LAB 1 Part 2

CSD 304 - Computer Networks

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Solution

Makefile

```
makelab: server/server.c client/client.c
    rm -f server/s
    rm -f client/c
    gcc server/server.c -o server/s
    gcc client/client.c -o client/c
    rm -f client/name.txt
    rm -f client/photo.jpg
    rm -f client/*.txt
```

server.c

```c
#include <stdio.h> /* printf and standard i/o */
#include <sys/socket.h> /* socket, bind, listen, accept, socklen_t */
#include <arpa/inet.h> /* sockaddr_in, inet_ntop */
#include <string.h> /* strlen */
#include <stdlib.h> /* atoi, EXIT_FAILURE */
#include <fcntl.h> /* open, O_RDONLY */
#include <unistd.h> /* close, read */
#define SRV_PORT 5322 /* default port number */
#define LISTEN_ENQ 5 /* for listen backlog */
#define MAX_RECV_BUF 256
#define MAX_SEND_BUF 256

void get_file_name(int sock, char* file_name)
{
    char recv_str[MAX_RECV_BUF]; /* to store received string */
    ssize_t rcvd_bytes; /* bytes received from socket */

    /* read name of requested file from socket */
    if ( (rcvd_bytes = recv(sock, recv_str, MAX_RECV_BUF, 0)) < 0) {
        perror("recv error");
        return;
    }
    sscanf (recv_str, "%s\n", file_name); /* discard CR/LF */
}


int send_file(int sock, char *file_name)
{
    int sent_count; /* how many sending chunks, for debugging */
    ssize_t read_bytes, /* bytes read from local file */
    sent_bytes, /* bytes sent to connected socket */
    sent_file_size;
    char send_buf[MAX_SEND_BUF]; /* max chunk size for sending file */
    char * errmsg_notfound = "FNF\n";
    int f; /* file handle for reading local file*/
    sent_count = 0;
    sent_file_size = 0;
    /* attempt to open requested file for reading */
    if( (f = open(file_name, O_RDONLY)) < 0) /* can't open requested file */
    {
        perror(file_name);
        if( (sent_bytes = send(sock, errmsg_notfound , strlen(errmsg_notfound), 0)) < 0 )
        {
            perror("send error");
            return -1;
        }
    }
    else /* open file successful */
    {
        printf("Sending file: %s\n", file_name);
        while( (read_bytes = read(f, send_buf, MAX_RECV_BUF)) > 0 )
        {
            if( (sent_bytes = send(sock, send_buf, read_bytes, 0)) < read_bytes )
            {
                    perror("send error");
                    return -1;
            }
            sent_count++;
            sent_file_size += sent_bytes;
        }
        close(f);
    } /* end else */

    printf("Done with this client. Sent %d bytes in %d send(s)\n\n", sent_file_size, sent_co
    return sent_count;
}
```

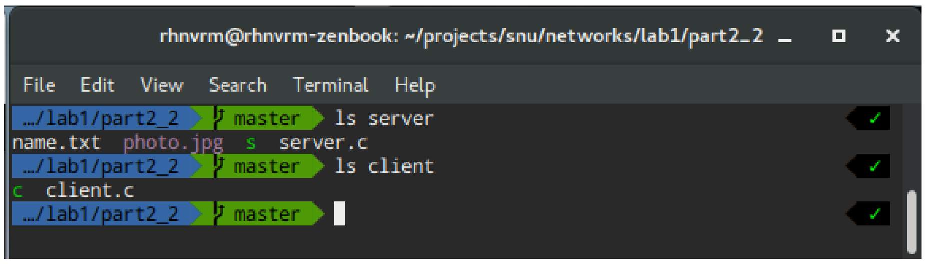
```
int main(int argc, char* argv[])
{
    int listen_fd, conn_fd;
    struct sockaddr_in srv_addr, cli_addr;
    socklen_t cli_len;
    char file_name [MAX_RECV_BUF]; /* name of the file to be sent */
    char print_addr [INET_ADDRSTRLEN]; /* readable IP address */
    memset(&srv_addr, 0, sizeof(srv_addr)); /* zero-fill srv_addr structure*/
    memset(&cli_addr, 0, sizeof(cli_addr)); /* zero-fill cli_addr structure*/
    srv_addr.sin_family = AF_INET;
    srv_addr.sin_addr.s_addr = htonl(INADDR_ANY);
     /* if port number supplied, use it, otherwise use SRV_PORT */
    srv_addr.sin_port = (argc > 1) ? htons(atoi(argv[1])) : htons(SRV_PORT);
    if ( (listen_fd = socket(AF_INET, SOCK_STREAM, IPPROTO_TCP)) < 0) {
        perror("socket error");
        exit(EXIT_FAILURE);
    }
    /* bind to created socket */
    if( bind(listen_fd, (struct sockaddr*) &srv_addr, sizeof(srv_addr)) < 0 ){
        perror("bind error");
        exit(EXIT_FAILURE);
    }

    printf("Listening on port number %d ...\n", ntohs(srv_addr.sin_port));
    if( listen(listen_fd, LISTEN_ENQ) < 0 ) {
        perror("listen error");
        exit(EXIT_FAILURE);
    }

    for( ; ; ) /* run forever*/
    {
        cli_len = sizeof(cli_addr);
        printf ("Waiting for a client to connect...\n\n");
        /* block until some client connects */
        if ( (conn_fd = accept(listen_fd, (struct sockaddr*) &cli_addr, &cli_len)) < 0 )
        {
            perror("accept error");
            break; /* exit from the for loop */
        }

        /* convert numeric IP to readable format for displaying */
        inet_ntop(AF_INET, &(cli_addr.sin_addr), print_addr, INET_ADDRSTRLEN);
        printf("Client connected from %s:%d\n",
            print_addr, ntohs(cli_addr.sin_port) );
        get_file_name(conn_fd, file_name);
        send_file(conn_fd, file_name);
        printf("Closing connection\n");
        close(conn_fd); /* close connected socket*/
    } /* end for */

    close(listen_fd); /* close listening socket*/
    return 0;
}
```

client.c

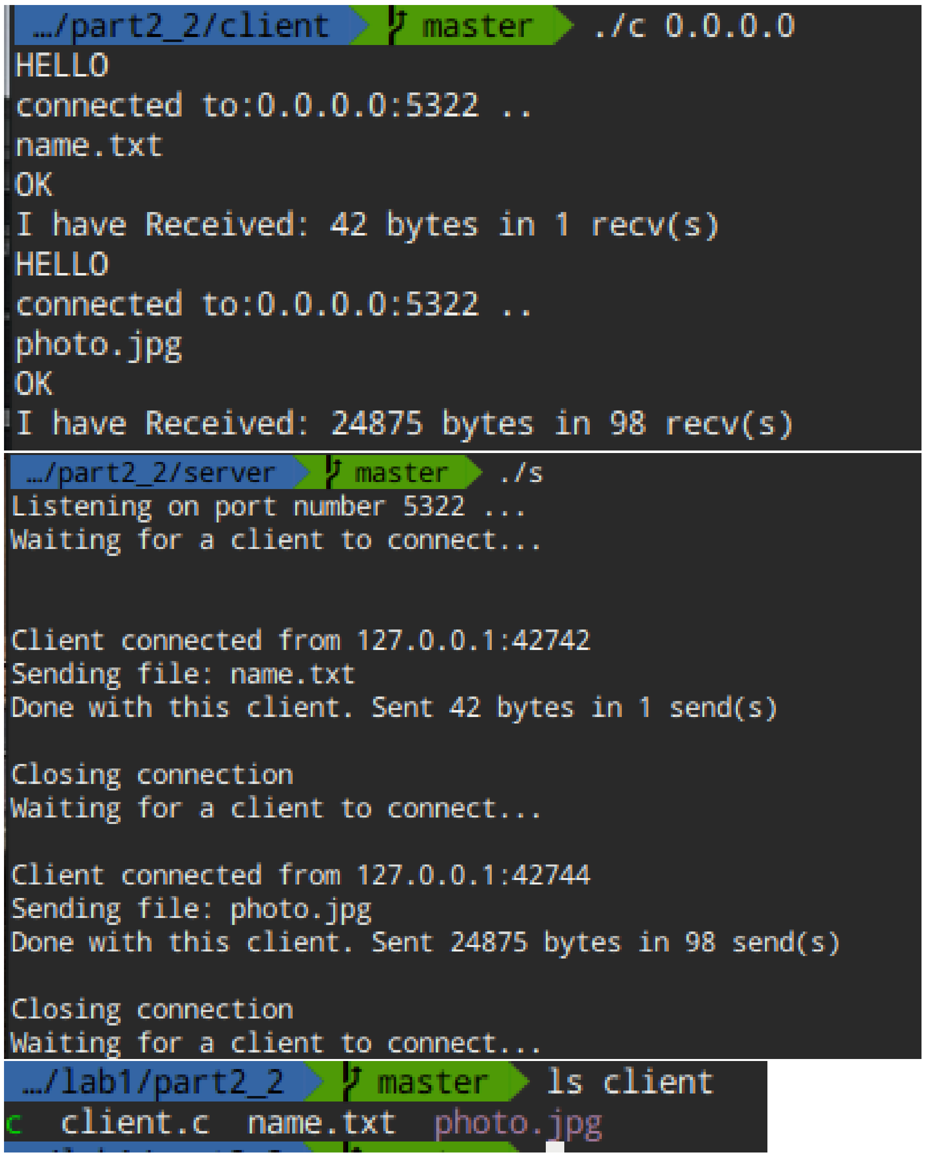
```
#include <stdio.h>
#include <sys/socket.h> /* socket, connect, socklen_t */
#include <arpa/inet.h> /* sockaddr_in, inet_pton */
#include <string.h>
#include <stdlib.h> /* atoi */
#include <fcntl.h> /* O_WRONLY, O_CREAT */
#include <unistd.h> /* close, write, read */
#define SRV_PORT 5322
#define MAX_RECV_BUF 256
#define MAX_SEND_BUF 256

int recv_file(int sock, char* file_name)
{
    char send_str [MAX_SEND_BUF]; /* message to be sent to server*/
    int f; /* file handle for receiving file*/
    ssize_t sent_bytes, rcvd_bytes, rcvd_file_size;
    int recv_count; /* count of recv() calls*/
    char recv_str[MAX_RECV_BUF]; /* buffer to hold received data */
    size_t send_strlen; /* length of transmitted string */

    sprintf(send_str, "%s\n", file_name); /* add CR/LF (new line) */
    send_strlen = strlen(send_str); /* length of message to be transmitted */
    if( (sent_bytes = send(sock, file_name, send_strlen, 0)) < 0 ) {
        perror("send error");
        return -1;
    }
    /* attempt to create file to save received data. 0644 = rw-r--r-- */
    if ( (f = open(file_name, O_WRONLY|O_CREAT, 0644)) < 0 )
    {
        perror("error creating file");
        return -1;
    }
    recv_count = 0; /* number of recv() calls required to receive the file */
    rcvd_file_size = 0;

    int keep_file = 1;
    while ( (rcvd_bytes = recv(sock, recv_str, MAX_RECV_BUF, 0)) > 0 )
    {
        recv_count++;
        rcvd_file_size += rcvd_bytes;
        if(strcmp(recv_str, "FNF\n") == 0){
            printf("File not found\n");
            keep_file = 0;
            break;
        }
        else if(keep_file == 1){
            printf("OK\n");
            keep_file = 2;
        }

        if (write(f, recv_str, rcvd_bytes) < 0 )
        {
            perror("error writing to file");
            return -1;
        }
    }
    close(f); /* close file*/
    if(!keep_file) remove(file_name);
    else{
        printf("I have Received: %d bytes in %d recv(s)\n", rcvd_file_size, recv_count);
    }
    return rcvd_file_size;
}

int main(int argc, char* argv[])
{

        int sock_fd;
        struct sockaddr_in srv_addr;

        if (argc < 2)
        {
            printf("usage: %s <IP address> [port number]\n", argv[0]);
            exit(EXIT_FAILURE);
        }
        memset(&srv_addr, 0, sizeof(srv_addr)); /* zero-fill srv_addr structure*/
    for(;;){
        /* create a client socket */
```

```
            sock_fd = socket(AF_INET, SOCK_STREAM, IPPROTO_TCP);
            srv_addr.sin_family = AF_INET; /* internet address family */

            /* convert command line argument to numeric IP */
            if ( inet_pton(AF_INET, argv[1], &(srv_addr.sin_addr)) < 1 )
            {
                printf("Invalid IP address\n");
                exit(EXIT_FAILURE);
            }

            /* if port number supplied, use it, otherwise use SRV_PORT */
            srv_addr.sin_port = (argc > 2) ? htons(atoi(argv[2])) : htons(SRV_PORT);

            if( connect(sock_fd, (struct sockaddr*) &srv_addr, sizeof(srv_addr)) < 0 )
            {
                perror("connect error");
                exit(EXIT_FAILURE);
            }
            printf("HELLO\nconnected to:%s:%d ..\n",argv[1],SRV_PORT);

            char file_name[100];
            scanf("%s", &file_name);
            if(strcmp(file_name, "Bye") == 0) break;
            recv_file(sock_fd, file_name); /* argv[1] = file name */

            /* close socket*/
            if(close(sock_fd) < 0)
            {
                perror("socket close error");
                exit(EXIT_FAILURE);
            }
        }
        return 0;
}
```

Screenshots


rhnvrm@rhnvrm-zenbook: ~/projects/snu/networks/lab1/part2_2
File Edit View Search Terminal Help

```
…/lab1/part2_2  master  ls server
name.txt  photo.jpg  s  server.c
…/lab1/part2_2  master  ls client
c  client.c
…/lab1/part2_2  master
```



```
…/part2_2/client  master  ./c 0.0.0.0
HELLO
connected to:0.0.0.0:5322 ..
name.txt
OK
I have Received: 42 bytes in 1 recv(s)
HELLO
connected to:0.0.0.0:5322 ..
photo.jpg
OK
I have Received: 24875 bytes in 98 recv(s)
```

```
…/part2_2/server  master  ./s
Listening on port number 5322 ...
Waiting for a client to connect...


Client connected from 127.0.0.1:42742
Sending file: name.txt
Done with this client. Sent 42 bytes in 1 send(s)

Closing connection
Waiting for a client to connect...

Client connected from 127.0.0.1:42744
Sending file: photo.jpg
Done with this client. Sent 24875 bytes in 98 send(s)

Closing connection
Waiting for a client to connect...
```

```
…/lab1/part2_2  master  ls client
c  client.c  name.txt  photo.jpg
```