Experiment No 2

Aim: Use basic networking commands in Linux (ping, tracert, nslookup, netstat, ARP, RARP, ip, ifconfig, dig, route)

Theory and Output:

Ipconfig for windows And ifconfig for linux:

Displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings. Used without parameters, ipconfig displays Internet Protocol version 4 (IPv4) and IPv6 addresses, subnet mask, and default gateway for all adapters.

Output:

```
C:\Users\DESKTOP>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::34f8:5ead:362b:eb9c%11
   IPv4 Address. . . . . . . . . . . : 192.168.0.106
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.0.1

Tunnel adapter isatap.{58F71FEC-1287-41C1-836F-DDC01AAA912A}:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```

Ipconfig /all for windows & ip r for linux:

Displays all configuration information for each adapter bound to TCP/IP.

Output:

```
C:\Users\DESKTOP>ipconfig/all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : DESKTOP-PC
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe FE Family Controller
   Physical Address. . . . . . . . . : B6-E0-4C-3C-14-FA
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::34f8:5ead:362b:eb9c%11(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.0.106(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : 08 October 2023 19:49:56
   Lease Expires . . . . . . . . . . : 08 October 2023 21:50:08
   Default Gateway . . . . . . . . . : 192.168.0.1
   DHCP Server . . . . . . . . . . . : 192.168.0.1
   DHCPv6 IAID . . . . . . . . . . . : 246865996
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2B-8C-AE-9B-B6-E0-4C-3C-14-FA

   DNS Servers . . . . . . . . . . . : 192.168.0.1
   NetBIOS over Tcpip. . . . . . . . : Enabled

Tunnel adapter isatap.{58F71FEC-1287-41C1-836F-DDC01AAA912A}:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft ISATAP Adapter
   Physical Address. . . . . . . . . : 00-00-00-00-00-00-00-E0
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes
```

Ping:

The ping command is a command-prompt command, used to test the ability of the source computer to reach a specified destination computer.It's usually used as a simple way to verify that a computer can communicate over the network with another computer or network device.

Output:

```
C:\Users\DESKTOP>ping google.com

Pinging google.com [142.251.42.14] with 32 bytes of data:
Reply from 142.251.42.14: bytes=32 time=2ms TTL=118
Reply from 142.251.42.14: bytes=32 time=2ms TTL=118
Reply from 142.251.42.14: bytes=32 time=2ms TTL=118
Reply from 142.251.42.14: bytes=32 time=1ms TTL=118

Ping statistics for 142.251.42.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms
```

Tracert for windows & traceroute for linux:

The tracert command (spelled traceroute in Unix/linux implementations) is one of the key diagnostic tools for TCP/IP. It displays a list of all routers that a packet must go through to get from the computer where tracert is run to any other computer on the internet.

Output:

```
C:\Users\DESKTOP>tracert instagram.com

Tracing route to instagram.com [157.240.16.174]
over a maximum of 30 hops:

  1    <1 ms    <1 ms    <1 ms  192.168.0.1
  2     1 ms    <1 ms    <1 ms  24-5-224-103.vasaicable.co.in [103.224.5.24]
  3     *        2 ms     *     17-5-224-103.vasaicable.co.in [103.224.5.17]
  4     3 ms     2 ms     2 ms  8-49-0-27.vasaicable.co.in [27.0.49.8]
  5     3 ms     2 ms     1 ms  ae2.pr03.bom1.tfbnw.net [157.240.66.88]
  6     2 ms     2 ms     1 ms  po103.psw02.bom1.tfbnw.net [157.240.53.69]
  7     2 ms     1 ms     1 ms  157.240.38.163
  8     2 ms     1 ms     1 ms  instagram-p42-shv-01-bom1.fbcdn.net [157.240.16.
174]

Trace complete.
```

Nslookup:

Nslookup(from name server lookup) is a network administration command line tool for querying the domain name system (DNS) to obtain the mapping between domain name and IP address ,or other DNS records.

Output:

```
C:\Users\DESKTOP>nslookup
Default Server:  UnKnown
Address:  192.168.0.1

> facebook.com
Server:  UnKnown
Address:  192.168.0.1

Non-authoritative answer:
Name:    facebook.com
Addresses:  2a03:2880:f12f:83:face:b00c:0:25de
          157.240.16.35
```

Hostname:

A hostname is a label that is assigned to a device connected to a computer network and that is used to identify the device in various forms of electronic communication ,such as the World Wide Web .Hostnames may be simple names consisting of a single word or phrase ,or they may be structured .Each hostname usually has at least one numeric network address associated with it for routing packets for performance and other reasons.

Output:

```
C:\Users\DESKTOP>hostname
DESKTOP-PC
```

Arp:

Arp command manipulates the System's ARP cache . It allows a complete dump of the ARP cache .ARP stands for Address Resolution Protocol.The primary function of this protocol is to resolve the IP address of a system to its mac address, and hence it works between level 2(Data link layer) and level 3 (Network layer).

Output:

```
C:\Users\DESKTOP>arp -a

Interface: 192.168.0.106 --- 0xb
  Internet Address      Physical Address      Type
  192.168.0.1           b0-95-75-0b-3f-e4     dynamic
  192.168.0.255         ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

CONCLUSION:

In this networking experiment, we learned how to use essential commands like "ipconfig," "ping," "tracert," "nslookup," "hostname," and "arp" to configure and troubleshoot networks. We performed tasks such as checking network configuration, testing connectivity, tracing packet routes, finding host IP addresses, and examining the ARP cache. These commands proved valuable for addressing network issues, making them indispensable tools for network configuration and troubleshooting.