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Aim:	Determine Class of the IP address

AIM: TO DETERMINE THE CLASS OF THE IP ADDRESS

THEORY:
- ✓ An Internet Protocol (IP) address is a unique numerical identifier for every device or network that connects to the internet.
- ✓ Typically assigned by an internet service provider (ISP), an IP address is an online device address used for communicating across the internet.
- ✓ There are two versions of IP addresses that are commonly used on the internet: **IPv4 and IPv6**.
- ✓ An IPv4 address is expressed as a set of four dotted decimal numbers, where each octet is separated by a period, such as 192.168.35.4.
- ✓ The three digits in **the first octet represent a particular network** on the internet while the rest of the digits represent the actual host address within the local network, such as a workstation or a server.
- ✓ An IPv6 address represents eight groups of four hexadecimal digits separated by colons, such as 2620:cc:8000:1c82:544c:cc2e:f2fa:5a9b.
- ✓ Each internet protocol address can send information to other IP addresses through discrete chunks known as packets
- ✓ Each network packet contains the data being transferred along with a header containing the metadata of the packet.
- ✓ The following is a list of differences between IPv4 and IPv6:
  - ○ IPv4 is 32-bit, whereas IPv6 is 128-bit.
  - ○ In IPv4, binary bits are separated by a dot (.) IPv6 separates binary bits by a colon (:).
  - ○ IPv4 follows the numeric addressing method and IPv6 is alphanumeric.
- ✓ Classful addressing is a network addressing the Internet's architecture from 1981 till Classless Inter-Domain Routing was introduced in 1993.
- ✓ This addressing method divides the IP address into five separate classes based on four address bits.
- ✓ Here, classes A, B, C offers addresses for networks of three distinct network sizes. Class D is only used for multicast, and class E reserved exclusively for experimental purposes.

- o **Class A Network**

This IP address class is used when there **are a large number of hosts**. In a Class A type of network, the first 8 bits (also called the first octet) identify the network, and the remaining have 24 bits for the host into that network.

An example of a Class A address is 102.168.212.226. Here, "102" helps you identify the network and 168.212.226 identify the host.

Class A addresses 127.0.0.0 to 127.255.255.255 cannot be used and is reserved for loopback and diagnostic functions.

- o **Class B Network**

In a B class IP address, the binary addresses start with 10. In this IP address, the class decimal number that can be between 128 to 191. The number 127 is reserved for loopback, **which is used for internal testing on the local machine**. The first 16 bits (known as two octets) help you identify the network. The other remaining 16 bits indicate the host within the network.

An example of Class B IP address is 168.212.226.204, where *168 212* identifies the network and *226.204* helps you identify the Hut network host.

- o **Class C Network**

Class C is a type of IP address that is used for the small network. In this class, three octets are used to indent the network. This IP ranges between 192 to 223.

In this type of network addressing method, the first two bits are set to be 1, and the third bit is set to 0, which makes the first 24 bits of the address them and the remaining bit as the host address.

Mostly **local area network used Class C** IP address to connect with the network.

Example for a Class C IP address

192.168.178.1

- o **Class D Network**

Class D addresses are only used **for multicasting applications**. Class D is never used for regular networking operations. This class addresses the first three bits set to "1" and their fourth bit set to use for "0". Class D addresses are 32-bit network addresses. All the values within the range are used to identify multicast groups uniquely.

Therefore, there is no requirement to extract the host address from the IP address, so Class D does not have any subnet mask.

Example for a Class D IP address:

227.21.6.173

- o **Class E Network**

Class E IP address is defined by including the starting four network address bits as 1, which allows you two to incorporate addresses from 240.0.0.0 to 255.255.255.255. However, E class is reserved, and its usage is never defined. Therefore, many network implementations discard these addresses **as undefined** or illegal.

Example for a Class E IP address:

243.164.89.28

- o **Limitations of classful IP addressing**
    - ✓ Risk of running out of address space soon
    - ✓ Class boundaries did not encourage efficient allocation of address space