Client-Server Application
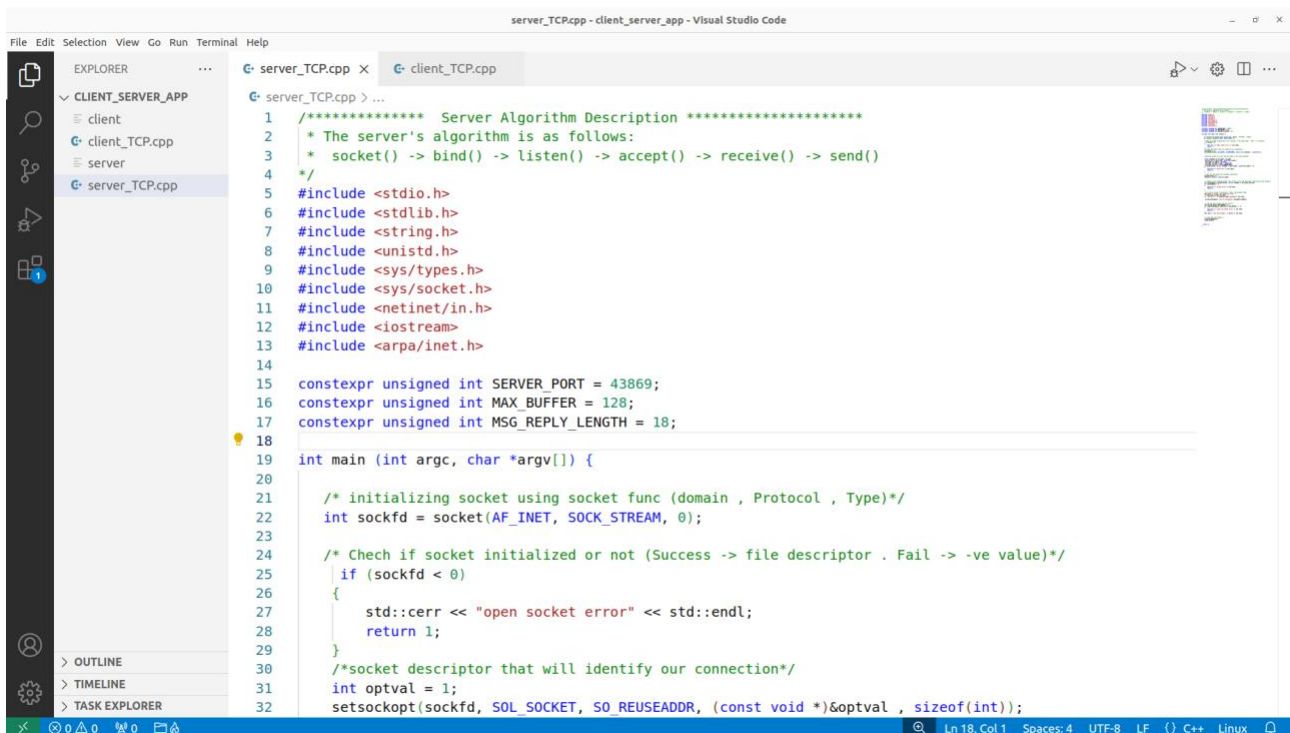
Server Test cases :

1- Verify that the server starts correctly and begins listening on the specified port
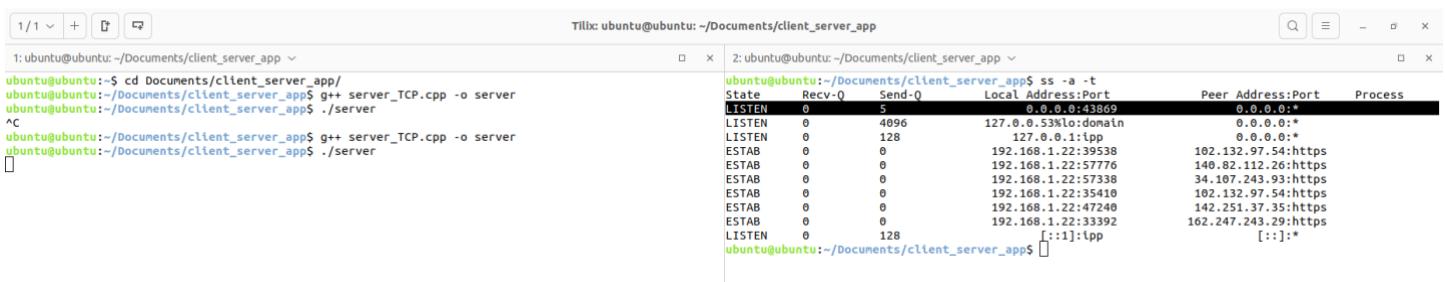
Steps:
1. Configure the server with a specific port number.(43869)

2. Start the server.
3. Check if the server is listening on the specified port (ss -a -t)

2- Ensure that the server correctly listens on different specified ports.

Steps :

1. Start the server with port (43869).

2. Verify the server is listening on port (43869).


```cpp
/************** Server Algorithm Description *********************
 * The server's algorithm is as follows:
 *  socket() -> bind() -> listen() -> accept() -> receive() -> send()
 */
#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 <iostream>
#include <arpa/inet.h>

constexpr unsigned int SERVER_PORT = 43869;
constexpr unsigned int MAX_BUFFER = 128;
constexpr unsigned int MSG_REPLY_LENGTH = 18;
```

```
ubuntu@ubuntu:~$ cd Documents/client_server_app/
ubuntu@ubuntu:~/Documents/client_server_app$ g++ server_TCP.cpp -o server
ubuntu@ubuntu:~/Documents/client_server_app$ ./server
^C
ubuntu@ubuntu:~/Documents/client_server_app$ g++ server_TCP.cpp -o server
ubuntu@ubuntu:~/Documents/client_server_app$ ./server
```
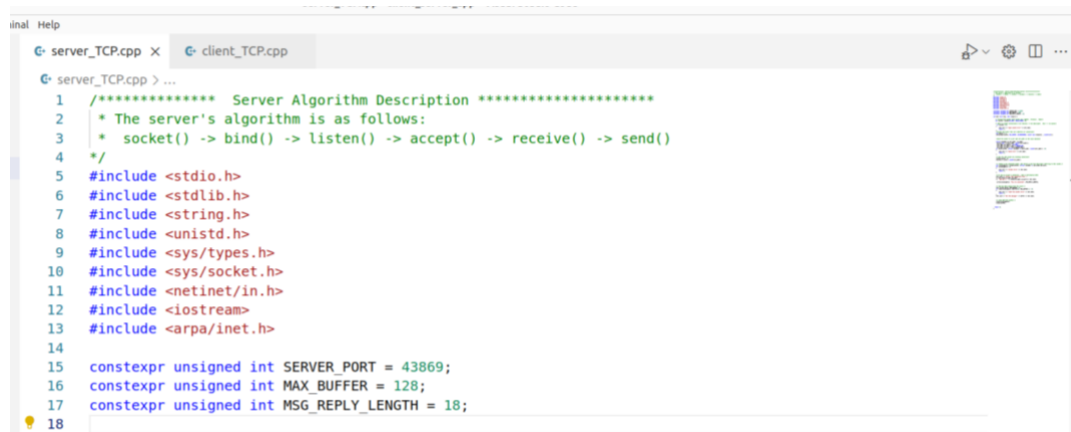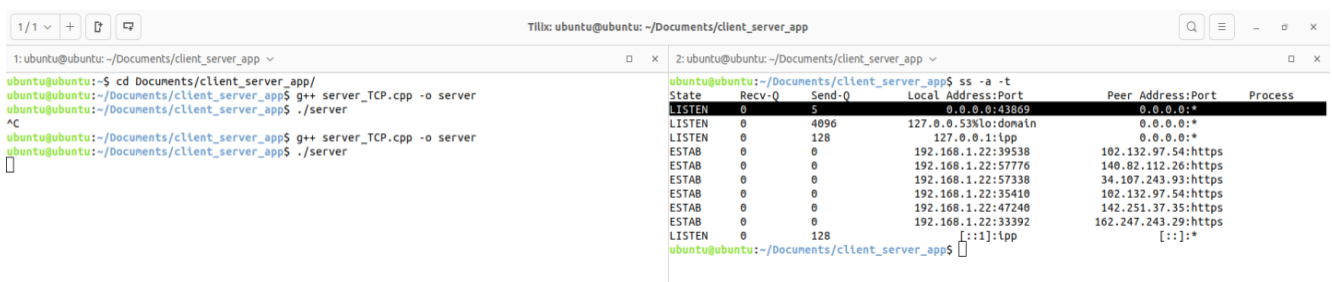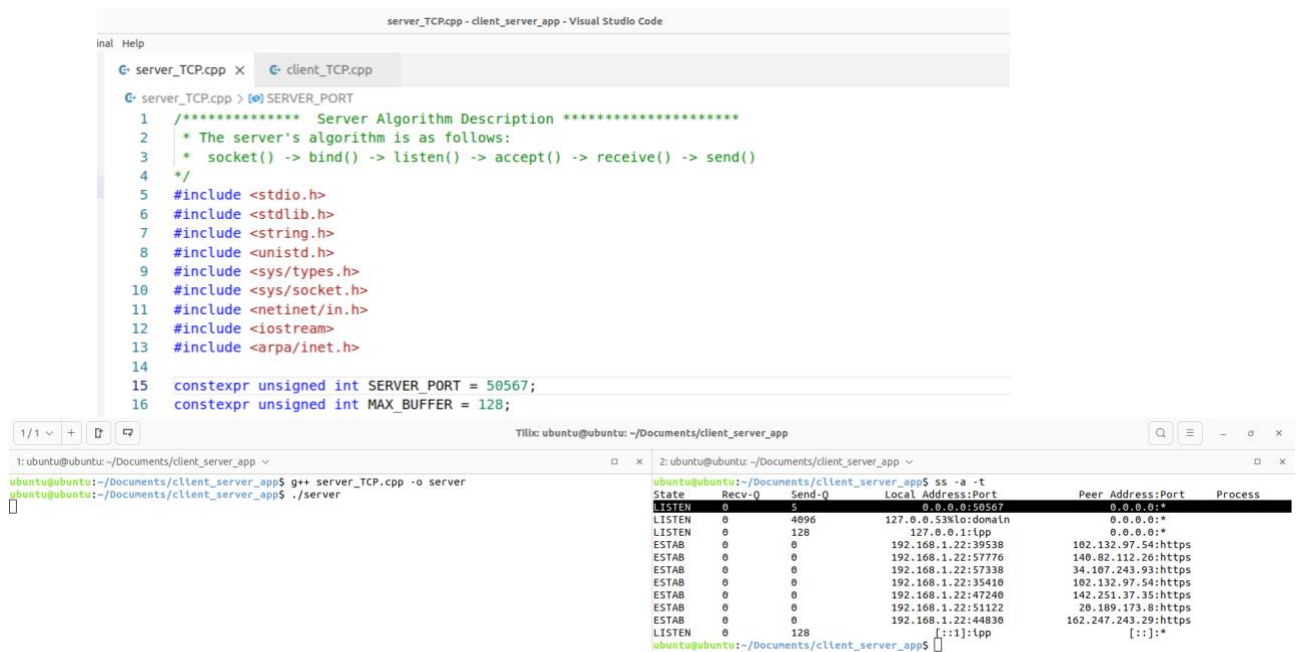
```
ubuntu@ubuntu:~/Documents/client_server_app$ ss -a -t
State    Recv-Q   Send-Q    Local Address:Port       Peer Address:Port    Process
LISTEN   0        5              0.0.0.0:43869              0.0.0.0:*
LISTEN   0        4096     127.0.0.53%lo:domain             0.0.0.0:*
LISTEN   0        128          127.0.0.1:ipp                0.0.0.0:*
ESTAB    0        0         192.168.1.22:39538       102.132.97.54:https
ESTAB    0        0         192.168.1.22:57776       140.82.112.26:https
ESTAB    0        0         192.168.1.22:57338       34.107.243.93:https
ESTAB    0        0         192.168.1.22:35410       102.132.97.54:https
ESTAB    0        0         192.168.1.22:47240       142.251.37.35:https
ESTAB    0        0         192.168.1.22:33392      162.247.243.29:https
LISTEN   0        128              [::1]:ipp                  [::]:*
ubuntu@ubuntu:~/Documents/client_server_app$
```

3. Stop the server and restart it with port (50567)

4. Verify the server is listening on port (50567)


```cpp
/************** Server Algorithm Description *********************
 * The server's algorithm is as follows:
 *  socket() -> bind() -> listen() -> accept() -> receive() -> send()
 */
#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 <iostream>
#include <arpa/inet.h>

constexpr unsigned int SERVER_PORT = 50567;
constexpr unsigned int MAX_BUFFER = 128;
```

```
ubuntu@ubuntu:~/Documents/client_server_app$ g++ server_TCP.cpp -o server
ubuntu@ubuntu:~/Documents/client_server_app$ ./server
```

```
ubuntu@ubuntu:~/Documents/client_server_app$ ss -a -t
State    Recv-Q   Send-Q    Local Address:Port       Peer Address:Port    Process
LISTEN   0        5              0.0.0.0:50567              0.0.0.0:*
LISTEN   0        4096     127.0.0.53%lo:domain             0.0.0.0:*
LISTEN   0        128          127.0.0.1:ipp                0.0.0.0:*
ESTAB    0        0         192.168.1.22:39538       102.132.97.54:https
ESTAB    0        0         192.168.1.22:57776       140.82.112.26:https
ESTAB    0        0         192.168.1.22:57338       34.107.243.93:https
ESTAB    0        0         192.168.1.22:35410       102.132.97.54:https
ESTAB    0        0         192.168.1.22:51122        20.189.173.8:https
ESTAB    0        0         192.168.1.22:44830      162.247.243.29:https
LISTEN   0        128              [::1]:ipp                  [::]:*
ubuntu@ubuntu:~/Documents/client_server_app$
```

3- Confirm that the server accepts incoming connections.
Steps :

1.Start the server.
2. Use a client to attempt a connection to the server.
3. Check the server logs or use a monitoring tool to verify the connection was accepted. (netstat -ntp)

Client Test cases :

1- Ensure the client starts correctly and attempts to connect to the server.
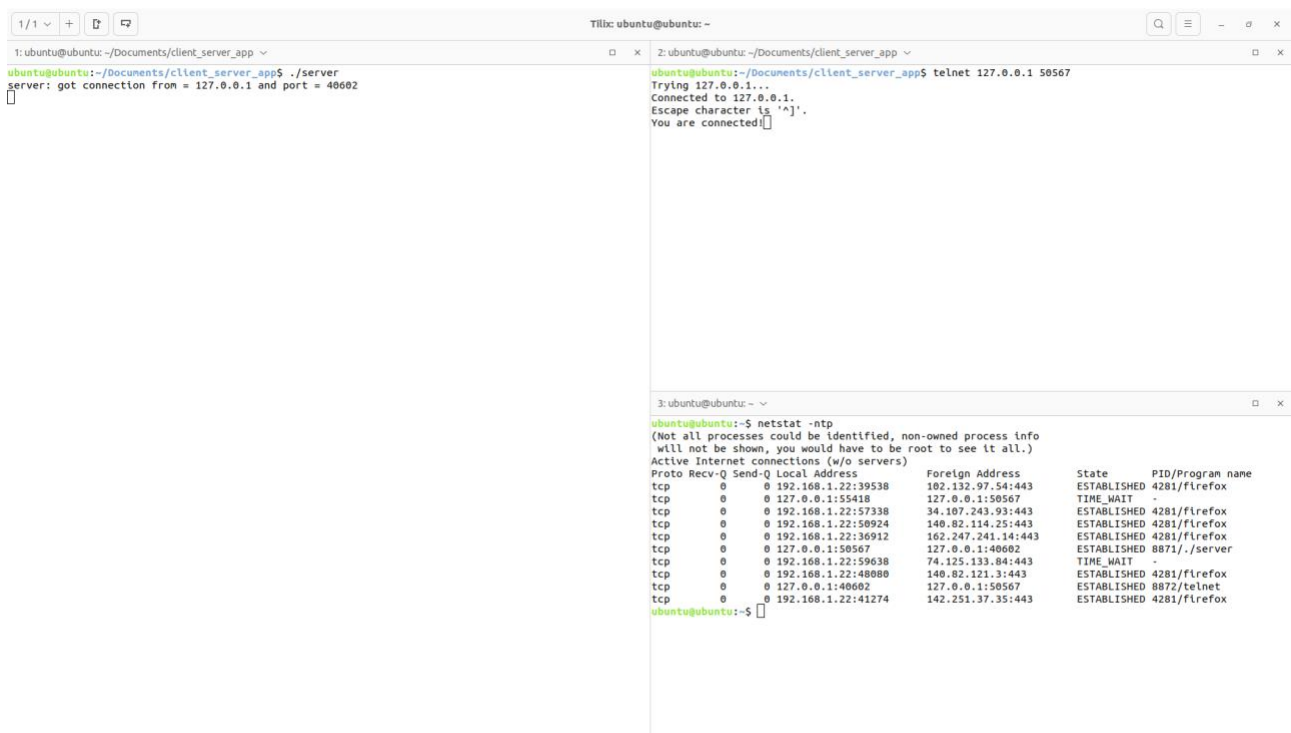
Steps:

1.Start the client with a valid server IP and port number.
   (telnet IP Port Number)

2. Check if the client sends a connection request to the server.
   (netstat -ntp)

2- Ensure the client correctly handles cases where the server is unavailable or refuses the connection.

Steps:

1. Start the client with a server IP and port where no server is running.

2. Observe how the client reacts to the failed connection attempt.

Documents/client_server_app

2: ubuntu@ubuntu: ~/Documents/client_server_app

```
ubuntu@ubuntu:~/Documents/client_server_app$ ./client 127.0.0.1
connect error
ubuntu@ubuntu:~/Documents/client_server_app$
```

Tilix: ubuntu@ubuntu: ~/Documents/client_server_app

1: ubuntu@ubuntu: ~/Documents/client_server_app

```
ubuntu@ubuntu:~/Documents/client_server_app$ ./server
server: got connection from = 127.0.0.1 and port = 40602
Got the message:HI

ubuntu@ubuntu:~/Documents/client_server_app$
```

2: ubuntu@ubuntu: ~/Documents/client_server_app

```
ubuntu@ubuntu:~/Documents/client_server_app$ telnet 127.0.0.1 50567
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
You are connected!HI
Connection closed by foreign host.
ubuntu@ubuntu:~/Documents/client_server_app$
```

3: ubuntu@ubuntu: ~

```
ubuntu@ubuntu:~$ netstat -ntp
(Not all processes could be identified, non-owned process info
 will not be shown, you would have to be root to see it all.)
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address         State       PID/Program name
tcp        0      0 192.168.1.22:39538     102.132.97.54:443       ESTABLISHED 4281/firefox
tcp        0      0 127.0.0.1:55418        127.0.0.1:50567         TIME_WAIT   -
tcp        0      0 192.168.1.22:57338     34.107.243.93:443       ESTABLISHED 4281/firefox
tcp        0      0 192.168.1.22:50924     140.82.114.25:443       ESTABLISHED 4281/firefox
tcp        0      0 192.168.1.22:36912     162.247.241.14:443      ESTABLISHED 4281/firefox
tcp        0      0 127.0.0.1:50567        127.0.0.1:40602         ESTABLISHED 8871/./server
tcp        0      0 192.168.1.22:59638     74.125.133.84:443       TIME_WAIT   -
tcp        0      0 192.168.1.22:48080     140.82.121.3:443        ESTABLISHED 4281/firefox
tcp        0      0 127.0.0.1:40602        127.0.0.1:50567         ESTABLISHED 8872/telnet
tcp        0      0 192.168.1.22:41274     142.251.37.35:443       ESTABLISHED 4281/firefox
ubuntu@ubuntu:~$
```