Computer Network Security

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Section	D

Firewall Exploration Lab

Task 1: Implementing a Simple Firewall

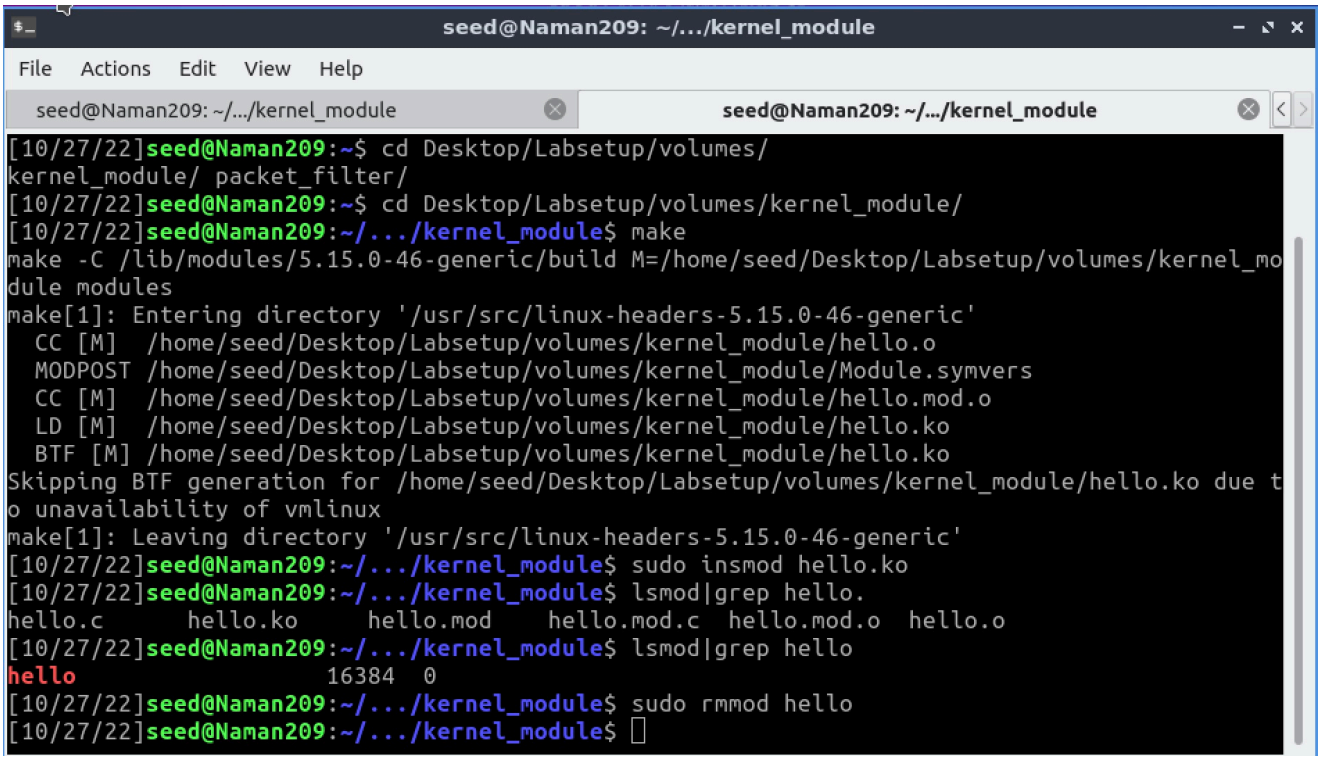
Task 1.A: Implement a Simple Kernel Module

C

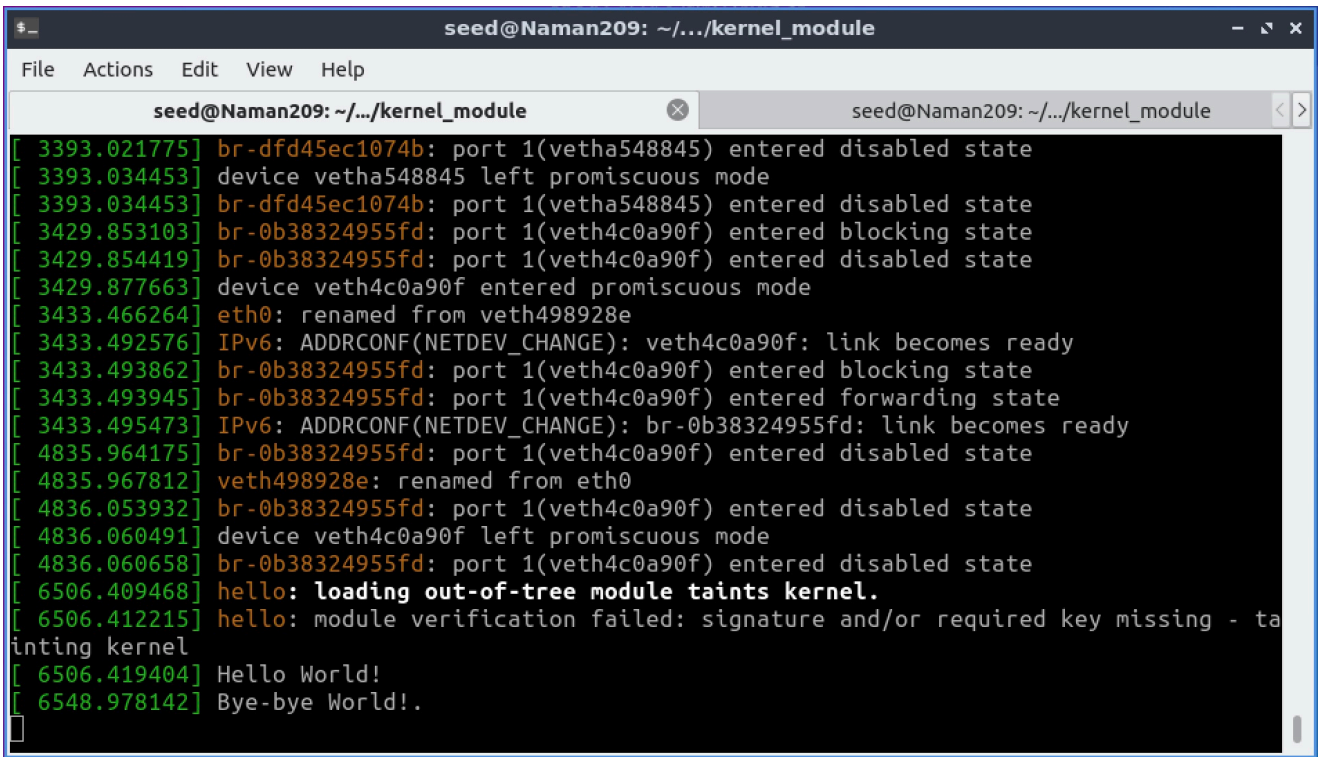
```c
#include <linux/module.h>
#include <linux/kernel.h>

int initialization(void)
{
    printk(KERN_INFO "Hello World!\n");
    return 0;
}

void cleanup(void)
{
    printk(KERN_INFO "Bye-bye World!.\n");
}

module_init(initialization);
module_exit(cleanup);

MODULE_LICENSE("GPL");
```

Bash

```bash
$ make
$ sudo insmod hello.ko (inserting a module) $ lsmod | grep hello (list modules)
$ sudo rmmod hello
```

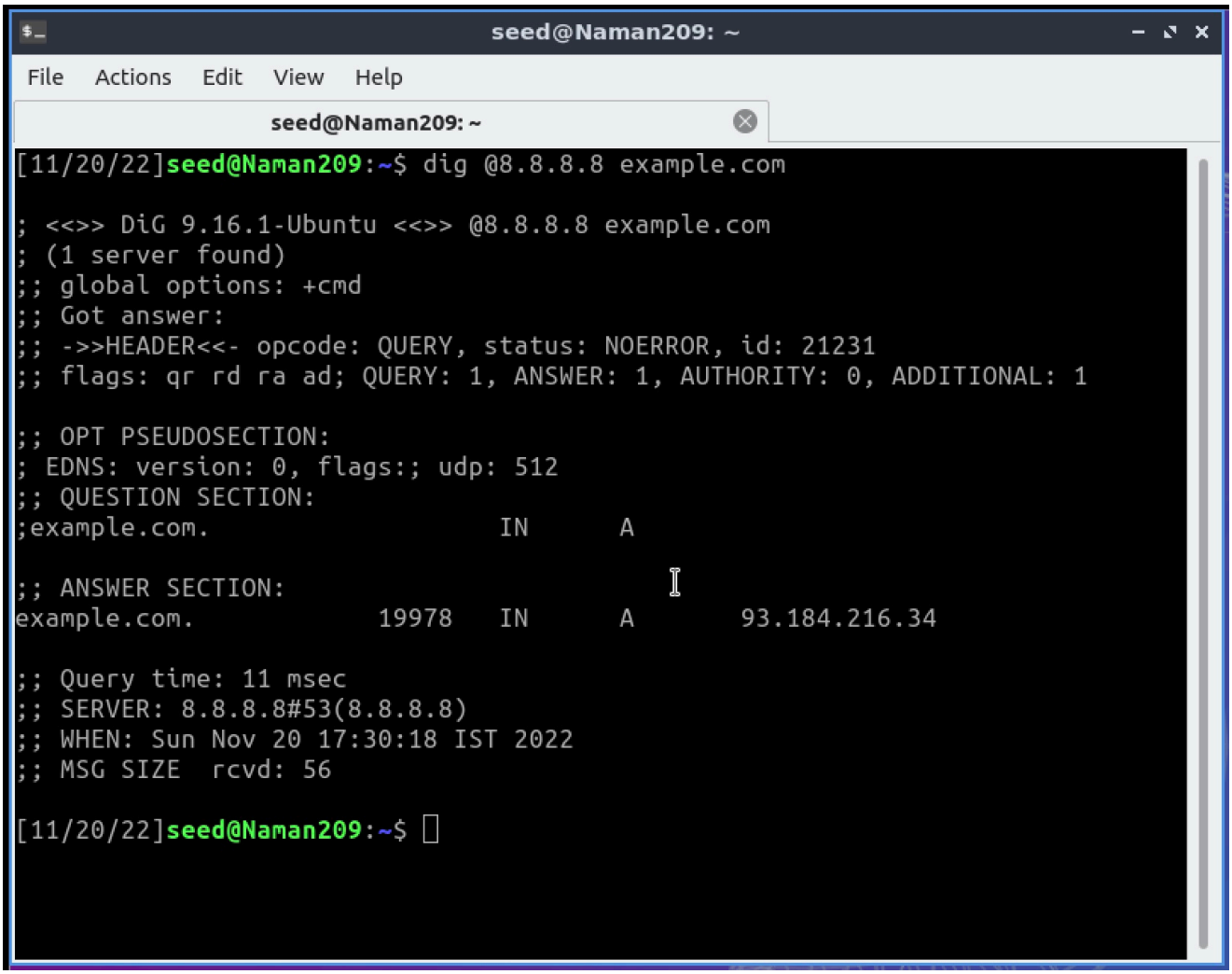



```bash
sudo dmesg -k -w
```



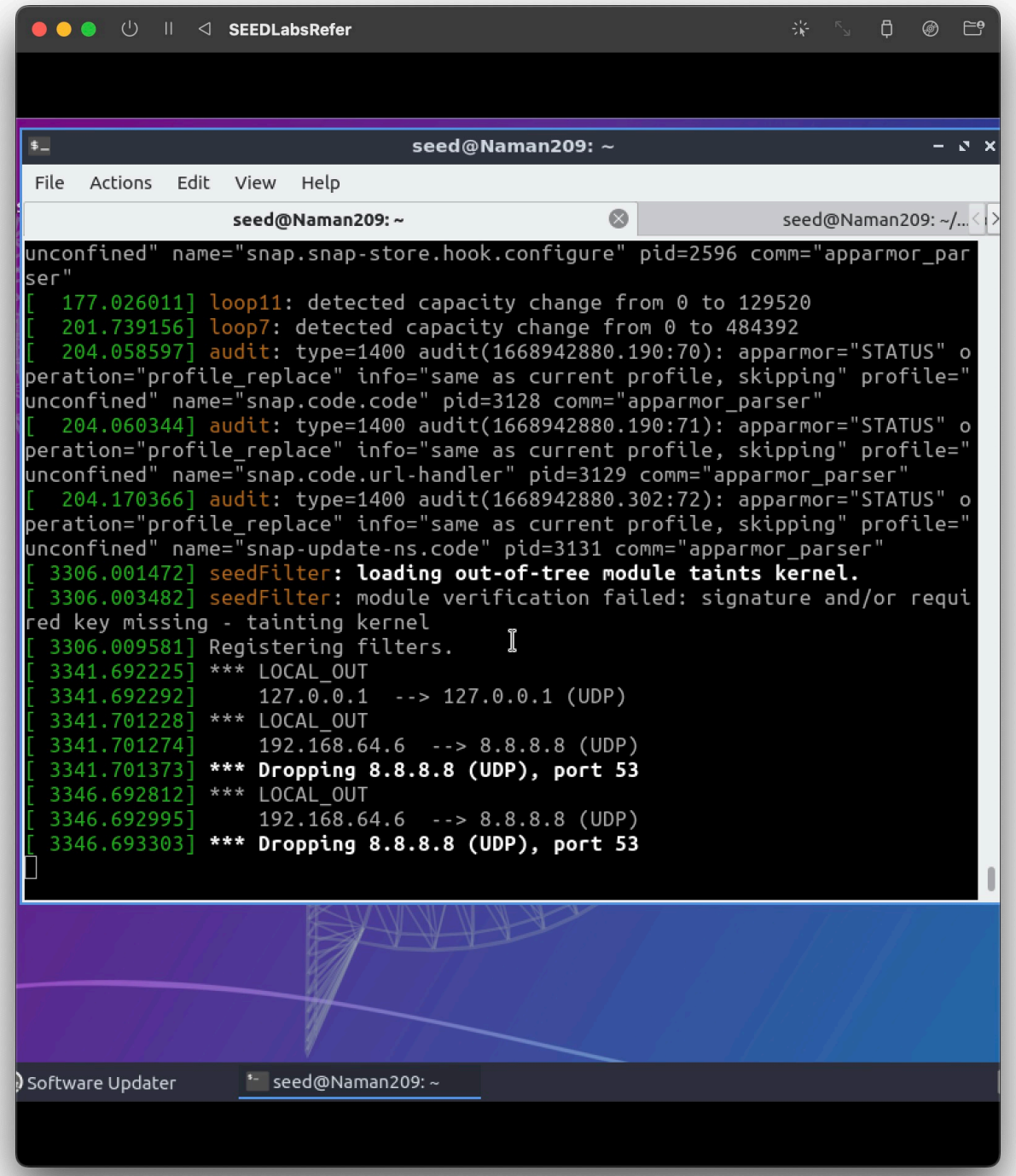
Task 1.B: Implement a Simple Firewall Using Netfilter

```bash
dig @8.8.8.8 www.example.com
```



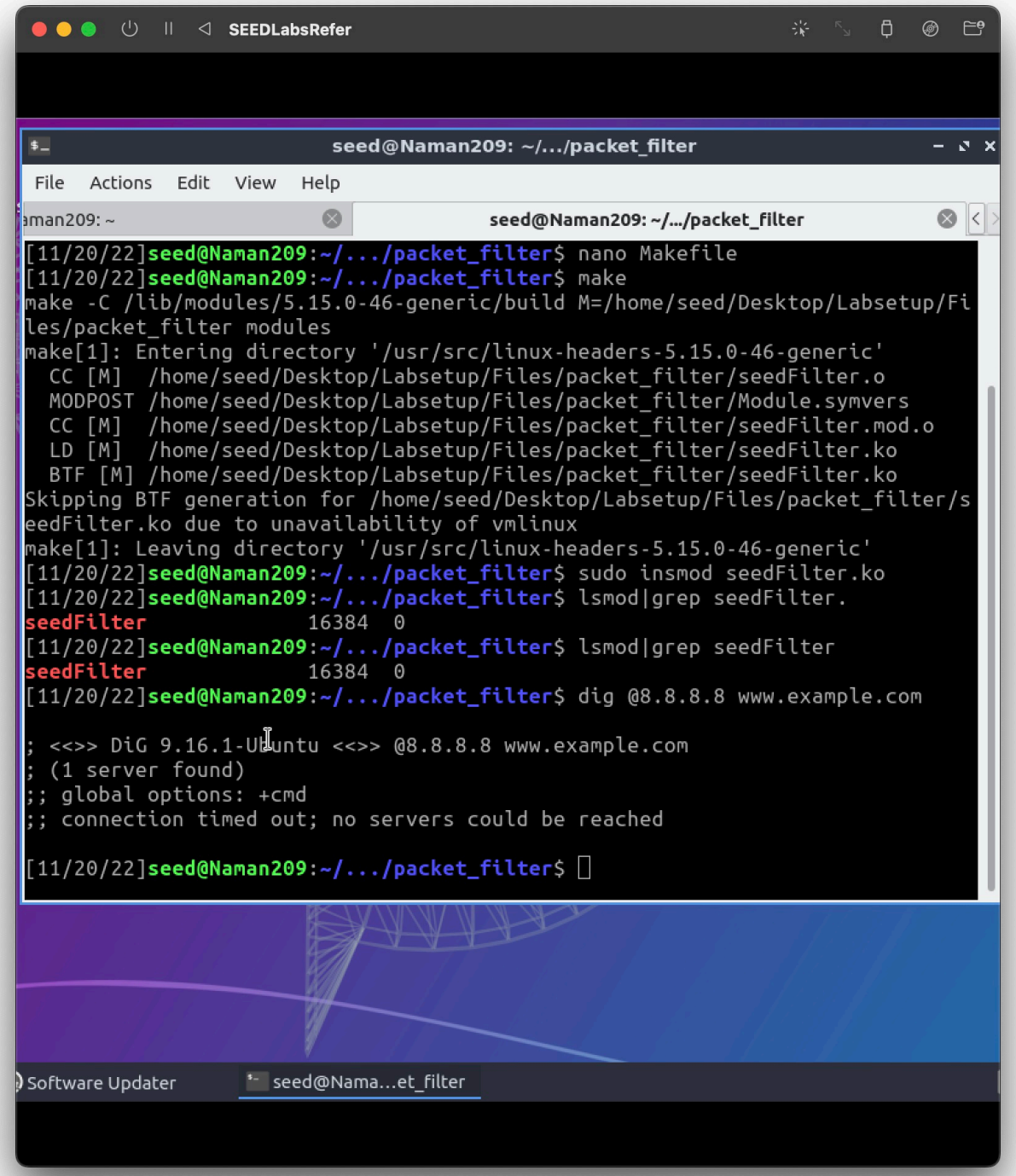
Bash

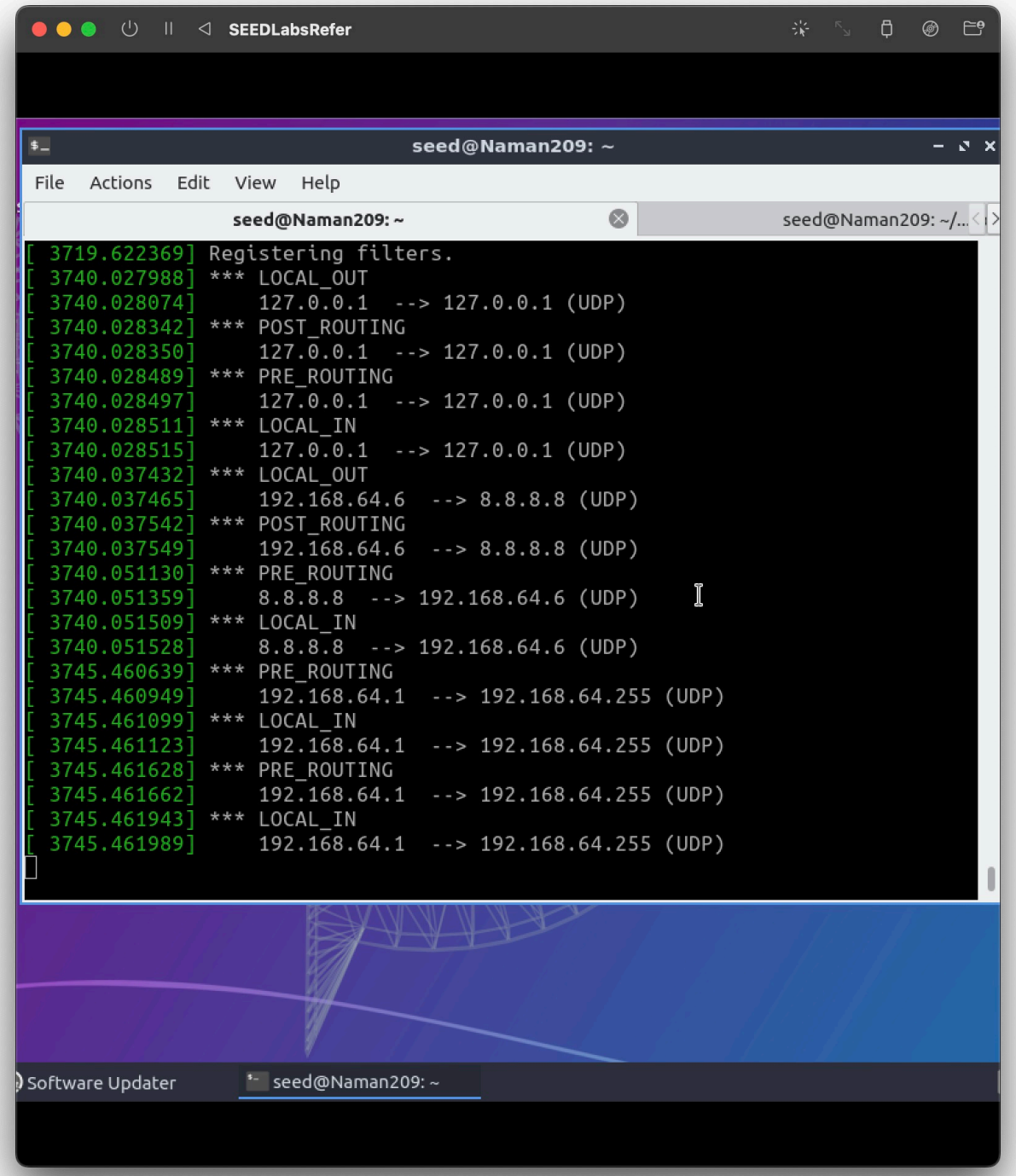
```
sudo dmesg -k -w
```



For seedFilter:

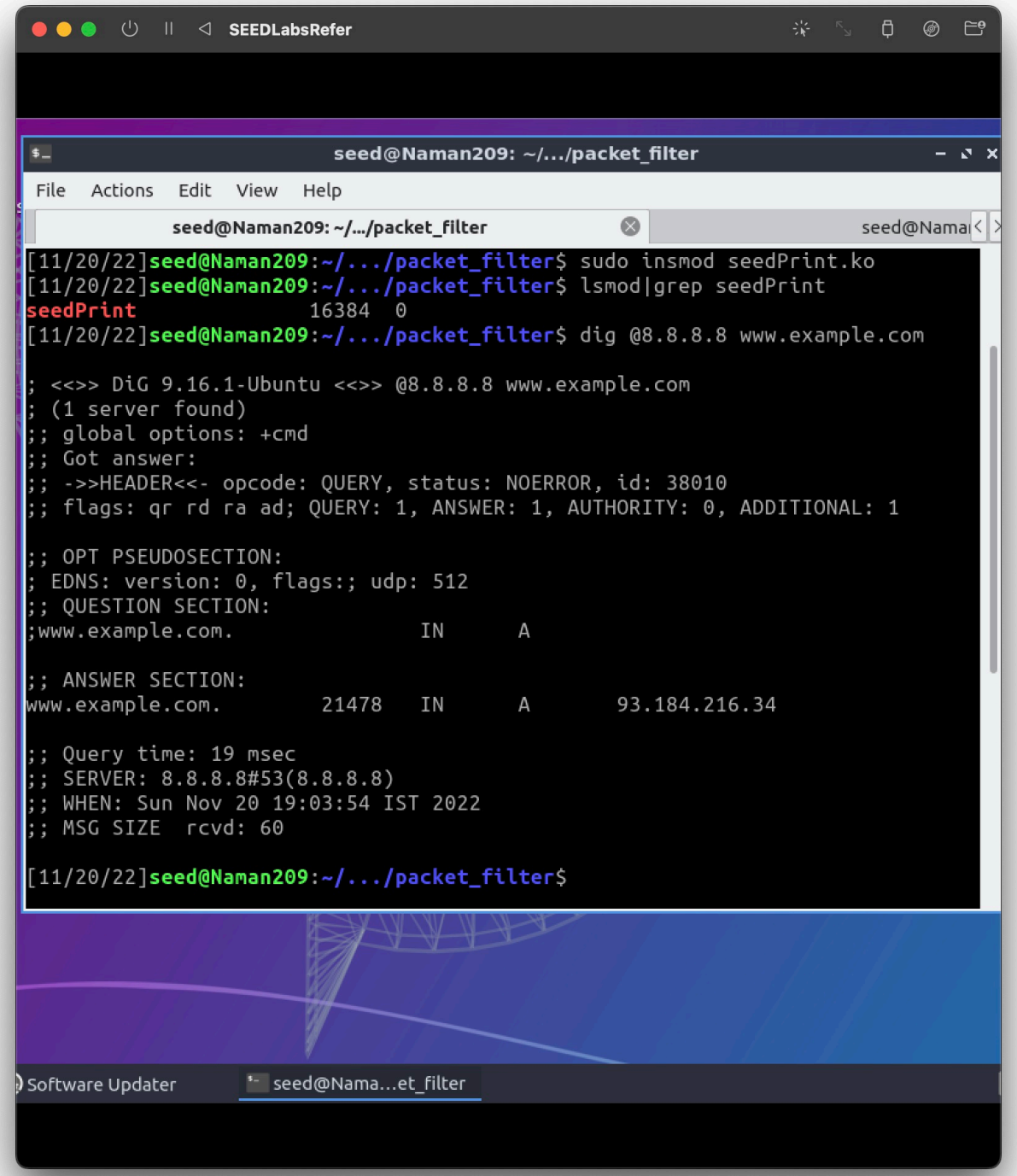
```Bash
$ make
$ sudo insmod seedFilter.ko
$ lsmod | grep seedFilter
```

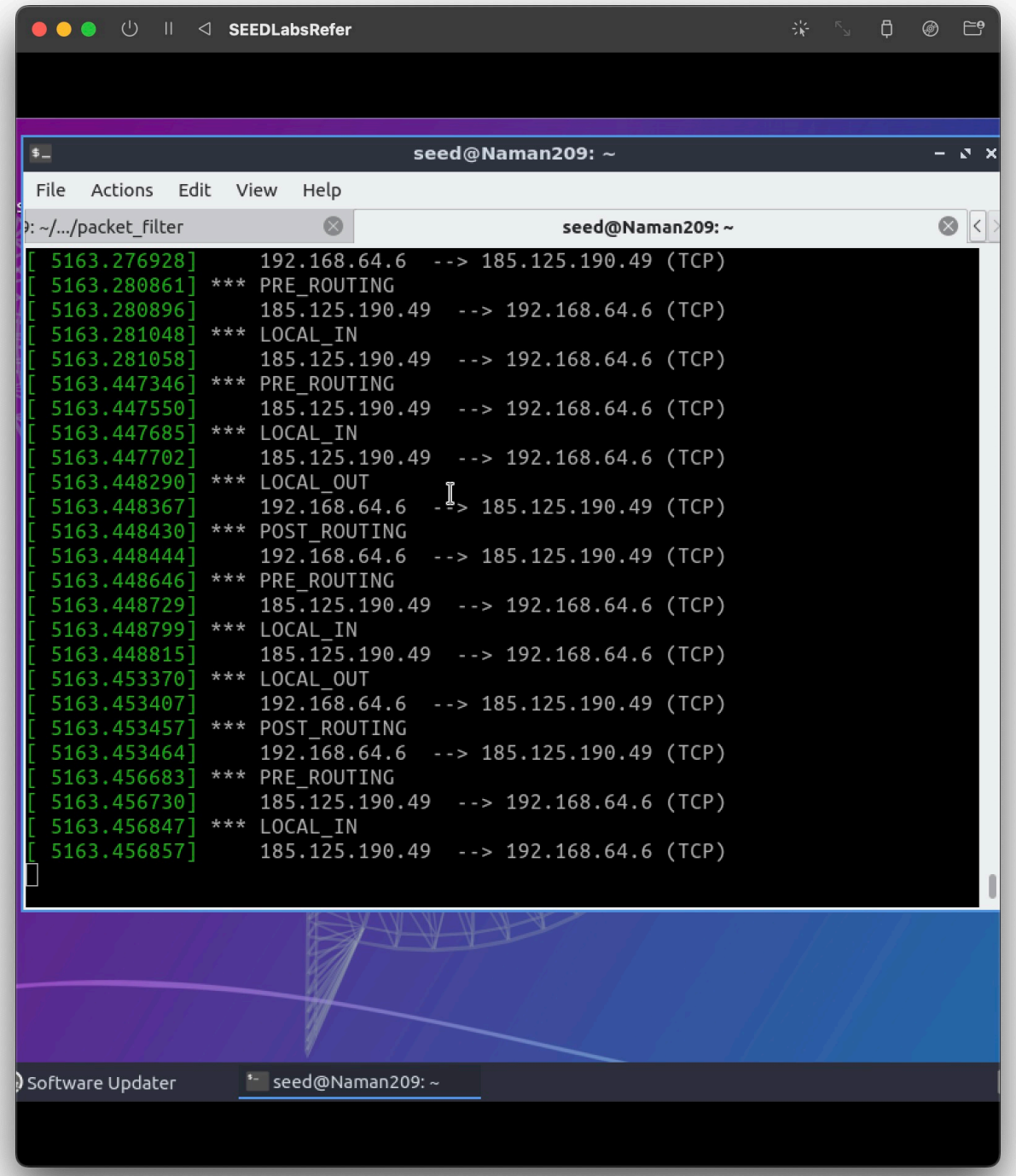

SEEDLabsRefer
seed@Naman209: ~/.../packet_filter
File Actions Edit View Help
aman209: ~
seed@Naman209: ~/.../packet_filter
[11/20/22]seed@Naman209:~/.../packet_filter$ nano Makefile
[11/20/22]seed@Naman209:~/.../packet_filter$ make
make -C /lib/modules/5.15.0-46-generic/build M=/home/seed/Desktop/Labsetup/Files/packet_filter modules
make[1]: Entering directory '/usr/src/linux-headers-5.15.0-46-generic'
CC [M] /home/seed/Desktop/Labsetup/Files/packet_filter/seedFilter.o
MODPOST /home/seed/Desktop/Labsetup/Files/packet_filter/Module.symvers
CC [M] /home/seed/Desktop/Labsetup/Files/packet_filter/seedFilter.mod.o
LD [M] /home/seed/Desktop/Labsetup/Files/packet_filter/seedFilter.ko
BTF [M] /home/seed/Desktop/Labsetup/Files/packet_filter/seedFilter.ko
Skipping BTF generation for /home/seed/Desktop/Labsetup/Files/packet_filter/seedFilter.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-5.15.0-46-generic'
[11/20/22]seed@Naman209:~/.../packet_filter$ sudo insmod seedFilter.ko
[11/20/22]seed@Naman209:~/.../packet_filter$ lsmod|grep seedFilter.
seedFilter 16384 0
[11/20/22]seed@Naman209:~/.../packet_filter$ lsmod|grep seedFilter
seedFilter 16384 0
[11/20/22]seed@Naman209:~/.../packet_filter$ dig @8.8.8.8 www.example.com
; <<>> DiG 9.16.1-Ubuntu <<>> @8.8.8.8 www.example.com
; (1 server found)
;; global options: +cmd
;; connection timed out; no servers could be reached
[11/20/22]seed@Naman209:~/.../packet_filter$
Software Updater
seed@Nama...et_filter



For seedPrint:

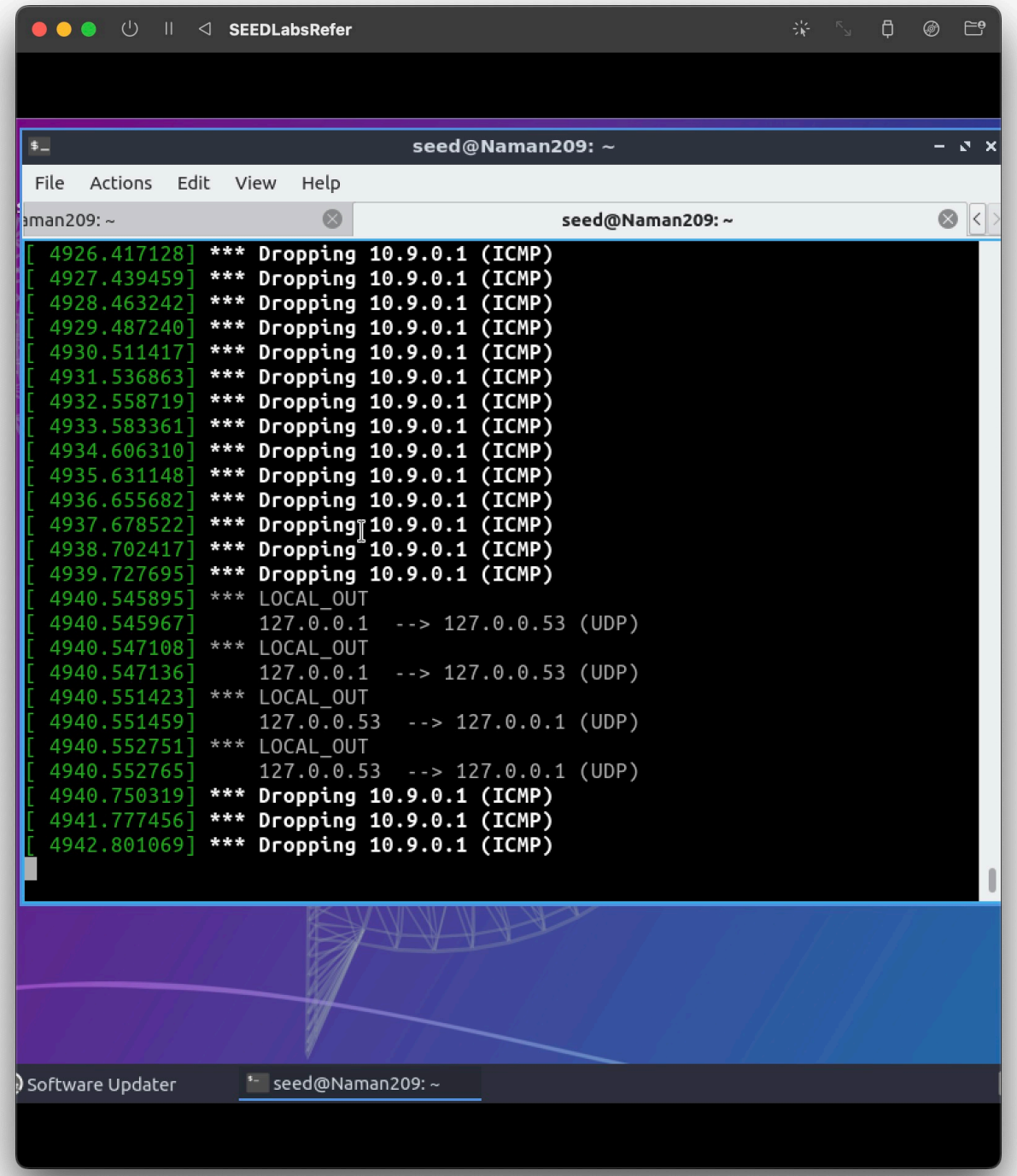
```bash
$ make
$ sudo insmod seedPrint.ko
$ lsmod | grep seedPrint
```

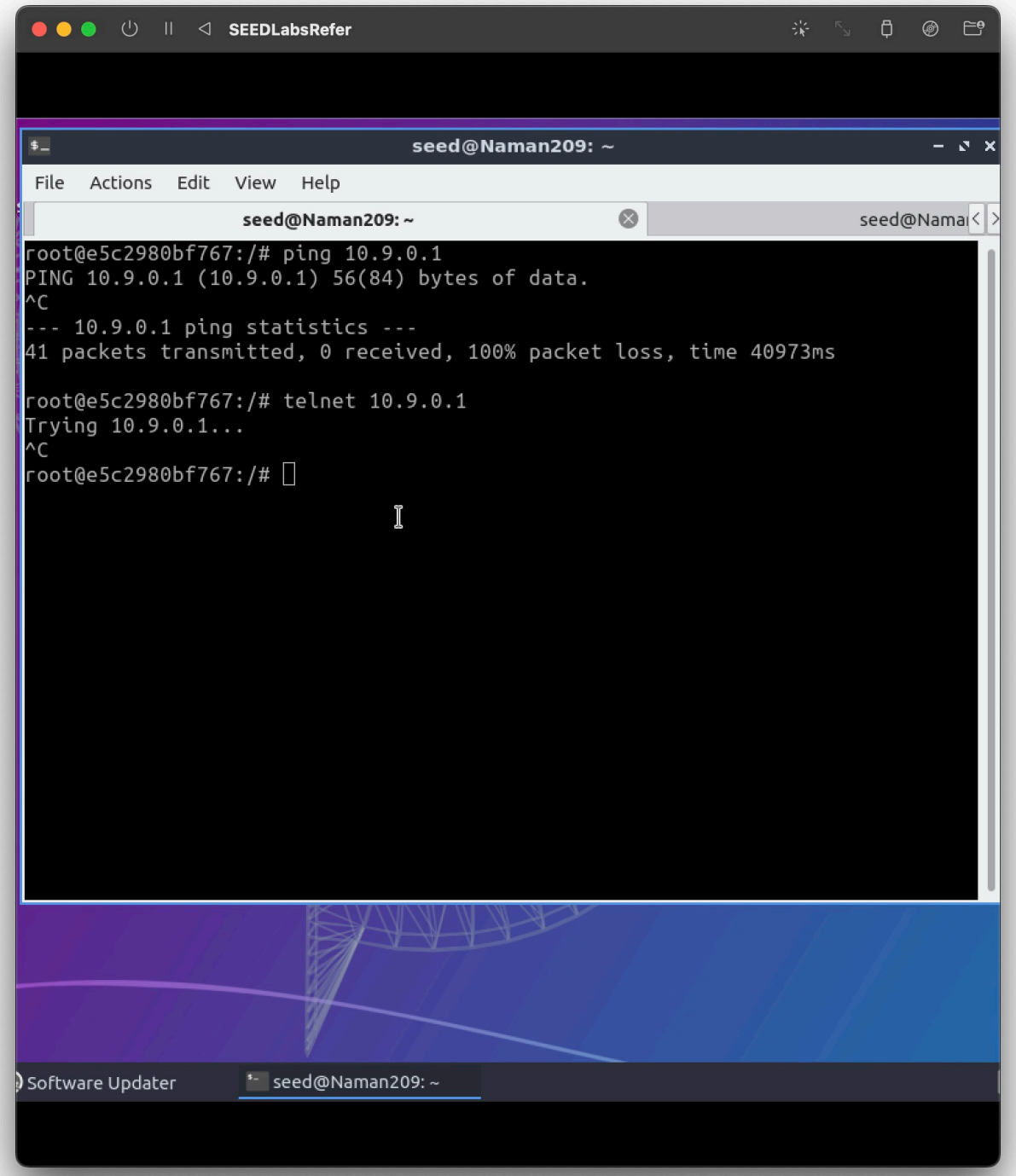

SEEDLabsRefer
seed@Naman209: ~/.../packet_filter
File Actions Edit View Help
seed@Naman209: ~/.../packet_filter
[11/20/22]seed@Naman209:~/.../packet_filter$ sudo insmod seedPrint.ko
[11/20/22]seed@Naman209:~/.../packet_filter$ lsmod|grep seedPrint
seedPrint 16384 0
[11/20/22]seed@Naman209:~/.../packet_filter$ dig @8.8.8.8 www.example.com
; <<>> DiG 9.16.1-Ubuntu <<>> @8.8.8.8 www.example.com
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 38010
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;www.example.com. IN A
;; ANSWER SECTION:
www.example.com. 21478 IN A 93.184.216.34
;; Query time: 19 msec
;; SERVER: 8.8.8.8#53(8.8.8.8)
;; WHEN: Sun Nov 20 19:03:54 IST 2022
;; MSG SIZE rcvd: 60
[11/20/22]seed@Naman209:~/.../packet_filter$
Software Updater
seed@Nama...et_filter



For seedBlock:

```bash
$ make
$ sudo insmod seedBlock.ko
$ lsmod | grep seedBlock
```


SEEDLabsRefer
seed@Naman209: ~
File Actions Edit View Help
aman209: ~
seed@Naman209: ~
[4926.417128] *** Dropping 10.9.0.1 (ICMP)
[4927.439459] *** Dropping 10.9.0.1 (ICMP)
[4928.463242] *** Dropping 10.9.0.1 (ICMP)
[4929.487240] *** Dropping 10.9.0.1 (ICMP)
[4930.511417] *** Dropping 10.9.0.1 (ICMP)
[4931.536863] *** Dropping 10.9.0.1 (ICMP)
[4932.558719] *** Dropping 10.9.0.1 (ICMP)
[4933.583361] *** Dropping 10.9.0.1 (ICMP)
[4934.606310] *** Dropping 10.9.0.1 (ICMP)
[4935.631148] *** Dropping 10.9.0.1 (ICMP)
[4936.655682] *** Dropping 10.9.0.1 (ICMP)
[4937.678522] *** Dropping 10.9.0.1 (ICMP)
[4938.702417] *** Dropping 10.9.0.1 (ICMP)
[4939.727695] *** Dropping 10.9.0.1 (ICMP)
[4940.545895] *** LOCAL_OUT
[4940.545967] 127.0.0.1 --> 127.0.0.53 (UDP)
[4940.547108] *** LOCAL_OUT
[4940.547136] 127.0.0.1 --> 127.0.0.53 (UDP)
[4940.551423] *** LOCAL_OUT
[4940.551459] 127.0.0.53 --> 127.0.0.1 (UDP)
[4940.552751] *** LOCAL_OUT
[4940.552765] 127.0.0.53 --> 127.0.0.1 (UDP)
[4940.750319] *** Dropping 10.9.0.1 (ICMP)
[4941.777456] *** Dropping 10.9.0.1 (ICMP)
[4942.801069] *** Dropping 10.9.0.1 (ICMP)
Software Updater
seed@Naman209: ~

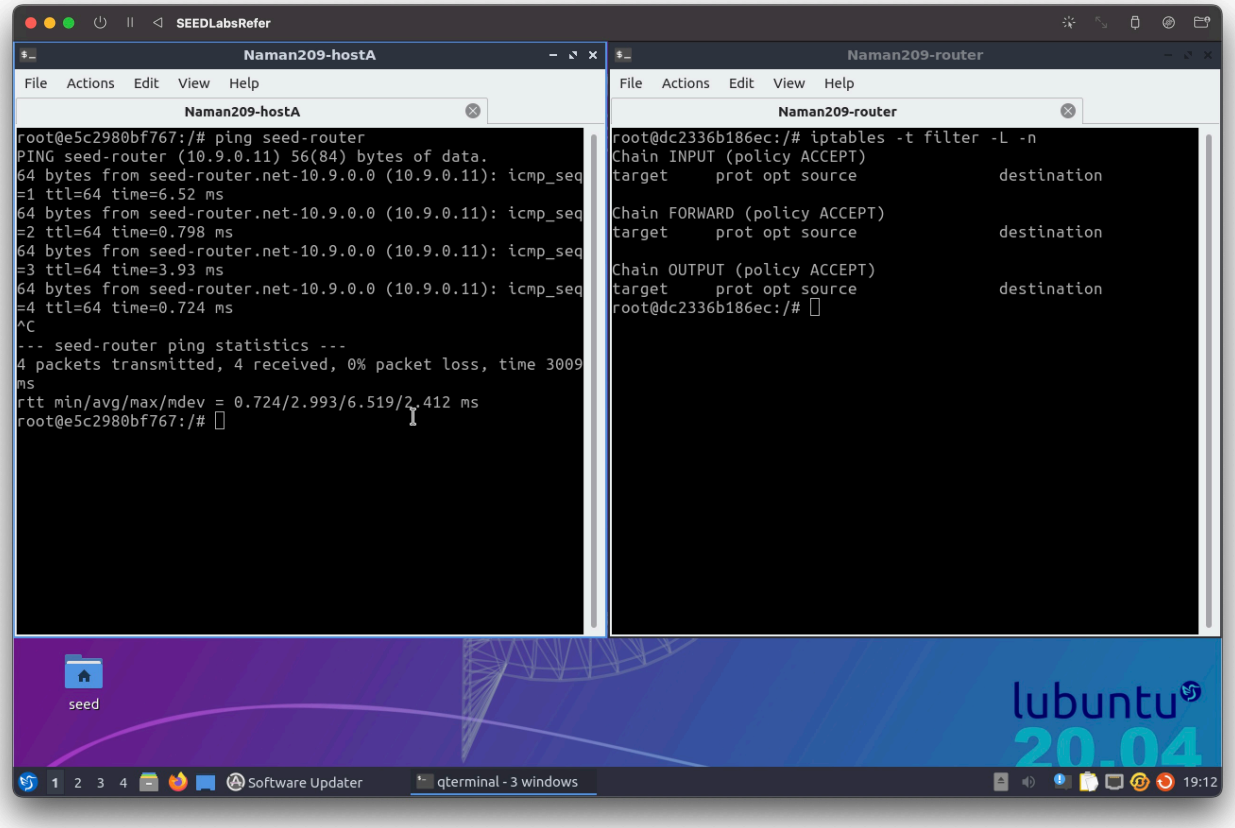


Task 2: Experimenting with Stateless Firewall Rules

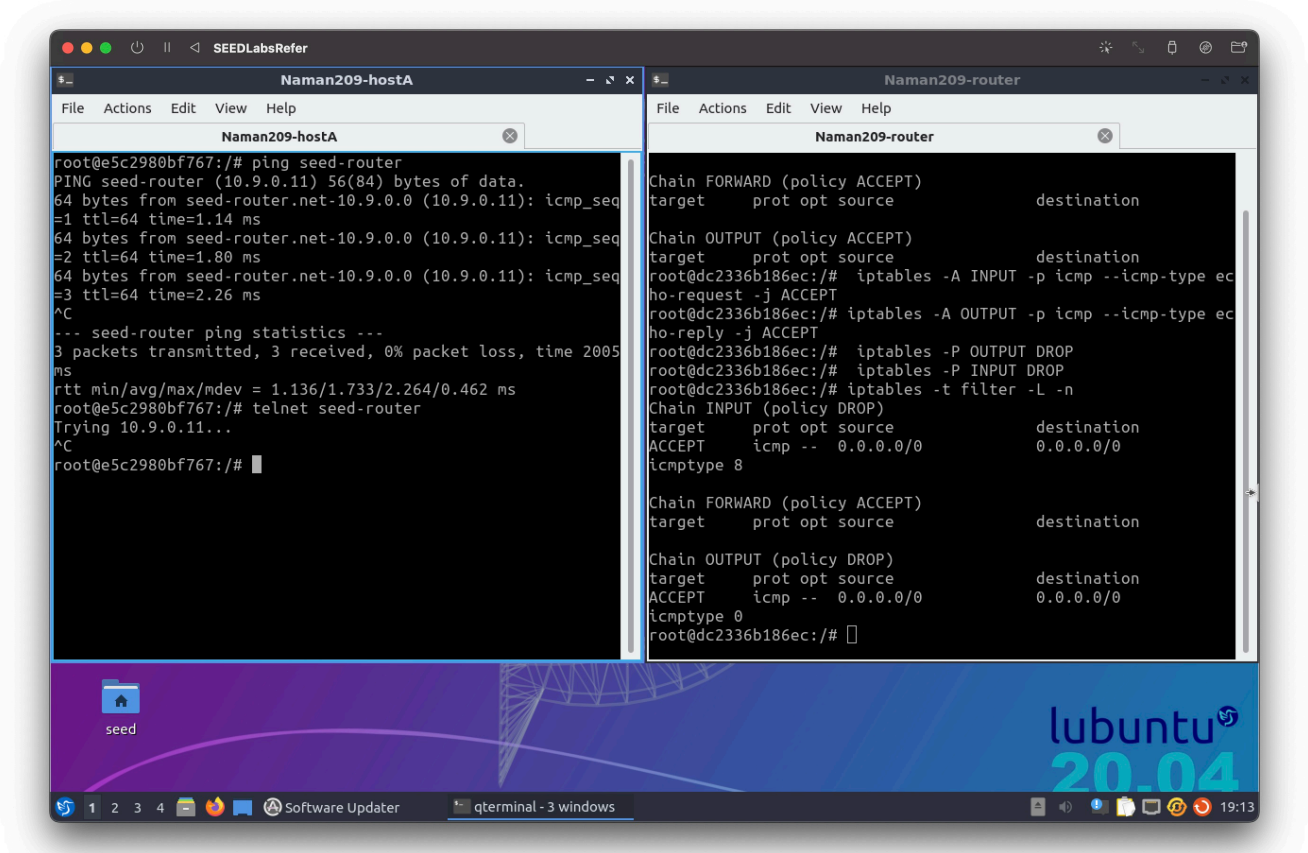
Task 2.A: Protecting the Router

```bash
iptables -A INPUT -p icmp --icmp-type echo-request -j ACCEPT
iptables -A OUTPUT -p icmp --icmp-type echo-reply -j ACCEPT
iptables -P OUTPUT DROP
iptables -P INPUT DROP
iptables -t filter -L -n
```

```bash
ping seed-router
```




```bash
telnet seed-router
```



Questions:

1 .Can you ping the router

-> Yes, Pinging the router is possible

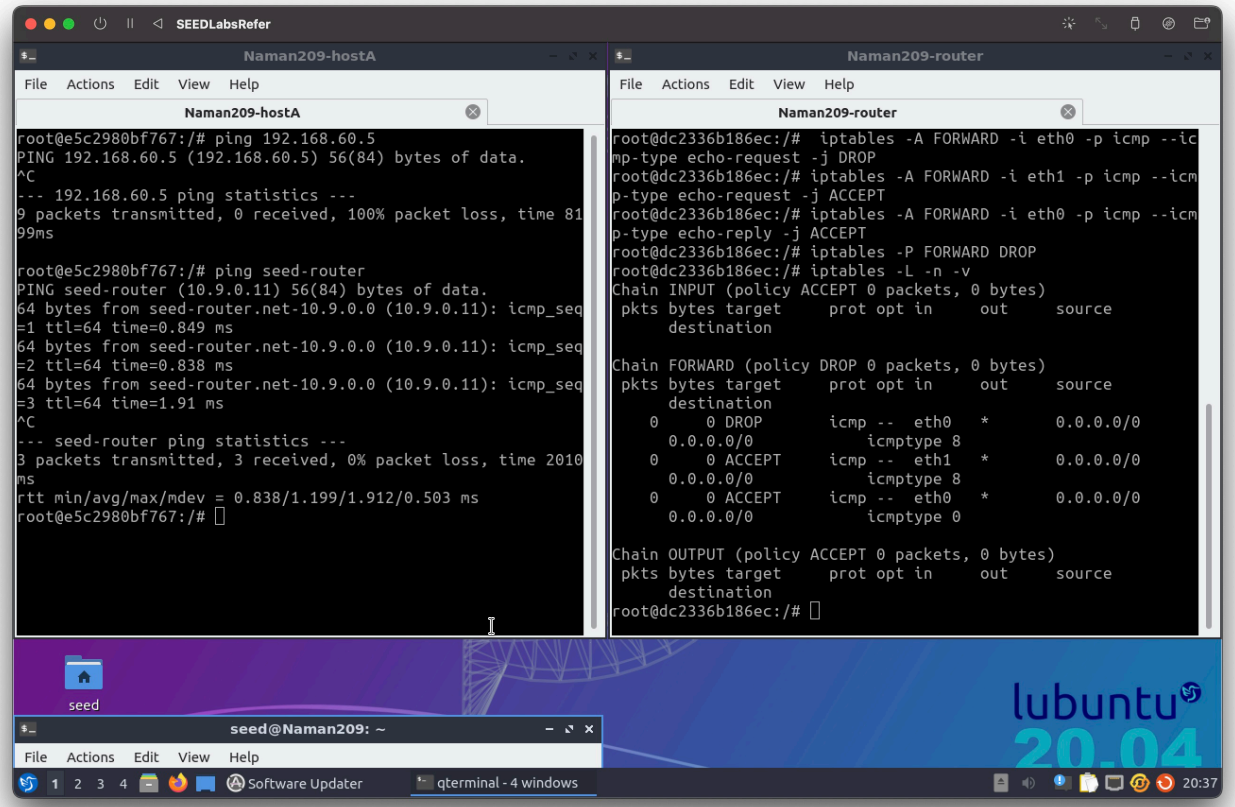
2 .Can you telnet into the router

-> No, Cannot telnet into the server, as it's stuck at 'Trying'

Task 2.B: Protecting the Internal Network

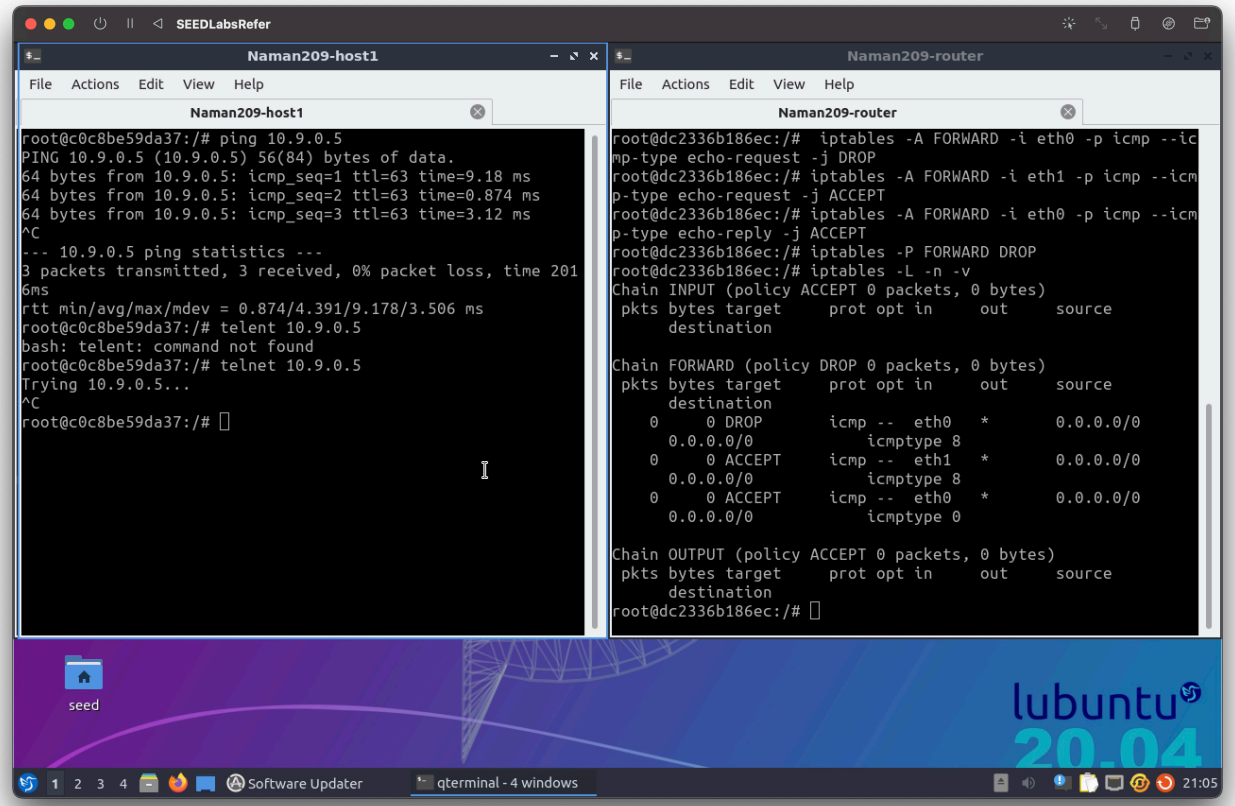
```bash
iptables -A FORWARD -i eth0 -p icmp --icmp-type echo-request -j DROP
iptables -A FORWARD -i eth1 -p icmp --icmp-type echo-request -j ACCEPT # iptables -A FORWARD -i eth0
iptables -P FORWARD DROP
iptables -L -n -v
```

```bash
ping 192.168.60.5
ping seed-router
```



Bash

```
ping 10.9.0.5
telnet 10.9.0.5
```

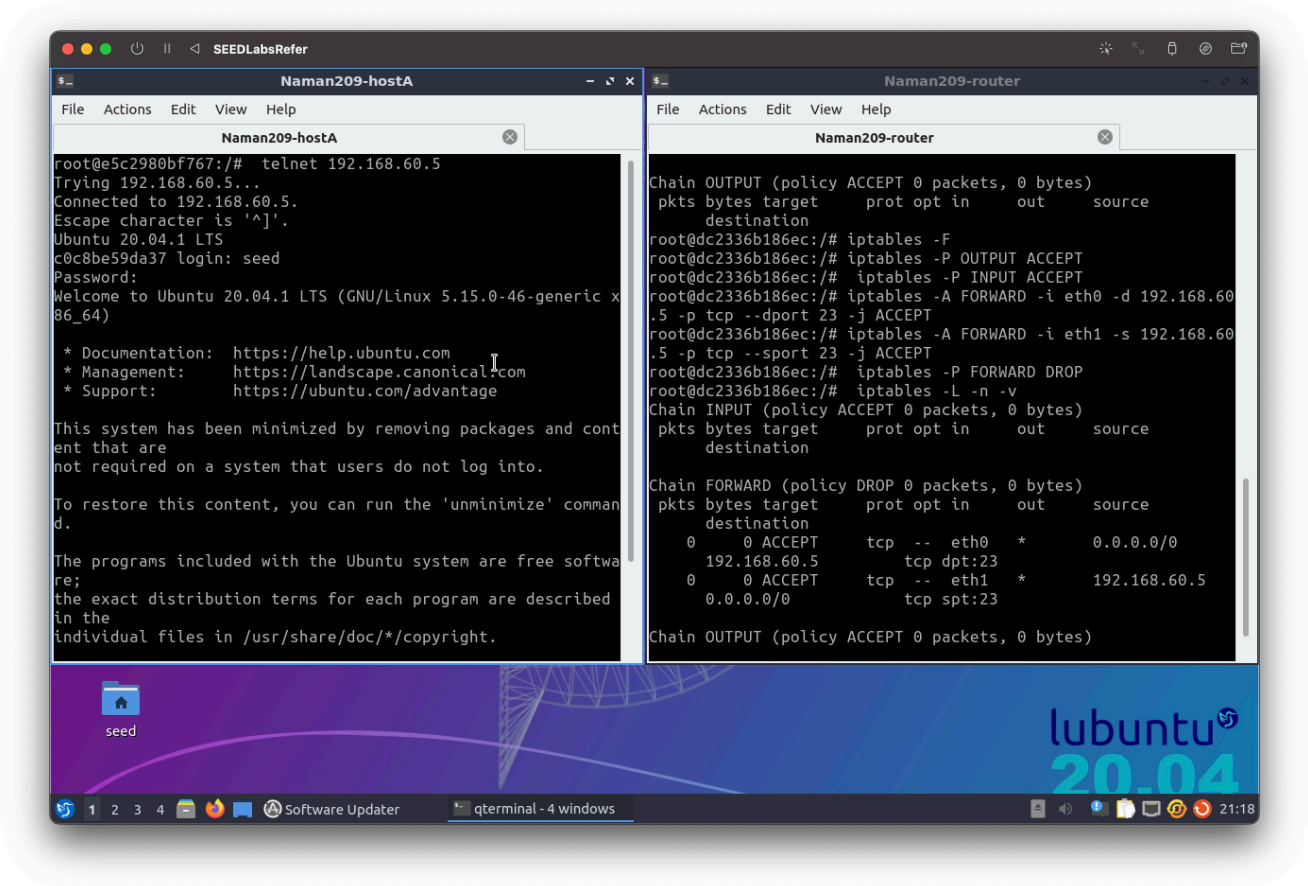


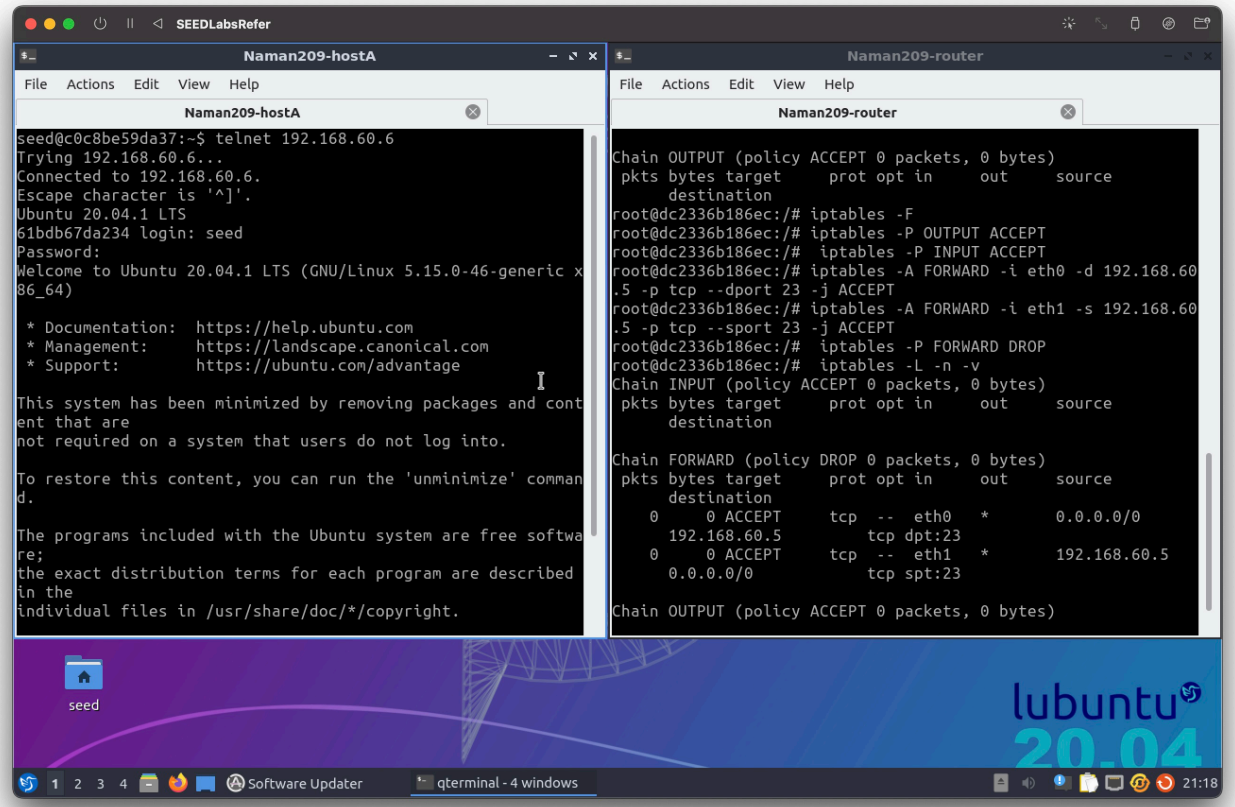
Task 2.C: Protecting Internal Servers

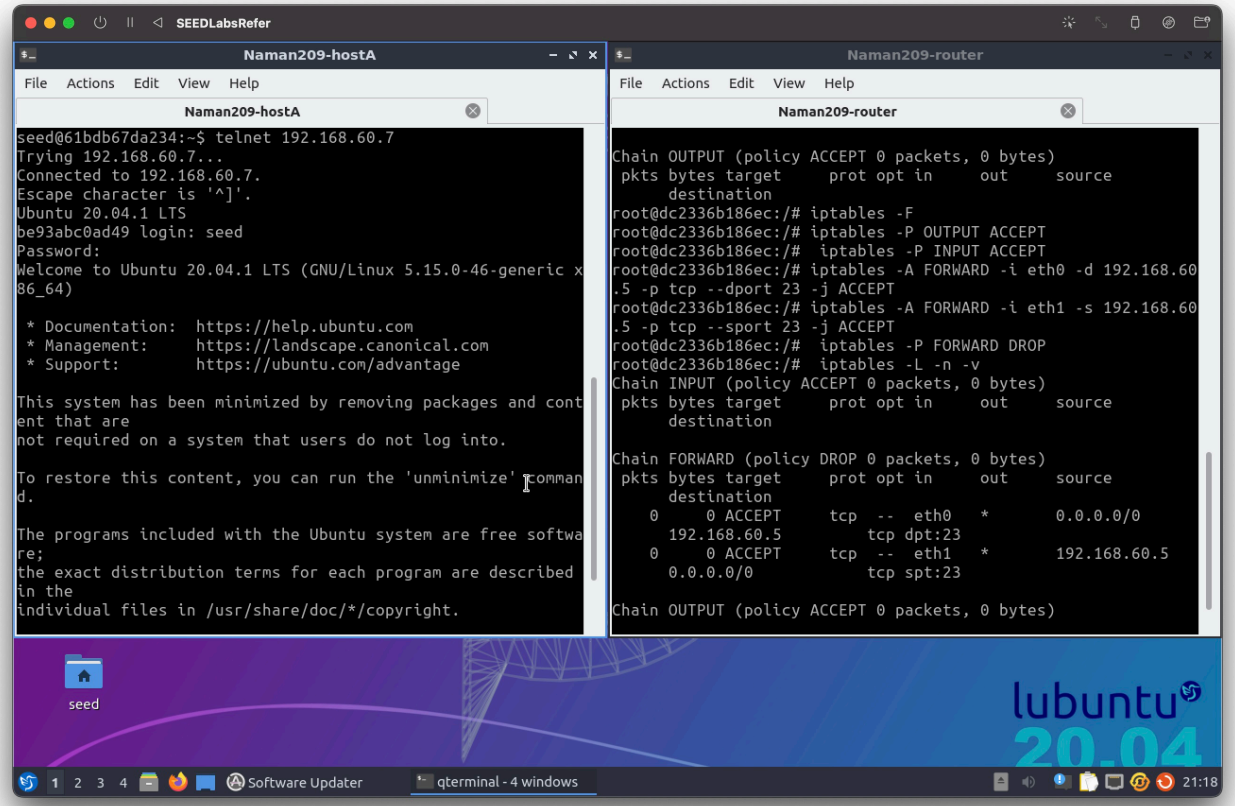
```bash
iptables -A FORWARD -i eth0 -d 192.168.60.5 -p tcp --dport 23 -j ACCEPT # iptables -A FORWARD -i eth1
iptables -L -n -v
```

In host1:

```bash
telnet 192.168.60.5
telnet 192.168.60.6
telnet 192.168.60.7
```

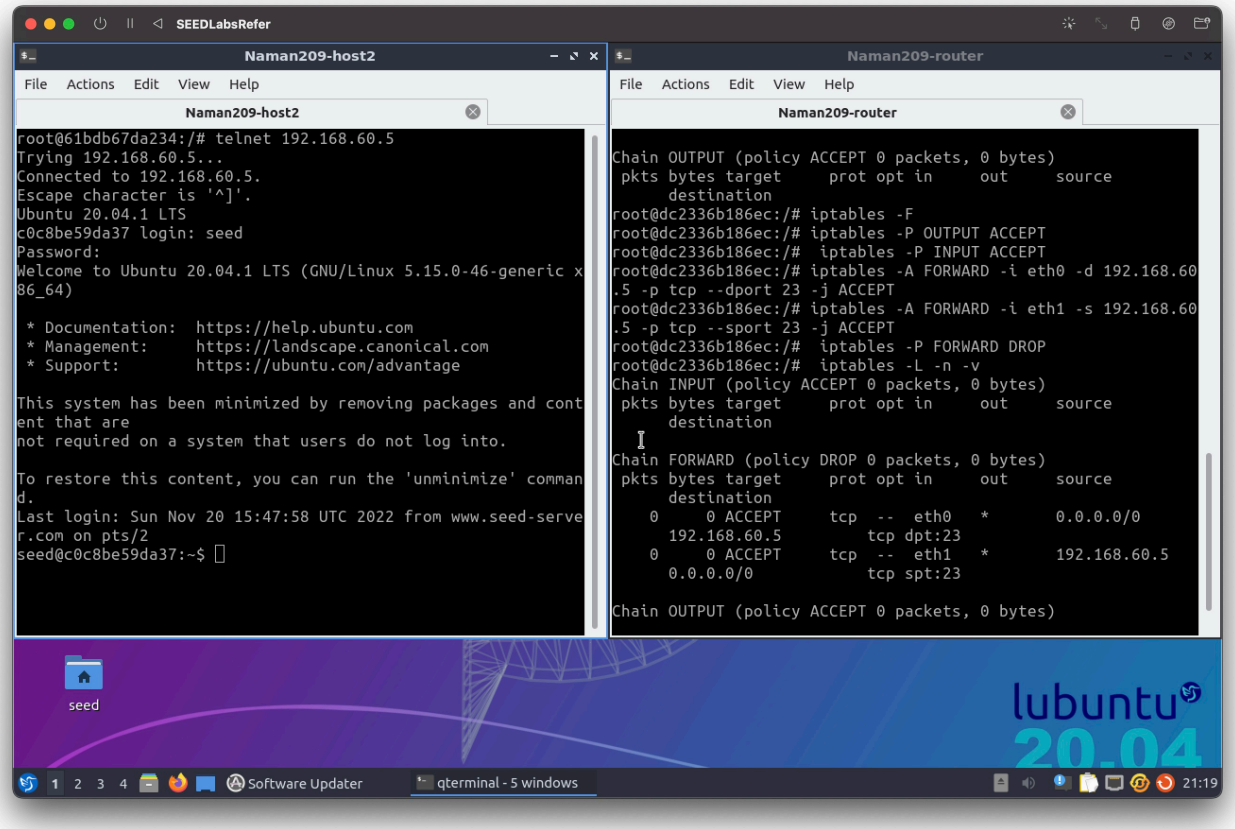


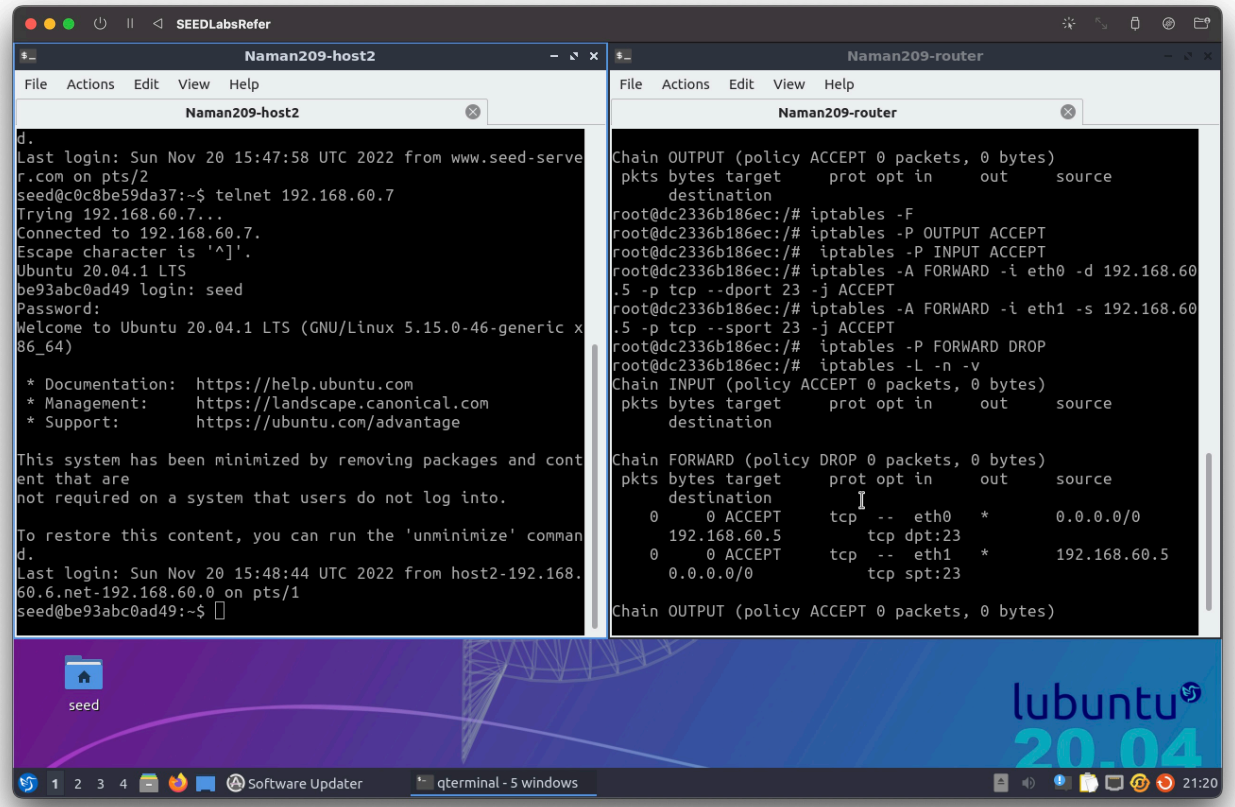

SEEDLabsRefer
Naman209-hostA
File Actions Edit View Help
Naman209-hostA
seed@c0c8be59da37:~$ telnet 192.168.60.6
Trying 192.168.60.6...
Connected to 192.168.60.6.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
61bdb67da234 login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.15.0-46-generic 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 that 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.
Naman209-router
File Actions Edit View Help
Naman209-router
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source
destination
root@dc2336b186ec:/# iptables -F
root@dc2336b186ec:/# iptables -P OUTPUT ACCEPT
root@dc2336b186ec:/# iptables -P INPUT ACCEPT
root@dc2336b186ec:/# iptables -A FORWARD -i eth0 -d 192.168.60.5 -p tcp --dport 23 -j ACCEPT
root@dc2336b186ec:/# iptables -A FORWARD -i eth1 -s 192.168.60.5 -p tcp --sport 23 -j ACCEPT
root@dc2336b186ec:/# iptables -P FORWARD DROP
root@dc2336b186ec:/# iptables -L -n -v
Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source
destination
Chain FORWARD (policy DROP 0 packets, 0 bytes)
pkts bytes target prot opt in out source
destination
0 0 ACCEPT tcp -- eth0 * 0.0.0.0/0
192.168.60.5 tcp dpt:23
0 0 ACCEPT tcp -- eth1 * 192.168.60.5
0.0.0.0/0 tcp spt:23
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
seed
lubuntu 20.04
Software Updater
qterminal - 4 windows
21:18

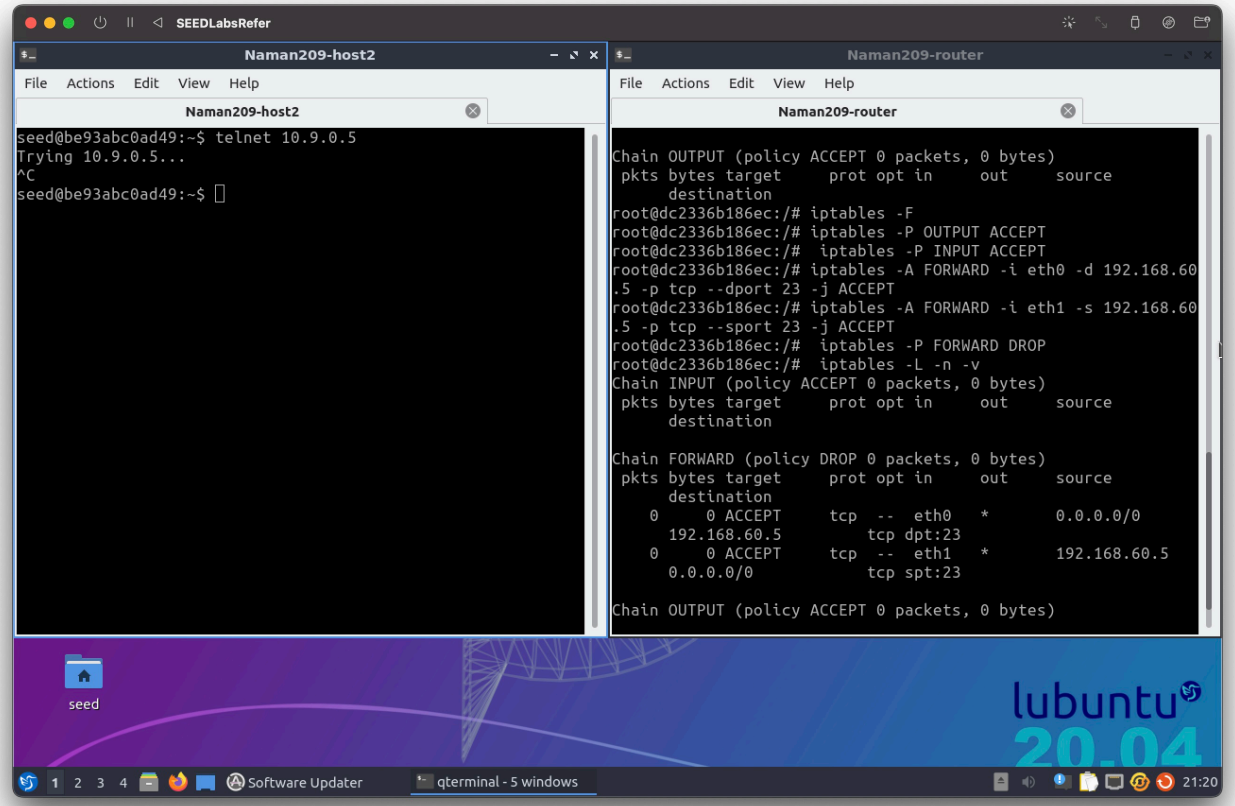

SEEDLabsRefer
Naman209-hostA
File Actions Edit View Help
Naman209-hostA
seed@61bdb67da234:~$ telnet 192.168.60.7
Trying 192.168.60.7...
Connected to 192.168.60.7.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
be93abc0ad49 login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.15.0-46-generic 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 that 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.
Naman209-router
File Actions Edit View Help
Naman209-router
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source
destination
root@dc2336b186ec:/# iptables -F
root@dc2336b186ec:/# iptables -P OUTPUT ACCEPT
root@dc2336b186ec:/# iptables -P INPUT ACCEPT
root@dc2336b186ec:/# iptables -A FORWARD -i eth0 -d 192.168.60.5 -p tcp --dport 23 -j ACCEPT
root@dc2336b186ec:/# iptables -A FORWARD -i eth1 -s 192.168.60.5 -p tcp --sport 23 -j ACCEPT
root@dc2336b186ec:/# iptables -P FORWARD DROP
root@dc2336b186ec:/# iptables -L -n -v
Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source
destination
Chain FORWARD (policy DROP 0 packets, 0 bytes)
pkts bytes target prot opt in out source
destination
0 0 ACCEPT tcp -- eth0 * 0.0.0.0/0
192.168.60.5 tcp dpt:23
0 0 ACCEPT tcp -- eth1 * 192.168.60.5
0.0.0.0/0 tcp spt:23
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
seed
lubuntu 20.04
Software Updater
qterminal - 4 windows
21:18

In host2:

```bash
telnet 192.168.60.5
telnet 192.168.60.7
telnet 10.9.0.5
```







Observation:

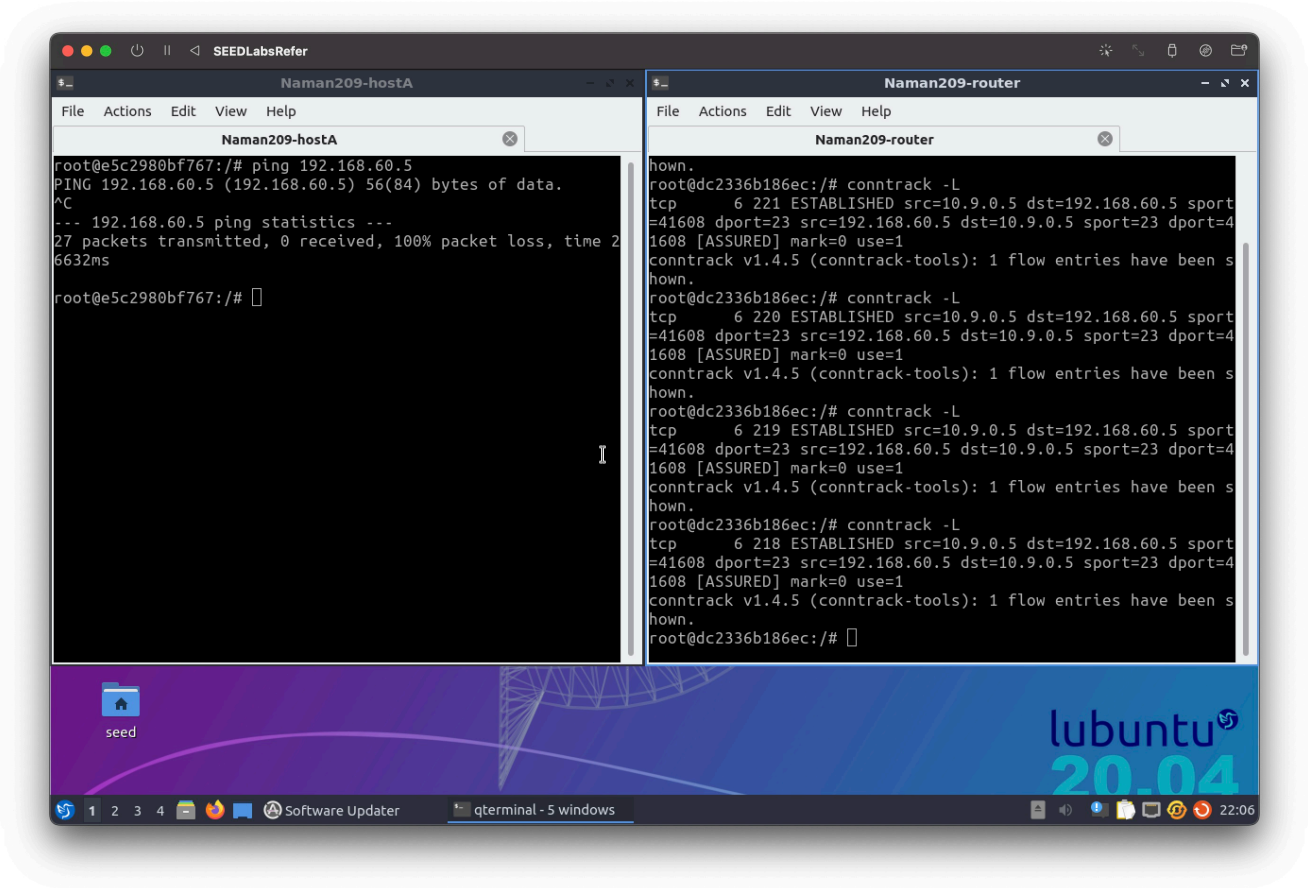
`iptables -A FORWARD -i eth0 -d 192.168.60.5 -p tcp --dport 23 -j ACCEPT` It accepts any tcp connection on the interface eth0 where the destination port is 23 and ip is 192.168.60.5

`iptables -A FORWARD -i eth1 -s 192.168.60.5 -p tcp --sport 23 -j ACCEPT` It accepts any tcp connection on the interface eth1 where the source port is 23 and ip is 192.168.60.5

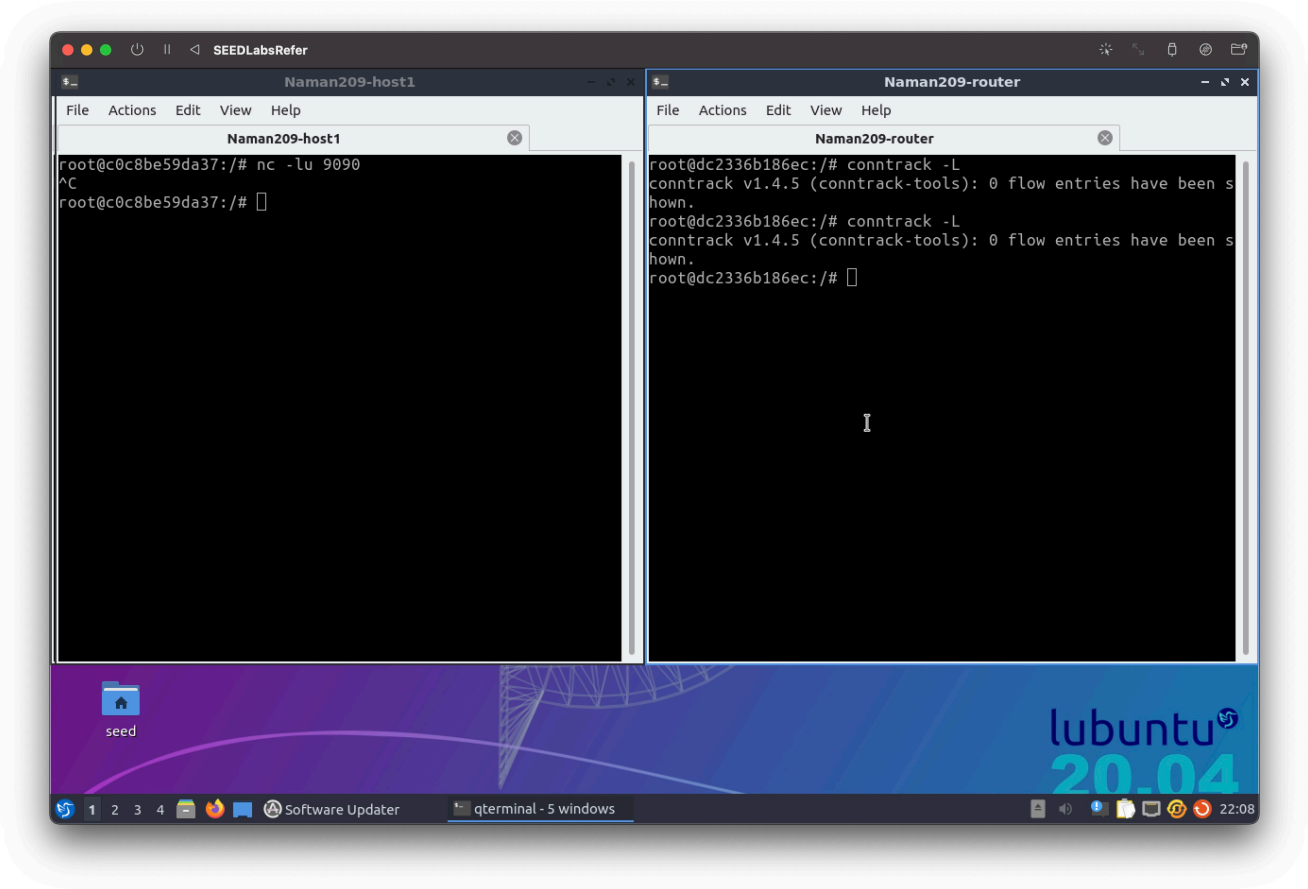
Task 3: Connection Tracking and Stateful Firewall

Task 3.A: Experiment with the Connection Tracking

```bash
ping 192.168.60.5
conntrack -L
```




```bash
nc -l 9090
```

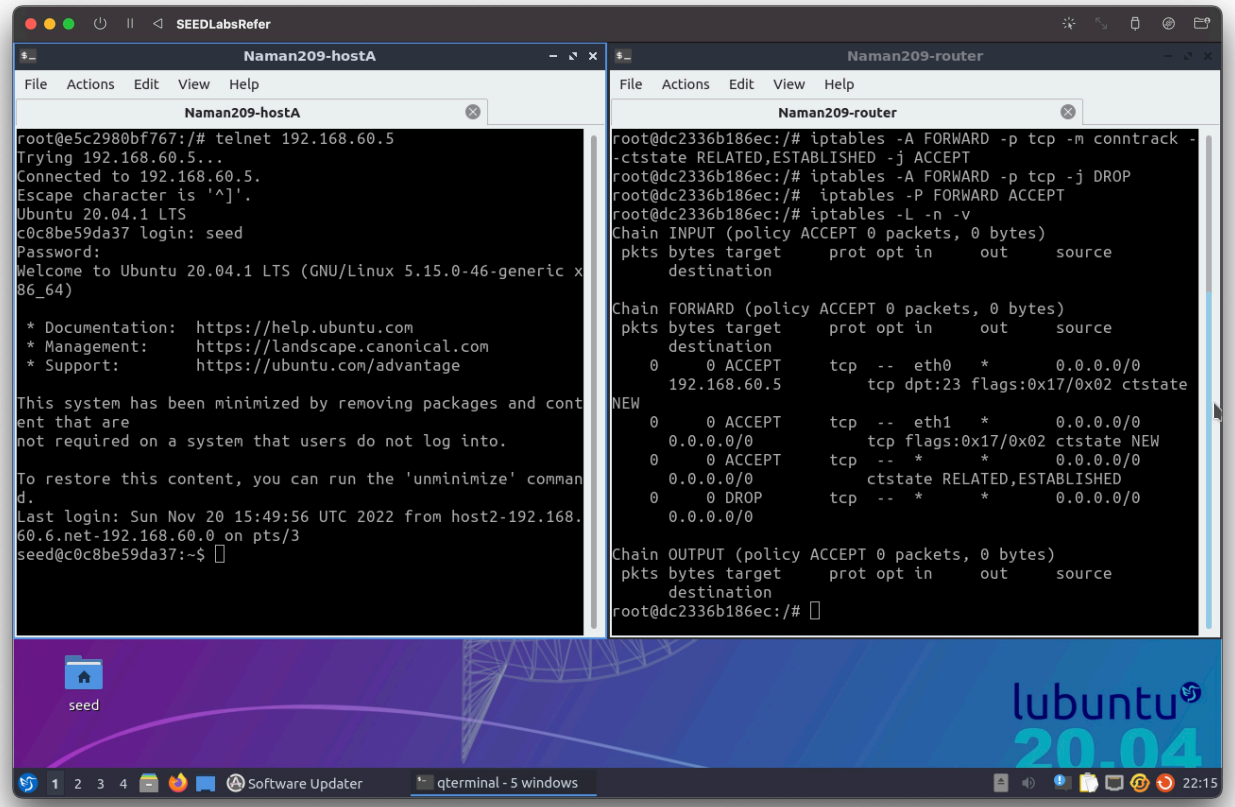


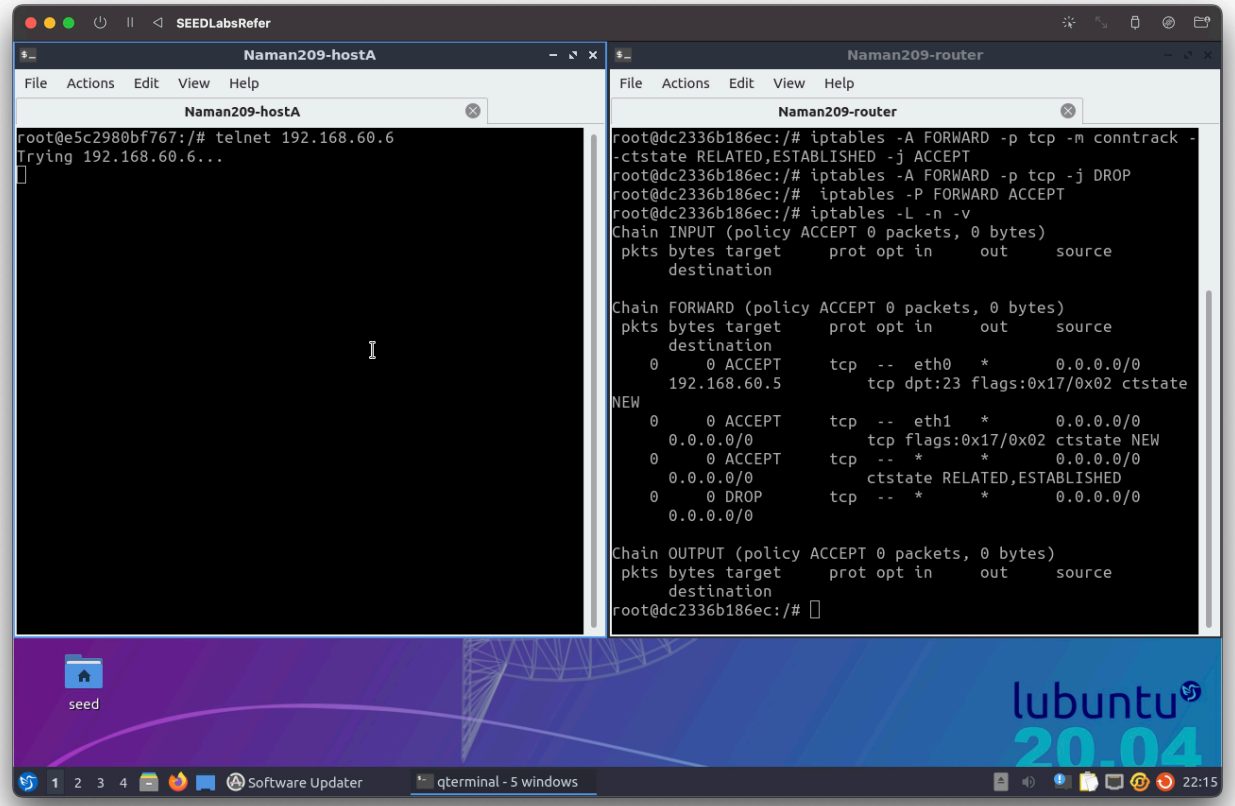
Task 3.B: Setting Up a Stateful Firewall

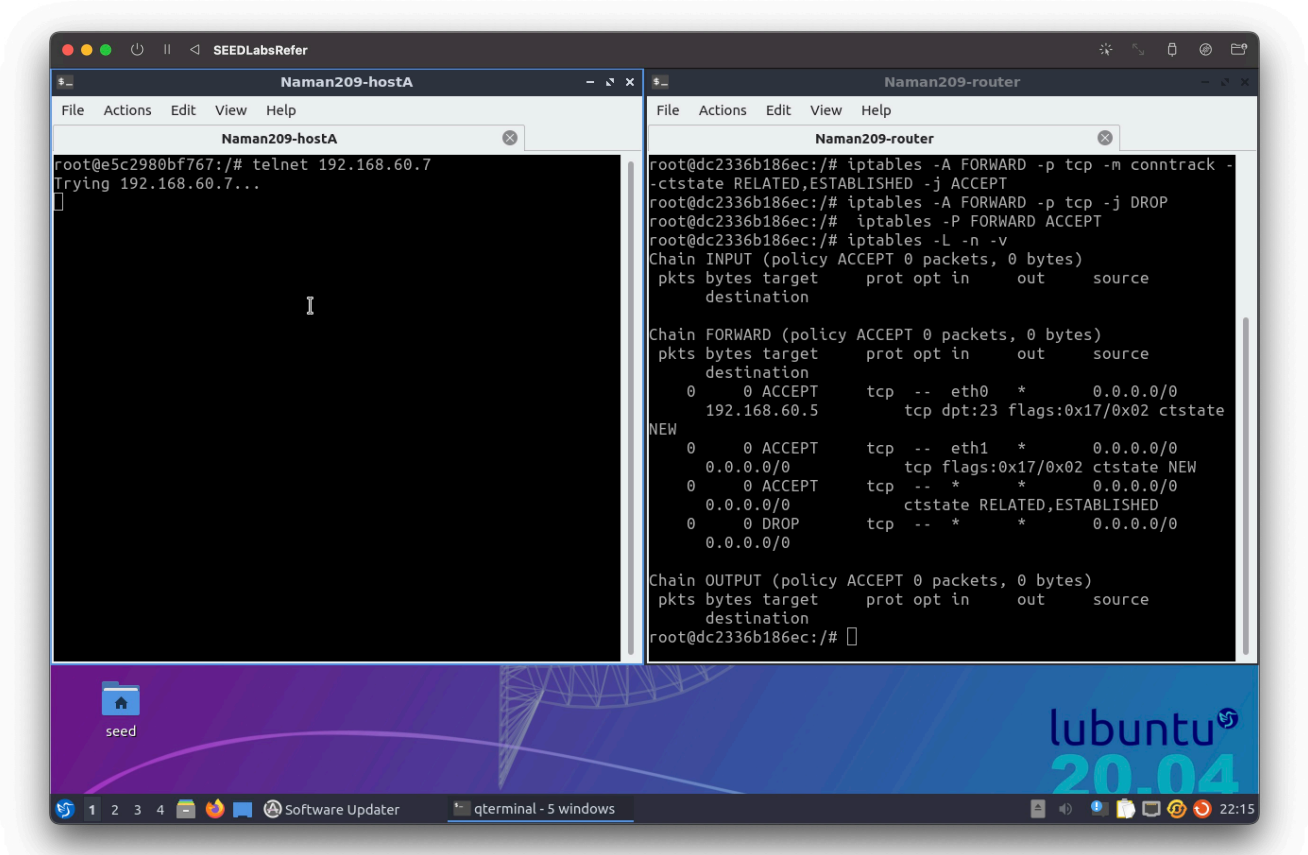
```bash
iptables -A FORWARD -p tcp -i eth0 -d 192.168.60.5 --dport 23 --syn -m conntrack --ctstate NEW -j ACC
iptables -A FORWARD -i eth1 -p tcp --syn -m conntrack --ctstate NEW -j ACCEPT
iptables -A FORWARD -p tcp -m conntrack --ctstate RELATED,ESTABLISHED -j ACCEPT
iptables -A FORWARD -p tcp -j DROP # iptables -P FORWARD ACCEPT
iptables -L -n -v
```

On host A:

```bash
telnet 192.168.60.5
telnet 192.168.60.6
telnet 192.168.60.7
```

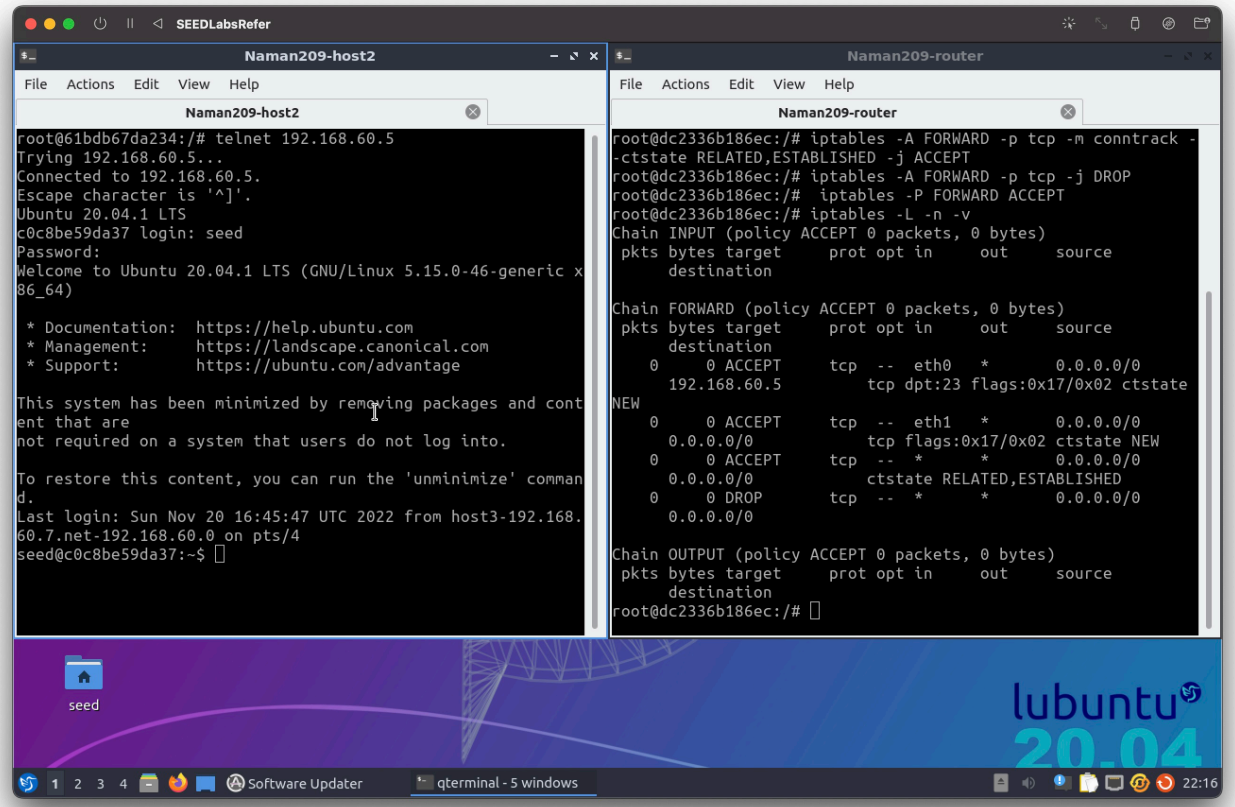

SEEDLabsRefer
Naman209-hostA
File Actions Edit View Help
Naman209-hostA
root@e5c2980bf767:/# telnet 192.168.60.5
Trying 192.168.60.5...
Connected to 192.168.60.5.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
c0c8be59da37 login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.15.0-46-generic 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 that are
not required on a system that users do not log into.
To restore this content, you can run the 'unminimize' command.
Last login: Sun Nov 20 15:49:56 UTC 2022 from host2-192.168.60.6.net-192.168.60.0 on pts/3
seed@c0c8be59da37:~$
Naman209-router
File Actions Edit View Help
Naman209-router
root@dc2336b186ec:/# iptables -A FORWARD -p tcp -m conntrack --ctstate RELATED,ESTABLISHED -j ACCEPT
root@dc2336b186ec:/# iptables -A FORWARD -p tcp -j DROP
root@dc2336b186ec:/# iptables -P FORWARD ACCEPT
root@dc2336b186ec:/# iptables -L -n -v
Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
Chain FORWARD (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
0 0 ACCEPT tcp -- eth0 * 0.0.0.0/0 192.168.60.5 tcp dpt:23 flags:0x17/0x02 ctstate NEW
0 0 ACCEPT tcp -- eth1 * 0.0.0.0/0 0.0.0.0/0 tcp flags:0x17/0x02 ctstate NEW
0 0 ACCEPT tcp -- * * 0.0.0.0/0 0.0.0.0/0 ctstate RELATED,ESTABLISHED
0 0 DROP tcp -- * * 0.0.0.0/0 0.0.0.0/0
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
root@dc2336b186ec:/#
seed
lubuntu 20.04
1 2 3 4 Software Updater qterminal - 5 windows 22:15

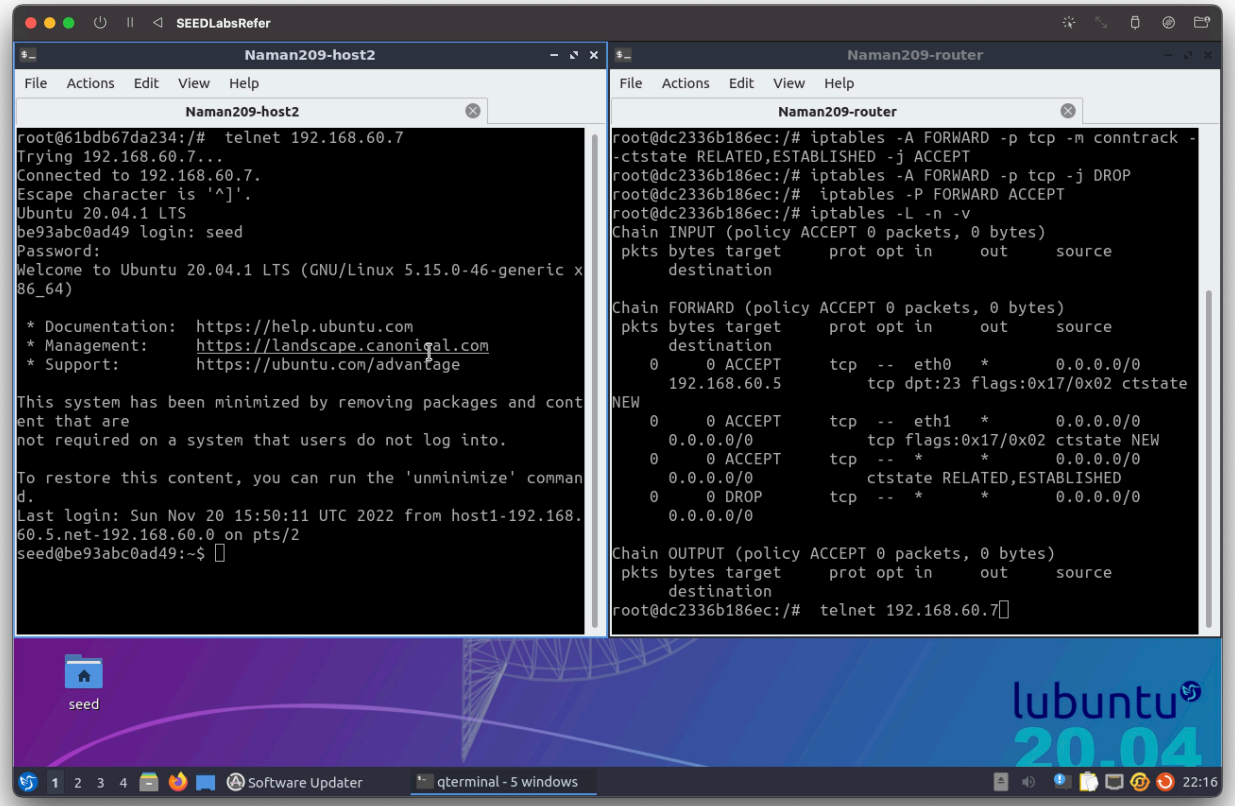

SEEDLabsRefer
Naman209-hostA
File Actions Edit View Help
Naman209-hostA
root@e5c2980bf767:/# telnet 192.168.60.6
Trying 192.168.60.6...
Naman209-router
File Actions Edit View Help
Naman209-router
root@dc2336b186ec:/# iptables -A FORWARD -p tcp -m conntrack --ctstate RELATED,ESTABLISHED -j ACCEPT
root@dc2336b186ec:/# iptables -A FORWARD -p tcp -j DROP
root@dc2336b186ec:/# iptables -P FORWARD ACCEPT
root@dc2336b186ec:/# iptables -L -n -v
Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
Chain FORWARD (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
0 0 ACCEPT tcp -- eth0 * 0.0.0.0/0 192.168.60.5 tcp dpt:23 flags:0x17/0x02 ctstate NEW
0 0 ACCEPT tcp -- eth1 * 0.0.0.0/0 0.0.0.0/0 tcp flags:0x17/0x02 ctstate NEW
0 0 ACCEPT tcp -- * * 0.0.0.0/0 0.0.0.0/0 ctstate RELATED,ESTABLISHED
0 0 DROP tcp -- * * 0.0.0.0/0 0.0.0.0/0
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
root@dc2336b186ec:/#
seed
lubuntu 20.04
1 2 3 4 Software Updater qterminal - 5 windows 22:15

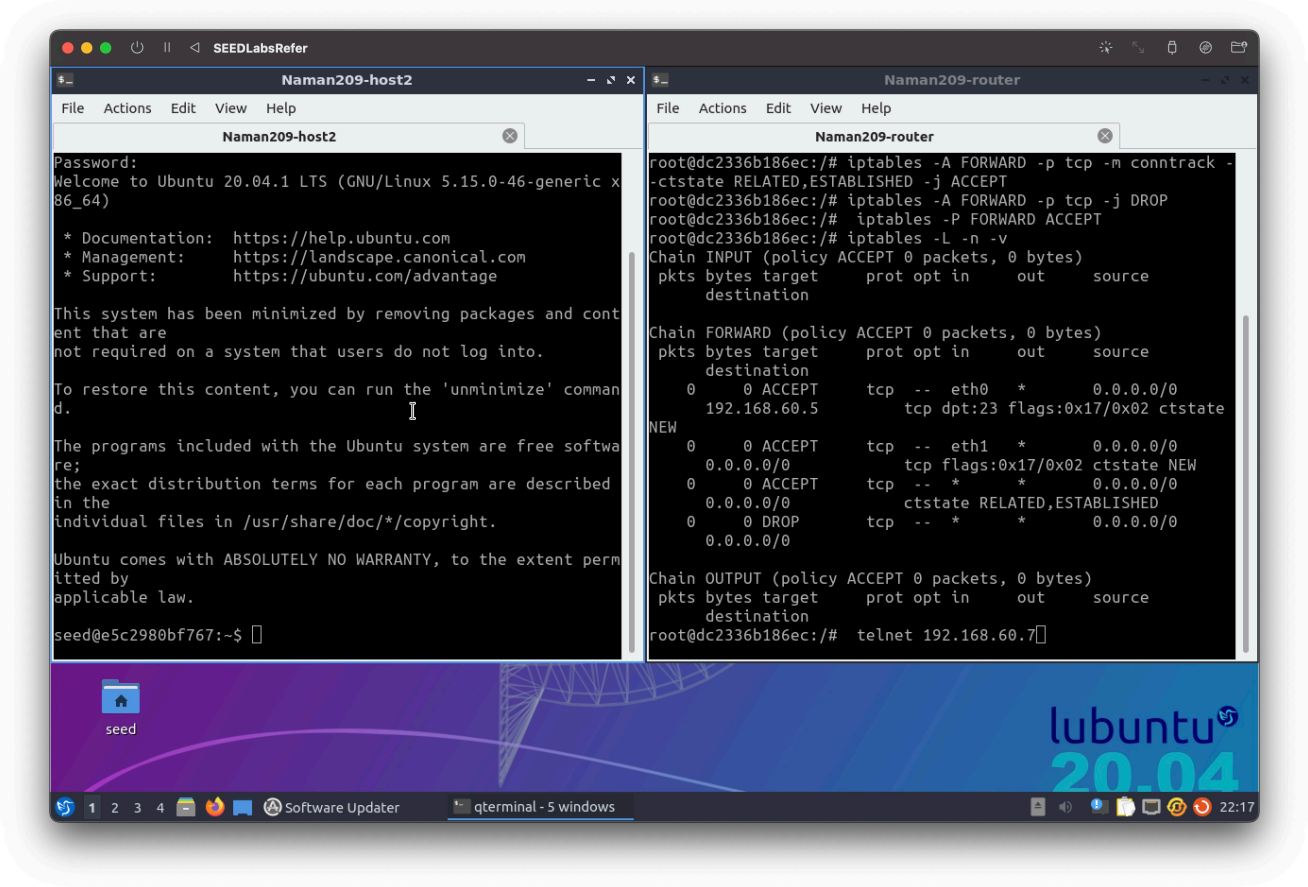


On host 2:

```bash
telnet 192.168.60.5
telnet 192.168.60.7
telnet 10.9.0.5
```


SEEDLabsRefer
Naman209-host2
File Actions Edit View Help
Naman209-host2
root@61bdb67da234:/# telnet 192.168.60.5
Trying 192.168.60.5...
Connected to 192.168.60.5.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
c0c8be59da37 login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.15.0-46-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 that are
not required on a system that users do not log into.
To restore this content, you can run the 'unminimize' command.
Last login: Sun Nov 20 16:45:47 UTC 2022 from host3-192.168.60.7.net-192.168.60.0 on pts/4
seed@c0c8be59da37:~$
Naman209-router
File Actions Edit View Help
Naman209-router
root@dc2336b186ec:/# iptables -A FORWARD -p tcp -m conntrack --ctstate RELATED,ESTABLISHED -j ACCEPT
root@dc2336b186ec:/# iptables -A FORWARD -p tcp -j DROP
root@dc2336b186ec:/# iptables -P FORWARD ACCEPT
root@dc2336b186ec:/# iptables -L -n -v
Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
Chain FORWARD (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
0 0 ACCEPT tcp -- eth0 * 0.0.0.0/0 192.168.60.5 tcp dpt:23 flags:0x17/0x02 ctstate NEW
0 0 ACCEPT tcp -- eth1 * 0.0.0.0/0 0.0.0.0/0 tcp flags:0x17/0x02 ctstate NEW
0 0 ACCEPT tcp -- * * 0.0.0.0/0 0.0.0.0/0 ctstate RELATED,ESTABLISHED
0 0 DROP tcp -- * * 0.0.0.0/0 0.0.0.0/0
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
root@dc2336b186ec:/#
seed
lubuntu 20.04
1 2 3 4 Software Updater qterminal - 5 windows 22:16


SEEDLabsRefer
Naman209-host2
File Actions Edit View Help
Naman209-host2
root@61bdb67da234:/# telnet 192.168.60.7
Trying 192.168.60.7...
Connected to 192.168.60.7.
Escape character is '^]'.
Ubuntu 20.04.1 LTS
be93abc0ad49 login: seed
Password:
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 5.15.0-46-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 that are
not required on a system that users do not log into.
To restore this content, you can run the 'unminimize' command.
Last login: Sun Nov 20 15:50:11 UTC 2022 from host1-192.168.60.5.net-192.168.60.0 on pts/2
seed@be93abc0ad49:~$
Naman209-router
File Actions Edit View Help
Naman209-router
root@dc2336b186ec:/# iptables -A FORWARD -p tcp -m conntrack --ctstate RELATED,ESTABLISHED -j ACCEPT
root@dc2336b186ec:/# iptables -A FORWARD -p tcp -j DROP
root@dc2336b186ec:/# iptables -P FORWARD ACCEPT
root@dc2336b186ec:/# iptables -L -n -v
Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
Chain FORWARD (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
0 0 ACCEPT tcp -- eth0 * 0.0.0.0/0 192.168.60.5 tcp dpt:23 flags:0x17/0x02 ctstate NEW
0 0 ACCEPT tcp -- eth1 * 0.0.0.0/0 0.0.0.0/0 tcp flags:0x17/0x02 ctstate NEW
0 0 ACCEPT tcp -- * * 0.0.0.0/0 0.0.0.0/0 ctstate RELATED,ESTABLISHED
0 0 DROP tcp -- * * 0.0.0.0/0 0.0.0.0/0
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
root@dc2336b186ec:/# telnet 192.168.60.7
seed
lubuntu 20.04
1 2 3 4 Software Updater qterminal - 5 windows 22:16



Observation:

`iptables -A FORWARD -p tcp -i eth0 -d 192.168.60.5 --dport 23 --syn -m conntrack --ctstate NEW -j ACCEPT`

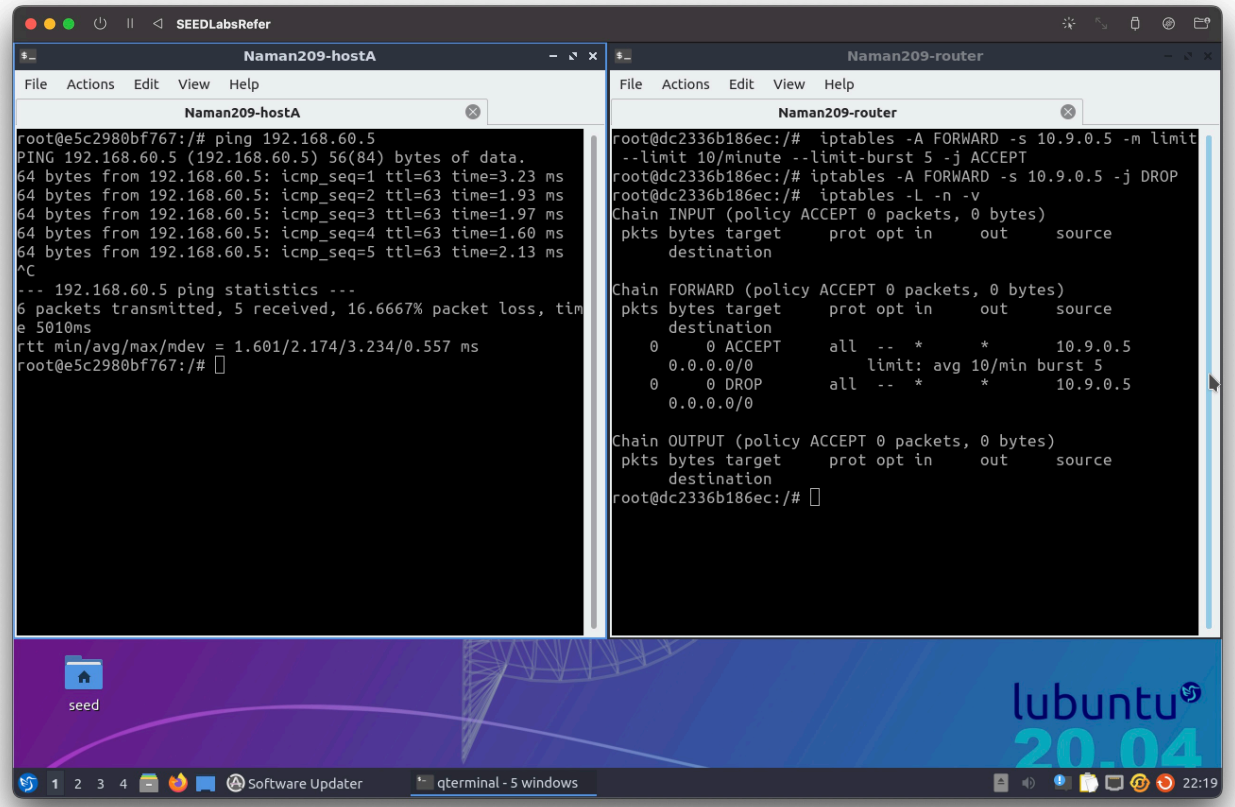
It accepts any tcp connection on the interface eth0 where the destination port is 23 and ip is 192.168.60.5 using the conntrack module

`iptables -A FORWARD -i eth1 -p tcp --syn -m conntrack --ctstate NEW -j ACCEPT` It accepts connections on eth1 interface using the conntrack module

Task 4: Limiting Network Traffic

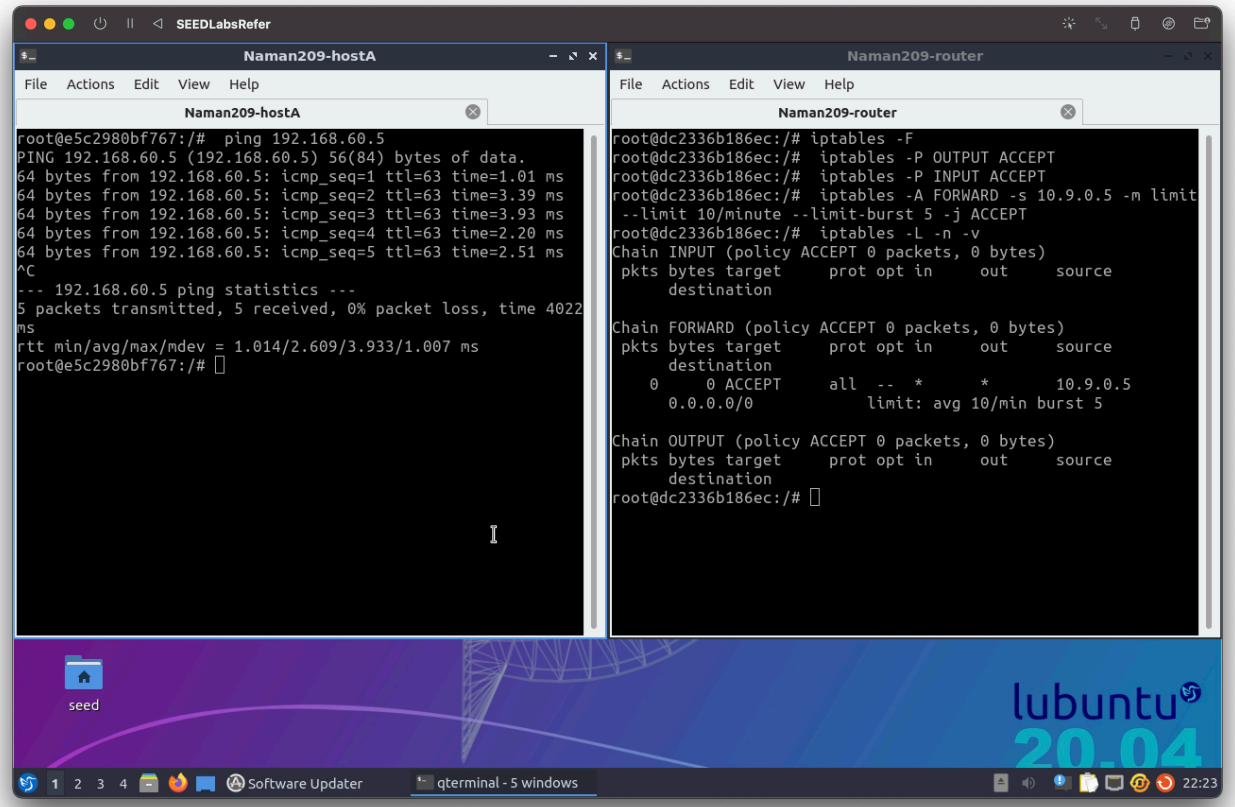
```bash
iptables -A FORWARD -s 10.9.0.5 -m limit --limit 10/minute --limit-burst 5 -j ACCEPT
iptables -A FORWARD -s 10.9.0.5 -j DROP
iptables -L -n -v
```

```bash
ping 192.168.60.5
```




```bash
iptables -A FORWARD -s 10.9.0.5 -m limit --limit 10/minute --limit-burst 5 -j ACCEPT
iptables -L -n -v
```

```bash
ping 192.168.60.5
```



Task 5: Load Balancing

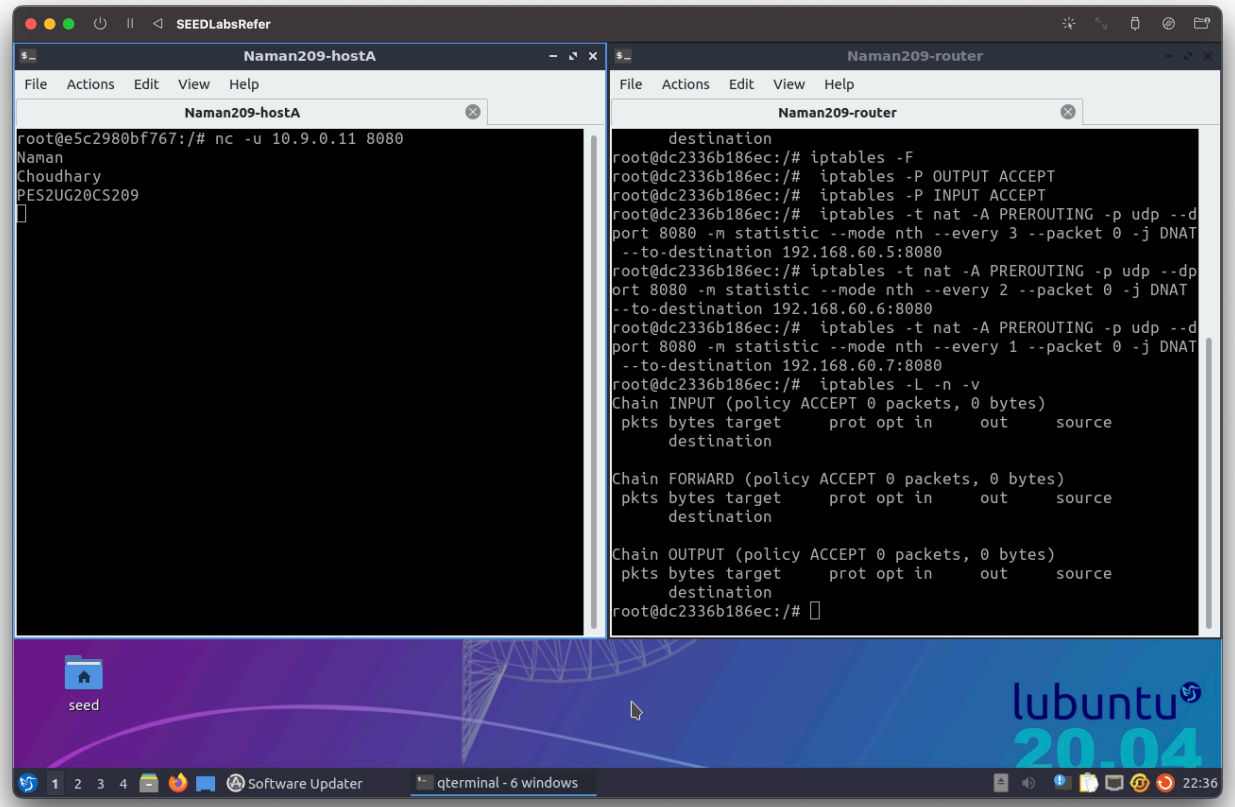
```bash
iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode nth --every 3 --packet 0 -j DNA
iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode nth --every 2 --packet 0 -j DNA
iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode nth --every 1 --packet 0 -j DNA
iptables -L -n -v
```

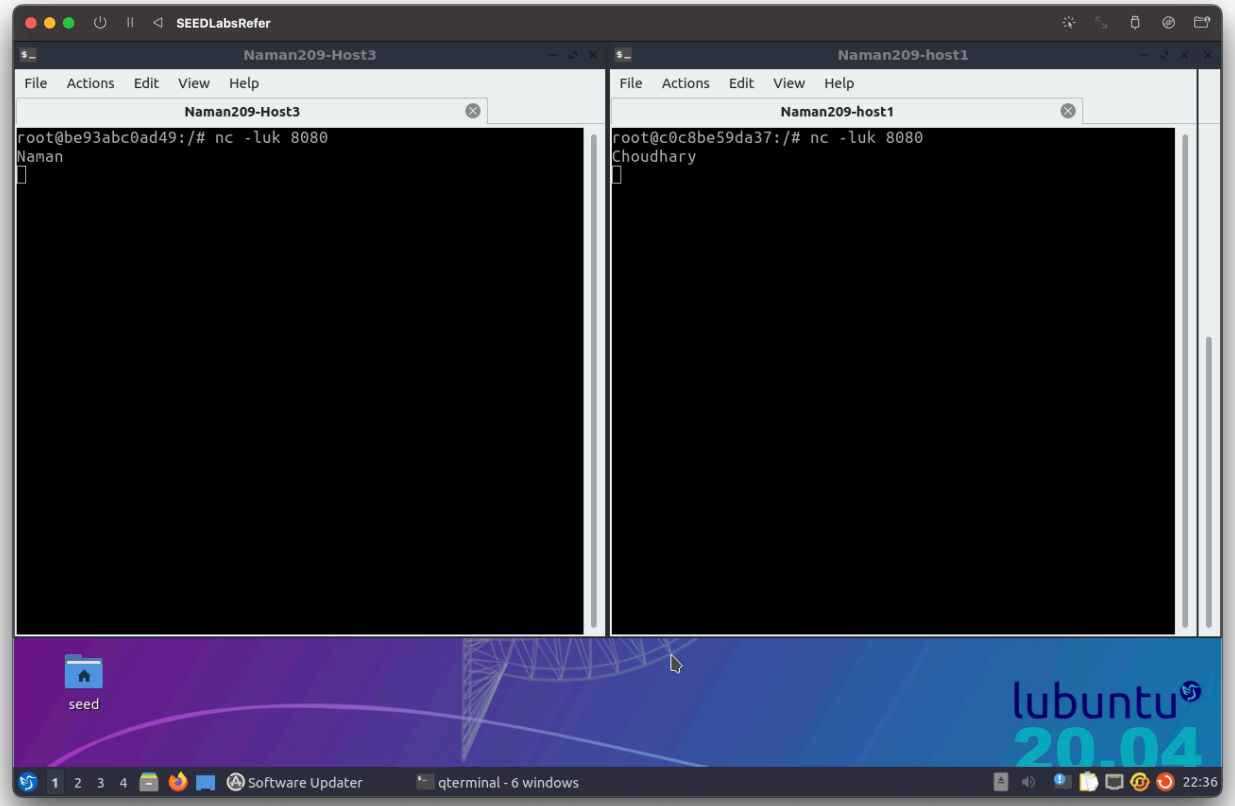
On Host 1,2,3

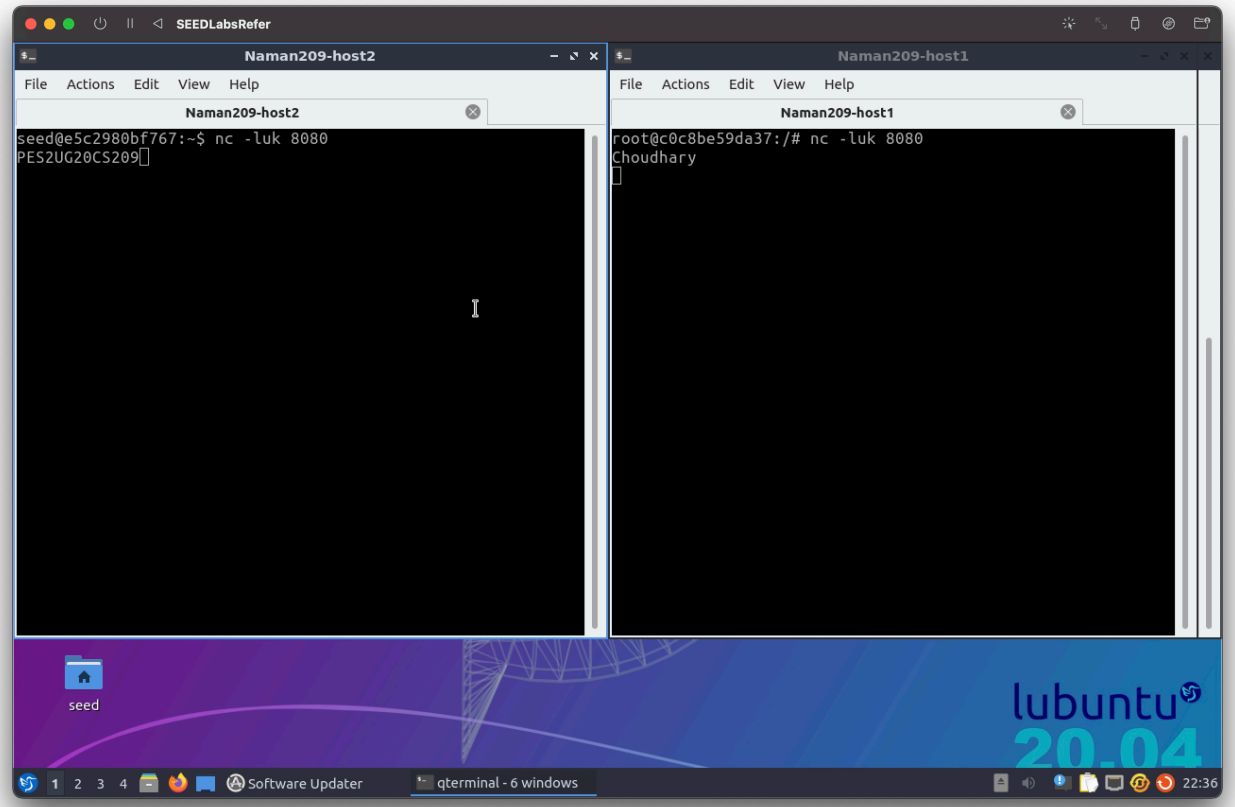
```bash
nc -luk 8080
nc -luk 8080
nc -luk 8080
```

On Host A

```bash
nc -u 10.9.0.11 8080
< enter 3 words, wait 30 seconds before entering the next word>
```


SEEDLabsRefer
Naman209-hostA
File Actions Edit View Help
Naman209-hostA
root@e5c2980bf767:/# nc -u 10.9.0.11 8080
Naman
Choudhary
PES2UG20CS209
Naman209-router
File Actions Edit View Help
Naman209-router
destination
root@dc2336b186ec:/# iptables -F
root@dc2336b186ec:/# iptables -P OUTPUT ACCEPT
root@dc2336b186ec:/# iptables -P INPUT ACCEPT
root@dc2336b186ec:/# iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode nth --every 3 --packet 0 -j DNAT --to-destination 192.168.60.5:8080
root@dc2336b186ec:/# iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode nth --every 2 --packet 0 -j DNAT --to-destination 192.168.60.6:8080
root@dc2336b186ec:/# iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode nth --every 1 --packet 0 -j DNAT --to-destination 192.168.60.7:8080
root@dc2336b186ec:/# iptables -L -n -v
Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
Chain FORWARD (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
root@dc2336b186ec:/#
seed
lubuntu 20.04
Software Updater
qterminal - 6 windows
22:36


SEEDLabsRefer
Naman209-Host3
File Actions Edit View Help
Naman209-Host3
root@be93abc0ad49:/# nc -luk 8080
Naman
Naman209-host1
File Actions Edit View Help
Naman209-host1
root@c0c8be59da37:/# nc -luk 8080
Choudhary
seed
lubuntu 20.04
Software Updater
qterminal - 6 windows
22:36



random mode

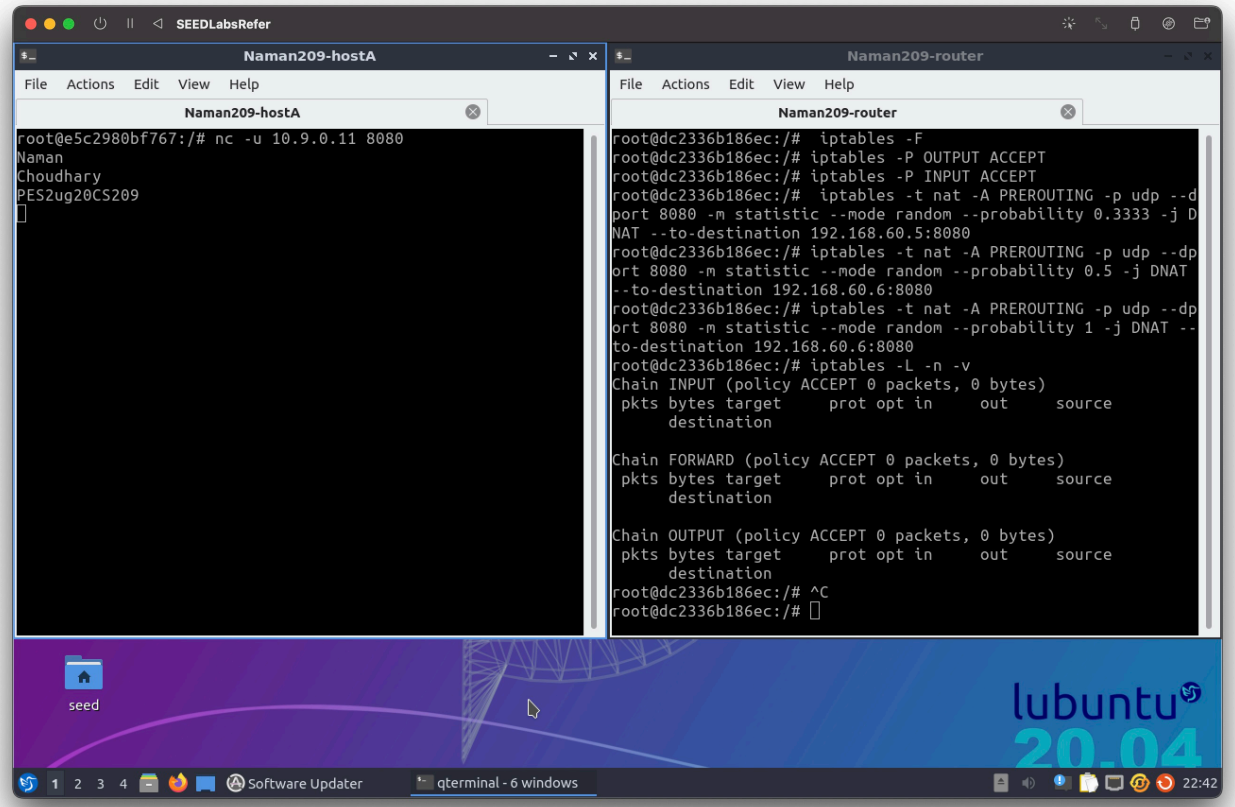
```bash
iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode random --probability 0.3333 -j
iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode random --probability 0.5 -j DNA
iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode random --probability 1 -j DNAT
iptables -L -n -v
```

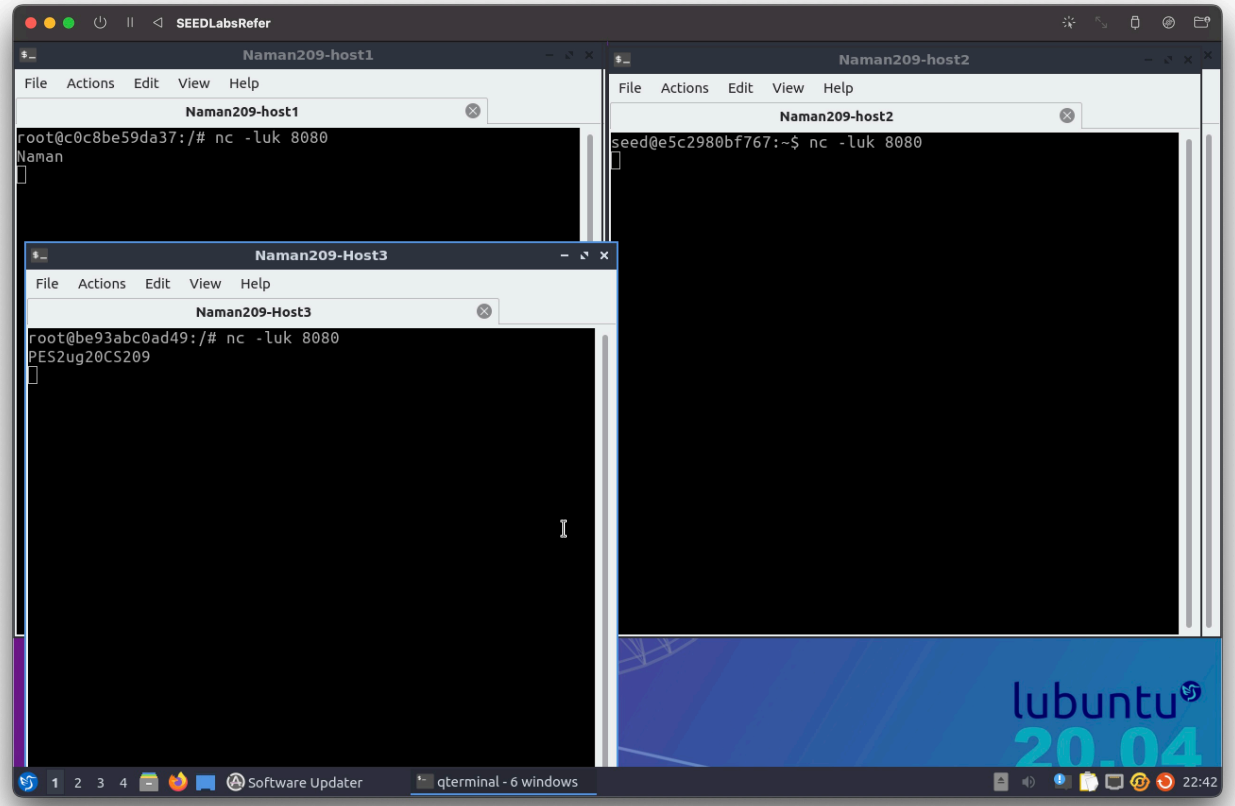
On Host 1,2,3

```bash
nc -luk 8080
nc -luk 8080
nc -luk 8080
```

On Host A

```bash
 nc -u 10.9.0.11 8080
< enter 3 words, wait 30 seconds before entering the next word>
```


SEEDLabsRefer
Naman209-hostA
File Actions Edit View Help
Naman209-hostA
root@e5c2980bf767:/# nc -u 10.9.0.11 8080
Naman
Choudhary
PES2ug20CS209
Naman209-router
File Actions Edit View Help
Naman209-router
root@dc2336b186ec:/# iptables -F
root@dc2336b186ec:/# iptables -P OUTPUT ACCEPT
root@dc2336b186ec:/# iptables -P INPUT ACCEPT
root@dc2336b186ec:/# iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode random --probability 0.3333 -j DNAT --to-destination 192.168.60.5:8080
root@dc2336b186ec:/# iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode random --probability 0.5 -j DNAT --to-destination 192.168.60.6:8080
root@dc2336b186ec:/# iptables -t nat -A PREROUTING -p udp --dport 8080 -m statistic --mode random --probability 1 -j DNAT --to-destination 192.168.60.6:8080
root@dc2336b186ec:/# iptables -L -n -v
Chain INPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
Chain FORWARD (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
Chain OUTPUT (policy ACCEPT 0 packets, 0 bytes)
pkts bytes target prot opt in out source destination
root@dc2336b186ec:/# ^C
root@dc2336b186ec:/#
seed
lubuntu 20.04
1 2 3 4 Software Updater qterminal - 6 windows 22:42


SEEDLabsRefer
Naman209-host1
File Actions Edit View Help
Naman209-host1
root@c0c8be59da37:/# nc -luk 8080
Naman
Naman209-host2
File Actions Edit View Help
Naman209-host2
seed@e5c2980bf767:~$ nc -luk 8080
Naman209-Host3
File Actions Edit View Help
Naman209-Host3
root@be93abc0ad49:/# nc -luk 8080
PES2ug20CS209
lubuntu 20.04
1 2 3 4 Software Updater qterminal - 6 windows 22:42