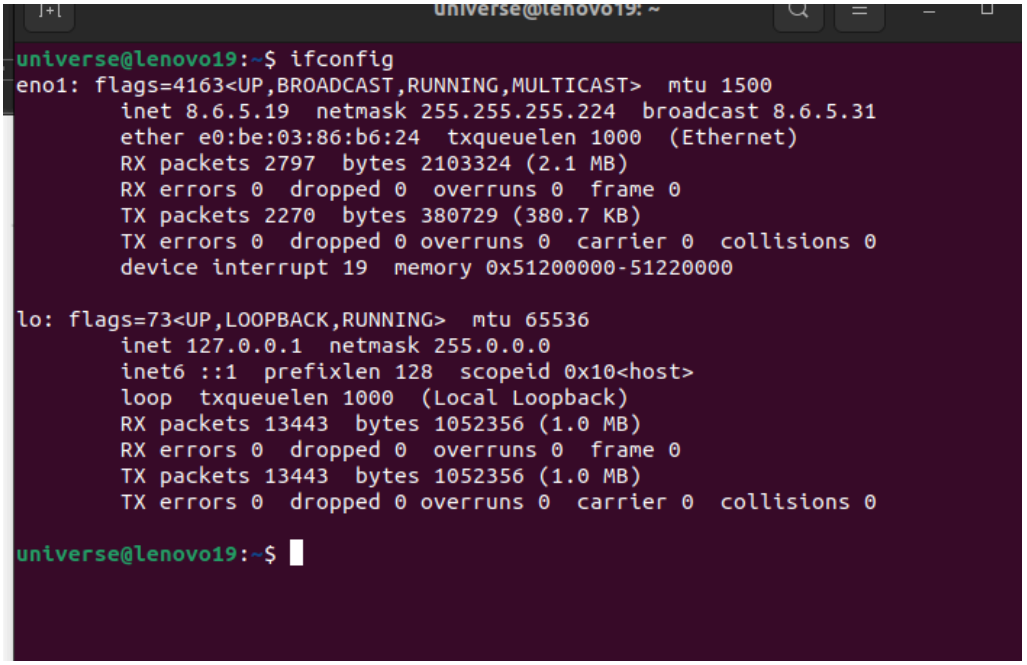
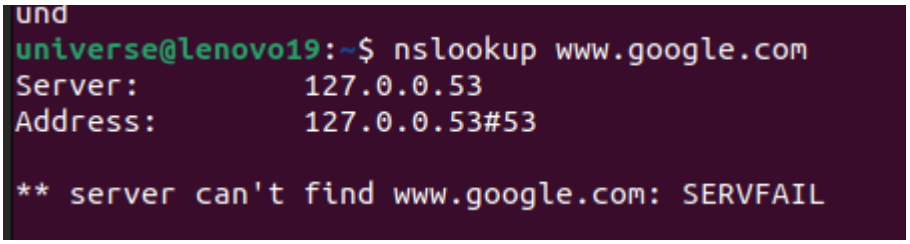
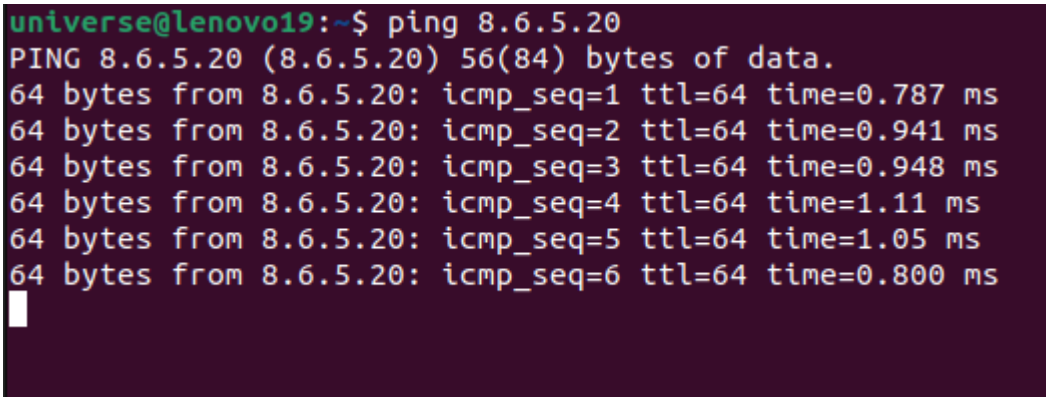
ifconfig



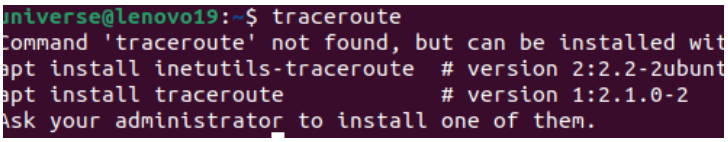
Nslookup



Ping



Traceroute



Netstat

```
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 lenovo19:40260          7.1.1.12:3128           ESTABLISHED
udp        0      0 localhost:44799         localhost:44799         ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  3      [ ]         STREAM     CONNECTED     65077
unix  3      [ ]         STREAM     CONNECTED     23150
unix  3      [ ]         STREAM     CONNECTED     30372
unix  3      [ ]         STREAM     CONNECTED     28285    /run/user/1001/at-spi
/bus_0
unix  3      [ ]         STREAM     CONNECTED     24439    /run/dbus/system_bus_
socket
unix  3      [ ]         STREAM     CONNECTED     25037    /run/systemd/journal/
stdout
unix  3      [ ]         STREAM     CONNECTED     27836    /run/dbus/system_bus_
socket
unix  3      [ ]         STREAM     CONNECTED     28257
unix  3      [ ]         STREAM     CONNECTED     21286    /run/systemd/journal/
stdout
unix  3      [ ]         STREAM     CONNECTED     24472
unix  3      [ ]         STREAM     CONNECTED     24462
```

Arp

```
universe@lenovo19:~$ arp
Address                  HWtype  HWaddress           Flags Mask            Iface
8.6.5.20                 ether   e0:be:03:83:bf:72   C                     eno1
8.6.5.22                 ether   a0:d3:c1:33:d7:34   C                     eno1
_gateway                 ether   78:32:1b:71:8b:56   C                     eno1
universe@lenovo19:~$
```

Dig

```
universe@lenovo19:~$ dig

; <<>> DiG 9.18.24-0ubuntu0.22.04.1-Ubuntu <<>>
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 16743
;; flags: qr aa rd ra ad; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;.                              IN      NS

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Thu Aug 01 19:38:32 IST 2024
;; MSG SIZE  rcvd: 28

universe@lenovo19:~$
```

Q1.what are the different types of addresses used in data communication in different layers?
https://www.quora.com/What-are-the-addresses-used-in-each-layer-of-the-OSI-model

Layer 1 - Physical Layer

The physical layer is responsible for the transmission and reception of raw, unformatted data bits over a physical communication medium. It deals with the electrical or optical characteristics of the signals, including voltage levels, timing, and synchronization. The addresses used at this layer are physical addresses, such as MAC addresses, which are unique identifiers for network devices.

Layer 2 - Data Link Layer

The data link layer handles error detection and correction, data framing, and flow control for reliable data transmission over a single communication link. It structures data into frames, adds error-checking codes, and manages the physical transmission of frames. The addresses used at this layer are also physical addresses, such as MAC addresses.

Layer 3 - Network Layer

The network layer provides logical addressing and routing for data packets across multiple interconnected networks. It assigns logical addresses, such as IP addresses, to devices and networks, and determines the best path for data packets to travel through the network. The addresses used at this layer are logical addresses, such as IP addresses.

Layer 4 - Transport Layer

The transport layer ensures reliable and end-to-end data delivery between applications. It segments data into segments, adds sequencing and acknowledgment mechanisms, and handles error recovery and retransmission. The addresses used at this layer are port addresses, which identify specific applications or processes on the destination device.

Layer 5 - Session Layer

The session layer establishes, manages, and terminates connections between applications. It synchronises communication sessions, coordinates dialog exchanges, and handles session termination. The addresses used at this layer are session IDs, which uniquely identify communication sessions between applications.

Layer 6 - Presentation Layer

The presentation layer handles data formatting, encryption, and compression to ensure compatibility between different application data formats. It translates data into a common format, encrypts data for security, and compresses data for efficient transmission. The addresses used at this layer are presentation addresses, which identify specific data formats or encoding schemes.

Layer 7 - Application Layer

The application layer provides network services to applications, such as file transfer, email, and web browsing. It interacts with user applications and provides network-based services to users. The addresses used at this layer are application-specific addresses, such as URLs or domain names.

Q2.In tcp/ip model, name the different protocols stack used in different layers?
https://www.geeksforgeeks.org/tcp-ip-model/

Network Layer:

IP: IP stands for Internet Protocol and it is responsible for delivering packets from the source host to the destination host by looking at the IP addresses in the packet headers

ICMP: ICMP stands for Internet Control Message Protocol. It is encapsulated within IP datagrams and is responsible for providing hosts with information about network problems.

ARP: ARP stands for Address Resolution Protocol. Its job is to find the hardware address of a host from a known IP address. ARP has several types: Reverse ARP, Proxy ARP, Gratuitous ARP, and Inverse ARP.

Transport Layer:

TCP: Applications can interact with one another using TCP as though they were physically connected by a circuit. TCP transmits data in a way that resembles character-by-character transmission rather than separate packets

UDP: The datagram delivery service is provided by UDP, the other transport layer protocol. Connections between receiving and sending hosts are not verified by UDP

Application Layer:

HTTP and HTTPS: HTTP stands for Hypertext transfer protocol. It is used by the World Wide Web to manage communications between web browsers and servers. HTTPS stands for HTTP-Secure. It is a combination of HTTP with SSL(Secure Socket Layer).

SSH: SSH stands for Secure Shell. It is a terminal emulations software similar to Telnet. The reason SSH is preferred is because of its ability to maintain the encrypted connection.

NTP: NTP stands for Network Time Protocol. It is used to synchronize the clocks on our computer to one standard time source. It is very useful in situations like bank transactions.