21BDS0340

Abhinav Dinesh Srivatsa

Computer Networks Lab

Assignment – V

Question 1

Aim:
Develop a program to find and display the class of IPv4 (Classes A-E) from set of input addresses

Code:

```
import java.util.Scanner;

public class question1 {
    public static String integerToBits(int n) {
        String bin = "";
        while (n != 0) {
            bin = Integer.toString(n % 2) + bin;
            n /= 2;
        }
        return bin;
    }

    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        String ip = s.nextLine().trim();
        int netId = Integer.parseInt(ip.split("\\.")[0]);
        String bits = integerToBits(netId);
        char ipClass = '\0';
        if (bits.startsWith("0"))
            ipClass = 'A';
        else if (bits.startsWith("10"))
            ipClass = 'B';
        else if (bits.startsWith("110"))
            ipClass = 'C';
        else if (bits.startsWith("1110"))
            ipClass = 'C';
        else if (bits.startsWith("1111"))
            ipClass = 'E';
        System.out.println("IP is class " + ipClass);
        s.close();
    }
}
```

Output:

```
192.168.0.1
IP is class C
```

Question 2

Aim:

Write a program that converts a 32-bit IP address to its equivalent dotted decimal number format

Code:

```java
import java.util.Scanner;

// 11111111111111110000000010101001
public class question2 {
    public static int bitsToInteger(String bits) {
        int sum = 0;
        for (int x = 0; x < bits.length(); x++)
            sum += (bits.charAt(x) - '0') * Math.pow(2, bits.length() - x - 1);
        return sum;
    }

    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        String ip = s.nextLine().trim();
        String bytes[] = ip.split("(?<=\\G.{8})");
        int c = 0;
        for (String str : bytes)
            if (c++ == 0)
                System.out.print(bitsToInteger(str));
            else
                System.out.print("." + bitsToInteger(str));
        System.out.println("");
        s.close();
    }
}
```

Output:

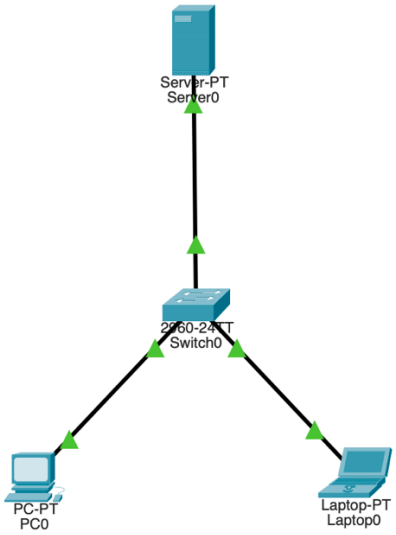
```
10110101100100111001011111110101
181.147.151.245
```

Question 3

Aim:

Implement the NAT in static dynamic and port type using the packet tracer for topology using 1 PC, 1 laptop, 1 switch and 1 web server

Topology:



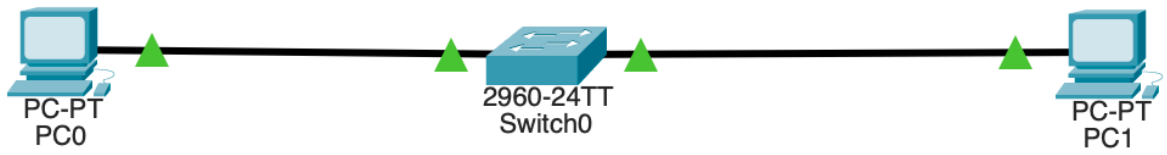
Testing Connections:

```
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=20ms TTL=128
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 20ms, Average = 5ms
```

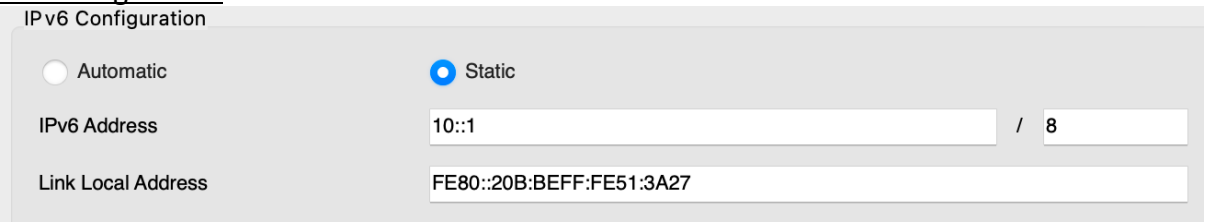
Question 4

Aim:
Simulate a IPv6 web traffic using simple network topology implemented in packet tracer. Test the connections using PDU's

Topology:



IPv6 Assignment:



Testing Connection:


```
C:\>ping 10::2

Pinging 10::2 with 32 bytes of data:

Reply from 10::2: bytes=32 time<1ms TTL=128
Reply from 10::2: bytes=32 time<1ms TTL=128
Reply from 10::2: bytes=32 time<1ms TTL=128
Reply from 10::2: bytes=32 time<1ms TTL=128

Ping statistics for 10::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Question 5

Aim:
Create a socket with the same machine for client and server program. Client can initiate a conversation to which a server can respond and keep listening for new messages. Client program will terminate if user enters "bye" or "exit".

Code:
Server:

```
import socket


def server_program():
```

```
    host = socket.gethostname()
    port = 4500

    server_socket = socket.socket()
    server_socket.bind((host, port))

    server_socket.listen(1)
    print("Server started. Waiting for connections...")

    client_socket, address = server_socket.accept()
    print("Connection from:", address)

    while True:
        data = client_socket.recv(1024).decode('utf-8')
        print("Client:", data)

        if data.lower() == "bye" or data.lower() == "exit":
            break

        message = input("Server: ")
        client_socket.send(message.encode('utf-8'))

    client_socket.close()
    server_socket.close()


if __name__ == '__main__':
    server_program()
```

Client:

```
import socket


def client_program():
    host = socket.gethostname()
    port = 4500

    client_socket = socket.socket()
    client_socket.connect((host, port))

    while True:
        message = input("Client: ")
        client_socket.send(message.encode('utf-8'))

        data = client_socket.recv(1024).decode('utf-8')
        print("Server:", data)

        if data.lower() == "bye" or data.lower() == "exit":
            break
```

```
    client_socket.close()


if __name__ == '__main__':
    client_program()
```

Output:

Server:

```
Server started. Waiting for connections...
Connection from: ('172.16.147.192', 51953)
Client: hi
Server: hello
Client: what is ur reg no?
Server: 21BDS0340
Client: ok thanks
Server: exit
Client:
Server:
```

Client:

```
Client: hi
Server: hello
Client: what is ur reg no?
Server: 21BDS0340
Client: ok thanks
Server: exit
```