

Sehajpreet1313 / Linux\_Lab01

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Sehajpreet1313 jxbejdbejd · 7a8a16d · 3 days ago

157 lines (114 loc) · 4.44 KB

Preview Code Blame

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# 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.

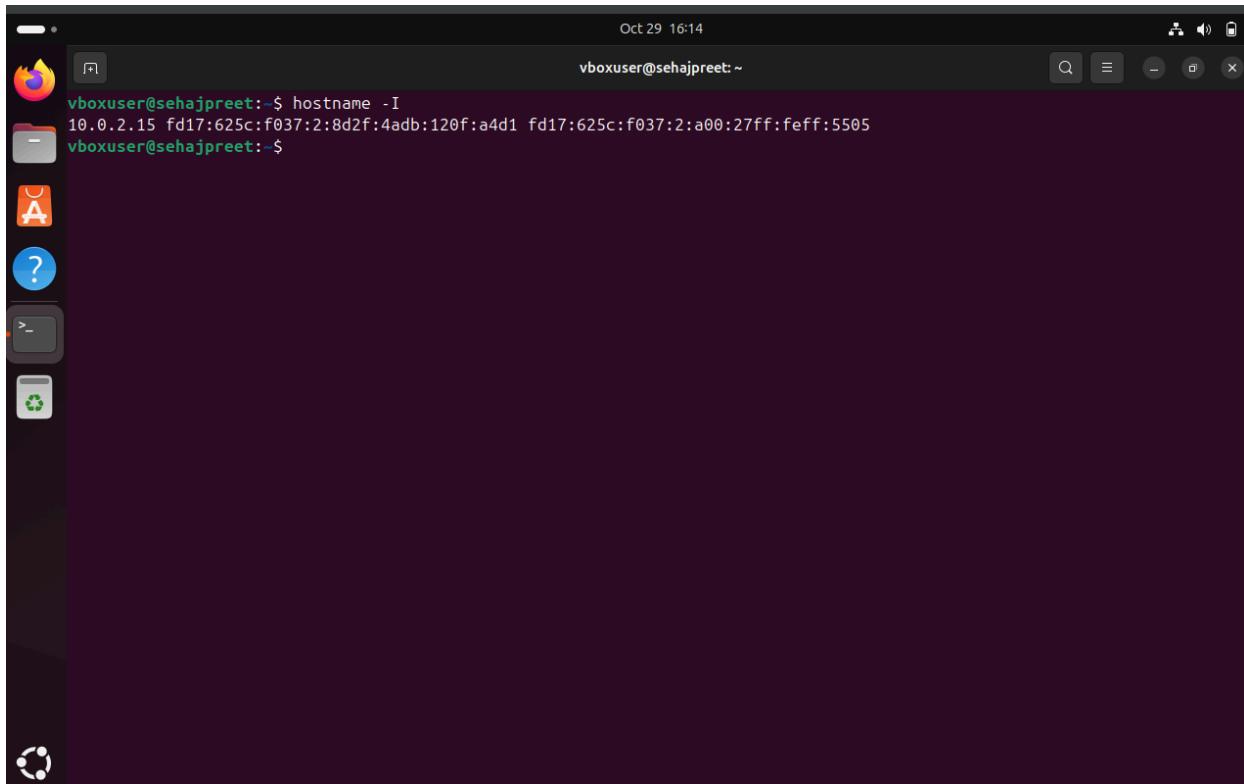
Command	Purpose
ifconfig / ip addr	Shows network interface configuration
ping	Tests connectivity to another host
hostname	Displays system hostname
traceroute	Shows the route packets take
netstat	Displays active connections
nslookup	Queries DNS information
ssh	Secure remote login
scp	Secure file transfer

## Procedure

### Step 1: View IP Address and Network Interfaces

```
ip addr show
```





A screenshot of a Linux desktop environment. On the left is a vertical dock containing icons for a file manager, terminal, browser, and system settings. The main window is a terminal window titled 'vboxuser@sehajpreet: ~'. The terminal shows the command 'hostname -I' followed by the output '10.0.2.15 fd17:625c:f037:2:8d2f:4adb:120f:a4d1 fd17:625c:f037:2:a00:27ff:feff:5505'. The status bar at the top right indicates the date and time as 'Oct 29 16:14'.

## Step 2:Display hostname

hostname

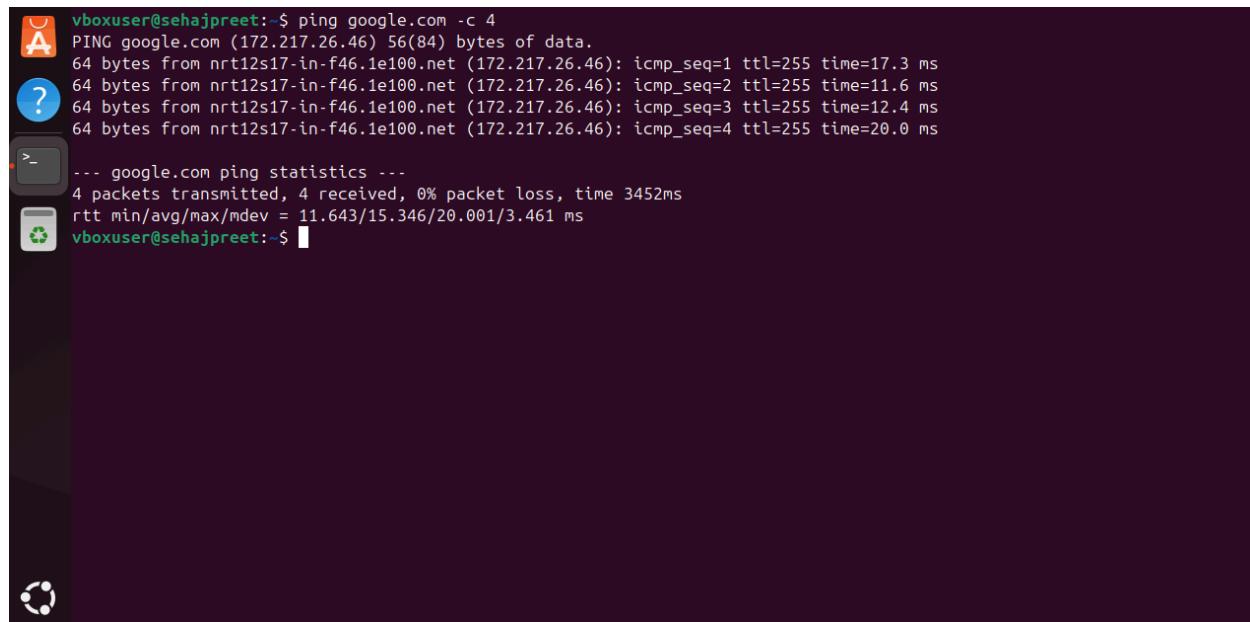


A screenshot of a Linux desktop environment. On the left is a vertical dock containing icons for a file manager, terminal, browser, and system settings. The main window is a terminal window titled 'vboxuser@sehajpreet: ~'. The terminal shows the command 'hostname' followed by the output 'sehajpreet'. The status bar at the top right indicates the date and time as 'Oct 29 16:14'.

## step 3:Test Network connectivity(ping)

ping google.com -c 4

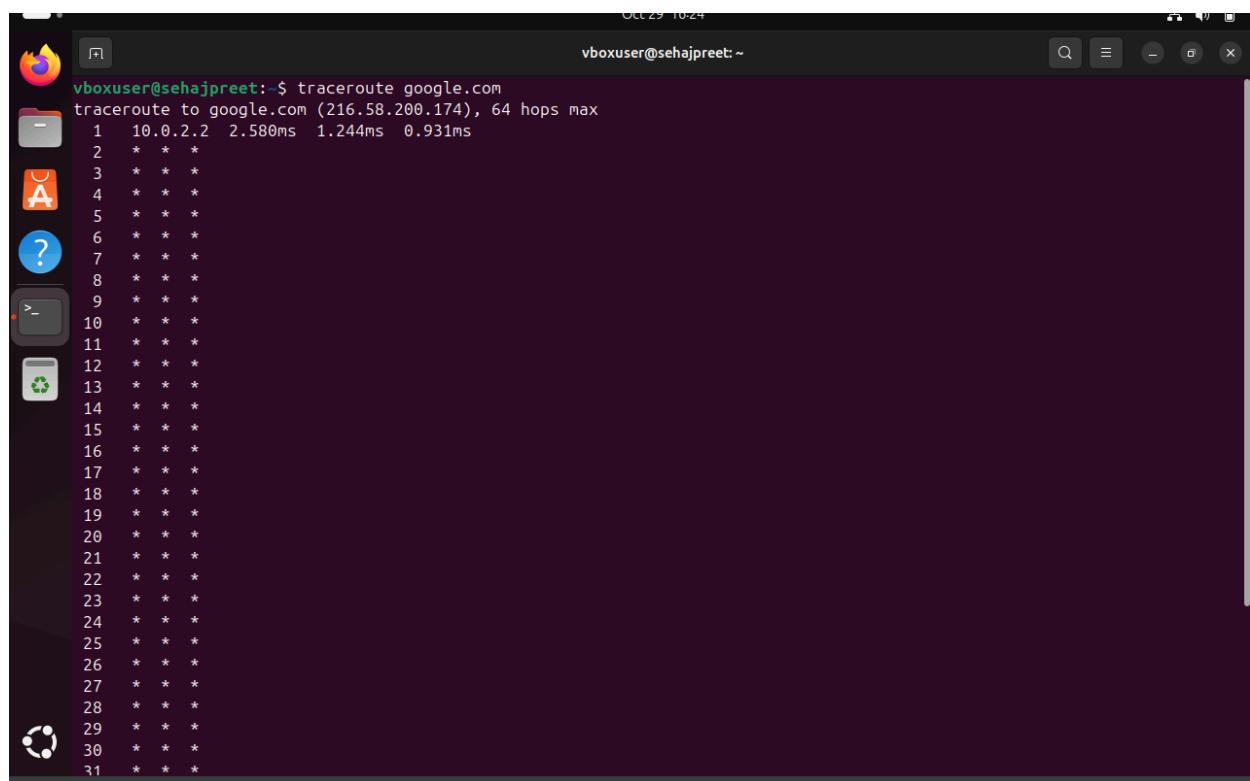




```
vboxuser@sehajpreet:~$ ping google.com -c 4
PING google.com (172.217.26.46) 56(84) bytes of data.
64 bytes from nrt12s17-in-f46.1e100.net (172.217.26.46): icmp_seq=1 ttl=255 time=17.3 ms
64 bytes from nrt12s17-in-f46.1e100.net (172.217.26.46): icmp_seq=2 ttl=255 time=11.6 ms
64 bytes from nrt12s17-in-f46.1e100.net (172.217.26.46): icmp_seq=3 ttl=255 time=12.4 ms
64 bytes from nrt12s17-in-f46.1e100.net (172.217.26.46): icmp_seq=4 ttl=255 time=20.0 ms
...
--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3452ms
rtt min/avg/max/mdev = 11.643/15.346/20.001/3.461 ms
vboxuser@sehajpreet:~$
```

## Step 4: Trace Route to Remote Host

traceroute google.com



```
vboxuser@sehajpreet:~$ traceroute google.com
traceroute to google.com (216.58.200.174), 64 hops max
 1  10.0.2.2  2.580ms  1.244ms  0.931ms
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
31  * * *
```

## 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/
```



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:~\$

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  
+ + curl -fsSL 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]  
Get:20 http://in.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Components [378 kB]

```

Oct 29 16:40
vboxuser@sehajpreet:~ Get:24 http://in.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Components [940 B]
Get:25 http://in.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 c-n-f Metadata [484 B]
Get:26 http://in.archive.ubuntu.com/ubuntu noble-backports/main amd64 Components [7,152 B]
Get:27 http://in.archive.ubuntu.com/ubuntu noble-backports/restricted amd64 Components [212 B]
Get:28 http://in.archive.ubuntu.com/ubuntu noble-backports/universe amd64 Components [11.0 kB]
Get:29 http://in.archive.ubuntu.com/ubuntu noble-backports/multiverse amd64 Components [212 B]
Get:30 http://security.ubuntu.com/ubuntu noble-security/main Translation-en [211 kB]
Get:31 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [21.5 kB]
Get:32 http://security.ubuntu.com/ubuntu noble-security/main amd64 c-n-f Metadata [9,008 B]
Get:33 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Packages [2,080 kB]
Get:34 http://security.ubuntu.com/ubuntu noble-security/restricted Translation-en [470 kB]
Get:35 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [212 B]
Get:36 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 c-n-f Metadata [500 B]
Get:37 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Packages [905 kB]
Get:38 http://security.ubuntu.com/ubuntu noble-security/universe Translation-en [203 kB]
Get:39 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.2 kB]
Get:40 http://security.ubuntu.com/ubuntu noble-security/universe amd64 c-n-f Metadata [19.4 kB]
Get:41 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Packages [27.4 kB]
Get:42 http://security.ubuntu.com/ubuntu noble-security/multiverse Translation-en [5,708 B]
Get:43 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [208 B]
Get:44 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 c-n-f Metadata [384 B]
Fetched 12.6 MB in 20s (637 kB/s)
Reading package lists... Done
+ sudo apt-get install -y tailscale tailscale-archive-keyring
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libgl1-amber-dri libglapi-mesa libllvm19
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  tailscale tailscale-archive-keyring
0 upgraded, 2 newly installed, 0 to remove and 46 not upgraded.

```

```

vboxuser@sehajpreet:~ + sudo apt-get install -y tailscale tailscale-archive-keyring
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libgl1-amber-dri libglapi-mesa libllvm19
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  tailscale tailscale-archive-keyring
0 upgraded, 2 newly installed, 0 to remove and 46 not upgraded.
Need to get 33.4 MB of archives.
After this operation, 64.9 MB of additional disk space will be used.
Get:2 https://pkgs.tailscale.com/stable/ubuntu/noble/main all tailscale-archive-keyring all 1.35.181 [3,082 B]
Get:1 https://pkgs.tailscale.com/stable/ubuntu/noble/main amd64 tailscale amd64 1.90.4 [33.4 MB]
Fetched 33.4 MB in 8s (4,041 kB/s)
Selecting previously unselected package tailscale.
(Reading database ... 195203 files and directories currently installed.)
Preparing to unpack .../tailscale_1.90.4_amd64.deb ...
Unpacking tailscale (1.90.4) ...
Selecting previously unselected package tailscale-archive-keyring.
Preparing to unpack .../tailscale-archive-keyring_1.35.181_all.deb ...
Unpacking tailscale-archive-keyring (1.35.181) ...
Setting up tailscale-archive-keyring (1.35.181) ...
Setting up tailscale (1.90.4) ...
Created symlink /etc/systemd/system/multi-user.target.wants/tailscaled.service → /usr/lib/systemd/system/tailscaled.service.
+ [ false = true ]
+ set +x
Installation complete! Log in to start using Tailscale by running:

sudo tailscale up
vboxuser@sehajpreet:~$
```

## 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

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

## Conclusion

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

## Viva Questions

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**?** 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/
```

