

## 1. Selective Repeat

Code:-

1) Receiver:-

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

public class Client {
    static Socket connection;

    public static void main(String a[]) throws SocketException {
        try {
            int v[] = new int[9];
            //int g[] = new int[8];
            int n = 0;
            InetAddress addr = InetAddress.getByName("Localhost");
            System.out.println(addr);
            connection = new Socket(addr, 8011);
            DataOutputStream out = new DataOutputStream(
                connection.getOutputStream());
            DataInputStream in = new DataInputStream(
                connection.getInputStream());
            int p = in.read();
            System.out.println("No of frame is:" + p);

            for (int i = 0; i < p; i++) {
                v[i] = in.read();
                System.out.println(v[i]);
                //g[i] = v[i];
            }
            v[3] = -1;
            for (int i = 0; i < p; i++)
            {
                System.out.println("Received frame is: " + v[i]);

            }
            for (int i = 0; i < p; i++)
            if (v[i] == -1) {
                System.out.println("Request to retransmit packet no "
                    + (i+1) + " again!!");
                n = i;
                out.write(n);
                out.flush();
            }

            System.out.println();

            v[n] = in.read();
            System.out.println("Received frame is: " + v[n]);
```

```

        System.out.println("quiting");
    } catch (Exception e) {
        System.out.println(e);
    }
}
}
}
Output:-

```

```

Wed 12:19
admin1@302-7: ~/Documents/F23122004/Assignment 4
File Edit View Search Terminal Help
bash: /u01/app/oracle/product/11.2.0/xe/bin/nls_lang.sh: No such file or directory
bash: export: `HADOOP_OPTS-Djava.library.path=/home/hadoop/hadoop-3.2.1/lib/native': not a valid identifier
admin1@302-7:~/Documents/F23122004/Assignment 4$ java Client
Localhost/127.0.0.1
No of frame is:9
10
20
30
40
45
7
90
8
1
Received frame is: 10
Received frame is: 20
Received frame is: 30
Received frame is: -1
Received frame is: 45
Received frame is: 7
Received frame is: 90
Received frame is: 8
Received frame is: 1
Request to retransmit packet no 4 again!!

Received frame is: 40
quiting
admin1@302-7:~/Documents/F23122004/Assignment 4$

```

## 2. Sender

```

import java.io.DataInputStream;
import java.io.DataOutputStream;
import java.io.IOException;
import java.net.ServerSocket;
import java.net.Socket;
import java.net.SocketException;

```

```

public class Server {

```

```

    static ServerSocket Serversocket;
    static DataInputStream dis;
    static DataOutputStream dos;

```

```

    public static void main(String[] args) throws SocketException {

```

```

        try {

```

```

            int a[] = { 10, 20, 30, 40, 45, 7, 90, 8, 1 };
            Serversocket = new ServerSocket(8011);
            System.out.println("waiting for connection");
            Socket client = Serversocket.accept();
            dis = new DataInputStream(client.getInputStream());

```

```

dos = new DataOutputStream(client.getOutputStream());
System.out.println("The number of packets sent is:" + a.length);
int y = a.length;
dos.write(y);
dos.flush();

for (int i = 0; i < a.length; i++) {
    dos.write(a[i]);
    dos.flush();
}

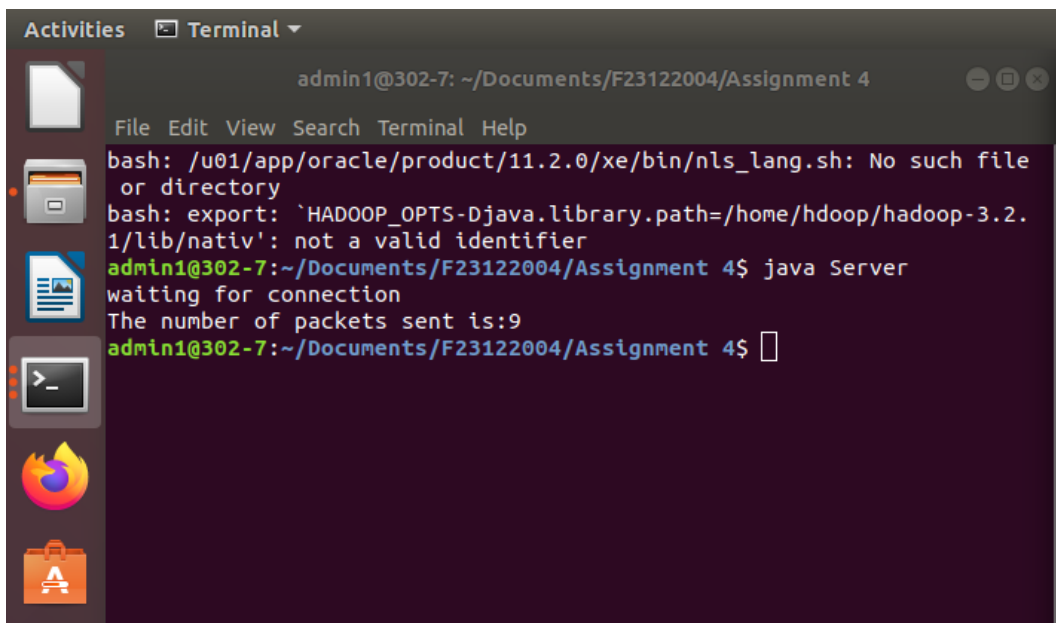
int k = dis.read();

dos.write(a[k]);
dos.flush();

} catch (IOException e) {
    System.out.println(e);
} finally {
    try {
        dis.close();
        dos.close();
    } catch (IOException e) {
        // TODO Auto-generated catch block
        e.printStackTrace();
    }
}
}
}

```

Output:-



```

admin1@302-7: ~/Documents/F23122004/Assignment 4
File Edit View Search Terminal Help
bash: /u01/app/oracle/product/11.2.0/xe/bin/nls_lang.sh: No such file
or directory
bash: export: `HADOOP_OPTS-Djava.library.path=/home/hadoop/hadoop-3.2.
1/lib/nativ': not a valid identifier
admin1@302-7:~/Documents/F23122004/Assignment 4$ java Server
waiting for connection
The number of packets sent is:9
admin1@302-7:~/Documents/F23122004/Assignment 4$

```

## 2. Go Back N

code:-

i. Sender

```
import java.net.*;
import java.util.*;

public class GoBackNClient {
    private static final int WINDOW_SIZE = 4;
    private static final int TIMEOUT = 1000; // milliseconds
    private static final int MAX_PACKETS = 10;

    public static void main(String[] args) throws Exception {
        DatagramSocket socket = new DatagramSocket();
        InetAddress serverAddress = InetAddress.getByName("localhost");
        int serverPort = 9876;

        byte[] data = new byte[256];
        Random rand = new Random();

        int base = 0;
        int nextSeqNum = 0;

        while (base < MAX_PACKETS) {
            // Send packets in window
            while (nextSeqNum < base + WINDOW_SIZE && nextSeqNum <
MAX_PACKETS) {
                String msg = "Packet " + nextSeqNum;
                DatagramPacket packet = new DatagramPacket(msg.getBytes(), msg.length(),
serverAddress, serverPort);
                socket.send(packet);
                System.out.println("Sent: " + msg);
                nextSeqNum++;
            }

            // Wait for acknowledgment
            socket.setSoTimeout(TIMEOUT);
            boolean allAked = false;

            while (!allAked) {
                try {
                    byte[] ackData = new byte[256];
                    DatagramPacket ackPacket = new DatagramPacket(ackData,
ackData.length);
                    socket.receive(ackPacket);

                    String ackMsg = new String(ackPacket.getData(), 0, ackPacket.getLength());
                    int ackNum = Integer.parseInt(ackMsg.split(" ")[1]);
                    System.out.println("Received Ack: " + ackMsg);

                    if (ackNum >= base) {
```

```

        base = ackNum + 1;
    }

    if (base == nextSeqNum) {
        allAked = true;
    }
} catch (SocketTimeoutException e) {
    // Timeout occurred, retransmit packets
    nextSeqNum = base;
    System.out.println("Timeout occurred, retransmitting...");
}
}
}

socket.close();
}
}

```

Output:-

```

admin1@302-7: ~/Documents/F23122004/Assignment 4
File Edit View Search Terminal Help
admin1@302-7:~/Documents/F23122004/Assignment 4$ java GoBackNClient
Sent: Packet 0
Sent: Packet 1
Sent: Packet 2
Sent: Packet 3
Received Ack: Ack 0
Received Ack: Ack 1
Received Ack: Ack 2
Received Ack: Ack 3
Sent: Packet 4
Sent: Packet 5
Sent: Packet 6
Sent: Packet 7
Received Ack: Ack 4
Received Ack: Ack 5
Received Ack: Ack 6
Received Ack: Ack 7
Sent: Packet 8
Sent: Packet 9
Received Ack: Ack 8
Received Ack: Ack 9
admin1@302-7:~/Documents/F23122004/Assignment 4$

```

ii. Receiver

```

import java.net.*;

public class GoBackNServer {
    private static final int PORT = 9876;

    public static void main(String[] args) throws Exception {
        DatagramSocket socket = new DatagramSocket(PORT);

        byte[] buffer = new byte[256];
        int expectedSeqNum = 0;
    }
}

```

```

while (true) {
    DatagramPacket packet = new DatagramPacket(buffer, buffer.length);
    socket.receive(packet);

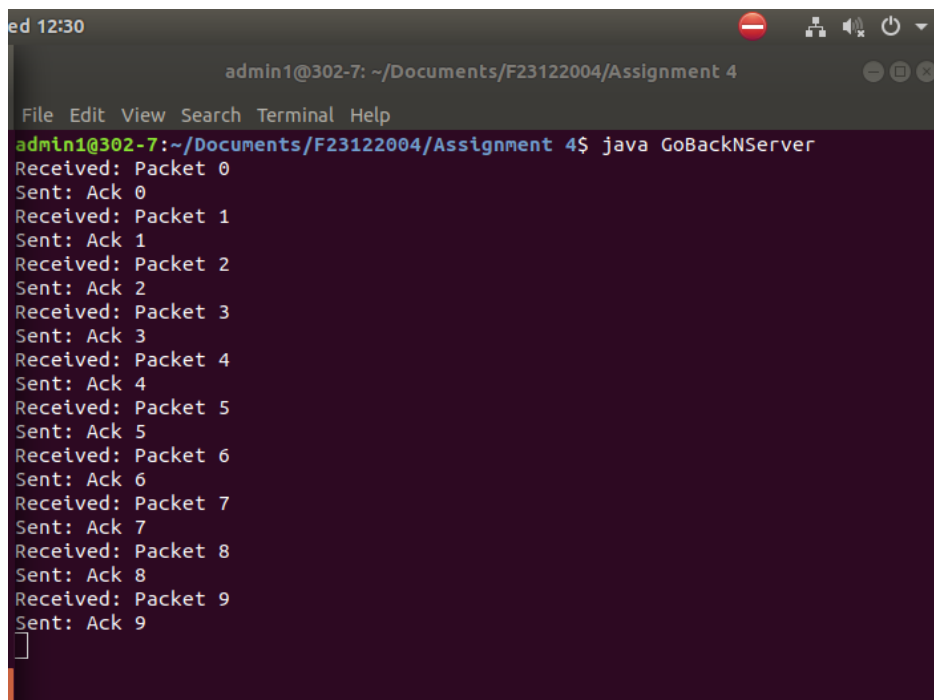
    String msg = new String(packet.getData(), 0, packet.getLength());
    System.out.println("Received: " + msg);

    int seqNum = Integer.parseInt(msg.split(" ")[1]);

    if (seqNum == expectedSeqNum) {
        String ackMsg = "Ack " + seqNum;
        DatagramPacket ackPacket = new DatagramPacket(ackMsg.getBytes(),
ackMsg.length(), packet.getAddress(), packet.getPort());
        socket.send(ackPacket);
        System.out.println("Sent: " + ackMsg);
        expectedSeqNum++;
    } else {
        // Resend acknowledgment for the last correctly received packet
        String ackMsg = "Ack " + (expectedSeqNum - 1);
        DatagramPacket ackPacket = new DatagramPacket(ackMsg.getBytes(),
ackMsg.length(), packet.getAddress(), packet.getPort());
        socket.send(ackPacket);
        System.out.println("Sent: " + ackMsg);
    }
}
}
}
}

```

Output:-



```

ed 12:30
admin1@302-7: ~/Documents/F23122004/Assignment 4
File Edit View Search Terminal Help
admin1@302-7:~/Documents/F23122004/Assignment 4$ java GoBackNServer
Received: Packet 0
Sent: Ack 0
Received: Packet 1
Sent: Ack 1
Received: Packet 2
Sent: Ack 2
Received: Packet 3
Sent: Ack 3
Received: Packet 4
Sent: Ack 4
Received: Packet 5
Sent: Ack 5
Received: Packet 6
Sent: Ack 6
Received: Packet 7
Sent: Ack 7
Received: Packet 8
Sent: Ack 8
Received: Packet 9
Sent: Ack 9

```