addif br1 eth0
brctl addif br1 eth1
brctl stp br1 on
ifconfig br1 up
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat sw22.startup
ifconfig eth0 up
ifconfig eth1 up
brctl addbr br3
brctl addif br3 eth0
brctl addif br3 eth1
brctl stp br3 on
ifconfig br3 up
thienng@thienng-VirtualBox:~/LAB4/EX18$


UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 6 15:23
thienng@thienng-VirtualBox: ~/LAB4/EX18
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat r1.startup
ifconfig eth0 192.168.10.1/24 up
ifconfig eth1 192.168.11.1/24 up
ifconfig eth2 200.112.117.33/28 up
ifconfig eth3 200.112.117.65/28 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat r2.startup
ifconfig eth0 192.168.20.1/24 up
ifconfig eth1 192.168.21.1/24 up
ifconfig eth2 200.112.117.34/28 up
ifconfig eth3 200.112.117.97/28 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat r3.startup
ifconfig eth0 200.112.117.66/28 up
ifconfig eth1 200.112.117.98/28 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX18$

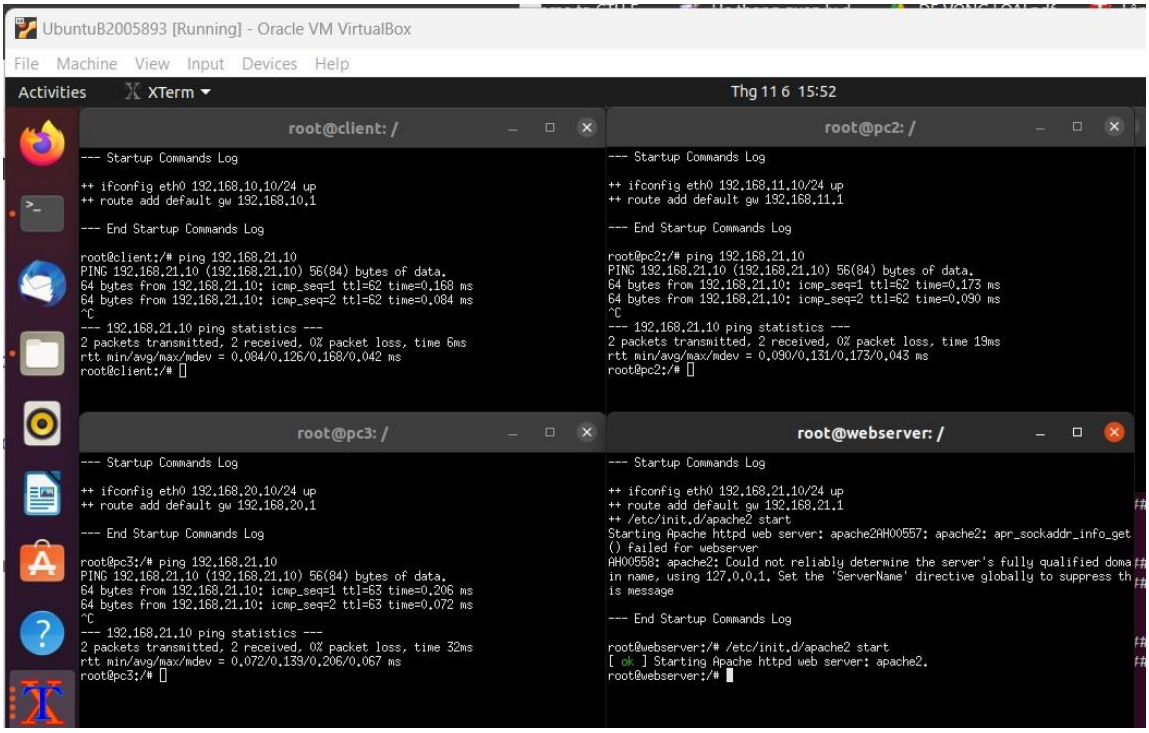

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 6 15:25
thienng@thienng-VirtualBox: ~/LAB4/EX18
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat r1/etc/quagga/daemons
zebra=yes
bgpd=no
ospfd=no
ospf6d=no
ripd=yes
ripngd=no
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat r1/etc/quagga/ripd.conf
hostname ripd
password zebra
enable password zebra
router rip
redistribute connected
network 192.168.0.0/24
network 200.112.117.0/28
log file /var/log/quagga/ripd.log
thienng@thienng-VirtualBox:~/LAB4/EX18$ cat r1/etc/quagga/zebra.conf
hostname zebra
password zebra
enable password zebra
log file /var/log/quagga/zebra.log
thienng@thienng-VirtualBox:~/LAB4/EX18$



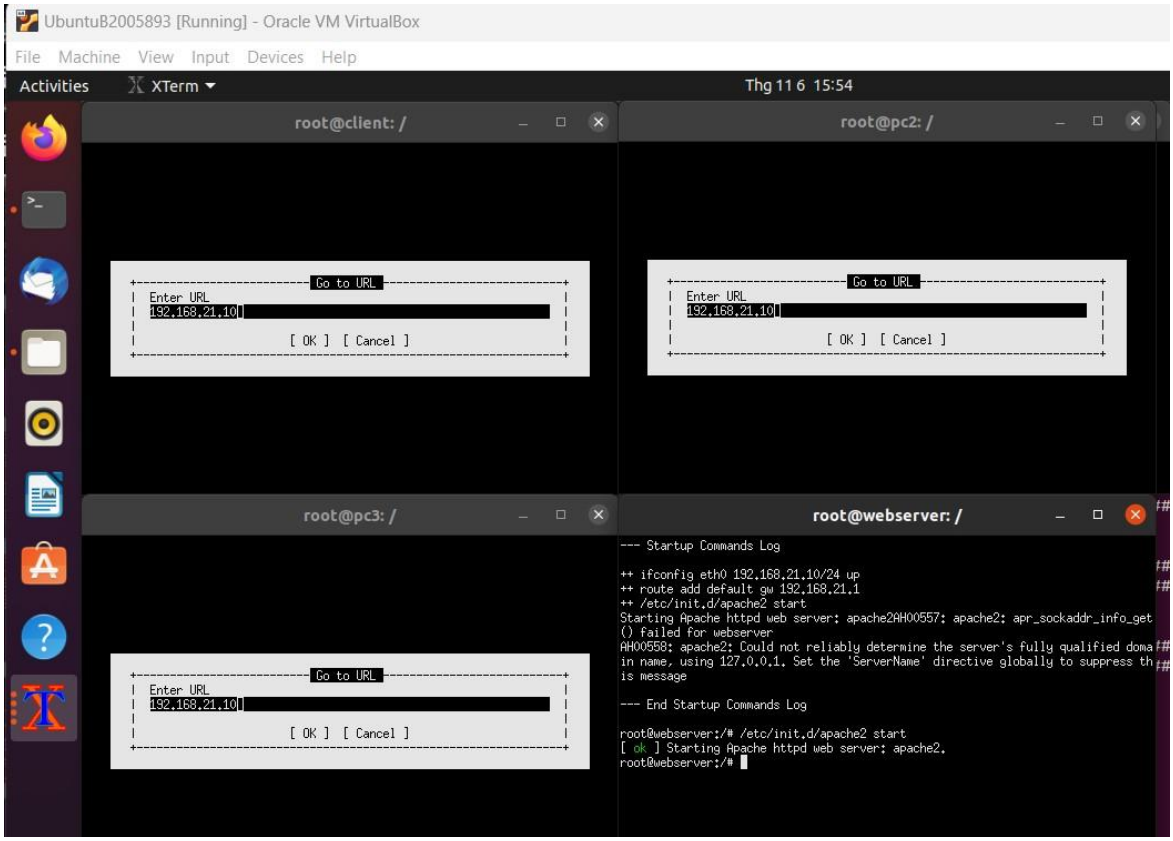
3. After building up the network, start kathara and open routing table on the routers
   # route -n

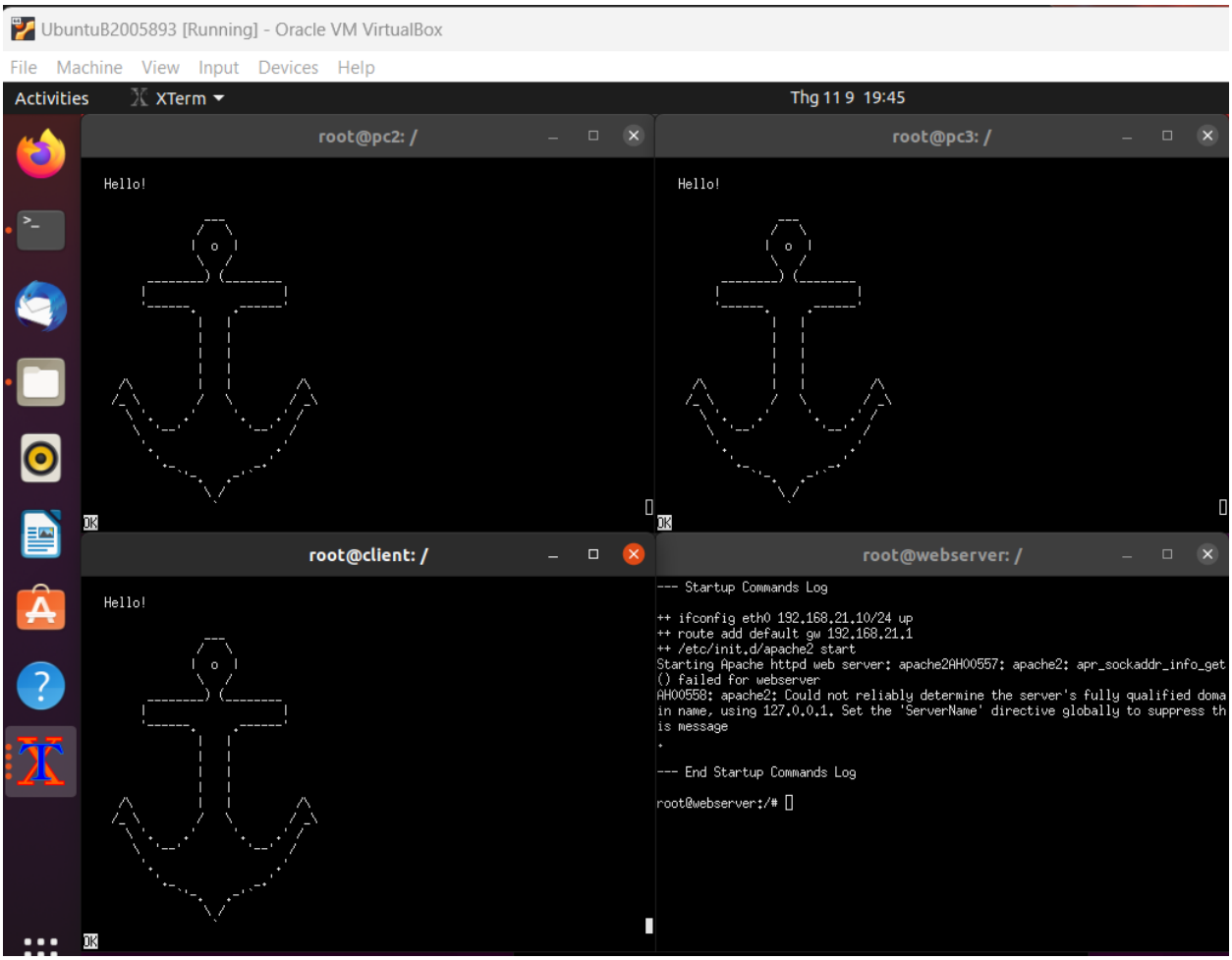


4. Test connectivity, ping all the pc and client to the webserver and start apache2 on the webserver
   # ping 192.168.21.10
   # /etc/init.d/apache2 start

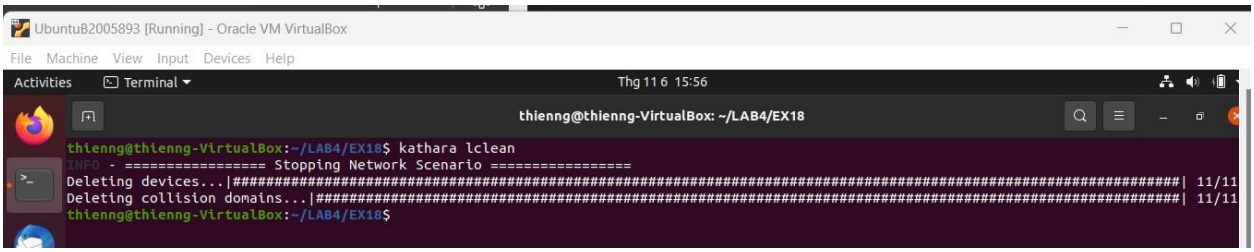


5. On the PC and the Client, open a web browser using the *links* command
   # links

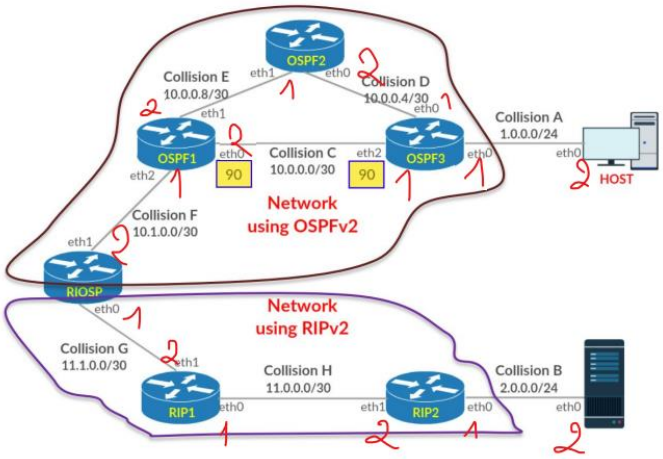




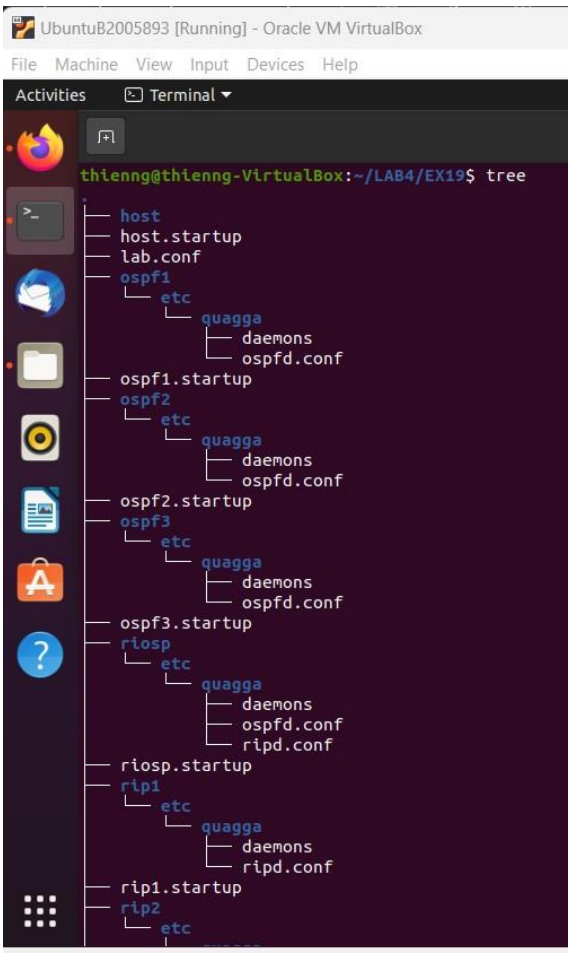
7. Delete VMs
   $ kathara lclean

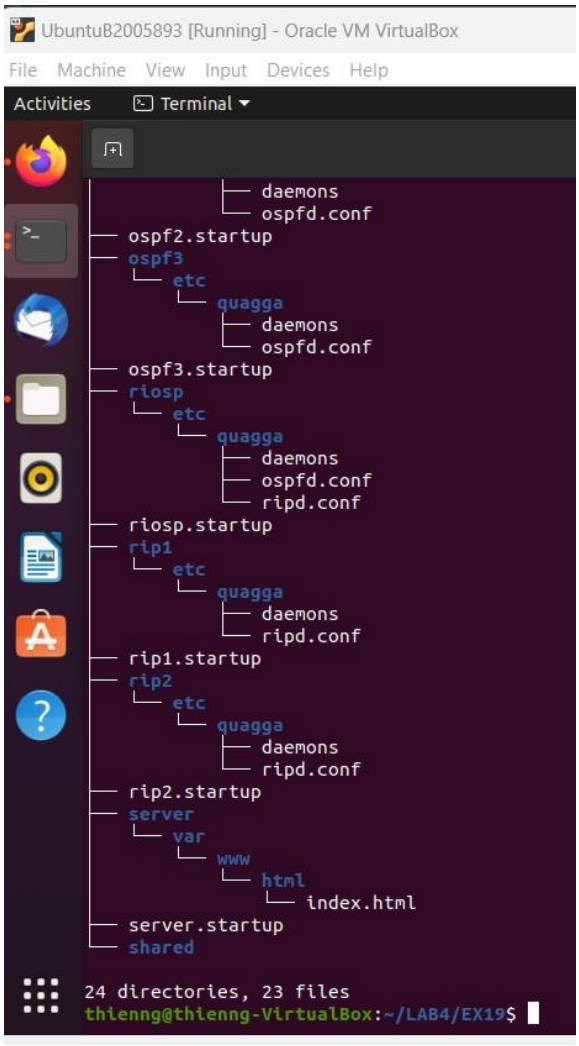


Exercise 19: Construct the following network.

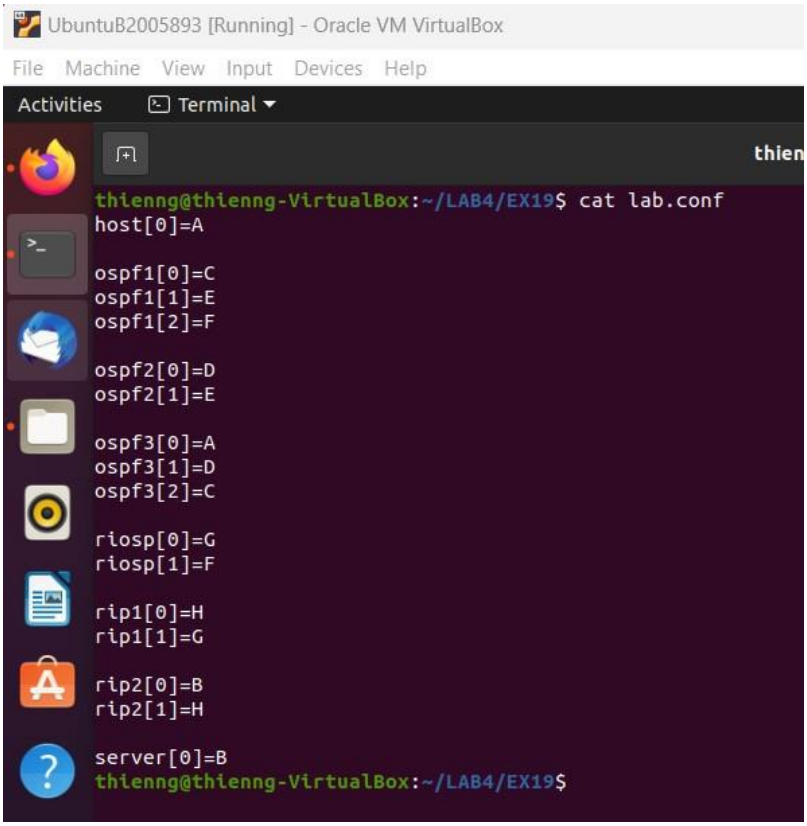


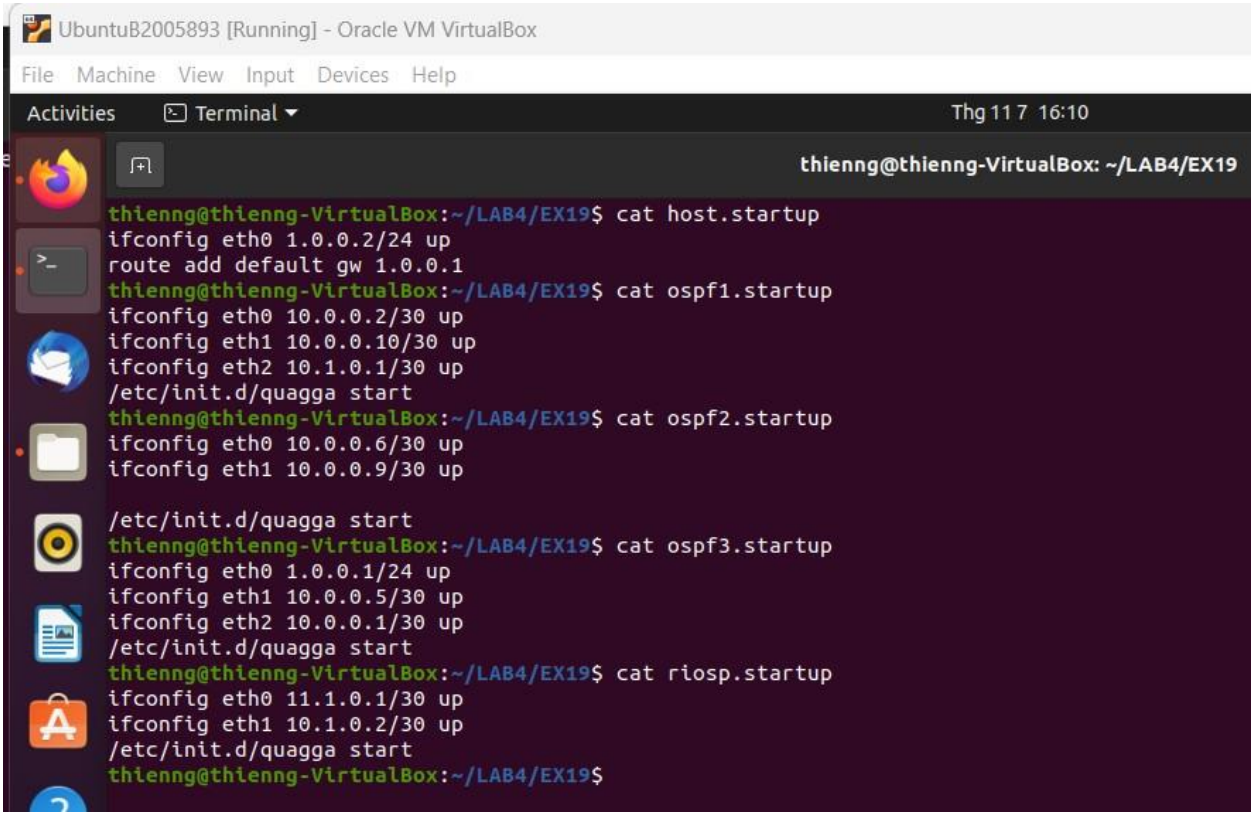
1. Files and Folders
   $ tree

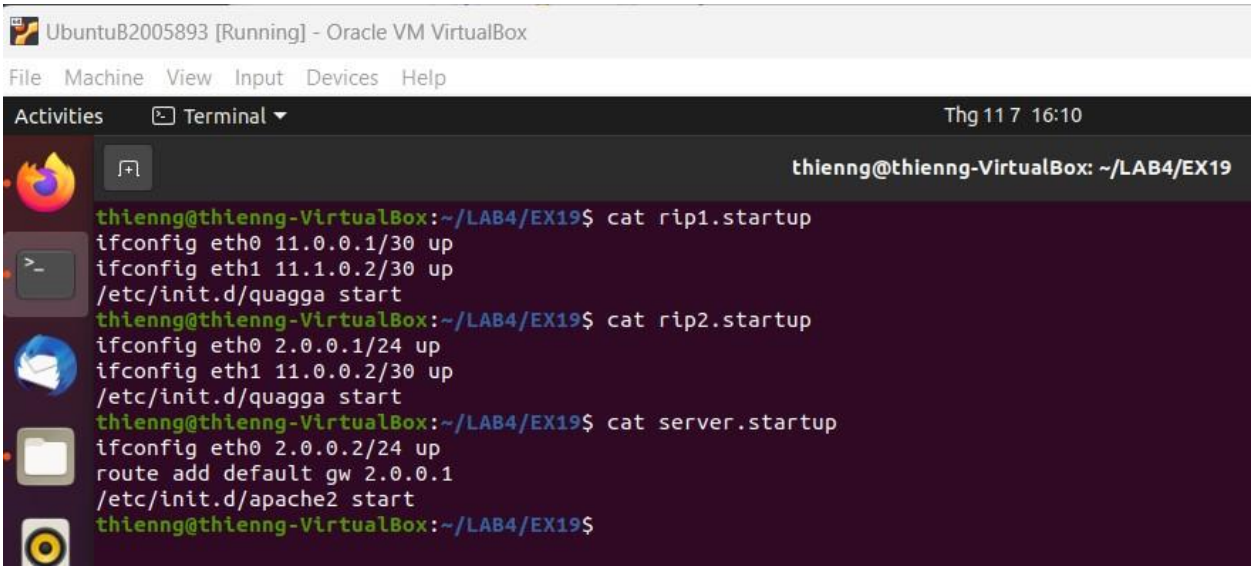


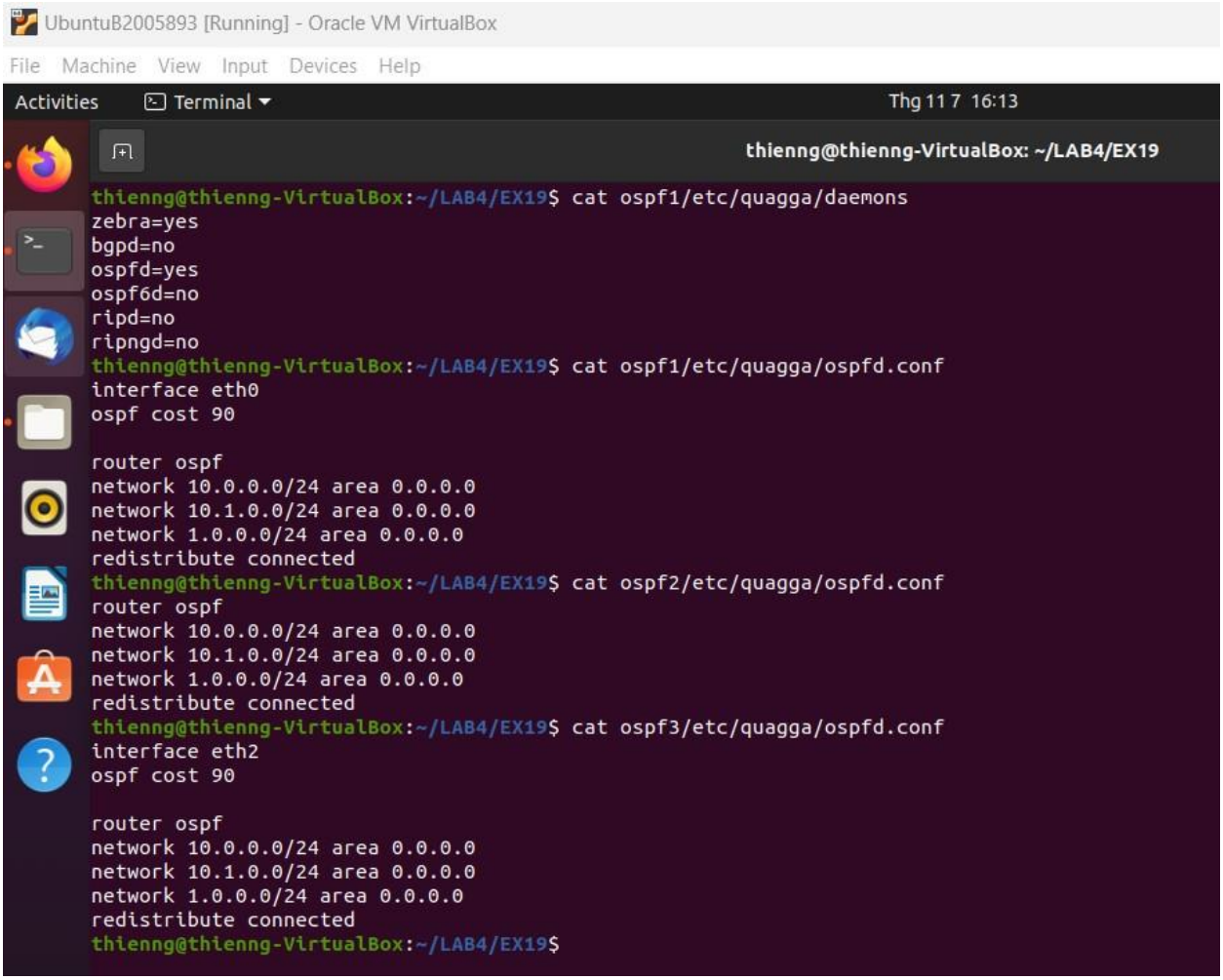


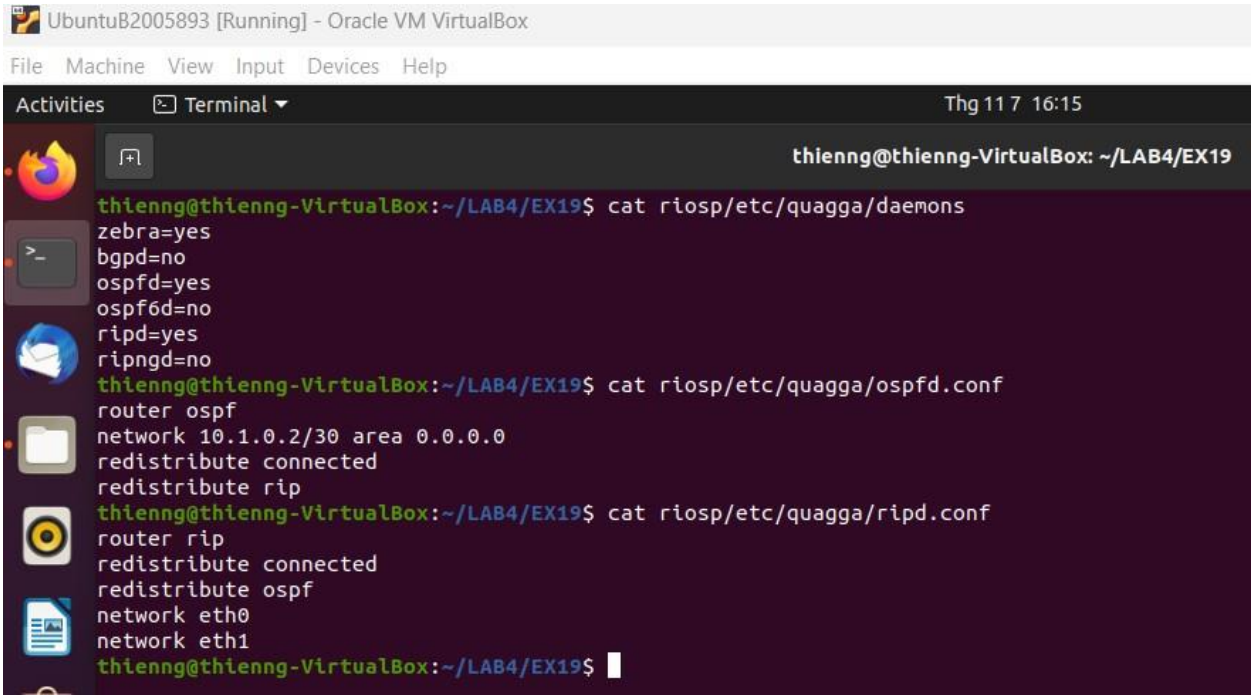
2. Files configurations

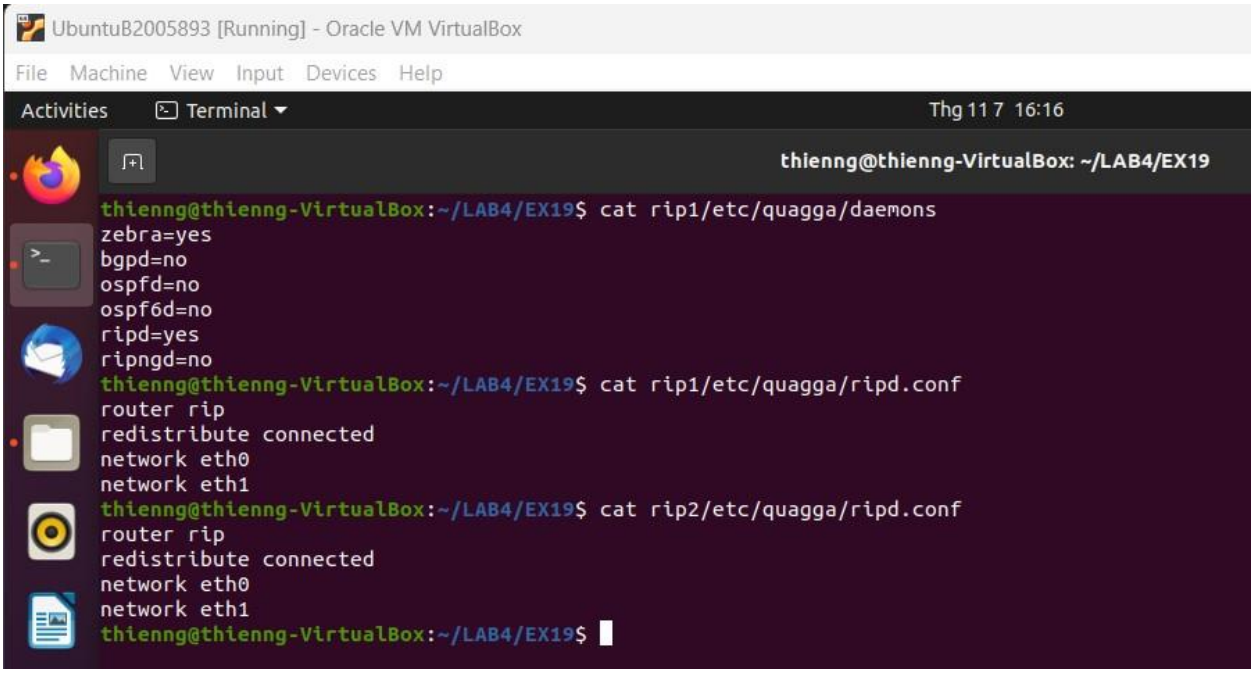


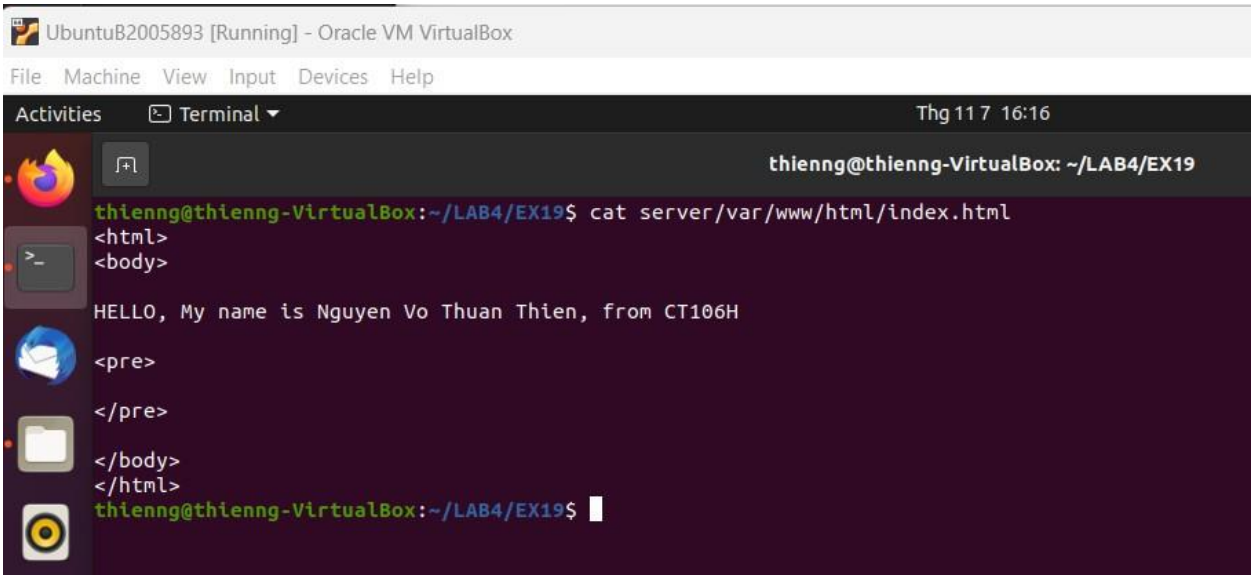



UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 7 16:10
thienng@thienng-VirtualBox: ~/LAB4/EX19
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat rip1.startup
ifconfig eth0 11.0.0.1/30 up
ifconfig eth1 11.1.0.2/30 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat rip2.startup
ifconfig eth0 2.0.0.1/24 up
ifconfig eth1 11.0.0.2/30 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat server.startup
ifconfig eth0 2.0.0.2/24 up
route add default gw 2.0.0.1
/etc/init.d/apache2 start
thienng@thienng-VirtualBox:~/LAB4/EX19$

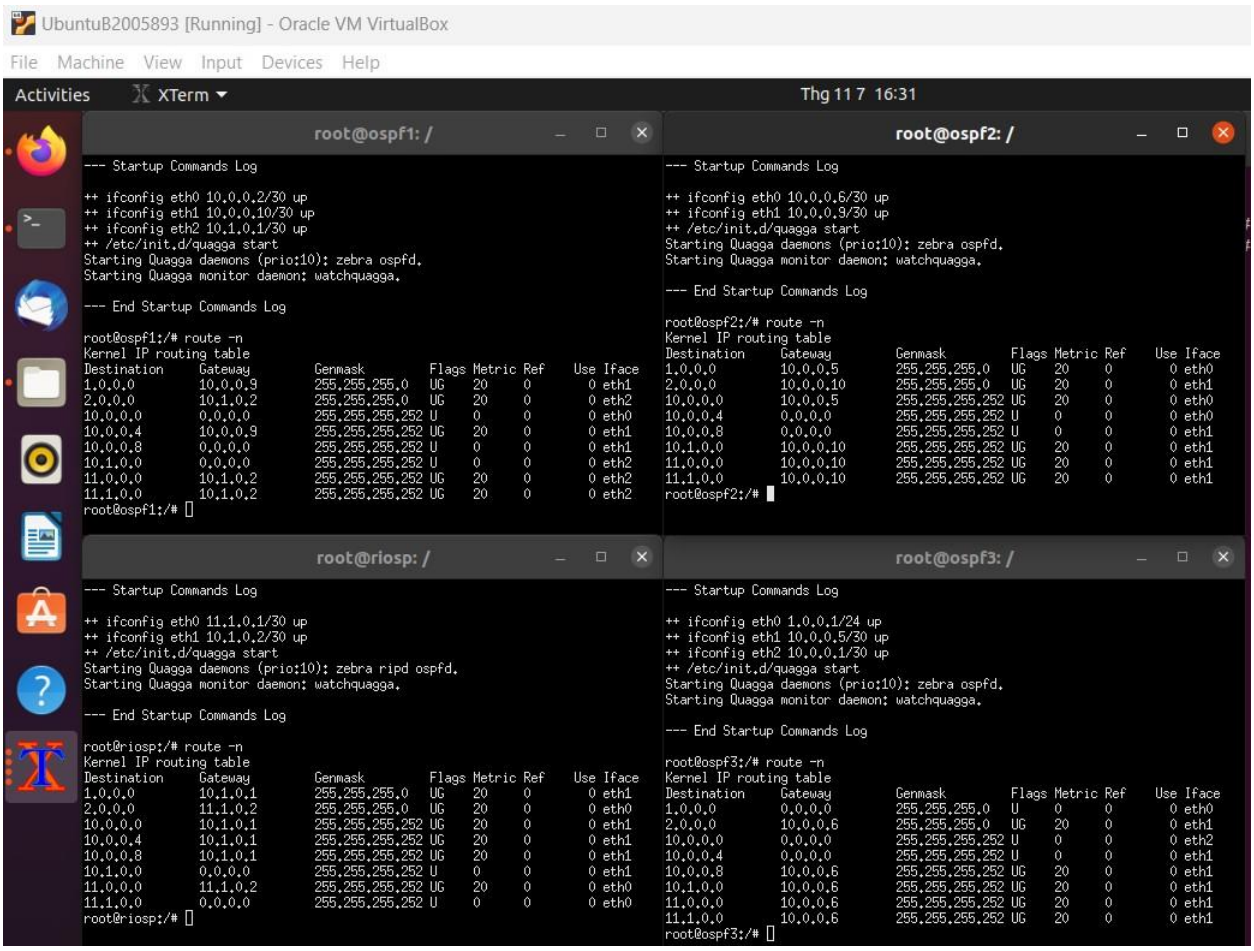

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 7 16:13
thienng@thienng-VirtualBox: ~/LAB4/EX19
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat ospf1/etc/quagga/daemons
zebra=yes
bgpd=no
ospfd=yes
ospf6d=no
ripd=no
ripngd=no
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat ospf1/etc/quagga/ospfd.conf
interface eth0
ospf cost 90
router ospf
network 10.0.0.0/24 area 0.0.0.0
network 10.1.0.0/24 area 0.0.0.0
network 1.0.0.0/24 area 0.0.0.0
redistribute connected
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat ospf2/etc/quagga/ospfd.conf
router ospf
network 10.0.0.0/24 area 0.0.0.0
network 10.1.0.0/24 area 0.0.0.0
network 1.0.0.0/24 area 0.0.0.0
redistribute connected
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat ospf3/etc/quagga/ospfd.conf
interface eth2
ospf cost 90
router ospf
network 10.0.0.0/24 area 0.0.0.0
network 10.1.0.0/24 area 0.0.0.0
network 1.0.0.0/24 area 0.0.0.0
redistribute connected
thienng@thienng-VirtualBox:~/LAB4/EX19$


UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 7 16:15
thienng@thienng-VirtualBox: ~/LAB4/EX19
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat riosp/etc/quagga/daemons
zebra=yes
bgpd=no
ospfd=yes
ospf6d=no
ripd=yes
ripngd=no
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat riosp/etc/quagga/ospfd.conf
router ospf
network 10.1.0.2/30 area 0.0.0.0
redistribute connected
redistribute rip
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat riosp/etc/quagga/ripd.conf
router rip
redistribute connected
redistribute ospf
network eth0
network eth1
thienng@thienng-VirtualBox:~/LAB4/EX19$

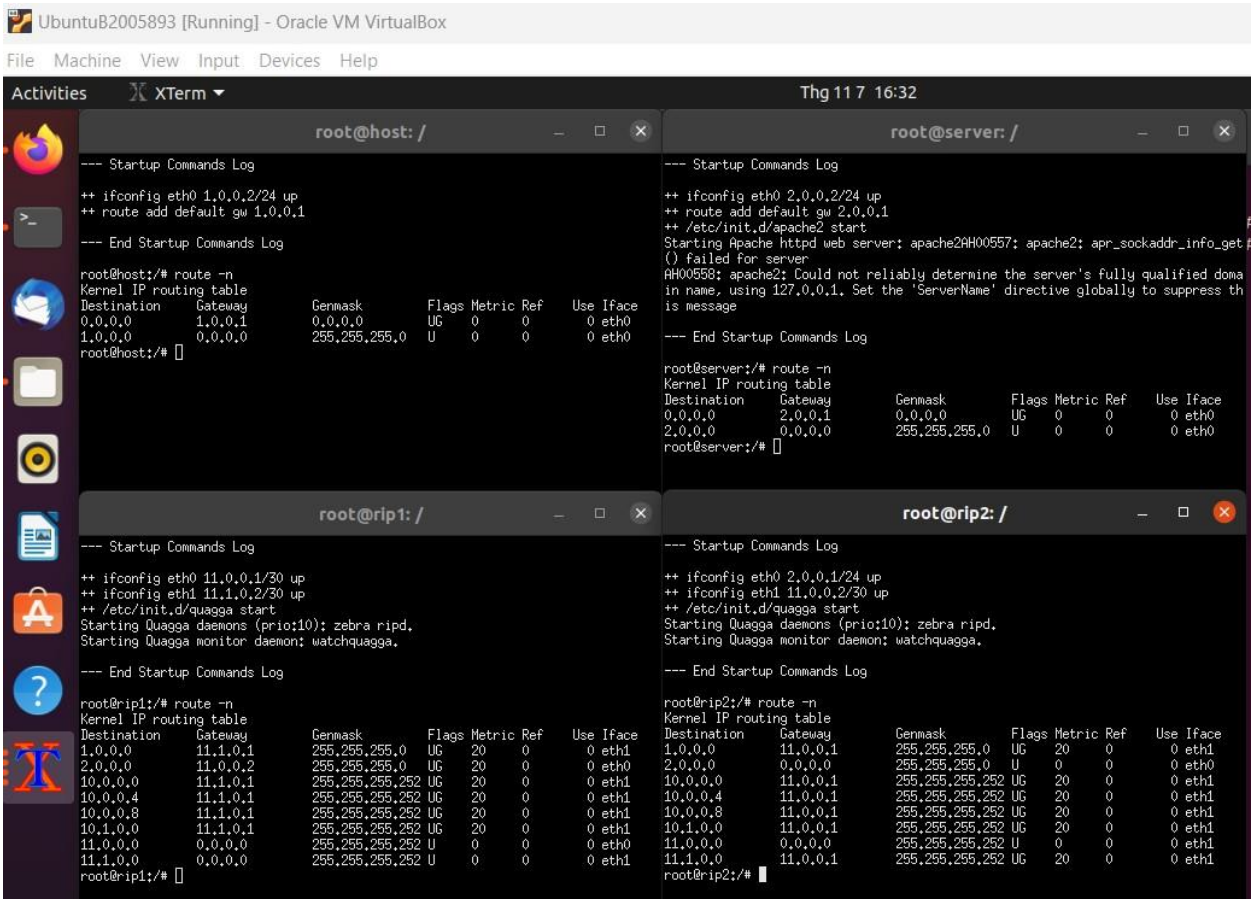

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 7 16:16
thienng@thienng-VirtualBox: ~/LAB4/EX19
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat rip1/etc/quagga/daemons
zebra=yes
bgpd=no
ospfd=no
ospf6d=no
ripd=yes
ripngd=no
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat rip1/etc/quagga/ripd.conf
router rip
redistribute connected
network eth0
network eth1
thienng@thienng-VirtualBox:~/LAB4/EX19$ cat rip2/etc/quagga/ripd.conf
router rip
redistribute connected
network eth0
network eth1
thienng@thienng-VirtualBox:~/LAB4/EX19$



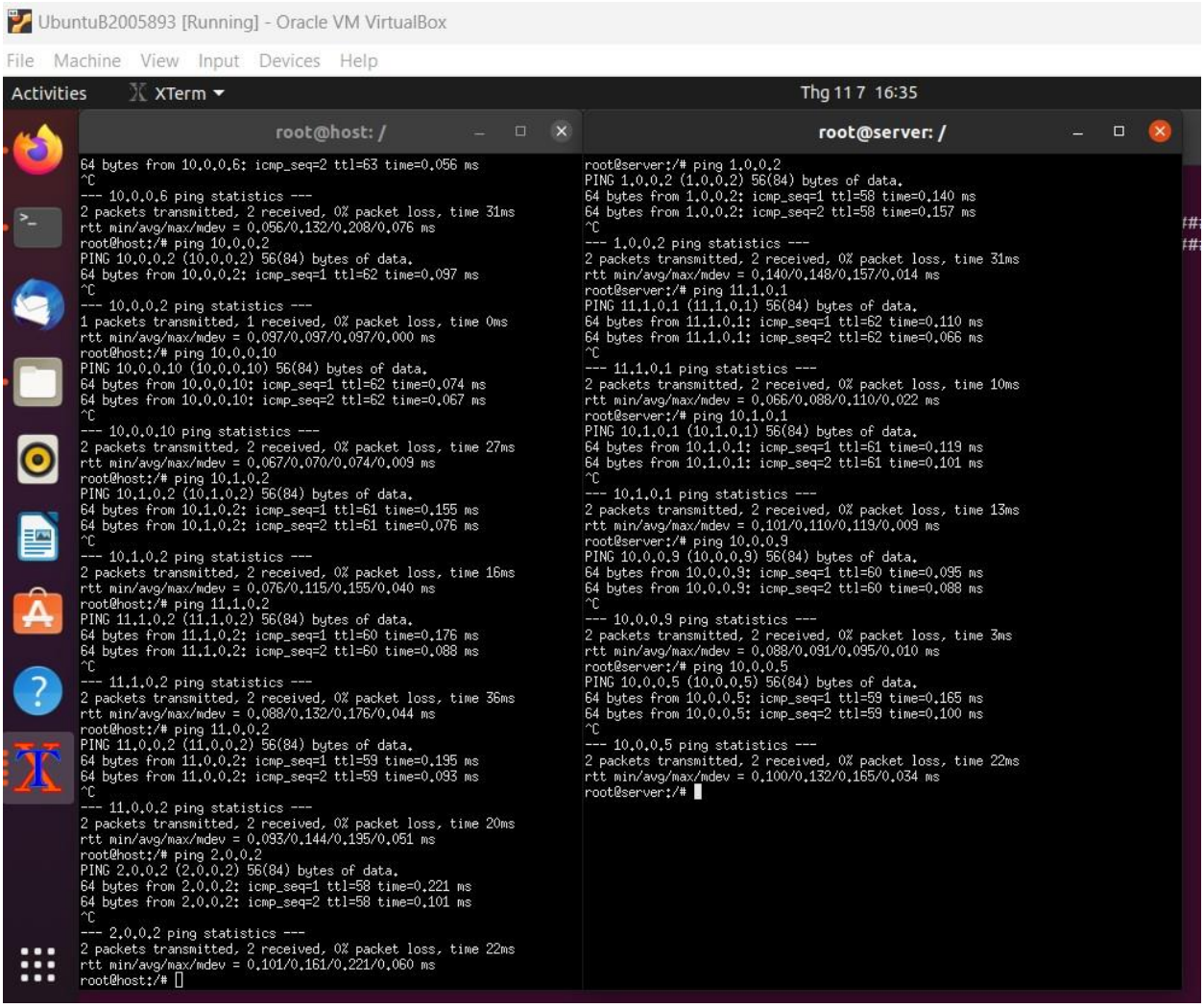
3. Routing table of ospf



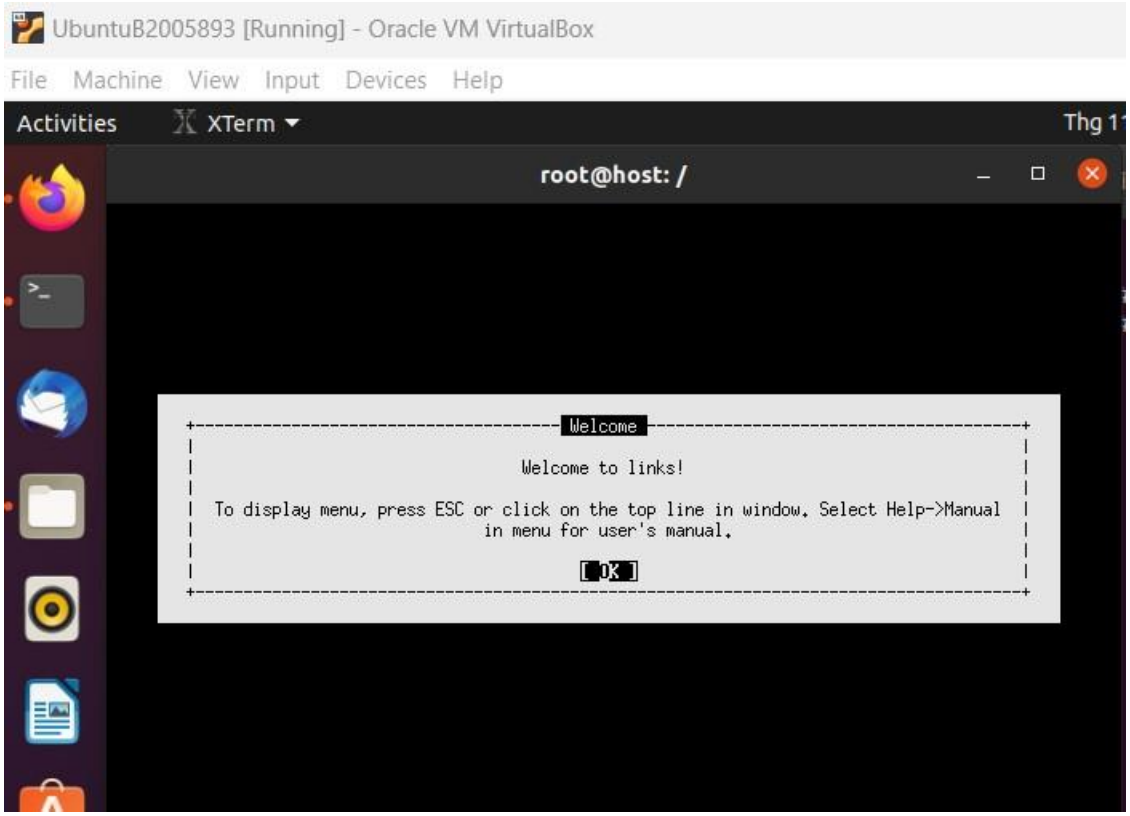
4. Routing table of RIP, host and server

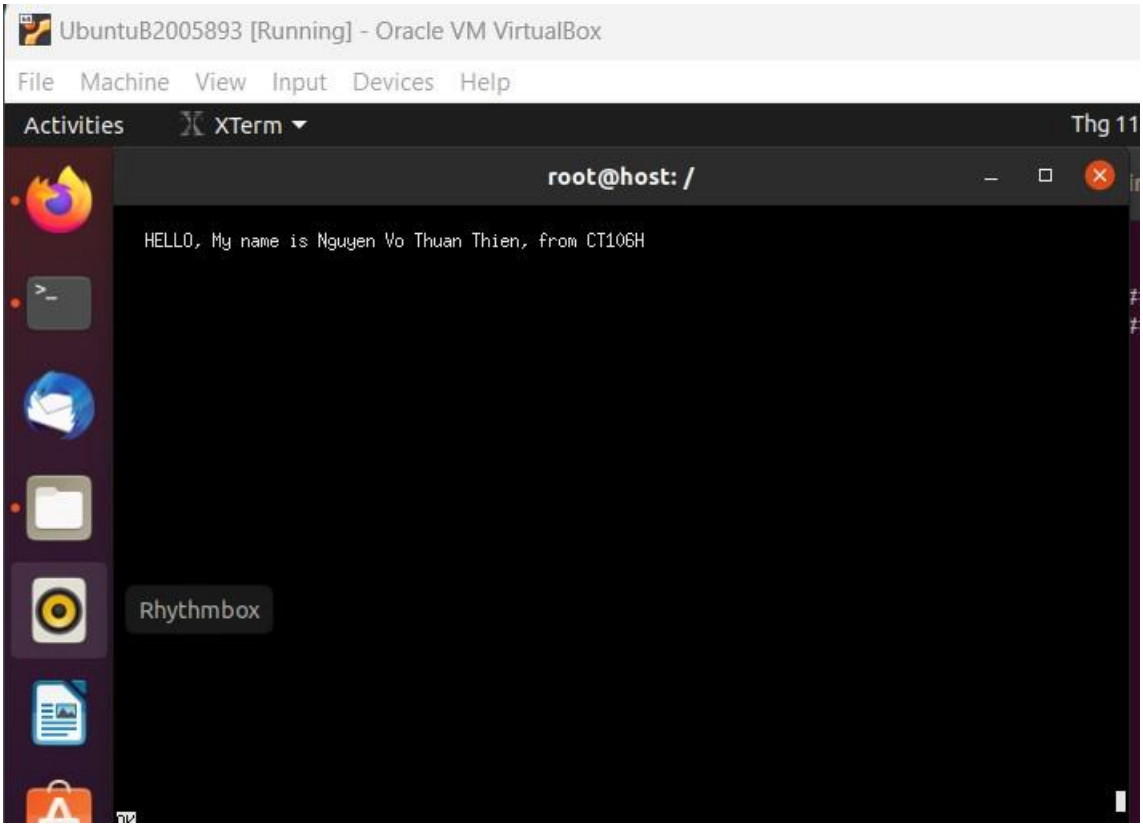


5. Test connectivity. Ping from host to server and server to host

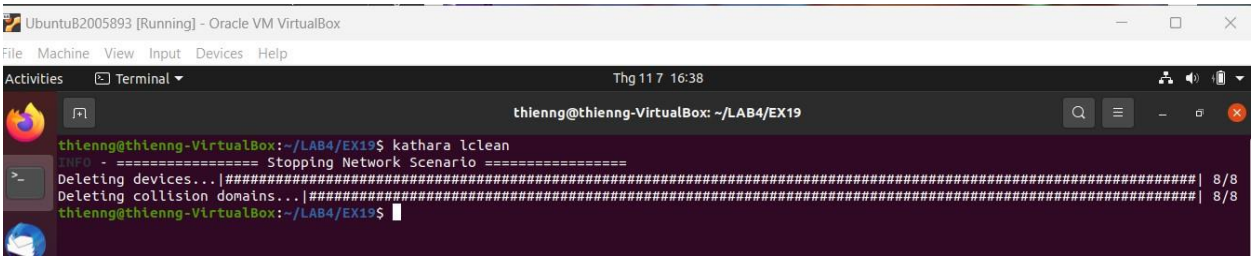


6. Links on host and connect it to the server

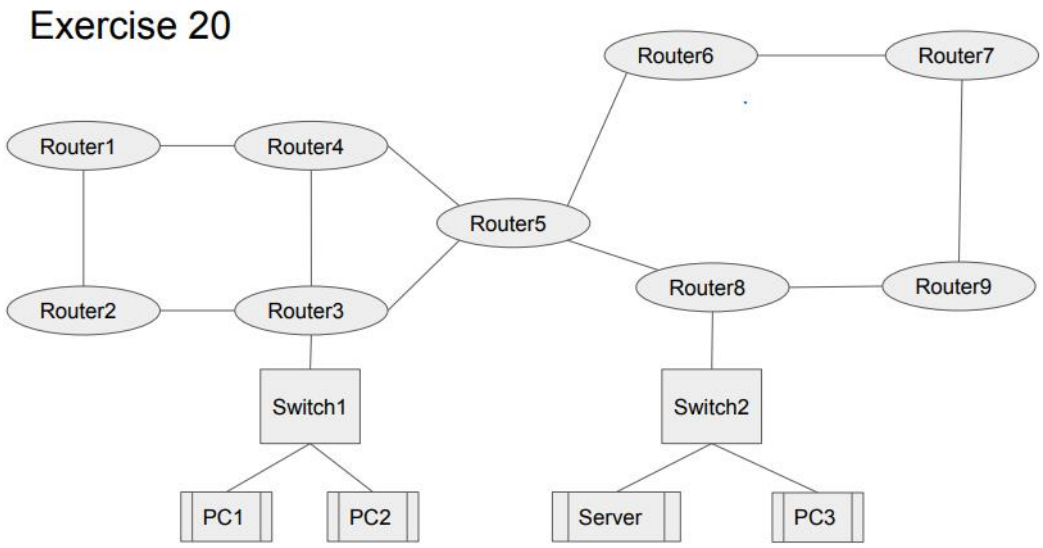




7. Delete VMs


UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 7 16:38
thienng@thienng-VirtualBox: ~/LAB4/EX19
thienng@thienng-VirtualBox:~/LAB4/EX19$ kathara lclean
INFO - ================= Stopping Network Scenario =================
Deleting devices...|##########| 8/8
Deleting collision domains...|##########| 8/8
thienng@thienng-VirtualBox:~/LAB4/EX19$

Exercise 20: Construct the following network.



Original network 182.182.182.128/26

→Netmask: 255.255.255.192

→Broadcast: 182.182.182.191

➔ The network has 7 LAN, in order to store it we need to use 3 bits for subnetting and 3 bits for representing hosts

# LAN	Subnet	Netmask	Broadcast	IP Range
1	182.182.182.128/29	255.255.255.248	182.182.182.135	182.182.182.129 - 182.182.182.134
2	182.182.182.136/29	255.255.255.248	182.182.182.143	182.182.182.137 - 182.182.182.142
3	182.182.182.144/29	255.255.255.248	182.182.182.151	182.182.182.145 - 182.182.182.150
4	182.182.182.152/29	255.255.255.248	182.182.182.159	182.182.182.153 - 182.182.182.158
5	182.182.182.160/29	255.255.255.248	182.182.182.167	182.182.182.161 - 182.182.182.166
6	182.182.182.168/29	255.255.255.248	182.182.182.175	182.182.182.169 - 182.182.182.174
7	182.182.182.176/29	255.255.255.248	182.182.182.183	182.182.182.177 - 182.182.182.182

Original network 190.190.190.0/25

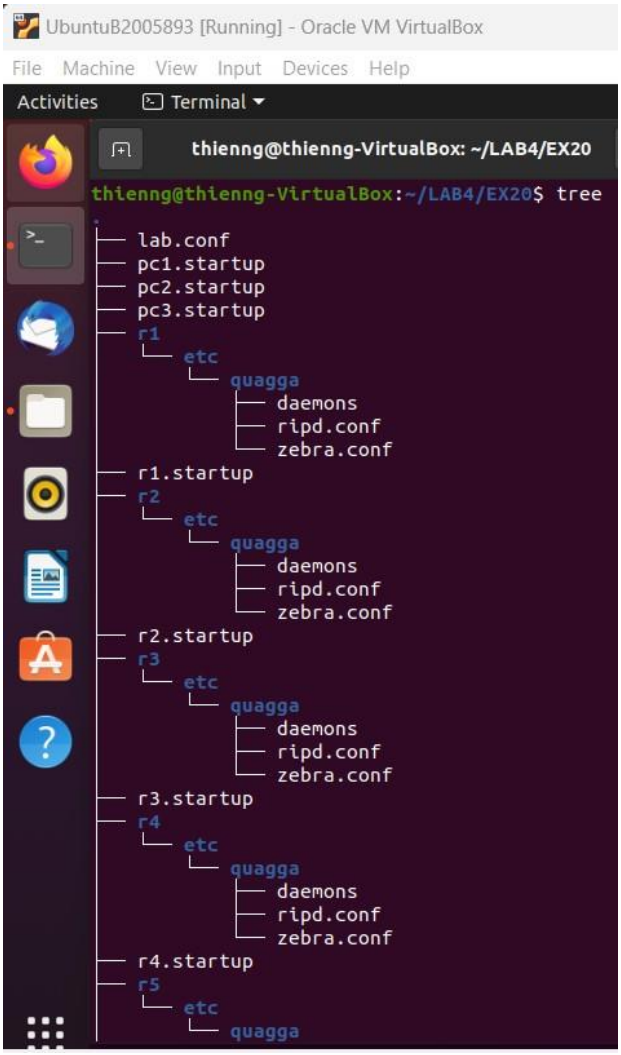
→Netmask: 255.255.255.128

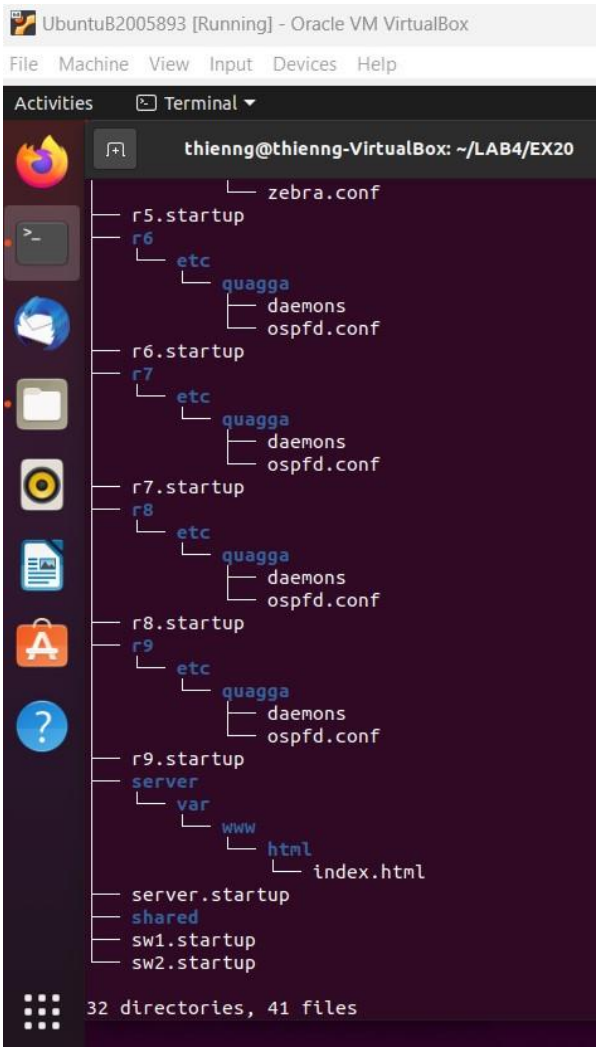
→Broadcast: 190.190.190.127

➔ The network has 6 Lan, in order to store it we need to use 3 bits for subnetting and 4 bits for representing hosts

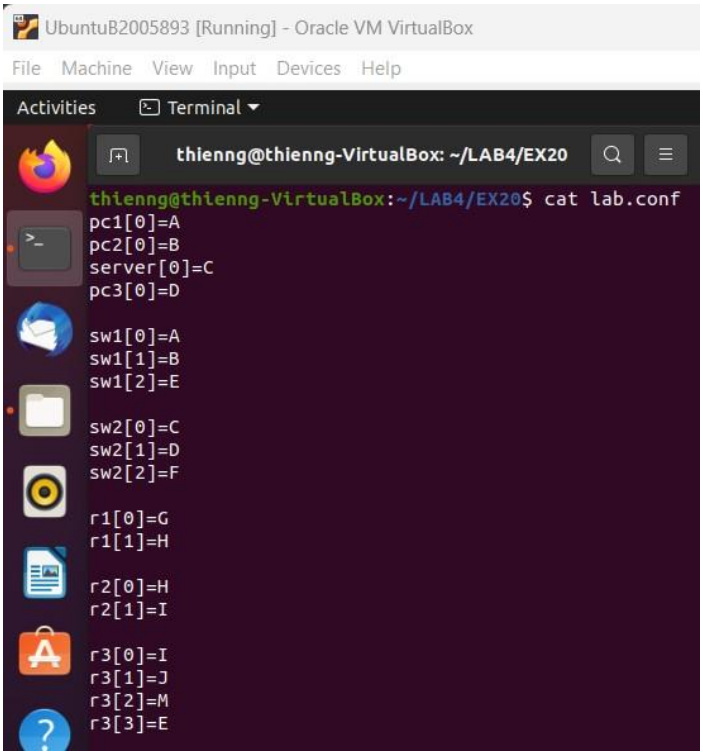
# LAN	Subnet	Netmask	Broadcast	IP Range
1	190.190.190.0/28	255.255.255.240	190.190.190.15	190.190.190.1 - 190.190.190.14
2	190.190.190.16/28	255.255.255.240	190.190.190.31	190.190.190.17 - 190.190.190.30
3	190.190.190.32/28	255.255.255.240	190.190.190.47	190.190.190.33 - 190.190.190.46
4	190.190.190.48/28	255.255.255.240	190.190.190.63	190.190.190.49 - 190.190.190.62
5	190.190.190.64/28	255.255.255.240	190.190.190.79	190.190.190.65 - 190.190.190.78
6	190.190.190.80/28	255.255.255.240	190.190.190.95	190.190.190.81 - 190.190.190.94

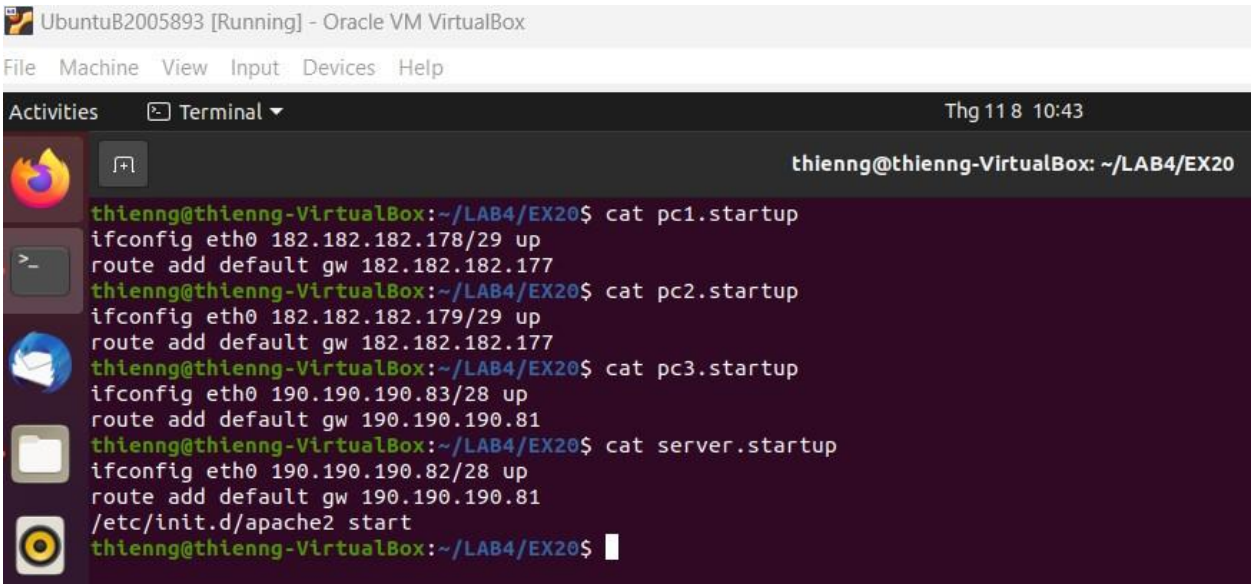
1. Files and Folders

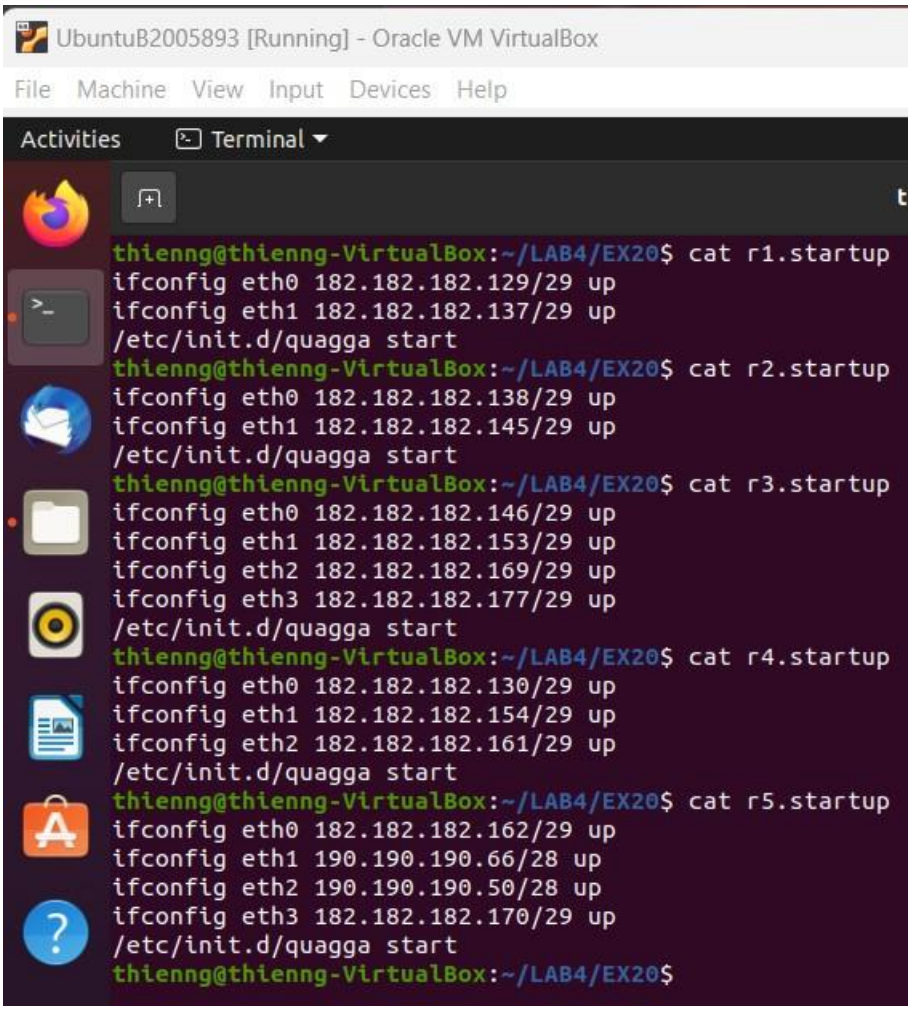


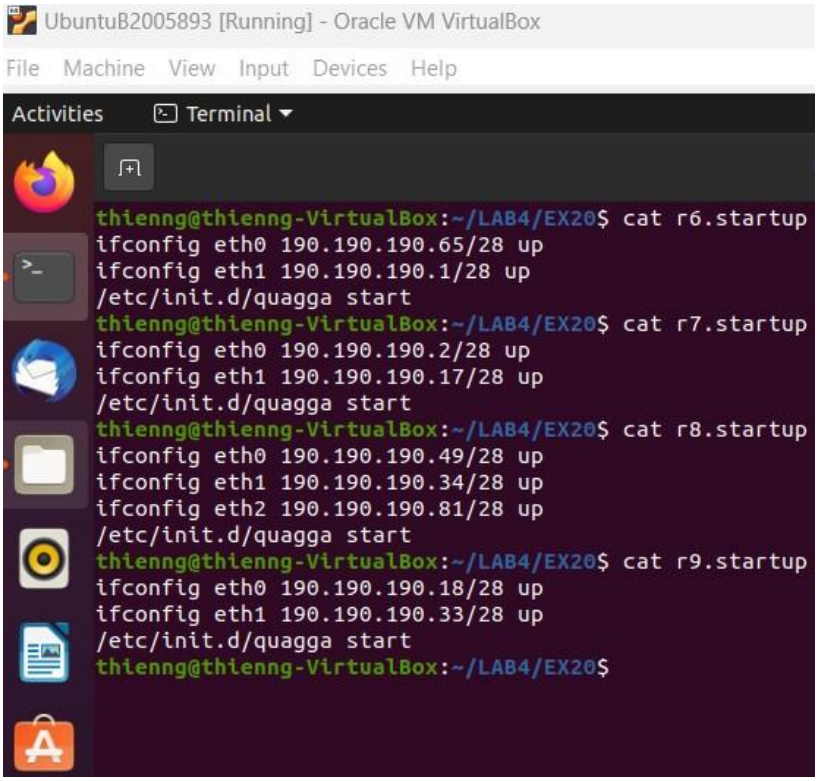


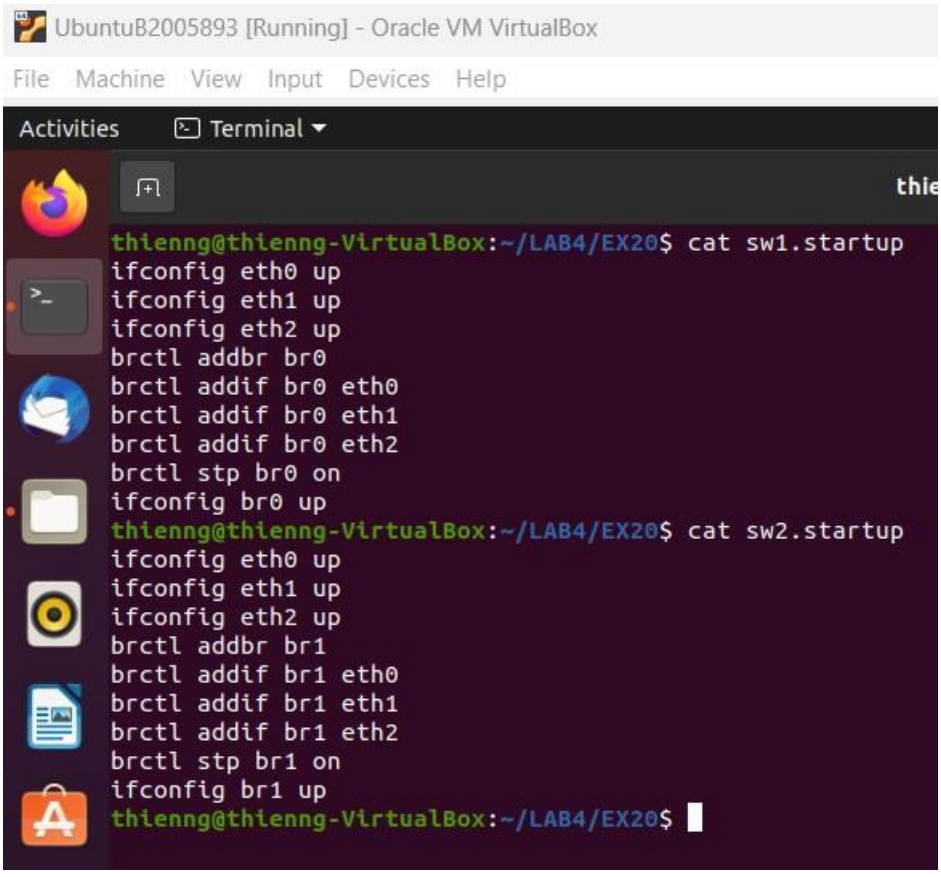
2. Files configurations

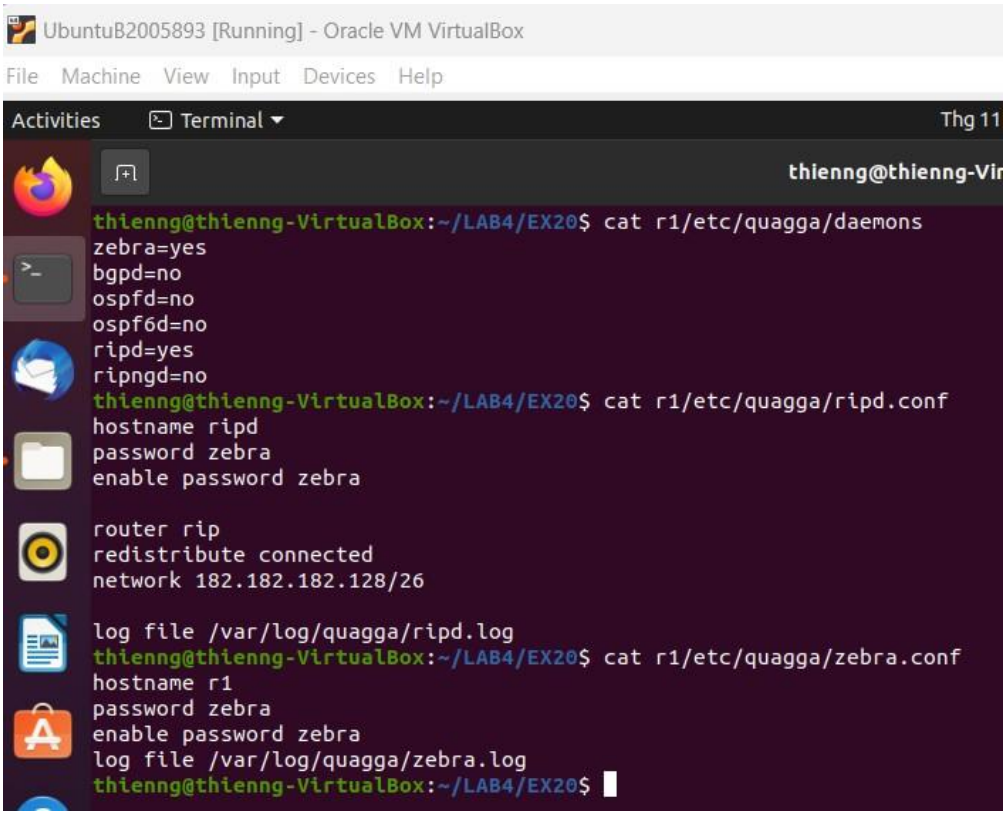


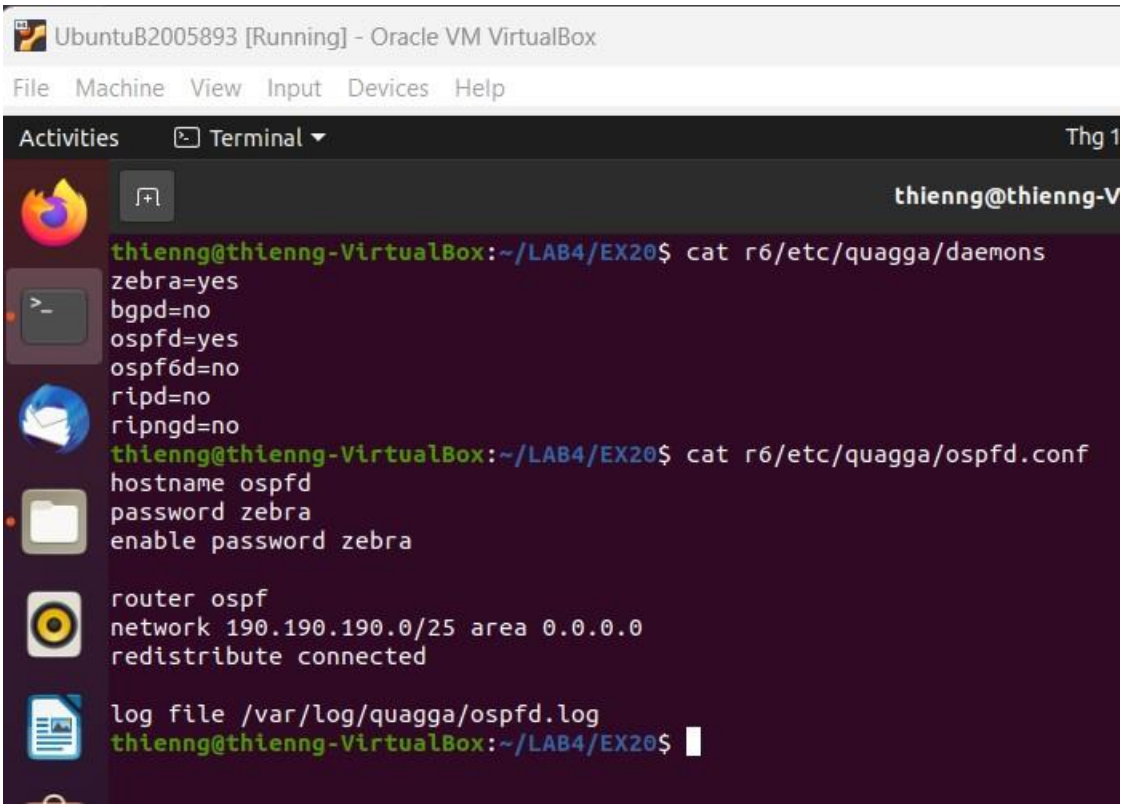

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Thg 11 8 10:43
thienng@thienng-VirtualBox: ~/LAB4/EX20
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat pc1.startup
ifconfig eth0 182.182.182.178/29 up
route add default gw 182.182.182.177
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat pc2.startup
ifconfig eth0 182.182.182.179/29 up
route add default gw 182.182.182.177
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat pc3.startup
ifconfig eth0 190.190.190.83/28 up
route add default gw 190.190.190.81
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat server.startup
ifconfig eth0 190.190.190.82/28 up
route add default gw 190.190.190.81
/etc/init.d/apache2 start
thienng@thienng-VirtualBox:~/LAB4/EX20$

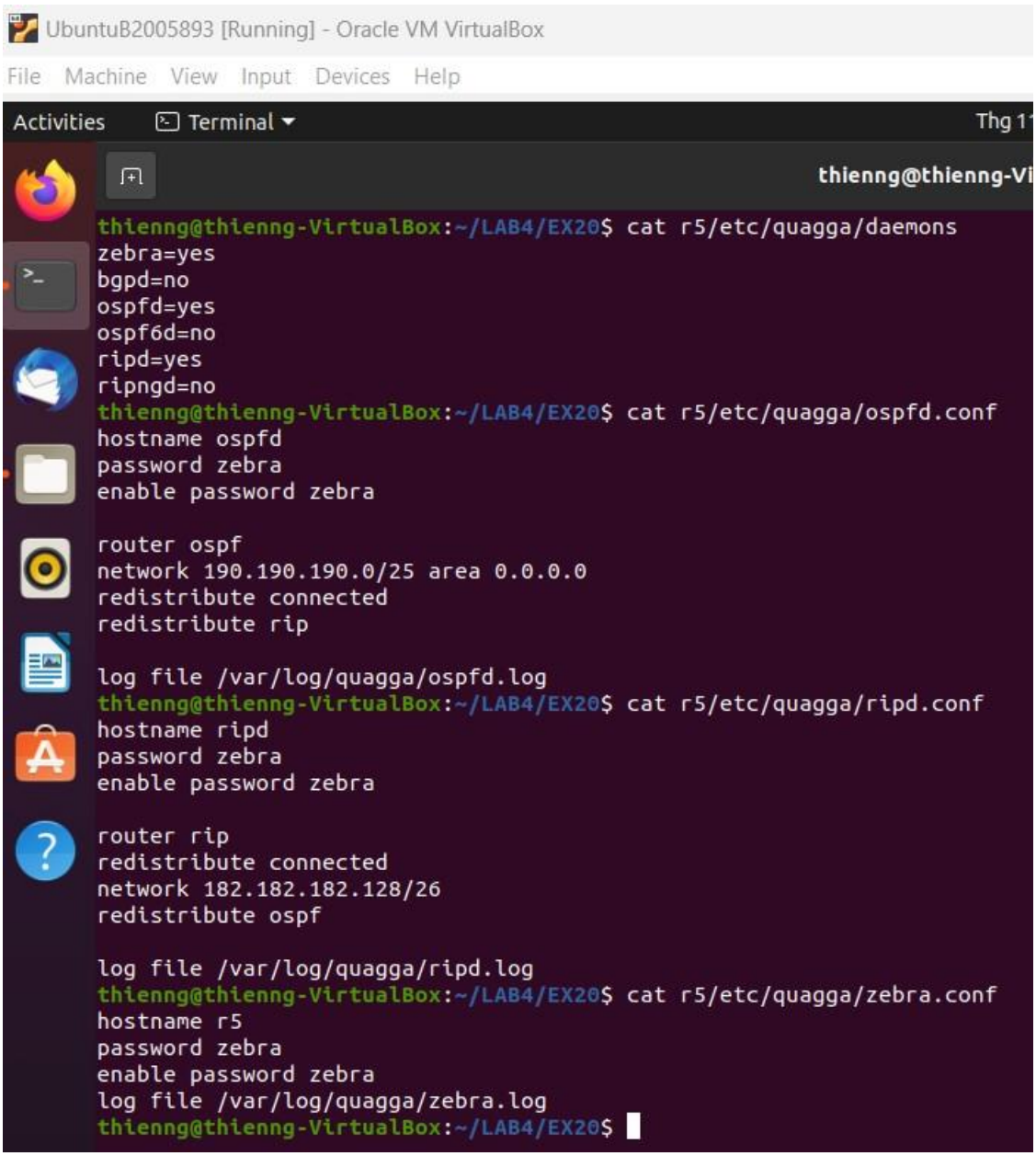

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r1.startup
ifconfig eth0 182.182.182.129/29 up
ifconfig eth1 182.182.182.137/29 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r2.startup
ifconfig eth0 182.182.182.138/29 up
ifconfig eth1 182.182.182.145/29 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r3.startup
ifconfig eth0 182.182.182.146/29 up
ifconfig eth1 182.182.182.153/29 up
ifconfig eth2 182.182.182.169/29 up
ifconfig eth3 182.182.182.177/29 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r4.startup
ifconfig eth0 182.182.182.130/29 up
ifconfig eth1 182.182.182.154/29 up
ifconfig eth2 182.182.182.161/29 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r5.startup
ifconfig eth0 182.182.182.162/29 up
ifconfig eth1 190.190.190.66/28 up
ifconfig eth2 190.190.190.50/28 up
ifconfig eth3 182.182.182.170/29 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$


UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r6.startup
ifconfig eth0 190.190.190.65/28 up
ifconfig eth1 190.190.190.1/28 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r7.startup
ifconfig eth0 190.190.190.2/28 up
ifconfig eth1 190.190.190.17/28 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r8.startup
ifconfig eth0 190.190.190.49/28 up
ifconfig eth1 190.190.190.34/28 up
ifconfig eth2 190.190.190.81/28 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r9.startup
ifconfig eth0 190.190.190.18/28 up
ifconfig eth1 190.190.190.33/28 up
/etc/init.d/quagga start
thienng@thienng-VirtualBox:~/LAB4/EX20$

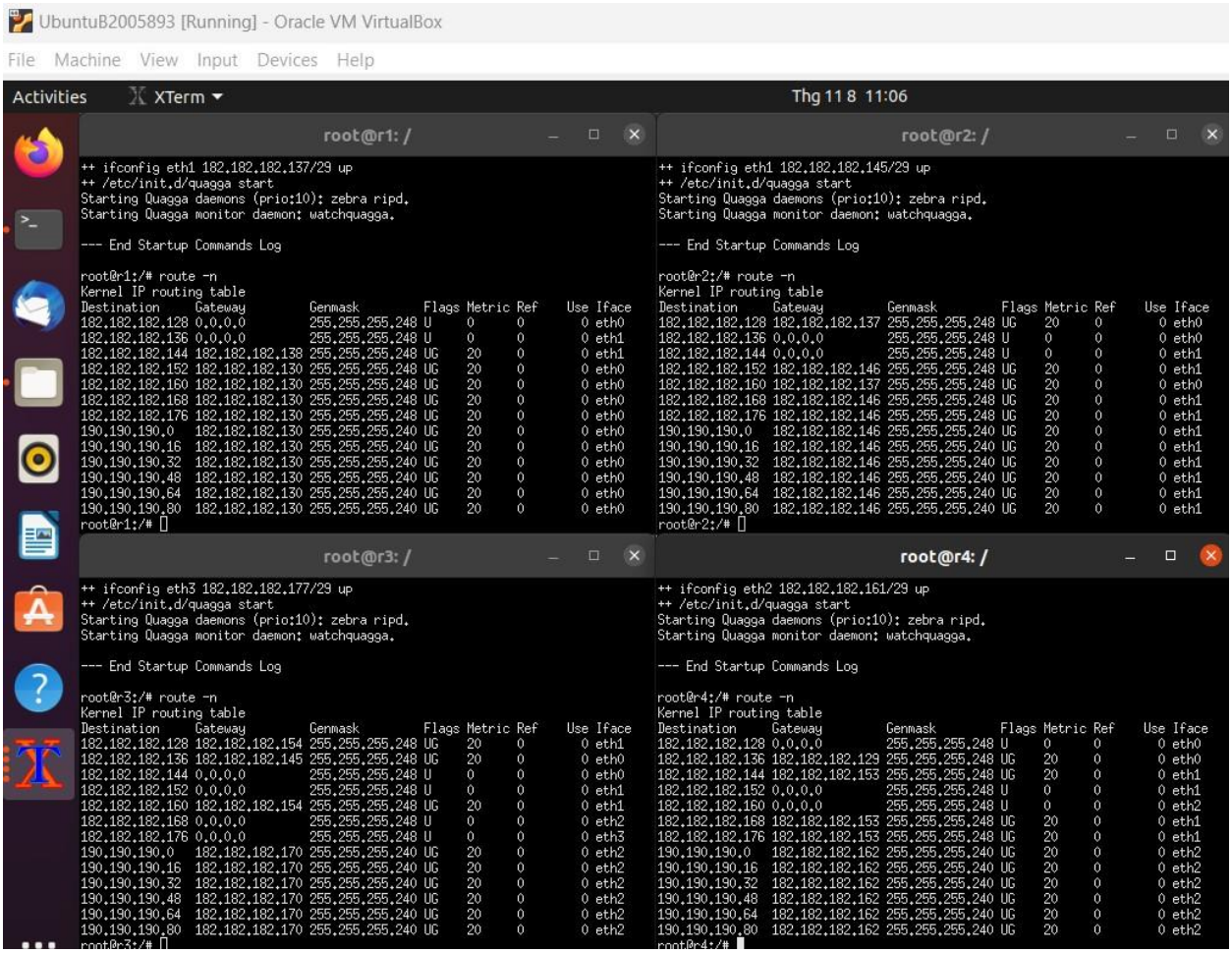

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat sw1.startup
ifconfig eth0 up
ifconfig eth1 up
ifconfig eth2 up
brctl addbr br0
brctl addif br0 eth0
brctl addif br0 eth1
brctl addif br0 eth2
brctl stp br0 on
ifconfig br0 up
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat sw2.startup
ifconfig eth0 up
ifconfig eth1 up
ifconfig eth2 up
brctl addbr br1
brctl addif br1 eth0
brctl addif br1 eth1
brctl addif br1 eth2
brctl stp br1 on
ifconfig br1 up
thienng@thienng-VirtualBox:~/LAB4/EX20$

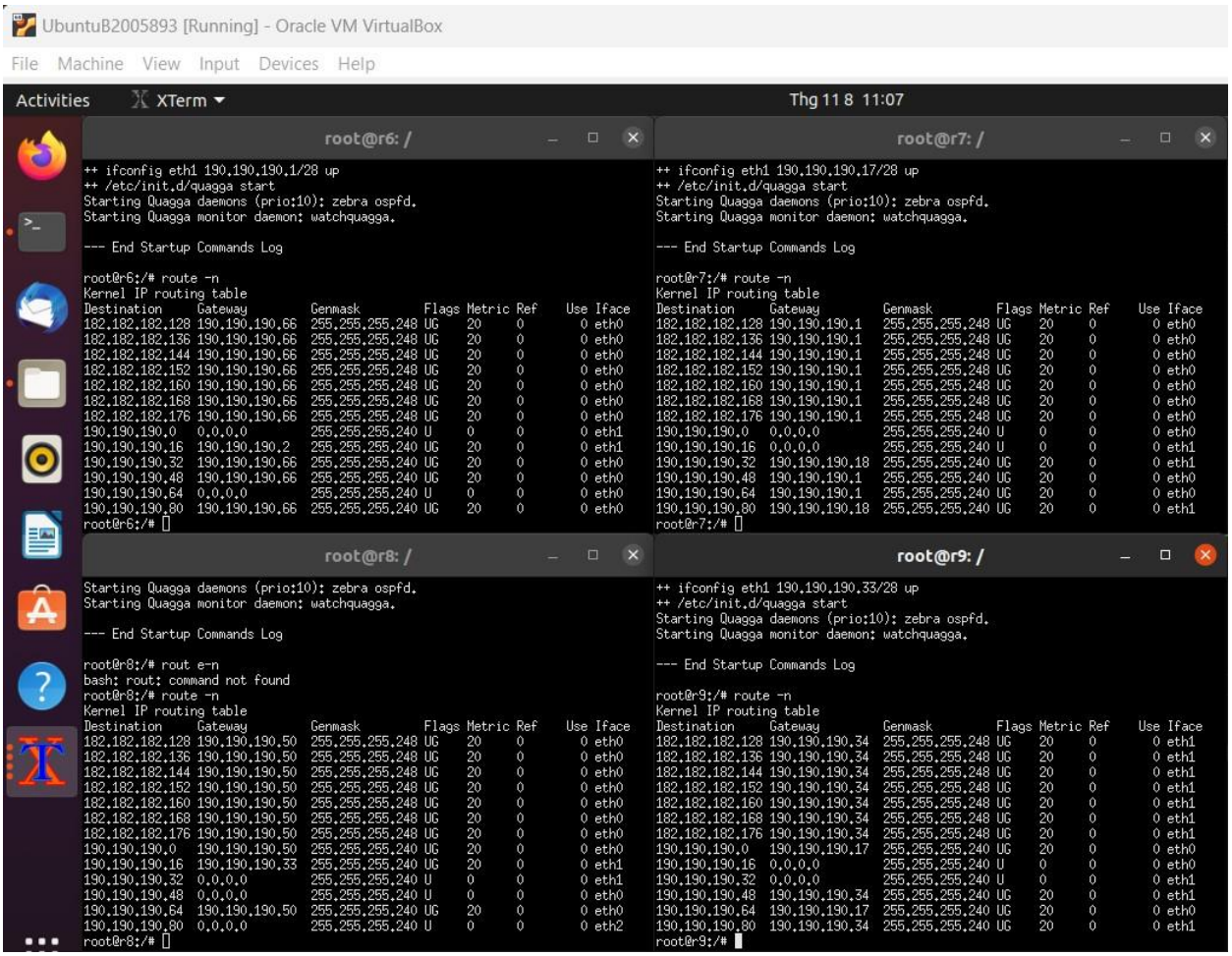

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11
thienng@thienng-Vir
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r1/etc/quagga/daemons
zebra=yes
bgpd=no
ospfd=no
ospf6d=no
ripd=yes
ripngd=no
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r1/etc/quagga/ripd.conf
hostname ripd
password zebra
enable password zebra
router rip
redistribute connected
network 182.182.182.128/26
log file /var/log/quagga/ripd.log
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r1/etc/quagga/zebra.conf
hostname r1
password zebra
enable password zebra
log file /var/log/quagga/zebra.log
thienng@thienng-VirtualBox:~/LAB4/EX20$


UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 1
thienng@thienng-V
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r6/etc/quagga/daemons
zebra=yes
bgpd=no
ospfd=yes
ospf6d=no
ripd=no
ripngd=no
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r6/etc/quagga/ospfd.conf
hostname ospfd
password zebra
enable password zebra
router ospf
network 190.190.190.0/25 area 0.0.0.0
redistribute connected
log file /var/log/quagga/ospfd.log
thienng@thienng-VirtualBox:~/LAB4/EX20$

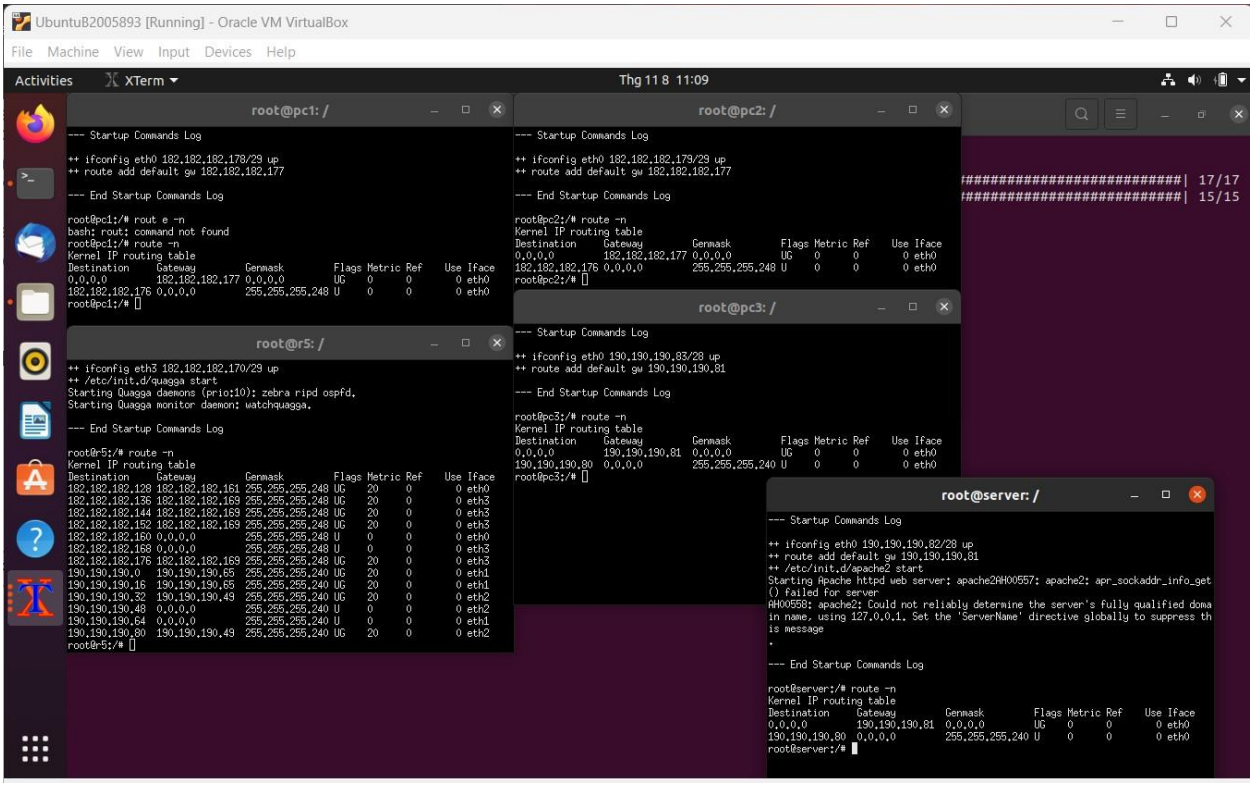

UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11
thienng@thienng-Vi
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r5/etc/quagga/daemons
zebra=yes
bgpd=no
ospfd=yes
ospf6d=no
ripd=yes
ripngd=no
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r5/etc/quagga/ospfd.conf
hostname ospfd
password zebra
enable password zebra
router ospf
network 190.190.190.0/25 area 0.0.0.0
redistribute connected
redistribute rip
log file /var/log/quagga/ospfd.log
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r5/etc/quagga/ripd.conf
hostname ripd
password zebra
enable password zebra
router rip
redistribute connected
network 182.182.182.128/26
redistribute ospf
log file /var/log/quagga/ripd.log
thienng@thienng-VirtualBox:~/LAB4/EX20$ cat r5/etc/quagga/zebra.conf
hostname r5
password zebra
enable password zebra
log file /var/log/quagga/zebra.log
thienng@thienng-VirtualBox:~/LAB4/EX20$

3. Routing table of router

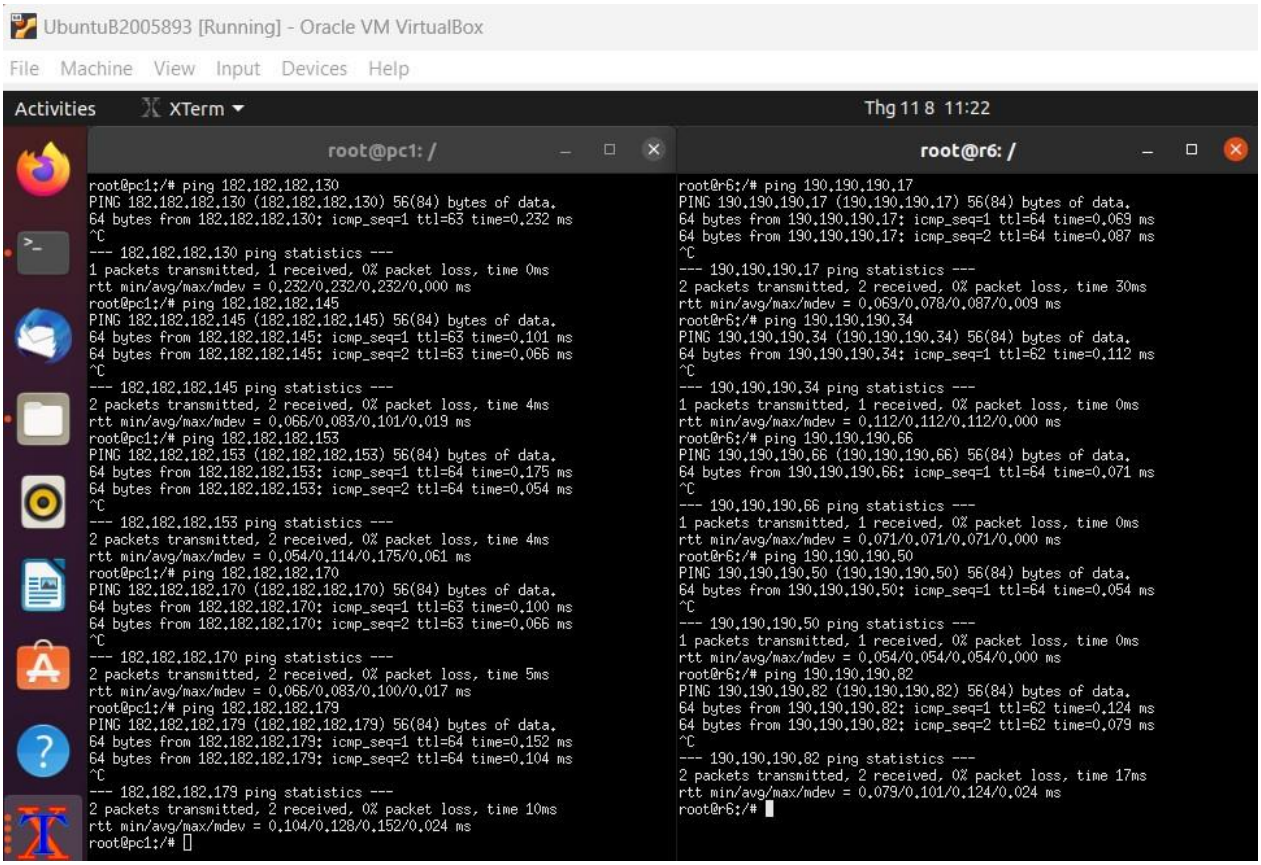



UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
XTerm
Thg 11 8 11:07
root@r6: /
++ ifconfig eth1 190.190.190.1/28 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log
root@r6:/# route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
182.182.182.128 190.190.190.66 255.255.255.248 UG 20 0 0 eth0
182.182.182.136 190.190.190.66 255.255.255.248 UG 20 0 0 eth0
182.182.182.144 190.190.190.66 255.255.255.248 UG 20 0 0 eth0
182.182.182.152 190.190.190.66 255.255.255.248 UG 20 0 0 eth0
182.182.182.160 190.190.190.66 255.255.255.248 UG 20 0 0 eth0
182.182.182.168 190.190.190.66 255.255.255.248 UG 20 0 0 eth0
182.182.182.176 190.190.190.66 255.255.255.248 UG 20 0 0 eth0
190.190.190.0 0.0.0.0 255.255.255.240 U 0 0 0 eth1
190.190.190.16 190.190.190.2 255.255.255.240 UG 20 0 0 eth1
190.190.190.32 190.190.190.66 255.255.255.240 UG 20 0 0 eth0
190.190.190.48 190.190.190.66 255.255.255.240 UG 20 0 0 eth0
190.190.190.64 0.0.0.0 255.255.255.240 U 0 0 0 eth0
190.190.190.80 190.190.190.66 255.255.255.240 UG 20 0 0 eth0
root@r6:/#
root@r7: /
++ ifconfig eth1 190.190.190.17/28 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log
root@r7:/# route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
182.182.182.128 190.190.190.1 255.255.255.248 UG 20 0 0 eth0
182.182.182.136 190.190.190.1 255.255.255.248 UG 20 0 0 eth0
182.182.182.144 190.190.190.1 255.255.255.248 UG 20 0 0 eth0
182.182.182.152 190.190.190.1 255.255.255.248 UG 20 0 0 eth0
182.182.182.160 190.190.190.1 255.255.255.248 UG 20 0 0 eth0
182.182.182.168 190.190.190.1 255.255.255.248 UG 20 0 0 eth0
182.182.182.176 190.190.190.1 255.255.255.248 UG 20 0 0 eth0
190.190.190.0 0.0.0.0 255.255.255.240 U 0 0 0 eth0
190.190.190.16 0.0.0.0 255.255.255.240 U 0 0 0 eth1
190.190.190.32 190.190.190.18 255.255.255.240 UG 20 0 0 eth1
190.190.190.48 190.190.190.1 255.255.255.240 UG 20 0 0 eth0
190.190.190.64 190.190.190.1 255.255.255.240 UG 20 0 0 eth0
190.190.190.80 190.190.190.18 255.255.255.240 UG 20 0 0 eth1
root@r7:/#
root@r8: /
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log
root@r8:/# rout e-n
bash: rout: command not found
root@r8:/# route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
182.182.182.128 190.190.190.50 255.255.255.248 UG 20 0 0 eth0
182.182.182.136 190.190.190.50 255.255.255.248 UG 20 0 0 eth0
182.182.182.144 190.190.190.50 255.255.255.248 UG 20 0 0 eth0
182.182.182.152 190.190.190.50 255.255.255.248 UG 20 0 0 eth0
182.182.182.160 190.190.190.50 255.255.255.248 UG 20 0 0 eth0
182.182.182.168 190.190.190.50 255.255.255.248 UG 20 0 0 eth0
182.182.182.176 190.190.190.50 255.255.255.248 UG 20 0 0 eth0
190.190.190.0 190.190.190.50 255.255.255.240 UG 20 0 0 eth0
190.190.190.16 190.190.190.33 255.255.255.240 UG 20 0 0 eth1
190.190.190.32 0.0.0.0 255.255.255.240 U 0 0 0 eth1
190.190.190.48 0.0.0.0 255.255.255.240 U 0 0 0 eth0
190.190.190.64 190.190.190.50 255.255.255.240 UG 20 0 0 eth0
190.190.190.80 0.0.0.0 255.255.255.240 U 0 0 0 eth2
root@r8:/#
root@r9: /
++ ifconfig eth1 190.190.190.33/28 up
++ /etc/init.d/quagga start
Starting Quagga daemons (prio:10): zebra ospfd.
Starting Quagga monitor daemon: watchquagga.
--- End Startup Commands Log
root@r9:/# route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
182.182.182.128 190.190.190.34 255.255.255.248 UG 20 0 0 eth1
182.182.182.136 190.190.190.34 255.255.255.248 UG 20 0 0 eth1
182.182.182.144 190.190.190.34 255.255.255.248 UG 20 0 0 eth1
182.182.182.152 190.190.190.34 255.255.255.248 UG 20 0 0 eth1
182.182.182.160 190.190.190.34 255.255.255.248 UG 20 0 0 eth1
182.182.182.168 190.190.190.34 255.255.255.248 UG 20 0 0 eth1
182.182.182.176 190.190.190.34 255.255.255.248 UG 20 0 0 eth1
190.190.190.0 190.190.190.17 255.255.255.240 UG 20 0 0 eth0
190.190.190.16 0.0.0.0 255.255.255.240 U 0 0 0 eth0
190.190.190.32 0.0.0.0 255.255.255.240 U 0 0 0 eth1
190.190.190.48 190.190.190.34 255.255.255.240 UG 20 0 0 eth1
190.190.190.64 190.190.190.17 255.255.255.240 UG 20 0 0 eth0
190.190.190.80 190.190.190.34 255.255.255.240 UG 20 0 0 eth1
root@r9:/#

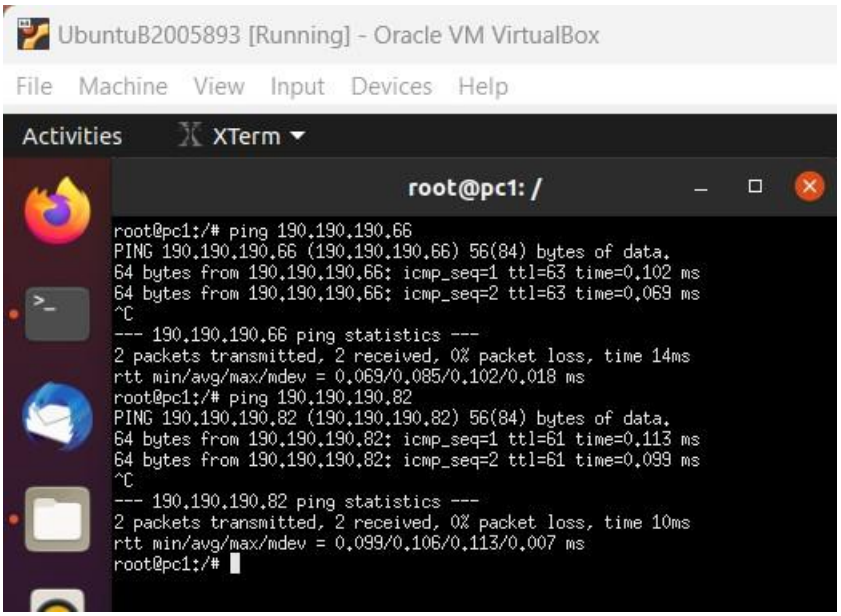
4. Routing table of r5 , pc , server



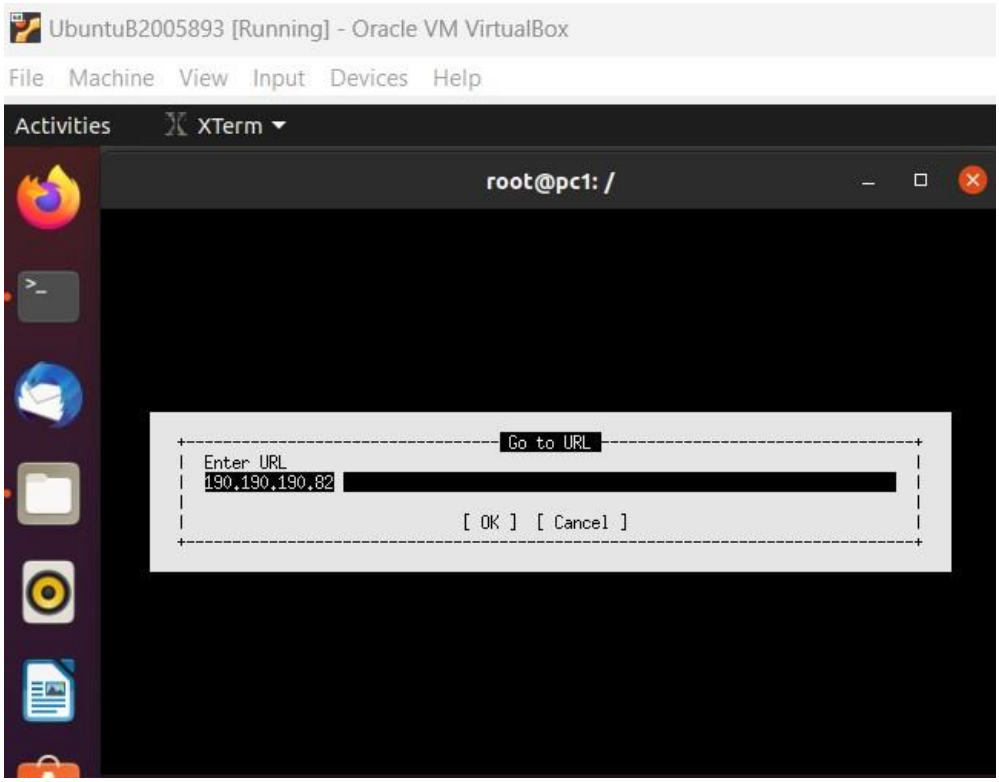
5. Test connectivity: Ping pc1 to its own area and r6 to its own area



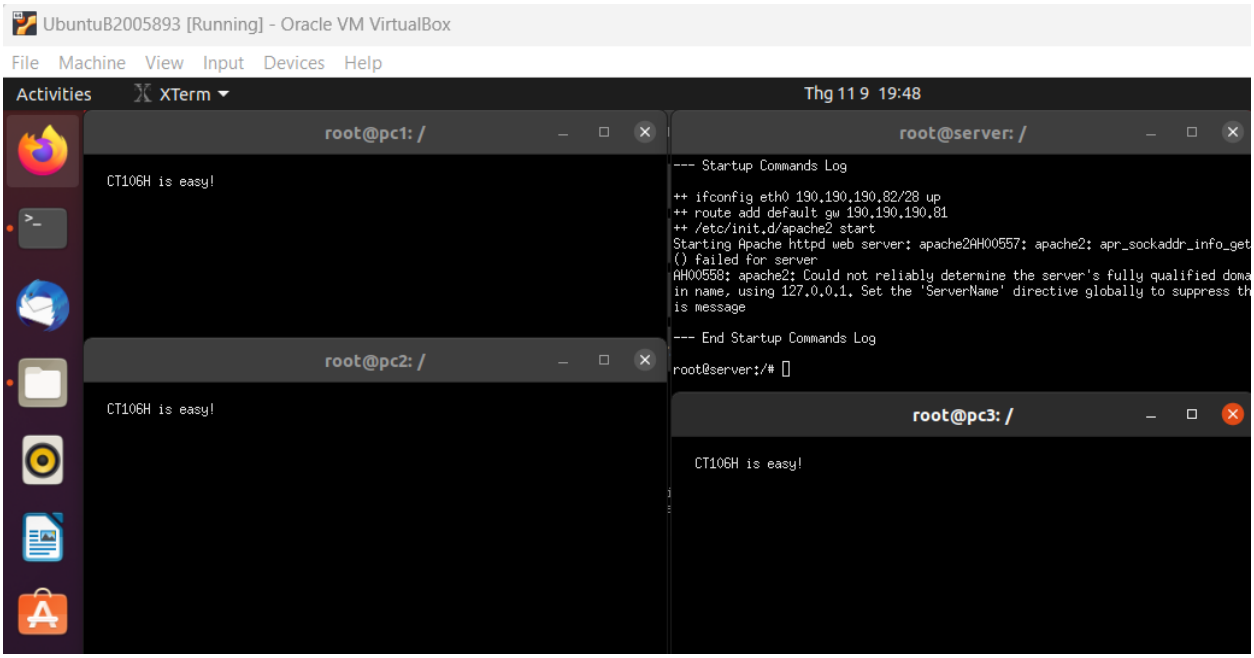
6. Test connectivity: From pc1 ping to r5 and to the server



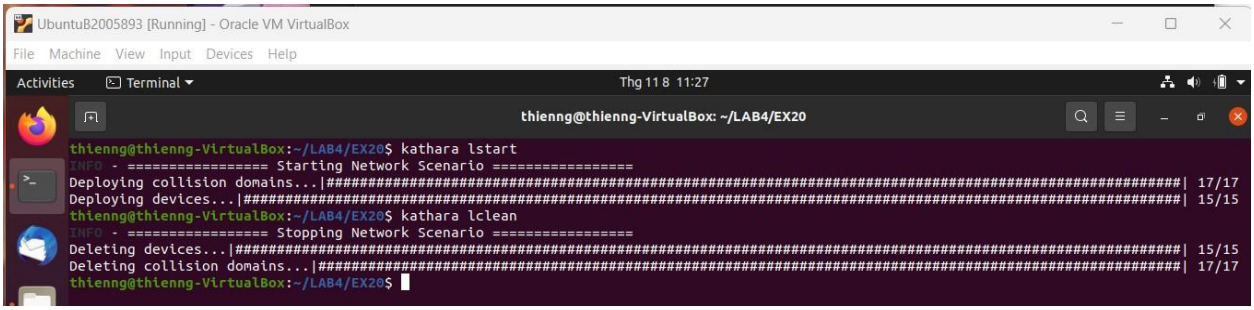
7. Link on pc1 and connect it to the server



➔ The Server provides a web service which shows “CT106H is easy!”



8. Delete VMs


UbuntuB2005893 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Thg 11 8 11:27
thienng@thienng-VirtualBox: ~/LAB4/EX20
thienng@thienng-VirtualBox:~/LAB4/EX20$ kathara lstart
INFO - ================= Starting Network Scenario =================
Deploying collision domains...|##########| 17/17
Deploying devices...|##########| 15/15
thienng@thienng-VirtualBox:~/LAB4/EX20$ kathara lclean
INFO - ================= Stopping Network Scenario =================
Deleting devices...|##########| 15/15
Deleting collision domains...|##########| 17/17
thienng@thienng-VirtualBox:~/LAB4/EX20$