

CSE3003 Lab 10

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Experiment : Implementation of GBN ARQ protocol using Java

Server.java

```
import java.net.*;
import java.io.*;
import java.util.*;
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++)
            {
                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 frame:" + 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)
{
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);
}
}

```

Client.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());
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();
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)
            {
                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);
        }
    }
}

```

OUTPUT:

Server Output:

```
job@debian:~/Documents/VITAP/Sem 4/CSE3003 Computer Networks/Lab/javaprogram$ java Server
Server established.
Client is now connected.
|0||1||2||3||4||5||6||7||8||9||10||11||12||13||14||0|

Frame 0 recieved
Data:0

Acknowledgement sent

|1||2||3||4||5||6||7||8||9||10||11||12||13||14||0||1|

Frame 1 recieved
Data:1

Error found. Acknowledgement not sent.

|2||3||4||5||6||7||8||9||10||11||12||13||14||0||1||2|

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

Exception in thread "main" java.io.EOFException
    at java.base/java.io.ObjectInputStream$BlockDataInputStream.peekByte(ObjectInputStream.java:3171)
    at java.base/java.io.ObjectInputStream.readObject0(ObjectInputStream.java:1630)
    at java.base/java.io.ObjectInputStream.readObject(ObjectInputStream.java:493)
    at java.base/java.io.ObjectInputStream.readObject(ObjectInputStream.java:451)
    at Server.main(Server.java:60)
```

Client Output:

```
job@debian:~/Documents/VITAP/Sem 4/CSE3003 Computer Networks/Lab/javaprogram$ java Client
Enter the value of m : 4
Enter no. of frames to be sent:3
Enter data for frame no 0 => 1
Enter data for frame no 1 => 2
Enter data for frame no 2 => 3
Connected with server.
|0||1||2|

Sending frame:0/2
1.png      server.png      2.png

Sending frame:1

Acknowledgement of frame no 0 recieved.

Sending frame:2

Sending frame:3

Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: Index 3 out of bounds for length 3
    at Client.main(Client.java:50)
```