Server Code

```
#include <arpa/inet.h>
#include <netinet/in.h>
#include <stdbool.h>
#include <stdio.h>
#include <string.h>
#include <unistd.h>

/**
 * TCP Uses 2 types of sockets, the connection socket and the listen socket.
 * The Goal is to separate the connection phase from the data exchange phase.
 * */

int main(int argc, char *argv[]) {
	// port to start the server on
	int SERVER_PORT = 8877;

	// socket address used for the server
	struct sockaddr_in server_address;
	memset(&server_address, 0, sizeof(server_address));
	server_address.sin_family = AF_INET;

	// htons: host to network short: transforms a value in host byte
	// ordering format to a short value in network byte ordering format
	server_address.sin_port = htons(SERVER_PORT);

	// htonl: host to network long: same as htons but to long
	server_address.sin_addr.s_addr = htonl(INADDR_ANY);
```

```
// create a TCP socket, creation returns -1 on failure
int listen_sock;
if ((listen_sock = socket(PF_INET, SOCK_STREAM, 0)) < 0) {
	printf("could not create listen socket\n");
	return 1;
}

// bind it to listen to the incoming connections on the created server
// address, will return -1 on error
if ((bind(listen_sock, (struct sockaddr *)&server_address,
       sizeof(server_address))) < 0) {
	printf("could not bind socket\n");
	return 1;
}

int wait_size = 16;  // maximum number of waiting clients, after which
	         // dropping begins
if (listen(listen_sock, wait_size) < 0) {
	printf("could not open socket for listening\n");
	return 1;
}

// socket address used to store client address
struct sockaddr_in client_address;
int client_address_len = 0;

// run indefinitely
while (true) {
	// open a new socket to transmit data per connection
```

```
int sock;
if ((sock =
        accept(listen_sock, (struct sockaddr *)&client_address,
              &client_address_len)) < 0) {
            printf("could not open a socket to accept data\n");
            return 1;
}

int n = 0;
int len = 0, maxlen = 100;
char buffer[maxlen];
char *pbuffer = buffer;

printf("client connected with ip address: %s\n",
      inet_ntoa(client_address.sin_addr));

// keep running as long as the client keeps the connection open
while ((n = recv(sock, pbuffer, maxlen, 0)) > 0) {
            pbuffer += n;
            maxlen -= n;
            len += n;

            printf("Server: Received '%s'\n", buffer);
            printf("Returning '%s'\n",buffer);
            // echo received content back
            send(sock, buffer, len, 0);
}

close(sock);
```

```
	}

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

Client Code

```
#include <arpa/inet.h>
#include <stdio.h>
#include <string.h>
#include <sys/socket.h>
#include <unistd.h>

int main() {
	const char* server_name = "localhost";
	const int server_port = 8877;

	struct sockaddr_in server_address;
	memset(&server_address, 0, sizeof(server_address));
	server_address.sin_family = AF_INET;

	// creates binary representation of server name
	// and stores it as sin_addr
	// http://beej.us/guide/bgnet/output/html/multipage/inet_ntopman.html
	inet_pton(AF_INET, server_name, &server_address.sin_addr);

	// htons: port in network order format
```

```
server_address.sin_port = htons(server_port);

// open a stream socket
int sock;
if ((sock = socket(PF_INET, SOCK_STREAM, 0)) < 0) {
	printf("could not create socket\n");
	return 1;
}

// TCP is connection oriented, a reliable connection
// **must** be established before any data is exchanged
if (connect(sock, (struct sockaddr*)&server_address,
	sizeof(server_address)) < 0) {
	printf("could not connect to server\n");
	return 1;
}

// send

// data that will be sent to the server
const char* data_to_send = "Hello";
send(sock, data_to_send, strlen(data_to_send), 0);
printf("Client : '%s'\n",data_to_send);
// receive

int n = 0;
int len = 0, maxlen = 100;
char buffer[maxlen];
char* pbuffer = buffer;
```

```
	// will remain open until the server terminates the connection
	while ((n = recv(sock, pbuffer, maxlen, 0)) > 0) {
		pbuffer += n;
		maxlen -= n;
		len += n;

		buffer[len] = '\0';
		printf(" '%s' This is the msg echoed by server\n", buffer);

	}

	// close the socket
	close(sock);
	return 0;
}
```

Output

Client

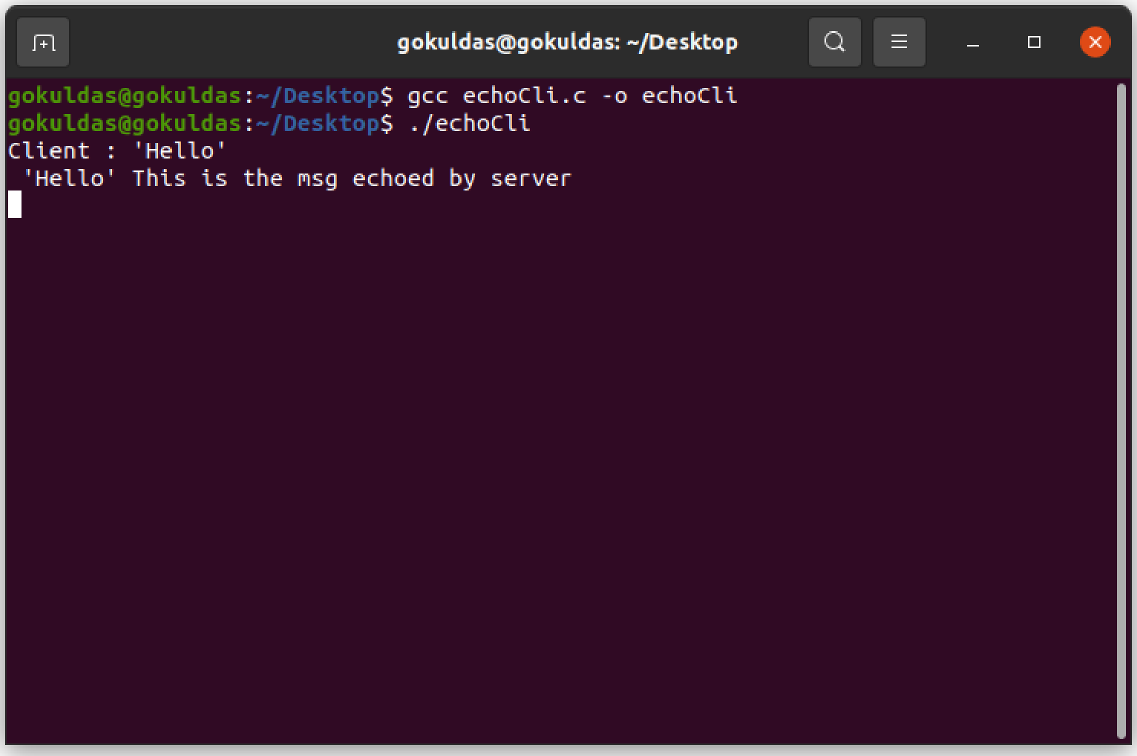
```
gokuldas@gokuldas:~/Desktop$ gcc echoCli.c -o echoCli
gokuldas@gokuldas:~/Desktop$ ./echoCli
Client : 'Hello'
 'Hello' This is the msg echoed by server
```

Server

```
gokuldas@gokuldas:~/Desktop$ gcc echoServ.c -o echoServ
gokuldas@gokuldas:~/Desktop$ ./echoServ
client connected with ip address: 0.0.0.0
```

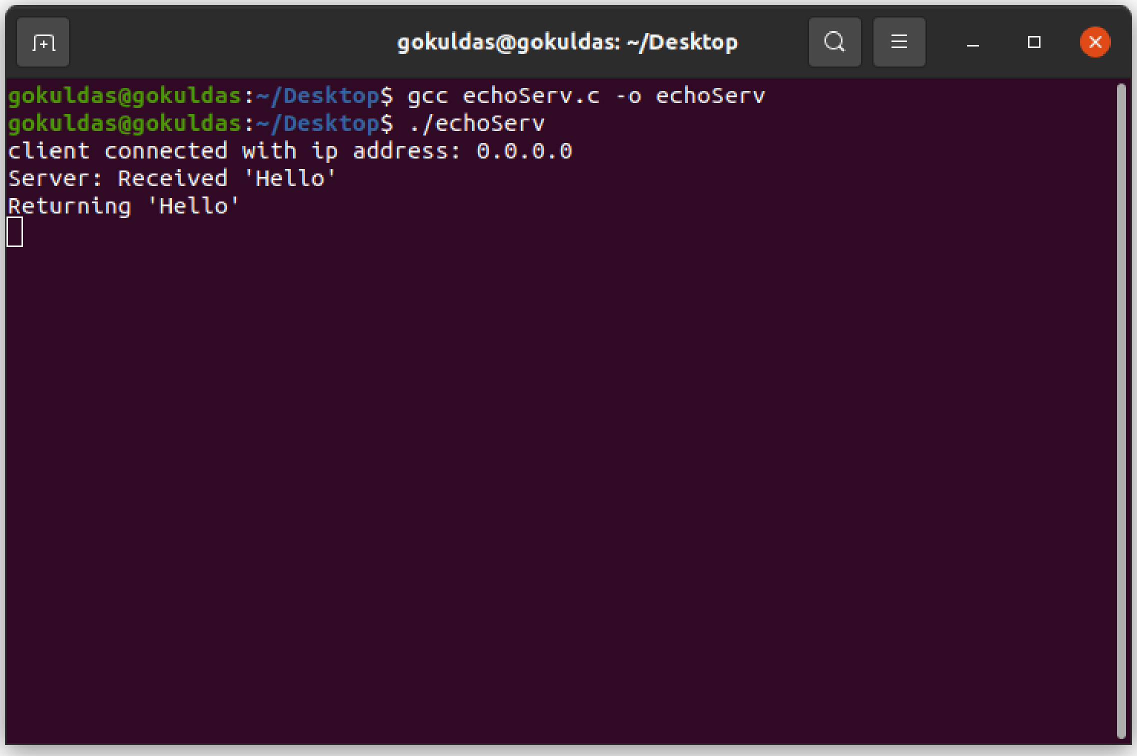
Server: Received 'Hello'

Returning 'Hello'



gokuldas@gokuldas: ~/Desktop

```
gokuldas@gokuldas:~/Desktop$ gcc echoCli.c -o echoCli
gokuldas@gokuldas:~/Desktop$ ./echoCli
Client : 'Hello'
 'Hello' This is the msg echoed by server
```



gokuldas@gokuldas: ~/Desktop

```
gokuldas@gokuldas:~/Desktop$ gcc echoServ.c -o echoServ
gokuldas@gokuldas:~/Desktop$ ./echoServ
client connected with ip address: 0.0.0.0
Server: Received 'Hello'
Returning 'Hello'
```