CS558: Computer Systems Lab

Application 5

Relay based peer to peer system using client server Programming

Group 20

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In this application we have implemented 3 programs.

1) server
2) client
3) node

And they communicate using the TCP sockets.

Instructions to run this application

- Open 5 terminals
    - terminal 1 is for Server
    - terminal 2 is for peer1
    - terminal 3 is for peer2
    - terminal 4 is for peer3
    - terminal 5 is for Client

- Compile the three codes in each folder Server, peer1, peer2, peer3 and Client
    - g++ server.cpp -o server
    - g++ peer.cpp -o peer
    - g++ peer.cpp -o peer

Run

/server <server port>

/peer <server address> <server port>

/peer <server address> <server port>

/peer <server address> <server port>

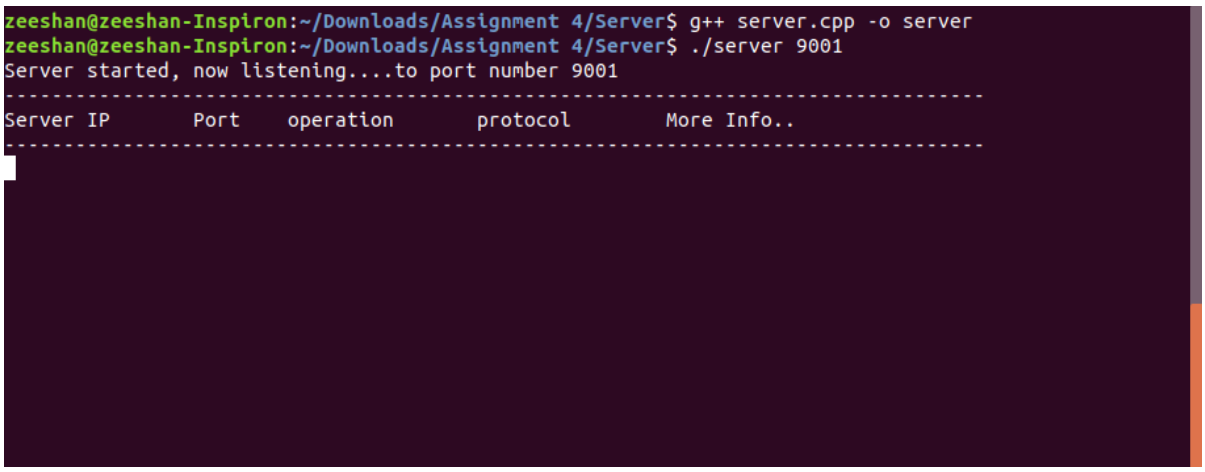
/client <server address> <server port>

Step 1:

Initially, run the server file with server port and peers with server IP and server port. The peers (acting like clients connects using connect()) will connect to the server (using the bind, listen, accept). After successful connection, all the peers provide their information that is IP address and port number and that will be written in node_info.txt file at server and then peers will close the connection. Now, the peers will act as servers and will wait to accept connection from client.

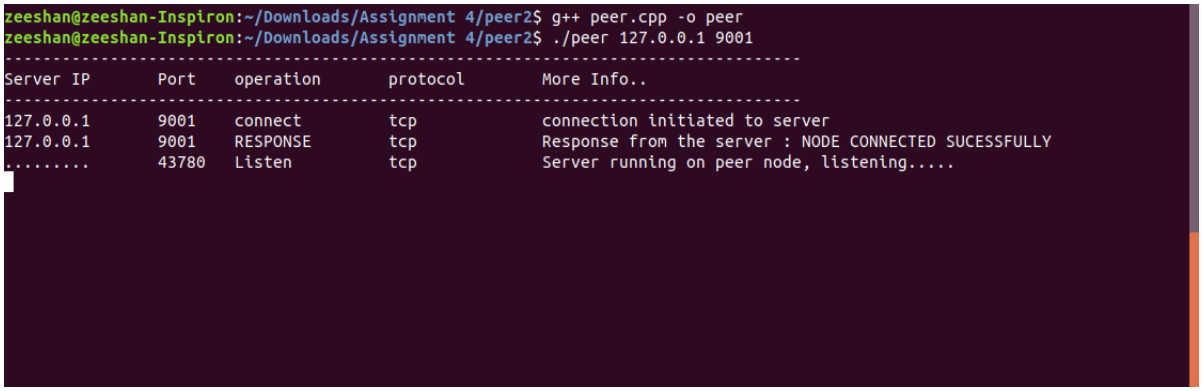
Run server :

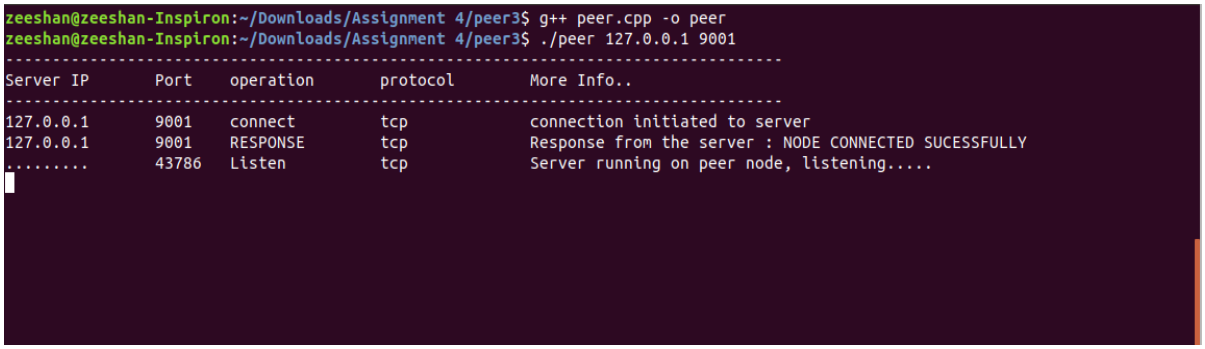
- **compile :** g++ server.cpp -o server
- **run:** ./server 9001



Run peers :

- **compile:** g++ peer.cpp -o peer
- **run:** ./peer 127.0.0.1 9001





Step 2:

Now, run the client file with server IP and server port. The client will connect to the relay server using the server's TCP port already known to it. After successful connection, it will request the server for active peer nodes information. Server will respond to the client with the active peer node information currently it is already having. The server after reading from node.txt and transfers the information to the client. On receiving the response message from the Server, the client closes the connection gracefully.

Run client :

- **Compile :** g++ client.cpp -o client

- **run:** ./client 127.0.0.1 9001

```
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/Client$ g++ client.cpp -o client
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/Client$ ./client 127.0.0.1 9001
--------------------------------------------------------------------------------
Server IP       Port    operation       protocol        More Info..
--------------------------------------------------------------------------------
127.0.0.1       9001    connect         tcp             connection initiated to relay server
127.0.0.1       9001    RESPONSE        tcp             Response from the server : CLIENT connected SUCESSFULLY
127.0.0.1       9001    REQUEST         tcp             Request to the server : peer Info
127.0.0.1       9001    RESPONSE        tcp             Response from the server :
Server has the following info:
127.0.0.1 43780
127.0.0.1 43784
127.0.0.1 43786
gracefully closing the connection with the relay server....
Enter the File name : C.txt
127.0.0.1       43780   connect         tcp             Connecting to the peerNode
                                                        Connection to the Peer SUCCESSFUL.
127.0.0.1       43780   REQUEST         tcp             Request to the peerNode : REQUEST : FILE : C.txt
127.0.0.1       43780   RESPONSE        tcp             Response from peer : FILE NOT FOUND
received unknown reply from the node
127.0.0.1       43784   connect         tcp             Connecting to the peerNode
                                                        Connection to the Peer SUCCESSFUL.
127.0.0.1       43784   REQUEST         tcp             Request to the peerNode : REQUEST : FILE : C.txt
127.0.0.1       43784   RESPONSE        tcp             Response from peer : FILE NOT FOUND
received unknown reply from the node
127.0.0.1       43786   connect         tcp             Connecting to the peerNode
                                                        Connection to the Peer SUCCESSFUL.
127.0.0.1       43786   REQUEST         tcp             Request to the peerNode : REQUEST : FILE : C.txt
127.0.0.1       43786   RESPONSE        tcp             Response from peer : FILE FOUND
File content is : This is peer3
gracefully closing the connection with the peer....
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/Client$
```

Step3:

Text file with some lines of data are distributed evenly among the three peer nodes. The Client will take the filename as an input from the user. Then it connects to the peer nodes one at a time using the response information. After successful connection, the client tries to fetch the file from the peer node. If the file is present with the peer node, it will provide the file content to the client and the client will print the file content in its terminal. If not, client will connect to the next peer node and perform the above action. This will continue till the client gets the file content or all the entries in the relay server response are exhausted. Here nodes work as servers (using bind, listen, accept) and client uses connect.
Then all connections will be closed.

Example : Enter the file name : C.txt

```
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/Client$ g++ client.cpp -o client
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/Client$ ./client 127.0.0.1 9001
--------------------------------------------------------------------------------
Server IP       Port    operation       protocol        More Info..
--------------------------------------------------------------------------------
127.0.0.1       9001    connect         tcp             connection initiated to relay server
127.0.0.1       9001    RESPONSE        tcp             Response from the server : CLIENT connected SUCESSFULLY
127.0.0.1       9001    REQUEST         tcp             Request to the server : peer Info
127.0.0.1       9001    RESPONSE        tcp             Response from the server :
Server has the following info:
127.0.0.1 43780
127.0.0.1 43784
127.0.0.1 43786
gracefully closing the connection with the relay server....
Enter the File name : C.txt
127.0.0.1       43780   connect         tcp             Connecting to the peerNode
                                                        Connection to the Peer SUCCESSFUL.
127.0.0.1       43780   REQUEST         tcp             Request to the peerNode : REQUEST : FILE : C.txt
127.0.0.1       43780   RESPONSE        tcp             Response from peer : FILE NOT FOUND
received unknown reply from the node
127.0.0.1       43784   connect         tcp             Connecting to the peerNode
                                                        Connection to the Peer SUCCESSFUL.
127.0.0.1       43784   REQUEST         tcp             Request to the peerNode : REQUEST : FILE : C.txt
127.0.0.1       43784   RESPONSE        tcp             Response from peer : FILE NOT FOUND
received unknown reply from the node
127.0.0.1       43786   connect         tcp             Connecting to the peerNode
                                                        Connection to the Peer SUCCESSFUL.
127.0.0.1       43786   REQUEST         tcp             Request to the peerNode : REQUEST : FILE : C.txt
127.0.0.1       43786   RESPONSE        tcp             Response from peer : FILE FOUND
File content is : This is peer3
gracefully closing the connection with the peer....
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/Client$
```

Status of peer nodes and server after the file transfer :

Peers will show in its terminal whether file is found successfully or not.

```
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer1$ g++ peer.cpp -o peer
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer1$ ./peer 127.0.0.1 9001
--------------------------------------------------------------------------------
Server IP       Port    operation       protocol        More Info..
--------------------------------------------------------------------------------
127.0.0.1       9001    connect         tcp             connection initiated to server
127.0.0.1       9001    RESPONSE        tcp             Response from the server : NODE CONNECTED SUCESSFULLY
.........       43784   Listen          tcp             Server running on peer node, listening.....
peerClient      52654   REQUEST         tcp             Received request for the file : C.txt from the client
                                                        requested file NOT Found
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer1$
```

```
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer2$ g++ peer.cpp -o peer
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer2$ ./peer 127.0.0.1 9001
--------------------------------------------------------------------------------
Server IP       Port    operation       protocol        More Info..
--------------------------------------------------------------------------------
127.0.0.1       9001    connect         tcp             connection initiated to server
127.0.0.1       9001    RESPONSE        tcp             Response from the server : NODE CONNECTED SUCESSFULLY
.........       43780   Listen          tcp             Server running on peer node, listening.....
peerClient      43694   REQUEST         tcp             Received request for the file : C.txt from the client
                                                        requested file NOT Found
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer2$
```

```
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer3$ g++ peer.cpp -o peer
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer3$ ./peer 127.0.0.1 9001
--------------------------------------------------------------------------------
Server IP       Port    operation       protocol        More Info..
--------------------------------------------------------------------------------
127.0.0.1       9001    connect         tcp             connection initiated to server
127.0.0.1       9001    RESPONSE        tcp             Response from the server : NODE CONNECTED SUCESSFULLY
.........       43786   Listen          tcp             Server running on peer node, listening.....
peerClient      41896   REQUEST         tcp             Received request for the file : C.txt from the client
                                                        Found the requested file
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/peer3$
```

Server will show the information of peer nodes that it got from peers.

```
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/Server$ g++ server.cpp -o server
zeeshan@zeeshan-Inspiron:~/Downloads/Assignment 4/Server$ ./server 9001
Server started, now listening....to port number 9001
--------------------------------------------------------------------------------
Server IP       Port    operation       protocol        More Info..
--------------------------------------------------------------------------------
peerNode1       43780   Connect tcp             Received Message - REQUEST : node
Server          43780   RESPONSE        tcp             sending RESPONSE : Node: N
peerNode2       43784   Connect tcp             Received Message - REQUEST : node
Server          43784   RESPONSE        tcp             sending RESPONSE : Node: N
peerNode3       43786   Connect tcp             Received Message - REQUEST : node
Server          43786   RESPONSE        tcp             sending RESPONSE : Node: N
Client  43788   Connect tcp             Received Message - REQUEST : client
Server          43788   RESPONSE        tcp             sending RESPONSE : client: C
peerClient      43788   REQUEST tcp             Request from the client - REQUEST : peer info
Server has the following info:
127.0.0.1 43780
127.0.0.1 43784
127.0.0.1 43786
```