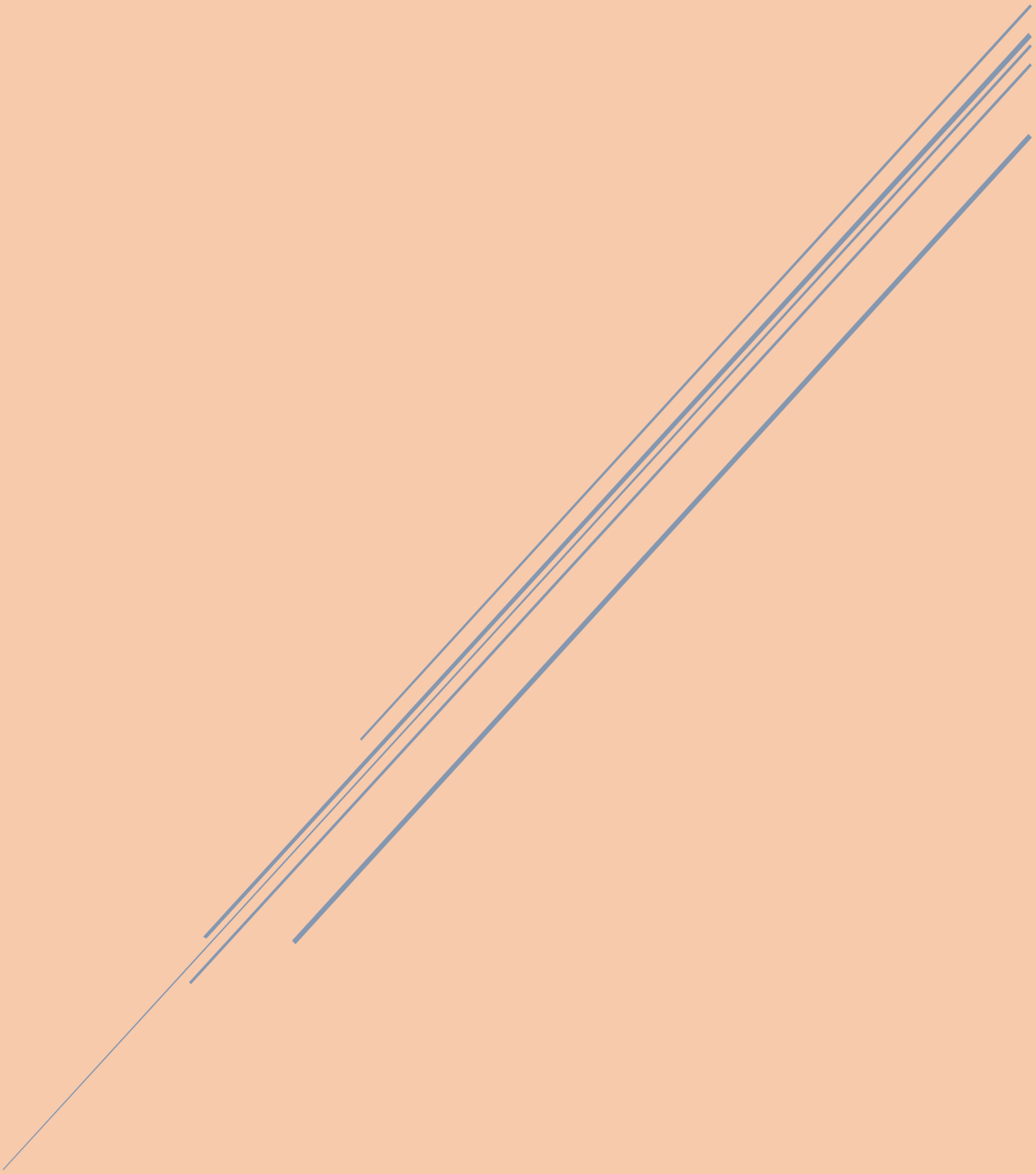
DCN

Assignment - 4



3152
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```
Question 1:- Write a java program to perform the implementation of Simplex
Protocol
//SimplexReceiver…….

import java.util.*; import java.net.*; import java.io.*;


class SimplexReceiver{

    public static void main(String[] args)

    {

        try

        {

            ServerSocket sk = new ServerSocket(6666);
System.out.println("Server listening on localhost:6666");


            Socket s = sk.accept(); System.out.println("Client got
Connected.");


            DataInputStream is = new DataInputStream(s.getInputStream());



            int frameno = 0; while(true)
        {

            String temp = is.readUTF(); frameno++;


            temp.trim();

            String data[] = temp.split(" ");

            int totalframes = Integer.parseInt(data[1]);
System.out.println("Received Frame: "+ frameno);


            if(frameno == totalframes)

            {

                System.out.println("Received All Frames Successfully.");
break;
            }




        }
```

```
            is.close();

            s.close();

            sk.close();

        }

        catch(Exception e)

        {

            System.out.println(e);

        }

    }

}


//SimplexSender……

import java.util.*; import java.net.*; import java.io.*;


class SimplexSender{

    public static void main(String[] args)

    {

        try

        {

            Socket s = new Socket("localhost",6666);

            DataOutputStream os = new DataOutputStream(s.getOutputStream());
Scanner sc = new Scanner(System.in);


            System.out.print("Enter No. of Frames to Send: "); int totalframes
= sc.nextInt();


            for(int i=1;i<=totalframes;i++)

            {

                String frame = i + " " + totalframes; os.writeUTF(frame);
                os.flush();
```

```
                System.out.println("Frame: "+ i + " sent");
Thread.sleep(1000);
            }



            System.out.println("Sent All Frames Successfully."); os.close();
            s.close();

        }

        catch(Exception e)

        {

            System.out.println(e);

        }

    }

}
```

```
C:\javap\A4>javac SimplexSender.java

C:\javap\A4>java SimplexSender
Enter No. of Frames to Send: 4
Frame: 1 sent
Frame: 2 sent
Frame: 3 sent
Frame: 4 sent
Sent All Frames Successfully.

C:\javap\A4>
```

```
C:\javap\A4>javac SimplexReceiver.java

C:\javap\A4>java SimplexReceiver
Server listening on localhost:6666
Client got Connected.
Received Frame: 1
Received Frame: 2
Received Frame: 3
Received Frame: 4
Received All Frames Successfully.

C:\javap\A4>
```

Question:-2 Write a java program to perform the implementation of Stop & Wait Protocol.

```
// StopAndWaitReceiver……. import java.util.*;
import java.net.*; import java.io.*;


class StopAndWaitReceiver{

    public static void main(String[] args)

    {

        try

        {
```

```
            ServerSocket sk = new ServerSocket(6666);
System.out.println("Server listening on localhost:6666");


            Socket s = sk.accept(); System.out.println("Client got
Connected.");


            DataInputStream is = new DataInputStream(s.getInputStream());
DataOutputStream os = new DataOutputStream(s.getOutputStream());


            int frameno = 0; while(true)
        {

            String temp = is.readUTF(); frameno++;

            temp.trim();

            String data[] = temp.split(" ");

            int totalframes = Integer.parseInt(data[1]);
System.out.print("Received Frame: "+ frameno);


            Thread.sleep(1000); os.writeUTF("Ack"); os.flush();
            System.out.println("..Acknowledgement Sent.");



            if(frameno == totalframes)

            {

                System.out.println("Received All Frames Successfully.");
break;
            }




        }

            is.close();

            s.close();

            sk.close();

        }

        catch(Exception e)

        {
```

```
            System.out.println(e);

        }

    }

}

// StopAndWaitSender…….

import java.util.*; import java.net.*; import java.io.*;


class StopAndWaitSender{

    public static void main(String[] args)

    {

        try

        {

            Socket s = new Socket("localhost",6666);

            DataOutputStream os = new DataOutputStream(s.getOutputStream());
DataInputStream is = new DataInputStream(s.getInputStream()); Scanner sc = new
Scanner(System.in);


            System.out.print("Enter No. of Frames to Send: "); int totalframes
= sc.nextInt();


            for(int i=1;i<=totalframes;)

            {

                String frame = i + " " + totalframes; os.writeUTF(frame);
                os.flush();

                System.out.print("Frame: "+ i + " sent");



                String ack = is.readUTF();

                if(ack!=null)

                {

                    System.out.print("..Acknowledgement Received.");
System.out.println("");
                    i++;
```

```
                }

                else

                {

                    System.out.println("..Acknowledgement Not Received for
                            Frame: "+ i);

                    System.exit(0);

                }



                Thread.sleep(1000);

            }



            System.out.println("Sent All Frames Successfully."); os.close();
            s.close();

        }

        catch(Exception e)

        {

            System.out.println(e);

        }

    }

}
```

```
C:\javap\A4>javac StopAndWaitReceiver.java

C:\javap\A4>java StopAndWaitReceiver
Server listening on localhost:6666
Client got Connected.
Received Frame: 1..Acknowledgement Sent.
Received Frame: 2..Acknowledgement Sent.
Received Frame: 3..Acknowledgement Sent.
Received Frame: 4..Acknowledgement Sent.
Received Frame: 5..Acknowledgement Sent.
Received Frame: 6..Acknowledgement Sent.
Received All Frames Successfully.

C:\javap\A4>
```

```
C:\javap\A4>java StopAndWaitSender
Enter No. of Frames to Send: 6
Frame: 1 sent..Acknowledgement Received.
Frame: 2 sent..Acknowledgement Received.
Frame: 3 sent..Acknowledgement Received.
Frame: 4 sent..Acknowledgement Received.
Frame: 5 sent..Acknowledgement Received.
Frame: 6 sent..Acknowledgement Received.
Sent All Frames Successfully.

C:\javap\A4>
```

Question:-3 Write a java program to perform the implementation of Stop & Wait ARQ Protocol.

```
// StopAndWaitARQReceiver……

import java.util.*; import java.net.*; import java.io.*;


class StopAndWaitARQReceiver{

    public static void main(String[] args)

    {

        try

        {

            ServerSocket sk = new ServerSocket(6666);
System.out.println("Server listening on localhost:6666");


            Socket s = sk.accept(); System.out.println("Client got
Connected.");


            DataInputStream is = new DataInputStream(s.getInputStream());
DataOutputStream os = new DataOutputStream(s.getOutputStream());


            String data = new String(); int ack = 0,flag = 0;




            while(true)

            {

                String temp = is.readUTF();



                if(temp.equals("FIN"))

                {

                    System.out.println("\nReceived All Frames Successfully.");
System.out.print("Received Data: "+ data);
                    break;

                }
```

```
                int seqno =Integer.valueOf(temp.substring(0,1));
System.out.print("Received Frame seqNo: "+ seqno);


                Thread.sleep(1000);



                if(seqno == ack)

                {

                    ack = (seqno==0)?1:0;

                    data = data + temp.substring(1,2);

                }

                else

                {

                    System.out.println(".  Duplicate Frames Received.");

                }



//intentionally send false ack

/*if(seqno==1 && flag==0)

{

os.writeInt(seqno); flag=1;
continue;

}*/



                os.writeInt(ack); os.flush();
                System.out.println("..Sent Acknowledgement: "+ ack);



            }

            is.close();

            os.close();

            s.close();

            sk.close();
```

```
        }

        catch(Exception e)

        {

            System.out.println(e);

        }

    }

}



// StopAndWaitARQSender……. import java.util.*;
import java.net.*; import java.io.*;


class StopAndWaitARQSender{

    public static void main(String[] args)

    {

        try

        {

            Socket s = new Socket("localhost",6666);

            DataOutputStream os = new DataOutputStream(s.getOutputStream());
DataInputStream is = new DataInputStream(s.getInputStream()); Scanner sc = new
Scanner(System.in);


            System.out.print("Enter data to Send: "); String data =
sc.nextLine();
            int totalframes = data.length(); int seqno = 0,flag = 0;


            for(int i=0;i<totalframes;)

            {

                String frame = seqno + data.substring(i,i+1);
os.writeUTF(frame);
                os.flush();

                System.out.print("Frame with seqNo: "+ seqno + " sent..");



                int aack = (seqno==0)?1:0; int rack = is.readInt();
```

```
                if(rack == aack)

                {

                    System.out.println("..Received Acknowledgement: "+ rack);
seqno = (seqno==0)?1:0;
                    i++;

                }

                else

                {

                    System.out.println("..Acknowledgement Not-
Received/Currupted for Frame with seqNo: "+ seqno);

                    System.out.println("Resending ther Frame.");

                }



                Thread.sleep(1000);



//intentionally resend the frame

/*if(i==3 && flag==0)

{

seqno = (seqno==0)?1:0; i--;
flag=1;

}*/

            }

            os.writeUTF("FIN"); os.flush();


            System.out.println("\nSent All Frame Successfully.");



            os.close();

            is.close();

            s.close();

        }
```

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

```
:\javap\A4>javac StopAndWaitReceiver.java

:\javap\A4>java StopAndWaitReceiver
erver listening on localhost:6666
lient got Connected.
eceived Frame: 1..Acknowledgement Sent.
eceived Frame: 2..Acknowledgement Sent.
eceived Frame: 3..Acknowledgement Sent.
eceived Frame: 4..Acknowledgement Sent.
eceived Frame: 5..Acknowledgement Sent.
eceived Frame: 6..Acknowledgement Sent.
eceived All Frames Successfully.

:\javap\A4>javac StopAndWaitARQSender.java

:\javap\A4>java StopAndWaitARQSender
nter data to Send: Hello Pr
rame with seqNo: 0 sent....Received Acknowledgement: 1
rame with seqNo: 1 sent....Received Acknowledgement: 0
rame with seqNo: 0 sent....Received Acknowledgement: 1
rame with seqNo: 1 sent....Received Acknowledgement: 0
rame with seqNo: 0 sent....Received Acknowledgement: 1
rame with seqNo: 1 sent....Received Acknowledgement: 0
rame with seqNo: 0 sent....Received Acknowledgement: 1
rame with seqNo: 1 sent....Received Acknowledgement: 0

ent All Frame Successfully.

:\javap\A4>
```

```
C:\javap\A4>java StopAndWaitARQReceiver
Server listening on localhost:6666
Client got Connected.
Received Frame seqNo: 0..Sent Acknowledgement: 1
Received Frame seqNo: 1..Sent Acknowledgement: 0
Received Frame seqNo: 0..Sent Acknowledgement: 1
Received Frame seqNo: 1..Sent Acknowledgement: 0
Received Frame seqNo: 0..Sent Acknowledgement: 1
Received Frame seqNo: 1..Sent Acknowledgement: 0
Received Frame seqNo: 0..Sent Acknowledgement: 1
Received Frame seqNo: 1..Sent Acknowledgement: 0

Received All Frames Successfully.
Received Data: Hello Pr
C:\javap\A4>
```

Question:-4 Write a java program to perform the implementation of Go Back N

ARQ Protocol.

```
// GoBackNARQReceiver……..
import java.util.*; import java.net.*; import java.io.*;

class GoBackNARQReceiver{
    public static void main(String[] args)
    {
```

```
        try

        {

            ServerSocket sk = new ServerSocket(6666);
System.out.println("Server listening on localhost:6666");


            Socket s = sk.accept(); System.out.println("Client got
Connected.");


            DataInputStream is = new DataInputStream(s.getInputStream());
DataOutputStream os = new DataOutputStream(s.getOutputStream());


            int counter = 0;



            while(true)

            {

                int rframe = is.readInt();

                if(rframe == -1)

                {

                    System.out.println("\nReceived All Frames Successfully.");
break;
                }



                System.out.print("Received Frame: "+ rframe);



                Thread.sleep(1000);




                if(rframe == counter)

                {

                    int ack = counter +1; System.out.println("...Sending ACK:
"+ack); os.writeInt(ack);
                    counter++;



                }
```

```
                else
                {
                    System.out.println("...Sending Negative ACK: -1");
os.writeInt(-1);
                }



            }
            os.close();
            is.close();
            s.close();
            sk.close();
        }
        catch(Exception e)
        {
            System.out.println(e);
        }
    }
}
//GoBackNARQSender…….
import java.util.*; import java.net.*; import java.io.*;

class GoBackNARQSender{
    public static void main(String[] args)
    {
        try
        {
            Socket s = new Socket("localhost",6666);
            DataOutputStream os = new DataOutputStream(s.getOutputStream());
DataInputStream is = new DataInputStream(s.getInputStream()); Scanner sc = new
```

```
Scanner(System.in);


            System.out.print("Enter window length: ");

            int wlen = sc.nextInt(); int ack[] = new int[wlen]; int
i=0,flag=0;


            for(; i<wlen; i++)

            {

//intentionally skip one frame if(i==2 && flag==0)
                {

                    flag=1; continue;
                }



                os.writeInt(i); os.flush();
                System.out.print("Frame: "+ i + " sent...");



                ack[i] = is.readInt(); System.out.println("..Received ACK:
"+ack[i]);


                Thread.sleep(1000);



                if(i == wlen-1)

                {

                    for(int a=0;a<wlen;a++)

                    {

                        if(ack[a]!=a+1)

                        {

                            System.out.println("Received Negative ACK for
Frame: " + a + "\nResending the frames from FrameNo : "+ a);

                            i=a-1; Thread.sleep(1000); break;


                        }

                    }
```

```
                }

            }


            os.writeInt(-1);

            os.flush();



            os.close();

            is.close();

            s.close();


        }

        catch(Exception e)

        {

            System.out.println(e);

        }

    }

}
```

```
C:\javap\A4>java GoBackNARQReceiver
Server listening on localhost:6666
Client got Connected.
Received Frame: 0...Sending ACK: 1
Received Frame: 1...Sending ACK: 2
Received Frame: 3...Sending Negative ACK: -1
Received Frame: 4...Sending Negative ACK: -1
Received Frame: 2...Sending ACK: 3
Received Frame: 3...Sending ACK: 4
Received Frame: 4...Sending ACK: 5

Received All Frames Successfully.

C:\javap\A4>
```

```
C:\javap\A4>java GoBackNARQSender
Enter window length: 5
Frame: 0 sent.....Received ACK: 1
Frame: 1 sent.....Received ACK: 2
Frame: 3 sent.....Received ACK: -1
Frame: 4 sent.....Received ACK: -1
Received Negative ACK for Frame: 2
Resending the frames from FrameNo : 2
Frame: 2 sent.....Received ACK: 3
Frame: 3 sent.....Received ACK: 4
Frame: 4 sent.....Received ACK: 5

Sent All Frames Successfully.

C:\javap\A4>
```

Question:-5 Write a java program to perform the implementation of Selective Repeat Protocol.

```
//SelectiveRepetARQReceiver……..

import java.util.*; import java.net.*; import java.io.*;


class SelectiveRepetARQReceiver{

    public static void main(String[] args)

    {

        try

        {

            ServerSocket sk = new ServerSocket(6666);
System.out.println("Server listening on localhost:6666");


            Socket s = sk.accept(); System.out.println("Client got
Connected.");


            DataInputStream is = new DataInputStream(s.getInputStream());
DataOutputStream os = new DataOutputStream(s.getOutputStream());


            int counter = 0;

            int missingFrame[] = new int[10]; int a=0;


            while(true)

            {

                int flag=0;

                int rframe = is.readInt(); if(rframe == -1)
            {

                System.out.println("\nReceived All Frames Successfully.");
break;

            }



                System.out.print("Received Frame: "+ rframe);
```

```
                Thread.sleep(1000);



                if(rframe == counter)

                {

                    int ack = counter +1; System.out.println("...Sending ACK:
"+ack); os.writeInt(ack);
                    counter++;



                }

                else

                {

                    for(int j=0;j<10;j++)

                    {

                        if(rframe == missingFrame[j])

                        {

                            int ack = rframe +1;
System.out.println("...Sending ACK: "+ack); os.writeInt(ack);
                            flag=1;

                        }

                    }


                    if(flag==0)

                    {

                        System.out.println("...Sending Negative ACK: -1");
os.writeInt(-1);
                        missingFrame[a] = counter; a++;
                        counter++;

                    }

                }



            }
```

```
            os.close();
            is.close();
            s.close();
            sk.close();
        }
        catch(Exception e)
        {
            System.out.println(e);
        }
    }
}
// SelectiveRepetARQSender……..


import java.util.*;
        import java.net.*; import java.io.*;

class SelectiveRepetARQSender{
    public static void main(String[] args)
    {
        try
        {
            Socket s = new Socket("localhost",6666);
            DataOutputStream os = new DataOutputStream(s.getOutputStream());
DataInputStream is = new DataInputStream(s.getInputStream()); Scanner sc = new
Scanner(System.in);


            System.out.print("Enter window length: "); int wlen =
sc.nextInt();
            int ack[] = new int[wlen]; int i=0,flag=0;


            for(; i<wlen; i++)
```

```
            {

//intentionally skip one frame if(i==2 && flag==0)
                {

                    flag=1; continue;
                }

                os.writeInt(i); os.flush();
                System.out.print("Frame: "+ i + " sent...");



                ack[i] = is.readInt(); System.out.println("..Received ACK:
"+ack[i]);


                Thread.sleep(1000);



                if(i == wlen-1)

                {

                    for(int a=0;a<wlen;a++)

                    {

                        if(ack[a]!=a+1)

                        {

                            System.out.println("Received Negative ACK for
Frame: " + a + "\nResending the frames from FrameNo : "+ a);


                            Thread.sleep(1000); os.writeInt(a); os.flush();
                            System.out.print("Frame: "+ i + " sent...");



                            ack[a]=is.readInt();

                            System.out.println("..Received ACK:
                                    "+ack[a]);



                                    a--;

                        }

                    }
```

```
                }

            }



            os.writeInt(-1);

            os.flush();



            System.out.println("\nSent All Frames Successfully."); os.close();
            is.close();

            s.close();



        }

        catch(Exception e)

        {

            System.out.println(e);

        }

    }
```

```
C:\javap\A4>javac SelectiveRepetARQReceiver.java

C:\javap\A4>java SelectiveRepetARQReceiver
Server listening on localhost:6666
Client got Connected.
Received Frame: 0...Sending ACK: 1
Received Frame: 1...Sending ACK: 2
Received Frame: 3...Sending Negative ACK: -1
Received Frame: 2...Sending ACK: 3
Received Frame: 3...Sending ACK: 4

Received All Frames Successfully.

C:\javap\A4>
```

```
C:\javap\A4>javac SelectiveRepetARQSender.java

C:\javap\A4>java SelectiveRepetARQSender
Enter window length: 4
Frame: 0 sent.....Received ACK: 1
Frame: 1 sent.....Received ACK: 2
Frame: 3 sent.....Received ACK: -1
Received Negative ACK for Frame: 2
Resending the frames from FrameNo : 2
Frame: 3 sent.....Received ACK: 3
Received Negative ACK for Frame: 3
Resending the frames from FrameNo : 3
Frame: 3 sent.....Received ACK: 4

Sent All Frames Successfully.

C:\javap\A4>
```