Date: 09/08 /2024

Lab Practical #07:

Study Client-Server Socket programming - TCP & UDP

Practical Assignment #07:

1. **Write a C/Java code for TCP Server-Client Socket Programming.**
2. **Write a C/Java code for UDP Server-Client Socket Programming.**

1. **For TCP Server-Client: Connection Based Protocol**

TCP Server Program:

```java
import java.io.*;

import java.net.*;


public class Server {
    private Socket socket = null;
    private ServerSocket server = null;
    private DataInputStream in = null;
    private DataOutputStream out = null;


    public Server(int port) {
        try {
            server = new ServerSocket(port);
            System.out.println("Server started");
            System.out.println("Waiting for a client ...");


            socket = server.accept();
            System.out.println("Client accepted");


            in = new DataInputStream(new BufferedInputStream(socket.getInputStream()));
            out = new DataOutputStream(socket.getOutputStream());
```

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```java
// Thread to listen for incoming messages from the client
Thread receiveThread = new Thread(() -> {
    String message;
    try {
        while (true) {
            message = in.readUTF();
            System.out.println("Client: " + message);
        }
    } catch (IOException e) {
        System.out.println("Connection closed.");
    }
});

receiveThread.start();

// Main thread to send messages to the client
BufferedReader consoleInput = new BufferedReader(new InputStreamReader(System.in));
String message;
while (true) {
    message = consoleInput.readLine();
    out.writeUTF(message);
}

} catch (IOException e) {
    System.out.println(e);
} finally {
```
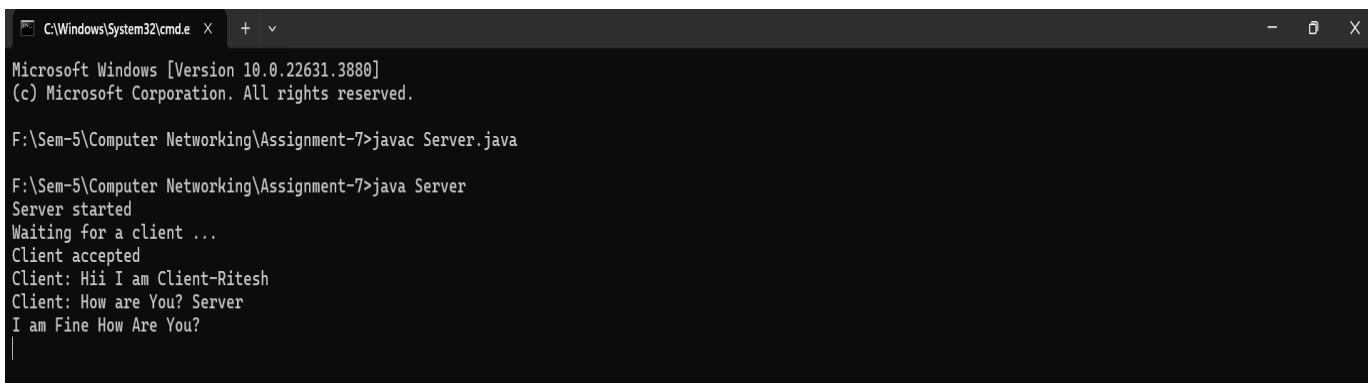
```java
            try {
                socket.close();
                in.close();
                out.close();
            } catch (IOException e) {
                System.out.println(e);
            }
        }
    }

    public static void main(String[] args) {
        Server server = new Server(5000);
    }
}
```

OUTPUT:

```
Microsoft Windows [Version 10.0.22631.3880]
(c) Microsoft Corporation. All rights reserved.

F:\Sem-5\Computer Networking\Assignment-7>javac Server.java

F:\Sem-5\Computer Networking\Assignment-7>java Server
Server started
Waiting for a client ...
Client accepted
Client: Hii I am Client-Ritesh
Client: How are You? Server
I am Fine How Are You?
```

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TCP Client Program:

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

public class ClientTCP {
    private Socket socket = null;
    private DataInputStream in = null;
    private DataOutputStream out = null;

    public ClientTCP(String address, int port) {
    try {
            socket = new Socket(address, port);
            System.out.println("Connected to the server");

            in = new DataInputStream(socket.getInputStream());
            out = new DataOutputStream(socket.getOutputStream());

        // Thread to listen for incoming messages from the server
        Thread receiveThread = new Thread(() -> {
        String message;
        try {
                while (true)
                {
                        message = in.readUTF();
                        System.out.println("Server: " + message);
                }
        }catch (IOException e) {
        System.out.println("Connection closed.");
```

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```java
        }
    });


            receiveThread.start();


            // Main thread to send messages to the server
        BufferedReader    consoleInput    =    new    BufferedReader(new
InputStreamReader(System.in));
        String message;
        while (true)
        {
            message = consoleInput.readLine();
            out.writeUTF(message);
        }


    } catch (UnknownHostException u) {
        System.out.println(u);
    } catch (IOException e) {
        System.out.println(e);
    } finally {
        try
        {
            socket.close();
            in.close();
            out.close();
        } catch (IOException e) {
            System.out.println(e);
        }
```

```
        }
    }


    public static void main(String[] args) {
        ClientTCP client = new ClientTCP("127.0.0.1", 5000);
    }
  }
}
```

OUTPUT:

```
C:\Windows\System32\cmd.e  X    +  ∨                                                          –   ☐   X

Microsoft Windows [Version 10.0.22631.3880]
(c) Microsoft Corporation. All rights reserved.

F:\Sem-5\Computer Networking\Assignment-7>javac ClientTCP.java

F:\Sem-5\Computer Networking\Assignment-7>java ClientTCP
Connected to the server
Hii I am Client-Ritesh
How are You? Server
Server: I am Fine How Are You?
```

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2. For UDP Server-Client: Connection Less Protocol

UDP Server Program:

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

class UDPServer {
  public static void main(String[] args) {
    try {
      DatagramSocket server_socket = new DatagramSocket(1234);

      byte[] in_data = new byte[1024];
      byte[] out_data;

      while (true) {

        DatagramPacket Packet2 = new DatagramPacket(in_data, in_data.length);
        server_socket.receive(Packet2);

        String str = new String(Packet2.getData(), 0, Packet2.getLength());
        System.out.println("Received from client: " + str);

        InetAddress IP_add1 = Packet2.getAddress();
        int port = Packet2.getPort();

        BufferedReader      server_input      =      new      BufferedReader(new
InputStreamReader(System.in));
        System.out.print("Enter response: ");
        String send_str = server_input.readLine();
```
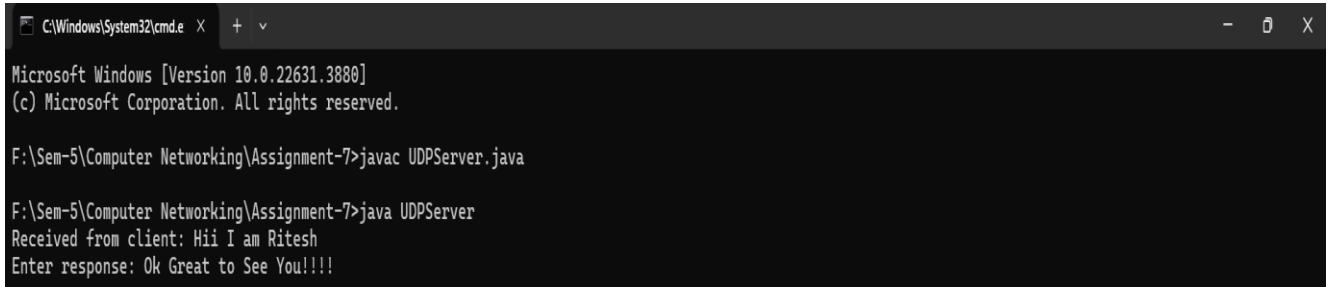
```
        out_data = send_str.getBytes();


        DatagramPacket Packet3 = new DatagramPacket(out_data, out_data.length,
IP_add1, port);
        server_socket.send(Packet3);
      }
    } catch (IOException e) {
      e.printStackTrace();
    }
  }
}
```

Output :

```
C:\Windows\System32\cmd.e   X   +   ∨                                    —  □  X

Microsoft Windows [Version 10.0.22631.3880]
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F:\Sem-5\Computer Networking\Assignment-7>javac UDPServer.java

F:\Sem-5\Computer Networking\Assignment-7>java UDPServer
Received from client: Hii I am Ritesh
Enter response: Ok Great to See You!!!!
```

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UDP Client Program:

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

class UDPClient {
    public static void main(String[] args) {
        try {
            BufferedReader user_input = new BufferedReader(new InputStreamReader(System.in));

            DatagramSocket client_socket = new DatagramSocket();

            InetAddress IP_add = InetAddress.getByName("localhost");

            byte[] out_data;
            byte[] in_data = new byte[1024];

            System.out.print("Enter message: ");
            String str = user_input.readLine();
            out_data = str.getBytes();

            DatagramPacket Packet1 = new DatagramPacket(out_data, out_data.length, IP_add, 1234);
            client_socket.send(Packet1);

            DatagramPacket Packet4 = new DatagramPacket(in_data, in_data.length);
            client_socket.receive(Packet4);

            String receive_str = new String(Packet4.getData(), 0, Packet4.getLength());
            System.out.println("Server response: " + receive_str);

            client_socket.close();
```

```
    } catch (IOException e) {

        e.printStackTrace();

    }

  }

}
```

OUTPUT: