IMPLEMENTING THE WINDOW SLIDING PROTOCOL

SERVER

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>

#define PORT 4042

int main()
{
    int socketfd = 0, clientfd = 0;
    struct sockaddr_in host_addr, client_addr;
    socklen_t length = sizeof(struct sockaddr_in);
    char buffer[1024];
    socketfd = socket(AF_INET, SOCK_STREAM, 0);

    if (socketfd < 0)
    {
        fprintf(stderr, "Socket creation error\n");
        return -1;
    }

    host_addr.sin_family = AF_INET;
    host_addr.sin_port = ntohs(PORT);
    inet_pton(AF_INET, "127.0.0.1", &host_addr.sin_addr);

    if (bind(socketfd, (struct sockaddr *)&host_addr, length) < 0)
    {
        fprintf(stderr, "Error in bind creation\n");
        return -1;
    }

    if (listen(socketfd, 5) < 0)
    {
        fprintf(stderr, "Error in listen port\n");
        return -1;
    }

    fprintf(stdout,"Listening on %s : %d\n",inet_ntoa(host_addr.sin_addr),ntohs(host_addr.sin_port));

    while(1){
        fprintf(stdout, "_____\n\n");
        clientfd = accept(socketfd, (struct sockaddr *)&host_addr, &length);

        if (clientfd < 0)
        {
            fprintf(stderr, "Error in accepting connection.\n");
            continue;
        }
        fprintf(stdout, "Accepted connection.\n");

        int w, f;
        recv(clientfd, &w, sizeof(int), 0);
        fprintf(stdout, "Window size : %d\n", w);

        recv(clientfd, &f, sizeof(int), 0);
        fprintf(stdout, "Number of frames to transmit : %d\n", f);
        int i = 0, frames;
```

```c
S:
        recv(clientfd, &frames, sizeof(int), 0);
        if (frames == -9999)
        {
            fprintf(stdout, "\nSending acknowledgement of above frames \n\n");
            fprintf(stdout,"_____\n\n");
            close(clientfd);
            break;
        }

        i++;
        fprintf(stdout, " %d\t", frames);

        if (i == w)
        {
            i = 0;
            fprintf(stdout, "\nSending acknowledgement of above frames\n\n");
        }
        goto S;
    }

    close(socketfd);
    return 0;
}
```

CLIENT

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>

#define PORT 4042

int main()
{
    int socketfd = 0;
    struct sockaddr_in host_addr;
    socklen_t length = sizeof(struct sockaddr_in);
    socketfd = socket(AF_INET, SOCK_STREAM, 0);

    if (socketfd < 0)
    {
        fprintf(stderr, "Error in creating socket.\n");
        return -1;
    }

    host_addr.sin_family = AF_INET;
    host_addr.sin_port = htons(PORT);
    inet_pton(AF_INET, "127.0.0.1", &host_addr.sin_addr);

    if (connect(socketfd, (struct sockaddr *)&host_addr, length) < 0)
    {
        fprintf(stderr, "Error in connecting to server.\n");
        return -1;
    }
```

```c
    fprintf(stdout, "Connection established.\n");

    int w, f;
    fprintf(stdout, "\nEnter Window size : ");
    scanf("%d", &w);
    send(socketfd, &w, sizeof(int), 0);

    fprintf(stdout, "\nEnter number of frames to transmit: ");
    scanf("%d", &f);
    send(socketfd, &f, sizeof(int), 0);

    int frames[f], temp[w];
    fprintf(stdout, "\nEnter %d frames : ", f);

    for (int i = 0; i < f; i++)
    {
        scanf("%d", &frames[i]);
    }

    int i, j, t;

    for (i = 0; i < f; i++)
    {
        if ((i + 1) % w == 0)
        {
            t = frames[i];
            send(socketfd, &t, sizeof(int), 0);
            fprintf(stdout, "%d\t", t);
            fprintf(stdout,"\nAcknowledgement of above frames sent is received by sender\n\n");
            j = 0;
        }
        else
        {
            t = frames[i];
            send(socketfd, &t, sizeof(int), 0);
            fprintf(stdout, "%d\t", t);
        }
    }

    if (f % w != 0)
        fprintf(stdout,"\nAcknowledgement of above frames sent is received by sender\n\n");

    t = -9999;
    send(socketfd, &t, sizeof(int), 0);

    close(socketfd);
    return 0;
}
```

OUTPUT :-

1)

Window size : 3

No. Of Frames : 7

```
[s2019103573@centos8-linux Wed Nov 10 05:35 PM ~]$ cd cn
[s2019103573@centos8-linux Wed Nov 10 05:36 PM cn]$ cd lab10
[s2019103573@centos8-linux Wed Nov 10 05:37 PM lab10]$ gcc server.c -o server
[s2019103573@centos8-linux Wed Nov 10 05:37 PM lab10]$ ./server
Listening on 127.0.0.1 : 4042
--------------------------------------------------------------
Accepted connection.
Window size : 3
Number of frames to transmit : 7
 5       574     20
Sending acknowledgement of above frames

 12      565     10
Sending acknowledgement of above frames

 99
Sending acknowledgement of above frames

--------------------------------------------------------------

[s2019103573@centos8-linux Wed Nov 10 05:39 PM lab10]$ []
```

```
[s2019103573@centos8-linux Wed Nov 10 05:35 PM ~]$ cd cn
[s2019103573@centos8-linux Wed Nov 10 05:37 PM cn]$ cd lab10
[s2019103573@centos8-linux Wed Nov 10 05:37 PM lab10]$ gcc client.c -o client
[s2019103573@centos8-linux Wed Nov 10 05:37 PM lab10]$ ./client
Connection established.

Enter Window size : 3

Enter number of frames to transmit: 7

Enter 7 frames : 5 574 20 12 565 10 99
 5       574     20
Acknowledgement of above frames sent is received by sender

 12      565     10
Acknowledgement of above frames sent is received by sender

 99
Acknowledgement of above frames sent is received by sender

[s2019103573@centos8-linux Wed Nov 10 05:39 PM lab10]$ █
```

2)

Window size : 4

No. Of Frames : 23

```
[s2019103573@centos8-linux Wed Nov 10 05:42 PM ~]$ cd cn
[s2019103573@centos8-linux Wed Nov 10 05:42 PM cn]$ cd lab10
[s2019103573@centos8-linux Wed Nov 10 05:42 PM lab10]$ gcc server.c -o server
[s2019103573@centos8-linux Wed Nov 10 05:42 PM lab10]$ ./server
Listening on 127.0.0.1 : 4042
--------------------------------------------------------------
Accepted connection.
Window size : 4
Number of frames to transmit : 23
 1       2       3       4
Sending acknowledgement of above frames

 5       6       7       8
Sending acknowledgement of above frames

 9       10      11      12
Sending acknowledgement of above frames

 13      14      15      16
Sending acknowledgement of above frames

 17      18      19      20
Sending acknowledgement of above frames

 21      22      23
Sending acknowledgement of above frames

--------------------------------------------------------------

[s2019103573@centos8-linux Wed Nov 10 05:43 PM lab10]$ []
```

```
[s2019103573@centos8-linux Wed Nov 10 05:42 PM ~]$ cd cn
[s2019103573@centos8-linux Wed Nov 10 05:42 PM cn]$ cd lab10
[s2019103573@centos8-linux Wed Nov 10 05:42 PM lab10]$ gcc client.c -o client
[s2019103573@centos8-linux Wed Nov 10 05:42 PM lab10]$ ./client
Connection established.

Enter Window size : 4

Enter number of frames to transmit: 23

Enter 23 frames : 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
 1       2       3       4
Acknowledgement of above frames sent is received by sender

 5       6       7       8
Acknowledgement of above frames sent is received by sender

 9       10      11      12
Acknowledgement of above frames sent is received by sender

 13      14      15      16
Acknowledgement of above frames sent is received by sender

 17      18      19      20
Acknowledgement of above frames sent is received by sender

 21      22      23
Acknowledgement of above frames sent is received by sender

[s2019103573@centos8-linux Wed Nov 10 05:43 PM lab10]$ █
```