Government College of Engineering, Jalgaon

(An Autonomous Institute of Govt. of Maharashtra)
Department of Computer Engineering

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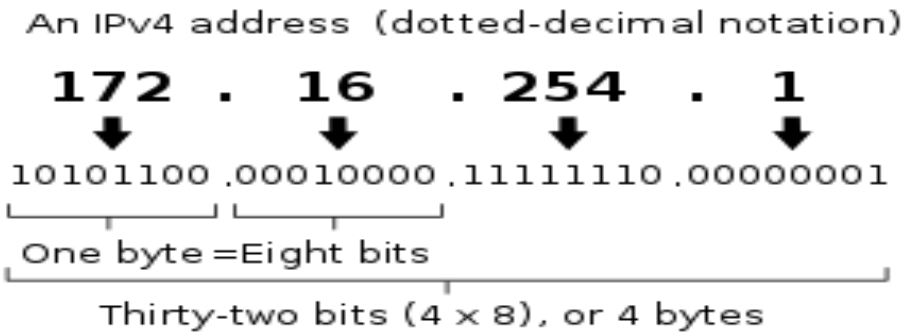
Experiment No. ____

Title: -Program to check enter IP address is valid IP or not.

Aim: -Accept IP address from user and check whether IP address is valid or In-Valid IP address.

Theory:

IPv4 addresses:



Decomposition of an IPv4 address from dot-decimal notation to its binary value.

An IP address in IPv4 is 32-bits in size, which limits the address space to 4294967296 (2^{32}) IP addresses. Of this number, IPv4 reserves some addresses for special purposes such as private networks (~18 million addresses) or multicast addresses (~270 million addresses).

IPv4 addresses are usually represented in dot-decimal notation, consisting of four decimal numbers, each ranging from 0 to 255, separated by dots, e.g., 172.16.254.1. Each part represents a group of 8 bits (octet) of the address. In some cases of technical writing, IPv4 addresses may be presented in various hexadecimal, octal, or binary representations.

Subnetting

In the early stages of development of the Internet Protocol,network administrators interpreted an IP address in two parts: network number portion and host number portion. The highest order octet (most significant eight bits) in an address was designated as the *network number* and the remaining bits were called the *rest field* or *host identifier* and were used for host numbering within a network.

This early method soon proved inadequate as additional networks developed that were independent of the existing networks already designated by a network number. In 1981, the Internet addressing specification was revised with the introduction of classful network architecture.

Classful network design allowed for a larger number of individual network assignments and fine-grained subnetwork design. The first three bits of the most significant octet of an IP address were defined as the *class* of the address. Three classes (*A*, *B*, and *C*) were defined for universal unicast addressing. Depending on the class derived, the network identification was based on octet boundary segments of the entire address. Each class used successively additional octets in the network identifier, thus reducing the possible number of hosts in the higher order classes (*B* and *C*). The following table gives an overview of this now obsolete system.

Class	Leading bits	Size of *network number* bit field	Size of *rest* bit field	Number of networks	Addresses per network	Start address	End address
A	0	8	24	128 (2^7)	16,777,216 (2^{24})	0.0.0.0	127.255.255.255
B	10	16	16	16,384 (2^{14})	65,536 (2^{16})	128.0.0.0	191.255.255.255
C	110	24	8	2,097,152 (2^{21})	256 (2^8)	192.0.0.0	223.255.255.255

Classful network design served its purpose in the startup stage of the Internet, but it lacked scalability in the face of the rapid expansion of the network in the 1990s. The class system of the address space was replaced with Classless Inter-Domain Routing (CIDR) in 1993. CIDR is based

on variable-length subnet masking (VLSM) to allow allocation and routing based on arbitrary-length prefixes.

Today, remnants of classful network concepts function only in a limited scope as the default configuration parameters of some network software and hardware components (e.g. netmask), and in the technical jargon used in network administrators' discussions.

Private addresses

Early network design, when global end-to-end connectivity was envisioned for communications with all Internet hosts, intended that IP addresses be uniquely assigned to a particular computer or device. However, it was found that this was not always necessary as private networks developed and public address space needed to be conserved.

Computers not connected to the Internet, such as factory machines that communicate only with each other via TCP/IP, need not have globally unique IP addresses. Three non-overlapping ranges of IPv4 addresses for private networks were reserved in RFC 1918. These addresses are not routed on the Internet and thus their use need not be coordinated with an IP address registry. Today, when needed, such private networks typically connect to the Internet through network address translation (NAT).

Start	End	Number of addresses
10.0.0.0	10.255.255.255	16777216
172.16.0.0	172.31.255.255	1048576
192.168.0.0	192.168.255.255	65536

Any user may use any of the reserved blocks. Typically, a network administrator will divide a block into subnets; for example, many home routers automatically use a default address range of 192.168.0.0 through 192.168.0.255 (192.168.0.0/24).

Implementation:

Sample Program:

```
#include <stdio.h>
#include <stdlib.h>
int main ()
{
   char ipAddr[50];
   int a=0,b=0,c=0,d=0,con;
   printf("\nEnter IP Address : ");
   scanf("%s",ipAddr);
   con = sscanf(ipAddr, "%d.%d.%d.%d", &a, &b, &c, &d);
   if ( 4 == con )
   {
        printf("\nScanned IP = %s has %d Octets\n\nFirst Octet = %d \nSecond Octet=%d\nThird Octet = %d\nFourth Octet = %d\n", ipAddr, con, a, b, c, d);
        if ((0<=a && a<=255) && (0<=b && b<=255) && (0<=c && c<=255) && (0<=d && d<=255) )
             printf("\n\nIt is Valid IP address\n\n");
        else
             printf("\n\nIt is not a valid IP address\n\n");
   }
   else
   {
        printf("\n\nMalformed IP Address\n\n");
   }
   return 0;
}
```

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