

### 35. Implementing the sliding window protocol in java/C.

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h> // For sleep function
#include <time.h>   // For srand and time

#define WINDOW_SIZE 4 // Sliding window size
#define TOTAL_FRAMES 10 // Total frames to send

// Function to simulate frame transmission
void sendFrames(int frames[], int start, int window) {
    printf("\nSender: Sending frames %d to %d...\n", start, start + window - 1);
}

// Function to simulate receiver acknowledgment
int receiveFrames(int frames[], int start, int window) {
    int i;
    for (i = start; i < start + window && i < TOTAL_FRAMES; i++) {
        if (rand() % 5 == 0) { // Simulate random error (20% probability)
            printf("Receiver: Frame %d is lost! ?\n", i);
            return i; // Return the lost frame number
        } else {
            printf("Receiver: Frame %d received ?\n", i);
        }
    }
    return -1; // No frame loss
}

int main() {
    int frames[TOTAL_FRAMES];
    int base = 0; // Base frame index
    int nextFrame;
    int i; // Declare loop variable outside the loop

    srand(time(0));

    // Initialize frame numbers
    for (i = 0; i < TOTAL_FRAMES; i++)
        frames[i] = i;

    while (base < TOTAL_FRAMES) {
        // Send frames in the window
        sendFrames(frames, base, WINDOW_SIZE);

        // Simulate receiver acknowledgment
        int lostFrame = receiveFrames(frames, base, WINDOW_SIZE);
```

```
if (lostFrame == -1) {
    printf("Sender: All frames acknowledged ??\n");
    base += WINDOW_SIZE; // Move window forward
} else {
    printf("Sender: Timeout! Resending from Frame %d... ??\n", lostFrame);
    base = lostFrame; // Resend from lost frame
}

sleep(1); // Simulate transmission delay
}

printf("\nAll frames sent successfully! ??\n");
return 0;
}
```



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```
Sender: Sending frames 0 to 3...
Receiver: Frame 0 is lost! ?
Sender: Timeout! Resending from Frame 0... ??
```

```
Sender: Sending frames 0 to 3...
Receiver: Frame 0 is lost! ?
Sender: Timeout! Resending from Frame 0... ??
```

```
Sender: Sending frames 0 to 3...
Receiver: Frame 0 received ?
Receiver: Frame 1 received ?
Receiver: Frame 2 received ?
Receiver: Frame 3 received ?
Sender: All frames acknowledged ?
```

```
Sender: Sending frames 4 to 7...
Receiver: Frame 4 received ?
Receiver: Frame 5 received ?
Receiver: Frame 6 is lost! ?
Sender: Timeout! Resending from Frame 6... ??
```

```
Sender: Sending frames 6 to 9...
Receiver: Frame 6 is lost! ?
Sender: Timeout! Resending from Frame 6... ??
```

```
Sender: Sending frames 6 to 9...
Receiver: Frame 6 received ?
Receiver: Frame 7 received ?
Receiver: Frame 8 received ?
Receiver: Frame 9 received ?
Sender: All frames acknowledged ?
```

```
All frames sent successfully! ??
```

```
-----
Process exited after 6.28 seconds with return value 0
Press any key to continue . . .
```