ToppersNotes

GATE

COMPUTER SCIENCE & INFORMATION TECHNOLOGY

VOLUME-II

COMPUTER NETWORKS
COMPUTER ORGANIZATION
& DATA STRUCTURES

Sierra Innovations Pvt. Ltd.

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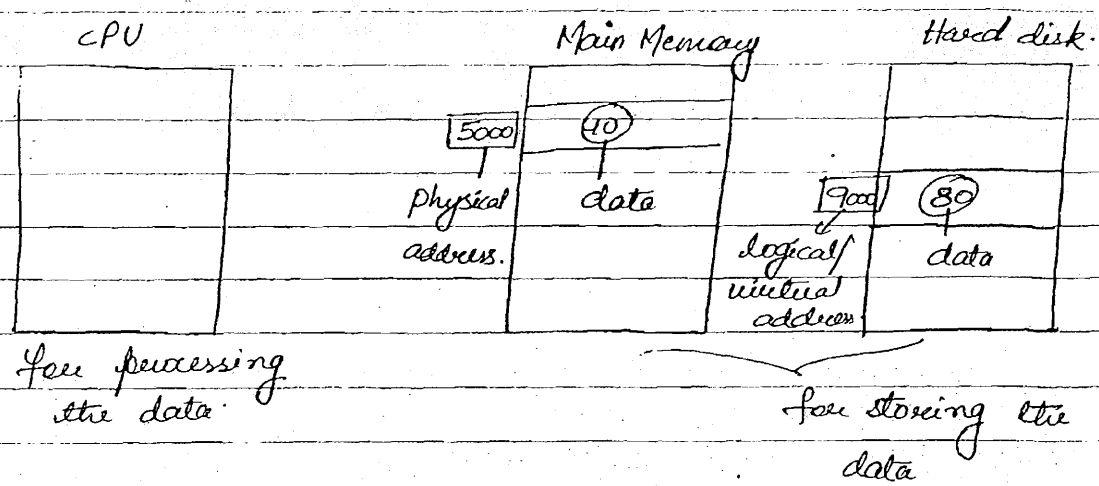
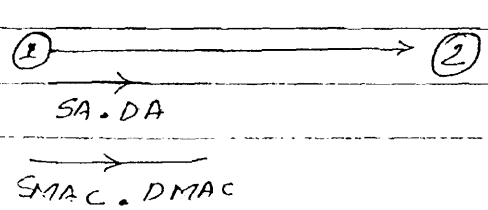


- Compt N/W is all about how the data is transferred from 1 computer to another through cable.

- The address pointing to 1 locat^n in MM is called physical address.
- The address pointing to a location in hard disk is called as virtual address.
- NIC card address
  or,
  MAC address
  or,
  physical address
  or,
  Ethernet address

  } by default it is 48 bit address.

- In n/w, address of computer is called physical address. On motherboard there is a NIC card & the address of NIC card is called as NIC card address.
-



- NIC card address can't be used for identificat^n in transmitting as they don't have unique structure.

- So, in n/w for transmitting b/w 1 compt & another computer classful addressing is used.

- MAC address alone can't be used as an entity in transmitting the data becoz every company has their own representation. So they introduced classful addressing / logical addressing or IP addressing [given by IANA (Internet assigned Number authority) organizat^n.].

IPV_4 - 32 bit address.

The different classes of classful addressing are:-

A B C D E → used for Research purpose.

A B C → unicasting (1-1 funct^n)

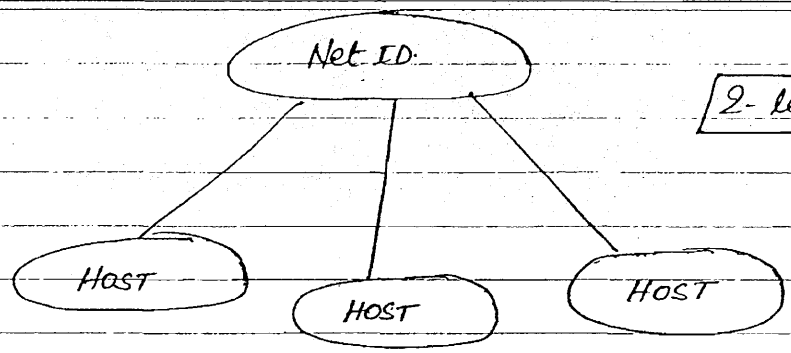
D → multicasting (if we are sending data to group of person) (1-many funct^n).

Broadcasting → 1 - all funct^n

- By default implicit address is MAC address.

- The explicit address that is given by the user to the compt is known as IP Address.

- Classful addressing supports 2 level hierarchy.



2- level hierarchy

- When the computer is given an IP address, it is called as **host**.

- For entire LAN n/w, a number is given, that no. is called as **Net ID**.

or,

Entire n/w will be represented by a no. called net ID.

- Representat^n:-

(a) Binary notation :-

- IP represented in the form of 0's & 1's.
- User isn't flexible with this notat^n.
- Computer is flexible with this notat^n.

Eg:- if IP is 32 bit it is represented as -

01010111 10101111 10101111 10101010

(b) Dotted Decimal ve notat^n:-

- each octat is seperated by a . (dot)
- User is flexible with this type of notat^n.

Eg:- 74.63.89.126.

Eg:- $63_{10} \Rightarrow (00111111)_2$

$80_{10} \Rightarrow (01010000)_2$

$(97)_{10} \Rightarrow (01100001)_2$ — 64 + 32 = 96

$(112)_{10} \Rightarrow (01110000)_2$ — 64 + 32 + 16 = 112

$(124)_{10} \Rightarrow (11100000)_2$ — 128 + 64 = 192 + 32 = 224

$(140)_{10} \Rightarrow (11110000)_2$ — 64 + 32 + 16 + 8 = 120 + 4 + 2 + 1

$(127)_{10} \Rightarrow (01111111)_2$

$(143)_{10} \Rightarrow (10001111)_2$ — 128 + 8 = 136 + 4 = 140 + 2 + 1 = 143

$(243)_{10} \Rightarrow (11110011)_2$

Maximum value with 8 bit (octat) = 255 (11111111)
Minimum value with octat = 0 ie (00000000).

In binary notatn, first few bits will decide the type of class.
In dotted decimal notatn, the first octat will decide the type of class.

CLASS A:- Net ID bit - 8 bits (1 bit for identificatn).
host bit → 24 bit

→ Net ID always starts with 0.
Minimum value :- 0 0000000 — 0
Maximum value :- 0 1111111 — 127.
Range — 0—127.

From 2^7 → 2 no's are special host ID ie 0 & 127

127. x.y.z
↳ loop bit address.

0.0.0.0
↳ DHCP closet

} special IP address.

$\underbrace{0\ (2^7-2)}_{\text{Net ID 8 bits}}$ $\underbrace{(2^{24}-2)}_{\text{host (24 bit)}}$

Each host can net ID can have $2^{24}-2$ host.

Eg:- 43. 57.89.126
↳ 43 in b/w 0-127. So it is class A.

CLASS B :-

Starting 2 bits should be 10.

Minimum value = $\overset{2^7}{1}0\ \underbrace{000000}_{\text{8 bit used for class identificatn}}\overset{2^0}{0} = 128$

Maximum value = 10 111111 = 191.

} (128-191)

Class B :- $\underbrace{10\ (2^{14})\ \text{networks}}_{\text{Net bits (16 bits)}}$ $\underbrace{(2^{16}-2)}_{\text{Host (16 bits)}}$

↳ this 16 bit is basically for class identificatn.
ie No. of class B n/w.

4 **CLASS C** :-

- Starting 3 bits are **110**
- Max value — 110.11111 — 192
  Min value — 110.00000 — 223 } (192-223)

$\underbrace{110\ (2^{21})\ n/w}_{\text{Net bit (24 bits)}}$ $\underbrace{(2^8-2)}_{\text{host (8 bit)}}$

- Each n/w can have (2^8-2) hosts.

NOTE :-

- All the above 3 classes supports unicasting.

If we want to give IP address to computer, it can be given only through either class A, B or C bcoz all these class have host part.

CLASS D :-

- Starting 4 bits are **1110**.

$\underbrace{1110}$

Min — 1110.0000 = 224
Max 1110-1111 = 239 } (224-239)

- But we can't assign it as IP address bcoz it has no host part. It is a group only.
  used for multicasting.