L11-Introduction to Computer Networking

Homework 11 Answers

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Problem 1 (50pts)

First, please compile and run the TCP Server/Client program using the command below.

$ gcc server.c –o server

$ ./server

$ gcc client.c –o client

$ ./client

```
/*
    C socket server example
*/

#include<stdio.h>
#include<string.h>    //strlen
#include<sys/socket.h>
#include<arpa/inet.h> //inet_addr
#include<unistd.h>    //write

int main(int argc , char *argv[])
{
    int socket_desc , client_sock , c , read_size;
    struct sockaddr_in server , client;
    char client_message[2000];

    //Create socket
    socket_desc = socket(AF_INET , SOCK_STREAM , 0);
```

```c
    if (socket_desc == -1)
    {
        printf("Could not create socket");
    }
    puts("Socket created");


    //Prepare the sockaddr_in structure
    server.sin_family = AF_INET;
    server.sin_addr.s_addr = INADDR_ANY;
    server.sin_port = htons( 8888 );


    //Bind
    if( bind(socket_desc,(struct sockaddr *)&server , sizeof(server)) <
0)
    {
        //print the error message
        perror("bind failed. Error");
        return 1;
    }
    puts("bind done");


    //Listen
    listen(socket_desc , 3);


    //Accept and incoming connection
    puts("Waiting for incoming connections...");
    c = sizeof(struct sockaddr_in);


    //accept connection from an incoming client
    client_sock = accept(socket_desc, (struct sockaddr *)&client,
(socklen_t*)&c);
    if (client_sock < 0)
    {
        perror("accept failed");
        return 1;
    }
```

```c
    puts("Connection accepted");

    //Receive a message from client
    while( (read_size = recv(client_sock , client_message , 2000 , 0)) >
0 )
    {
        //Send the message back to client
        write(client_sock , client_message , strlen(client_message));
    }

    if(read_size == 0)
    {
        puts("Client disconnected");
        fflush(stdout);
    }
    else if(read_size == -1)
    {
        perror("recv failed");
    }

    return 0;
}
```

```c
/*
    C ECHO client example using sockets
*/
#include<stdio.h> //printf
#include<string.h>    //strlen
#include<sys/socket.h>    //socket
#include<arpa/inet.h> //inet_addr
#include<unistd.h>

int main(int argc , char *argv[])
{
    int sock;
    struct sockaddr_in server;
```

```c
char message[1000] , server_reply[2000];

//Create socket
sock = socket(AF_INET , SOCK_STREAM , 0);
if (sock == -1)
{
    printf("Could not create socket");
}
puts("Socket created");

server.sin_addr.s_addr = inet_addr("127.0.0.1");
server.sin_family = AF_INET;
server.sin_port = htons( 8888 ); //port number

//Connect to remote server
if (connect(sock , (struct sockaddr *)&server , sizeof(server)) < 0)
{
    perror("connect failed. Error");
    return 1;
}

puts("Connected¥n");

//keep communicating with server
while(1)
{
    printf("Enter message : ");
    scanf("%s" , message);

    //Send some data
    if( send(sock , message , strlen(message) , 0) < 0)
    {
        puts("Send failed");
        return 1;
    }
```

```c
        //Receive a reply from the server
        if( recv(sock , server_reply , 2000 , 0) < 0)
        {
            puts("recv failed");
            break;
        }


        puts("Server reply :");
        puts(server_reply);
    }


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

```
std6dc28{s1240234}61: gcc server.c -o server
std6dc28{s1240234}62: ./server
Socket created
bind done
Waiting for incoming connections...
```

```
std6dc28{s1240234}63: gcc client.c -o client
client.c:60:5: warning: implicit declaration of function 'close' is invalid in
      C99 [-Wimplicit-function-declaration]
    close(sock);
    ^
1 warning generated.
std6dc28{s1240234}64: ./client
Socket created
connect failed. Error: Connection refused
std6dc28{s1240234}65:
```

Problem2(50pts). Then, please answer the following questions or increment according functions.

2-1. Print the error message when the client start up before the server, and try to explain the reason(10pts)

Socket created
connect failed. Error: Connection refused

Reason:
There are no sockets to connect this client, so it can't establish a connection.

2-2 Print the error message when the client try to connect with a different port 9999, and try to explain the reason (20pts)

Socket created
connect failed. Error: Connection refused

Reason:
There are sockets to connect this client, but it can't connect the port.

2-3 Revise the source code to display the basic information on server side after the startup of the server Such as below
TCPServer: <your hostname>
IP Address: <your IP like 163.143.45.32>
PORT: <post number>......
(20pts)