Practical-4

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Problem Statement:

Write a program to implement sliding window mechanisms using
1. Stop and Wait ARQ
2. Go Back N ARQ
3. Selective Repeat ARQ

Code:

1. Stop and Wait ARQ

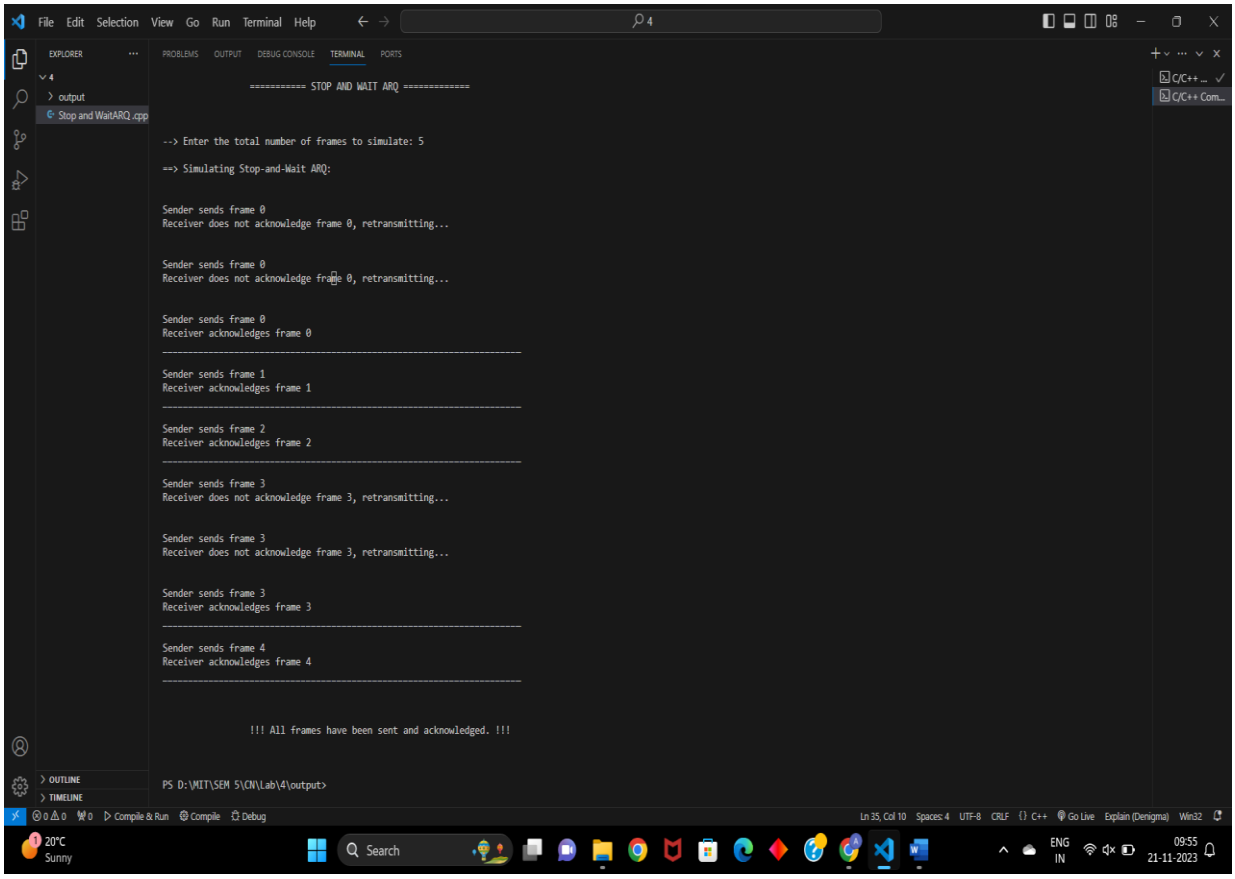
```
 #include<iostream>
#include<cstdlib>
#include<ctime>
using namespace std;

// Simulate frame transmission and return true if the frame is received, false otherwise.
bool transmitFrame()
{
   // Simulate frame transmission and random acknowledgment (50% chance of success)
   return rand() % 2 == 0;
}

int main()
{
   srand(time(0)); // Seed the random number generator
   int totalFrames;
   cout<<"\n\n\n\t\t ========== STOP AND WAIT ARQ ==========\n\n\n\n";
   cout << "--> Enter the total number of frames to simulate: ";
   cin >> totalFrames;
   int frameNumber = 0;
   cout << "\n==> Simulating Stop-and-Wait ARQ:\n\n";
   while (frameNumber < totalFrames)
   {
      cout << "\nSender sends frame " << frameNumber << endl;
      bool received = transmitFrame();
      if (received)
      {
         cout << "Receiver acknowledges frame " << frameNumber << endl;
         cout<<"_____
_________";
         frameNumber++; // Move to the next frame
      }
      else
```

```
        {
            cout << "Receiver does not acknowledge frame " << frameNumber << ",
retransmitting...\n";
        }
        cout << endl;
    }
    cout << "\n\n\n\t\t !!! All frames have been sent and acknowledged. !!!\n\n\n\n";
    return 0;
}
```

OUTPUT:



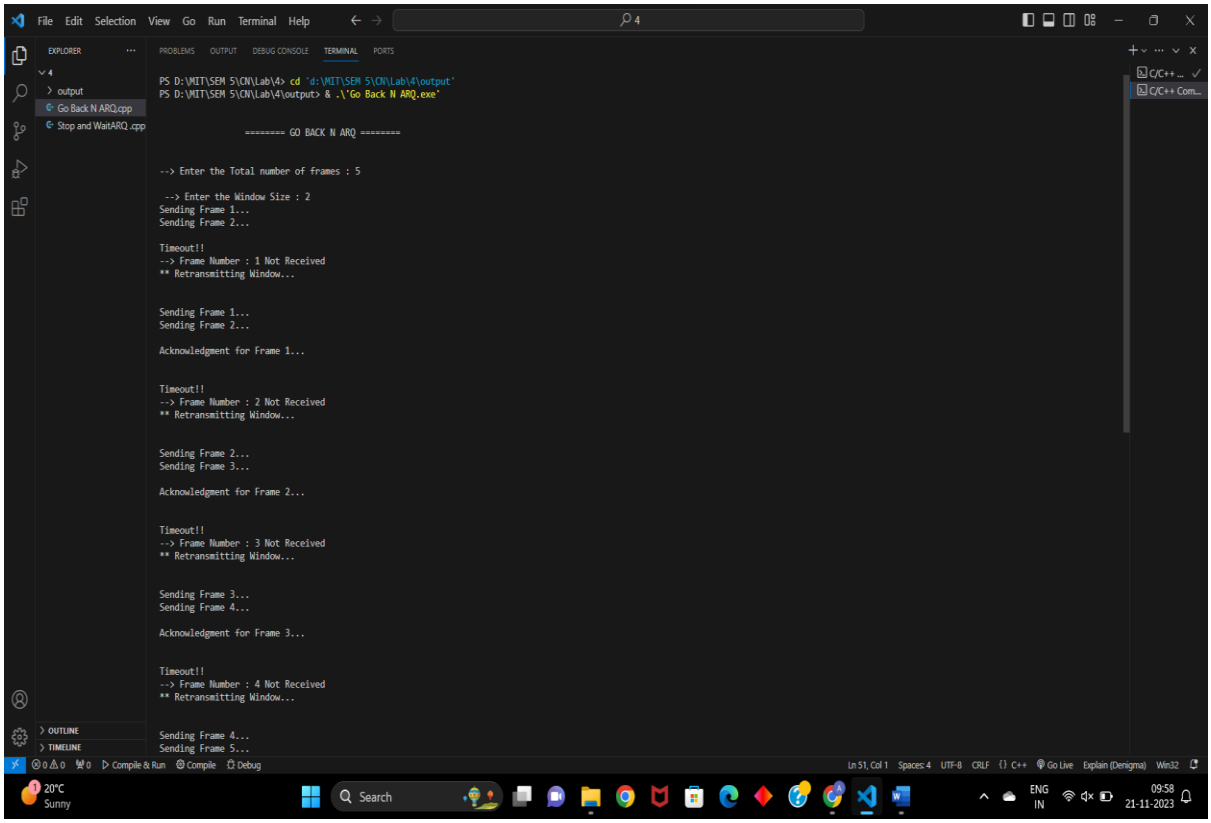
2. **Go Back N ARQ**

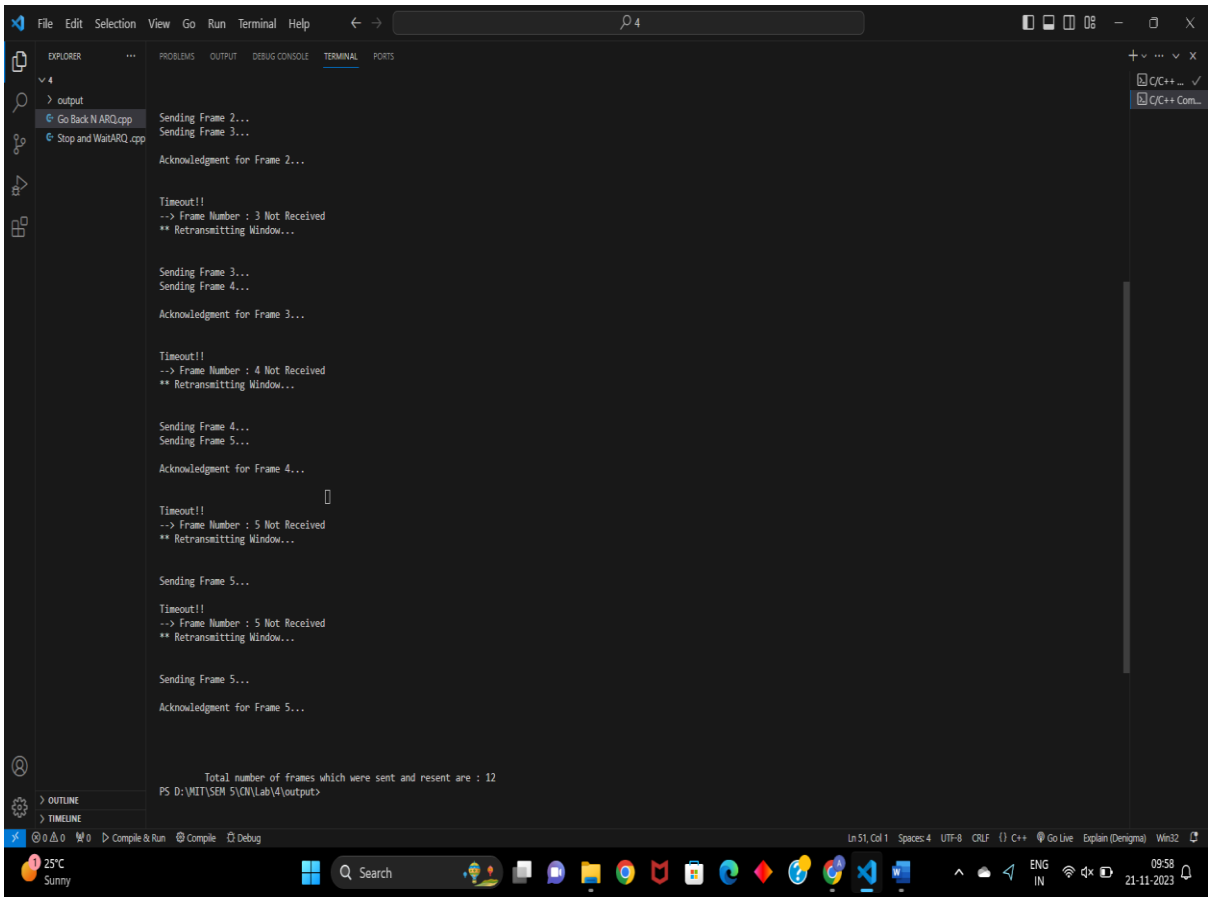
```
#include <bits/stdc++.h>
#include <ctime>
#define ll long long int
using namespace std;
void transmission(ll &i, ll &N, ll &tf, ll &tt)
{
    while (i <= tf)
    {
        int z = 0;
        for (int k = i; k < i + N && k <= tf; k++)
```

```
        {
            cout << "Sending Frame " << k << "..." << endl;
            tt++;
        }
        for (int k = i; k < i + N && k <= tf; k++)
        {
            int f = rand() % 2;
            if (!f)
            {
                cout << "\nAcknowledgment for Frame " << k << "...\n"
                     << endl;
                z++;
            }
            else
            {
                cout << "\nTimeout!!\n--> Frame Number : " << k << " Not Received" << endl;
                cout << "** Retransmitting Window...\n"
                     << endl;
                break;
            }
        }
        cout << "\n";
        i = i + z;
    }
}

int main()
{
    ll tf, N, tt = 0;
    srand(time(NULL));
    cout << "\n\n\t\t ======== GO BACK N ARQ ========\n\n\n";
    cout << "--> Enter the Total number of frames : ";
    cin >> tf;
    cout << "\n --> Enter the Window Size : ";
    cin >> N;
    ll i = 1;
    transmission(i, N, tf, tt);
    cout << "\n\n\t Total number of frames which were sent and resent are : " << tt << endl;
    return 0;
}
```

OUTPUT:


PS D:\MIT\SEM 5\CN\Lab\4> cd 'd:\MIT\SEM 5\CN\Lab\4\output'
PS D:\MIT\SEM 5\CN\Lab\4\output> & .\'Go Back N ARQ.exe'
======== GO BACK N ARQ ========
--> Enter the Total number of frames : 5
--> Enter the Window Size : 2
Sending Frame 1...
Sending Frame 2...
Timeout!!
--> Frame Number : 1 Not Received
** Retransmitting Window...
Sending Frame 1...
Sending Frame 2...
Acknowledgment for Frame 1...
Timeout!!
--> Frame Number : 2 Not Received
** Retransmitting Window...
Sending Frame 2...
Sending Frame 3...
Acknowledgment for Frame 2...
Timeout!!
--> Frame Number : 3 Not Received
** Retransmitting Window...
Sending Frame 3...
Sending Frame 4...
Acknowledgment for Frame 3...
Timeout!!
--> Frame Number : 4 Not Received
** Retransmitting Window...
Sending Frame 4...
Sending Frame 5...


Sending Frame 2...
Sending Frame 3...
Acknowledgment for Frame 2...
Timeout!!
--> Frame Number : 3 Not Received
** Retransmitting Window...
Sending Frame 3...
Sending Frame 4...
Acknowledgment for Frame 3...
Timeout!!
--> Frame Number : 4 Not Received
** Retransmitting Window...
Sending Frame 4...
Sending Frame 5...
Acknowledgment for Frame 4...
Timeout!!
--> Frame Number : 5 Not Received
** Retransmitting Window...
Sending Frame 5...
Timeout!!
--> Frame Number : 5 Not Received
** Retransmitting Window...
Sending Frame 5...
Acknowledgment for Frame 5...
Total number of frames which were sent and resent are : 12
PS D:\MIT\SEM 5\CN\Lab\4\output>

3. Selective Repeat ARQ

```
#include <iostream>
#include <vector>
#include <cstdlib>
#include <ctime>
using namespace std;

// Define the maximum window size and the total number of frames
const int MAX_WINDOW_SIZE = 4;
const int TOTAL_FRAMES = 10;
int main()
{
   int windowSize;
   int totalFramesSent = 0;
   cout << "\n\n\n\t\t ========== SELECTIVE REPEAT ARQ ===========\n\n\n";
   cout << "--> Enter window size: ";
   cin >> windowSize;
   vector<bool> acknowledged(TOTAL_FRAMES, false);
   srand(time(0)); // Seed the random number generator
   cout << "\n-->Simulating Selective Repeat ARQ:\n\n";
   while (totalFramesSent < TOTAL_FRAMES)
   {
      cout << "Sender's Window: ";
      // Send frames within the current window
      for (int i = totalFramesSent; i < min(totalFramesSent + windowSize,
TOTAL_FRAMES); i++)
      {
         if (!acknowledged[i])
         {
            cout << i << " ";
            // Simulate frame transmission and random acknowledgment
            if (rand() % 2 == 0)
            {
               acknowledged[i] = true;
               cout << "(Sent) ";
            }
         }
      }
      cout << "\nReceiver's Window: ";
      // Simulate receiver's acknowledgment
      for (int i = totalFramesSent; i < min(totalFramesSent + windowSize,
TOTAL_FRAMES); i++)
      {
         if (acknowledged[i])
         {
            cout << i << " ";
```

```
            }
        }
        cout << "\n\n";
        // Move the window
        totalFramesSent += windowSize;
    }
    cout << "\n\n\t\t!!! All frames have been sent and acknowledged. !!!\n\n\n";
    return 0;
}
```

OUTPUT: