ECEN 602 TCP Echo Server and Client

Sep.17th,2018

Team: 23   Feiyan Yu, Ningze Wang, Boquan Tao

Server side code

Socket_server_yfy.cpp

```
#include <stdio.h>
#include <string>
#include <stdlib.h>
#include <sys/socket.h>
#include <sys/types.h>
#include <sys/un.h>
#include <signal.h>
#include <sys/wait.h>
#include <netdb.h>
#include <arpa/inet.h>
#include <unistd.h>
#include <errno.h>

//STR_SIZE is the maxsize of message, MAXLINE is to give a buffer
#define MAXLINE 100
#define STR_SIZE 50

int readline (int sockfd, char* buffer, int n);
int writen (int sockfd, char* buffer, int n);
void sig_handling(int sig);
int echo_new(int sockfd);
char* trim(char *str);

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

    int sockfd;
    char recvline[MAXLINE+1];
    struct sockaddr_in servaddr;
    int port_num;

    //Command is echo port
    if (argc != 2){
        printf( "Command error\n");
        exit(0);
}
//create a socket
if ((sockfd = socket(AF_INET,SOCK_STREAM,0)) < 0){
        printf("Socket error\n");
        exit(0);
}
//Get port number.
for (char *p = argv[1]; *p != '\0'; p++) {
        if (*p >= '0' && *p <= '9') {
                port_num = port_num * 10 + (*p - '0');
        }
        else {
                printf("Invaild port number error\n");
                exit(0);
        }
}
printf("Port number is:%d\n", port_num);

//Socket initialization
bzero(&servaddr, sizeof(servaddr));
servaddr.sin_family = AF_INET;
servaddr.sin_port = htons(port_num);

//inet_aton("10.230.169.95", &servaddr.sin_addr);
servaddr.sin_addr.s_addr = INADDR_ANY;

//printf("%d\n", servaddr.sin_addr.s_addr);
socklen_t servaddr_size = sizeof(servaddr);

//binding (sockaddr and sockaddr_in is at same size, so just cast)
if (bind (sockfd, (struct sockaddr*)&servaddr, servaddr_size) < 0){
        printf("Binding socket error.");
        printf("Error number:%d\n",(int) errno);
        exit(0);
}
else {
        printf("Socket binded successfully.\n");
}
//listen to the client
//backblog: max connected number.
if(listen(sockfd, 10) < 0){
        printf("Unable to find client.\n");
        printf("Error number%d\n ",(int) errno);
        exit(0);
}
else {
        //listen to socket and waiting for client
        printf("Listening to the cilent.\n");
}

//Prepared for echo.
char received_str[MAXLINE];
//Process the zombie using sigaction
struct sigaction act;
act.sa_handler = sig_handling;
sigemptyset(&act.sa_mask);
act.sa_flags = 0;
sigaction(SIGCHLD,&act,0);


while(true){
        struct sockaddr_in clientaddr;
        socklen_t clientaddr_size = sizeof(clientaddr);
        int client_socket = accept(sockfd, (struct sockaddr*)&clientaddr, &clientaddr_size);

        if(client_socket < 0){
                if(errno == EINTR){
                //EINTR, try it again.
                        continue;
                }
                else {
                        printf("Unable to accept client\n");
                        printf("Error number: %d\n", (int) errno);
                        exit(0);
                }
        }
        //create a child process

        int pid = fork();

        if (pid < 0){
                perror("Error of fork a child\n");
                exit(1);
        }
        else if (pid == 0){
                //child process
                //echo(client_socket);
```

```
				close(sockfd);
				echo_new(client_socket);
				close(client_socket);
				exit(0);
			}
			//main process do nothing but loop.
			else {

				//sleep(0.2);
			}

		}
		return 0;
}

int readline (int sockfd, char* buffer, int n){
		char str[MAXLINE + 1];
		int len;
		int letter;
		char *b;
		char character;

		if (n <= 0 || buffer == NULL) {
			printf("Invaild input.\n");
			return -1;
		}

		//Initialization
		b = buffer;
		len = 0;

		for(int i = 0; i < MAXLINE; i++){
			//read one letter
			letter = (int)read(sockfd, &character, 1);
			//printf("%d\n",letter);
			if(letter == -1) {
				if(errno == EINTR){
				//EINTR, try it again.
					continue;
				}
				else {
				//Some errors occur
					return -1;
				}
```

```
            }
            else if(letter == 0) {
                //Some letter is read, end with '\0', read is over
                break;
            }
            else {
                // only read <= n-1 letters
                if (len < n - 1) {
                    len++;
                    *b = character;
                    b++;
                }
                // The line is over.
                if (character == '\n') {
                    break;
                }
            }
        }
        //Mark the end of the string(line)
        *b = '\0';
        return len;
}

int writen (int sockfd, char* buffer, int n){
        int len_written;
        char* b = buffer;
        /*
        write(fp, p1+len, (strlen(p1)-len)
        */
        for (int i = n; i > 0; ){
            len_written = write(sockfd, b, i);
            if (len_written <= 0){
                if (len_written < 0 && errno == EINTR){
                    //Try it again.
                    continue;
                }
                else {
                    //Some errors occur.
                    return -1;
                }
            }
            else {
                i -= len_written;
                //point to the next location for write
```

```
			b += len_written;
		}
	}
	return n;
}

//Handler for process the SIGCHLD when child is terminated
void sig_handling(int sig) {
	int status;
	pid_t pid;
	if(sig == SIGCHLD)
	{
		//waitpid to kill zombie
		pid = waitpid(-1,&status,WNOHANG);
		if(WIFEXITED(status))
		{
			printf("process %d exited,return value=%d\n",pid,WEXITSTATUS(status));
		}
	}
}

int echo_new(int sockfd) {
	int len;
	char str[MAXLINE + 1];
	memset(str, 0, STR_SIZE);

	//Receive message from client.

	while(1){
		//len = read(sockfd, str, STR_SIZE);
		len = readline(sockfd, str, STR_SIZE);
		//printf("len: %d\n",len);
		//str[STR_SIZE]='\0';
		if(len < 0){
			printf("Unable to receive message from client.\n");
			break;
		}
		else if(len == 0) {
			printf("Client type EOF, service terminate.");
			break;
		}
		else{
			char *temp = (char *)malloc((MAXLINE + 1) * sizeof(char));
			strcpy(temp, str);
```

```
                        temp = trim(temp);
                        //printf("temp: %s\n", temp);
                        //printf("is quit: %d\n", strcmp(temp, "quit"));
                        if (strcmp(temp, "\0") != 0){
                                //printf("len: %d\n",len);
                                printf("Message from client: %s\n", temp);
                                writen(sockfd, str, len);
                        }
                        if (strcmp(temp, "quit") == 0 ) {
                                break;
                        }
                }
        }


        return 0;
}
//Trim a string. remove the head and tail of '\0' '\n' '\t' '\r'
char* trim(char *str) {
        int first = -1;
        int last = -1;
        for (int i = 0; str[i] != '\0'; i++) {
                if (str[i] != ' ' && str[i] != '\t' && str[i] != '\n' && str[i] != '\r'){
                        first = i;
                        break;
                }
        }
        if (first == -1){
                str[0] = '\0';
                return str;
        }

        for (int i = first; str[i] != '\0'; i++){
                if (str[i] != ' ' && str[i] != '\t' && str[i] != '\n' && str[i] != '\r') {
                        last = i;
                }
        }

        str[last + 1] = '\0';
        return str + first;
}
```

Client side code

client_wnz.cpp

```
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <arpa/inet.h>
#include <errno.h>
#include <iostream>
#include <stdio.h>
#include <string.h>
#include <unistd.h>
#include <stdio_ext.h>
#include <stdlib.h>
using namespace std;

#define MAXLINE 50

//********readline function*******//
int readline(int fd, char* buf, int len)
{
	int bytes, bytes_get;
	char x;
	char *y;
	if (buf == NULL || len <= 0)
	{
		errno = EINVAL;
		return -1;
	}

	bytes_get = 0;
	y = buf;
	while (1)
	{
		bytes = read(fd, &x, 1);    // returns one character per function call
		if (bytes == -1)
		{
			if (errno == EINTR)
				continue;
			else
				return -1;
		}
```

```
        else if (bytes == 0)
        {
            if (bytes_get == 0)    //read no character
                return 0;
            else      break;           //a line terminated with a newline
        }
        if (bytes_get<len - 1)
        {
            bytes_get++;
            *y = x;
            y++;
        }
        if (x == EOF) return -1;    //turn to close the socket
        if (x == '\n')
            break;
    }
    *y = '\0';
    return bytes_get;
}

//*************writen function**********//
int writen(int fd, char* buf, int len)
{
    char*    sen = buf;
    int bytes_left = len;        //total characters need to be writen
    int bytes_written;
    while (bytes_left>0)
    {
        bytes_written = (int)write(fd, sen, bytes_left);
        if (bytes_written <= 0)
        {
            if (bytes_written<=0 && errno == EINTR)
                bytes_written = 0;
            else         return -1;
        }
        sen += bytes_written;
        bytes_left -= bytes_written;
    }
    return bytes_written;
}

void str_cli(FILE* stdin, int sockfd)
{
    char sendline[MAXLINE], recvline[MAXLINE];
```

```
        while (fgets(sendline, MAXLINE, stdin) != NULL) //get the message from
keyboard to sendline
        {
            if (feof(stdin))
            {
                cout << "\n" << "EOF detected, stop sending messages and exit" <<
endl;
                break;
            }

            sendline[MAXLINE - 1] = '\0';
            if (strlen(sendline) == MAXLINE - 1 && sendline[MAXLINE - 1] != '\n')
            {
                cout << "size of input string exceed the maximum" << endl;
                cout << "restart, the maximum is    " << MAXLINE - 1 << endl;
                __fpurge(stdin);
                continue;
            }
            writen(sockfd, sendline, strlen(sendline));      //write to the server
            if (readline(sockfd, recvline, MAXLINE) == 0)
                perror("str_cli:server shut off");
            fputs(recvline, stdout);//echo it on screen
        }
    }

    int main(int argc, char *argv[])
    {
        if (argc != 3)
        {
            printf("command error");
            exit(0);
        }

        int c0,result,port_num;
        struct sockaddr_in servaddr;

        //****get port number*******//
        for (char *p = argv[2]; *p != '\0'; p++) {
            if (*p >= '0' && *p <= '9') {
                port_num = port_num * 10 + (*p - '0');
            }
            else {
                printf("Invaild port number error\n");
                exit(0);
            }
        }
        printf("Port number is:%d\n", port_num);

        c0 = socket(AF_INET, SOCK_STREAM, 0);
        bzero(&servaddr, sizeof(servaddr));
        servaddr.sin_family = AF_INET;
        servaddr.sin_port = htons(port_num);// server listen port
        result=inet_pton(AF_INET, argv[1], &servaddr.sin_addr);// IP address of server
        if (result<0)
        {
            perror("first parameter error:system doesn't support this protocol type");
            close(c0);
            exit(1);
        }
        else if (result == 0)
        {
            perror("second parameter is not valid format");
            exit(1);
        }
        if (connect(c0, (const struct sockaddr*)&servaddr, sizeof(struct sockaddr_in)) ==
-1)
        {
            perror("fail to connect");
            close(c0);
            exit(1);
        }
        cout << "Connected to server\n";

        cout << "Input a sentence(Ctrl+D means to stop connection)" << endl;
        cout << "The maximum length is 50" << endl;

        str_cli(stdin, c0);//echo
        exit(0);
}
```

client_yfy.cpp

```
#include <stdio.h>
#include <string>
#include <sys/un.h>
#include <sstream>
#include <stdlib.h>
#include <stdio_ext.h>
```

```
#include <sys/socket.h>
#include <netdb.h>
#include <arpa/inet.h>
#include <unistd.h>
#include <errno.h>

//STR_SIZE is the maxsize of message, MAXLINE is to give a buffer
#define MAXLINE 100
#define STR_SIZE 50

int readline (int sockfd, char* buffer, int n);
int writen (int sockfd, char* buffer, int n);
char* trim(char *str);

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

	int sockfd;
	char str[MAXLINE+1];
	struct sockaddr_in servaddr;
	int port_num = 0;
	unsigned int ip;

	//command is echo server_address port
	if(argc != 3) {
		printf("command error\n");
		exit(0);
	}

	//create a socket
	if ((sockfd = socket(AF_INET,SOCK_STREAM,0)) < 0){
		printf("Socket error\n");
		exit(0);
	}

	//Get a unsigned int32 IPv4 address(aton is ok).
	ip = inet_aton(argv[1], &servaddr.sin_addr);
	if (ip == 0){
		printf("IPv4 format invalid!\n");
		exit(0);
	}

	//Get port number.
	for (char *p = argv[2]; *p != '\0'; p++) {
		if (*p > '0' || *p < '9') {
			port_num = port_num * 10 + (*p - '0');
		}
		else {
			printf("Invaild port number error\n");
			exit(0);
		}
	}
	printf("Connecting to %s:%d.", inet_ntoa(servaddr.sin_addr), port_num);

	//Socket initialization
	bzero(&servaddr, sizeof(servaddr));
	servaddr.sin_family = AF_INET;
	servaddr.sin_port = htons(port_num);
	socklen_t server_addr_size = sizeof(servaddr);

	//Connect to server
	int                connection_status                =                connect(sockfd,(struct
sockaddr*)&servaddr,server_addr_size);
	if(connection_status < 0){
		printf("Error when connecting to server.\n");
		printf("Error number: %d\n", (int) errno);
		exit(0);
	}
	printf("Server connected.\n");
	char buffer[MAXLINE+1];
	char buffer_recv[MAXLINE+1];
	while(1) {

		//Send message to server
		printf("Send Message: ");
		if (fgets(buffer, sizeof(buffer), stdin) == NULL && feof(stdin)) {
			printf("EOF detected, the client will be terminated.");
			break;
		}
		//buffer[strlen(buffer)] = '\0';
		/*
		if(feof(stdin)){
			printf("EOF detected, the client will be terminated.");
			break;
		}*/
		if(strlen(buffer) >= STR_SIZE){
			printf("Exceed limit, try again.(50)\n");
			continue;
		}
		int write_to_server = writen(sockfd, buffer, strlen(buffer));

		if(write_to_server < 0){
			printf("Error occur when writing.");
			break;
		}

		//trim temp and compared to "quit"
		char *temp = (char *)malloc((MAXLINE + 1) * sizeof(char));
		strcpy(temp, buffer);
		temp = trim(temp);
		if(!strcmp(temp,"quit")){
			printf("Quit detected, the client will be terminated.");
			break;
		}

		readline(sockfd, buffer_recv, STR_SIZE);
		printf("Echoed message from server: %s\n", buffer_recv);


	}
	close(sockfd);
	printf("You shut off the connection.\n");
}

int readline (int sockfd, char* buffer, int n){
	char str[MAXLINE + 1];
	int len;
	int letter;
	char *b;
	char character;

	if (n <= 0 || buffer == NULL) {
		printf("Invaild input.\n");
		return -1;
	}

	//Initialization
	b = buffer;
	len = 0;

	for(int i = 0; i < MAXLINE; i++){
		//read one letter
		letter = (int)read(sockfd, &character, 1);
```

```
                //printf("%d",letter);
                if(letter == -1) {
                        if(errno == EINTR){
                        //EINTR, try it again.
                                continue;
                        }
                        else {
                        //Some errors occur
                                return -1;
                        }
                }
                else if(letter == 0) {
                        //Some letter is read, end with '\0'
                        break;
                }
                else {
                        // only read <= n-1 letters
                        if (len < n - 1) {
                                len++;
                                *b = character;
                                b++;
                        }
                        // The line is over.
                        if (character == '\n') {
                                break;
                        }
                }
        }
        //Mark the end of the string(line)
        *b = '\0';
        return len;
}

int writen (int sockfd, char* buffer, int n){
        int len_written;
        char* b = buffer;
        /*
        write(fp, p1+len, (strlen(p1)-len)
        */
        for (int i = n; i > 0; ){
                len_written = write(sockfd, b, i);
                if (len_written <= 0){
                        if (len_written < 0 && errno == EINTR){
                                //Try it again.
                continue;
            }
            else {
                //Some errors occur.
                return -1;
            }
        }
        else {
            i -= len_written;
            //point to the next location for write
            b += len_written;
        }
    }
    return n;
}

char* trim(char *str) {
    int first = -1;
    int last = -1;
    for (int i = 0; str[i] != '\0'; i++) {
        if (str[i] != ' ' && str[i] != '\t' && str[i] != '\n' && str[i] != '\r'){
            first = i;
            break;
        }
    }
    if (first == -1){
        str[0] = '\0';
        return str;
    }

    for (int i = first; str[i] != '\0'; i++){
        if (str[i] != ' ' && str[i] != '\t' && str[i] != '\n' && str[i] != '\r') {
            last = i;
        }
    }

    str[last + 1] = '\0';
    return str + first;
}
```

client_tbq.cpp

```
    #include <stdio.h>
    #include <string>
```

```
#include <sys/un.h>
#include <sstream>
#include <stdlib.h>
#include <stdio_ext.h>
#include <sys/socket.h>
#include <netdb.h>
#include <arpa/inet.h>
#include <unistd.h>
#include <errno.h>

#define maxlen 20

//describe errors
void err_sys(const char*x){
	perror(x);
	exit(1);
}

//write from buf to sockfd
int writen(int sockfd,char* buf,int N){
	int NumLeft=N;
	int Numcount;
	char* ptr=buf;
	while(NumLeft){
		Numcount=write(sockfd,ptr,NumLeft);
		if(Numcount<0){
			if(errno==EINTR)
				continue;
			else
				return -1;			//errors occur
		}
		NumLeft-=Numcount;			//number left to write to sockfd
		ptr+=Numcount;				//pointer ptr pointing to left
characters
	}
	return N;
}

//read from sockfd to buf
int readline(int sockfd,char* buf,int N){
	int i;
	int len=0;
	int readf;
	char* ptr=buf;
	char c;
	if(N<0||buf==NULL){
		printf("input N or buf error!\n"); //invalid input
	}

	//read each character
	for(i=1;i<N;i++){
		readf=read(sockfd,&c,1);
		if(readf<0){
			if(errno==EINTR){
				i--;
				continue;
			}
			else
				return -1;		//errors occur
		}
		else if(readf==0)		//break when '\0' is found
			break;
		else {
			if (len< N - 1) {
				*ptr=c;
				len++;
				ptr++;
			}
			if (c == '\n') {
				break;
			}
		}
	}
	*ptr='\0';
	return len;
}


int main(int argc,char** argv){
	int sock_client;
	int pton;
	int writeto;
	int readfrom;
	struct sockaddr_in server_addr;
	unsigned short int portnum=0;
	char* port=argv[2];
	char sendbuf[maxlen+1];
	char recvbuf[maxlen+1];
```

```
if(argc!=3){
        printf("command line error!\n");
        exit(1);
}

pton=inet_pton(AF_INET,argv[1],&server_addr.sin_addr);
if(pton==0){
        printf("IP address invalid!\n");
        exit(1);
}

while(*port!='\0'){
        if(*port>='0'&&*port<='9'){
                portnum=portnum*10+(*port-'0');
                port++;
        }
        else{
                printf("portnumber error!\n");
                exit(1);
        }
}
printf("connecting to %s ; %d\n", inet_ntoa(server_addr.sin_addr), portnum);

sock_client=socket(AF_INET,SOCK_STREAM,0);
if(sock_client<0){
        printf("socket not created!\n");
        printf("error number is :%d\n",errno);
        err_sys("client:socket");
        exit(1);
}

memset(&server_addr,0,sizeof(server_addr));
server_addr.sin_family=AF_INET;
server_addr.sin_port=htons(portnum);
socklen_t server_addr_size = sizeof(server_addr);

if(connect(sock_client,(struct sockaddr*)&server_addr,server_addr_size)==-1){
        printf("connection failed!\n");
        printf("error number is :%d\n",errno);
        err_sys("client:connect");
        exit(1);
}

printf("connected to server!\n");
```

```
        while(fgets(sendbuf,sizeof(sendbuf),stdin)){
            printf("input a text\n");
            if(feof(stdin)){
                printf("terminated text transmission!\n");
                break;
            }
            sendbuf[maxlen]='\0';
            if(strlen(sendbuf)==sizeof(sendbuf)-1&&sendbuf[maxlen-1]!='\n'){
                printf("Exceed limit!\n");
                continue;
            }
            else{
                writeto=writen(sock_client,sendbuf,strlen(sendbuf));
                if(writeto<0){
                    printf("no sending text!\n");
                    break;
                }
                readfrom=readline(sock_client,recvbuf,maxlen);
                if(readfrom<0){
                    printf("read error!\n");
                    exit(1);
                }
                printf("message received from server :%s\n",recvbuf);

            }
        }

        close(sock_client);
        printf("connection is closed!\n");
    }
```

Makefile

```
all: server client1 client2 client3
server: Socket_server_yfy.cpp
    g++ -o server Socket_server_yfy.cpp

client1: client_wnz.cpp
    g++ -o client1 client_wnz.cpp

client2: client_yfy.cpp
    g++ -o client2 client_yfy.cpp
```

```
client3: client_tbq.cpp
	g++ -o client3 client_tbq.cpp

clean:
	rm -rf *.o
```

Readme

ECEN 602

Contribution:

Feiyan Yu:

For groupwork, I coded the client_yfy.cpp and server. I made a lot of tries to create socket server and socket client.

My experience:
This assignment provides a good way for us to have a real understanding of the socket programming. I trained my C++ programming ability and got familiar with Linux Operating. I also learned how to use GDB to debug.

My first version is to echo a single line of message by a child process. The client need to reconnect the server after it finishes sending a line. This actually works, but not a good method because the server need to create a child for a single line.

Ningze Wang

For groupwork, I coded the client_wnz.cpp For myself, I practiced coding the server and the client.

Boquan Tao

I coded the client_tbq.cpp for group work. Also I coded part of the server for my own testing.

Reward: I learned how to use diffenrent socket functions like bind, connect... I learned how to use fork function to creat a child process. I enhanced my understanding of IP protocal and TCP protocal.

Usage

Server:

./server   any port number bigger than 1023

Client:
./client1 IPv4 address of the server the port number you put the server listen to
then   input string from keyboard.
./client2   IPv4 address of the server   the port number you put the server listen to
then   input string from keyboard.
./client3   IPv4 address of the server   the port number you put the server listen to
then   input string from keyboard.

Architecture

Client:
1.create a socket and initialize it
2.get the Ipv4 address and port number
3.connect server
4.input string from keyboard to the socket
5.ready to receive the character from the socket
6.show the echo on screen

Server:
1.create a socket and initialize it
2.get the port number
3.bind, listen and ready to accept and fork.
4.readline and writen contribute the echo.
5.check for EOF and when that happens kill the childprocess

Details:

Client:
1. int readline (int sockfd, char* buffer, int n):
Read a line from 'sockfd', and put the string in buffer. Using 'read' function to get 1 character a time until '\n', and add a '\0' as mark of termination for a string.
Return the length of buffer.

2. int writen (int sockfd, char* buffer, int n):
Write n character to buffer from 'sockfd', terminated when have read n character or read a '\0'.
Return n if writen successfully(actually no use).

3.char* trim(char *str):
Remove the blank part of head a tail of a string.
It is used to process the situation when user type something like "   quit   "   to   close the client. This function could return "quit".

Server:
1. int readline (int sockfd, char* buffer, int n):
Same as client.

2. int writen (int sockfd, char* buffer, int n):
Same as client.

3. void sig_handling(int sig):
To process the zombie process, using 'waitpid' function. This function is set to a sigaction struct.

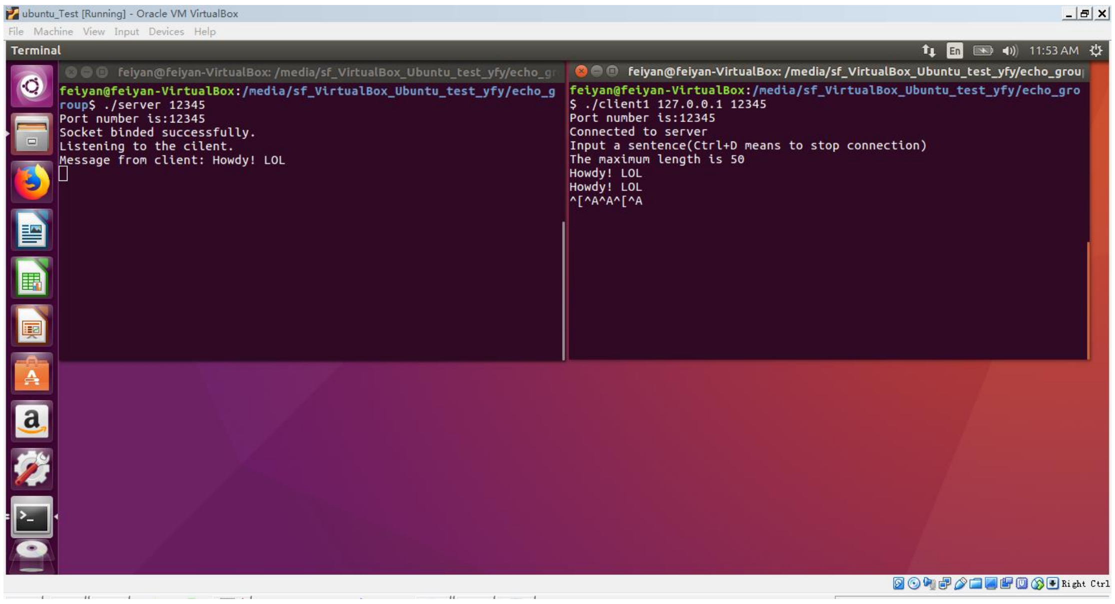
4. int echo_new(int sockfd);
The name is 'echo_new' because this is the second version of 'echo' function.
Using 'readline' to read the message from client, save in buffer. And if there is no 'quit' in buffer, use 'writen' function to send message in buffer back to client.
Return 0 if exit successfully.

5. char* trim(char *str);
Same as client.

Errta:
In first version, I could not using a loop in echo. I could just reconnect when the same client send message. By debugging, I found the close(client_socket) is the reason. So echo_new is created.
(So many bugs I met, so I did not present other details. Some of the bugs are easy or stupid problems.)

Test Case

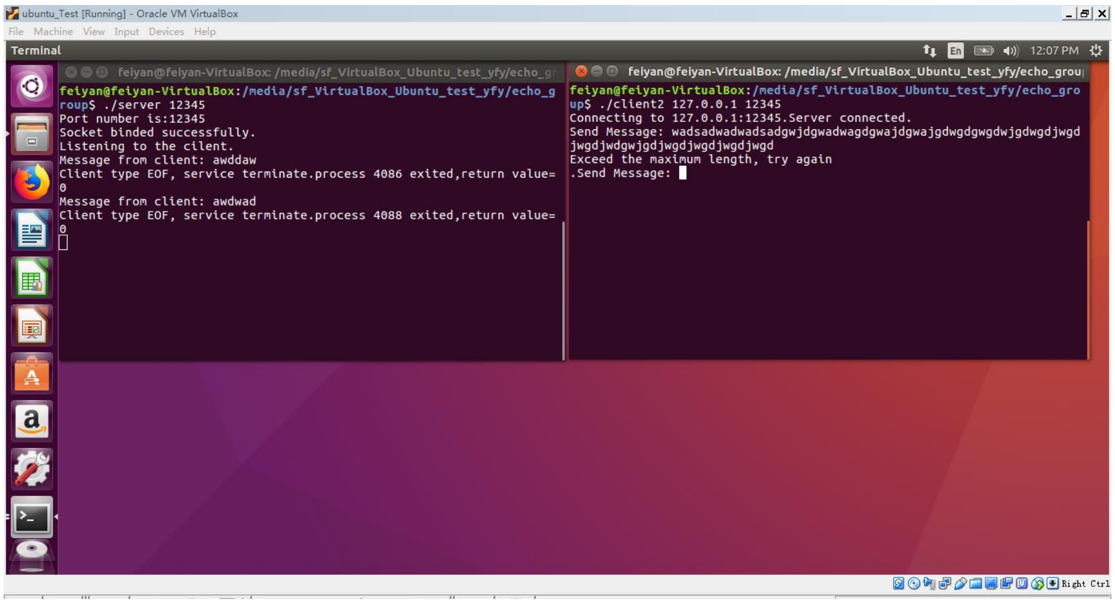
1. line of text terminated by a newline



```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./server 12345
Port number is:12345
Socket binded successfully.
Listening to the cilent.
Message from client: Howdy! LOL
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
$ ./client1 127.0.0.1 12345
Port number is:12345
Connected to server
Input a sentence(Ctrl+D means to stop connection)
The maximum length is 50
Howdy! LOL
Howdy! LOL
^[^A^A^[^A
```

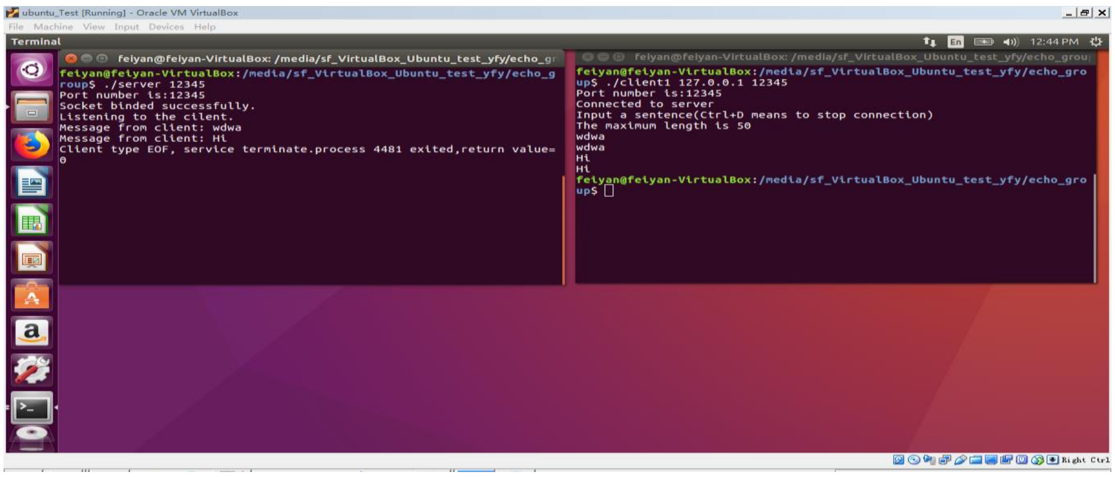
2. line of text the maximum line length without a newline



```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./server 12345
Port number is:12345
Socket binded successfully.
Listening to the cilent.
Message from client: awddaw
Client type EOF, service terminate.process 4086 exited,return value=
0
Message from client: awdwad
Client type EOF, service terminate.process 4088 exited,return value=
0
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ ./client2 127.0.0.1 12345
Connecting to 127.0.0.1:12345.Server connected.
Send Message: wadsadwadwadsadgwjdgwadwagdgwajdgwajgdwgdgwgdwjgdwgdjwgd
jwgdjwdgwjgdjwgdjwgdjwgdjwgd
Exceed the maximum length, try again
.Send Message: 
```

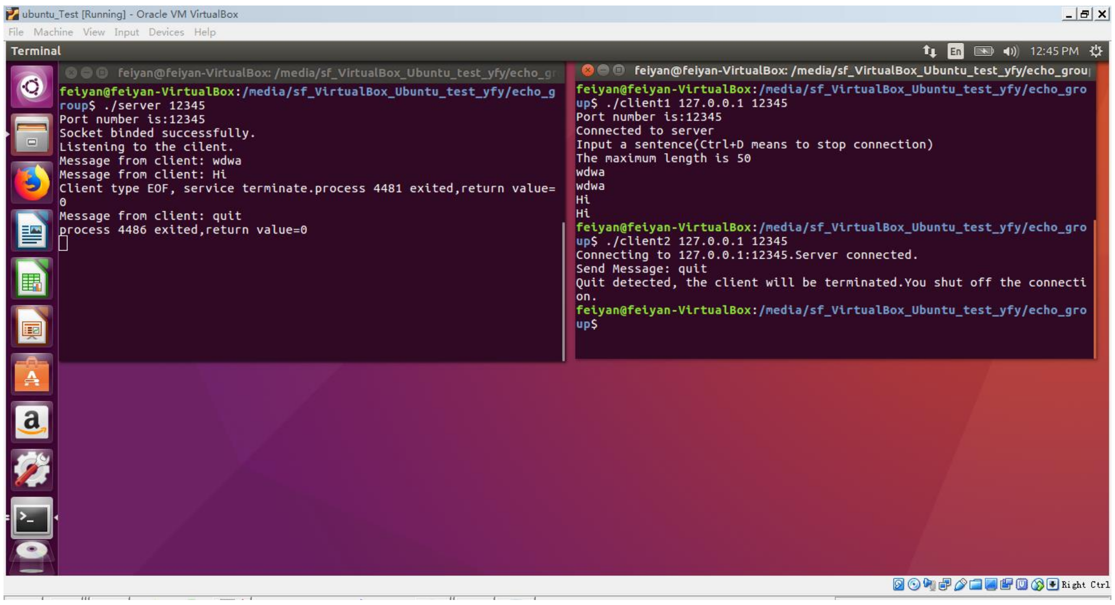
3. line with no characters and EOF



```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./server 12345
Port number is:12345
Socket binded successfully.
Listening to the cilent.
Message from client: wdwa
Message from client: Hi
Client type EOF, service terminate.process 4481 exited,return value=
0
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ ./client1 127.0.0.1 12345
Port number is:12345
Connected to server
Input a sentence(Ctrl+D means to stop connection)
The maximum length is 50
wdwa
wdwa
Hi
Hi
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ 
```

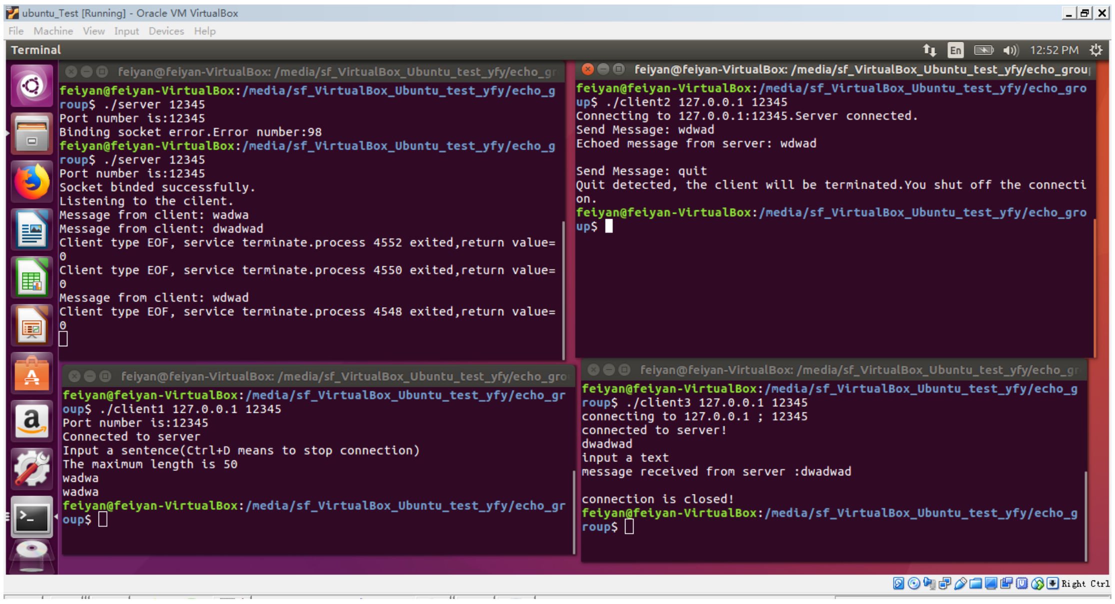
4. client terminated after entering text



```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./server 12345
Port number is:12345
Socket binded successfully.
Listening to the cilent.
Message from client: wdwa
Message from client: Hi
Client type EOF, service terminate.process 4481 exited,return value=
0
Message from client: quit
process 4486 exited,return value=0
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ ./client1 127.0.0.1 12345
Port number is:12345
Connected to server
Input a sentence(Ctrl+D means to stop connection)
The maximum length is 50
wdwa
wdwa
Hi
Hi
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ ./client2 127.0.0.1 12345
Connecting to 127.0.0.1:12345.Server connected.
Send Message: quit
Quit detected, the client will be terminated.You shut off the connecti
on.
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$
```

5. three clients connected to theserver



```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./server 12345
Port number is:12345
Binding socket error.Error number:98
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./server 12345
Port number is:12345
Socket binded successfully.
Listening to the cilent.
Message from client: wadwa
Message from client: dwadwad
Client type EOF, service terminate.process 4552 exited,return value=
0
Client type EOF, service terminate.process 4550 exited,return value=
0
Message from client: wdwad
Client type EOF, service terminate.process 4548 exited,return value=
0
```

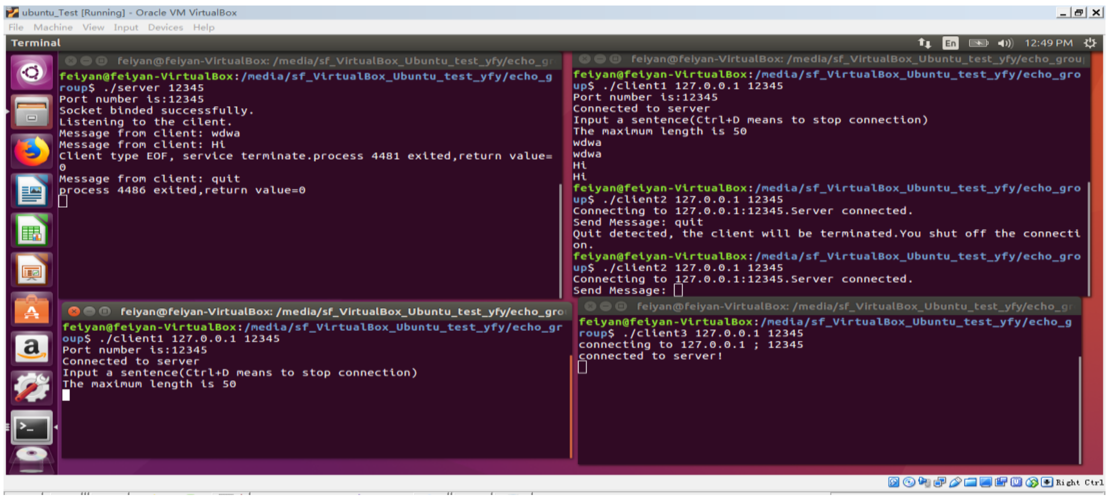
```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ ./client2 127.0.0.1 12345
Connecting to 127.0.0.1:12345.Server connected.
Send Message: wdwad
Echoed message from server: wdwad

Send Message: quit
Quit detected, the client will be terminated.You shut off the connecti
on.
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gr
oup$ ./client1 127.0.0.1 12345
Port number is:12345
Connected to server
Input a sentence(Ctrl+D means to stop connection)
The maximum length is 50
wadwa
wadwa
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gr
oup$
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./client3 127.0.0.1 12345
connecting to 127.0.0.1 ; 12345
connected to server!
dwadwad
input a text
message received from server :dwadwad

connection is closed!
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$
```



```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./server 12345
Port number is:12345
Socket binded successfully.
Listening to the cilent.
Message from client: wdwa
Message from client: Hi
Client type EOF, service terminate.process 4481 exited,return value=
0
Message from client: quit
process 4486 exited,return value=0
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ ./client1 127.0.0.1 12345
Port number is:12345
Connected to server
Input a sentence(Ctrl+D means to stop connection)
The maximum length is 50
wdwa
wdwa
Hi
Hi
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ ./client2 127.0.0.1 12345
Connecting to 127.0.0.1:12345.Server connected.
Send Message: quit
Quit detected, the client will be terminated.You shut off the connecti
on.
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gro
up$ ./client2 127.0.0.1 12345
Connecting to 127.0.0.1:12345.Server connected.
Send Message:
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_gr
oup$ ./client1 127.0.0.1 12345
Port number is:12345
Connected to server
Input a sentence(Ctrl+D means to stop connection)
The maximum length is 50
```

```
feiyan@feiyan-VirtualBox:/media/sf_VirtualBox_Ubuntu_test_yfy/echo_g
roup$ ./client3 127.0.0.1 12345
connecting to 127.0.0.1 ; 12345
connected to server!
```