EX.NO: 7
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SLIDING WINDOW PROTOCOL

AIM:

Write a program to implement flow control at data link layer using sliding window protocol. Simulate the flow of frames from one node to another

PROGRAM

sender.py

```
import time
import os
def input_window_size():
    return int(input("Enter window size: "))
def input_text_message():
    return input("Enter text message: ")
def create_frames(text_message):
    frames = [(i, char) for i, char in enumerate
                                    (text_message)]
    frames.append((len(text_message), 'END'))
    return frames
def write_to_file(filename, data):
    with open(filename, 'w') as file:
        for frame in data:
            file.write(f"{frame[0]},{frame[1]}\n")
def read_from_file(filename):
    if not os.path.exists(filename):
        return []
    with open(filename, 'r') as file:
        return [line.strip().split(',') for line in file.readlines()]
```

```
def send_frames(frames, window_size):
    i = 0
    while i < len(frames):
        window = frames[i: i + window_size]
        print(f"Sending frames: {window}")
        write_to_file('Send_Buffer.txt', window)
        time.sleep(3)

        receiver_buffer = read_from_file('Receiver_Buffer.txt')
        if not receiver_buffer:
            print("No acknowledgement received yet.")
            continue

        ack_frame = receiver_buffer[0]
        ack_number, ack_type = int(ack_frame[0]), ack_frame[1]

        if ack_type == 'ACK':
            print(f'ACK received for frame {ack_number},
                                sending next set of frames.")

            i = window_size
        elif ack_type == 'NACK':
            print(f"NACK received for frame {ack_number},
                    resending frames from frame {ack_number}.")

            i = ack_number

def main_sender():
    window_size = input_window_size()
    text_message = input_text_message()
    frames = create_frames(text_message)
    send_frames(frames, window_size)

if __name__ == "__main__":
    main_sender()
```

receiver.py

```
import random
import time
import os
def write_to_file(filename, data):
    with open(filename, 'w') as file:
        file.write(data)
def read_from_file(filename):
    if not os.path.exists(filename):
        return []
    with open(filename, 'r') as file:
        return [line.strip().split(',') for line in
                file.readlines()]
def process_frames(frames):
    acks = []
    frame_seen = set()
    for frame in frames:
        frame_number = int(frame[0])
        data = frame[1]
        if frame_number in frame_seen:
            continue
        print(f"Received frame {frame_number}: {data}")
        if random.choice([True, False]):
            print(f"Sending ACK for frame {frame_number}")
            acks.append(f"{frame_number},ACK\n")
            break
    return ''.join(acks)
```

```
def main_receiver():
    while True:
        time.sleep(3)
        frames = read_from_file('Sender_Buffer.txt')
        if not frames:
            print("No frames to process, waiting...")
            continue

        acks = process_frames(frames)
        write_to_file('Receiver_Buffer.txt', acks)

        if any(frame[1] == 'END' for frame in frames):
            print("End of transmission received.")
            break

if __name__ == "__main__":
    main_receiver()
```

OUTPUT

```
python sender.py
Enter window size: 3
Enter text message: hello
Sending frame: [(0,'h'),(1,'e'),(2,'l')]
ACK received for frame 0, sending next set of frames
Sending frames: [(3,'l'),(4,'o'),(5,'END')]
ACK received for frame 3, sending next set of frames
```

```
python receiver.py
Received frame 0: h
Sending Ack for frame 0
Received frame 1: e
Sending Ack for frame 1
```