

MAWLANA BHASHANI SCIENCE AND TECHNOLOGY UNIVERSITY



DEPARTMENT OF ICT

ASSIGNMENT NO : 02

Course Code : ICT-3208

Course Title : Network Planning and designing Lab.

Assignment Name : Linux Exercise (Linux Networking Tools) .

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Objectives : How to Install , use and understand how to Linux networking tools. To Learn how to use the tools ping, nsenter ,iptables, routehttp, dig ,ssh , whois, nslookup, and finger etc for Linux administration and troubleshooting.

Explanation :

Linux Networking tools : One can use a variety of network tools to perform tasks such as obtaining information about other systems on your network, accessing other systems, and communicating directly with other users. Network information can be obtained using utilities such as ping, finger, host, dig, etc .

Details of Linux Networking tools :

Ping:

PING (Packet Internet Groper) command is used to check the network connectivity between host and server/host.

```
sohan1801@sohan1801-VirtualBox:~$ ping google.com
PING google.com (172.217.166.110) 56(84) bytes of data.
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=1 ttl=116 time=118 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=2 ttl=116 time=58.2 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=3 ttl=116 time=56.3 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=4 ttl=116 time=61.6 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=5 ttl=116 time=99.2 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=6 ttl=116 time=120 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=7 ttl=116 time=56.4 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=8 ttl=116 time=55.1 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=9 ttl=116 time=60.3 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=12 ttl=116 time=406 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=13 ttl=116 time=55.7 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=14 ttl=116 time=57.1 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=15 ttl=116 time=111 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=16 ttl=116 time=56.1 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=17 ttl=116 time=55.2 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=18 ttl=116 time=75.5 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=19 ttl=116 time=95.3 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=20 ttl=116 time=122 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=21 ttl=116 time=123 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=22 ttl=116 time=69.1 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=23 ttl=116 time=118 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=24 ttl=116 time=99.7 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=25 ttl=116 time=96.4 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=27 ttl=116 time=109 ms
64 bytes from maa05s09-in-f14.1e100.net (172.217.166.110): icmp_seq=28 ttl=116 time=60.4 ms
```

Curl :

curl is a command line tool to transfer data to or from a server, using any of the supported protocols .

```
sohan18011@sohan18011-VirtualBox:~$ curl https://lucid-franklin-28947c.netlify.app
<!DOCTYPE html>
<html>
<head>
  <link rel="stylesheet" href=
"https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css">
  <script src=
"https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.min.js">
  </script>
  <script src=
"https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/popper.min.js">
  </script>
  <script src=
"https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/js/bootstrap.min.js">
  </script>

  <!-- CDN link used below is compatible with this example -->
  <link rel="stylesheet" href=
"https://cdnjs.cloudflare.com/ajax/libs/bootstrap-select/1.13.1/css/bootstrap-select.min.css">
  <script src=
"https://cdnjs.cloudflare.com/ajax/libs/bootstrap-select/1.13.1/js/bootstrap-select.min.js">
  </script>

  <link rel="stylesheet" href="style.css">
</head>
<body>

<div class="container1" style="margin-left: 430px; width: 50%; padding: 10px">

  <select id="mySelect" onchange="Flightchange()" class="selectpicker"
    data-style="btn-success">
    <option selected hidden>select any option </option>
    <option value="1">One-way</option>
    <option value="2">Round-trip</option>
    <option value="3">Multi-Cities</option>
  </select>

```

HTTP :

HTTP clients are utility software that enables you to download files over the Internet. Apart from being able to download files remotely, these command line tools can be used for other task.

```
sohan18011@sohan18011-VirtualBox:~$ http https://lucid-franklin-20947c.netlify.app
HTTP/1.1 200 OK
Age: 493
Cache-Control: public, max-age=0, must-revalidate
Connection: keep-alive
Content-Encoding: gzip
Content-Length: 2111
Content-Type: text/html; charset=UTF-8
Date: Wed, 23 Dec 2020 15:45:59 GMT
Etag: "874a053a27a5d398ed45d578dd03ce5a-ssl-df"
Server: Netlify
Strict-Transport-Security: max-age=31536000; includeSubDomains; preload
Vary: Accept-Encoding
X-NF-Request-ID: 49624942-af64-4941-8206-3754e101b47b-12879236

<!DOCTYPE html>
<html>
<head>
  <link rel="stylesheet" href=
"https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css">
    <script src=
"https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.min.js">
    </script>
    <script src=
"https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/popper.min.js">
    </script>
    <script src=
"https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/js/bootstrap.min.js">
    </script>

    <!-- CDN link used below is compatible with this example -->
    <link rel="stylesheet" href=
"https://cdnjs.cloudflare.com/ajax/libs/bootstrap-select/1.13.1/css/bootstrap-select.min.css">
    <script src=
"https://cdnjs.cloudflare.com/ajax/libs/bootstrap-select/1.13.1/js/bootstrap-select.min.js">
```

Wget :

Wget is the non-interactive network downloader which is used to download files from the server even when the user has not logged on to the system and it can work in the background without hindering the current process

```
sohan18011@sohan18011-VirtualBox:~$ wget https://lucid-franklin-20947c.netlify.app
--2020-12-23 21:57:06--  https://lucid-franklin-20947c.netlify.app/
Resolving lucid-franklin-20947c.netlify.app (lucid-franklin-20947c.netlify.app)... 178.128.17.49, 206.189.89.118, 2406:da18:8801:1cc2:f2d
:5830:6195, ...
Connecting to lucid-franklin-20947c.netlify.app (lucid-franklin-20947c.netlify.app)|178.128.17.49|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/html]
Saving to: 'index.html'

Index.html                                              [ <=>                               ] 10.52K  --.-KB/s   in 0s

2020-12-23 21:57:08 (23.2 MB/s) - 'index.html' saved [10772]

sohan18011@sohan18011-VirtualBox:~$
```

Dig :

The dig command in Linux is used to gather DNS information. It stands for Domain Information Groper, and it collects data about Domain Name Servers.

```
sohan18011@sohan18011-VirtualBox:~$ dig -v
DiG 9.16.1-Ubuntu
sohan18011@sohan18011-VirtualBox:~$ dig google.com

; <>> DiG 9.16.1-Ubuntu <>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 62040
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;google.com.           IN      A

;; ANSWER SECTION:
google.com.        230     IN      A      172.217.166.110

;; Query time: 3 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: মৃখ ডিসেম্বর 23 21:59:15 +06 2020
;; MSG SIZE  rcvd: 55

sohan18011@sohan18011-VirtualBox:~$
```

Whois :

Whois is a query and response protocol that is widely used for querying databases that store the registered users or assignees of an Internet resource, such as a domain name, an IP address block or an autonomous system, but is also used for a wider range of other information.

```
sohan18011@sohan18011-VirtualBox:~$ whois google.com
Domain Name: GOOGLE.COM
Registry Domain ID: 2138514_DOMAIN_COM-VRSN
Registrar WHOIS Server: whois.markmonitor.com
Registrar URL: http://www.markmonitor.com
Updated Date: 2019-09-09T15:39:04Z
Creation Date: 1997-09-15T04:00:00Z
Registry Expiry Date: 2028-09-14T04:00:00Z
Registrar: MarkMonitor Inc.
Registrar IANA ID: 292
Registrar Abuse Contact Email: abusecomplaints@markmonitor.com
Registrar Abuse Contact Phone: +1.2083895740
Domain Status: clientDeleteProhibited https://icann.org/epp#clientDeleteProhibited
Domain Status: clientTransferProhibited https://icann.org/epp#clientTransferProhibited
Domain Status: clientUpdateProhibited https://icann.org/epp#clientUpdateProhibited
Domain Status: serverDeleteProhibited https://icann.org/epp#serverDeleteProhibited
Domain Status: serverTransferProhibited https://icann.org/epp#serverTransferProhibited
Domain Status: serverUpdateProhibited https://icann.org/epp#serverUpdateProhibited
Name Server: NS1.GOOGLE.COM
Name Server: NS2.GOOGLE.COM
Name Server: NS3.GOOGLE.COM
Name Server: NS4.GOOGLE.COM
DNSSEC: unsigned
URL of the ICANN Whois Inaccuracy Complaint Form: https://www.icann.org/wicf/
>>> Last update of whois database: 2020-12-23T16:05:31Z <<<

For more information on Whois status codes, please visit https://icann.org/epp

NOTICE: The expiration date displayed in this record is the date the
registrar's sponsorship of the domain name registration in the registry is
currently set to expire. This date does not necessarily reflect the expiration
date of the domain name registrant's agreement with the sponsoring
registrar. Users may consult the sponsoring registrar's Whois database to
view the registrar's reported date of expiration for this registration.

TERMS OF USE: You are not authorized to access or query our Whois
database through the use of electronic processes that are high-volume and
automated except as reasonably necessary to register domain names or
```

ssh :

The ssh command provides a secure encrypted connection between two hosts over an insecure network.

```
sohan18011@sohan18011-VirtualBox:~$ sudo service ssh status
Unit ssh.service could not be found.
sohan18011@sohan18011-VirtualBox:~$ sudo service ssh status
Unit ssh.service could not be found.
sohan18011@sohan18011-VirtualBox:~$ sudo apt install service ss status
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package service
E: Unable to locate package ss
E: Unable to locate package status
sohan18011@sohan18011-VirtualBox:~$ sudo service ssh status
Unit ssh.service could not be found.
sohan18011@sohan18011-VirtualBox:~$
```

Ngrep : .

ngrep or network grep is a command line program that can be used to analyze and search network packets for a given regex pattern.

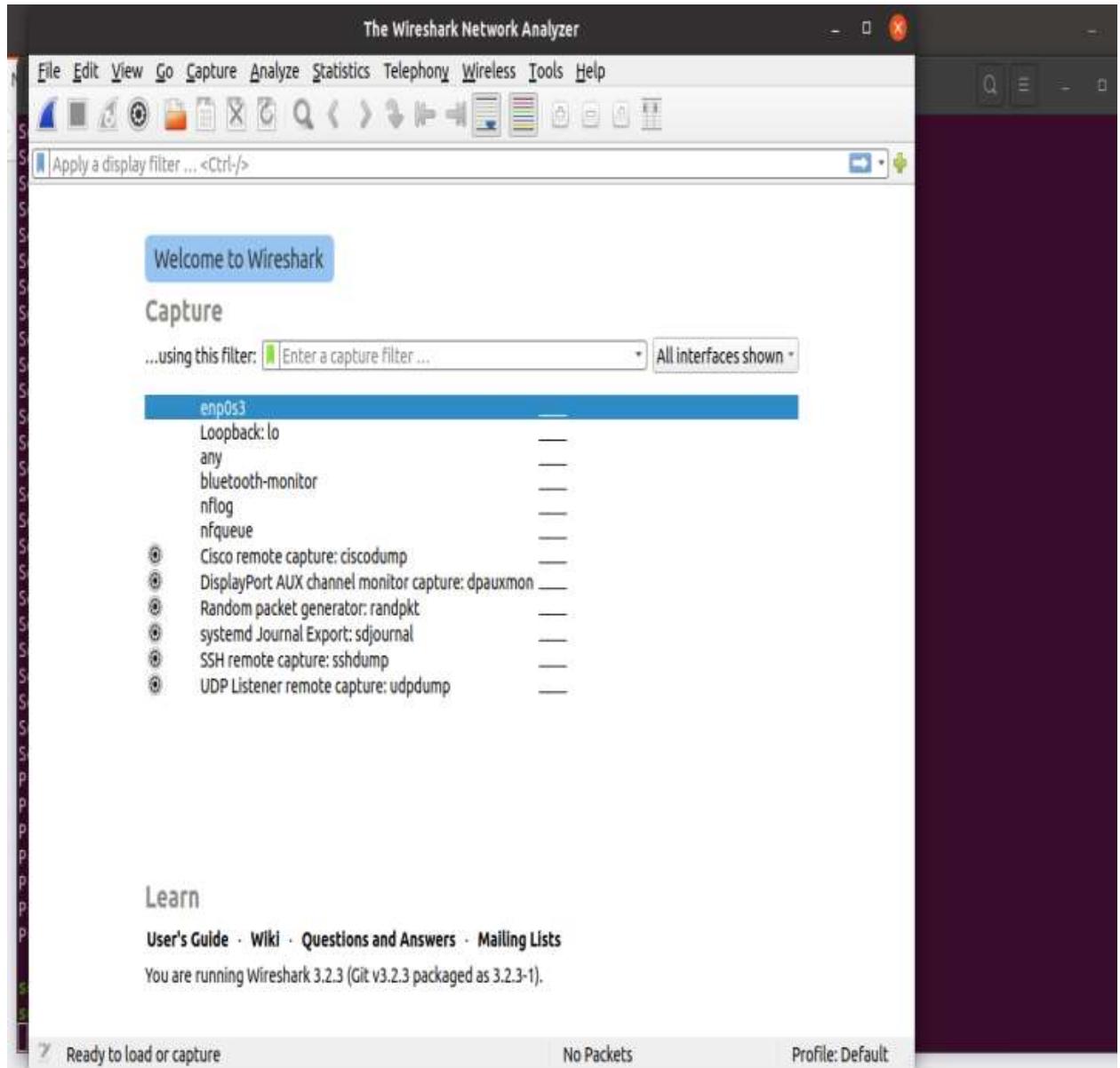
```
sohan18011@sohan18011-VirtualBox:~$ sudo ngrep -q ',' 'host google.com'
interface: enp0s3 (10.0.2.0/255.255.255.0)
filter: ( host google.com ) and ((ip || ip6) || (vlan && (ip || ip6)))
match: ,
```

Wireshark :

Wireshark is a popular open source graphical user interface (GUI) tool for analyzing packets. However, it also provides a powerful command-line utility called TShark for people who prefer to work on the Linux command line.

```
sohan18011@sohan18011-VirtualBox:~$ wireshark
Command 'wireshark' not found, but can be installed with:
sudo apt install wireshark-gtk

sohan18011@sohan18011-VirtualBox:~$ sudo apt install wireshark -qt
[sudo] password for sohan18011:
E: Option -qt requires an argument.
sohan18011@sohan18011-VirtualBox:~$ sohan
sohan: command not found
sohan18011@sohan18011-VirtualBox:~$ sudo apt install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
 libc-ares2 libdouble-conversion3 liblua5.2-0 libpcre2-16-0 libqt5core5a libqt5dbus libqt5gui5 libqt5multimedia5
 libqt5multimedia5-plugins libqt5multimediasettings5 libqt5multimediaclient5 libqt5network5 libqt5opengl5
 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2ldbl libsnappy1v5 libspandsp2 libssh-gcrypt-4 libwireshark-data
 libwireshark13 libwiretap0 libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme qttranslations5-l10n
 wireshark-common wireshark-qt
Suggested packages:
 qt5-image-formats-plugins qtwayland5 snmp-mibs-downloader geoipupdate geoip-database geoip-database-extra
 libjs-leaflet libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
 libc-ares2 libdouble-conversion3 liblua5.2-0 libpcre2-16-0 libqt5core5a libqt5dbus libqt5gui5 libqt5multimedia5
 libqt5multimedia5-plugins libqt5multimediasettings5 libqt5multimediaclient5 libqt5network5 libqt5opengl5
 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2ldbl libsnappy1v5 libspandsp2 libssh-gcrypt-4 libwireshark-data
 libwireshark13 libwiretap0 libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme qttranslations5-l10n
 wireshark wireshark-common wireshark-qt
0 upgraded, 31 newly installed, 0 to remove and 412 not upgraded.
Need to get 32.7 MB/32.9 MB of archives.
After this operation, 163 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://bd.archive.ubuntu.com/ubuntu focal/universe amd64 libdouble-conversion3 amd64 3.1.5-4ubuntu1 [37.9 kB]
Get:2 http://bd.archive.ubuntu.com/ubuntu focal/main amd64 libpcre2-16-0 amd64 10.34-7 [181 kB]
```



TCPflow :

TCPflow is a free, open source, powerful command line based tool for analyzing network traffic on Unix-like systems such as Linux. It captures data received or transferred over TCP connections, and stores it in a file for later analysis, in a useful format that allows for protocol analysis and debugging.

```
sohan18011@sohan18011-VirtualBox:~$  
sohan18011@sohan18011-VirtualBox:~$ sudo tcpflow  
reportfilename: ./report.xml  
tcpflow: listening on enp0s3
```

ifconfig :

ifconfig is used to configure the system's kernel-resident network interfaces. It is used at boot time to set up interfaces as necessary.

```
sohan18011@sohan18011-VirtualBox:~$ ifconfig  
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255  
inet6 fe80::4bab:debe:da58:a8e8 prefixlen 64 scopeid 0x20<link>  
ether 08:00:27:d5:a4:0f txqueuelen 1000 (Ethernet)  
RX packets 195689 bytes 254690566 (254.6 MB)  
RX errors 0 dropped 0 overruns 0 frame 0  
TX packets 28381 bytes 2223649 (2.2 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 4758 bytes 405343 (405.3 KB)  
RX errors 0 dropped 0 overruns 0 frame 0  
TX packets 4758 bytes 405343 (405.3 KB)  
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Route :

route command in Linux is used when you want to work with the IP/kernel routing table. It is mainly used to set up static routes to specific hosts or networks via an interface. It is used for showing or update the IP/kernel routing table

```
sohan18011@sohan18011-VirtualBox:~$ route
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref    Use Iface
default         _gateway       0.0.0.0        UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U     100    0        0 enp0s3
link-local      0.0.0.0        255.255.0.0    U     1000   0        0 enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

Ip:

The ip command is used to assign an address to a network interface and/or configure network interface parameters on Linux operating systems

```
sohan18011@sohan18011-VirtualBox:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:d5:a4:0f brd ff:ff:ff:ff:ff:ff
        inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
            valid_lft 77424sec preferred_lft 77424sec
        inet6 fe80::4bab:debe:da58:a8e8/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
sohan18011@sohan18011-VirtualBox:~$
```

Arp:

The arp command manipulates or displays the kernel's IPv4 network neighbour cache. It can add entries to the table, delete one, or display the current content.

```
sohan18011@sohan18011-VirtualBox:~$ arp
Address           HWtype  HWaddress          Flags Mask     Iface
_gateway          ether    52:54:00:12:35:02  C          enp0s3
sohan18011@sohan18011-VirtualBox:~$
```

Nmap :

Nmap is an open source Linux command line tool for network exploration and security auditing. With Nmap, server administrators can quickly reveal hosts and services, search for security issues, and scan for open ports.

```
sohan18011@sohan18011-VirtualBox:~$ nmap subdomain.server.com
Command 'nmap' not found, but can be installed with:

sudo snap install nmap # version 7.91, or
sudo apt install nmap # version 7.80+dfsg1-2build1

See 'snap info nmap' for additional versions.

sohan18011@sohan18011-VirtualBox:~$
```

Socat :

Socat is a command line based utility that establishes two bidirectional byte streams and transfers data between them.

```
sohan18011@sohan18011-VirtualBox:~$ sudo apt install socat
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
socat
0 upgraded, 1 newly installed, 0 to remove and 412 not upgraded.
Need to get 323 kB of archives.
After this operation, 1,394 kB of additional disk space will be used.
Get:1 http://bd.archive.ubuntu.com/ubuntu focal/main amd64 socat amd64 1.7.3.3-2 [323 kB]
Fetched 323 kB in 13s (24.8 kB/s)
Selecting previously unselected package socat.
(Reading database ... 143437 files and directories currently installed.)
Preparing to unpack .../socat_1.7.3.3-2_amd64.deb ...
Unpacking socat (1.7.3.3-2) ...
Setting up socat (1.7.3.3-2) ...
Processing triggers for man-db (2.9.1-1) ...
sohan18011@sohan18011-VirtualBox:~$ socat
2020/12/23 22:58:36 socat[16344] E exactly 2 addresses required (there are 0); use option "-h" for help
sohan18011@sohan18011-VirtualBox:~$ socat - TCP4:www.example.com:80
2020/12/23 23:00:34 socat[16638] E TCP4: wrong number of parameters (1 instead of 2)
sohan18011@sohan18011-VirtualBox:~$ socat - TCP4:www.example.com:1
2020/12/23 23:00:52 socat[16639] E TCP4: wrong number of parameters (1 instead of 2)
sohan18011@sohan18011-VirtualBox:~$
```

Telnet :

The telnet command is used for interactive communication with another host using the TELNET protocol .

```
sohan18011@sohan18011-VirtualBox:~$ telnet localhost  
Trying 127.0.0.1...  
telnet: Unable to connect to remote host: Connection refused  
sohan18011@sohan18011-VirtualBox:~$
```

FTP :

FTP is the simplest file transfer protocol to exchange files to and from a remote computer or network.

```
sohan18011@sohan18011-VirtualBox:~$ ftp ftp.cesca.es  
Connected to verdaguer-ftp.cesca.cat.  
220 Welcome to Anella Cientifica FTP service.  
Name (ftp.cesca.es:sohan18011):  
331 This FTP server is anonymous only.  
Password:  
503 Login with USER first.  
Login failed.  
ftp>  
ftp> exit  
221 Goodbye.  
sohan18011@sohan18011-VirtualBox:~$
```

Netsta :

Netstat is a command line utility that can be used to list out all the network (socket) connections on a system.

```

sohan18011@sohan18011-VirtualBox:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 localhost:domain        0.0.0.0:*
                                         LISTEN
tcp      0      0 localhost:ipp          0.0.0.0:*
                                         LISTEN
tcp      0      0 sohan18011-Virtua:36466 ec2-44-233-1-41.u:https ESTABLISHED
tcp6     0      0 ip6-localhost:ipp       [::]:*
                                         LISTEN
udp      0      0 0.0.0.0:33372        0.0.0.0:*
                                         LISTEN
udp      0      0 0.0.0.0:631         0.0.0.0:*
                                         LISTEN
udp      0      0 localhost:domain        0.0.0.0:*
                                         LISTEN
udp      0      0 sohan18011-Virtu:bootpc _gateway:bootps      ESTABLISHED
udp      0      0 0.0.0.0:mdns         0.0.0.0:*
                                         LISTEN
udp6     0      0 [::]:54921          [::]:*
                                         LISTEN
udp6     0      0 [::]:mdns          [::]:*
                                         LISTEN
raw6     0      0 [::]:ipv6-icmp       [::]:*
                                         7
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags      Type      State      I-Node  Path
unix    2      [ ACC ]   STREAM    LISTENING  24940   @/tmp/.ICE-unix/1049
unix    2      [ ACC ]   SEQPACKET LISTENING  13367   /run/udev/control
unix    2      [ ACC ]   STREAM    LISTENING  13340   /run/systemd/private
unix    2      [ ACC ]   STREAM    LISTENING  13342   /run/systemd/userdb/io.systemd.DynamicUser
unix    2      [ ACC ]   STREAM    LISTENING  106454  @/tmp/dbus-MihópaqE
unix    2      [ ]        DGRAM     LISTENING  13351   /run/systemd/journal/syslog
unix    2      [ ]        DGRAM     LISTENING  22243   /run/user/1000/systemd/notify
unix    2      [ ACC ]   STREAM    LISTENING  13353   /run/systemd/fsck.progress
unix    2      [ ACC ]   STREAM    LISTENING  22246   /run/user/1000/systemd/private
unix    2      [ ACC ]   STREAM    LISTENING  22255   /run/user/1000/bus
unix    16     [ ]        DGRAM     LISTENING  13361   /run/systemd/journal/dev-log
unix    2      [ ACC ]   STREAM    LISTENING  13363   /run/systemd/journal/stdout
unix    8      [ ]        DGRAM     LISTENING  13365   /run/systemd/journal/socket
unix    2      [ ACC ]   STREAM    LISTENING  22256   /run/user/1000/gnupg/S.dirmngr
unix    2      [ ACC ]   STREAM    LISTENING  24941   @/tmp/.ICE-unix/1049

```

Iptables :

Iptables is a Linux command line firewall that allows system administrators to manage incoming and outgoing traffic via a set of configurable table rules.

```

sohan18011@sohan18011-VirtualBox:~$ sudo iptables -L --line-number
Chain INPUT (policy ACCEPT)
num  target     prot opt source          destination
Chain FORWARD (policy ACCEPT)
num  target     prot opt source          destination
Chain OUTPUT (policy ACCEPT)
num  target     prot opt source          destination
sohan18011@sohan18011-VirtualBox:~$ 

```

sysctl :

sysctl is used to modify kernel parameters at runtime. The parameters available are those listed under /proc/sys/.

```
sohan18011@sohan18011-VirtualBox:~$ sysctl -a
abi.vsyscall32 = 1
debug.exception-trace = 1
debug.kprobes-optimization = 1
dev.cdrom.autoclose = 1
dev.cdrom.autoeject = 0
dev.cdrom.check_media = 0
dev.cdrom.debug = 0
dev.cdrom.info = CD-ROM information, Id: cdrom.c 3.20 2003/12/17
dev.cdrom.info =
dev.cdrom.info = drive name:          sr0
dev.cdrom.info = drive speed:        32
dev.cdrom.info = drive # of slots:   1
dev.cdrom.info = Can close tray:     1
dev.cdrom.info = Can open tray:      1
dev.cdrom.info = Can lock tray:      1
dev.cdrom.info = Can change speed:   1
dev.cdrom.info = Can select disk:    0
dev.cdrom.info = Can read multisession: 1
dev.cdrom.info = Can read MCN:       1
dev.cdrom.info = Reports media changed: 1
dev.cdrom.info = Can play audio:     1
dev.cdrom.info = Can write CD-R:      0
dev.cdrom.info = Can write CD-RW:     0
dev.cdrom.info = Can read DVD:       1
dev.cdrom.info = Can write DVD-R:     0
dev.cdrom.info = Can write DVD-RAM:   0
dev.cdrom.info = Can read MRW:       1
dev.cdrom.info = Can write MRW:      1
dev.cdrom.info = Can write RAM:      1
dev.cdrom.info =
dev.cdrom.info =
dev.cdrom.lock = 0
dev.hpet.max-user-freq = 64
```

Nsenter

Then nsenter command executes program in the namespace(s) that are specified in the command -line options (described below). If program is not given, then ``\${SHELL}'' is run (default: /bin/sh).

```
sohan18011@sohan18011-VirtualBox:~$ nsenter --v
nsenter from util-linux 2.34
sohan18011@sohan18011-VirtualBox:~$
```

OpenSSL :

OpenSSL is an open-source command line tool that is commonly used to generate private keys, create CSRs, install your SSL/TLS certificate, and identify certificate information.

```
sohan18011@sohan18011-VirtualBox:~$ openssl genrsa -out private.key 2048
Generating RSA private key, 2048 bit long modulus (2 primes)
.....+++++
.....+++++
e is 65537 (0x010001)
sohan18011@sohan18011-VirtualBox:~$
```

Conclusion:

I have known that how to install linux app, networking tools from this work. I have tested to all networking tools by command line in linux terminal from this lab. I can efficiently collect information. To do network design. I discussed some commonly used commands. This command will help me to secure my network. Operating system is very much interesting. I want to learn deep in operating system for my curiusity.