Experiment: Basic Linux Data Networking Commands

Aim

To study and execute basic data networking commands in Linux using the command line interface.

Objectives

- To understand Linux network configuration.
- To test network connectivity.
- To diagnose network-related issues.
- To access and transfer data between systems using networking tools.

Requirements

- Linux Operating System (Ubuntu/Debian/Fedora/Kali etc.)
- Terminal access
- Basic knowledge of Linux commands
- Internet connection (optional)

Theory

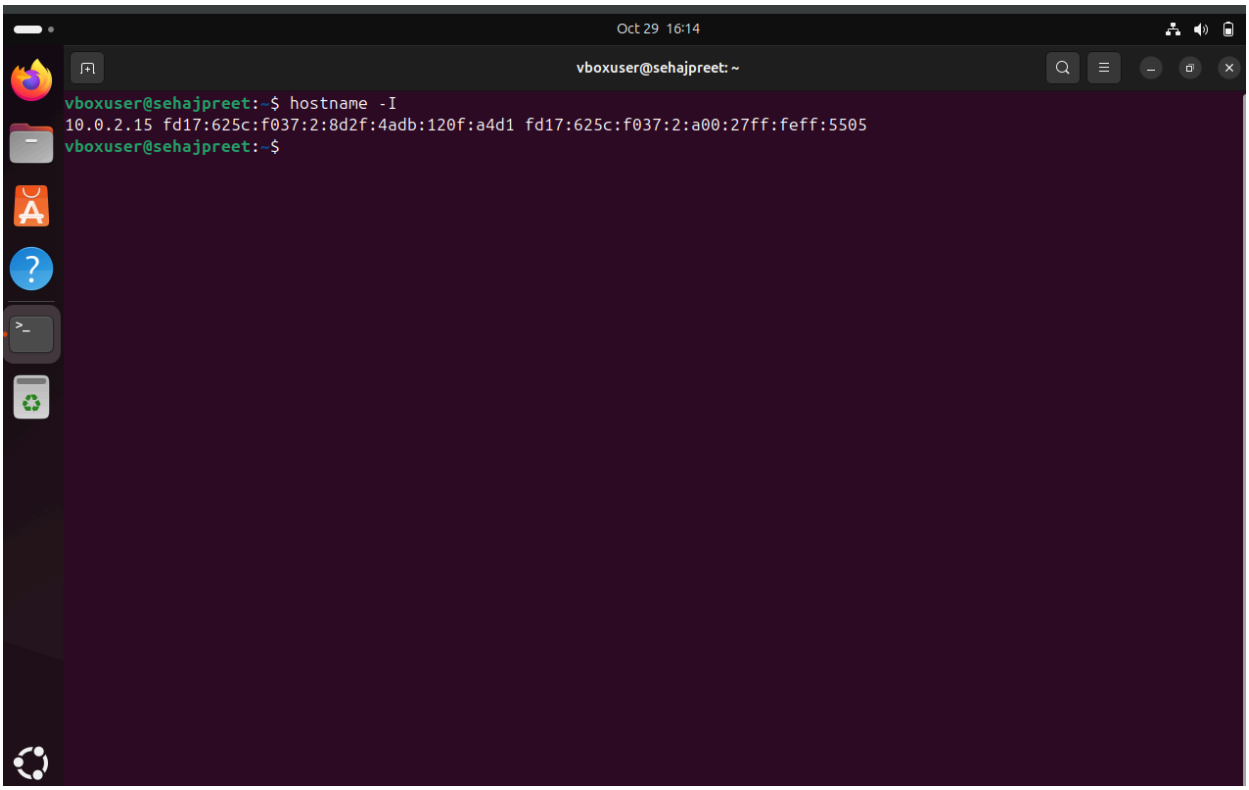
Data networking in Linux is performed using built-in terminal commands. These commands help configure systems, test connections, and troubleshoot network problems.

Command	Purpose
`ifconfig / ip addr`	Shows network interface configuration
`ping`	Tests connectivity to another host
`hostname`	Displays system hostname
`traceroute`	Shows the route packets take
`netstat`	Displays active connections
`nslookup`	Queries DNS information
`ssh`	Secure remote login
`scp`	Secure file transfer

Procedure

Step 1: View IP Address and Network Interfaces

```
ip addr show
```

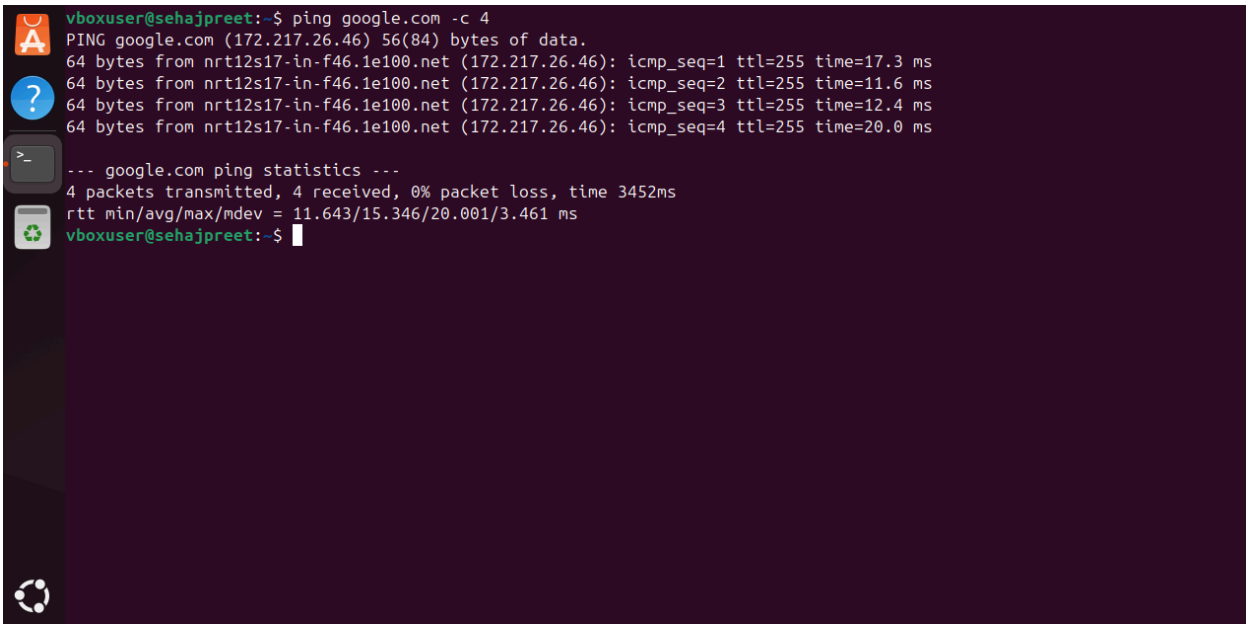


Step 2:Display hostname

```
hostname
```

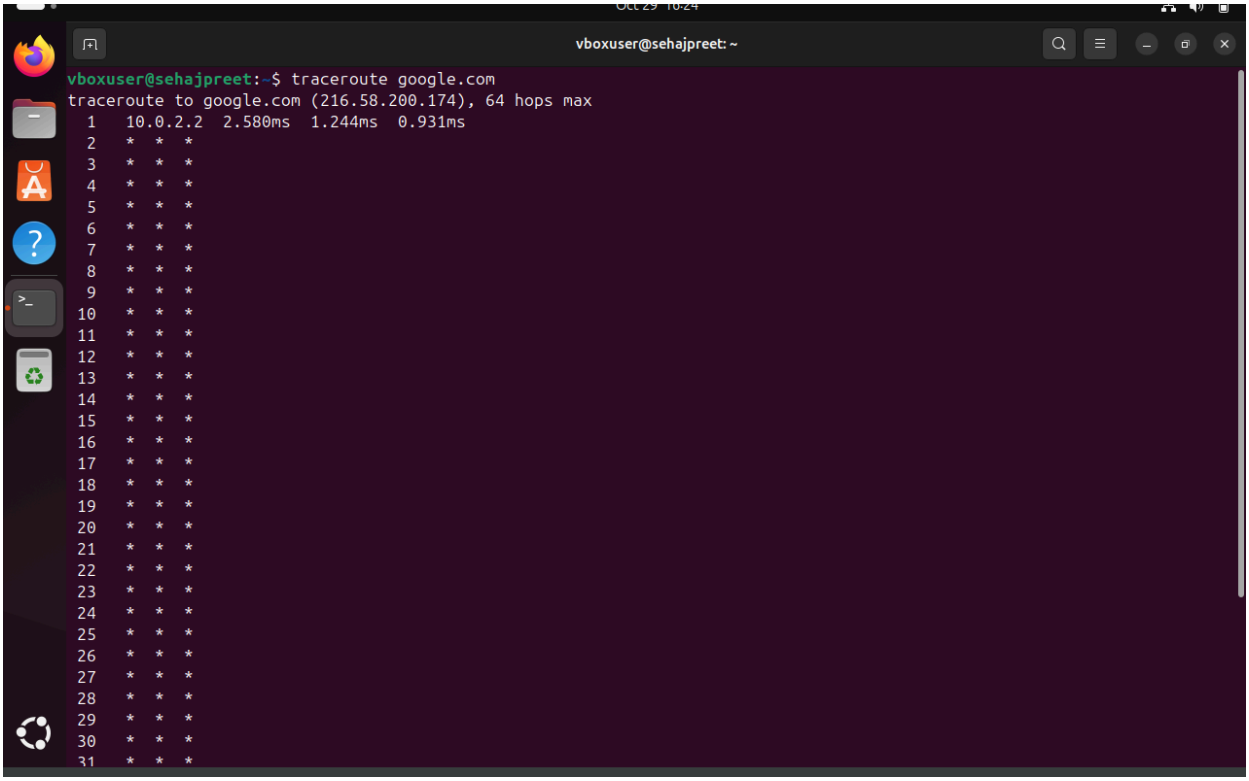
step 3:Test Network connectivity(ping)

```
ping google.com -c 4
```



Step 4: Trace Route to Remote Hosti

```
traceroute google.com
```



Step 5: View Active Network Ports

```
netstat -tulnp
```

Step 6: DNS Lookup

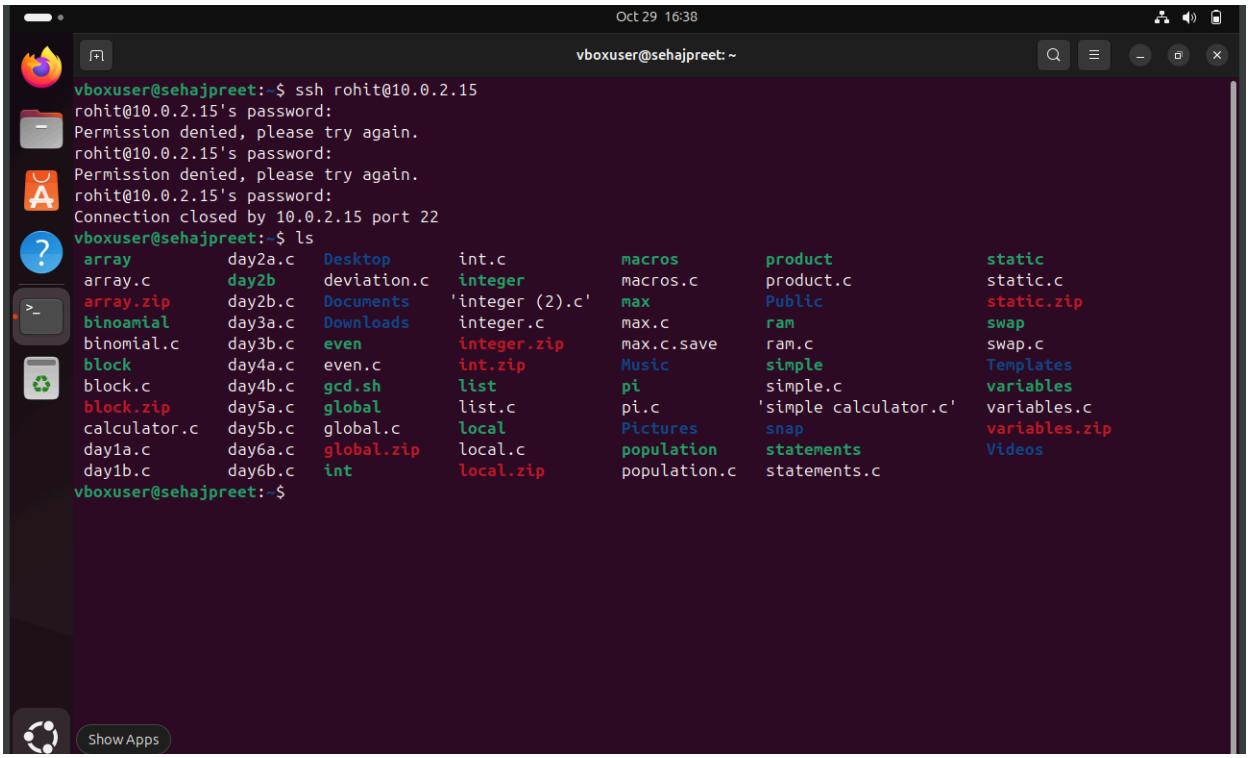
```
nslookup google.com
```

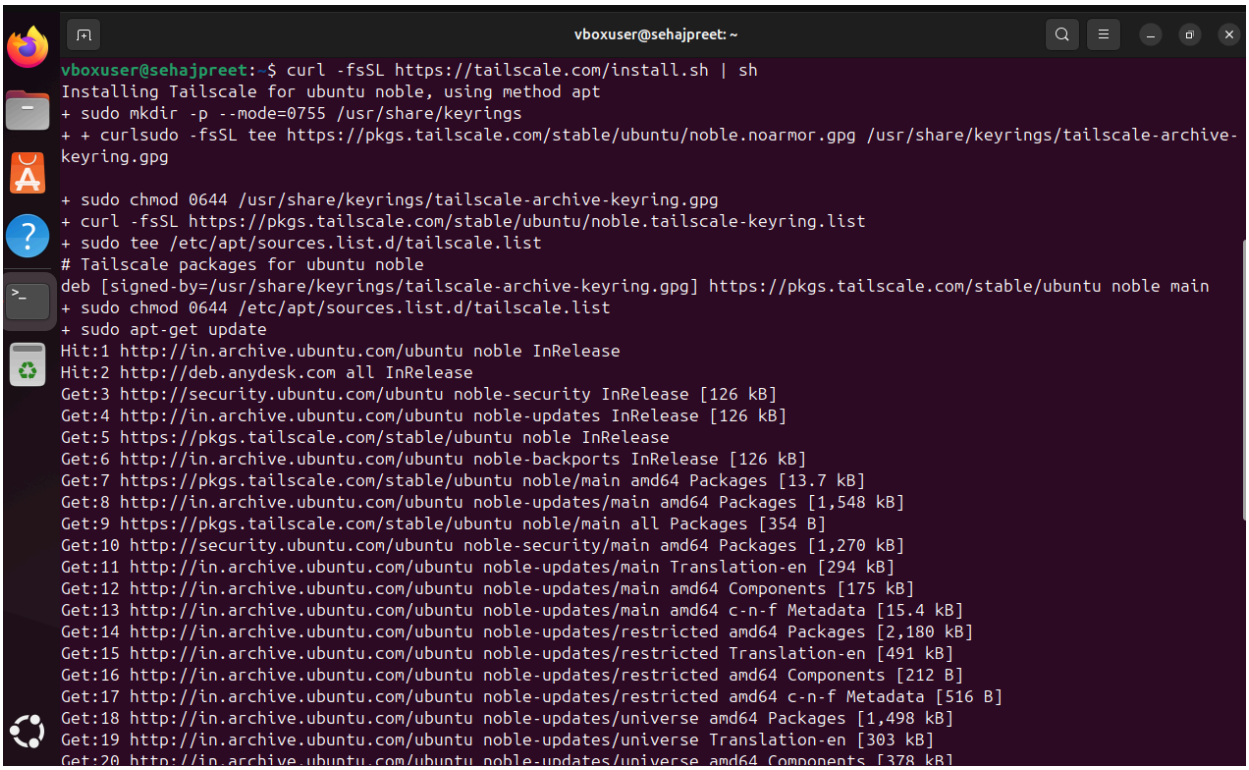
Step 7: Remote Login using SSH

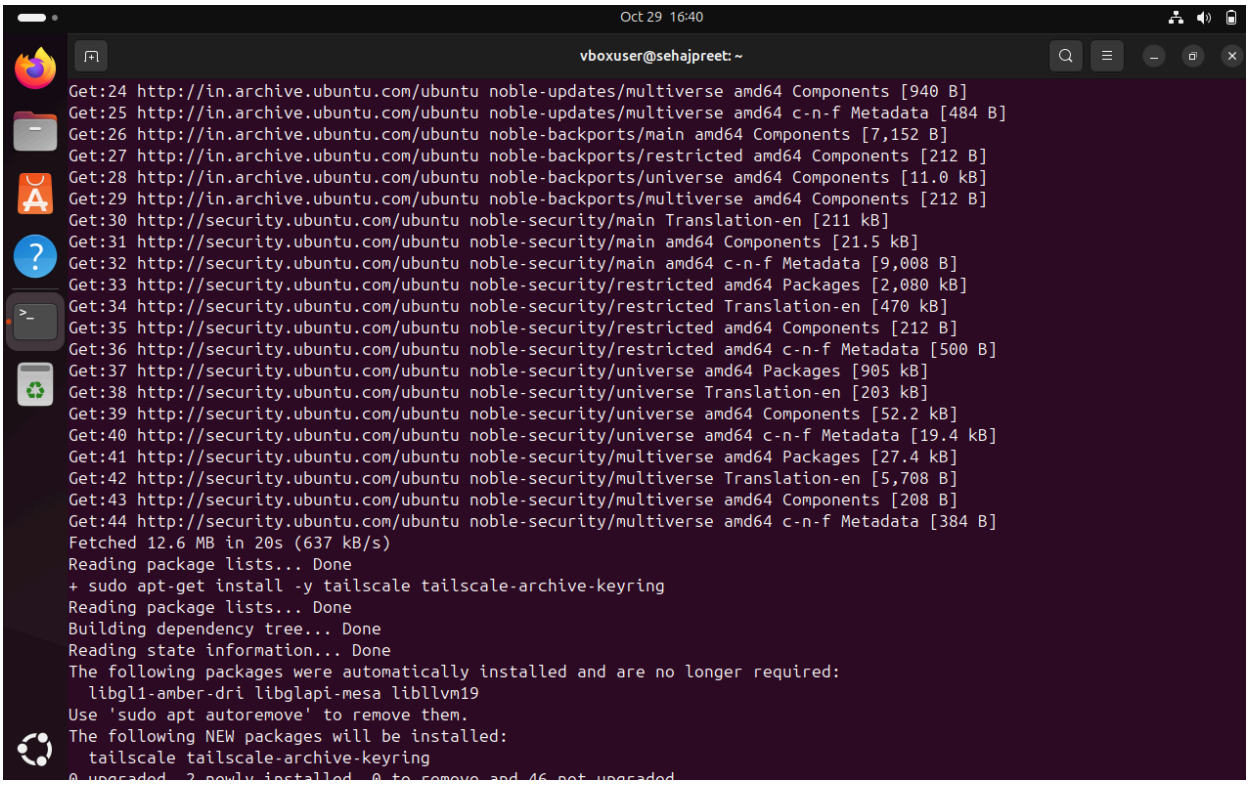
```
ssh user@192.168.1.10
```

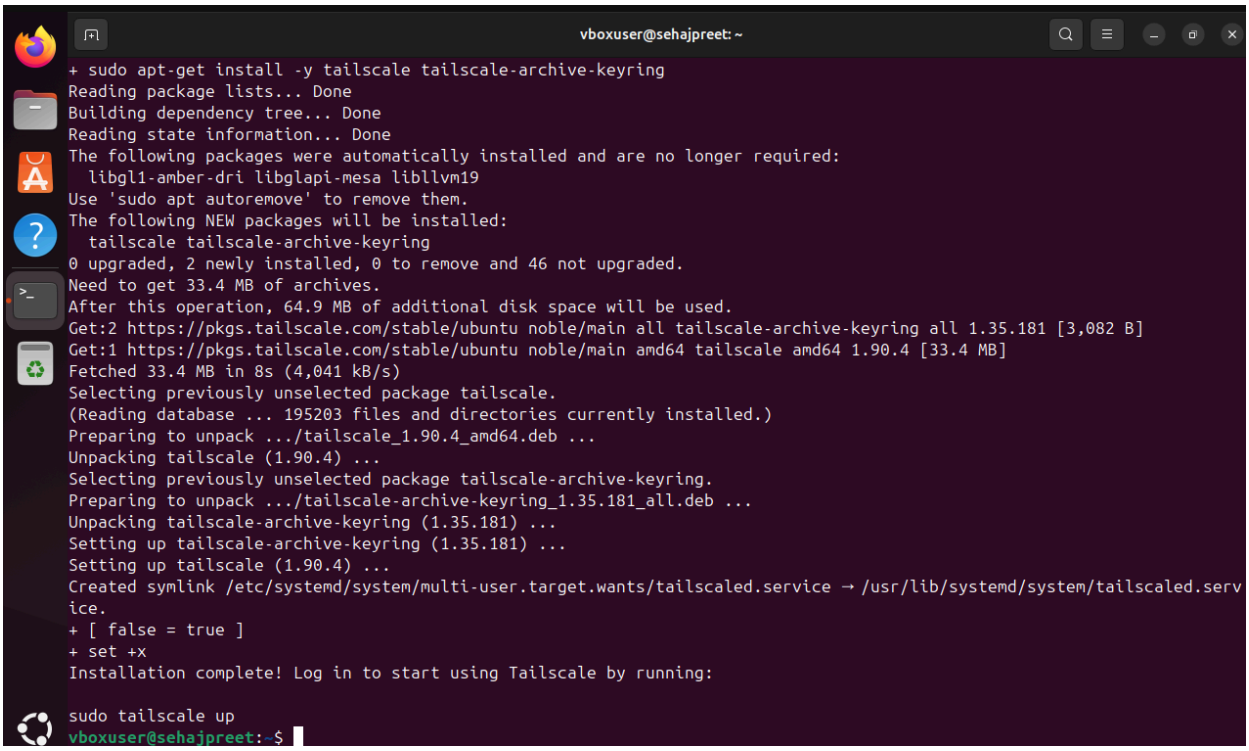
Step 8: File Transfer using SCP

```
scp test.txt user@192.168.1.10:/home/user/
```


Oct 29 16:38
vboxuser@sehajpreet: ~
vboxuser@sehajpreet:~$ ssh rohit@10.0.2.15
rohit@10.0.2.15's password:
Permission denied, please try again.
rohit@10.0.2.15's password:
Permission denied, please try again.
rohit@10.0.2.15's password:
Connection closed by 10.0.2.15 port 22
vboxuser@sehajpreet:~$ ls
array day2a.c Desktop int.c macros product static
array.c day2b deviation.c integer macros.c product.c static.c
array.zip day2b.c Documents 'integer (2).c' max Public static.zip
binoamial day3a.c Downloads integer.c max.c ram swap
binomial.c day3b.c even integer.zip max.c.save ram.c swap.c
block day4a.c even.c int.zip Music simple Templates
block.c day4b.c gcd.sh list pi simple.c variables
block.zip day5a.c global list.c pi.c 'simple calculator.c' variables.c
calculator.c day5b.c global.c local Pictures snap variables.zip
day1a.c day6a.c global.zip local.c population statements Videos
day1b.c day6b.c int local.zip population.c statements.c
vboxuser@sehajpreet:~$
Show Apps


vboxuser@sehajpreet: ~
vboxuser@sehajpreet:~$ curl -fsSL https://tailscale.com/install.sh | sh
Installing Tailscale for ubuntu noble, using method apt
+ sudo mkdir -p --mode=0755 /usr/share/keyrings
+ + curlsudo -fsSL tee https://pkgs.tailscale.com/stable/ubuntu/noble.noarmor.gpg /usr/share/keyrings/tailscale-archive-keyring.gpg
+ sudo chmod 0644 /usr/share/keyrings/tailscale-archive-keyring.gpg
+ curl -fsSL https://pkgs.tailscale.com/stable/ubuntu/noble.tailscale-keyring.list
+ sudo tee /etc/apt/sources.list.d/tailscale.list
# Tailscale packages for ubuntu noble
deb [signed-by=/usr/share/keyrings/tailscale-archive-keyring.gpg] https://pkgs.tailscale.com/stable/ubuntu noble main
+ sudo chmod 0644 /etc/apt/sources.list.d/tailscale.list
+ sudo apt-get update
Hit:1 http://in.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://deb.anydesk.com all InRelease
Get:3 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:5 https://pkgs.tailscale.com/stable/ubuntu noble InRelease
Get:6 http://in.archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:7 https://pkgs.tailscale.com/stable/ubuntu noble/main amd64 Packages [13.7 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1,548 kB]
Get:9 https://pkgs.tailscale.com/stable/ubuntu noble/main all Packages [354 B]
Get:10 http://security.ubuntu.com/ubuntu noble-security/main amd64 Packages [1,270 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu noble-updates/main Translation-en [294 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu noble-updates/main amd64 Components [175 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu noble-updates/main amd64 c-n-f Metadata [15.4 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Packages [2,180 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu noble-updates/restricted Translation-en [491 kB]
Get:16 http://in.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Components [212 B]
Get:17 http://in.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 c-n-f Metadata [516 B]
Get:18 http://in.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [1,498 kB]
Get:19 http://in.archive.ubuntu.com/ubuntu noble-updates/universe Translation-en [303 kB]





Output / Observations

Command	Result
`ip addr`	Lists network interfaces and IP addresses
`ping`	Replies received indicate connectivity
`traceroute`	Displays the route path to the destination
`nslookup`	Shows DNS IP information

Command	Result
`ssh`	Connects to a remote machine securely
`scp`	Transfers files securely over SSH

Result

Basic Linux networking commands were successfully executed and network connectivity and configuration were verified.

Conclusion

Linux provides powerful built-in commands for networking tasks such as configuration, troubleshooting, monitoring, and secure communication between systems.

Viva Questions

❓ What is the purpose of the `ping` command?

✨The `ping` command is used to test network connectivity between the source and a destination host. It sends ICMP Echo Request packets and waits for Echo Reply packets to verify whether the destination is reachable and to measure round-trip time.

❓ What is the difference between SSH and Telnet?

✨| Feature | SSH (Secure Shell) | Telnet |

|----------|------------------|--------| | Security | Encrypted communication | No encryption | | Default Port | 22 | 23 | | Usage | Secure remote login | Unsecure remote login | | Current Status | Widely used | Mostly outdated |

SSH is preferred over Telnet because it provides secure communication.

❓ How does `traceroute` help in network troubleshooting?

✨ `traceroute` displays the path taken by packets from the local system to a remote host. It shows each intermediate router (hop) along the path and the time taken. It helps identify:

- Network delays
- Connection failures
- Routing issues

❓ Why is DNS used in networking?

✨DNS (Domain Name System) translates human-friendly domain names like `www.google.com` into machine-readable IP addresses like `142.250.182.14`. This is necessary because computers communicate using IP addresses, not domain names.

❓ How can you transfer a file securely in Linux?

✨Files can be transferred securely in Linux using the `scp` (Secure Copy) command, which uses SSH encryption.

Example:

```
scp file.txt user@192.168.1.10:/home/user/
```