```
/*
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Batch : B4
*/

// Aim : Design distributed application which consists of a server and client using threads
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Server.java

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

public class Server {
    public static void main(String args[]) {
        int port = 6789;// port number
        Server server = new Server(port);// calling constructructor of server final and initialisig in
                                    // object(server) of serverfina;
        server.startServer(); // calling startserver function
    }

    // declare a server socket and a client socket for the server;
    // declare the number of connections

    ServerSocket echoServer = null;// declaring echo server
    Socket clientSocket = null;// declaring client socket
    int numConnections = 0;
    int port;

    public Server(int port) {
        this.port = port;// port is initialised in member variable port
    }

    public void stopServer() // Switching off the server
    {
        System.out.println("Server cleaning up.");
        System.exit(0);
    }
```

```
public void startServer() // starting the server
{
    // Try to open a server socket on the given port
    // Note that we can't choose a port less than 1024 if we are not
    // privileged users (root)

    try {
        echoServer = new ServerSocket(port);// initialising server by calling server socket function
    } catch (IOException e) {// if error persist
        System.out.println(e);
    }

    System.out.println("Server is started and is waiting for connections.");
    System.out.println("With multi-threading, multiple connections are allowed.");
    System.out.println("Any client can send -1 to stop the server.");

    // Whenever a connection is received, start a new thread to process the
    // connection
    // and wait for the next connection.

    while (true) {
        try {
            clientSocket = echoServer.accept();// clientsocket is intialised
            numConnections++;// number of connectections is increament
            Server2Connection oneconnection = new Server2Connection(clientSocket,
numConnections, this);// caling
                                                                    // constructor
                                                                    //of
                                                                    // server2
                                                                    // funcction
            new Thread(oneconnection).start();// run function is called for each thread
        } catch (IOException e) {
            System.out.println(e);
        }
    }
}
```

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}

class Server2Connection implements Runnable {
    BufferedReader is;
    PrintStream os;
    Socket clientSocket;
    int id;
    Server server;

    public Server2Connection(Socket clientSocket, int id, Server server) {
        this.clientSocket = clientSocket;
        this.id = id;
        this.server = server;
        System.out.println("Connection " + id + " established with: " + clientSocket);
        try {
            is = new BufferedReader(new InputStreamReader(clientSocket.getInputStream()));// data
input stream of server
            os = new PrintStream(clientSocket.getOutputStream());// output stream of serve
        } catch (IOException e) {
            System.out.println(e);
        }
    }

    public void run() {
        String line;
        try {
            boolean serverStop = false;

            while (true) {
                line = is.readLine(); // getting line from client
                System.out.println("Received " + line + " from Connection " + id + ".");// displaying
                int n = Integer.parseInt(line);
                if (n == -1) {// checking if to stop the server or client
                    serverStop = true;
                    break;
                }
                if (n == 0)
```

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                break;
            os.println("" + n * n); // writing square in input buffer of client
        }

        System.out.println("Connection " + id + " closed.");
        // closing client connection
        is.close();
        os.close();
        clientSocket.close();

        if (serverStop)
            server.stopServer();// this is used to close all the connection
    } catch (IOException e) {
        System.out.println(e);// if error occured
    }
  }
}
```

Client.java

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

public class Client {
  public static void main(String[] args) {

    String hostname = "localhost";// hostname
    int port = 6789; // port numbrt

    // declaration section:
    // clientSocket: our Clientfinal socket
    // os: output stream
    // is: input stream

    Socket clientSocket = null;
    DataOutputStream os = null;
    BufferedReader is = null;
```

```
// Initialization section:
// Try to open a socket on the given port
// Try to open input and output streams

try {
    clientSocket = new Socket(hostname, port); // initialising client socket
    os = new DataOutputStream(clientSocket.getOutputStream());// output stream of client socket
    is = new BufferedReader(new InputStreamReader(clientSocket.getInputStream()));// input
stream of client
                                                                    // socket
} catch (UnknownHostException e) {
    System.err.println("Don't know about host: " + hostname);
} catch (IOException e) {
    System.err.println("Couldn't get I/O for the connection to: " + hostname);
}

// If everything has been initialized then we want to write some data
// to the socket we have opened a connection to on the given port

if (clientSocket == null || os == null || is == null) {
    System.err.println("Something is wrong. One variable is null.");
    return;
}

try {
    while (true) {
        System.out.print("Enter an integer (0 to stop connection, -1 to stop server): ");
        BufferedReader br = new BufferedReader(new InputStreamReader(System.in));// taking
input from terminal
        String keyboardInput = br.readLine();// storing input in keyboard
        os.writeBytes(keyboardInput + "\n");// writing keyboard into input stream buffer of server

        int n = Integer.parseInt(keyboardInput);
        if (n == 0 || n == -1) {// condiition to get out from loop
            break;
        }

        String responseLine = is.readLine();// getting input stream in response line
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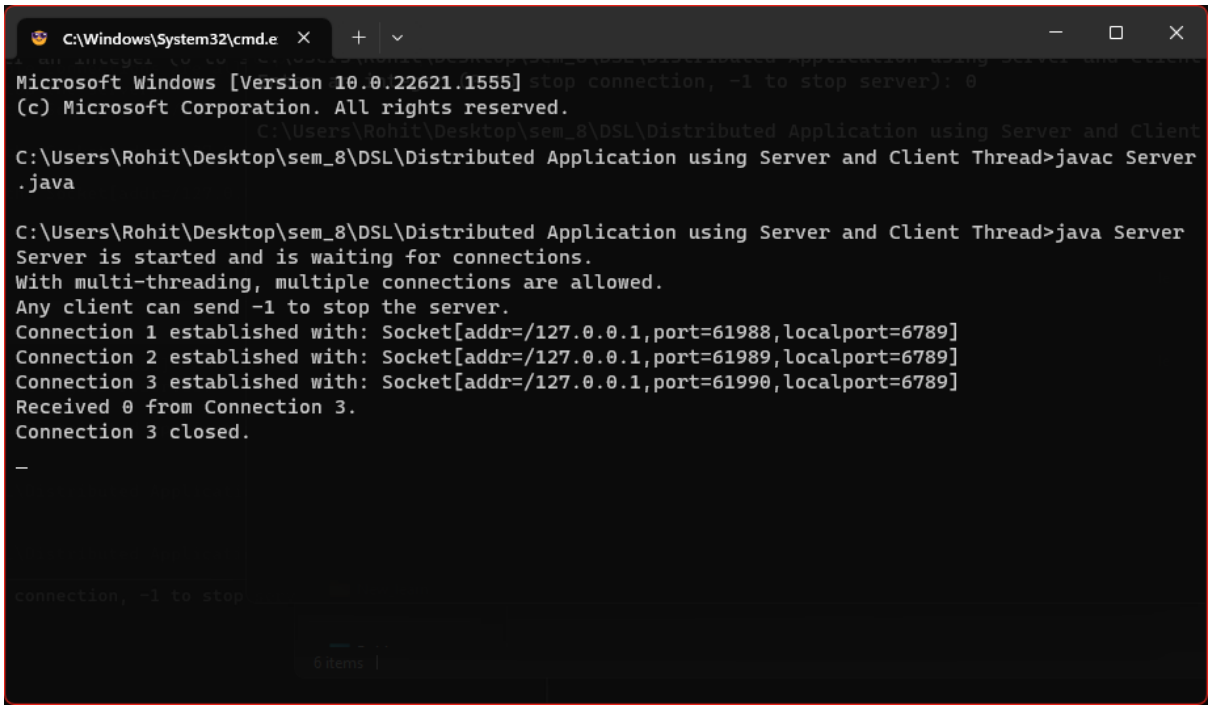
            System.out.println("Server returns its square as: " + responseLine);
        }

        // clean up:
        // close the output stream
        // close the input stream
        // close the socket

        os.close();
        is.close();
        clientSocket.close();
    } catch (UnknownHostException e) {
        System.err.println("Trying to connect to unknown host: " + e);
    } catch (IOException e) {
        System.err.println("IOException:  " + e);
    }
  }
}
```

Output :

Server.java



Client.java

```
C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22621.1555]
(c) Microsoft Corporation. All rights reserved.
C:\Users\Rohit\Desktop\sem_8\DSL\Distributed Application using Server and Client Thread>javac Client
y.java
javac: file not found: Clienty.java
Usage: javac <options> <source files>
use -help for a list of possible options

C:\Users\Rohit\Desktop\sem_8\DSL\Distributed Application using Server and Client Thread>javac Client
.java

C:\Users\Rohit\Desktop\sem_8\DSL\Distributed Application using Server and Client Thread>java Client
Enter an integer (0 to stop connection, -1 to stop server): _
```

Client.java

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C:\Users\Rohit\Desktop\sem_8\DSL\Distributed Application using Server and Client Thread>java Client
Enter an integer (0 to stop connection, -1 to stop server): _
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Client.java

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Microsoft Windows [Version 10.0.22621.1555]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Rohit\Desktop\sem_8\DSL\Distributed Application using Server and Client Thread>java Client
Enter an integer (0 to stop connection, -1 to stop server): 0

C:\Users\Rohit\Desktop\sem_8\DSL\Distributed Application using Server and Client Thread>_
```