Go Back N Protocol

Client.java

```java
import java.util.*;

import java.net.*;

import java.io.*;

public class Client

{

public static void main(String args[]) throws Exception

{

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

System.out.print("Enter the value of m : ");

int m=Integer.parseInt(br.readLine());

int x=(int)((Math.pow(2,m))-1);

System.out.print("Enter no. of frames to be sent:");

int count=Integer.parseInt(br.readLine());

int data[]=new int[count];

int h=0;

for(int i=0;i<count;i++)

{

System.out.print("Enter data for frame no " +h+ " => ");

data[i]=Integer.parseInt(br.readLine());
```

```java
            h=(h+1)%x;

        }

        Socket client=new Socket("localhost",6262);

        ObjectInputStream ois=new ObjectInputStream(client.getInputStream());

        ObjectOutputStream oos=new
        ObjectOutputStream(client.getOutputStream());

        System.out.println("Connected with server.");

        boolean flag=false;

        GoBackNListener listener=new GoBackNListener(ois,x);

        listener=new GoBackNListener(ois,x);

        listener.t.start();

        int strt=0;

        h=0;

        oos.writeObject(x);

        do

        {

        int c=h;

        for(int i=h;i<count;i++)

        {

        System.out.print("|"+c+"|");

        c=(c+1)%x;

        }

        System.out.println();

        System.out.println();
```

```java
h=strt;

for(int i=strt;i<x;i++)

{

System.out.println("Sending frame:"+h);

h=(h+1)%x;

System.out.println();

oos.writeObject(i);

oos.writeObject(data[i]);

Thread.sleep(100);

}

listener.t.join(3500);

if(listener.reply!=x-1)

{

System.out.println("No reply from server in 3.5 seconds. Resending data from

frame no " + (listener.reply+1));

System.out.println();

strt=listener.reply+1;

flag=false;

}

else

{

System.out.println("All elements sent successfully. Exiting");

flag=true;
```

```
      }
    }while(!flag);
    oos.writeObject(-1);
    }
}
class GoBackNListener implements Runnable
{
 Thread t;
 ObjectInputStream ois;
 int reply,x;
 GoBackNListener(ObjectInputStream o,int i)
 {
 t=new Thread(this);
 ois=o;
 reply=-2;
 x=i;
 }
 @Override
 public void run() {
 try
 {
 int temp=0;
 while(reply!=-1)
```

```java
{

reply=(Integer)ois.readObject();

if(reply!=-1 && reply!=temp+1)

reply=temp;

if(reply!=-1)

{

temp=reply;

System.out.println("Acknowledgement of frame no " + (reply%x) + " recieved.");

System.out.println();

}

}

reply=temp;

}

catch(Exception e)

{

System.out.println("Exception => " + e);

}

}

}
```

Server.java

```java
import java.net.*;

import java.io.*;

import java.util.*;
```

```java
public class Server
{
    public static void main(String args[]) throws Exception
    {
        ServerSocket server=new ServerSocket(6262);

        System.out.println("Server established.");

        Socket client=server.accept();

        ObjectOutputStream oos=new
        ObjectOutputStream(client.getOutputStream());

        ObjectInputStream ois=new ObjectInputStream(client.getInputStream());

        System.out.println("Client is now connected.");

        int x=(Integer)ois.readObject();

        int k=(Integer)ois.readObject();

        int j=0;

        int i=(Integer)ois.readObject();

        boolean flag=true;

        Random r=new Random(6);

        int mod=r.nextInt(6);

        while(mod==1||mod==0)

        mod=r.nextInt(6);

        while(true)
        {
            int c=k;

            for(int h=0;h<=x;h++)
```

```java
{
System.out.print("|"+c+"|");

c=(c+1)%x;

}

System.out.println();

System.out.println();

if(k==j)

{

System.out.println("Frame "+k+" recieved"+"\n"+"Data:"+j);

j++;

System.out.println();

}

else

System.out.println("Frames recieved not in correct order"+"\n"+" Expected farme:" +

j +"\n"+ " Recieved frame no :"+ k);

System.out.println();

if(j%mod==0 && flag)

{

System.out.println("Error found. Acknowledgement not sent. ");

flag=!flag;

j--;

}

else if(k==j-1)
```

```java
        {
        oos.writeObject(k);

        System.out.println("Acknowledgement sent");

        }

        System.out.println();

        if(j%mod==0)

        flag=!flag;

        k=(Integer)ois.readObject();

        if(k==-1)

        break;

        i=(Integer)ois.readObject();

        }

        System.out.println("Client finished sending data. Exiting");

        oos.writeObject(-1);

        }

        }
```

Input & output

Command Prompt - java Client

```
icrosoft Windows [Version 10.0.19044.1889]
c) Microsoft Corporation. All rights reserved.

:\Users\nazmu>cd Desktop/GoBackNProtocol

:\Users\nazmu\Desktop\GoBackNProtocol>javac Client.java

:\Users\nazmu\Desktop\GoBackNProtocol>java Client
nter the value of m : 3
nter no. of frames to be sent:4
nter data for frame no 0 => 1
nter data for frame no 1 => 2
nter data for frame no 2 => 3
nter data for frame no 3 => 4
onnected with server.
0||1||2||3|

ending frame:0

cknowledgement of frame no 0 recieved.

ending frame:1

ending frame:2

ending frame:3

ending frame:4

xception in thread "main" java.lang.ArrayIndexOutOfBoundsException: Inde
 4 out of bounds for length 4
        at Client.main(Client.java:50)
```

Command Prompt - java Server

```
C:\Users\nazmu\Desktop\GoBackNProtocol>java Server
Server established.
Client is now connected.
|0||1||2||3||4||5||6||0|

Frame 0 recieved
Data:0

Acknowledgement sent

|1||2||3||4||5||6||0||1|

Frame 1 recieved
Data:1

Error found. Acknowledgement not sent.

|2||3||4||5||6||0||1||2|

Frames recieved not in correct order
Expected farme:1
Recieved frame no :2

|3||4||5||6||0||1||2||3|

Frames recieved not in correct order
Expected farme:1
Recieved frame no :3
```