Batch: B3   **Experiment Number: 5**

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Aim of the Experiment: To write a program to identify the class to which a given IP Address belongs to.

Program/ Steps:

```java
import java.util.Scanner;
import java.io.*;
import java.util.regex.Matcher;
import java.util.regex.Pattern;
public class Ipaddress{
    Run | Debug
    public static void main(String[] args)
    {
        Scanner input=new Scanner(System.in);
        System.out.println(x:"Enter the IP address : ");
        String IP=input.nextLine();
        if (validChecker(IP)==true) {
            String[] ADD=IP.split(regex:"\\.");
            String address=ADD[0];
            int add=Integer.parseInt(address);
            String IP1=Integer.toBinaryString(add);
            classification(IP1);
        }
        else
            System.out.println(x:"Invalid IP Address");


    }
    static void classification(String Intprot){
        String[] arr1=Intprot.split(regex:"");
        if(arr1[0].equals(anObject:"0"))
            System.out.println(x:"This ip address belongs to class A");
        else if(arr1[1].equals(anObject:"0"))
            System.out.println(x:"This ip address belongs to class B");
        else if(arr1[2].equals(anObject:"0"))
            System.out.println(x:"This ip address belongs to class C");
        else if(arr1[3].equals(anObject:"0"))
            System.out.println(x:"This ip address belongs to class D");
        else
            System.out.println(x:"This ip address belongs to class E");
    }
```

```java
    static boolean validChecker(String ip)
    {
        Pattern pattern=Pattern.compile(regex:"^((25[0-5]|2[0-4][0-9]|1[0-9][0-9]|[1-9][0-9]|[0-9])\\.){3}(25[0-5]|2[0-4][0-9]|1[0-9][0-9]|[1-9][0-9]|[0-9])$");
        Matcher matcher=pattern.matcher(ip);
        boolean found=matcher.find();
        return found;
    }
}
```

Output/Result:

```
PS C:\JAVAAAAA> cd "c:\JAVAAAAA\" ; if ($?) { javac Ipaddress.java } ; if ($?) { java Ipaddress }
Enter the IP address :
8.8.8.8
This ip address belongs to class B
PS C:\JAVAAAAA> cd "c:\JAVAAAAA\" ; if ($?) { javac Ipaddress.java } ; if ($?) { java Ipaddress }
Enter the IP address :
0.0.0.0
This ip address belongs to class A
PS C:\JAVAAAAA> cd "c:\JAVAAAAA\" ; if ($?) { javac Ipaddress.java } ; if ($?) { java Ipaddress }
Enter the IP address :
255.255.255.255
This ip address belongs to class E
PS C:\JAVAAAAA> cd "c:\JAVAAAAA\" ; if ($?) { javac Ipaddress.java } ; if ($?) { java Ipaddress }
Enter the IP address :
256.0.0.1
Invalid IP Address
```

Post Lab Question-Answers:

1) Which OSI layer corresponds to the IP Layer?

Ans: The Internet Layer of the TCP/IP model aligns with the Layer 3 (Network) layer of the OSI model.

2) Compare IPv4 and IPv6 header

Ans.

IPv4	vs.	IPv6
Deployed 1981		Deployed 1998
32-bit IP address		128-bit IP address
4.3 billion addresses Addresses must be reused and masked		7.9×10^{28} addresses Every device can have a unique address
Numeric dot-decimal notation 192.168.5.18		Alphanumeric hexadecimal notation 50b2:6400:0000:0000:6c3a:b17d:0000:10a9 (Simplified - 50b2:6400::6c3a:b17d:0:10a9)
DHCP or manual configuration		Supports autoconfiguration

3) What is fragmentation?

Ans: Fragmentation at the Network Layer is a process of dividing a large data packet into smaller pieces, known as fragments, to improve the efficiency of data transmission over a network.

4) What is Subnetting?

Ans: Subnetting is a method of dividing a single physical network into logical sub-networks (subnets). Subnetting allows a business to expand its network without requiring a new network number from its Internet service provider. Subnetting helps to reduce the network traffic and also conceals network complexity. Subnetting is necessary when a single network number must be assigned to several portions of a local area network (LAN).

5)What is Supernetting?

Ans: Supernetting is the opposite of Subnetting. In subnetting, a single big network is divided into multiple smaller subnetworks. In Supernetting, multiple networks are combined into a bigger network termed as a Supernetwork or Supernet. Supernetting is mainly used in Route Summarization, where routes to multiple networks with similar network prefixes are combined into a single routing entry, with the routing entry pointing to a Super network, encompassing all the networks. This in turn significantly reduces the size of routing tables and also the size of routing updates exchanged by routing protocols.

Outcomes:

CO3. Build the skills of sub-netting and routing mechanisms.

Conclusion (based on the Results and outcomes achieved):

We learnt how ip addresses are classified and wrote a program to separate them.

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of faculty in-charge with date

References:

Books/ Journals/ Websites:

● **Behrouz A Forouzan, Data Communication and Networking, Tata Mc Graw**

hill, India, 4 th Edition

● **S. Tanenbaum," Computer Networks", 4th edition, Prentice Hall**