

Practical No: - 01

Develop a multi-client chat server application where multiple clients chat with each other concurrently. The messages sent by different clients are first communicated to the server and then the server, on behalf of the source client, communicates the messages to the appropriate destination client.

ChatServer.java:

```
package pract1;
import java.net.*;
import java.io.*;
public class ChatServer {
    //A chat server that delivers public and private messages.
    // The server socket.
    private static ServerSocket serverSocket = null;
    // The client socket.
    private static Socket clientSocket = null;
    // This chat server can accept up to maxClientsCount clients'
connections.
    private static final int maxClientsCount = 5;
    private static final clientThread[] threads = new
clientThread[maxClientsCount];
    public static void main(String args[]) {
        //1
        // The default port number.
        int portNumber = 2222;
        if (args.length < 1) {
            System.out.println("Usage: java MultiThreadChatServer
<portNumber>\n"
                + "Now using port number=" + portNumber);
        } else {
            portNumber = Integer.valueOf(args[0]).intValue();
        }
        // Open a server socket on the portNumber (default 2222). Note
that we cannot choose a port less than 1023 if we are not privileged users
(root).
```

```

    try {
        serverSocket = new ServerSocket(portNumber);
    } catch (IOException e) {
        System.out.println(e);
    }
    // Create a client socket for each connection and pass it to a new
client thread.
    while (true) {
        try {
            clientSocket = serverSocket.accept();
            int i = 0;
//2
            for (i = 0; i < maxClientsCount; i++) {
                if (threads[i] == null) {
                    (threads[i] = new clientThread(clientSocket, threads)).start();
                    break;
                }
            }
//3
            if (i == maxClientsCount) {
                PrintStream os = new
PrintStream(clientSocket.getOutputStream());
                os.println("Server too busy. Try later.");
                os.close();
                clientSocket.close();
            }
        } catch (IOException e) {
            System.out.println(e);
        }
    }
}
}
/*

```

The chat client thread. This client thread opens the input and the output

streams for a particular client, ask the client's name, informs all the clients connected to the server about the fact that a new client has joined the chat room, and as long as it receive data, echos that data back to all other clients. When a client leaves the chat room this thread informs also all the clients about that and terminates.

```
*/  
class clientThread extends Thread {  
    private DataInputStream is = null;  
    private PrintStream os = null;  
    private Socket clientSocket = null;  
    private final clientThread[] threads;  
    private int maxClientsCount;  
    public clientThread(Socket clientSocket, clientThread[] threads) {  
        this.clientSocket = clientSocket;  
        this.threads = threads;  
        maxClientsCount = threads.length;  
    }  
    public void run() {  
        int maxClientsCount = this.maxClientsCount;  
        clientThread[] threads = this.threads;  
        try {  
            // Create input and output streams for this client.  
            is = new DataInputStream(clientSocket.getInputStream());  
            os = new PrintStream(clientSocket.getOutputStream());  
            os.println("Enter your name.");  
            String name = is.readLine().trim();  
            os.println("Hello " + name  
                + " to our chat room.\nTo leave enter /quit in a new line");  
            //4  
            for (int i = 0; i < maxClientsCount; i++) {  
                if (threads[i] != null && threads[i] != this) {  
                    threads[i].os.println("*** A new user " + name
```

```

        + " entered the chat room !!! ***");
    }
}

//5 Start the conversation
while (true) {
    String line = is.readLine();
    if (line.startsWith("/quit")) {
        break;
    }
}

//6 Message is public, broadcast to everyone
for (int i = 0; i < maxClientsCount; i++) {
    if (threads[i] != null) {
        threads[i].os.println("<" + name + "> " + line);
    }
}

} //7

//8
for (int i = 0; i < maxClientsCount; i++) {
    if (threads[i] != null && threads[i] != this) {
        threads[i].os.println("*** The user " + name
            + " is leaving the chat room !!! ***");
    }
}

//9
os.println("*** Bye " + name + " ***");
/*
    * Clean up. Set the current thread variable to null so that a new
client
    * could be accepted by the server.
*/

//10
for (int i = 0; i < maxClientsCount; i++) {
    if (threads[i] == this) {
        threads[i] = null;
    }
}

```

```

    }
    // Close the output stream, close the input stream, close the socket.
    //11
    is.close();
    os.close();
    clientSocket.close();
}
catch (IOException e) {
}
}
}

```

MultiClient.java:

```

package pract1;
import java.net.*;
import java.io.*;
public class MultiClient implements Runnable{
    // The client socket
    private static Socket clientSocket = null;
    // The output stream
    private static PrintStream os = null;
    // The input stream
    private static DataInputStream is = null;
    private static BufferedReader inputLine = null;
    private static boolean closed = false;
    public static void main(String[] args) {
        // The default port.
        int portNumber = 2222;
        // The default host.
        String host = "localhost";
        if (args.length < 2) {
            System.out
                .println("Usage: java MultiThreadChatClient <host>
<portNumber>\n"

```

```

        + "Now using host=" + host + ", portNumber=" +
portNumber);
    } else {
        host = args[0];
        portNumber = Integer.valueOf(args[1]).intValue();
    }
    /*
    * Open a socket on a given host and port. Open input and output
streams.
    */
    try {
        clientSocket = new Socket(host, portNumber);
        inputLine = new BufferedReader(new
InputStreamReader(System.in));
        os = new PrintStream(clientSocket.getOutputStream());
        is = new DataInputStream(clientSocket.getInputStream());
    } catch (UnknownHostException e) {
        System.err.println("Don't know about host " + host);
    } catch (IOException e) {
        System.err.println("Couldn't get I/O for the connection to the
host "
        + host);
    }
    /*
    * If everything has been initialized then we want to write some
data to the
    * socket we have opened a connection to on the port portNumber.
    */
    if (clientSocket != null && os != null && is != null) {
        try {
            /* Create a thread to read from the server. */
            new Thread(new MultiClient()).start();
            while (!closed) {
                os.println(inputLine.readLine().trim());
            }
        }
    }

```

```

        /*
        * Close the output stream, close the input stream, close the
socket.
        */
        os.close();
        is.close();
        clientSocket.close();
    } catch (IOException e) {
        System.err.println("IOException: " + e);
    }
}
}
// Create a thread to read from the server. (non-Javadoc)
@SuppressWarnings("deprecation")
public void run() {
    /*
    * Keep on reading from the socket till we receive "Bye" from the
    * server. Once we received that then we want to break.
    */
    String responseLine;
    try {
        while ((responseLine = is.readLine()) != null) {
            System.out.println(responseLine);
            if (responseLine.indexOf("*** Bye") != -1)
                break;
        }
        closed = true;
    } catch (IOException e) {
        System.err.println("IOException: " + e);
    }
}
}

```

Output: -

```
Problems Servers Terminal Data Source Explorer Prop
ChatServer [Java Application] C:\Users\Admin\.p2\pool\plugins\org.eclipse.ju
Usage: java MultiThreadChatServer <portNumber>
Now using port number=2222
```

```
Problems Servers Terminal Data Source Explorer Properties C
MultiClient [Java Application] C:\Users\Admin\.p2\pool\plugins\org.eclipse.justj.openjdk
Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Vinayak
Hello Vinayak to our chat room.
To leave enter /quit in a new line
*** A new user Lokesh entered the chat room !!! ***
*** A new user Sairaj entered the chat room !!! ***
*** A new user Divya entered the chat room !!! ***
*** A new user Deepika entered the chat room !!! ***
```

```
Problems Servers Terminal Data Source Explorer Properties
MultiClient [Java Application] C:\Users\Admin\.p2\pool\plugins\org.eclipse.justj.ope
Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Lokesh
Hello Lokesh to our chat room.
To leave enter /quit in a new line
*** A new user Sairaj entered the chat room !!! ***
*** A new user Divya entered the chat room !!! ***
*** A new user Deepika entered the chat room !!! ***
```

```
Problems Servers Terminal Data Source Explorer Properti
MultiClient [Java Application] [pid: 1868]
Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Sairaj
Hello Sairaj to our chat room.
To leave enter /quit in a new line
*** A new user Divya entered the chat room !!! ***
*** A new user Deepika entered the chat room !!! ***
```


Problems Servers Terminal Data Source Explorer Properties

MultiClient [Java Application] C:\Users\Admin\p2\pool\plugins\org.eclipse.justj.op

Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Divya
Hello Divya to our chat room.
To leave enter /quit in a new line
*** A new user Deepika entered the chat room !!! ***

Problems Servers Terminal Data Source Explorer Properties

MultiClient [Java Application] [pid: 13772]

Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Deepika
Hello Deepika to our chat room.
To leave enter /quit in a new line

Problems Servers Terminal Data Source Explorer Properties

MultiClient [Java Application] [pid: 14048]

Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Server too busy. Try later.

Problems Servers Terminal Data Source Explorer Properties

MultiClient [Java Application] C:\Users\Admin\p2\pool\plugins\org.eclipse.justj.op

Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Vinayak
Hello Vinayak to our chat room.
To leave enter /quit in a new line
*** A new user Lokesh entered the chat room !!! ***
*** A new user Sairaj entered the chat room !!! ***
*** A new user Divya entered the chat room !!! ***
*** A new user Deepika entered the chat room !!! ***
Hii Everyone, Myself Vinayak
<Vinayak> Hii Everyone, Myself Vinayak
<Deepika> Hii Everyone, Myself Deepika
<Lokesh> Hii Everyone, Myself Lokesh
<Sairaj> Hii Everyone, Myself Sairaj
<Divya> Hii Everyone, Myself Deepika

Problems Servers Terminal Data Source Explorer Pro

MultiClient [Java Application] C:\Users\Admin\p2\pool\plugins\org.eclipse

Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Lokesh
Hello Lokesh to our chat room.
To leave enter /quit in a new line
*** A new user Sairaj entered the chat room !!! ***
*** A new user Divya entered the chat room !!! ***
*** A new user Deepika entered the chat room !!! ***
<Vinayak> Hii Everyone, Myself Vinayak
<Deepika> Hii Everyone, Myself Deepika
Hii Everyone, Myself Lokesh
<Lokesh> Hii Everyone, Myself Lokesh
<Sairaj> Hii Everyone, Myself Sairaj
<Divya> Hii Everyone, Myself Deepika

Problems Servers Terminal Data Source Explorer

MultiClient [Java Application] C:\Users\Admin\p2\pool\plugins\org

Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Sairaj
Hello Sairaj to our chat room.
To leave enter /quit in a new line
*** A new user Divya entered the chat room !!! ***
*** A new user Deepika entered the chat room !!! ***
<Vinayak> Hii Everyone, Myself Vinayak
<Deepika> Hii Everyone, Myself Deepika
<Lokesh> Hii Everyone, Myself Lokesh
Hii Everyone, Myself Sairaj
<Sairaj> Hii Everyone, Myself Sairaj
<Divya> Hii Everyone, Myself Deepika

Problems Servers Terminal Data Source Explorer Properties

MultiClient [Java Application] C:\Users\Admin\p2\pool\plugins\org.eclipse.justj

Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Divya
Hello Divya to our chat room.
To leave enter /quit in a new line
*** A new user Deepika entered the chat room !!! ***
<Vinayak> Hii Everyone, Myself Vinayak
<Deepika> Hii Everyone, Myself Deepika
<Lokesh> Hii Everyone, Myself Lokesh
<Sairaj> Hii Everyone, Myself Sairaj
Hii Everyone, Myself Deepika
<Divya> Hii Everyone, Myself Deepika

```
Problems Servers Terminal Data Source Explorer Pro
MultiClient [Java Application] [pid: 16316]
Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Deepika
Hello Deepika to our chat room.
To leave enter /quit in a new line
<Vinayak> Hii Everyone, Myself Vinayak
Hii Everyone, Myself Deepika
<Deepika> Hii Everyone, Myself Deepika
<Lokesh> Hii Everyone, Myself Lokesh
<Sairaj> Hii Everyone, Myself Sairaj
<Divya> Hii Everyone, Myself Deepika
|
```

```
Problems Servers Terminal Data Source Explorer
MultiClient [Java Application] [pid: 16316]
Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Deepika
Hello Deepika to our chat room.
To leave enter /quit in a new line
<Vinayak> Hii Everyone, Myself Vinayak
Hii Everyone, Myself Deepika
<Deepika> Hii Everyone, Myself Deepika
<Lokesh> Hii Everyone, Myself Lokesh
<Sairaj> Hii Everyone, Myself Sairaj
<Divya> Hii Everyone, Myself Deepika
/quit
*** Bye Deepika ***
```

```
Problems Servers Terminal Data Source Explorer Pro
MultiClient [Java Application] C:\Users\Admin\.p2\pool\plugins\org.eclipse
Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Divya
Hello Divya to our chat room.
To leave enter /quit in a new line
*** A new user Deepika entered the chat room !!! ***
<Vinayak> Hii Everyone, Myself Vinayak
<Deepika> Hii Everyone, Myself Deepika
<Lokesh> Hii Everyone, Myself Lokesh
<Sairaj> Hii Everyone, Myself Sairaj
Hii Everyone, Myself Deepika
<Divya> Hii Everyone, Myself Deepika
*** The user Deepika is leaving the chat room !!! ***
/quit
*** Bye Divya ***
```

Problems Servers Terminal Data Source Explorer P
MultiClient [Java Application] C:\Users\Admin\p2\pool\plugins\org.eclipse
Hello Vinayak to our chat room.
To leave enter /quit in a new line
*** A new user Lokesh entered the chat room !!! ***
*** A new user Sairaj entered the chat room !!! ***
*** A new user Divya entered the chat room !!! ***
*** A new user Deepika entered the chat room !!! ***
Hii Everyone, Myself Vinayak
<Vinayak> Hii Everyone, Myself Vinayak
<Deepika> Hii Everyone, Myself Deepika
<Lokesh> Hii Everyone, Myself Lokesh
<Sairaj> Hii Everyone, Myself Sairaj
<Divya> Hii Everyone, Myself Deepika
*** The user Deepika is leaving the chat room !!! ***
*** The user Divya is leaving the chat room !!! ***
/quit
*** Bye Vinayak ***

Problems Servers Terminal Data Source Explorer P
MultiClient [Java Application] C:\Users\Admin\p2\pool\plugins\org.eclipse
Usage: java MultiThreadChatClient <host> <portNumber>
Now using host=localhost, portNumber=2222
Enter your name.
Jitesh
Hello Jitesh to our chat room.
To leave enter /quit in a new line
Hii Everyone, I'm Jitesh
<Jitesh> Hii Everyone, I'm Jitesh