

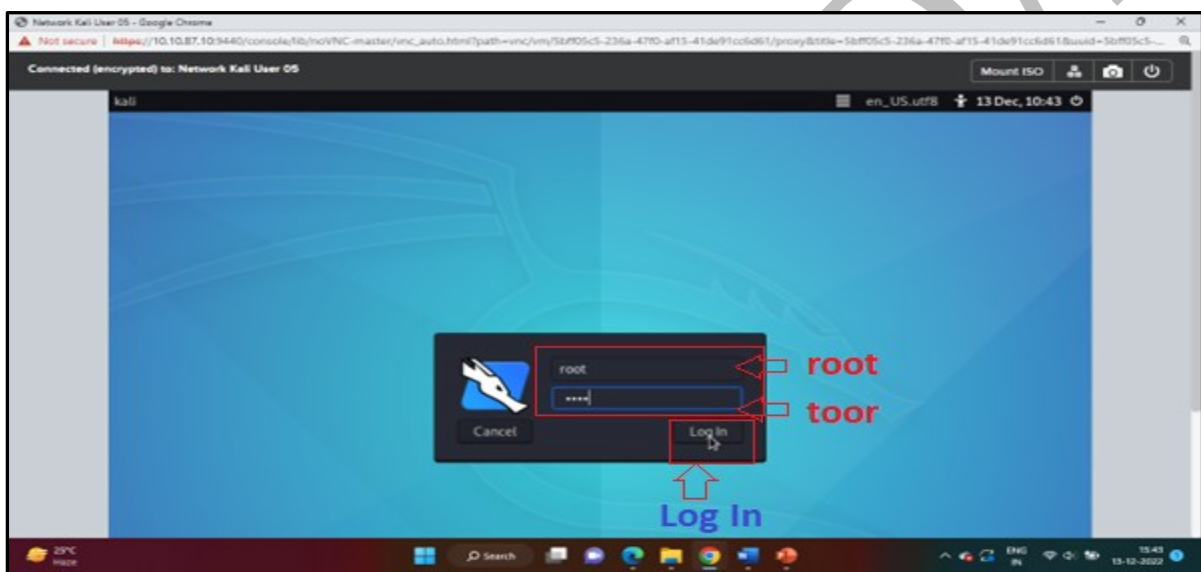
## NETWORK SYSTEM & MANAGEMENT

Linux networking commands are used widely to inspect, analyze, maintain, and troubleshoot the network/s connected to the system.

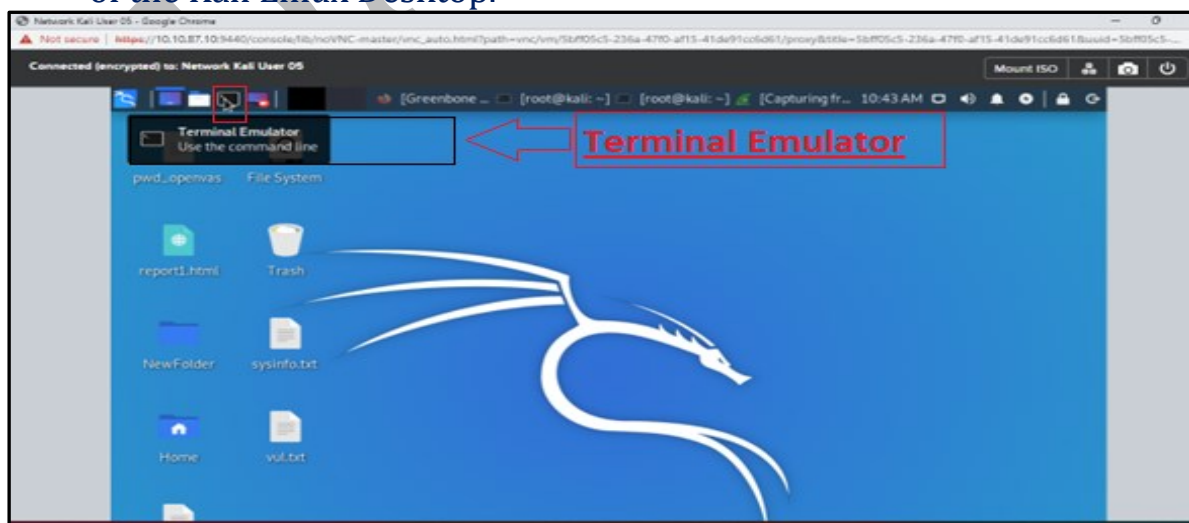
In this lab manual, you will understand some of the basic networking commands used in Linux with a detailed explanation of each.

Follow the below-given steps for executing the commands.

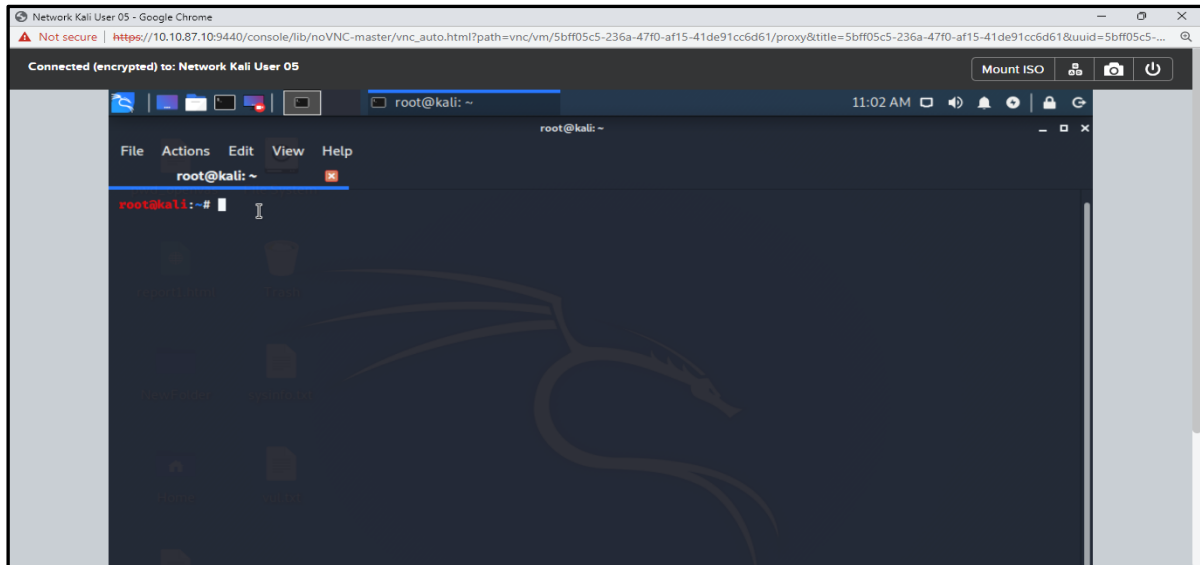
1. Connect to the kali Linux machine, created by you, using the RDP protocol.
2. When prompted for the username and password, enter root as username and toor as password. The root is the administrator user of the machine.



3. click on the black box icon (Terminal Emulator) in the top left corner of the Kali Linux Desktop.



Running the terminal while using the root account, allows you to run various commands with administrator rights.



Let's Understand some network system management commands one by one.

## Networking Testing using PING and Tracert

### a) Ping

A ping (Packet Internet or Inter-Network Groper) is a basic Internet program that allows a user to test and verify if a particular destination IP address exists and can accept requests in computer network administration.

- min: minimum time to get a response
- avg: average time to get responses
- max: maximum time to get a response

#### a) To Check Utility Version

Ping -V

```
(cdac@cdac)-[~]  
$ ping -V  
ping from iputils 20211215
```

#### b) To test Active machines on Internet

Ping google.com

```

(cdac@cdac)-[~]
$ ping google.com
PING google.com (172.217.167.238) 56(84) bytes of data.
64 bytes from del11s04-in-f14.1e100.net (172.217.167.238): icmp_seq=1 ttl=59 time=7.94 ms
64 bytes from del11s04-in-f14.1e100.net (172.217.167.238): icmp_seq=2 ttl=59 time=6.72 ms
64 bytes from del11s04-in-f14.1e100.net (172.217.167.238): icmp_seq=3 ttl=59 time=6.93 ms
64 bytes from del11s04-in-f14.1e100.net (172.217.167.238): icmp_seq=4 ttl=59 time=6.33 ms
64 bytes from del11s04-in-f14.1e100.net (172.217.167.238): icmp_seq=5 ttl=59 time=6.36 ms
64 bytes from del11s04-in-f14.1e100.net (172.217.167.238): icmp_seq=6 ttl=59 time=6.36 ms
^C
--- google.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5008ms
rtt min/avg/max/mdev = 6.331/6.774/7.942/0.566 ms

```

you can use an IP address in place of the domain name also.

## b) Traceroute

Traceroute command in Linux prints the route that a packet takes to reach the host. This command is useful when you want to know about the route and about all the hops that a packet takes. The below image depicts how the traceroute command is used to reach the Google (172.217.26.206) host from the local machine and it also prints details about all the hops that it visits in between.

- How to use Traceroute Command:

Traceroute [options] host-address [pathlength]

```

prabhakar@Inspiron-3542:~$ traceroute google.com
traceroute to google.com (172.217.26.206), 30 hops max, 60 byte packets
 1  192.168.43.45 (192.168.43.45)  2.014 ms  2.313 ms  2.588 ms
 2  * * *
 3  10.45.1.230 (10.45.1.230)  75.449 ms  115.244 ms  115.224 ms
 4  10.45.8.178 (10.45.8.178)  93.856 ms  115.138 ms  93.822 ms
 5  10.45.8.187 (10.45.8.187)  115.116 ms  115.106 ms  115.070 ms
 6  * * *
 7  218.248.235.141 (218.248.235.141)  120.589 ms  108.033 ms  106.962 ms
 8  218.248.235.142 (218.248.235.142)  114.489 ms  * *
 9  72.14.211.114 (72.14.211.114)  98.076 ms  93.232 ms  93.781 ms
10  108.170.253.113 (108.170.253.113)  98.688 ms  91.388 ms  108.170.253.97 (108.170.253.97)  107.241 ms
11  74.125.253.69 (74.125.253.69)  95.120 ms  72.14.237.165 (72.14.237.165)  102.594 ms  103.137 ms
12  maa03s23-in-f14.1e100.net (172.217.26.206)  101.794 ms  97.987 ms  97.165 ms
prabhakar@Inspiron-3542:~$

```

## Using Linux TCP/IP Network Config Files for setting up a network

There are some important Linux files, which contain setting related to network configurations. These files may be updated, to change the network configuration settings. Below is the list of such files.

File	Description
<code>/etc/resolve.conf</code>	List DNS servers for Internet domain name resolution.
<code>/etc/hosts</code>	Lists hosts to be resolved locally (not by DNS).
<code>/etc/nsswitch.conf</code>	Lists the order of hostname search. Typically look at local files, then NIS server, then DNS server.
Red Hat/Fedora/CentOS: <code>/etc/sysconfig/network</code>	Specify network configuration. eg. Static IP, DHCP, NIS, etc.
Red Hat/Fedora/CentOS: <code>/etc/sysconfig/network-scripts/ifcfg-<i>device</i></code>	Specify TCP network information.
Ubuntu/Debian: <code>/etc/network/interfaces</code>	Specify network configuration and devices. eg. Static IP and info, DHCP, etc.

Let's learn about some important network settings, that can be performed by changing these configuration files.

a) **Setting up Physical Interfaces with static values**

Go to `/etc/Network File` and update

```
iface eth0 inet static
address 192.168.1.5
netmask 255.255.255.0
gateway 192.168.1.254
```

b) **Setting up Interfaces to use DHCP service**

```
auto eth0
iface eth0 inet dhcp
```

### c) To Convert DHCP Network Config to Static IP

#### Go to /etc/Network File

1. Open Network Config File : `sudo vi /etc/network/interfaces`
2. Find and remove dhcp entry : `iface eth0 inet dhcp`
3. Append New Network Settings:  
`iface eth0 inet static`  
`address 192.168.1.100`  
`netmask 255.255.255.0`  
`network 192.168.1.0`  
`broadcast 192.168.1.255`  
`gateway 192.168.1.254`
4. Save and Close the file, Restart the network: `sudo /etc/init.d/networking restart`