EXP:07	Flow control at Data Link Layer

Aim

To write a program to implement flow control at the data link layer using the **Sliding Window Protocol** and simulate the flow of frames from one node to another.

Algorithm / Procedure

1. **Define** the window size for the sender and receiver.
2. **Implement** the sender logic:
   - Maintain a sending window of sequence numbers.
   - Send frames within the window limit.
   - Start a timer for each unacknowledged frame.
3. **Implement** the receiver logic:
   - Maintain a receiving window.
   - Accept frames in order and send cumulative acknowledgments (ACKs).
   - Discard out-of-order frames (or buffer, depending on the specific protocol variant).
4. **Simulate** the flow of frames, including scenarios for successful transmission, lost frames, and lost ACKs, to demonstrate the flow control mechanism.

Code:

```
import random
import time

#  ----------------------------
# Sliding Window Protocol (Go-Back-N) Simulation #
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def sliding_window_simulation(total_frames, window_size):
   print("\n--- Sliding Window Protocol Simulation ---")
   print(f"Total Frames to Send: {total_frames}")
   print(f"Window Size: {window_size}\n")

   sent = 0  # Number of frames sent so far


   while sent < total_frames:
      # Determine frames in the current window window_end =
      min(sent + window_size, total_frames)
      current_window = list(range(sent + 1, window_end + 1)) print(f"Sender:
      Sending frames {current_window}")
```
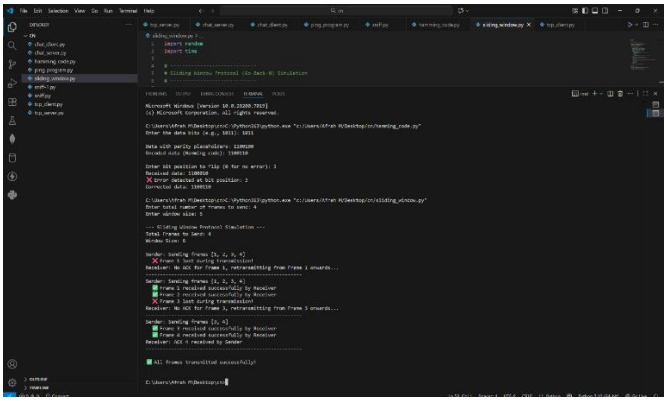

```
        # Simulate sending each frame in the window
        acked = True
        for frame in current_window:
            # Randomly simulate frame loss (20% chance) if
            random.random() < 0.2:
                print(f"Frame {frame} lost during transmission!")
                acked = False
                break
            else:
                print(f" Frame {frame} received successfully by Receiver")
                time.sleep(0.3)

        if acked:
            # All frames acknowledged → Slide window forward
            print(f"Receiver: ACK {window_end} received by Sender") sent
            = window_end
        else:
            # Go-Back-N retransmission
            print(f"Receiver: No ACK for Frame {frame}, retransmitting from Frame {frame}
onwards...")
            time.sleep(1)
            # Sender will retransmit from the lost frame sent
            = frame - 1

        print("-" * 55)
        time.sleep(0.5)

    print("\nAll frames transmitted successfully!\n")


# ----------------------------
# MAIN PROGRAM
#  ----------------------------
if __name__== "__main__":
    total_frames = int(input("Enter total number of frames to send: "))
    window_size = int(input("Enter window size: "))

    sliding_window_simulation(total_frames,  window_size)
```

Output:



Result:

A program simulating the Sliding Window Protocol was successfully implemented. The simulation demonstrated effective flow control by managing the rate of frame transmission between the sender and receiver.