

## **Problem Statement:**

Write a program using TCP sockets for wired network to implement a . Peer to Peer Chat

b. Multiuser Chat

Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.

## **Theory:**

### **Network socket:**

A **network socket** is an internal endpoint for sending or receiving data at a single node in a computer network. Concretely, it is a representation of this endpoint in networking software (protocol stack), such as an entry in a table (listing communication protocol, destination, status, etc.), and is a form of system resource.

The term "socket" is analogous to physical female connectors, communication between two nodes through a channel being visualized as a cable with two male connectors plugging into sockets at each node. Similarly, the term "port" (another term for a female connector) is used for *external* endpoints at a node, and the term "socket" is also used for an internal endpoint of local inter-process communication (IPC) (not over a network). However, the analogy is strained, as network communication need not be one-to-one or have a channel.

### **Peer to Peer Chat:**

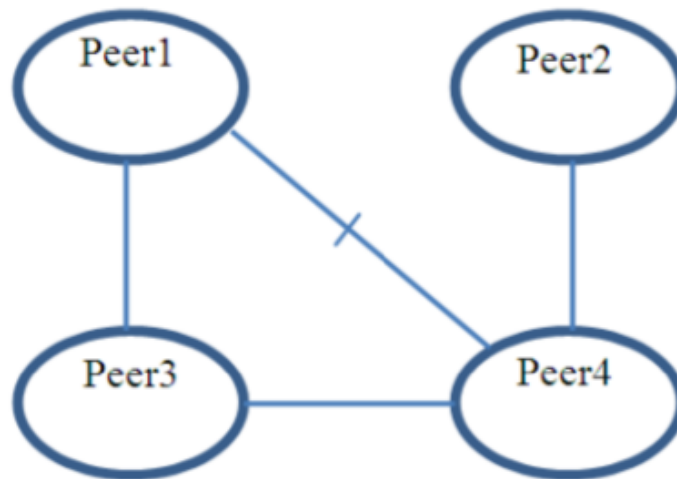
Communication is a mean for people to exchange messages. It has started since the beginning of human creation. Distant communication began as early as 1800 century with the introduction of television, telegraph and then telephony. Interestingly enough, telephone communication stands out as the fastest growing technology, from fixed line to mobile wireless, from voice call to data transfer. The emergence of computer network and telecommunication technologies bears the same objective that is to allow people to communicate. All this while, much efforts has been drawn towards consolidating the device into one and therefore indiscriminate the services. The principle of communication can generally be categorized into two, client-server and peep-to-peer. In client-server environment, there is a dedicated server while the rest of other nodes are acting as clients throughout the whole communication. Whereby, in peer- to-peer environment, a node can be either a client or a server depending whether it is a requestor or provider of the service at that specific time.

Client-server technology has been around for some times. Some examples of client-server applications are web access, network time and windows login. Specific to user login, user's credentials are stored in the database at the server side. Anyone who has an access to the server and the database can easily access user information. This creates the idea of single point of failure which may cause a devastated damage in case of breaks in. Another downside of client-server is the resource consumption which always concentrates on the server side. This gives rise to the infrastructure cost for the provider. Chat application is becoming an important digital communication tools, people use it for business, education and socialize. It offers users an ability to identify online friends, a user then just selects the one that he/she wants to communicate before begins exchanging messages at will. Basic function of chat application is to be able to exchange a text-based message although today's application is equipped with more advanced features such as audio, video conferencing to the least. The application can be developed based on either client-server or Peer-to-Peer (P2P) architectures.

However, P2P now turned out to be the popular architecture as it offers many advantages such as low maintenance cost for server side (considering client-server scenario) and high availability content distribution system. For this reasons, many popular applications like Skype, BitTorrent and eMule rely on P2P network. Being one of the most successful computer-based chat applications, Skype offers many user-friendly functions such as buddy list, video conferencing and file transfer. Skype is built on top of hybrid peer-to-peer architecture (Baset and Schulzrinne, 2006). The terms hybrid is used to refer to some element of client-server embedded within P2P architecture. By and large, before using Skype, a user needs to register to the centralized Skype server for setting up username and password. It is an easy process and is fully guided by the software itself. Fortunately, registration is only one-time operation. Upon completion, at any time when a user wants to communicate with a friend, he/she is required to authenticate him/herself to the login server for the purpose of self-identification and retrieving buddy list. To make sure the client having the right destination server, Skype hard codes the IP address and port number of the server in its executable. Client side uses this parameter when communicating credentials with the server.

Table of Peer1:  
Username, Password,  
IP address, Port  
number for Peer3 and  
Peer4

Index Table of Peer2:  
Username, Password,  
IP address, Port  
number for Peer4



Index Table of Peer3:  
Username, Password,  
IP address, Port  
number for Peer1 and  
Peer4

Index Table of  
Peer4:  
Username, Password,  
IP address, Port  
number for Peer1,  
Peer2 and Peer3

### Multiuser Chat:

With **Multi-User Chat** (short *MUC* , German *multi-user chat* ), and **group chat** are at XMPP , the chat rooms designated, where multiple users can converse simultaneously.

Similar to the Internet Relay Chat ( *IRC* ), a chat room can have different statuses (visible, hidden, password protected, etc.) and the participants take the role of the participant, visitor or moderator (similar to the IRC of the operator , voice, etc.).

However, the MUC has many advantages over the IRC. This is how you go online in the MUC with its globally unique Jabber Identifier , which can not be occupied by someone else. Therefore, the MUC does not need cumbersome services (such as NickServ ) to uniquely identify users. In addition, rooms (channels) can be registered in the MUC without any detours via bots (such as ChanServ ). In addition, the different rights of users in a room (owner, operator, speech, read, exiled) are linked to the user's Jabber Identifier, After changing the host and the nickname , you can enter the room again. In addition, the MUC has an optional feature

to log calls on the server side without a bot . In order to maintain anonymity, you can choose an arbitrary name in the MUC (optional), which will then be sent to normal subscribers instead of the Jabber Identifier. However, owners and operators can see the Jabber Identifier, which is also necessary to change the rights of a user in the room. Nicknames are chosen spatially and are not network-wide as in IRC. One can choose an arbitrary name in the MUC (optional), which is then sent to normal subscribers instead of the Jabber identifier. However, owners and operators can see the Jabber Identifier, which is also necessary to change the rights of a user in the room. Nicknames are chosen spatially and are not network-wide as in IRC. One can choose an arbitrary name in the MUC (optional), which is then sent to normal subscribers instead of the Jabber identifier. However, owners and operators can see the Jabber Identifier, which is also necessary to change the rights of a user in the room. Nicknames are chosen spatially and are not network-wide as in IRC.

### **Functions:**

MUC offers various functions. This allows the server to create a log file over a room , if desired . However, regardless of this, the latest messages are also saved and sent to new visitors with correct timings, so that they can see what is going to happen.

In addition, each user can have different privileges in a chat, he can write in a room or change the subject / subject depending on his / her privileges. In addition, the privileges allow users to kick or ban other users . It is also possible to set which user can see the Jabber identifiers of the others. If the rights are sufficient, these users can change the rights of the other users, thus avoiding the right to speak.

In addition, the user number can be restricted in a chat. A chat is also available without the user being present and can also be hidden or protected with a password. And if an internal chat should be established, it is also possible to specify which users can join and which are not. In addition, a chat can be anonymous and thus hide the Jabber identifiers of the others.

### **Wireshark Packet Analyzer Tool:**

Wireshark is a network packet analyzer. A network packet analyzer will try to capture network packets and tries to display that packet data as detailed as possible.

You could think of a network packet analyzer as a measuring device used to examine what's going on inside a network cable, just like a voltmeter is used by an electrician to examine what's going on inside an electric cable (but at a higher level, of course).

In the past, such tools were either very expensive, proprietary, or both. However, with the advent of Wireshark, all that has changed.

Wireshark is perhaps one of the best open source packet analyzers available today.

The following are some of the many features Wireshark provides:

- Available for UNIX and Windows.
- Capture live packet data from a network interface.
- Open files containing packet data captured with tcpdump/WinDump, Wireshark, and a number of other packet capture programs.
- Import packets from text files containing hex dumps of packet data.
- Display packets with very detailed protocol information.
- Save packet data captured.
- Export some or all packets in a number of capture file formats.
- Filter packets on many criteria.
- Search for packets on many criteria.
- Colorize packet display based on filters.
- Create various statistics.
- ...and a lot more!

### **Oral Questions**

1. what is mean by Peer to Peer?
2. What is Multiuser Chat?
3. What is wireshark Packet Analyzer Tool?
4. How packets are captured traces using Wireshark Packet Analyzer Tool for peer to peer mode?