



LAB 1

Họ tên và MSSV: Quách Minh Hón

Nhóm học phần: 11

- Các sinh viên bị phát hiện sao chép bài của nhau sẽ nhận 0đ cho tất cả bài thực hành của môn này.
- Bài nộp phải ở dạng PDF. Tên file PDF đặt theo cấu trúc “CT112_MSSV_Lab1_HoTen”. Ví dụ, SV có MSSV là B1234 và Họ tên là “Nguyễn Văn A”; tên file sẽ đặt như sau “CT112_B1234_Lab1_NguyenVanA”.
- File nộp cần cung cấp đầy đủ các bước giải quyết bài toán.

Bài 1:

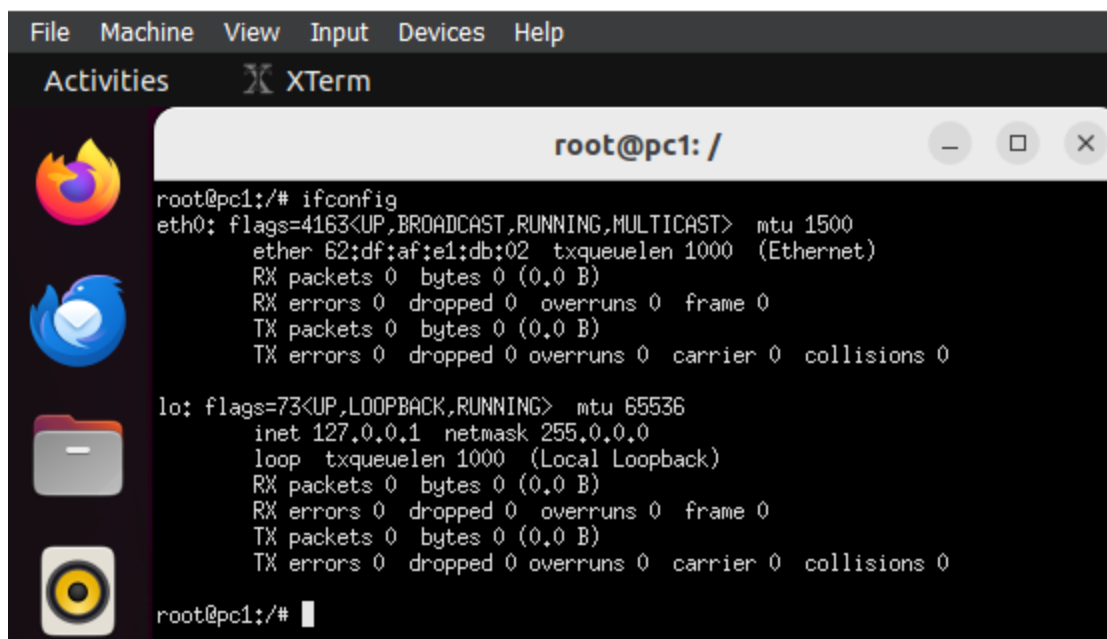
UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
b2110078@UbuntuB2110078: ~/CT112/BaiTap1
b2110078@UbuntuB2110078:~/CT112/BaiTap1$ kathara vstart -n pc1 --eth 0:A
INFO - ===== Starting Device =====
Deploying collision domains...|#####| 1/1
Deploying devices...|#####| 1/1
b2110078@UbuntuB2110078:~/CT112/BaiTap1$
INFO - =====
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
b2110078@UbuntuB2110078: ~/CT112/BaiTap1
b2110078@UbuntuB2110078:~/CT112/BaiTap1$ kathara vstart -n pc2 --eth 0:A
INFO - ===== Starting Device =====
Deploying collision domains...|#####| 1/1
Deploying devices...|#####| 1/1
b2110078@UbuntuB2110078:~/CT112/BaiTap1$
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox



```
File Machine View Input Devices Help
Activities XTerm

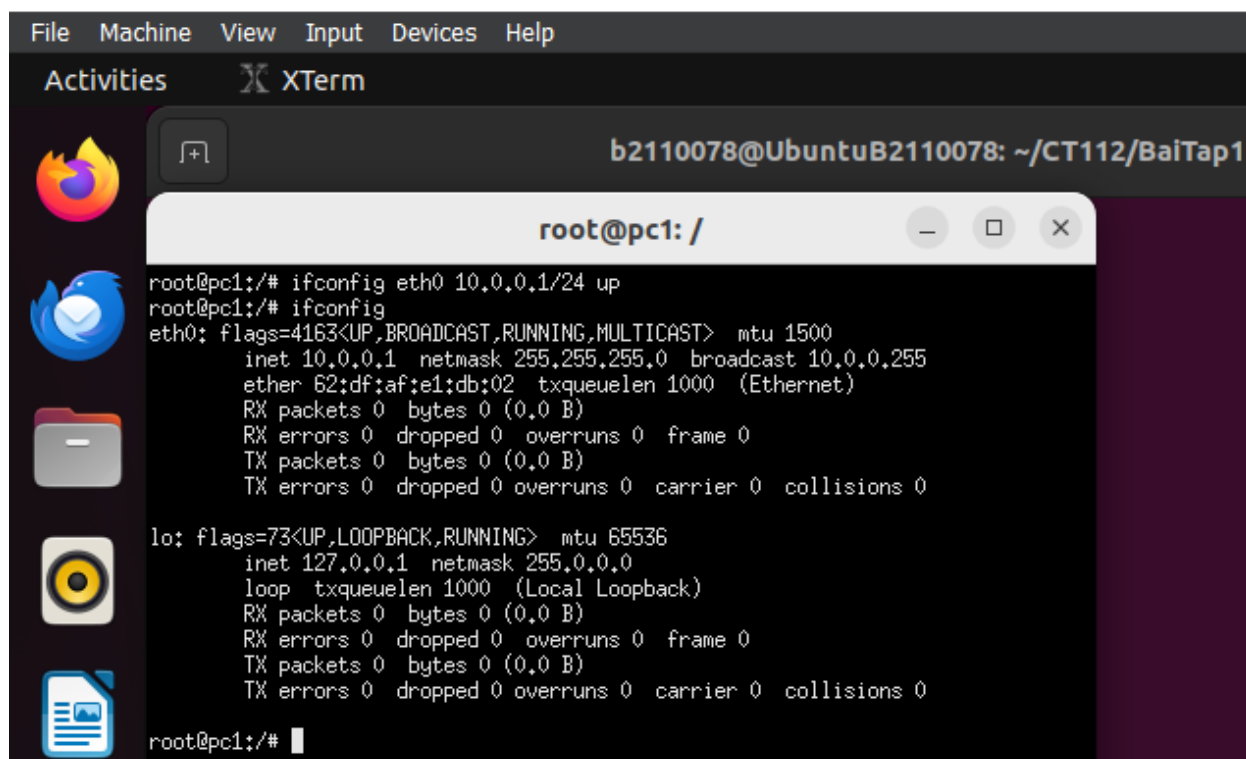
root@pc1: /

root@pc1:~# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    ether 62:df:af:e1:db:02 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    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
    loop txqueuelen 1000 (Local Loopback)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@pc1:~#
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox



```
File Machine View Input Devices Help
Activities XTerm

b2110078@UbuntuB2110078: ~/CT112/BaiTap1

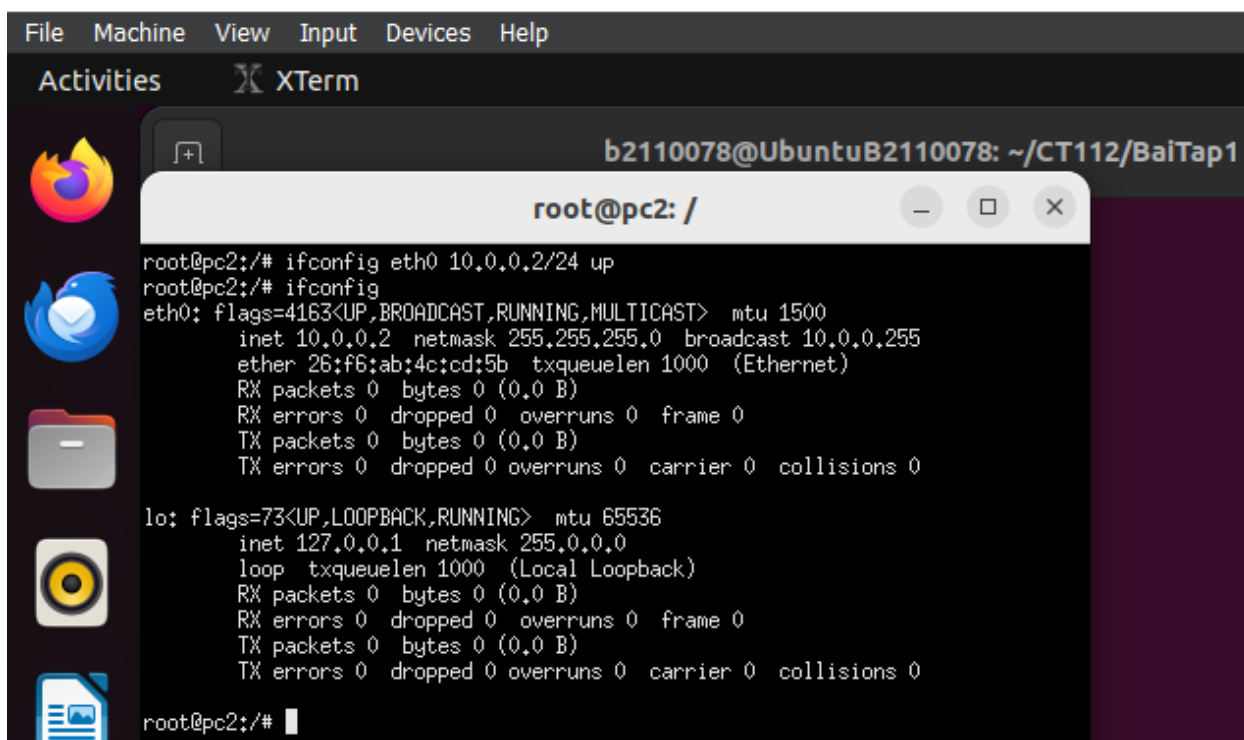
root@pc1: /

root@pc1:~# ifconfig eth0 10.0.0.1/24 up
root@pc1:~# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.0.1 netmask 255.255.255.0 broadcast 10.0.0.255
    ether 62:df:af:e1:db:02 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    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
    loop txqueuelen 1000 (Local Loopback)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@pc1:~#
```

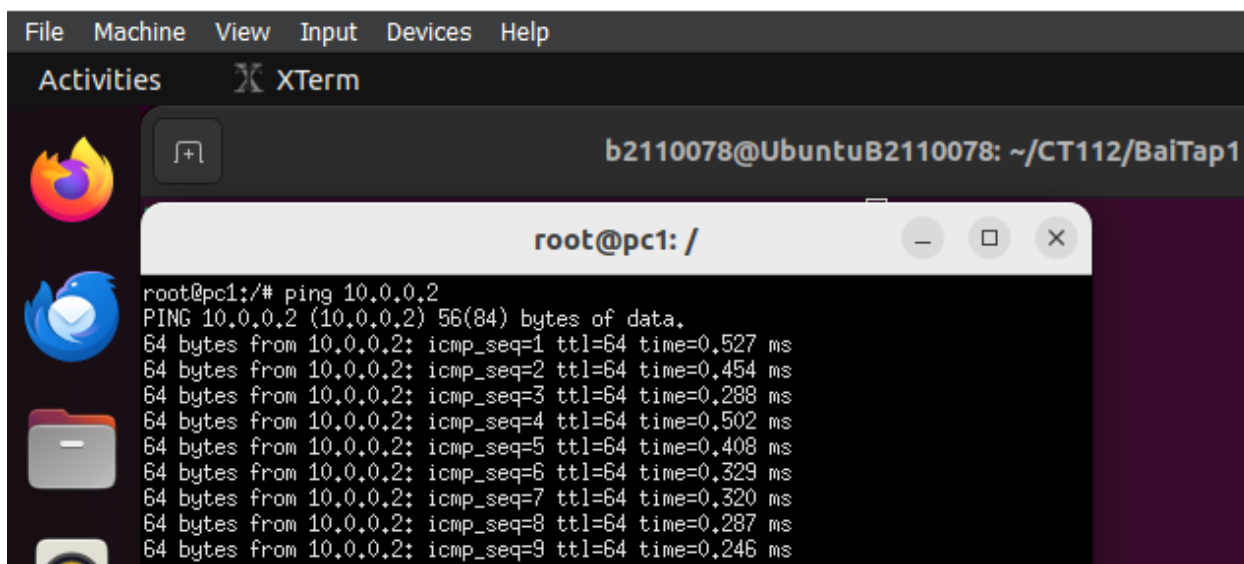
UbuntuB2110078 [Running] - Oracle VM VirtualBox



The screenshot shows a terminal window titled "b2110078@UbuntuB2110078: ~/CT112/BaiTap1". The terminal prompt is "root@pc2: /". The user has entered the command "ifconfig eth0 10.0.0.2/24 up" followed by "ifconfig". The output shows the configuration for the eth0 interface, including its flags, MTU, IP address, netmask, broadcast address, and various statistics. The lo interface is also shown with its configuration and statistics.

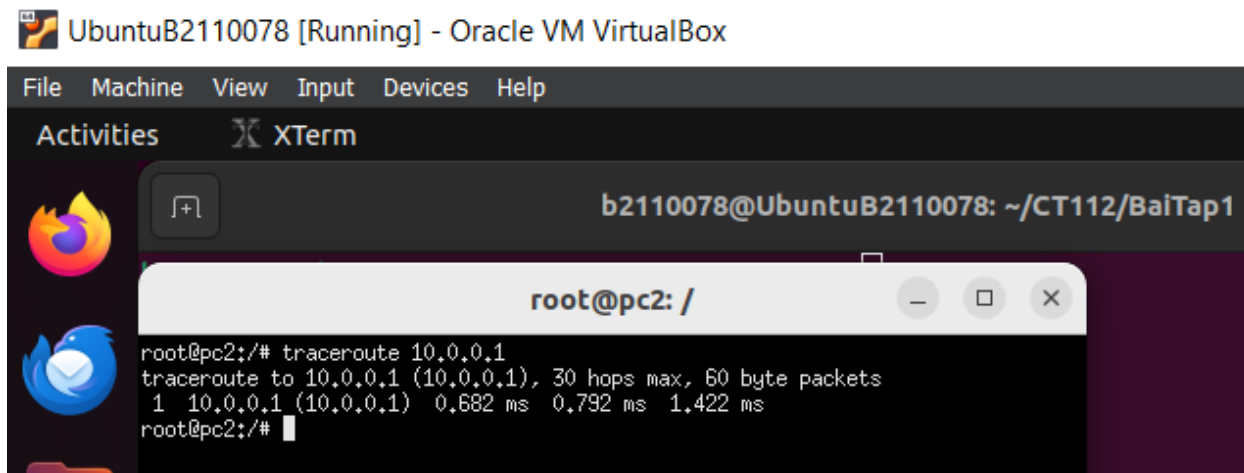
```
root@pc2: /  
root@pc2: /# ifconfig eth0 10.0.0.2/24 up  
root@pc2: /# ifconfig  
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 10.0.0.2 netmask 255.255.255.0 broadcast 10.0.0.255  
    ether 26:f6:ab:4c:cd:5b txqueuelen 1000 (Ethernet)  
    RX packets 0 bytes 0 (0.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 0 bytes 0 (0.0 B)  
    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  
    loop txqueuelen 1000 (Local Loopback)  
    RX packets 0 bytes 0 (0.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 0 bytes 0 (0.0 B)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
root@pc2: /#
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox



The screenshot shows a terminal window titled "b2110078@UbuntuB2110078: ~/CT112/BaiTap1". The terminal prompt is "root@pc1: /". The user has entered the command "ping 10.0.0.2". The output shows the results of the ping test, including the IP address, the size of the data packets, and the time taken for each packet to reach the destination.

```
root@pc1: /  
root@pc1: /# ping 10.0.0.2  
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data:  
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=0.527 ms  
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.454 ms  
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.288 ms  
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.502 ms  
64 bytes from 10.0.0.2: icmp_seq=5 ttl=64 time=0.408 ms  
64 bytes from 10.0.0.2: icmp_seq=6 ttl=64 time=0.329 ms  
64 bytes from 10.0.0.2: icmp_seq=7 ttl=64 time=0.320 ms  
64 bytes from 10.0.0.2: icmp_seq=8 ttl=64 time=0.287 ms  
64 bytes from 10.0.0.2: icmp_seq=9 ttl=64 time=0.246 ms  
64 bytes from 10.0.0.2: icmp_seq=10 ttl=64 time=0.278 ms
```



UbuntuB2110078 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

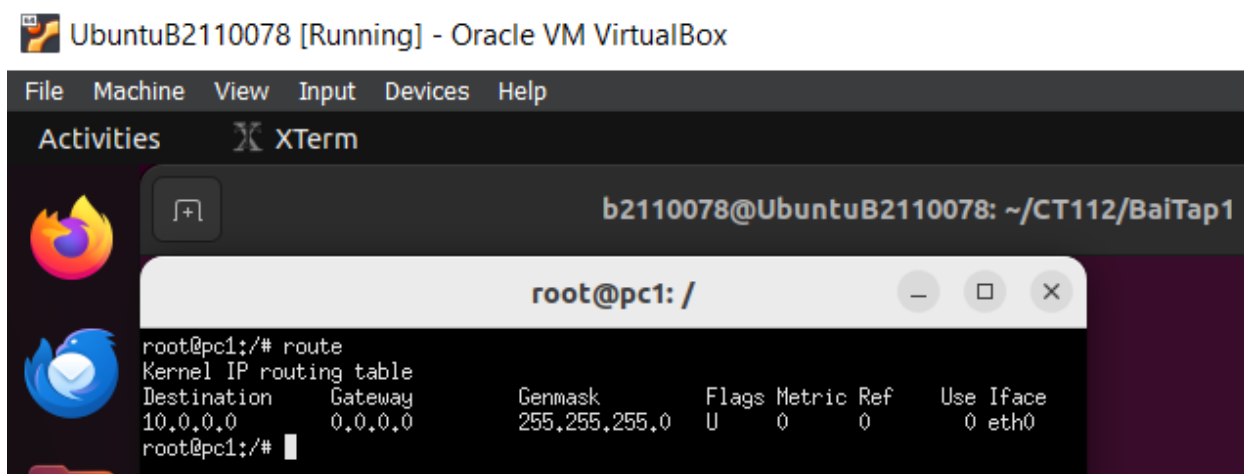
Activities XTerm

b2110078@UbuntuB2110078: ~/CT112/BaiTap1

```
root@pc2: /  
root@pc2:/# traceroute 10.0.0.1  
traceroute to 10.0.0.1 (10.0.0.1), 30 hops max, 60 byte packets  
1 10.0.0.1 (10.0.0.1) 0.682 ms 0.792 ms 1.422 ms  
root@pc2:/#
```

Traceroute 10.0.0.1:

- Dòng đầu hiển thị số bước nhảy tối đa là 30 và kích thước các gói byte được gửi là 60 byte
- Dòng tiếp theo là danh sách các route đi đến host IP (chỉ có 1 route), bao gồm các round-trip time (RTT)



UbuntuB2110078 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

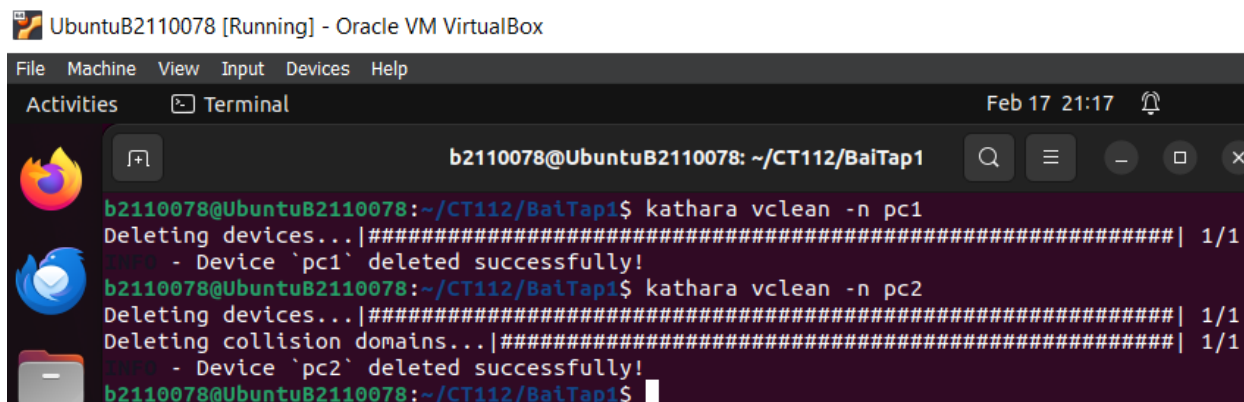
Activities XTerm

b2110078@UbuntuB2110078: ~/CT112/BaiTap1

```
root@pc1: /  
root@pc1:/# route  
Kernel IP routing table  
Destination Gateway Genmask Flags Metric Ref Use Iface  
10.0.0.0 0.0.0.0 255.255.255.0 U 0 0 0 eth0  
root@pc1:/#
```

Route:

- Thể hiện đích đến, gateway, genmask, Flags, Metric, Ref, Use và Iface
- Flags U có nghĩa route đang hoạt động



UbuntuB2110078 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Feb 17 21:17

b2110078@UbuntuB2110078: ~/CT112/BaiTap1

```
b2110078@UbuntuB2110078:~/CT112/BaiTap1$ kathara vclean -n pc1  
Deleting devices...|#####| 1/1  
INFO - Device 'pc1' deleted successfully!  
b2110078@UbuntuB2110078:~/CT112/BaiTap1$ kathara vclean -n pc2  
Deleting devices...|#####| 1/1  
Deleting collision domains...|#####| 1/1  
INFO - Device 'pc2' deleted successfully!  
b2110078@UbuntuB2110078:~/CT112/BaiTap1$
```

Bài 2:

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities Terminal

b2110078@UbuntuB2110078: ~/CT112/BaiTap2

b2110078@UbuntuB2110078:~/CT112/BaiTap2$ mkdir pc1
b2110078@UbuntuB2110078:~/CT112/BaiTap2$ mkdir pc2
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities Terminal Feb 17 21:28

b2110078@UbuntuB2110078: ~/CT112/BaiTap2

GNU nano 6.2 lab.conf
pc1[0]=A
pc2[0]=A

[ Wrote 2 lines ]
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^_ Go To Line
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

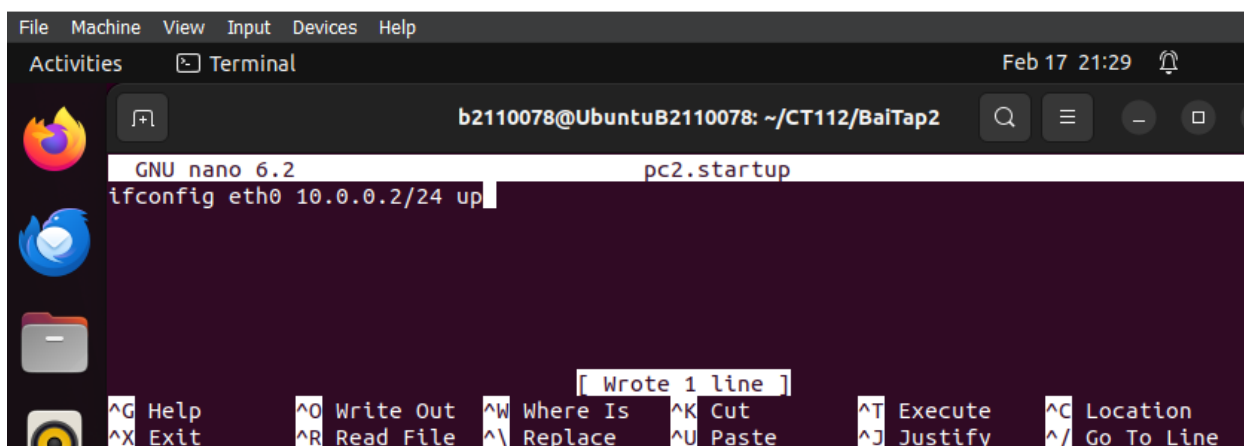
```
File Machine View Input Devices Help
Activities Terminal Feb 17 21:27

b2110078@UbuntuB2110078: ~/CT112/BaiTap2

GNU nano 6.2 pc1.startup
ifconfig eth0 10.0.0.1/24 up

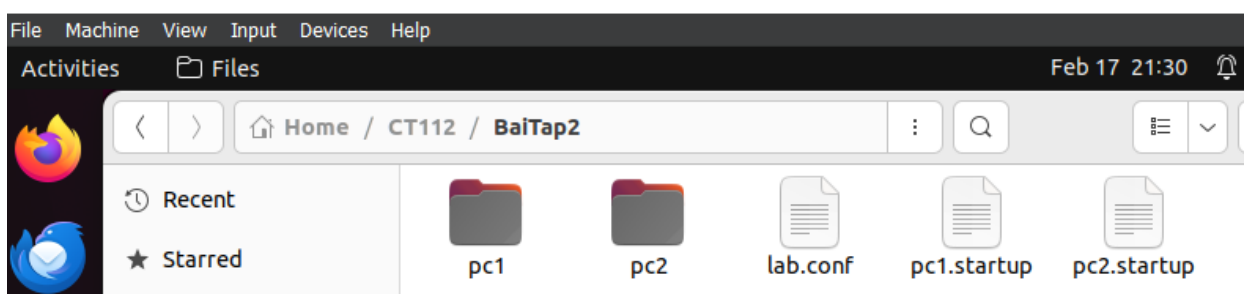
[ Wrote 1 line ]
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^_ Go To Line
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

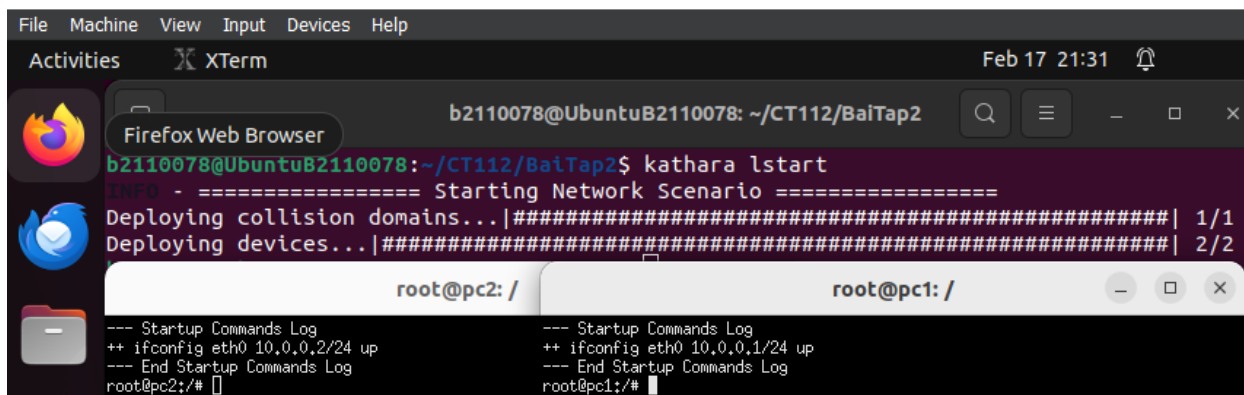


The screenshot shows a terminal window titled "b2110078@UbuntuB2110078: ~/CT112/BaiTap2". The terminal is running the GNU nano 6.2 text editor, editing a file named "pc2.startup". The current line of code is "ifconfig eth0 10.0.0.2/24 up". The nano editor's status bar at the bottom indicates "Wrote 1 line". The terminal window is part of the UbuntuB2110078 virtual machine running in Oracle VM VirtualBox.

UbuntuB2110078 [Running] - Oracle VM VirtualBox



UbuntuB2110078 [Running] - Oracle VM VirtualBox



UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities XTerm

root@pc1: /

--- Startup Commands Log
++ ifconfig eth0 10.0.0.1/24 up
--- End Startup Commands Log
root@pc1:/# ping 10.0.0.2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=1.07 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.168 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.411 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.635 ms
64 bytes from 10.0.0.2: icmp_seq=5 ttl=64 time=0.423 ms
64 bytes from 10.0.0.2: icmp_seq=6 ttl=64 time=0.383 ms
^Z
[1]+  Stopped                  ping 10.0.0.2
root@pc1:/#
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities XTerm

root@pc2: /

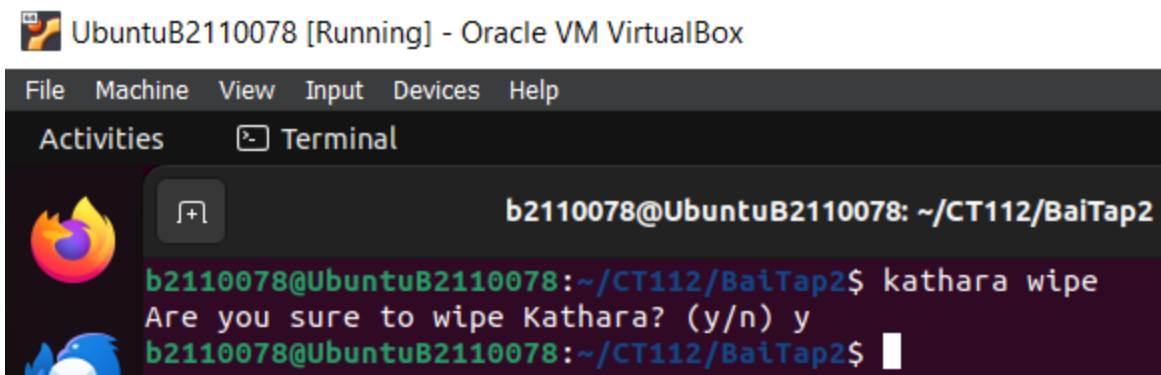
--- Startup Commands Log
++ ifconfig eth0 10.0.0.2/24 up
--- End Startup Commands Log
root@pc2:/# traceroute 10.0.0.1
traceroute to 10.0.0.1 (10.0.0.1), 30 hops max, 60 byte packets
 1 10.0.0.1 (10.0.0.1) 0.848 ms 1.124 ms 1.267 ms
root@pc2:/#
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities XTerm

root@pc1: /

root@pc1:/# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.0 0.0.0.0 255.255.255.0 U 0 0 0 eth0
root@pc1:/#
```



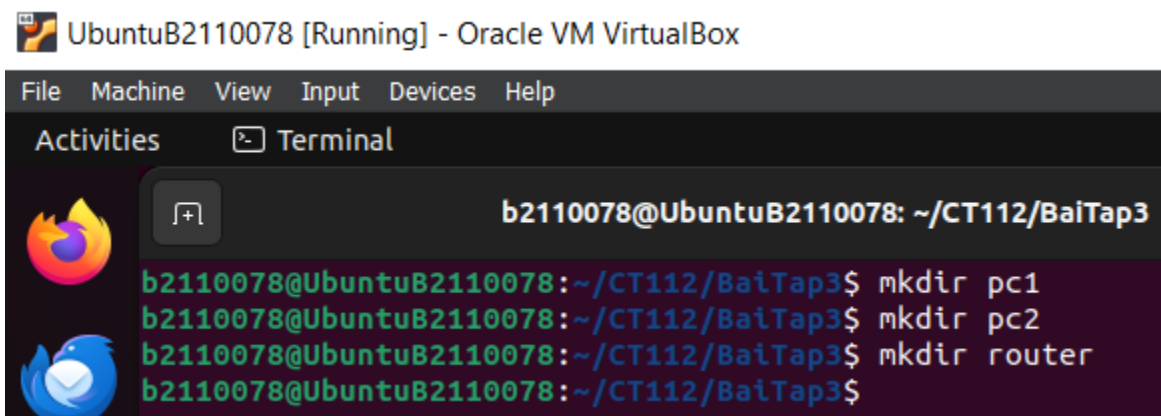
UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities Terminal

b2110078@UbuntuB2110078: ~/CT112/BaiTap2

b2110078@UbuntuB2110078:~/CT112/BaiTap2$ kathara wipe
Are you sure to wipe Kathara? (y/n) y
b2110078@UbuntuB2110078:~/CT112/BaiTap2$
```

Bài 3:

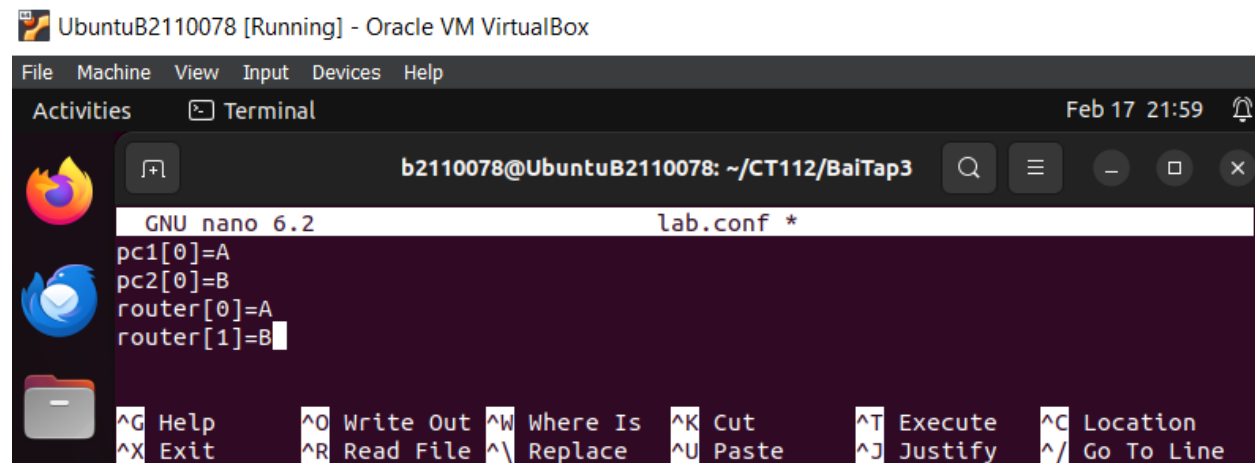


UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities Terminal

b2110078@UbuntuB2110078: ~/CT112/BaiTap3

b2110078@UbuntuB2110078:~/CT112/BaiTap3$ mkdir pc1
b2110078@UbuntuB2110078:~/CT112/BaiTap3$ mkdir pc2
b2110078@UbuntuB2110078:~/CT112/BaiTap3$ mkdir router
b2110078@UbuntuB2110078:~/CT112/BaiTap3$
```



UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities Terminal Feb 17 21:59

b2110078@UbuntuB2110078: ~/CT112/BaiTap3

GNU nano 6.2 lab.conf *
pc1[0]=A
pc2[0]=B
router[0]=A
router[1]=B

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute  ^C Location
^X Exit      ^R Read File ^\ Replace  ^U Paste    ^J Justify  ^_ Go To Line
```


UbuntuB2110078 [Running] - Oracle VM VirtualBox

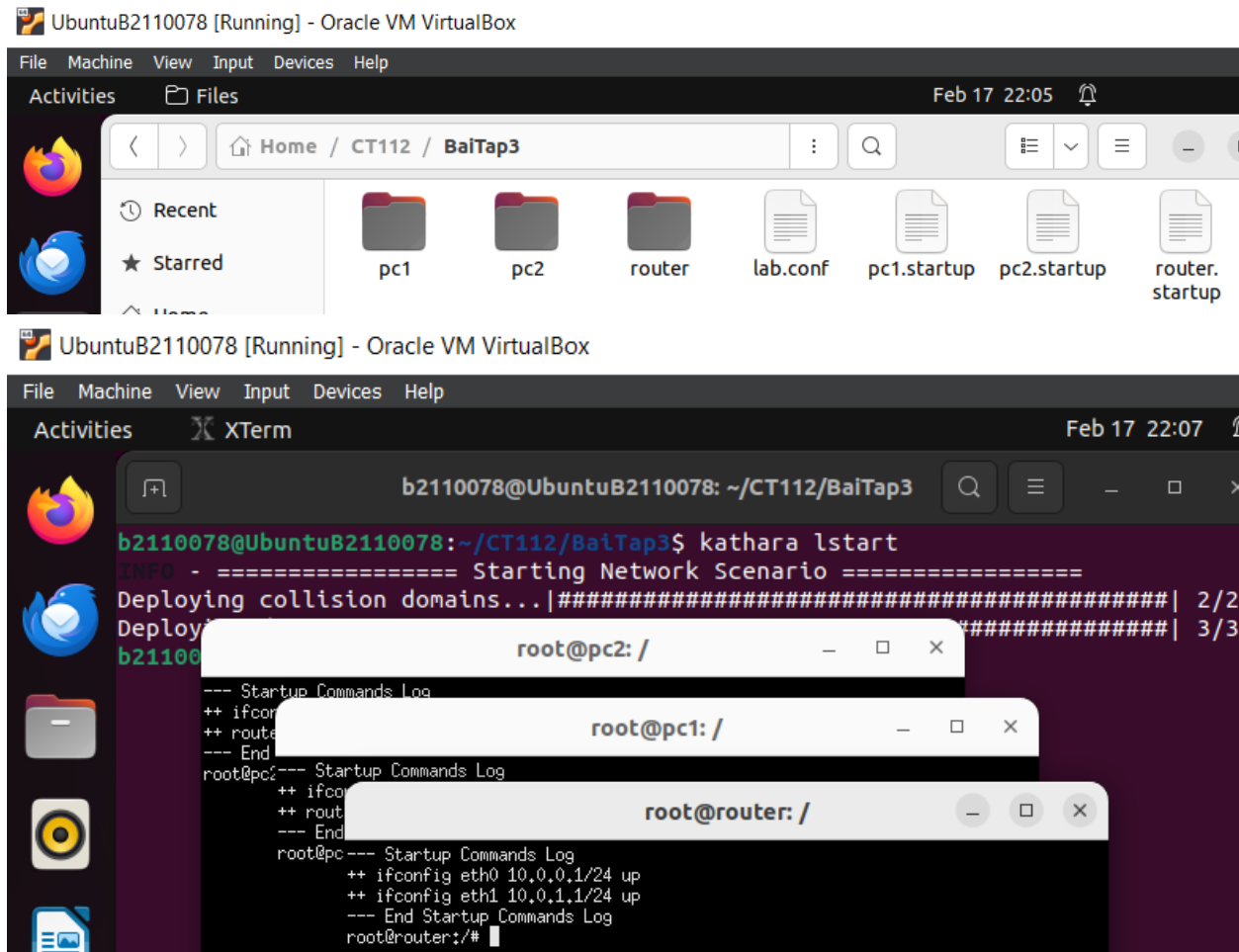
```
File Machine View Input Devices Help
Activities Terminal Feb 17 22:03
b2110078@UbuntuB2110078: ~/CT112/BaiTap3
GNU nano 6.2 pc1.startup
ifconfig eth0 10.0.0.101/24 up
route add default gw 10.0.0.1
[Wrote 2 lines]
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities Terminal Feb 17 22:02
b2110078@UbuntuB2110078: ~/CT112/BaiTap3
GNU nano 6.2 pc2.startup
ifconfig eth0 10.0.1.101/24 up
route add default gw 10.0.1.1
[Wrote 2 lines]
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities Terminal Feb 17 22:04
b2110078@UbuntuB2110078: ~/CT112/BaiTap3
GNU nano 6.2 router.startup
ifconfig eth0 10.0.0.1/24 up
ifconfig eth1 10.0.1.1/24 up
[Wrote 2 lines]
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line
```



UbuntuB2110078 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities XTerm

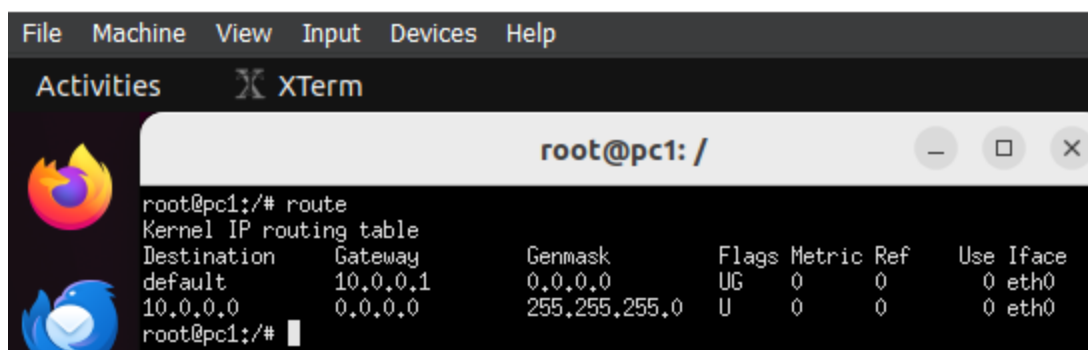
```
root@pc1: /
root@pc1:/# ping -c 3 10.0.1.101
PING 10.0.1.101 (10.0.1.101) 56(84) bytes of data.
64 bytes from 10.0.1.101: icmp_seq=1 ttl=63 time=0.935 ms
64 bytes from 10.0.1.101: icmp_seq=2 ttl=63 time=0.630 ms
64 bytes from 10.0.1.101: icmp_seq=3 ttl=63 time=0.882 ms

--- 10.0.1.101 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2026ms
rtt min/avg/max/mdev = 0.630/0.815/0.935/0.133 ms
root@pc1:/# ping -c 3 10.0.0.1
PING 10.0.0.1 (10.0.0.1) 56(84) bytes of data.
64 bytes from 10.0.0.1: icmp_seq=1 ttl=64 time=0.713 ms
64 bytes from 10.0.0.1: icmp_seq=2 ttl=64 time=0.202 ms
64 bytes from 10.0.0.1: icmp_seq=3 ttl=64 time=0.396 ms

--- 10.0.0.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2193ms
rtt min/avg/max/mdev = 0.202/0.437/0.713/0.210 ms
root@pc1:/# ping -c 3 10.0.1.1
PING 10.0.1.1 (10.0.1.1) 56(84) bytes of data.
64 bytes from 10.0.1.1: icmp_seq=1 ttl=64 time=0.441 ms
64 bytes from 10.0.1.1: icmp_seq=2 ttl=64 time=0.318 ms
64 bytes from 10.0.1.1: icmp_seq=3 ttl=64 time=0.236 ms

--- 10.0.1.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2052ms
rtt min/avg/max/mdev = 0.236/0.331/0.441/0.084 ms
root@pc1:/#
```

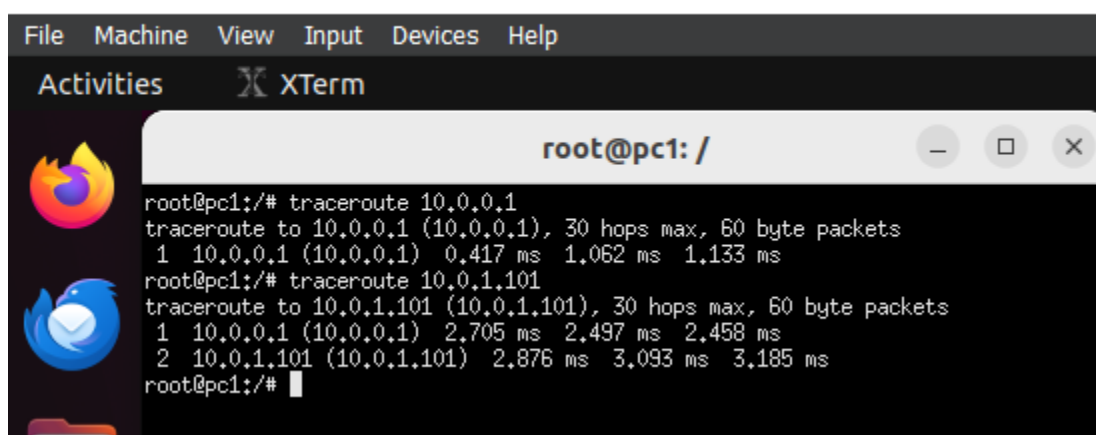
UbuntuB2110078 [Running] - Oracle VM VirtualBox



The screenshot shows an XTerm window titled 'root@pc1: /'. The terminal output displays the kernel IP routing table. The table has columns: Destination, Gateway, Genmask, Flags, Metric, Ref, Use, and Iface. There are two entries: a default route to 10.0.0.1 via eth0, and a specific route to 10.0.0.0 via eth0.

```
root@pc1:/# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default 10.0.0.1 0.0.0.0 UG 0 0 0 eth0
10.0.0.0 0.0.0.0 255.255.255.0 U 0 0 0 eth0
root@pc1:/#
```

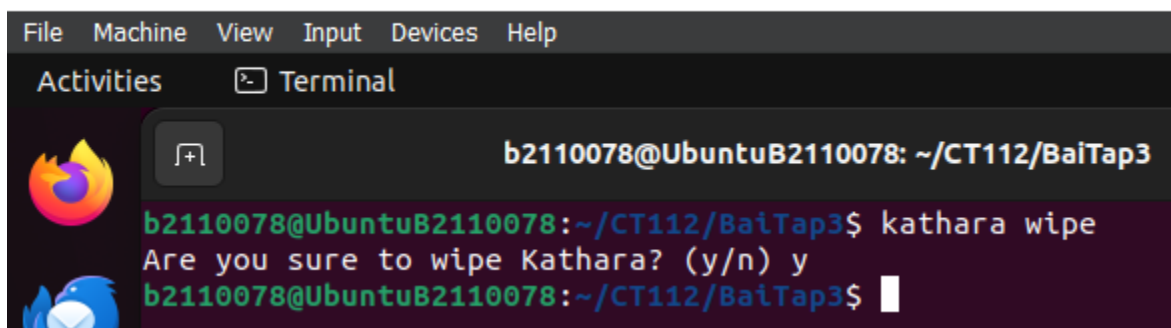
UbuntuB2110078 [Running] - Oracle VM VirtualBox



The screenshot shows an XTerm window titled 'root@pc1: /'. The terminal output displays the results of two traceroute commands. The first command is 'traceroute 10.0.0.1', showing a single hop to 10.0.0.1. The second command is 'traceroute 10.0.1.101', showing two hops: 10.0.0.1 and then 10.0.1.101.

```
root@pc1:/# traceroute 10.0.0.1
traceroute to 10.0.0.1 (10.0.0.1), 30 hops max, 60 byte packets
 1 10.0.0.1 (10.0.0.1) 0.417 ms 1.062 ms 1.133 ms
root@pc1:/# traceroute 10.0.1.101
traceroute to 10.0.1.101 (10.0.1.101), 30 hops max, 60 byte packets
 1 10.0.0.1 (10.0.0.1) 2.705 ms 2.497 ms 2.458 ms
 2 10.0.1.101 (10.0.1.101) 2.876 ms 3.093 ms 3.185 ms
root@pc1:/#
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

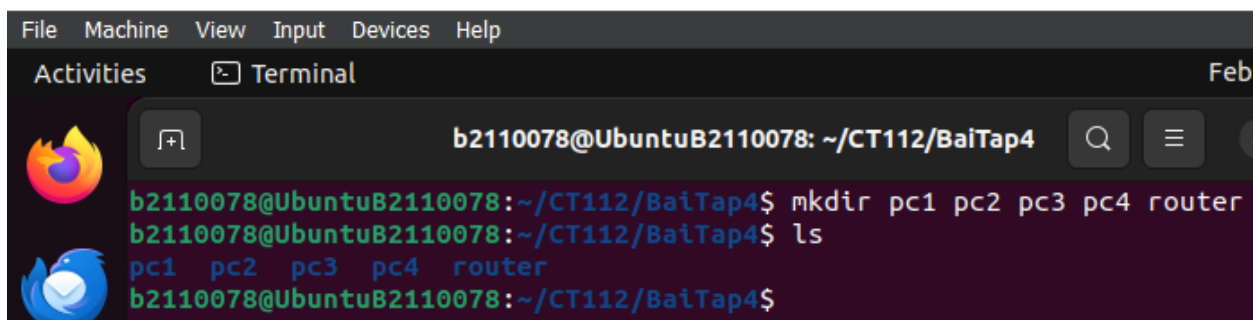


The screenshot shows a Terminal window titled 'b2110078@UbuntuB2110078: ~/CT112/BaiTap3'. The terminal output shows the command 'kathara wipe' being executed, followed by a confirmation prompt 'Are you sure to wipe Kathara? (y/n)' which is answered with 'y'.

```
b2110078@UbuntuB2110078: ~/CT112/BaiTap3$ kathara wipe
Are you sure to wipe Kathara? (y/n) y
b2110078@UbuntuB2110078: ~/CT112/BaiTap3$
```

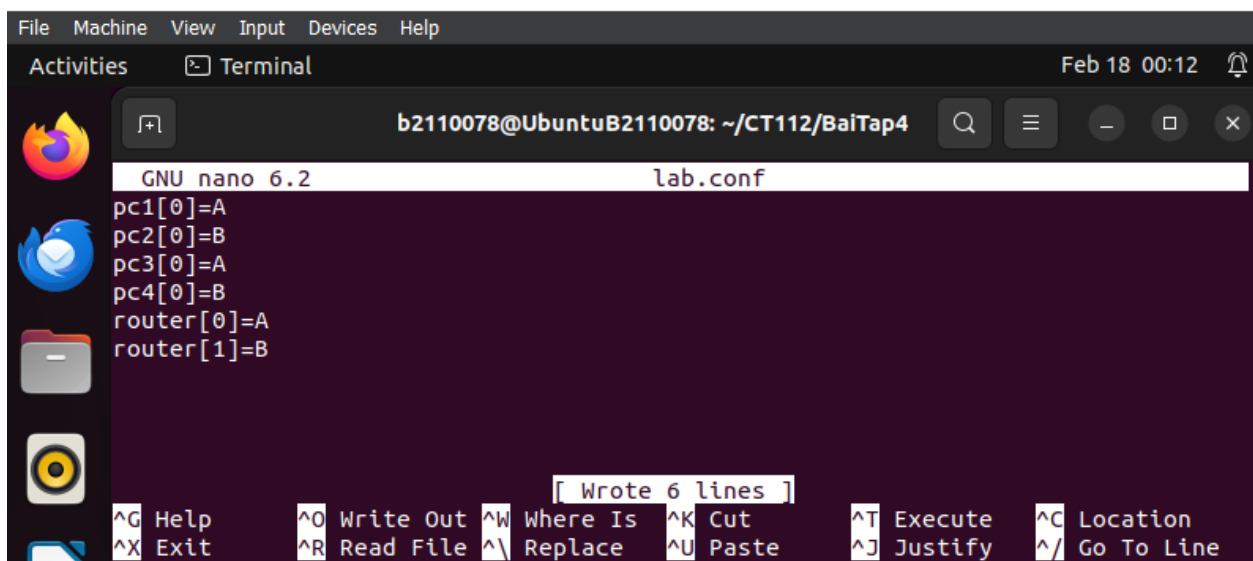
Bài 4:

UbuntuB2110078 [Running] - Oracle VM VirtualBox



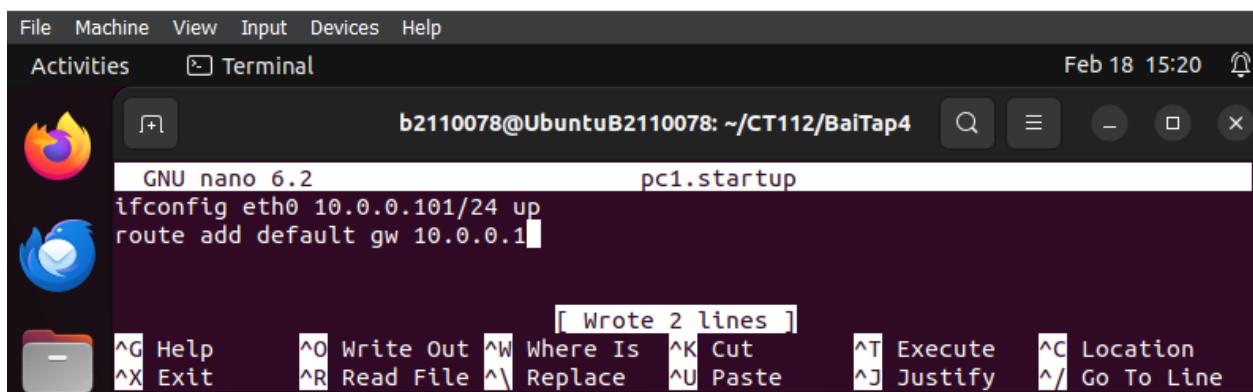
```
File Machine View Input Devices Help
Activities Terminal
b2110078@UbuntuB2110078: ~/CT112/BaiTap4
b2110078@UbuntuB2110078:~/CT112/BaiTap4$ mkdir pc1 pc2 pc3 pc4 router
b2110078@UbuntuB2110078:~/CT112/BaiTap4$ ls
pc1 pc2 pc3 pc4 router
b2110078@UbuntuB2110078:~/CT112/BaiTap4$
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox



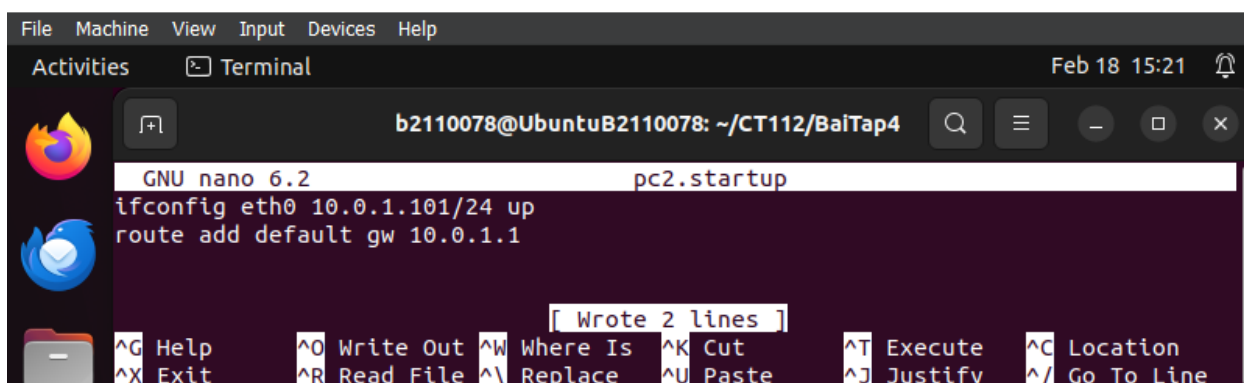
```
File Machine View Input Devices Help
Activities Terminal
b2110078@UbuntuB2110078: ~/CT112/BaiTap4
GNU nano 6.2 lab.conf
pc1[0]=A
pc2[0]=B
pc3[0]=A
pc4[0]=B
router[0]=A
router[1]=B
[ Wrote 6 lines ]
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox



```
File Machine View Input Devices Help
Activities Terminal
b2110078@UbuntuB2110078: ~/CT112/BaiTap4
GNU nano 6.2 pc1.startup
ifconfig eth0 10.0.0.101/24 up
route add default gw 10.0.0.1
[ Wrote 2 lines ]
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line
```

UbuntuB2110078 [Running] - Oracle VM VirtualBox

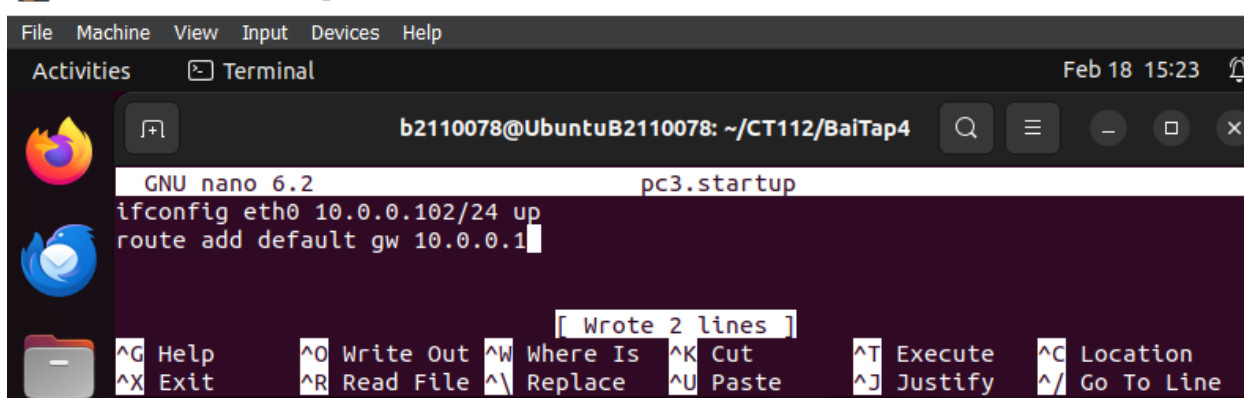


The screenshot shows a terminal window titled "b2110078@UbuntuB2110078: ~/CT112/BaiTap4". The terminal is running GNU nano 6.2 and editing a file named "pc2.startup". The content of the file is:

```
ifconfig eth0 10.0.1.101/24 up
route add default gw 10.0.1.1
```

The terminal interface includes a menu bar with options: ^G Help, ^O Write Out, ^W Where Is, ^K Cut, ^T Execute, ^C Location, ^X Exit, ^R Read File, ^\ Replace, ^U Paste, ^J Justify, and ^_ Go To Line. A status bar at the bottom indicates "Wrote 2 lines".

UbuntuB2110078 [Running] - Oracle VM VirtualBox

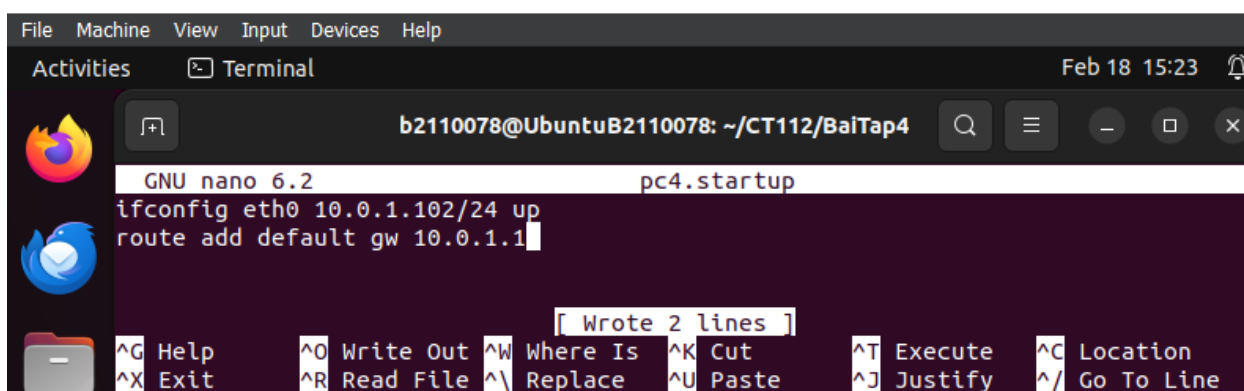


The screenshot shows a terminal window titled "b2110078@UbuntuB2110078: ~/CT112/BaiTap4". The terminal is running GNU nano 6.2 and editing a file named "pc3.startup". The content of the file is:

```
ifconfig eth0 10.0.0.102/24 up
route add default gw 10.0.0.1
```

The terminal interface includes a menu bar with options: ^G Help, ^O Write Out, ^W Where Is, ^K Cut, ^T Execute, ^C Location, ^X Exit, ^R Read File, ^\ Replace, ^U Paste, ^J Justify, and ^_ Go To Line. A status bar at the bottom indicates "Wrote 2 lines".

UbuntuB2110078 [Running] - Oracle VM VirtualBox

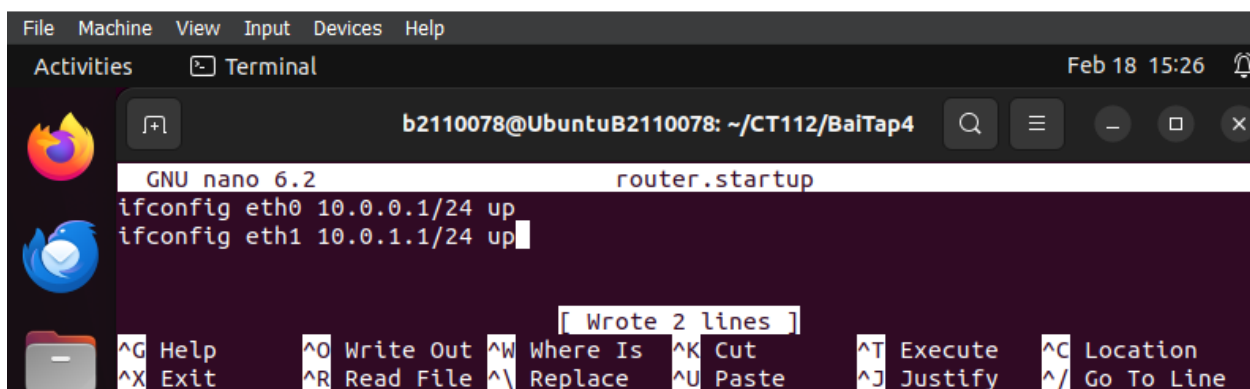


The screenshot shows a terminal window titled "b2110078@UbuntuB2110078: ~/CT112/BaiTap4". The terminal is running GNU nano 6.2 and editing a file named "pc4.startup". The content of the file is:

```
ifconfig eth0 10.0.1.102/24 up
route add default gw 10.0.1.1
```

The terminal interface includes a menu bar with options: ^G Help, ^O Write Out, ^W Where Is, ^K Cut, ^T Execute, ^C Location, ^X Exit, ^R Read File, ^\ Replace, ^U Paste, ^J Justify, and ^_ Go To Line. A status bar at the bottom indicates "Wrote 2 lines".

UbuntuB2110078 [Running] - Oracle VM VirtualBox

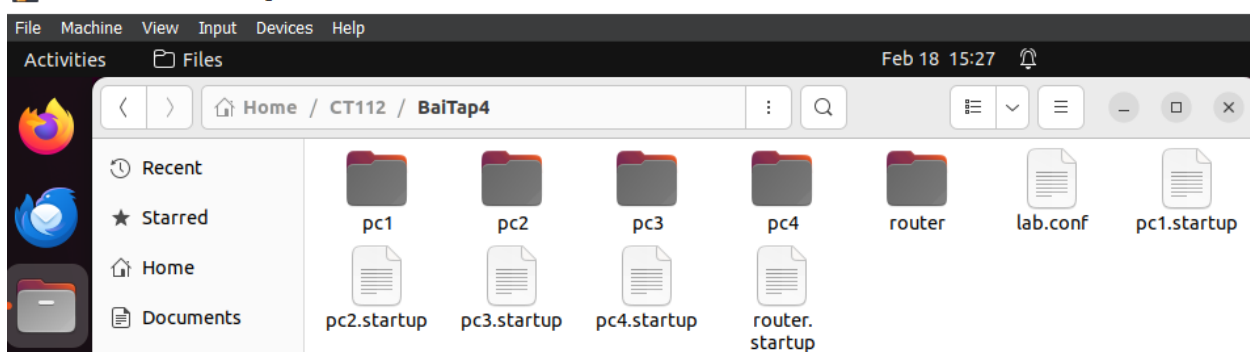


The screenshot shows a terminal window titled "b2110078@UbuntuB2110078: ~/CT112/BaiTap4". The user is using the GNU nano 6.2 text editor to edit a file named "router.startup". The content of the file is as follows:

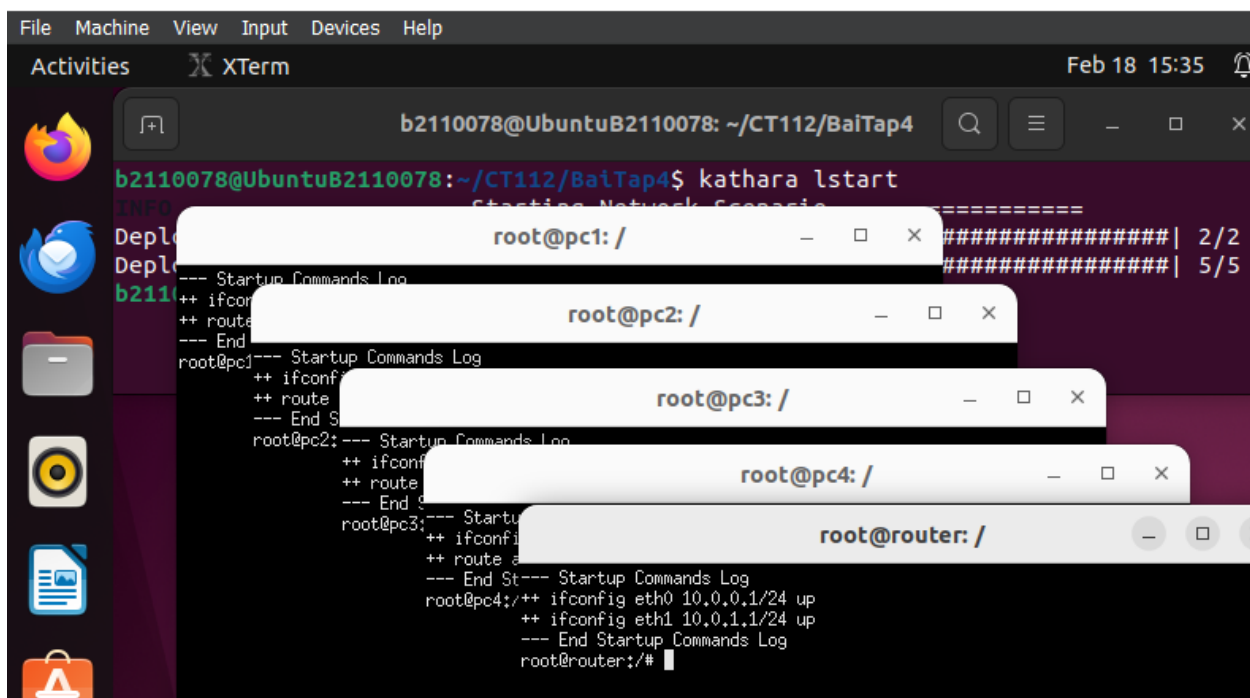
```
ifconfig eth0 10.0.0.1/24 up
ifconfig eth1 10.0.1.1/24 up
```

The terminal also displays a status bar at the bottom with various keyboard shortcuts for nano, such as "Wrote 2 lines", "Write Out", "Where Is", "Cut", "Execute", "Location", "Exit", "Read File", "Replace", "Paste", "Justify", and "Go To Line".

UbuntuB2110078 [Running] - Oracle VM VirtualBox



UbuntuB2110078 [Running] - Oracle VM VirtualBox



- ping pc3:

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities XTerm

root@pc1: /

root@pc1:/# ping -c 3 10.0.0.102
PING 10.0.0.102 (10.0.0.102) 56(84) bytes of data.
64 bytes from 10.0.0.102: icmp_seq=1 ttl=64 time=0.298 ms
64 bytes from 10.0.0.102: icmp_seq=2 ttl=64 time=0.418 ms
64 bytes from 10.0.0.102: icmp_seq=3 ttl=64 time=0.407 ms

--- 10.0.0.102 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2032ms
rtt min/avg/max/mdev = 0.298/0.374/0.418/0.054 ms
root@pc1:/#
```

- ping pc2 và pc4:

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities XTerm

root@pc1: /

root@pc1:/# ping -c 3 10.0.1.101
PING 10.0.1.101 (10.0.1.101) 56(84) bytes of data.
64 bytes from 10.0.1.101: icmp_seq=1 ttl=63 time=1.17 ms
64 bytes from 10.0.1.101: icmp_seq=2 ttl=63 time=0.487 ms
64 bytes from 10.0.1.101: icmp_seq=3 ttl=63 time=0.420 ms

--- 10.0.1.101 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 0.420/0.691/1.168/0.337 ms
root@pc1:/# ping -c 3 10.0.1.102
PING 10.0.1.102 (10.0.1.102) 56(84) bytes of data.
64 bytes from 10.0.1.102: icmp_seq=1 ttl=63 time=0.681 ms
64 bytes from 10.0.1.102: icmp_seq=2 ttl=63 time=0.424 ms
64 bytes from 10.0.1.102: icmp_seq=3 ttl=63 time=0.364 ms

--- 10.0.1.102 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2037ms
rtt min/avg/max/mdev = 0.364/0.489/0.681/0.137 ms
root@pc1:/#
```


- ping router:

UbuntuB2110078 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
Activities XTerm

root@pc1: /

root@pc1:~# ping -c 3 10.0.0.1
PING 10.0.0.1 (10.0.0.1) 56(84) bytes of data.
64 bytes from 10.0.0.1: icmp_seq=1 ttl=64 time=0.251 ms
64 bytes from 10.0.0.1: icmp_seq=2 ttl=64 time=0.290 ms
64 bytes from 10.0.0.1: icmp_seq=3 ttl=64 time=0.248 ms

--- 10.0.0.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2036ms
rtt min/avg/max/mdev = 0.248/0.263/0.290/0.019 ms
root@pc1:~# ping -c 3 10.0.1.1
PING 10.0.1.1 (10.0.1.1) 56(84) bytes of data.
64 bytes from 10.0.1.1: icmp_seq=1 ttl=64 time=0.318 ms
64 bytes from 10.0.1.1: icmp_seq=2 ttl=64 time=0.373 ms
64 bytes from 10.0.1.1: icmp_seq=3 ttl=64 time=0.405 ms

--- 10.0.1.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2033ms
rtt min/avg/max/mdev = 0.318/0.365/0.405/0.035 ms
root@pc1:~#
```

- route:


UbuntuB2110078 [Running] - Oracle VM VirtualBox

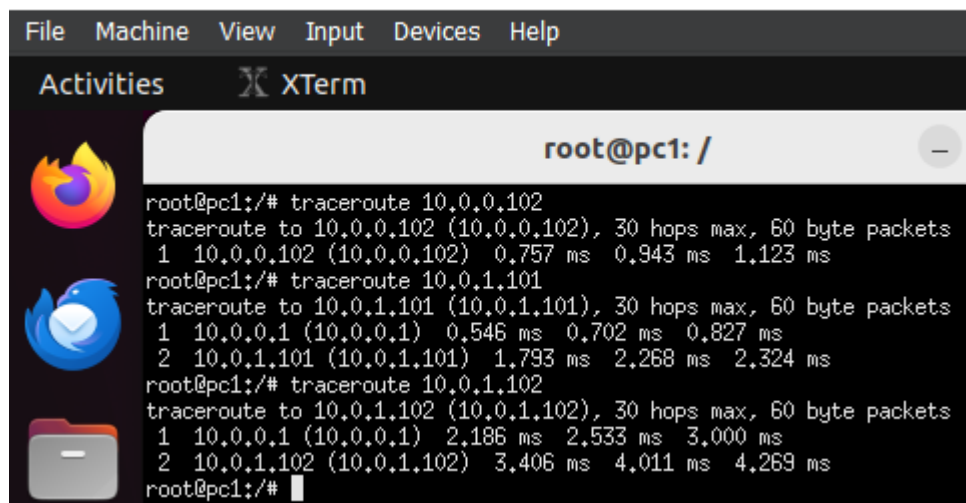
```
File Machine View Input Devices Help
Activities XTerm

root@pc1: /

root@pc1:~# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default 10.0.0.1 0.0.0.0 UG 0 0 0 eth0
10.0.0.0 0.0.0.0 255.255.255.0 U 0 0 0 eth0
root@pc1:~#
```

- traceroute:

 UbuntuB2110078 [Running] - Oracle VM VirtualBox




The screenshot shows an XTerm window titled "root@pc1: /". The terminal output displays three traceroute commands and their results:

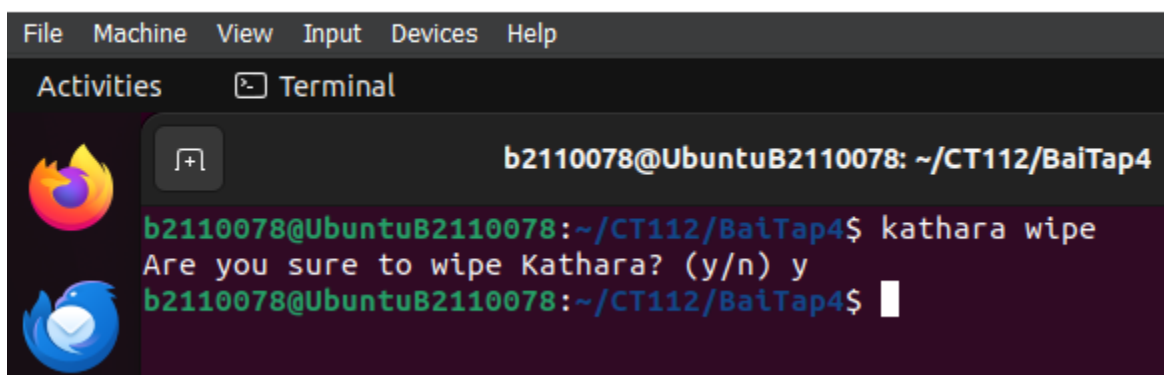
```
root@pc1:/# traceroute 10.0.0.102
traceroute to 10.0.0.102 (10.0.0.102), 30 hops max, 60 byte packets
 1 10.0.0.102 (10.0.0.102) 0.757 ms 0.943 ms 1.123 ms

root@pc1:/# traceroute 10.0.1.101
traceroute to 10.0.1.101 (10.0.1.101), 30 hops max, 60 byte packets
 1 10.0.0.1 (10.0.0.1) 0.546 ms 0.702 ms 0.827 ms
 2 10.0.1.101 (10.0.1.101) 1.793 ms 2.268 ms 2.324 ms

root@pc1:/# traceroute 10.0.1.102
traceroute to 10.0.1.102 (10.0.1.102), 30 hops max, 60 byte packets
 1 10.0.0.1 (10.0.0.1) 2.186 ms 2.533 ms 3.000 ms
 2 10.0.1.102 (10.0.1.102) 3.406 ms 4.011 ms 4.269 ms

root@pc1:/#
```

 UbuntuB2110078 [Running] - Oracle VM VirtualBox



The screenshot shows a Terminal window titled "b2110078@UbuntuB2110078: ~/CT112/BaiTap4". The terminal output shows the execution of the 'kathara wipe' command and a confirmation prompt:

```
b2110078@UbuntuB2110078:~/CT112/BaiTap4$ kathara wipe
Are you sure to wipe Kathara? (y/n) y
b2110078@UbuntuB2110078:~/CT112/BaiTap4$
```