Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE ENGINEERING

AND INFORMATION SYSTEMS

FALL SEMESTER 2024-2025

PMCA502P – JAVA PROGRAMMING LAB

LAB ASSESSMENT – 3

SUBMITTED ON: 15 – NOV - 2024

SUBMITTED BY-

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PROGRAM: MCA

REGISTER No.: 24MCA0242

01. Develop a TCP based client –server application using java.net.*. Let the client transfers the operation in the format of 'A + B' and server in turn interprets the operator, perform the requested operation using the operands and transmits the result to get displayed in client.

CODE:

Server.java:

```
package tcp_client_server;

import java.io.*;

import java.net.*;

public class Server {

    public static void main(String[] args) {

    try (ServerSocket serverSocket = new ServerSocket(6789)) {

        System.out.println("Server Connected");

        System.out.println("Server is listening on port 6789");

        while (true) {

            try (Socket socket = serverSocket.accept()) {

                BufferedReader input = new BufferedReader(new
InputStreamReader(socket.getInputStream()));

                PrintWriter output = new PrintWriter(socket.getOutputStream(), true);

                String operation = input.readLine();

                String[] parts = operation.split(" ");

                int num1 = Integer.parseInt(parts[0]);

                String operator = parts[1];

                int num2 = Integer.parseInt(parts[2]);

                int result = 0;

                switch (operator) {
```

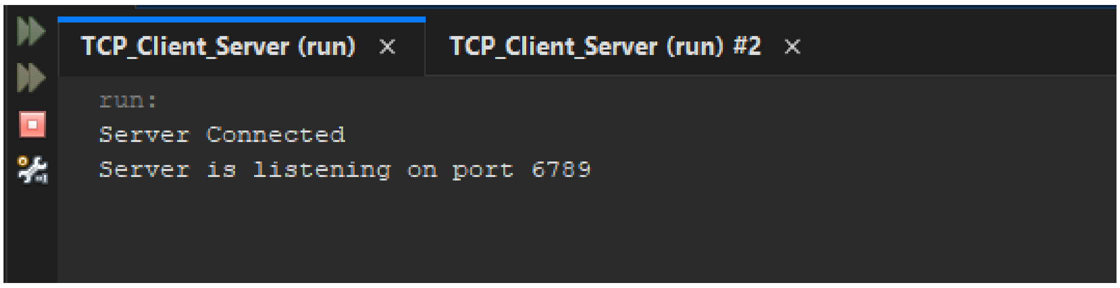
```
                case "+":
                    result = num1 + num2;
                    break;
                case "-":
                    result = num1 - num2;
                    break;
                case "*":
                    result = num1 * num2;
                    break;
                case "/":
                    result = num1 / num2;
                    break;
                default:
                    output.println("Invalid operator");
                    continue;
            }
            output.println("Result: " + result);
        } catch (IOException | NumberFormatException e) {
            System.out.println("Server exception: " + e.getMessage());
        }
    }
  } catch (IOException e) {
      System.out.println("Could not listen on port 6789");
  }
}
```

```
}
```

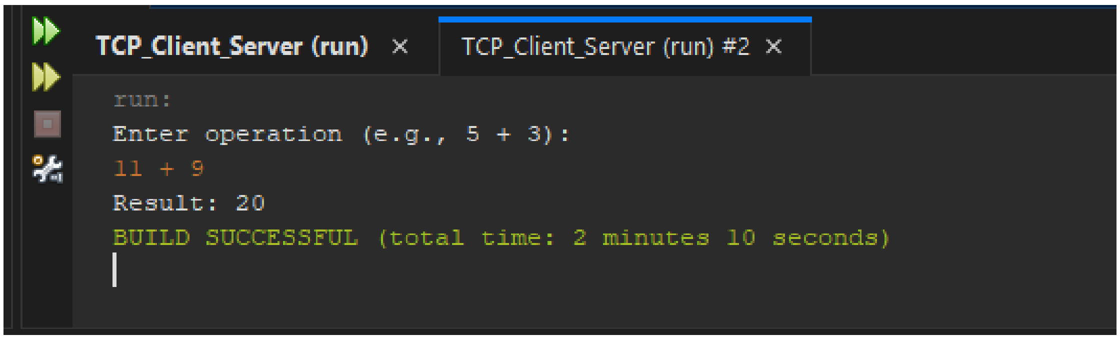
Client.java:

```
package tcp_client_server;

import java.io.*;

import java.net.*;

public class Client {

    public static void main(String[] args) {

        try (Socket socket = new Socket("localhost", 6789)) {

            PrintWriter output = new PrintWriter(socket.getOutputStream(), true);

            BufferedReader input = new BufferedReader(new InputStreamReader(socket.getInputStream()));

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

            System.out.println("Enter operation (e.g., 5 + 3): ");

            String operation = consoleInput.readLine();

            output.println(operation);

            String response = input.readLine();

            System.out.println(response);

        } catch (IOException e) {

            System.out.println("Client exception: " + e.getMessage());

        }

    }

}
```

OUTPUT:



```
run:
Server Connected
Server is listening on port 6789
```



```
run:
Enter operation (e.g., 5 + 3):
11 + 9
Result: 20
BUILD SUCCESSFUL (total time: 2 minutes 10 seconds)
```

02. Design a UDP application in which sender broadcasts the message and the receiver computes count of each character in a message.

CODE:

UDPSender.java:

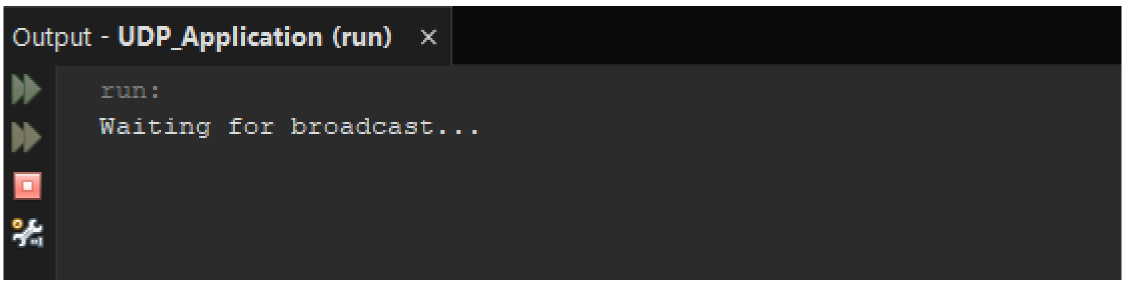
```
package udp_application;

import java.net.DatagramPacket;

import java.net.DatagramSocket;

import java.net.InetAddress;

public class UDPSender {

    public static void main(String[] args) {

    try {

        DatagramSocket socket = new DatagramSocket();

        socket.setBroadcast(true);

        String message = "Hello JAVA";

        byte[] buffer = message.getBytes();
```

```
            InetAddress broadcastAddress = InetAddress.getByName("255.255.255.255");
            DatagramPacket packet = new DatagramPacket(buffer, buffer.length, broadcastAddress, 9876);
            socket.send(packet);
            socket.close();
            System.out.println("Message broadcasted: " + message);
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

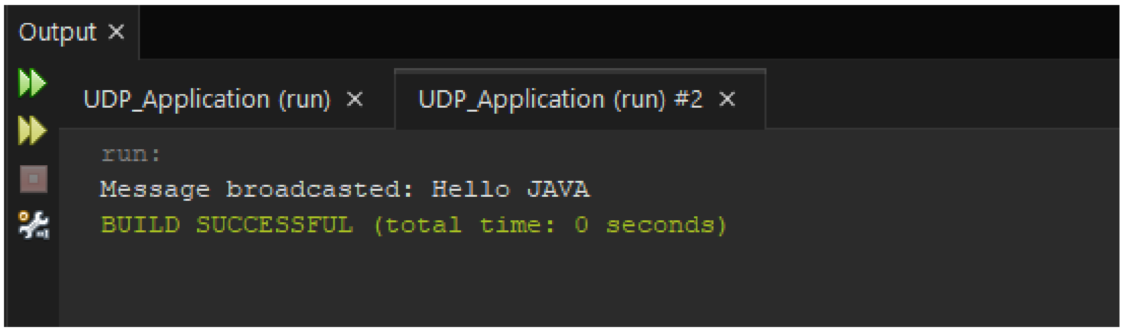
UDPReceiver.java:

```
package udp_application;
import java.net.DatagramPacket;
import java.net.DatagramSocket;
public class UDPReceiver {
    public static void main(String[] args) {
        try {
            DatagramSocket socket = new DatagramSocket(9876);
            byte[] buffer = new byte[1024];
            DatagramPacket packet = new DatagramPacket(buffer, buffer.length);
            System.out.println("Waiting for broadcast...");
            socket.receive(packet);
            String message = new String(packet.getData(), 0, packet.getLength());
            System.out.println("Message received: " + message);
            int[] charCount = new int[256];
            for (char c : message.toCharArray()) {
                charCount[c]++;
            }
            for (int i = 0; i < charCount.length; i++) {
                if (charCount[i] > 0) {
                    System.out.print((char) i + ": " + charCount[i]);
                }
            }
            socket.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

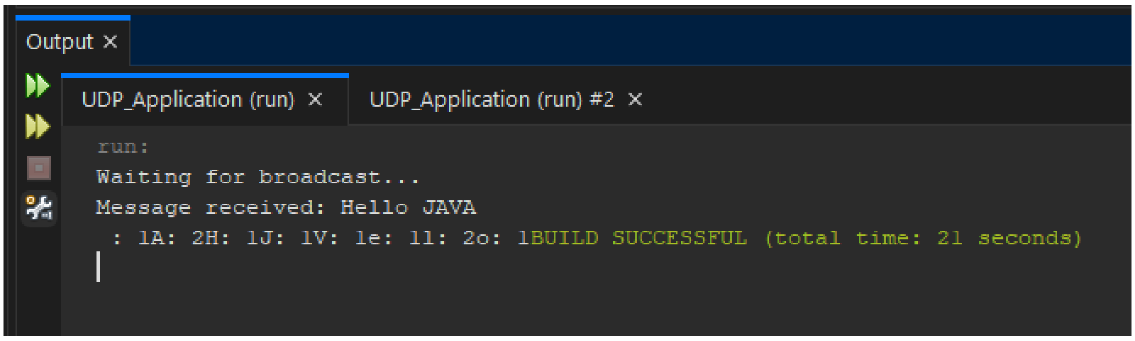
OUTPUT:



```
run:
Waiting for broadcast...
```



```
run:
Message broadcasted: Hello JAVA
BUILD SUCCESSFUL (total time: 0 seconds)
```



```
run:
Waiting for broadcast...
Message received: Hello JAVA
 : 1A: 2H: 1J: 1V: 1e: 1l: 2o: 1BUILD SUCCESSFUL (total time: 21 seconds)
```

03. Implement an RMI application to invoke a factorial method with appropriate parameter deployed in server and display the result in client.

CODE:

Factorial_Impl.java:

```
import java.rmi.RemoteException;

import java.rmi.server.UnicastRemoteObject;

public class Factorial_Impl extends UnicastRemoteObject implements Factorial {

    protected Factorial_Impl() throws RemoteException {

        super();

    }

    @Override

    public long calculateFactorial(int number) throws RemoteException {

        if (number <= 1) {

            return 1;

        } else {

            return number * calculateFactorial(number - 1);

        }

    }

}
```

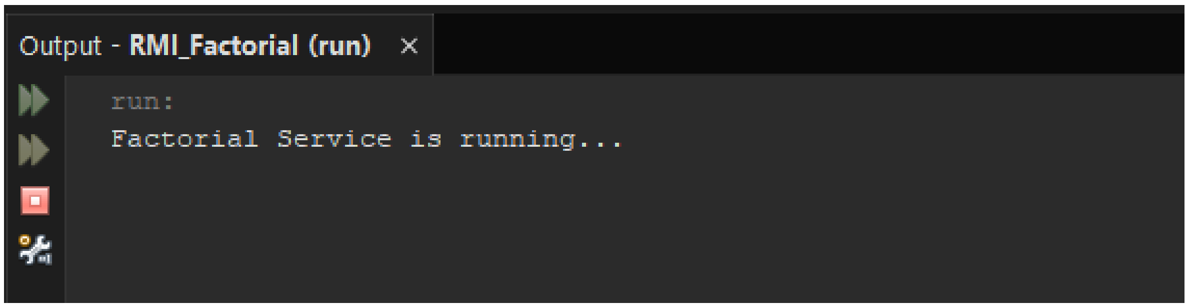
FactorialServer.java:

```
import java.rmi.Naming;

import java.rmi.registry.LocateRegistry;

public class FactorialServer {

   public static void main(String[] args) {

      try {

         LocateRegistry.createRegistry(1099);

         Factorial_Impl factorial = new Factorial_Impl();

         Naming.rebind("rmi://localhost/FactorialService", factorial);

         System.out.println("Factorial Service is running...");

      } catch (Exception e) {

         e.printStackTrace();

      }

   }

}
```

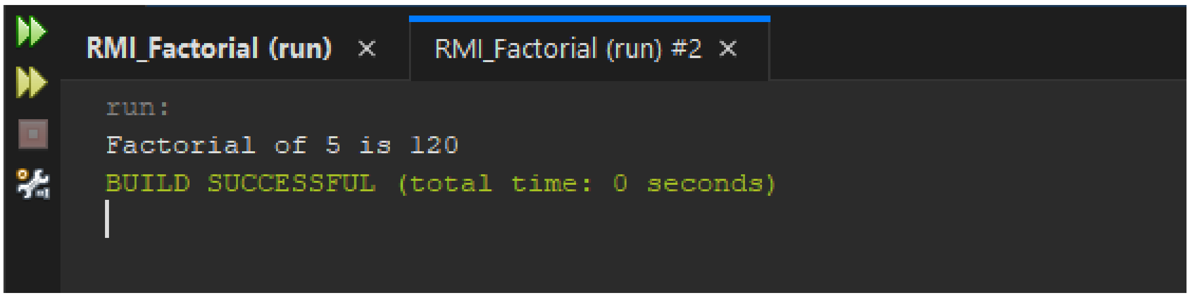
FactorialClient.java:

```
import java.rmi.Naming;

public class FactorialClient {

   public static void main(String[] args) {

      try {

         Factorial factorial = (Factorial) Naming.lookup("rmi://localhost/FactorialService");

         int number = 5;

         long result = factorial.calculateFactorial(number);

         System.out.println("Factorial of " + number + " is " + result);

      } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

OUTPUT:



```
run:
Factorial Service is running...
```



```
run:
Factorial of 5 is 120
BUILD SUCCESSFUL (total time: 0 seconds)
```