NA1

PROJECT

DOCUMENTATION

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Part I.

GENI/Socket programming Warm-up (50%)

Develop and deploy a simple TCP client and server programs on GENI (refer GENI LabZero slide and sample socket programs). Show the screenshots of simple message exchanges. Start from client message 'Hello from Client-your names' and server responses with 'Hello from Server-your names'. Then messages from each side are echoed to each other. The program quit the program with typing 'Bye from Client-your name' and 'Bye from Server-your name'.

SOL:-

<u>TCP Server:-</u>

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

class TCPServer {

  public static void main(String argv[]) throws Exception
    {
      String clientSentence;
      String capitalizedSentence;

      ServerSocket welcomeSocket = new ServerSocket(6789);

      while(true) {

           Socket connectionSocket = welcomeSocket.accept();

          BufferedReader inFromClient =
            new BufferedReader(new
            InputStreamReader(connectionSocket.getInputStream()));
          DataOutputStream  outToClient =
            new DataOutputStream(connectionSocket.getOutputStream());
```

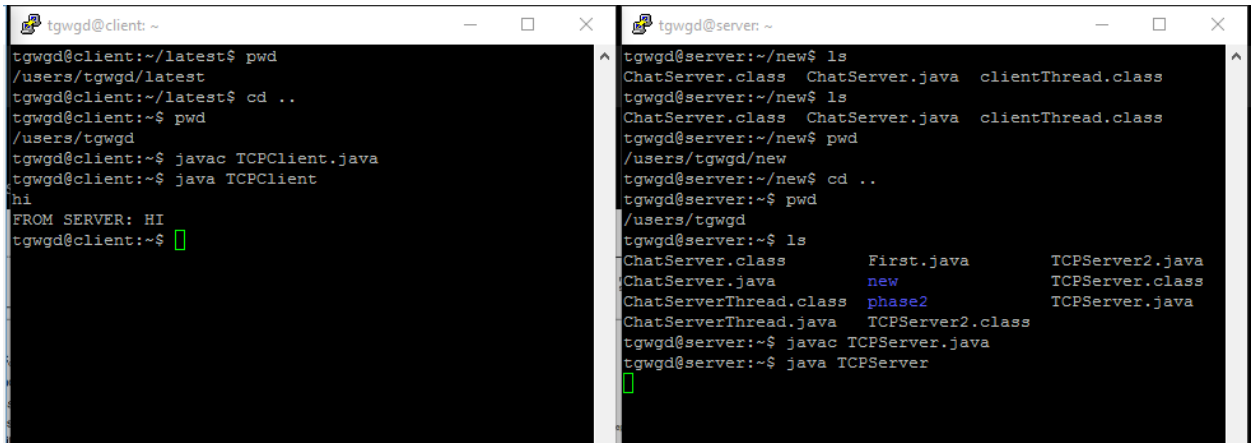
```
        clientSentence = inFromClient.readLine();

        capitalizedSentence = clientSentence.toUpperCase() + '\n';

        outToClient.writeBytes(capitalizedSentence);
      }
    }
}
```

TCP Client

```
import java.io.*;
import java.net.*;
class TCPClient {

    public static void main(String argv[]) throws Exception
    {
      String sentence;
      String modifiedSentence;

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

      Socket clientSocket = new Socket("server.Prudhvi.ch-geni-
net.instageni.iu.edu", 6789);

      DataOutputStream outToServer =
        new DataOutputStream(clientSocket.getOutputStream());
      BufferedReader inFromServer =
        new BufferedReader(new
        InputStreamReader(clientSocket.getInputStream()));

      sentence = inFromUser.readLine();
```

```
        outToServer.writeBytes(sentence + '\n');

        modifiedSentence = inFromServer.readLine();

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

        clientSocket.close();

    }
}
```

Output:-



b) Server disconnects when client sends bye.

TCP Server

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

class TCPServer2 {
```

```
  public static void main(String argv[]) throws Exception
    {
      String clientSentence;
      String capitalizedSentence;

      ServerSocket welcomeSocket = new ServerSocket(6789);

      while(!capitalizedSentence.equals("BYE"))
{

           Socket connectionSocket = welcomeSocket.accept();

          BufferedReader inFromClient =
            new BufferedReader(new
            InputStreamReader(connectionSocket.getInputStream()));
          DataOutputStream  outToClient =
           new DataOutputStream(connectionSocket.getOutputStream());

          clientSentence = inFromClient.readLine();

          capitalizedSentence = clientSentence.toUpperCase() + '\n';

          outToClient.writeBytes(capitalizedSentence);
```

```
            connectionSocket.close();


        }

    }

}
```

TCP Client:-

```
import java.io.*;
import java.net.*;
class TCPClient {

    public static void main(String argv[]) throws Exception
    {
        String sentence;
        String modifiedSentence;

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

        Socket clientSocket = new Socket("server.Prudhvi.ch-geni-
net.instageni.iu.edu ", 6789);


                while(!capitalizedSentence.equals("BYE"))

               {



        DataOutputStream outToServer =
          new DataOutputStream(clientSocket.getOutputStream());
        BufferedReader inFromServer =
          new BufferedReader(new
          InputStreamReader(clientSocket.getInputStream()));

        sentence = inFromUser.readLine();
```

```
        outToServer.writeBytes(sentence + '\n');

        modifiedSentence = inFromServer.readLine();

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


}
}
```

Output:-

Part II.

Simple Chat socket program (50%)

Develop a simple chat program (similar to google hangout and skype chat), and show the screenshots of the execution of the below. Extend the first program to chat client-server program following these steps.

a) A chat server will accept a single client connection and display everything the client types. If the client user types ‘quit’, both client and server will end the program.

Sol:-

TCP Server:-

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

class TCPServer2 {

  public static void main(String argv[]) throws Exception
    {
      String clientSentence;
      String capitalizedSentence;

      ServerSocket welcomeSocket = new ServerSocket(6789);

      while(!capitalizedSectence.equals("QUIT"))
{

            Socket connectionSocket = welcomeSocket.accept();

           BufferedReader inFromClient =
              new BufferedReader(new
              InputStreamReader(connectionSocket.getInputStream()));
```

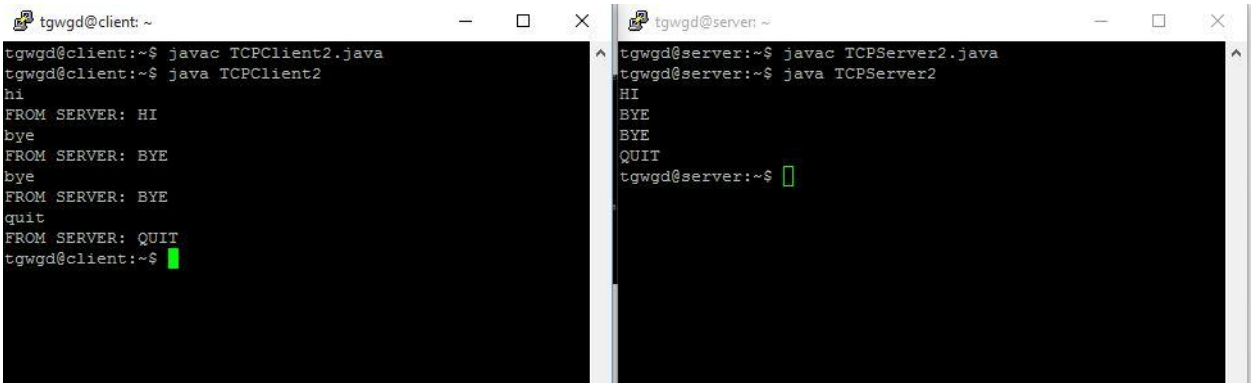
```
        DataOutputStream  outToClient =
          new DataOutputStream(connectionSocket.getOutputStream());

        clientSentence = inFromClient.readLine();

        capitalizedSentence = clientSentence.toUpperCase() + '\n';

        outToClient.writeBytes(capitalizedSentence);

          ServerSocket.close();

      }
   }
}
```

TCPClient:-

```
import java.io.*;
import java.net.*;
class TCPClient {

   public static void main(String argv[]) throws Exception
   {
      String sentence;
      String modifiedSentence;

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

      Socket clientSocket = new Socket("server.Prudhvi.ch-geni-
net.instageni.iu.edu ", 6789);
```

```
        while(!capitalizedSectence.equals("QUIT"))
        {


      DataOutputStream outToServer =
        new DataOutputStream(clientSocket.getOutputStream());
      BufferedReader inFromServer =
        new BufferedReader(new
        InputStreamReader(clientSocket.getInputStream()));

      sentence = inFromUser.readLine();

      outToServer.writeBytes(sentence + '\n');

      modifiedSentence = inFromServer.readLine();

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

      clientSocket.close();

    }
}
}
```

Output:-



2

b) A server now remains ‘open’ for additional connection once a client quits. The server can handle at most one connection at a time.

Sol:-

Given in question that server at most handles one client at a time. Thus in the program the variable maxClients is initialized to 1 so that server handles one client at a time.

Program :

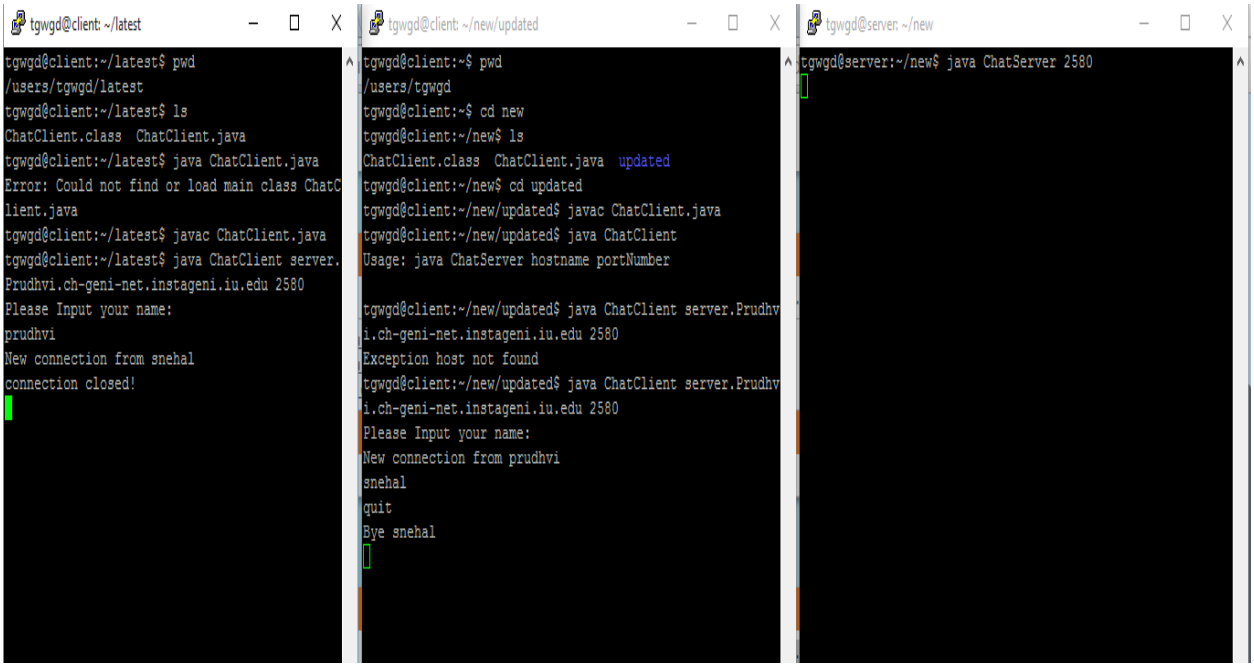
```
import java.io.*;
import java.io.PrintStream;
import java.io.IOException;
import java.net.Socket;
import java.net.ServerSocket;

public class ChatServer {

  private static ServerSocket sSocket = null;
  private static Socket cSocket = null;
  private static final int maxClients = 1;
  private static final clientThread[] threads = new clientThread[maxClients];

  public static void main(String args[]) {
  int portNumber=0;
   if (args.length < 1) {
System.out
```

```
    .println("Usage: java ChatServer portNumber\n");
            System.exit(0);
} else {
  portNumber = Integer.valueOf(args[0]).intValue();
}
        try {
          sSocket = new ServerSocket(portNumber);
        } catch (IOException e) {
          System.out.println(e);
        }

        while (true) {
          try {
            cSocket = sSocket.accept();
            int i = 0;
            for (i = 0; i < 1; i++) {
              if (threads[i] == null) {
                (threads[i] = new clientThread(cSocket, threads)).start();
                break;
              }
            }
            if (i == maxClients) {
              PrintStream os = new PrintStream(cSocket.getOutputStream());
              os.println("limit exceeded.");
              os.close();
```

```
        cSocket.close();
      }
    } catch (IOException e) {
      System.out.println(e);
    }
  }
 }
}

class clientThread extends Thread {

  private BufferedReader inData = null;
  private PrintStream outData = null;
  private Socket clientSocket = null;
  private final clientThread[] threads;
  private int maxClients;

  public clientThread(Socket clientSocket, clientThread[] threads) {
    this.clientSocket = clientSocket;
    this.threads = threads;
    maxClients = threads.length;
  }

  public void run() {
    int maxClients = this.maxClients;
```

```
clientThread[] threads = this.threads;


try {
  inData = new BufferedReader(new
InputStreamReader(clientSocket.getInputStream()));
  outData = new PrintStream(clientSocket.getOutputStream());
  outData.println("Please Input your name:");
  String name = inData.readLine().trim();
  for (int i = 0; i < maxClients; i++) {
    if (threads[i] != null && threads[i] != this) {
      threads[i].outData.println("New connection from "+ name);
    }
  }
  while (true) {
    String line = inData.readLine();
            System.out.println(line);
    if (line.startsWith("quit")) {
      break;
    }
    for (int i = 0; i < maxClients; i++) {
      if (threads[i] != null) {
        threads[i].outData.println(name + ":" + line);
      }
    }
  }
  for (int i = 0; i < maxClients; i++) {
```

```
        if (threads[i] != null && threads[i] != this) {
          threads[i].outData.println("connection closed!");
        }
      }
      outData.println("Bye " + name);
      for (int i = 0; i < maxClients; i++) {
        if (threads[i] == this) {
          threads[i] = null;
        }
      }
      inData.close();
      outData.close();
      clientSocket.close();
    } catch (IOException e) {
    }
  }
}
```



2)

c) A server now can handle multiple clients at the same time. The output from all the connected clients will appear on the server's screen.

Program:

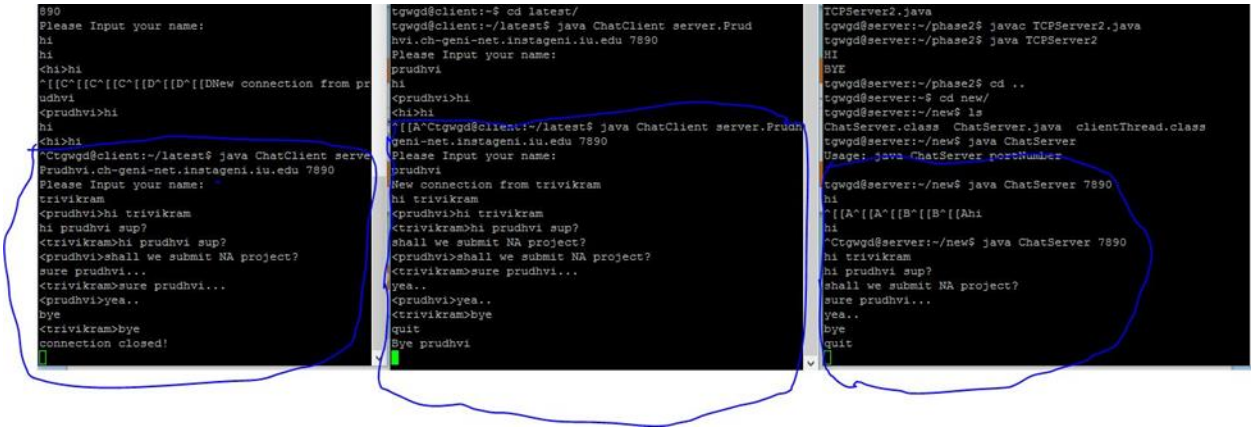
```
import java.io.*;

import java.io.PrintStream;

import java.io.IOException;

import java.net.Socket;

import java.net.ServerSocket;


public class ChatServer {


  private static ServerSocket sSocket = null;

  private static Socket cSocket = null;

  private static final int maxClients = 10;
```

```
        private static final clientThread[] threads = new clientThread[maxClients];

        public static void main(String args[]) {
        int portNumber=0;
         if (args.length < 1) {
  System.out
      .println("Usage: java ChatServer portNumber\n");
                System.exit(0);
} else {
  portNumber = Integer.valueOf(args[0]).intValue();
}
          try {
            sSocket = new ServerSocket(portNumber);
          } catch (IOException e) {
            System.out.println(e);
          }

          while (true) {
            try {
              cSocket = sSocket.accept();
              int i = 0;
              for (i = 0; i < 10; i++) {
                if (threads[i] == null) {
                  (threads[i] = new clientThread(cSocket, threads)).start();
                  break;
```

```
          }
        }
        if (i == maxClients) {
          PrintStream os = new PrintStream(cSocket.getOutputStream());
          os.println("limit exceeded.");
          os.close();
          cSocket.close();
        }
      } catch (IOException e) {
        System.out.println(e);
      }
    }
  }
}

class clientThread extends Thread {

  private BufferedReader inData = null;
  private PrintStream outData = null;
  private Socket clientSocket = null;
  private final clientThread[] threads;
  private int maxClients;

  public clientThread(Socket clientSocket, clientThread[] threads) {
    this.clientSocket = clientSocket;
```

```
    this.threads = threads;
    maxClients = threads.length;
  }

  public void run() {
    int maxClients = this.maxClients;
    clientThread[] threads = this.threads;

    try {
      inData = new BufferedReader(new
InputStreamReader(clientSocket.getInputStream()));
      outData = new PrintStream(clientSocket.getOutputStream());
      outData.println("Please Input your name:");
      String name = inData.readLine().trim();
      for (int i = 0; i < maxClients; i++) {
        if (threads[i] != null && threads[i] != this) {
          threads[i].outData.println("New connection from "+ name);
        }
      }
      while (true) {
        String line = inData.readLine();
                System.out.println(line);
        if (line.startsWith("quit")) {
          break;
        }
        for (int i = 0; i < maxClients; i++) {
```

```
          if (threads[i] != null) {
            threads[i].outData.println(name + ":" + line);
          }
        }
      }
      for (int i = 0; i < maxClients; i++) {
        if (threads[i] != null && threads[i] != this) {
          threads[i].outData.println("connection closed!");
        }
      }
      outData.println("Bye " + name);
      for (int i = 0; i < maxClients; i++) {
        if (threads[i] == this) {
          threads[i] = null;
        }
      }
      inData.close();
      outData.close();
      clientSocket.close();
    } catch (IOException e) {
    }
  }
}
```



2)

d) A server now echoes all the text received from any of the connected clients to all

Program:

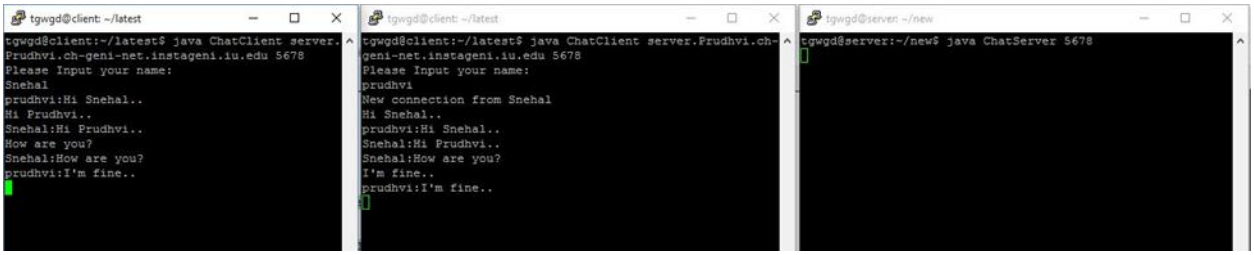
```
import java.io.*;
import java.io.PrintStream;
import java.io.IOException;
import java.net.Socket;
import java.net.ServerSocket;

public class ChatServer {

  private static ServerSocket sSocket = null;
  private static Socket cSocket = null;
  private static final int maxClients = 10;
  private static final clientThread[] threads = new clientThread[maxClients];
```

```
        public static void main(String args[]) {
        int portNumber=0;
         if (args.length < 1) {
  System.out
      .println("Usage: java ChatServer portNumber\n");
                 System.exit(0);
} else {
  portNumber = Integer.valueOf(args[0]).intValue();
}
          try {
            sSocket = new ServerSocket(portNumber);
          } catch (IOException e) {
            System.out.println(e);
          }

          while (true) {
            try {
              cSocket = sSocket.accept();
              int i = 0;
              for (i = 0; i < 10; i++) {
                if (threads[i] == null) {
                  (threads[i] = new clientThread(cSocket, threads)).start();
                  break;
                }
```

```
        }
        if (i == maxClients) {
          PrintStream os = new PrintStream(cSocket.getOutputStream());
          os.println("limit exceeded.");
          os.close();
          cSocket.close();
        }
      } catch (IOException e) {
        System.out.println(e);
      }
    }
  }
}

class clientThread extends Thread {

  private BufferedReader inData = null;
  private PrintStream outData = null;
  private Socket clientSocket = null;
  private final clientThread[] threads;
  private int maxClients;

  public clientThread(Socket clientSocket, clientThread[] threads) {
    this.clientSocket = clientSocket;
    this.threads = threads;
```

```
    maxClients = threads.length;
  }

  public void run() {
    int maxClients = this.maxClients;
    clientThread[] threads = this.threads;

    try {
      inData = new BufferedReader(new
InputStreamReader(clientSocket.getInputStream()));
      outData = new PrintStream(clientSocket.getOutputStream());
      outData.println("Please Input your name:");
      String name = inData.readLine().trim();
      for (int i = 0; i < maxClients; i++) {
        if (threads[i] != null && threads[i] != this) {
          threads[i].outData.println("New connection from "+ name);
        }
      }
      while (true) {
        String line = inData.readLine();
        if (line.startsWith("quit")) {
          break;
        }
        for (int i = 0; i < maxClients; i++) {
          if (threads[i] != null) {
            threads[i].outData.println(name + ":" + line);
```

```
        }
      }
    }
    for (int i = 0; i < maxClients; i++) {
      if (threads[i] != null && threads[i] != this) {
        threads[i].outData.println("connection closed!");
      }
    }
    outData.println("Bye " + name);
    for (int i = 0; i < maxClients; i++) {
      if (threads[i] == this) {
        threads[i] = null;
      }
    }
    inData.close();
    outData.close();
    clientSocket.close();
  } catch (IOException e) {
  }
}
}
```



Team Contributions:-

1) **Trivikram Reddy: 16212362**
   Created Slice
   Generated ssh key
   Downloaded putty
   Executed phase 1
   Project documentation
2) **Snehal Vantashala:16206488**
   Putty keygen downloaded
   Created private key
   Login server and client machine
   Executed phase 1
3) **Prudhvi Raj: 16208160**
   Initiazed nodes
   Phase 1 execution on server
   Client server chat using threads
   Phase 2 execution on server