Practical No: 01

1. Develop a JAVA program for multi-client chat server.

ChatServer.java

```
package multiclient;

import java.net.ServerSocket;

import java.net.Socket;



public class ChatServer {

        int port;

    ServerSocket serverSocket;

    Socket socket;


    public ChatServer(int port) {

                super();

                this.port = port;

        }


        public void listen() {

        try {

            serverSocket = new ServerSocket(port);

            System.out.println("Listening on ip:" +
serverSocket.getInetAddress().getHostAddress() + " and port:" + port);

            while(true)

            {

                socket = serverSocket.accept();

                System.out.println("Client Accepted " + socket);

                ServRequest sr=new ServRequest(socket,this);

                sr.start();

            }


        } catch (Exception e) {
            System.out.println(e.getMessage());
        }
    }
        public static void main(String[] args) {
                // TODO Auto-generated method stub
                ChatServer cs = new ChatServer(5000);
                cs.listen();
        }

}
```

ChatClient.java

```
package multiclient;
import java.io.BufferedReader;
import java.io.DataInputStream;
import java.io.DataOutputStream;
import java.io.InputStreamReader;
import java.net.InetAddress;
import java.net.Socket;

public class ChatClient {
        Socket socket;
        int port;

        public ChatClient(int port) {
                super();
                this.port = port;
        }

        public void request() {
                try {
                        InetAddress host = InetAddress.getLocalHost();
                        socket = new Socket(host.getHostName(), port);

                        DataOutputStream dos = new
DataOutputStream(socket.getOutputStream());
                        DataInputStream dis = new DataInputStream(socket.getInputStream());
                        System.out.println("Connected");

                        BufferedReader keyRead = new BufferedReader(new
InputStreamReader(System.in));
                        String line = "";

                        while(!line.equals("bye")) {
                                line = keyRead.readLine();
                    dos.writeUTF(line);
                    dos.flush();

                    line = dis.readUTF();
                    System.out.println("Server reply - " + line);
                   }
                        keyRead.close();
                        dos.close();
                        socket.close();
                }
                catch(Exception e) {
        System.out.println(e.getMessage());
                }
        }

        public static void main(String[] ar) {
                ChatClient cc = new ChatClient(5000);
                cc.request();
```

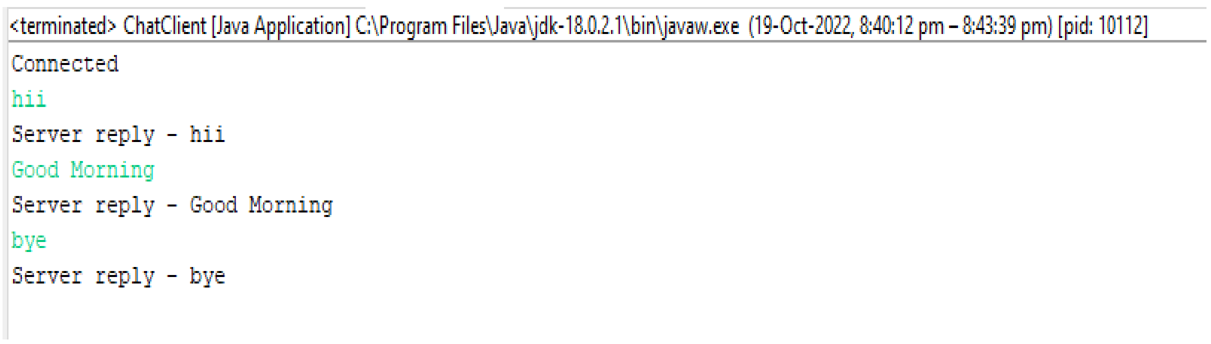
```
   }

}
```

ServRequest.java

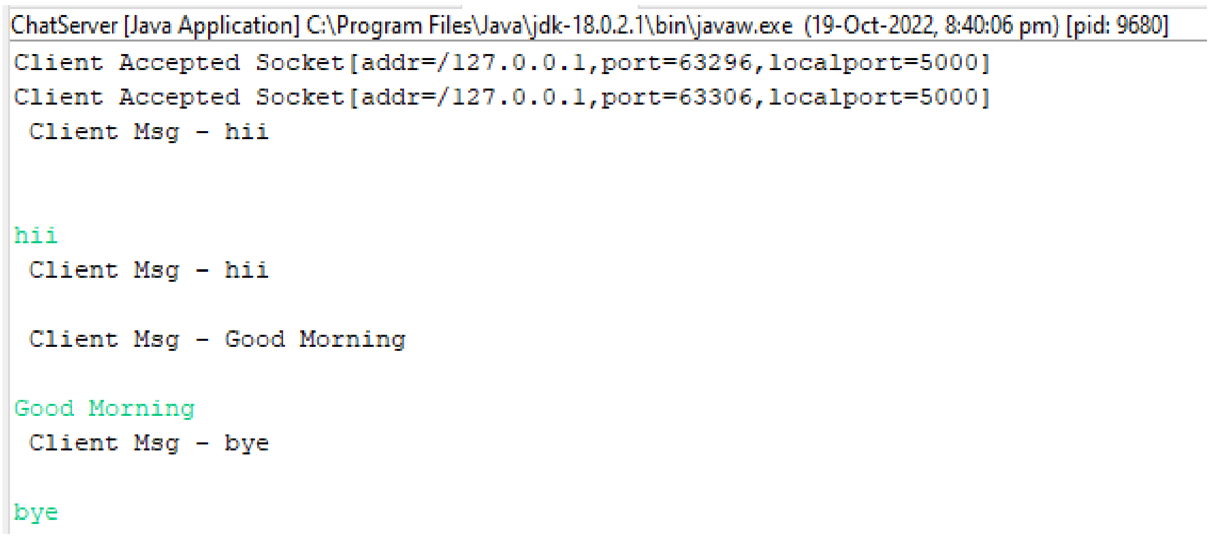
```
package multiclient;

import java.io.BufferedInputStream;

import java.io.BufferedOutputStream;

import java.io.BufferedReader;

import java.io.DataInputStream;

import java.io.DataOutputStream;

import java.io.InputStreamReader;

import java.net.Socket;


public class ServRequest extends Thread{

		private Socket socket;

		@SuppressWarnings("unused")

		private ChatServer chatServer;


   public ServRequest(Socket socket, ChatServer chatServer) {

				this.socket=socket;

				this.chatServer=chatServer;

		}


		public void run()

		{

				try {

						DataInputStream dis = new DataInputStream(new
BufferedInputStream(socket.getInputStream()));

              DataOutputStream dos = new DataOutputStream(new
BufferedOutputStream(socket.getOutputStream()));


              BufferedReader keyRead = new BufferedReader(new InputStreamReader(System.in));
```

```
            boolean done = false;

            while (!done) {
                String line = dis.readUTF();
                                System.out.println(" Client Msg - "+ line + "\n");
                                done = line.equals("bye");
                                line = keyRead.readLine();
                                dos.writeUTF(line);
                                dos.flush();
            }
            dis.close();
            socket.close();

                }
                catch(Exception e)
                {
                        System.out.println(e.getMessage());
                }


        }

}
```

Output:



```
<terminated> ChatClient [Java Application] C:\Program Files\Java\jdk-18.0.2.1\bin\javaw.exe  (19-Oct-2022, 8:40:12 pm – 8:43:39 pm) [pid: 10112]
Connected
hii
Server reply - hii
Good Morning
Server reply - Good Morning
bye
Server reply - bye
```


ChatServer [Java Application] C:\Program Files\Java\jdk-18.0.2.1\bin\javaw.exe (19-Oct-2022, 8:40:06 pm) [pid: 9680]

```
Client Accepted Socket[addr=/127.0.0.1,port=63296,localport=5000]
Client Accepted Socket[addr=/127.0.0.1,port=63306,localport=5000]
 Client Msg - hii


hii
 Client Msg - hii

 Client Msg - Good Morning

Good Morning
 Client Msg - bye

bye
```

2. Write a java program to implement mutual exclusion using Token ring algorithm.

UDPChatClient2.java

```
package tokenring;

import java.io.BufferedReader;

import java.io.InputStreamReader;

import java.net.DatagramPacket;

import java.net.DatagramSocket;

import java.net.InetAddress;


public class UDPChatClient {

        DatagramSocket udpClientSocket;

  int port;


  public UDPChatClient(int port) {

    this.port = port;

  }


  public void sendReq() {

        InetAddress serverAddress;
        String in;


        try {
            udpClientSocket = new DatagramSocket();
            InetAddress host = InetAddress.getLocalHost();
                serverAddress = InetAddress.getByName(host.getHostName());


                BufferedReader keyRead = new BufferedReader(new
InputStreamReader(System.in));
                System.out.println("UDP Client-1 started at " + InetAddress.getLocalHost());


                while (true) {
                    System.out.println("Enter message for server: ");
                   in = keyRead.readLine();
                   DatagramPacket sndPacket = new DatagramPacket(in.getBytes(),
in.getBytes().length, serverAddress, port);
                   udpClientSocket.send(sndPacket);


                   if(in.equalsIgnoreCase("bye"))
                    break;


                   byte[] buf = new byte[1024];
                   DatagramPacket recPacket = new DatagramPacket(buf, buf.length);
                   udpClientSocket.receive(recPacket);
                   String msg = new String(recPacket.getData()).trim();


                   System.out.println("Message from " +
recPacket.getAddress().getHostAddress() + ": " + msg);
                }
        }
        catch(Exception e) {
            System.out.println(e.getMessage());
                        }
        finally {
            udpClientSocket.close();
        }
    }

    public static void main(String[] args) {
            UDPChatClient sender = new UDPChatClient(5000);
        sender.sendReq();

    }

}
```

UDPChatSrv.java

```
package tokenring;
import java.io.BufferedReader;
import java.io.InputStreamReader;
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;

public class UDPChatSrv {
            public DatagramSocket udpSrvSocket;
            public int port;
            String in;
```

```
        public UDPChatSrv(int port) {
    this.port = port;
}

private void listen() {
        try {
        udpSrvSocket = new DatagramSocket(port);
        BufferedReader keyRead = new BufferedReader(new
InputStreamReader(System.in));
        String msg;
        int [] clientPortA = new int[2];
        InetAddress clientAddress;
        int clientPort, clientCnt = 0;
        int tokenTo = -1, currentClient = -1;
      DatagramPacket recPacket, sndPacket;
      System.out.println("Server started at " + InetAddress.getLocalHost());

      while (true) {
        byte[] buf = new byte[1024];
        //System.out.println("while @server");
        recPacket = new DatagramPacket(buf, buf.length);

        // blocks until a packet is received
        udpSrvSocket.receive(recPacket);
        msg = new String(recPacket.getData()).trim();
        clientAddress = recPacket.getAddress();
        clientPort = recPacket.getPort();

        boolean clientPortPresent = false;
        int i;
```

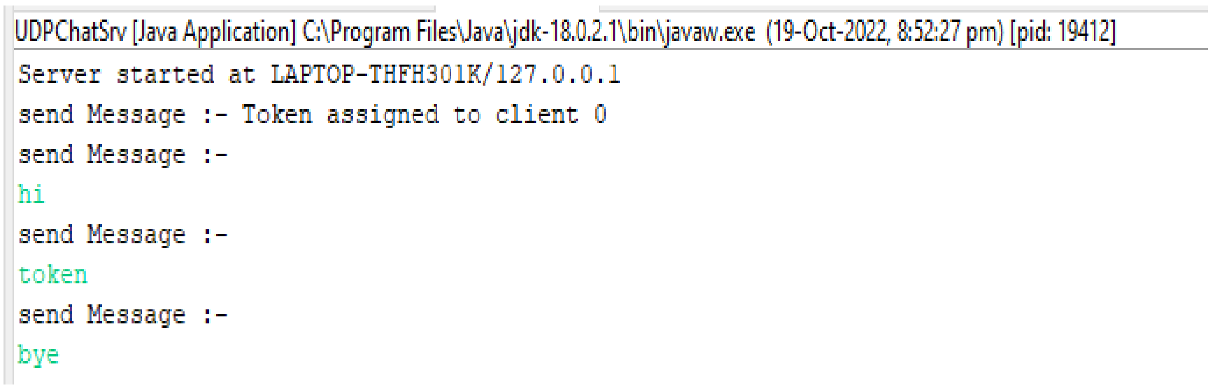
```
          for(i = 0; i < clientPortA.length; i++) {
           if(clientPortA[i] == clientPort) {
                      clientPortPresent = true;
                      currentClient = i;
                      break;
           }
          }
          if(clientPortPresent == false) {
           clientPortA[clientCnt] = clientPort;
           currentClient = clientCnt;
           clientCnt++;
          }
          //System.out.println("Message from client " + currentClient + ": " + msg);


          if(tokenTo == -1 && clientCnt == 1) {
                      tokenTo = 0;    //Assign token to 1st client in d list
                      System.out.println("send Message :- Token assigned to client " +
currentClient);
           in = "Token assigned";
           sndPacket = new DatagramPacket(in.getBytes(), in.getBytes().length, clientAddress,
clientPortA[currentClient]);
           udpSrvSocket.send(sndPacket);
          }
       //1. token is with 0th client in d list => clientCnt=1
       //2. client send message token => either he wants it or return it.
       //3. if he wants check who has d token n reply accordingly
       //3.1 if token is with 1 n 2 wants then deny
       //3.2 token message arrived at server, current client n tokenTo are same
          //3.2 so remove token from current n assign it to next
       //4. if he returns it then assign it next in list
```

```
            if(msg.contains("token")) {
             if(tokenTo == currentClient) {
                        if(clientPortA.length == tokenTo)
                                    tokenTo = 0;
                        else
                                    tokenTo++;
                        System.out.println("send Message :- Token assigned to client " +
currentClient);
                        //in = keyRead.readLine();
                        in = "Token assigned";
                        sndPacket = new DatagramPacket(in.getBytes(), in.getBytes().length,
clientAddress, clientPortA[tokenTo]);
                        udpSrvSocket.send(sndPacket);
             }
             else {
                        System.out.println("send Message :- ");
                        //in = keyRead.readLine();
                        in = "Token is with Client - " + tokenTo +". Wait for your turn.";
                        sndPacket = new DatagramPacket(in.getBytes(), in.getBytes().length,
clientAddress, clientPortA[currentClient]);
                        udpSrvSocket.send(sndPacket);
             }
            }
            else {
             if(currentClient == tokenTo) {
                        System.out.println("send Message :- ");
                        in = keyRead.readLine();
                        //in = "Token assigned";
                        sndPacket = new DatagramPacket(in.getBytes(), in.getBytes().length,
clientAddress, clientPortA[currentClient]);
```

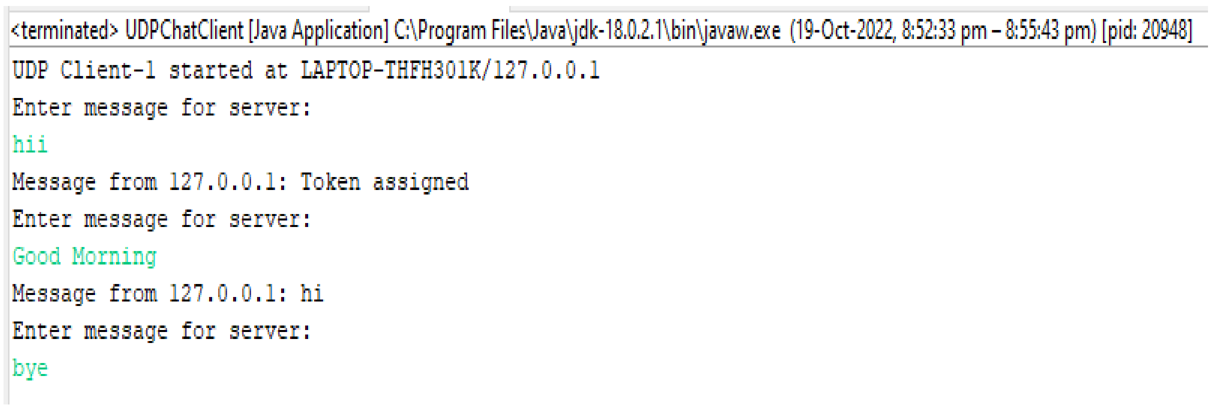
```
                        udpSrvSocket.send(sndPacket);
            }
            else{
                        System.out.println("send Message :- ");
                        //in = keyRead.readLine();
                        in = "Token is with Client - " + tokenTo +". Wait for your turn.";
                        sndPacket = new DatagramPacket(in.getBytes(), in.getBytes().length,
clientAddress, clientPortA[currentClient]);
                        udpSrvSocket.send(sndPacket);
            }


           }
           /*if(msg.equalsIgnoreCase("bye"))
            clientCnt--;
           */
       }
            }
   catch(Exception e) {
            System.out.println(e.getMessage());
   }
            finally {
                        udpSrvSocket.close();
            }
}

public static void main(String[] args) {
            UDPChatSrv client = new UDPChatSrv(5000);
   client.listen();
}
```

```
}
```

Output:



```
UDPChatSrv [Java Application] C:\Program Files\Java\jdk-18.0.2.1\bin\javaw.exe  (19-Oct-2022, 8:52:27 pm) [pid: 19412]
Server started at LAPTOP-THFH301K/127.0.0.1
send Message :- Token assigned to client 0
send Message :-
hi
send Message :-
token
send Message :-
bye
```



```
<terminated> UDPChatClient [Java Application] C:\Program Files\Java\jdk-18.0.2.1\bin\javaw.exe  (19-Oct-2022, 8:52:33 pm – 8:55:43 pm) [pid: 20948]
UDP Client-1 started at LAPTOP-THFH301K/127.0.0.1
Enter message for server:
hii
Message from 127.0.0.1: Token assigned
Enter message for server:
Good Morning
Message from 127.0.0.1: hi
Enter message for server:
bye
```