NIC – network interface card is a hardware component used to connect a computer to a network.it is also known as Network adapter.

IP Address

- An **IP address** is a unique series of numbers that identifies a device connected to the internet.
- Your ISP assigns an IP address to your device, and your internet activity goes through your ISP using your IP address
- Internet Service Provider (ISP) – wifi →It assignes the IP address to your device
- This address is just a string of numbers written in a certain format. It is generally expressed in a set of numbers for example 192.155.12.1.
- Here each number in the set is from 0 to 255 range. Or we can say that a full IP address ranges from 0.0.0.0 to 255.255.255.255.
- And an IP Address is assigned to your device from the given range available.
- Your internet activity goes through your service provider, and they route it back to you, using your IP address.
- Your IP address can change. For example, turning your router on or off can change your IP Address. Switching your machine (VM) on or off can change your IP

Types of IP

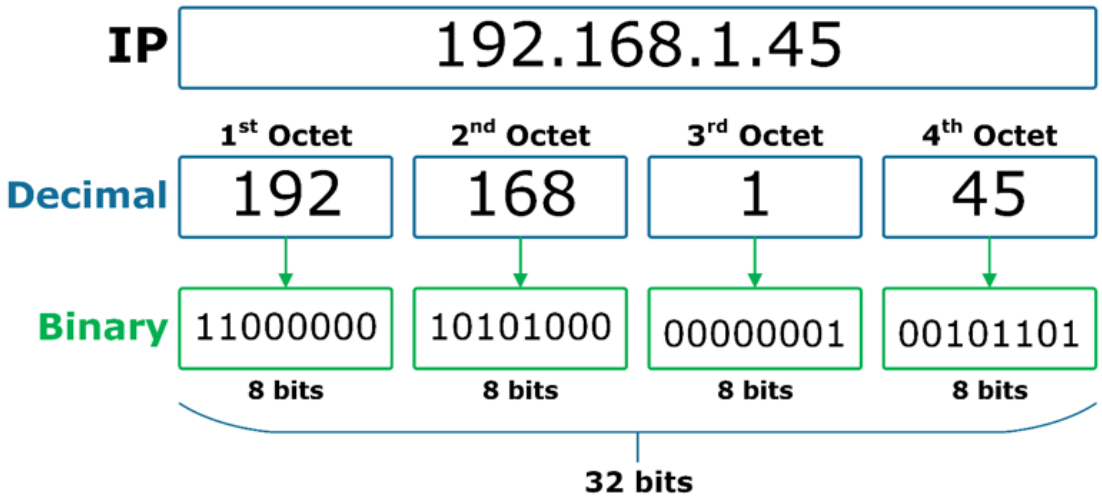
- Public and Private IP
  - Private
  - Public
- Static and Dynamic IP

Versions of IP address

- IP v4 - There are around 4.3 billion IPv4 addresses
- IP v6

IP v4

- It consists of 4 numbers separated by the dots. Each number can be from 0-255 in decimal numbers.
- But computers do not understand decimal numbers, they instead change them to binary numbers which are only 0 and 1. Therefore, in binary, this (0-255) range can be written as (00000000 – 11111111).
- Since each number N can be represented by a group of 8-digit binary digits. So, a whole IPv4 binary address can be represented by 32-bits of binary digits.
- In IPv4, a unique sequence of bits is assigned to a computer, so a total of (2^32) devices approximately = 4,294,967,296 can be assigned with IPv4.
- IP Address can be divided into two portions
  - Network Portion
  - Host Portion



eg . 192.168.44.0 -- > reserved for networking

192.168.44.1 -- > gateway -- router

192.168.44.255 -- > reserved for broadcasting

Types of Classes in IPV4 Address.

1. Class A
2. Class B
3. Class C
4. Class D
5. Class E

Class A	**0.0.0.0 to 126.255.255.255**	16 million addresses large organizations and enterprises.
Class B	**128.0.0.0 to 191.255.255.255**	This range is often utilized in schools, universities, and businesses. It encompasses 16 blocks of 65,534 addresses
Class C	**192.0.0.0 to 223.255.255.255**	smallest of the three classes, offering over 256 addresses commonly used in small office or home networks .
Class D	**224.0.0.1 to 239.255.255.255**	Reserved for Multicasting
Cass E	**240.0.0.1 to 254.255.255.255**	Reserved for Research & Development Purpose

Subnet

- Subnet is an logical subdivision of an IP network. Dividing an IP network is subnetting.
- Subnet mask is a 32 bit number that is used to identify Network Portion & Host Portion in the IP Address.
- It is made of putting all Network bits as "1" & Host bits as "0"
- subnet mask can also be expressed in another method called CIDR – classless inter domain routing (/notation)
- /notation is a shorter way to write a subnet mask.
- Class A – the classful subnet mask is /8.
- Class B – the classful subnet mask is /16.
- Class C – the classful subnet mask is /24.

	Subnet Mask	Binary Format	Decimal Format
Class A	8-bit	11111111.00000000.00000000.00000000	255.0.0.0
Class B	16-bit	11111111.11111111.00000000.00000000	255.255.0.0
Class C	24-bit	11111111.11111111.11111111.00000000	255.255.255.0

Syntax

1. set the dynamic IP address
   - selete VM ---> settings ---> Add Network adapter
   - ifconfig (check the IF name)
   - nmcli device show
   - nmcli device connect ens160

2. set the static IP address
   - selete VM ---> settings ---> Add Network adapter
   - ifconfig (check the IF name)
   - nmcli device show
   - nmcli connection status
   - nmcli con add type ethernet con-name ens160 ifname ens160 ipv4.addresses 192.168.159.51/24 ipv4.gateway 192.168.0.1 autoconnect yes ipv4.method manual
   - nmcli con add type ethernet con-name ens160 ifname ens160 ip4 192.168.159.51/24 gw4 192.168.0.1 autoconnect yes ipv4.method manual

3. command to check gateway
   - netstat -rn
   - route -n

4. To check ethernet card status
   - ethtool ens160
   - ethtool ens192

5. connection modify

   - nmcli con modify ens160 ipv4.addresses 192.168.2.100/24
   - nmcli con mod ens160 ipv4.gateway 192.168.2.1
   - nmcli con mod ens160 ipv4.dns 8.8.8.8
   - nmcli con mod ens160 ipv4.method manual
   - nmcli con mod ens160 connection.autoconnect yes
   - nmcli con modify ens160 +ipv4.addresses 192.168.2.100/24
   - nmcli con down ens160;nmcli con up ens160

- nmcli con edit ens160
    - > print ipv4
    - set/remove ipv4.addresses
    - >save
    - >quit
- nmcli con modify ens160 ipv4.addresses 192.168.2.100/24 ipv4.gateway 192.168.2.1 ipv4.method manual connection.autoconnect yes

6. Disconnect and delete
    - nmcli device disconnect ens160
    - ifconfig
    - nmcli con delete ens160
    - Delete the network adapter from VM->Settings->n/w adapter ->remove

7. To Monitor IP Packets
    - iptraf-ng

8. nmtui – network manager text user interface