19CSE301 - COMPUTER NETWORKS

Socket Programming

LAB-4 : (10-08-2021)

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1. **Implement the simple UDP client-server**

Client:

```
import java.io.*;
import java.net.*;

class UDPClient {
    public static void main(String args[]) throws Exception
    {

        BufferedReader inFromUser =
                new BufferedReader(new InputStreamReader(System.in));

        DatagramSocket clientSocket = new DatagramSocket();

        InetAddress IPAddress = InetAddress.getByName("hostname");

        byte[] sendData = new byte[1024];
        byte[] receiveData = new byte[1024];

        String sentence = inFromUser.readLine();

        sendData = sentence.getBytes();

        DatagramPacket sendPacket =
                new DatagramPacket(sendData, sendData.length,
IPAddress, 9876);

        clientSocket.send(sendPacket);

        DatagramPacket receivePacket =
                new DatagramPacket(receiveData, receiveData.length);

        clientSocket.receive(receivePacket);

        String modifiedSentence =
                new String(receivePacket.getData());

        System.out.println("FROM SERVER:" + modifiedSentence);

        clientSocket.close();
```

```
    }
}
```

Server:

```
import java.io.*;
import java.net.*;

class UDPServer {
    public static void main(String args[]) throws Exception
    {

        DatagramSocket serverSocket = new DatagramSocket(9876);

        byte[] receiveData = new byte[1024];
        byte[] sendData  = new byte[1024];

        while(true)
        {

            DatagramPacket receivePacket =
                    new DatagramPacket(receiveData,
receiveData.length);

            serverSocket.receive(receivePacket);

            String sentence = new String(receivePacket.getData());

            InetAddress IPAddress = receivePacket.getAddress();

            int port = receivePacket.getPort();

            String capitalizedSentence = sentence.toUpperCase();

            sendData = capitalizedSentence.getBytes();

            DatagramPacket sendPacket =
                    new DatagramPacket(sendData, sendData.length,
IPAddress,
                            port);

            serverSocket.send(sendPacket);
        }
    }
}
```

Output:

```
"C:\Program Files\Java\jdk-16.0.1\bin\java.exe"

Process finished with exit code 0
```

2. Single Datagram:

Code :

Receiver:

```
import java.net.DatagramPacket;
import java.net.DatagramSocket;

class datagramReceiver {
    public static void main(String[] args) {
        try {
            int MAX_LEN = 40;
            int localPortNum = Integer.parseInt(args[0]);
            DatagramSocket mySocket = new
DatagramSocket(localPortNum);
            byte[] buffer = new byte[MAX_LEN];
            DatagramPacket packet = new DatagramPacket(buffer,
MAX_LEN);
            mySocket.receive(packet);
            String message = new String(buffer);
            System.out.println(message);
            mySocket.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

Sender:

```
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;

class datagramSender {
    public static void main(String[] args) {
        try {
            InetAddress receiverHost = InetAddress.getByName(args[0]);
            int receiverPort = Integer.parseInt(args[1]);
            String message = args[2];
            DatagramSocket mySocket = new DatagramSocket();
            byte[] buffer = message.getBytes();
            DatagramPacket packet = new DatagramPacket(buffer,
buffer.length, receiverHost,
                    receiverPort);
            mySocket.send(packet);
            mySocket.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

Output:

```
C:\Users\Administrator\Documents\19CSE301 - CN\Labs\Lab4\src>javac datagramReceiver.java

C:\Users\Administrator\Documents\19CSE301 - CN\Labs\Lab4\src>java datagramReceiver 9090
Good Evening!

C:\Users\Administrator\Documents\19CSE301 - CN\Labs\Lab4\src>
```

```
C:\Users\Administrator\Documents\19CSE301 - CN\Labs\Lab4\src>javac datagramSender.java

C:\Users\Administrator\Documents\19CSE301 - CN\Labs\Lab4\src>java datagramSender.java localhost 9090 "
Good Evening!"

C:\Users\Administrator\Documents\19CSE301 - CN\Labs\Lab4\src>
```

3. Multi Client Server :

Code:

Receiver :

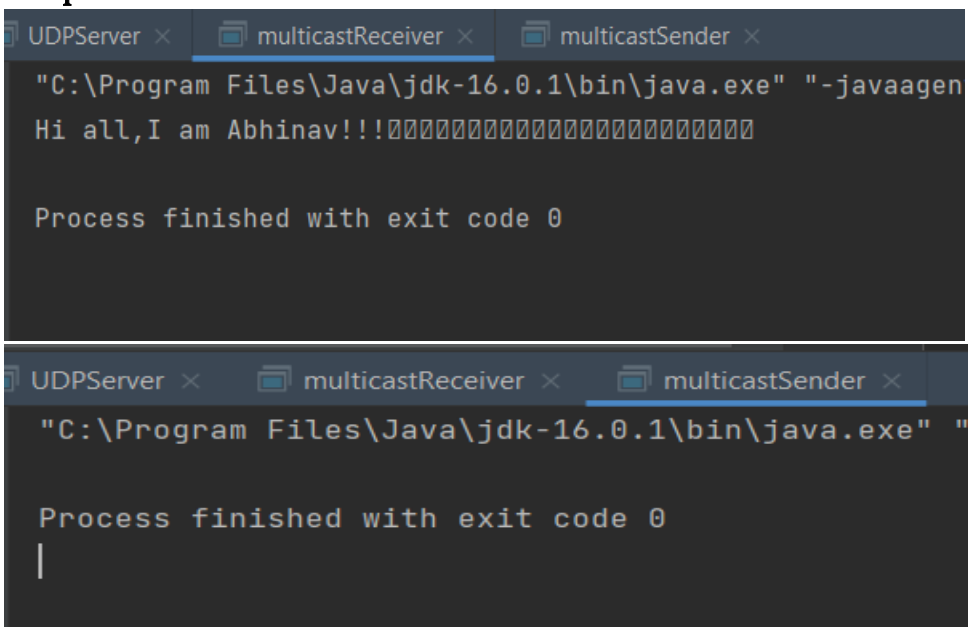
```
import java.net.DatagramPacket;
import java.net.InetAddress;
import java.net.MulticastSocket;

class multicastReceiver {
    public static void main(String[] args) {
        try {
            InetAddress group = InetAddress.getByName("224.0.0.1");
            MulticastSocket multicastSock = new
MulticastSocket(3456);
            multicastSock.joinGroup(group);
            byte[] buffer = new byte[45];
            DatagramPacket packet = new DatagramPacket(buffer,
buffer.length);
            multicastSock.receive(packet);
            System.out.println(new String(buffer));
            multicastSock.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

Sender:

```
import java.net.DatagramPacket;
import java.net.InetAddress;
import java.net.MulticastSocket;
```

```
class multicastSender {
    public static void main(String[] args) {
        try {
            InetAddress group = InetAddress.getByName("224.0.0.1");
            MulticastSocket multicastSock = new
MulticastSocket(3456);
            String msg = "Hi all,I am Abhinav!!!";
            DatagramPacket packet = new
DatagramPacket(msg.getBytes(), msg.length(), group,3456);
            multicastSock.send(packet);
            multicastSock.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

Output :



4. **Exercise :**

Client:

```
    import java.io.IOException;
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;
import java.util.Scanner;

public class UDPClient
{
    public static void main(String args[]) throws IOException
    {
        System.out.println("client started, enter input:");
        Scanner sc = new Scanner(System.in);

        // Step 1:Create the socket object for
        // carrying the data.
        DatagramSocket ds = new DatagramSocket();
```

```
        InetAddress ip = InetAddress.getLocalHost();
        byte buf[] = null;

        // loop while user not enters "bye"
        while (true)
        {
            String inp = sc.nextLine();

            // convert the String input into the byte array.
            buf = inp.getBytes();

            // Step 2 : Create the datagramPacket for sending
            // the data.
            DatagramPacket DpSend =
                    new DatagramPacket(buf, buf.length, ip, 2345);

            // Step 3 : invoke the send call to actually send
            // the data.
            ds.send(DpSend);

            // break the loop if user enters "bye"
            if (inp.equals("bye"))
                break;
        }
    }
}
```

Server:

```
//Java program to illustrate Server side
//Implementation using DatagramSocket
import java.io.IOException;
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;
import java.net.SocketException;

public class UDPServer
{
    public static void main(String[] args) throws IOException
    {
        System.out.println("server started");
        // Step 1 : Create a socket to listen at port 2345
        DatagramSocket ds = new DatagramSocket(2345);
        byte[] receive = new byte[65535];

        DatagramPacket DpReceive = null;
        while (true)
        {

            // Step 2 : create a DatgramPacket to receive the data.
            DpReceive = new DatagramPacket(receive, receive.length);

            // Step 3 : receive the data in byte buffer.
            ds.receive(DpReceive);

            System.out.println("Client:-" + data(receive));

            // Exit the server if the client sends "bye"
```

```
            if (data(receive).toString().equals("bye"))
            {
                System.out.println("Client sent bye.....EXITING");
                break;
            }

            // Clear the buffer after every message.
            receive = new byte[65535];
        }
    }

    // A utility method to convert the byte array
    // data into a string representation.
    public static StringBuilder data(byte[] a)
    {
        if (a == null)
            return null;
        StringBuilder ret = new StringBuilder();
        int i = 0;
        while (a[i] != 0)
        {
            ret.append((char) a[i]);
            i++;
        }
        return ret;
    }
}
```

Output:

Server

```
"C:\Program Files\Java\jdk-16.0.1\bin
server started
Client:-Good Evening
Client:-My name is Abhinav.
Client:-bye
Client sent bye.....EXITING

Process finished with exit code 0
```

Client

```
"C:\Program Files\Java\jdk-16.0.1\bin\
client started, enter input:
Good Evening
My name is Abhinav.
bye

Process finished with exit code 0
```