Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

COMPUTER NETWORKS

Experiment No: 06

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IP Address

Aim: Write a program to identify the class and subnet address of the given IP address.

Theory:

To determine the class and subnet address of an IP address, we need to look at the first few bits of the address.

In IPv4, the first 4 bits of the IP address determine the class of the address. There are five classes of IP addresses:

Class A: the first bit is 0, and the next 7 bits represent the network ID. The remaining 24 bits represent the host ID.

Class B: the first two bits are 10, and the next 14 bits represent the network ID. The remaining 16 bits represent the host ID.

Class C: the first three bits are 110, and the next 21 bits represent the network ID. The remaining 8 bits represent the host ID.

Class D: the first four bits are 1110, and the remaining 28 bits represent a multicast address.

Class E: the first four bits are 1111, and the remaining 28 bits are reserved for future use.

To determine the subnet address, we need to look at the subnet mask. The subnet mask is a 32-bit value that is used to divide an IP address into a network address and a host address. The subnet mask consists of a string of 1's followed by a string of 0's. The number of 1's in the subnet mask determines the size of the network.

For example, if we have an IP address of 192.168.1.100 and a subnet mask of 255.255.255.0, we can determine that this is a Class C address because the first three bits are 110. The subnet mask has 24 1's followed by 8 0's, which means that the network size is 2^8 = 256. The subnet address would be 192.168.1.0, and the host ID would be 100.

In summary, the class and subnet address of an IP address can be determined by looking at the first few bits of the address to determine the class and the subnet mask to determine the size of the network and the subnet address.

Code:

```
import java.util.*;

class ipaddress {
    public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    String ip;
    String ipClass;
    System.out.println("Enter an IP address: ");
    ip = sc.next();
    ipClass = getIPClass(ip);
    String mask = "";
    int val = Integer.parseInt(ip.substring(0, ip.indexOf(".")));
    if (val >= 0 && val <= 127)
        mask = "255.0.0.0";
    else if (val >= 128 && val <= 191)
        mask = "255.255.0.0";
    else if (val >= 192 && val <= 223)
        mask = "255.255.255.0";
    else if (val >= 224 && val <= 239)
        mask = "multicast";
    else if (val >= 240 && val <= 255)
        mask = "reserved";
    System.out.println("The Subnet Mask for " + ip + " is " + mask);
    String result = "";
    int count = 0;
    mask = mask + ".";
    ip = ip + ".";
    if (!mask.equals("multicast.") && !mask.equals("reserved.")) {
        int i1, j1, i2, j2;
        int s1, s2;
        j1 = 0;
        j2 = 0;
        i1 = 0;
        i2 = 0;
        while (count <= 3) {
            while (ip.charAt(j1) != '.')
                j1++;
            while (mask.charAt(j2) != '.')
                j2++;
            s1 = Integer.parseInt(ip.substring(i1, j1));
            s2 = Integer.parseInt(mask.substring(i2, j2));
            int res = s1 & s2;
            result = result + Integer.toString(res) + ".";
            count++;
            j1++;
```

```
            j2++;
            i1 = j1;
            i2 = j2;
        }
    }
    System.out.println("Subnet Address is " + result.substring(0, result.length() - 1));
    System.out.println("Class of IP Address is " + ipClass);
}

    private static String getIPClass(String ip) {
        int val = Integer.parseInt(ip.substring(0, ip.indexOf(".")));
        if (val >= 0 && val <= 127)
            return "Class A";
        else if (val >= 128 && val <= 191)
            return "Class B";
        else if (val >= 192 && val <= 223)
            return "Class C";
        else if (val >= 224 && val <= 239)
            return "Class D";
        else
            return "Class E";
    }
}
```

Output:

```
Enter an IP address:
103.44.8.22
The Subnet Mask for 103.44.8.22 is 255.0.0.0
Subnet Address is 103.0.0.0
Class of IP Address is Class A
```

Conclusion:

IP Class Addressing has been implemented successfully.