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Roll no: 1902104
Batch: C22

Experiment 09

Aim: Design personal firewall using iptables

Theory:

A firewall can be defined as a special type of network security device or a software program that monitors and filters incoming and outgoing network traffic based on a defined set of security rules. It acts as a barrier between internal private networks and external sources (such as the public Internet).

The primary purpose of a firewall is to allow non-threatening traffic and prevent malicious or unwanted data traffic for protecting the computer from viruses and attacks. A firewall is a cybersecurity tool that filters network traffic and helps users block malicious software from accessing the Internet in infected computers.

Functions of firewalls:

- Network Threat Prevention
- Application and Identity-Based Control
- Hybrid Cloud Support
- Scalable Performance
- Network Traffic Management and Control
- Access Validation

IPTABLES Firewall:
The iptables firewall operates by comparing network traffic against a set of rules. The rules define the characteristics that a packet must have to match the rule, and the action that should be taken for matching packets.

These rules are organized into groups called chains. A chain is a set of rules that a packet is checked against sequentially. When the packet matches one of the rules, it executes the associated action and is not checked against the remaining rules in the chain.

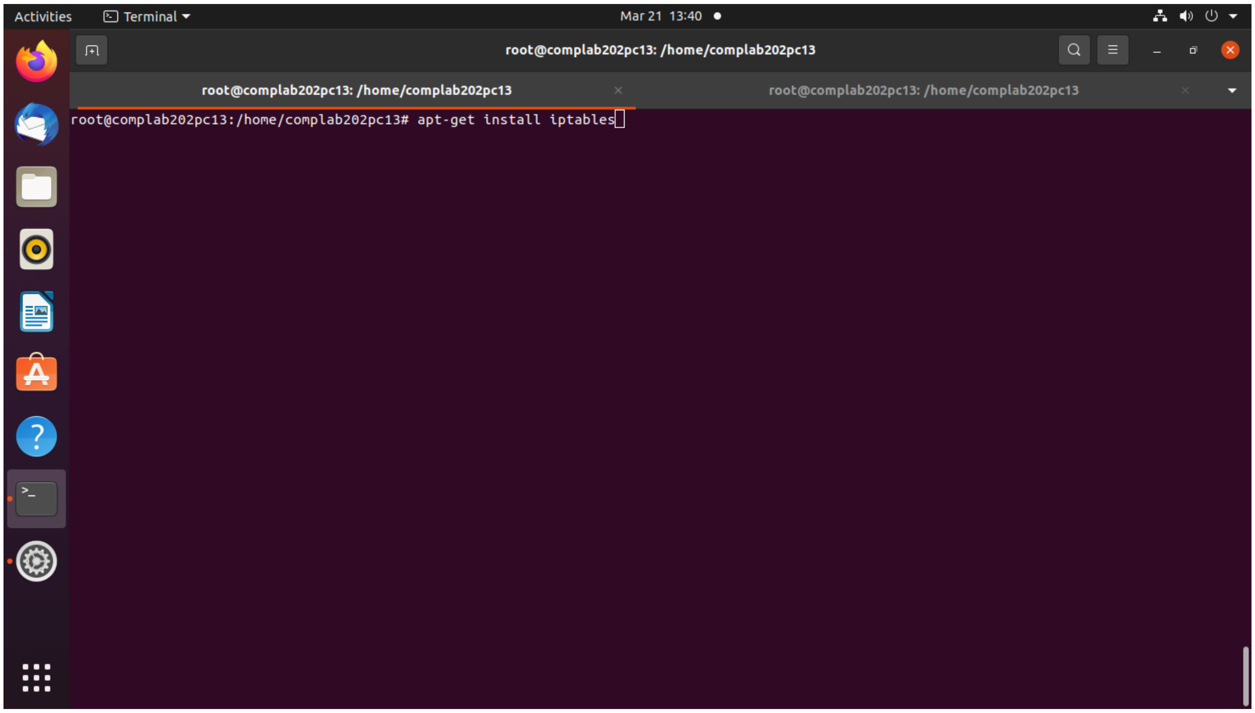
A user can create chains as needed. There are three chains defined by default. They are:

INPUT: This chain handles all packets that are addressed to your server.
OUTPUT: This chain contains rules for traffic created by your server.
FORWARD: This chain is used to deal with traffic destined for other servers

that are not created on your server. This chain is basically a way to configure your server to route requests to other machines.

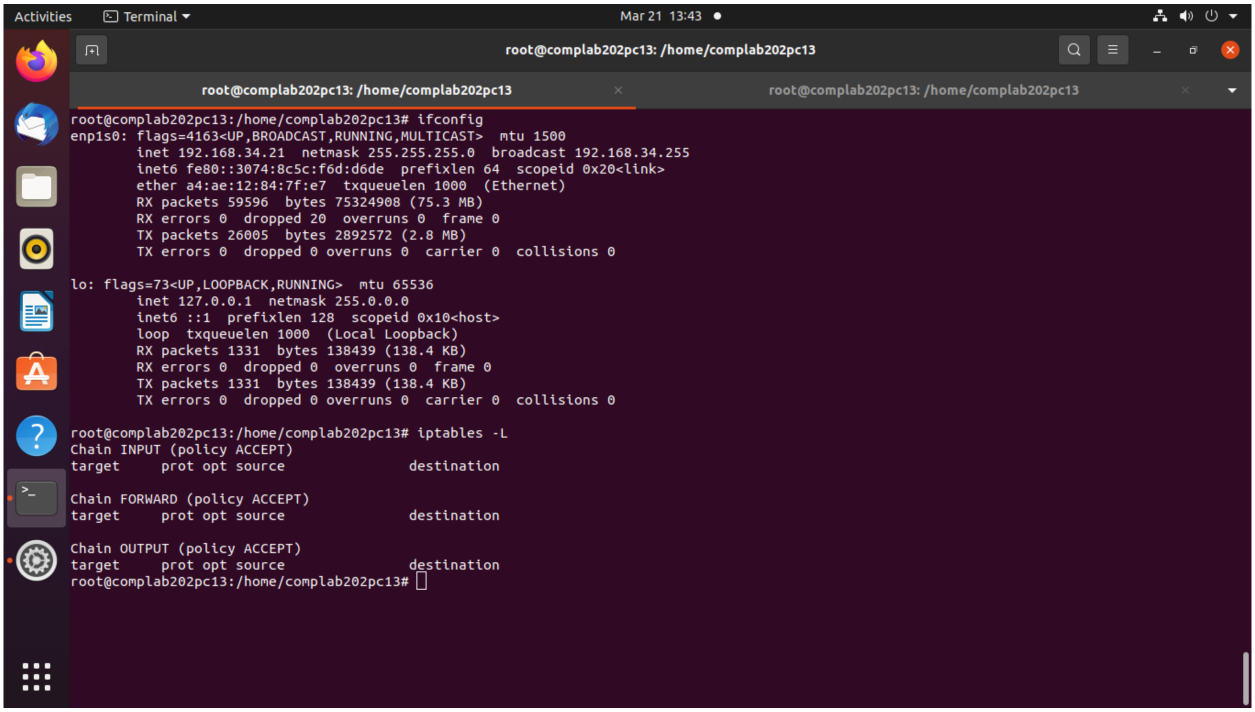
Output:

Install the package iptables


Activities
Terminal
Mar 21 13:40
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
root@complab202pc13:/home/complab202pc13# apt-get install iptables
```

Next get your IP by typing down ifconfig and in another window ping your IP


Activities
Terminal
Mar 21 13:43
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
root@complab202pc13:/home/complab202pc13# ifconfig
enp1s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.34.21  netmask 255.255.255.0  broadcast 192.168.34.255
        inet6 fe80::3074:8c5c:f6d:d6de  prefixlen 64  scopeid 0x20<link>
        ether a4:ae:12:84:7f:e7  txqueuelen 1000  (Ethernet)
        RX packets 59596  bytes 75324908 (75.3 MB)
        RX errors 0  dropped 20  overruns 0  frame 0
        TX packets 26005  bytes 2892572 (2.8 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

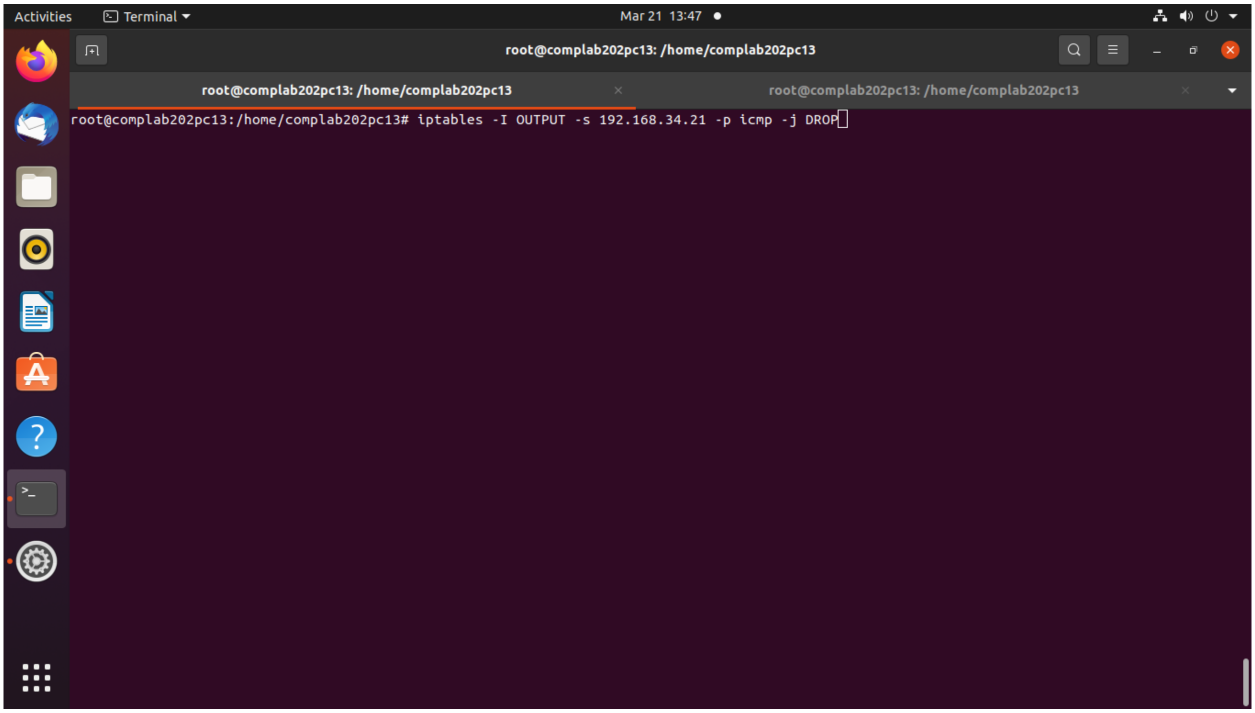
lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 1331  bytes 138439 (138.4 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1331  bytes 138439 (138.4 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

root@complab202pc13:/home/complab202pc13# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination

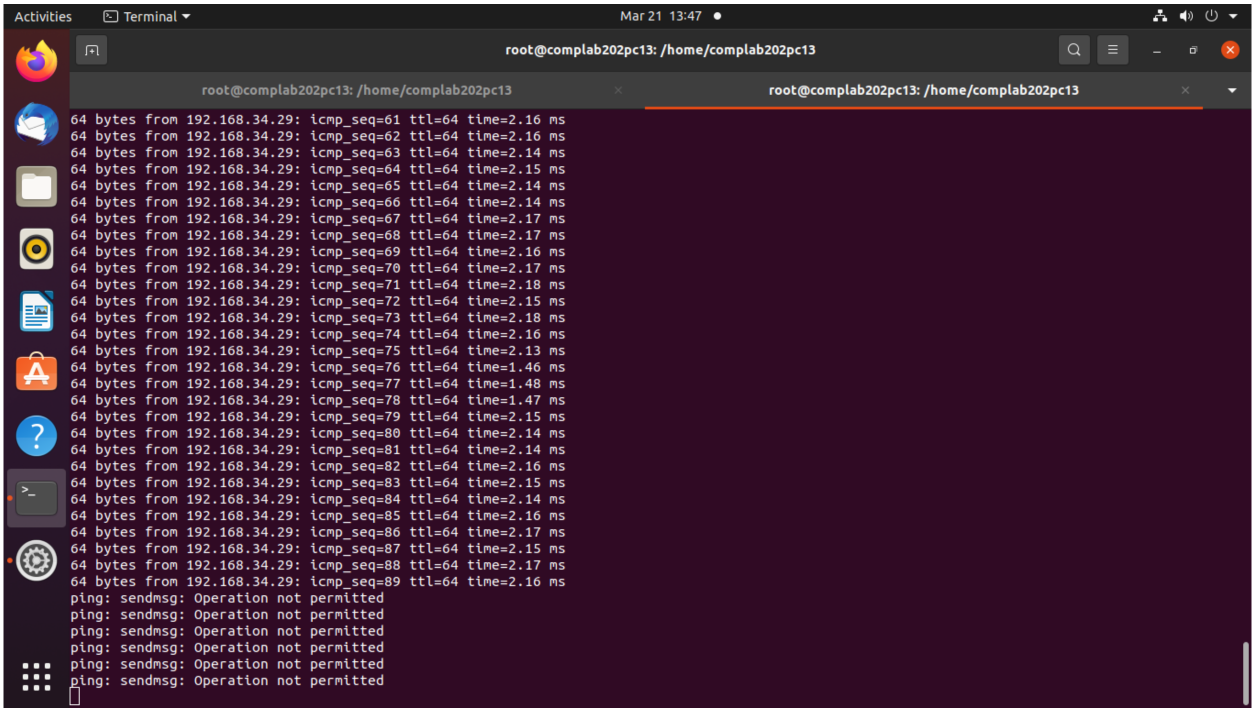
Chain FORWARD (policy ACCEPT)
target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
root@complab202pc13:/home/complab202pc13# 
```

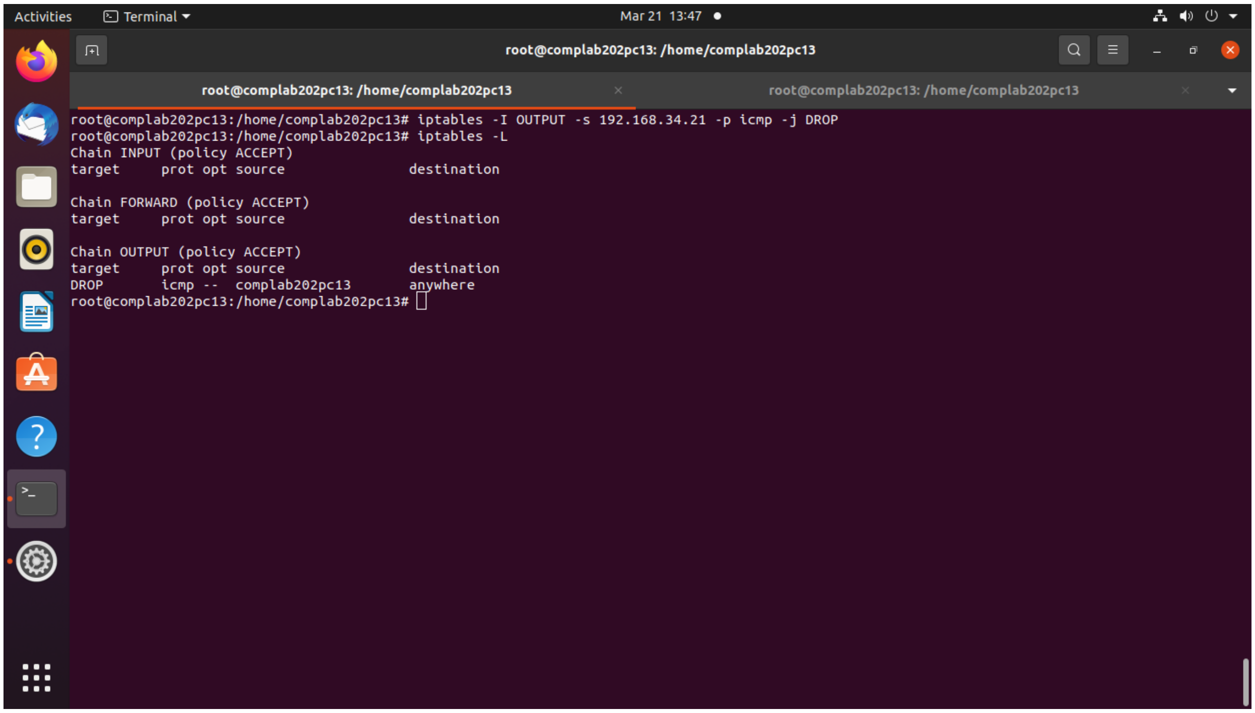
Performing a DROP, REJECT request


Activities
Terminal
Mar 21 13:47
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
root@complab202pc13:/home/complab202pc13# iptables -I OUTPUT -s 192.168.34.21 -p icmp -j DROP
```


Activities
Terminal
Mar 21 13:47
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

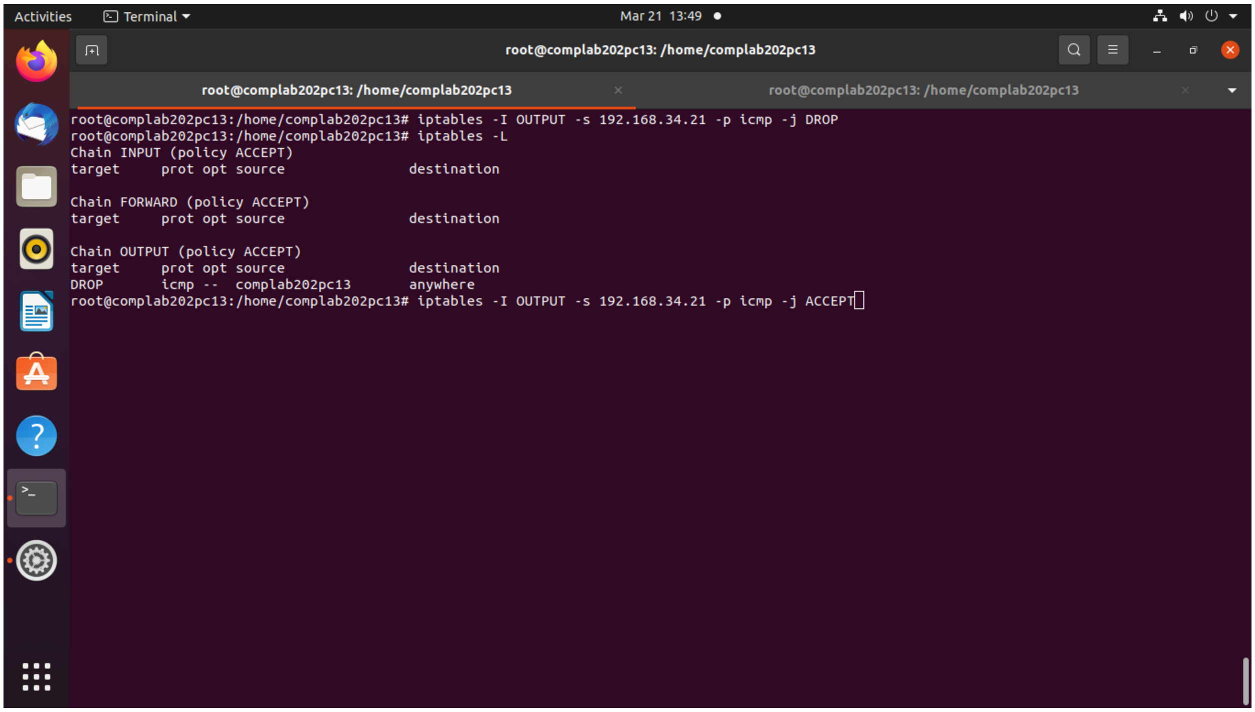
```
64 bytes from 192.168.34.29: icmp_seq=61 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=62 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=63 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=64 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=65 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=66 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=67 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=68 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=69 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=70 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=71 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=72 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=73 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=74 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=75 ttl=64 time=2.13 ms
64 bytes from 192.168.34.29: icmp_seq=76 ttl=64 time=1.46 ms
64 bytes from 192.168.34.29: icmp_seq=77 ttl=64 time=1.48 ms
64 bytes from 192.168.34.29: icmp_seq=78 ttl=64 time=1.47 ms
64 bytes from 192.168.34.29: icmp_seq=79 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=80 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=81 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=82 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=83 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=84 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=85 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=86 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=87 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=88 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=89 ttl=64 time=2.16 ms
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
```


Activities
Terminal
Mar 21 13:47
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
root@complab202pc13:/home/complab202pc13# iptables -I OUTPUT -s 192.168.34.21 -p icmp -j DROP
root@complab202pc13:/home/complab202pc13# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination

Chain FORWARD (policy ACCEPT)
target     prot opt source               destination

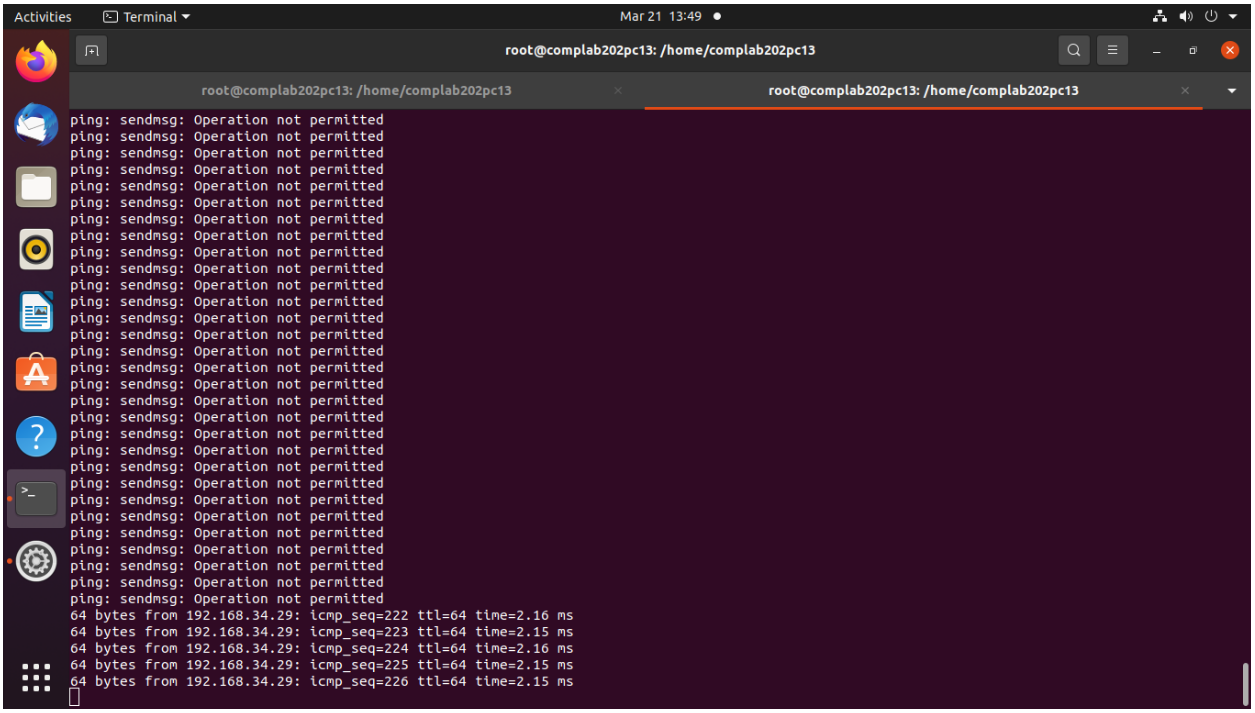
Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
DROP       icmp --  complab202pc13       anywhere
root@complab202pc13:/home/complab202pc13#
```


Activities
Terminal
Mar 21 13:49
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
root@complab202pc13:/home/complab202pc13# iptables -I OUTPUT -s 192.168.34.21 -p icmp -j DROP
root@complab202pc13:/home/complab202pc13# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination

Chain FORWARD (policy ACCEPT)
target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
DROP       icmp --  complab202pc13       anywhere
root@complab202pc13:/home/complab202pc13# iptables -I OUTPUT -s 192.168.34.21 -p icmp -j ACCEPT
```


Activities
Terminal
Mar 21 13:49
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
ping: sendmsg: Operation not permitted
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ping: sendmsg: Operation not permitted
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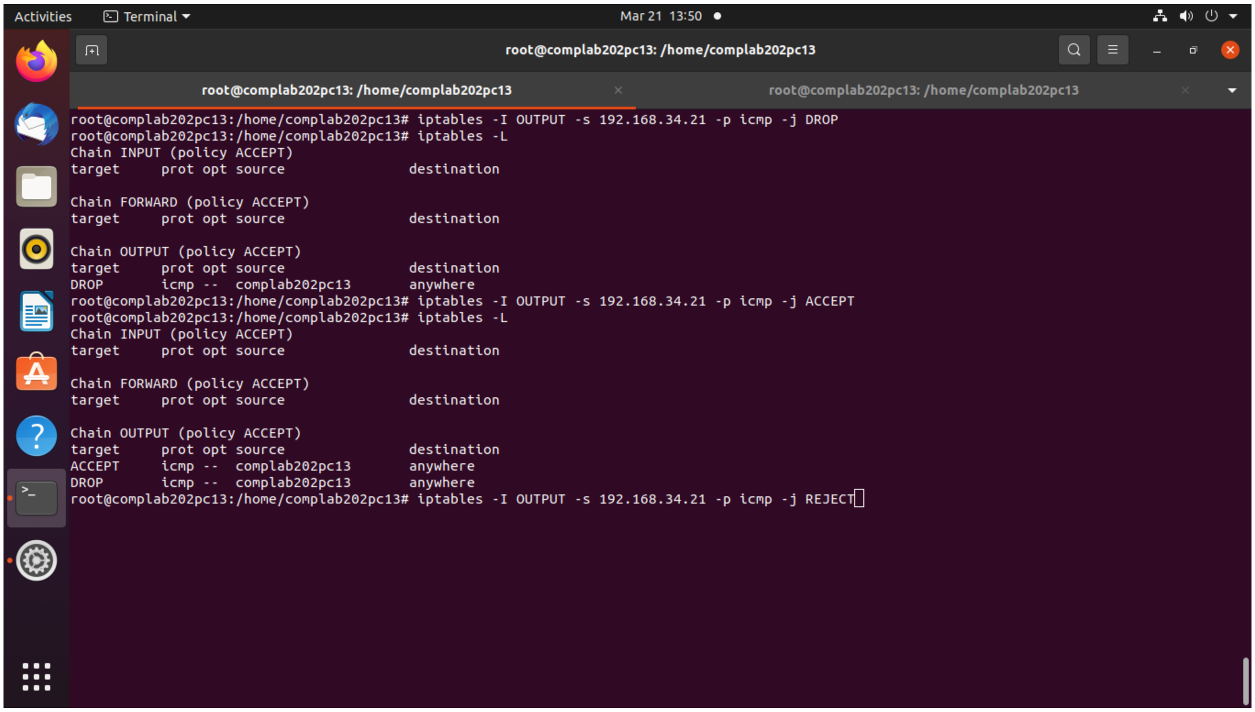
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
64 bytes from 192.168.34.29: icmp_seq=222 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=223 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=224 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=225 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=226 ttl=64 time=2.15 ms
```



Activities
Terminal
Mar 21 13:50
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

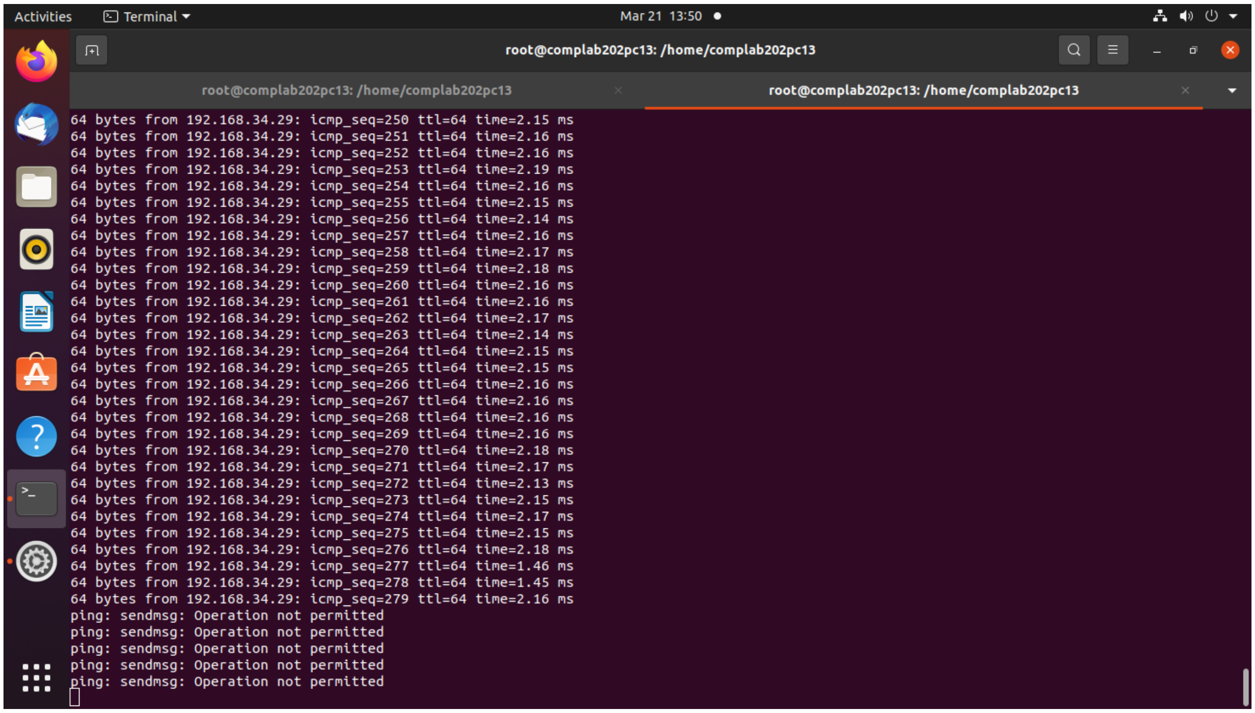
```
root@complab202pc13:/home/complab202pc13# iptables -I OUTPUT -s 192.168.34.21 -p icmp -j DROP
root@complab202pc13:/home/complab202pc13# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination

Chain FORWARD (policy ACCEPT)
target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
DROP       icmp --  complab202pc13       anywhere
root@complab202pc13:/home/complab202pc13# iptables -I OUTPUT -s 192.168.34.21 -p icmp -j ACCEPT
root@complab202pc13:/home/complab202pc13# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination

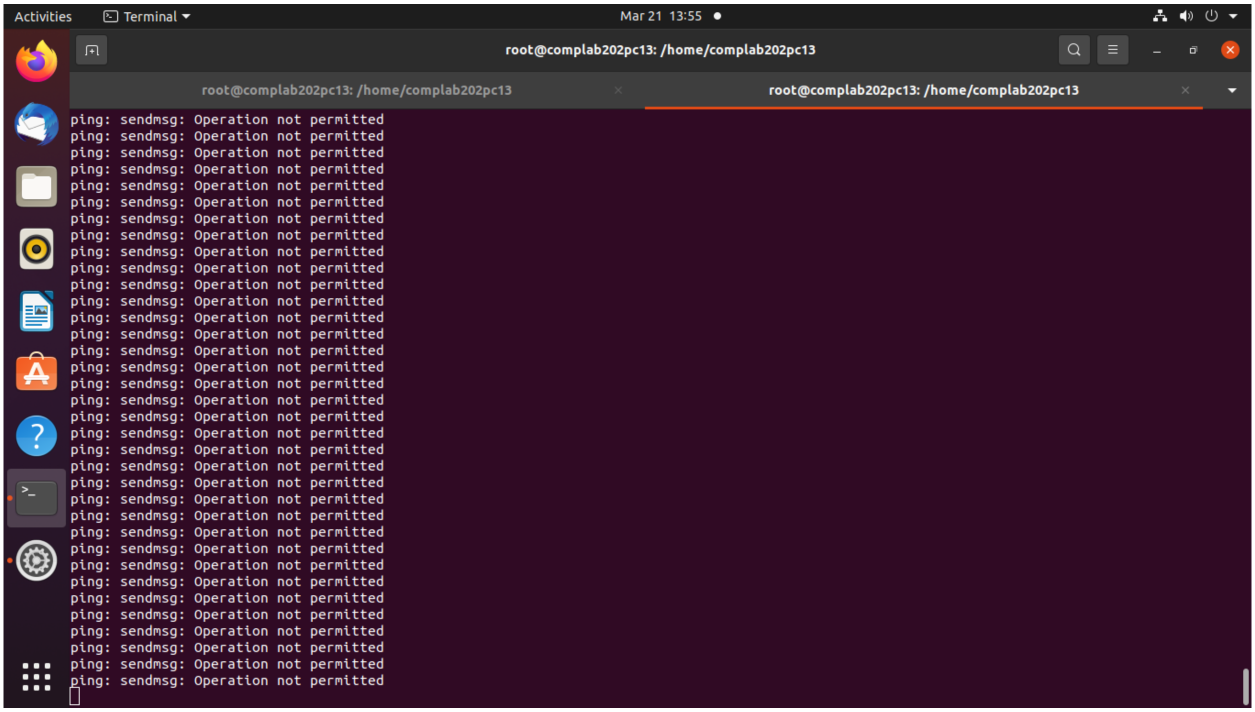
Chain FORWARD (policy ACCEPT)
target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
ACCEPT     icmp --  complab202pc13       anywhere
DROP       icmp --  complab202pc13       anywhere
root@complab202pc13:/home/complab202pc13# iptables -I OUTPUT -s 192.168.34.21 -p icmp -j REJECT
```



Activities
Terminal
Mar 21 13:50
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
64 bytes from 192.168.34.29: icmp_seq=250 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=251 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=252 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=253 ttl=64 time=2.19 ms
64 bytes from 192.168.34.29: icmp_seq=254 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=255 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=256 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=257 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=258 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=259 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=260 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=261 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=262 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=263 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=264 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=265 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=266 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=267 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=268 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=269 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=270 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=271 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=272 ttl=64 time=2.13 ms
64 bytes from 192.168.34.29: icmp_seq=273 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=274 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=275 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=276 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=277 ttl=64 time=1.46 ms
64 bytes from 192.168.34.29: icmp_seq=278 ttl=64 time=1.45 ms
64 bytes from 192.168.34.29: icmp_seq=279 ttl=64 time=2.16 ms
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
```



Activities
Terminal
Mar 21 13:55
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
ping: sendmsg: Operation not permitted
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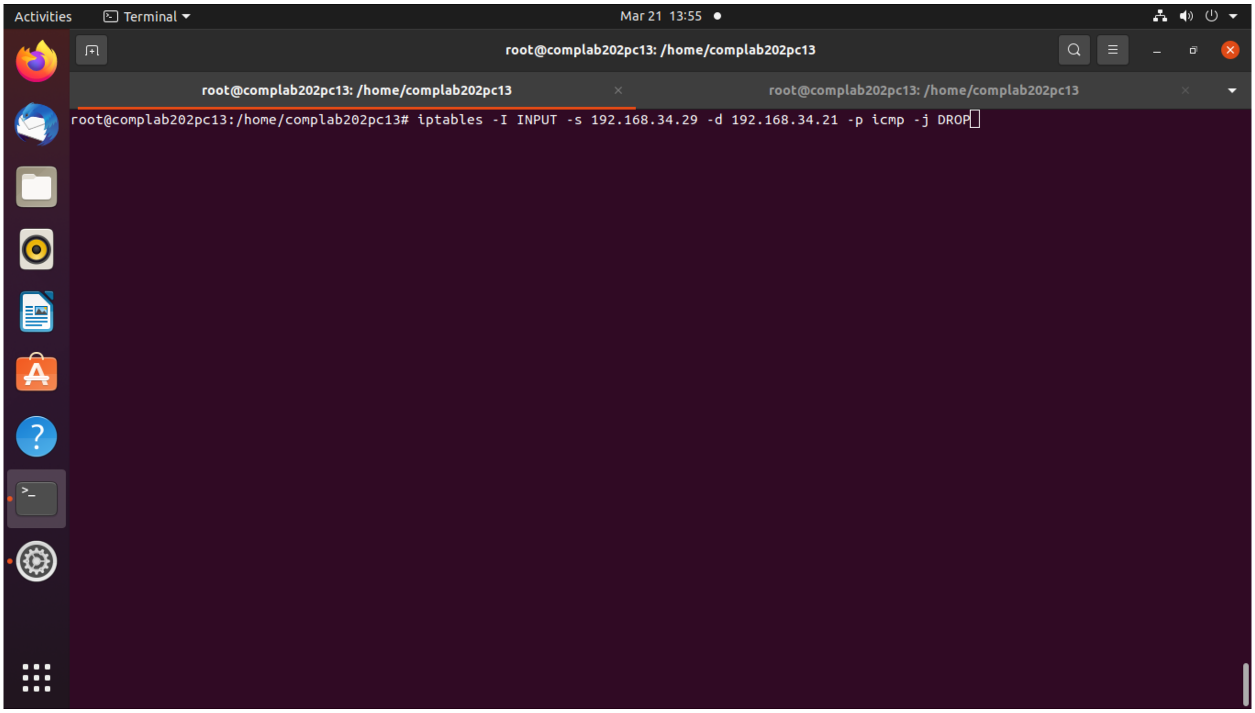
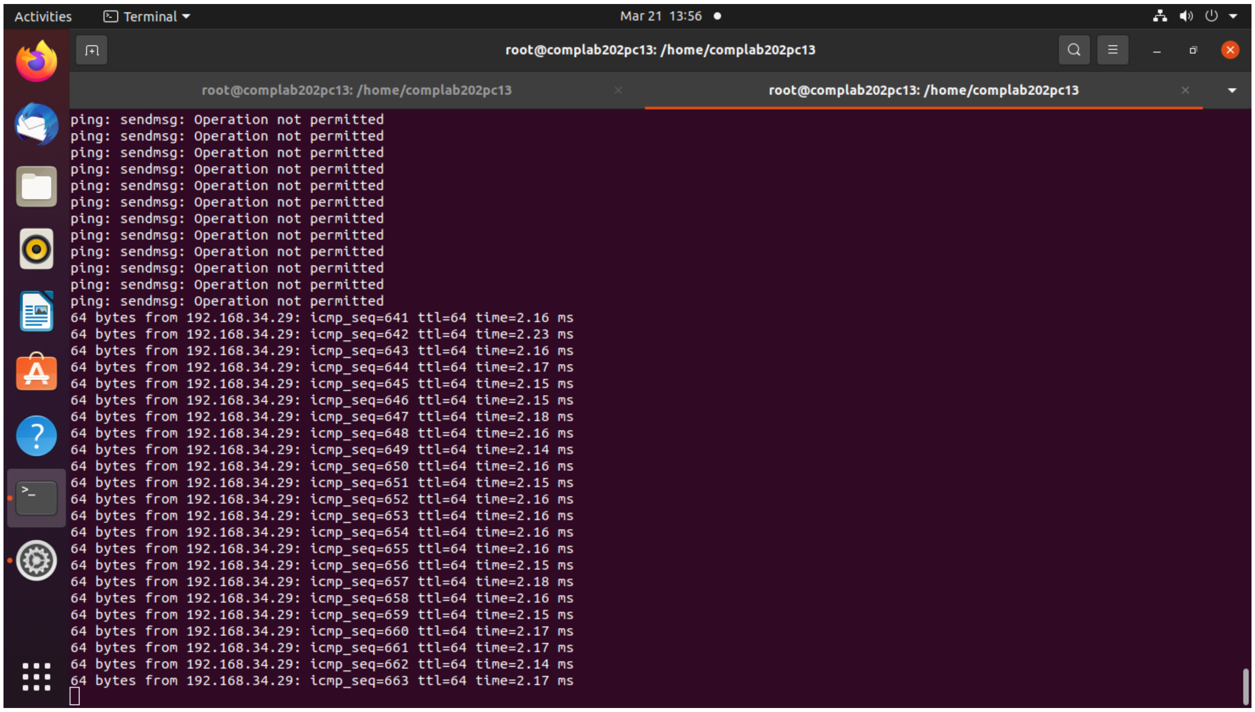
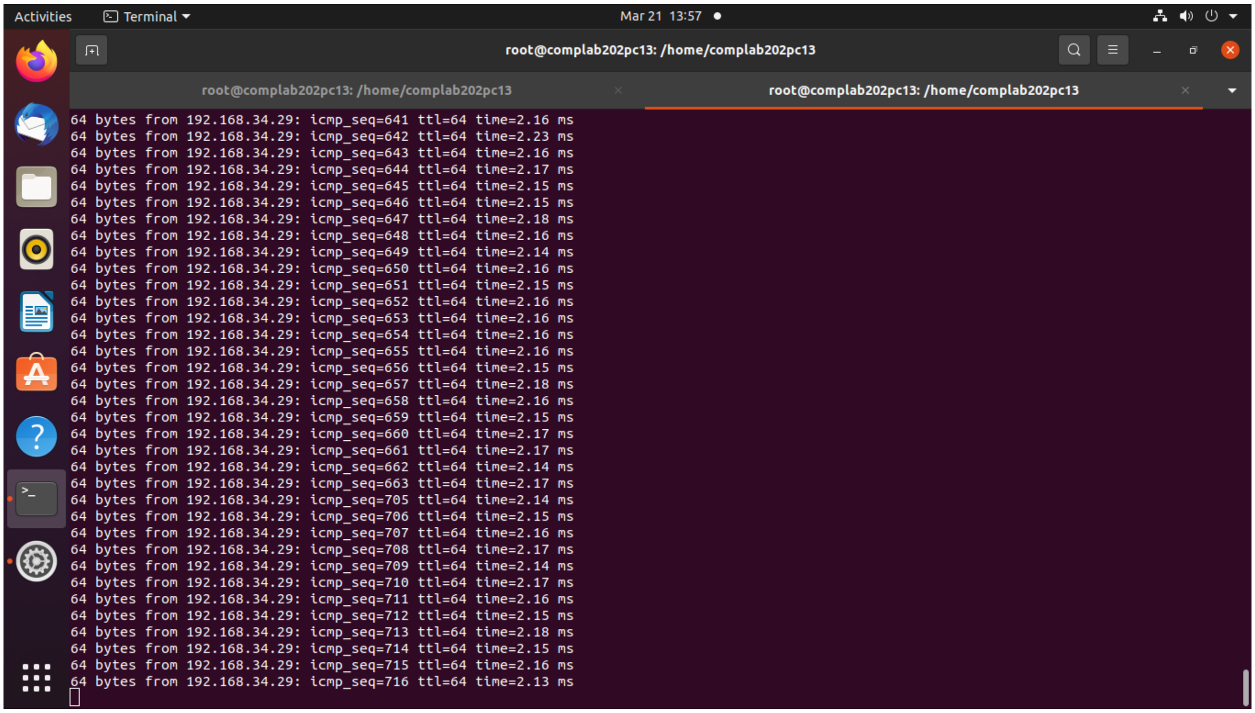


Activities
Terminal
Mar 21 13:55
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
root@complab202pc13:/home/complab202pc13# iptables -I INPUT -s 192.168.34.29 -d 192.168.34.21 -p icmp -j DROP
```

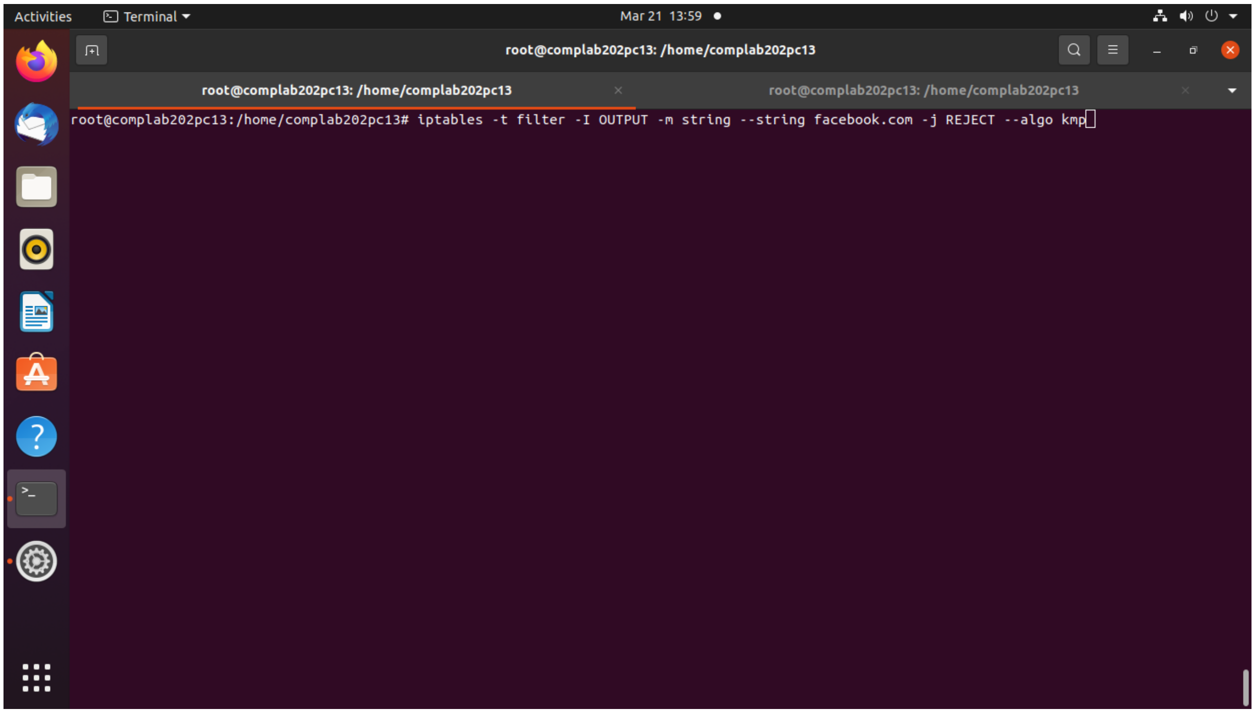

Activities
Terminal
Mar 21 13:56
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
64 bytes from 192.168.34.29: icmp_seq=641 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=642 ttl=64 time=2.23 ms
64 bytes from 192.168.34.29: icmp_seq=643 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=644 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=645 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=646 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=647 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=648 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=649 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=650 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=651 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=652 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=653 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=654 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=655 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=656 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=657 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=658 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=659 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=660 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=661 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=662 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=663 ttl=64 time=2.17 ms
```


Activities
Terminal
Mar 21 13:57
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

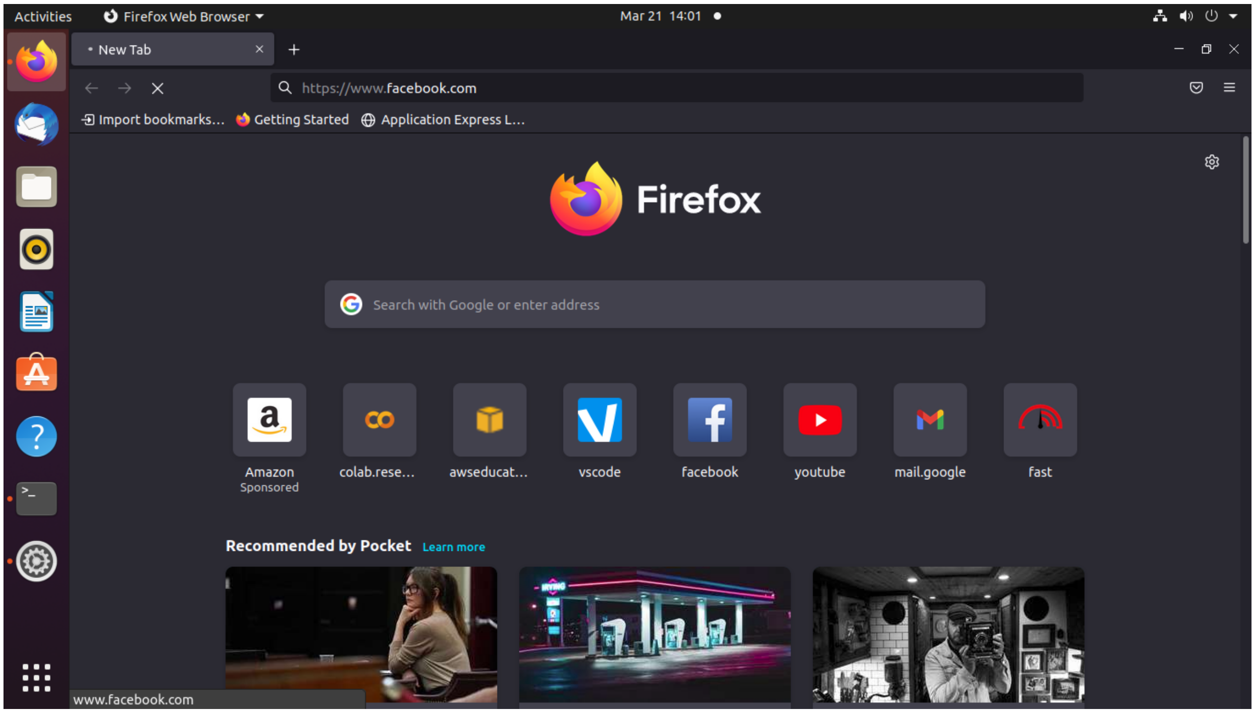
```
64 bytes from 192.168.34.29: icmp_seq=641 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=642 ttl=64 time=2.23 ms
64 bytes from 192.168.34.29: icmp_seq=643 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=644 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=645 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=646 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=647 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=648 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=649 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=650 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=651 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=652 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=653 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=654 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=655 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=656 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=657 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=658 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=659 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=660 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=661 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=662 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=663 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=705 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=706 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=707 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=708 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=709 ttl=64 time=2.14 ms
64 bytes from 192.168.34.29: icmp_seq=710 ttl=64 time=2.17 ms
64 bytes from 192.168.34.29: icmp_seq=711 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=712 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=713 ttl=64 time=2.18 ms
64 bytes from 192.168.34.29: icmp_seq=714 ttl=64 time=2.15 ms
64 bytes from 192.168.34.29: icmp_seq=715 ttl=64 time=2.16 ms
64 bytes from 192.168.34.29: icmp_seq=716 ttl=64 time=2.13 ms
```

Rejecting all connections to facebook.com



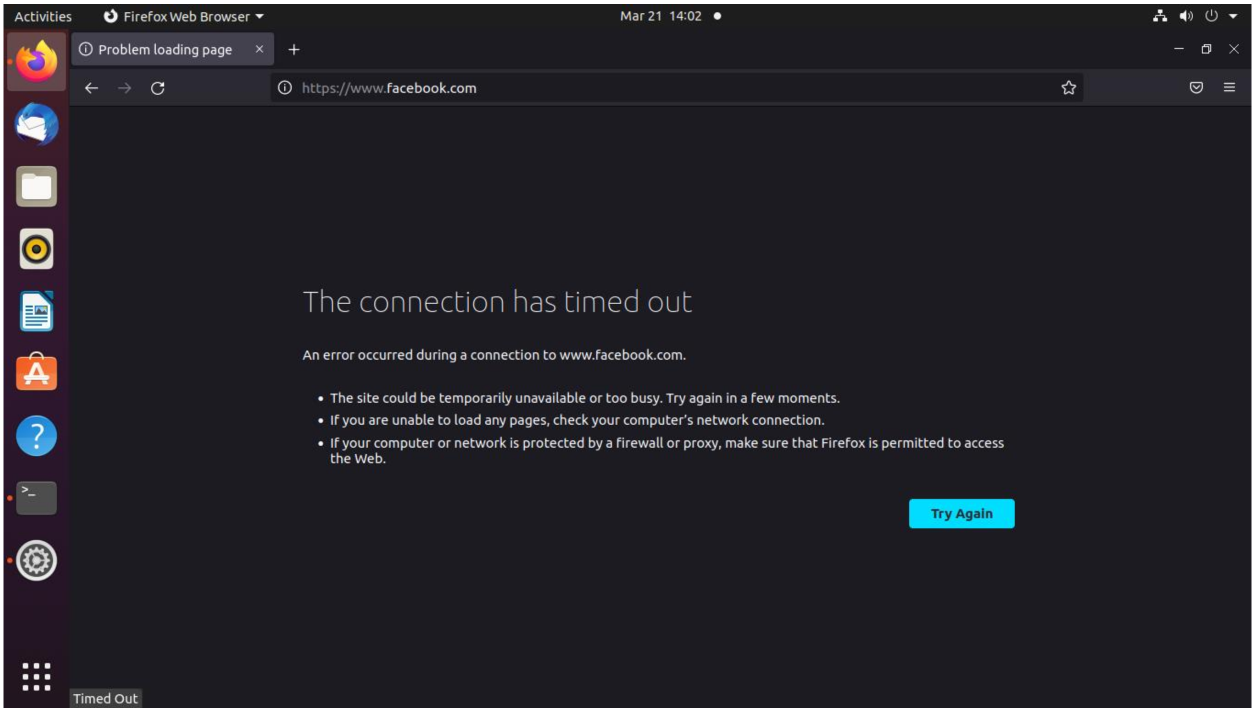
Activities
Terminal
Mar 21 13:59
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
root@complab202pc13:/home/complab202pc13# iptables -t filter -I OUTPUT -m string --string facebook.com -j REJECT --algo kmp
```



https://www.facebook.com

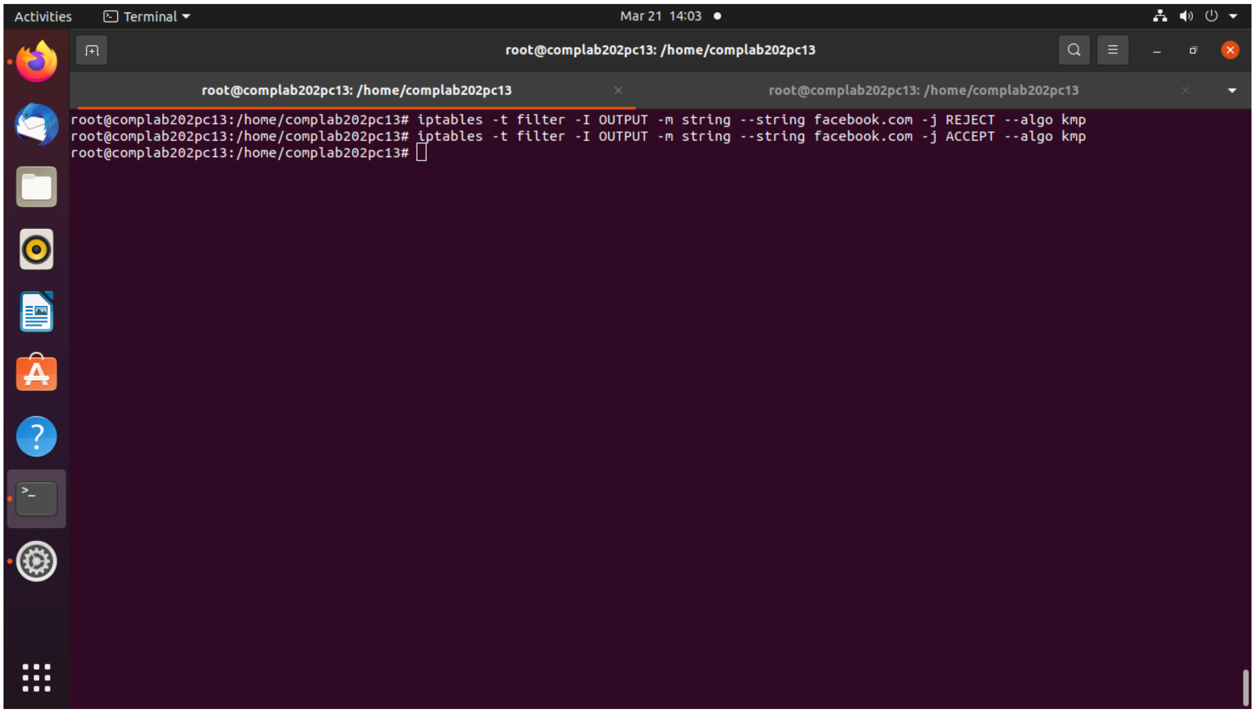
www.facebook.com



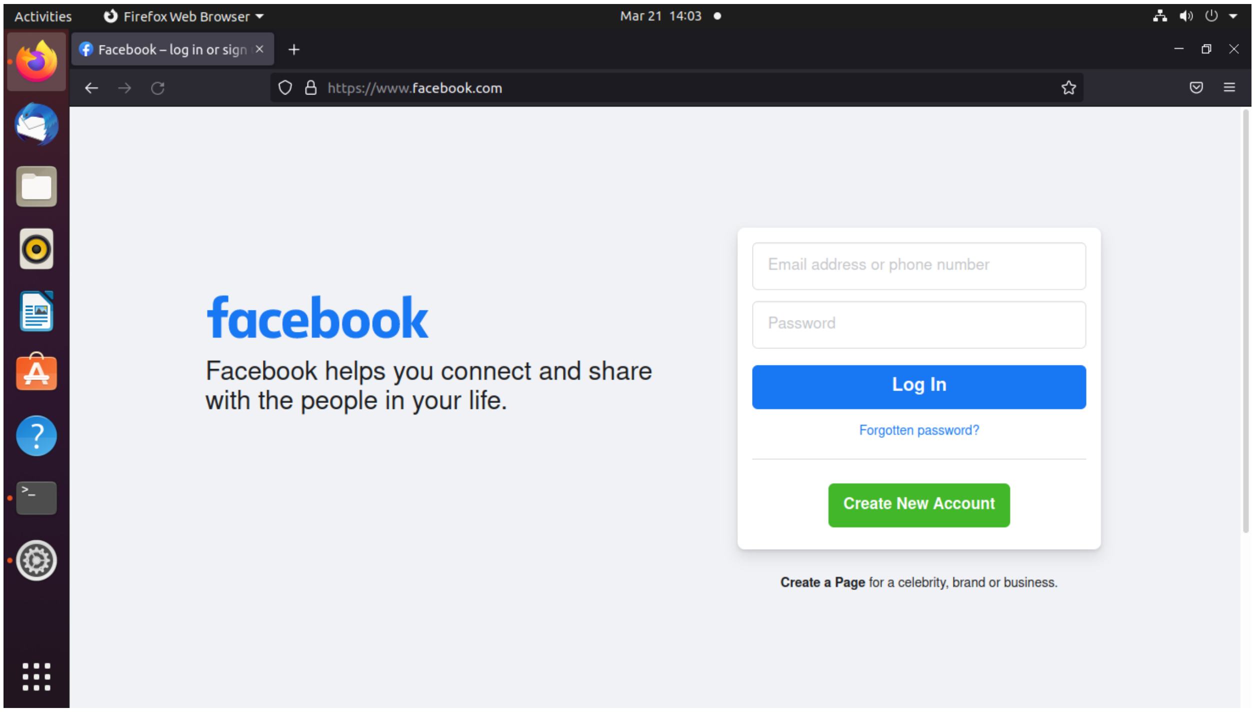
The connection has timed out

An error occurred during a connection to www.facebook.com.

- The site could be temporarily unavailable or too busy. Try again in a few moments.
- If you are unable to load any pages, check your computer's network connection.
- If your computer or network is protected by a firewall or proxy, make sure that Firefox is permitted to access the Web.


Activities
Terminal
Mar 21 14:03
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13
root@complab202pc13: /home/complab202pc13

```
root@complab202pc13:/home/complab202pc13# iptables -t filter -I OUTPUT -m string --string facebook.com -j REJECT --algo kmp
root@complab202pc13:/home/complab202pc13# iptables -t filter -I OUTPUT -m string --string facebook.com -j ACCEPT --algo kmp
root@complab202pc13:/home/complab202pc13# 
```



Facebook helps you connect and share with the people in your life.

Create a Page for a celebrity, brand or business.

Conclusion: Implemented firewall using iptables. Understood the functions and importance of a firewall. Successfully defined rules for certain ips to accept or reject them.