CS23532-COMPUTER NETWORKS-LAB MANUAL
Practical -7

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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 should achieve at least below given requirements. You can make it a bidirectional program wherein receiver is sending its data frames with acknowledgement (Piggybacking)

Create a sender program with following features:-

1. Input Window size from the user.
2. Input a Text message from the user.
3. Consider 1 character per frame.
4. Create a frame with following fields [Frame no., DATA].
5. Send the frames. [Print the output on screen and save it in a file called Sender_Buffer.]
6. Wait for the acknowledgement from the Receiver. [Induce delay in the program]
7. Reader a file called Receiver_Buffer.
8. Check ACK field for the Acknowledgement number.
9. If the Acknowledgement number is as expected, send new set of frames accordingly, [overwrite the Sender_Buffer file with new frames] Else if NACK is received, resend the frames accordingly. [Overwrite the Sender_Buffer with old frame].

Create a receiver file with following features

1. Reader a file called Sender_Buffer.
2. Check the Frame no.
3. If the Fame no. are as expected, write the appropriate ACK no. in the Receiver_ Buffer file. Else write NACK no. in the Receiver_Buffer file.

NOTE: Induce error and verify the behaviour of the program. Manually Change the Frame no and Ack no in the files].

Program:

Sender.py

```python
import time

win = int(input("Enter window size: "))
msg = input("Enter message: ")

frames = [[i + 1, msg[i]] for i in range(len(msg))]
ack = 0

while ack < len(frames):
    send = frames[ack:ack + win]
    print("\nSending frames:", send)
    with open("Sender_Buffer.txt", "w") as f:
        for fr in send:
            f.write(f"{fr[0]} {fr[1]}\n")
    time.sleep(1)  # simulate delay

    with open("Receiver_Buffer.txt") as f:
        res = f.read().strip()
    if res.startswith("ACK"):
        ack_no = int(res.split()[1])
        print("Received:", res)
        ack = ack_no
    else:
        print("Received:", res, "→ Resending same frames.")
print("\nAll frames sent successfully!")
```

receiver.py

```python
try:
    with open("Sender_Buffer.txt") as f:
        lines = [line.strip().split() for line in f.readlines()]
except FileNotFoundError:
    exit("No sender buffer found!")

expected = 1
valid = True
for fr_no, data in lines:
    if int(fr_no) != expected:
        valid = False
        break
    expected += 1

with open("Receiver_Buffer.txt", "w") as f:
    if valid:
        f.write(f"ACK {expected-1}")
        print("Frames received correctly. Sending ACK", expected-1)
    else:
```

```
        f.write(f"NACK {expected}")
        print("Frame error. Sending NACK", expected)
```

Input:

Enter window size: 3
Enter message: HELLO

Output:

Sending frames: [[1, 'H'], [2, 'E'], [3, 'L']]
Received: ACK 3

Sending frames: [[4, 'L'], [5, 'O']]
Received: ACK 5

All frames sent successfully!

RESULT:

Thus the program to implement flow control at data link layer using sliding window protocol
has been executed successfully.