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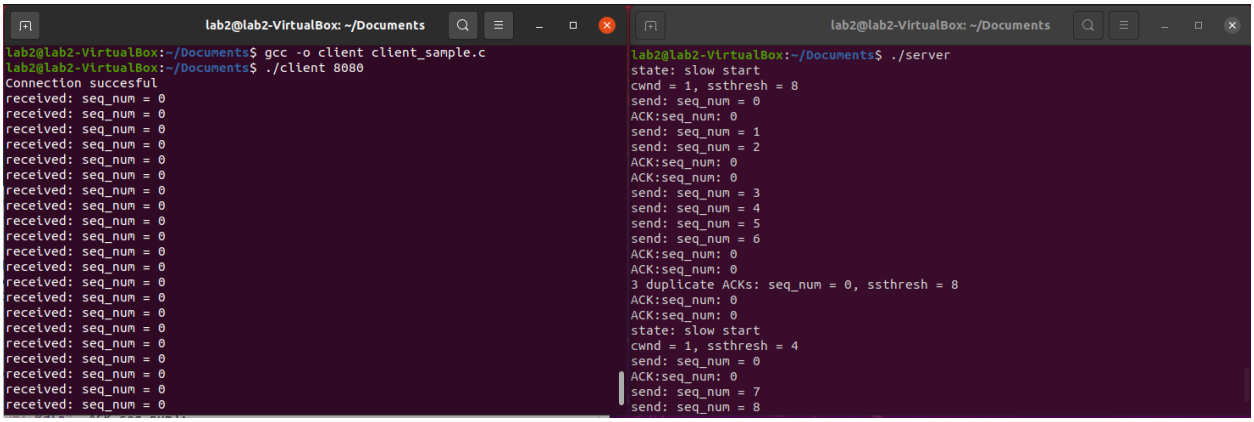
Report for Lab3

Dear TAs, sorry I cannot fix my bug for the program, due to the time limitation. Because I had my last final exams on 17 June 2022. And I tried my best for doing this lab.

Thank you.

Result:



1. How to send the packet with correct sequence number?

I failed to do it because I think something wrong with my code. As according to the result, it seems like I could send the correct sequence number.

```
for(int i=0; i<cwnd; i++)
{
    send(clientSockfd, &data_seq.Data, LENGTH, 0);
    printf("send: seq_num = %d\n", data_seq.seq_num);
    data_seq.seq_num++;
}
```

2. How to simulate packet loss?

```
if (check == true && (data_seq.seq_num == 8 || data_seq.seq_num == 13)){
    check = false;
}
if (( count != 0 && data_seq.seq_num == 8 || data_seq.seq_num == 13) ){
    printf("lost: seq_num: %d\n", data_seq.seq_num);
    ACK.seq_num = rec = data_seq.seq_num;
    check = true;
}
```

3.

The way I done is checking every sequence number received, as if the count is greater than or equal to 3, then the check for the duplicate ACK will be true. Then, from here, the packet loss can be detected.

```
for(int i=0; i<cwnd; i++){
    recv(clientSockfd, &data_seq.Data, LENGTH, 0);
    ACK.seq_num = atoi(data_seq.Data);
    if (pre_ACK == ACK.seq_num){
        count++;
    }

    if (count >= 3){
        printf("3 duplicate ACKs: seq_num = %d, ssthresh = %d\n", ACK.seq_num, ssthresh);
        check = true;
    }
    pre_ACK = ACK.seq_num;
    printf("ACK:seq_num: %d\n", ACK.seq_num);
}
```

4. How to update cwnd and ssthresh

```
if (check != false){
    ssthresh /= 2;
    cwnd = 1;
    printf("state: slow start\n");
    printf("cwnd = %d, ssthresh = %d\n", cwnd, ssthresh);
    last_seq = data_seq.seq_num;
    data_seq.seq_num = pre_ACK;
}
else if (cwnd >= ssthresh){
    printf("state: congestion avoidance\n");
    printf("cwnd = %d, ssthresh = %d\n", cwnd, ssthresh);
    cwnd += 1;
}
else {
    cwnd *= 2;
}
```

5. How do client receive data and send ACKs with correct sequence number?

```
if(check == true){
    if (count != 0){
        send(client_socket, &data_seq.Data, LENGTH, 0);
        count--;
    }
    else{
        printf("received: seq_num = %d\n", data_seq.seq_num);
        ACK.seq_num = rec;
        send(client_socket, &data_seq.Data, LENGTH, 0);
    }
}
else {
    printf("received: seq_num = %d\n", data_seq.seq_num);
    ACK.seq_num = data_seq.seq_num;
    send(client_socket, &data_seq.Data, LENGTH, 0);
}
```