# SPL-1 Project Report, 2019

**File Sender FTP**

**SE 305: Software Project Lab 1**


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**BSSE Session: 2017-18**

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**[29-05-2019]**

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## 1. Introduction

The File Sender Ftp is mainly a file sharing application. It's main goal is to transfer files from machine to machine using TCP/IP socket and FTP protocol. It mainly uses server client model to connect machines where the session takes places. The client operates the session. During any session client is able to retrieve ,store files with in the directory of the server and if it is not the desired directory than the client can change the directory according to their needs

For the server, it usually hosts the session and acts on the commands given by the client , Here the commands are mainly FTP commands . The server can host multiple clients at a time and the during each session other sessions are not hampered and all of them are not known to the server or each other.

### 1.1. Background Study

**Socket**

One of the core part of this software is TCP socket. And a strong knowledge about TCP socket was needed. A TCP socket works on the basis of 4 points, server ip and port and client ip and port. The server creates the socket and wait for connection. So over all socket programming is a way of connection between two machines.

Now here our server firsts creates the socket that means it binds ip and port and that waits for clients request. Than the client sends request to the server and the server listens and accepts the connection. That is how our socket is implemented here.

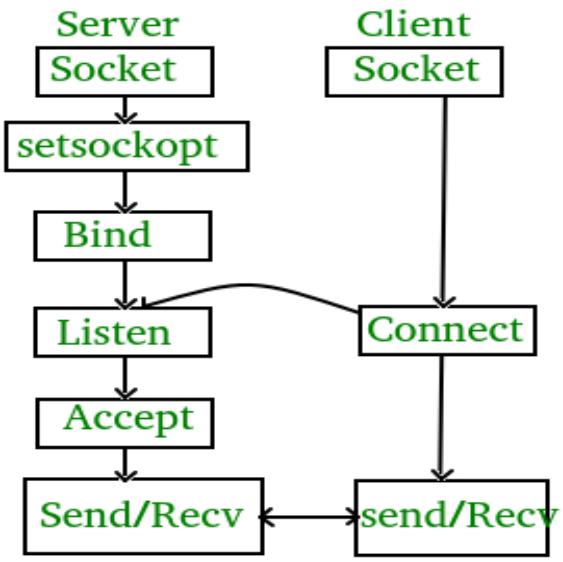



**Fig 2 : Socket basic diagram (geeksforgeeks.com)**

## Reading Files

To send files to socket I have used a different technique . The files have been read in binary mood and than all have been included in an array and than the array is sent. Besides for sending text files sendfileoversocket has been implemented.

## FTP

The File Transfer Protocol (FTP) is a standard network protocol used for the transfer of computer files between a client and server on a computer network.

FTP is built on a client-server model architecture using separate control and data connections between the client and the server. FTP users may authenticate themselves with a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously if the server is configured to allow it.
The first FTP client applications were command-line programs developed before operating systems had graphical user interfaces, and are still shipped with most Windows, Unix, and Linux operating systems
When a FTP session is started between a client and a server, the client initiates a control TCP connection with the server side. The client sends control information over this. When the server receives this, it initiates a data connection to the client side. Only one file can be sent over one data connection. But the control connection remains active throughout the user session. As we know HTTP is stateless i.e. it does not have to keep track of any user state. But FTP needs to maintain a state about its user throughout the session.

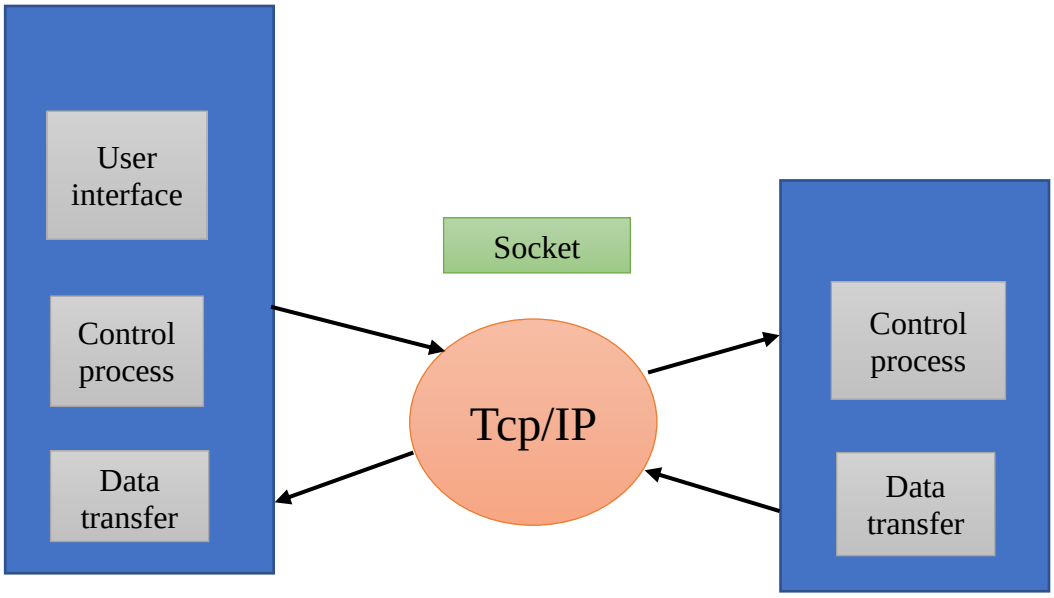



Fig 2: Sample FTP session diagram

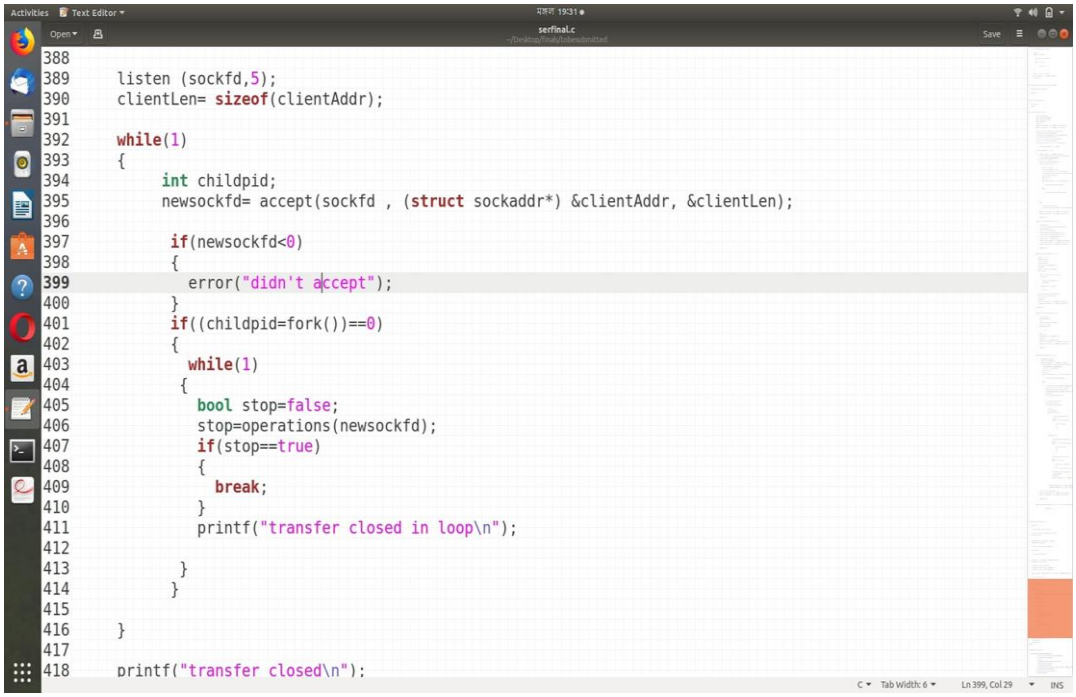
## Fork

The server can add multiple clients at a time . But as we have used c language there was no scope for thread there fore we have implemented fork. Fork is a function in Unix that is used to generate a duplicate of particular process by creating two simultaneous executing processes of a program

Fork system call use for creates a new process, which is called child process, which runs concurrently with process (which process called system call fork) and this process is called parent process. After a new child process created, both processes will execute the next instruction following the fork() system call. A child process uses the same pc(program counter), same CPU registers, same open files which use in the parent process.

Fork takes no parameters and returns an integer value. Below are different values returned by fork().

Negative Value: creation of a child process was unsuccessful.
Zero: Returned to the newly created child process.
Positive value: Returned to parent or caller. The value contains process ID of newly created child process.



```
listen (sockfd,5);
clientLen= sizeof(clientAddr);

while(1)
{
     int childpid;
     newsockfd= accept(sockfd , (struct sockaddr*) &clientAddr, &clientLen);

      if(newsockfd<0)
      {
        error("didn't accept");
      }
      if((childpid=fork())==0)
      {
        while(1)
       {
         bool stop=false;
         stop=operations(newsockfd);
         if(stop==true)
         {
           break;
         }
         printf("transfer closed in loop\n");

       }
      }

}

printf("transfer closed\n");
```

**Fig 3 : use of fork**

### 1.2. Challenges

My main challenge was to send various files . Such as text , jpg, video etc. And for these I have tried quit a few process and most of them appeared with different problems. . Finally I have solved these problems by sending them as binary form.

Besides adding ,multiple clients was a challenge her. I have used fork to accomplish these challenge.. Besides maintaining standard format changing directory or getting the current file list , I have solved these challenges. So to point out the key challenges were

- ⇨ Understanding concept of Socket
- ⇨ Read all files in binary and send them
- ⇨ Getting list of files from server
- ⇨ Use standard protocols
- ⇨ Make the server handle multiple clients

## 2. Project Overview

The software I have designed has two parts

- ⇨ Server part
- ⇨ Client part

The main operations are run by the server part where the client send different FTP commands . The client is mainly the driver of the session . The client actually give the commands. Multiple client are able to run multiple session and all of them are different from Each other. The software is mainly linux based and runs on linux operating system.

**Server part**

My server part works as the main server here which receives the FTP commands. Such as The client wants to change the directory than he initially gives the command to the client interface and from there the client sends the command to the server. The server gets the command matches with its standard and than operate the operation

Our server mainly acts on commands such as

- ⇨ Get Filename
- ⇨ Put Filename
- ⇨ cd
- ⇨ ls
- ⇨ pwd
- ⇨ quit

our server accepts these commands.

**Get Filename**

Here Get Filename command is used to retrieve any kind of file which is in the server.
The server executes the command checks if the file is in the current directory of the server And if it is there than first sends a message ok for the client part to confirm that serer has got the file and it will start the transfer.

While going to transfer the server uses two ways . If the file is txt than it is send at a whole. If not than it send as small chunks. First if it is not text than the file size is send. Then the total file size is divide by 100. The number of results is also the number of segments which are to be sent and again the file size is mode by 100 and this time the remain is sent as another small chunk. Here first the chunks are copied into an array and the array is sent to the server. Thus the whole file is sent to the server.

**Put Filename**

The put Filename command is used to store file in the current directory of the server. Here first the server gets the command put filename and extracts the filename and create corresponding file of that name. If again it is not txt than the file is sent as chunks. Here the server also receives the file size from the client and uses malloc to create a certain buffer of that size and than using fwrite the buffer is written down in the corresponding file.

**Ls**

The server also supports the command ls which stands for list of files. Often the client needs to know which files are in the current directory of the server . First the server receives the command and than it runs system function for ls and store the result in a txt file and than that Txt file is sent to the client . And the txt file is by default removed from the server.

**Pwd**

Now pwd stands for present working directory. If the current working directory of the server is not known to the server than the client can easily send the command to the server and the server again runs the system function and gives the present directory along with conformation.

**Cd**

The cd command is for change of current directory. After the ls and pwd commands or may be any part of the session and if the client thinks that it the current directory does not hold the files than the cd command is given . First the server receives the cd command and sends the confirmation that server is ready and than the client gives his desired path and the server than changes the directory and sends confirmation.

**quit**

if the client sends the command quit that means that the client is wanting to end the session and the process stops.

Our server accepts multiple client at a time. But all the connections are not disturbed by others. I have used fork here to run different process peralally. So even if a client gives the command quit only his/her certain session stops . The server is still alive .

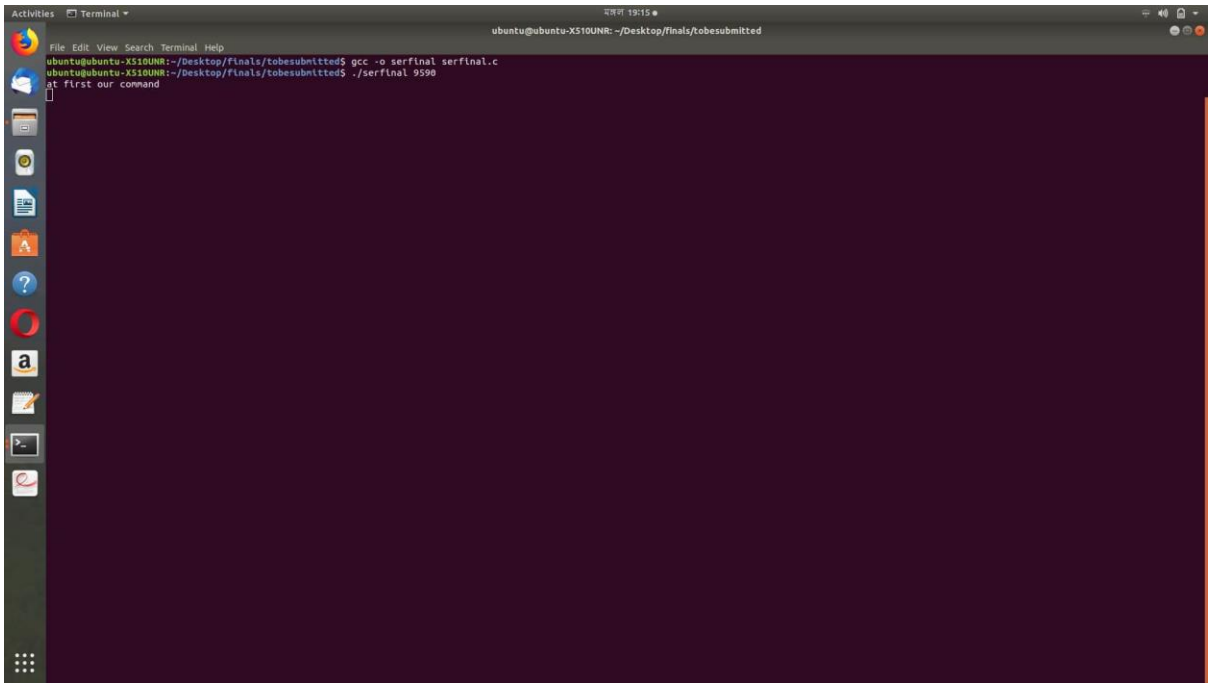



Fig 4: server part running and waiting for client request

**Client part**

The client part is the driver of our session. The client gives the command to the server. Here the user gives the command as he needs. Besides the client part has a few commands for itself as well.

- ⇨ !ls
- ⇨ !cd
- ⇨ !pwd

**!ls**

If the client wants know the list of files in his current directory than this !ls command can be used by the client.

**!cd**

If the client wants change his own directory than !cd command is used. Than if all is right than the client provides his/her desired directory.

**!pwd**

The !pwd stands for present directory of the client

Again the client must end the process by giving the command quit. The file receving pattern for the client is first the size of the file is received and using malloc a file of same size is created . If the file is txt than we have used fopen to create the file. And than using recv() the file is received.

And if the file is not such than we have used the same process as of sending just only here we are receiving the chunk arrays and than after receving all the array thay are concatenated and using fwrite they are written on the file.

And for put or for sending files first the name is sent to the server and than the file size and the size of the file. And than depending on the type of the file the file is sent .

Over all, these are my works for the server and the client part.

Using these process two machine can connect between them and operate a session.

## 3. User Manual

First we need two set up the server. Our application is mainly a linux based application. Runs on linux operating system. First we need to set up the server. The server must run a particular port. Generally for FTP the port is 21 . But for our custom built software random ports are to be used. So to initialize the server first we need to go to the currnt directory of the server and run commands

```
~$ gcc -o serfinal serfinal.c
~$ ./serfinal 9590
```

These commands will activate our server.

NOW ANY CLIENT WILL BE ABLE TO CONNECT THE SERVER ON THE CERTAIN PORT.

Now to eun our client part

```
~$ gcc -o clifinal clifinal.c
~$ ./clifinal {IP of server} {port of server}
```

And thus our session begins.

Now moving on to the commands

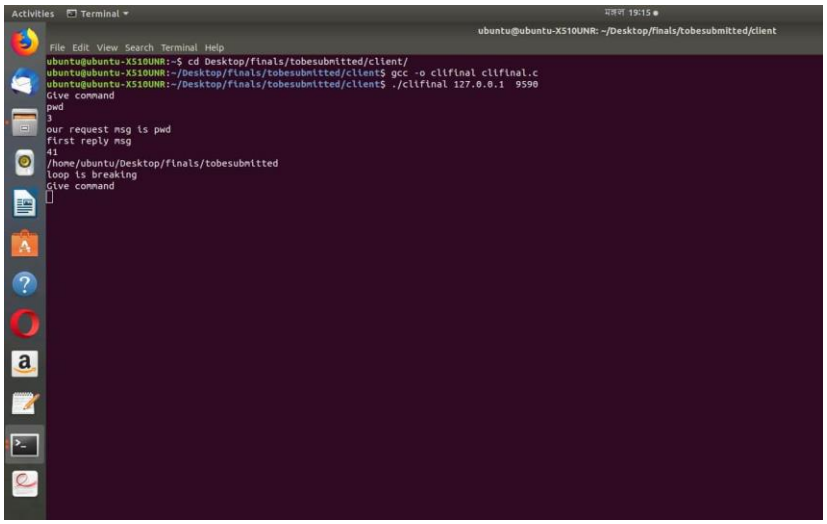



Fig 5: pwd

The client just have to write the command pwd on the prompt Give command

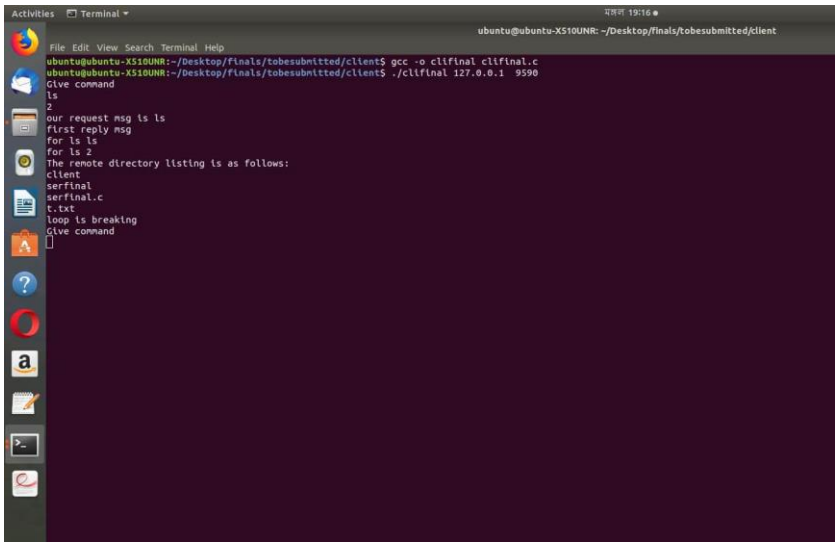



Fig 6: ls

The client just gives the command ls

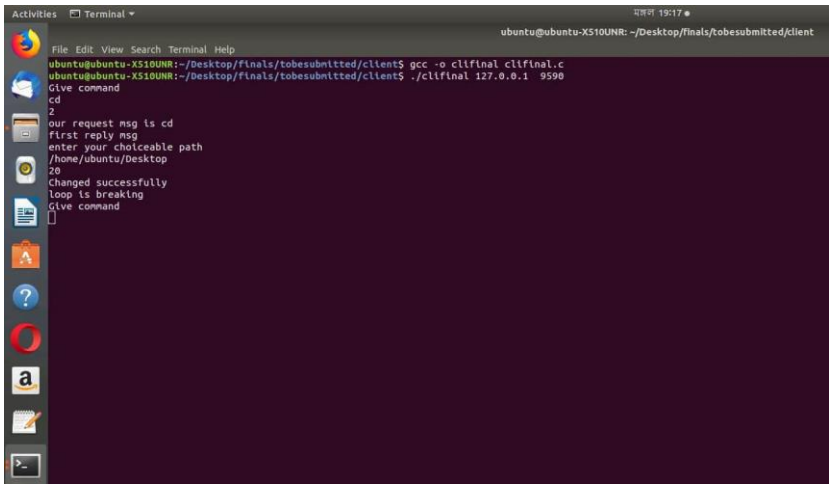



Fig 7:cd

The client first needs to give the command cd. And than the full path of the new directory has to be given.

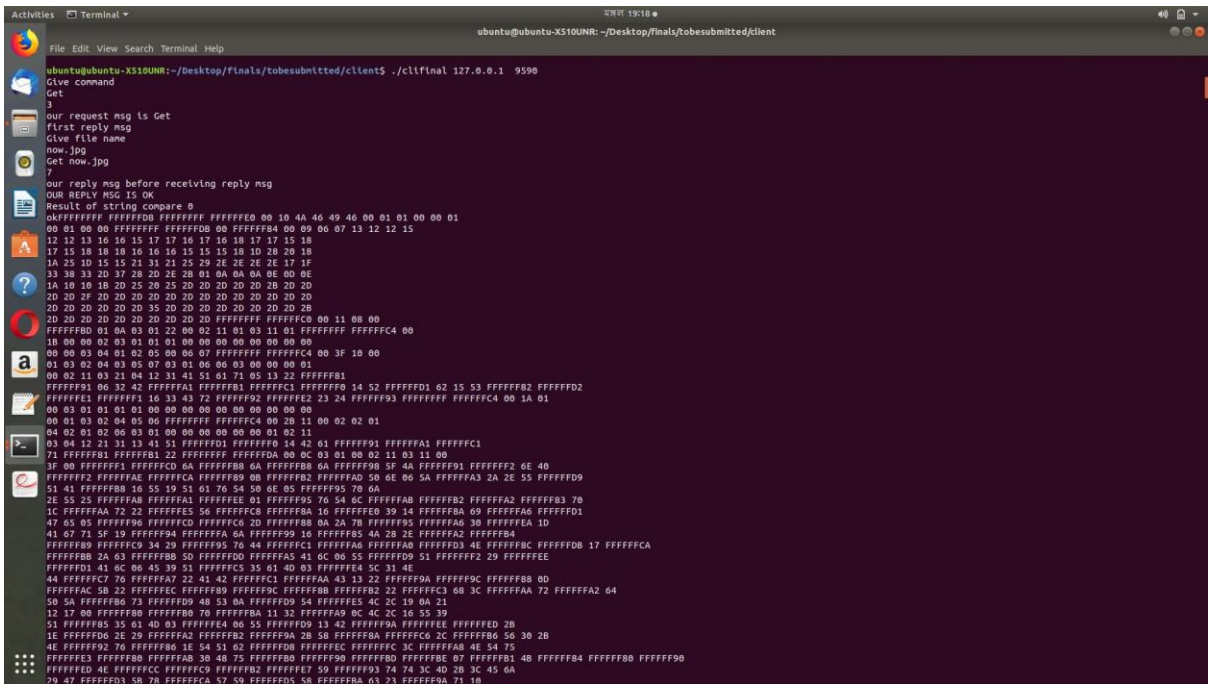



Fig 8 : Get

First the client gives the command get and than the file name.
Than both the commands are attached and sent to the server.

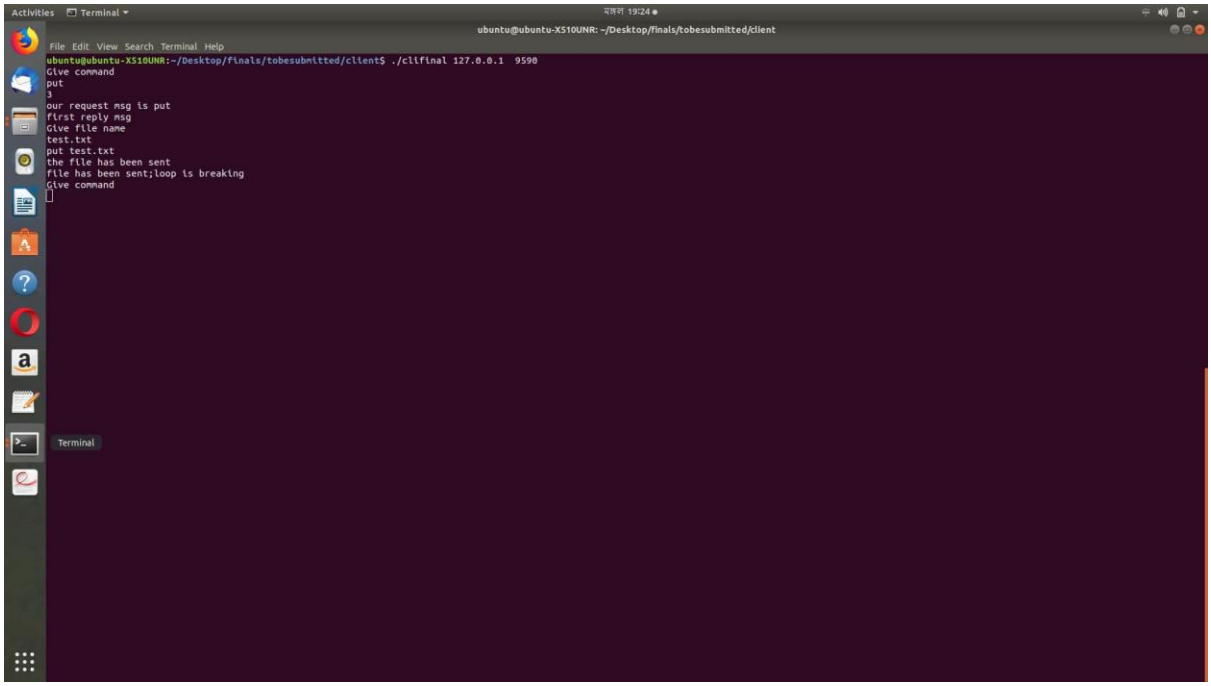



Fig 9: put

Same way. First put than filename and than they are attached and sent to server

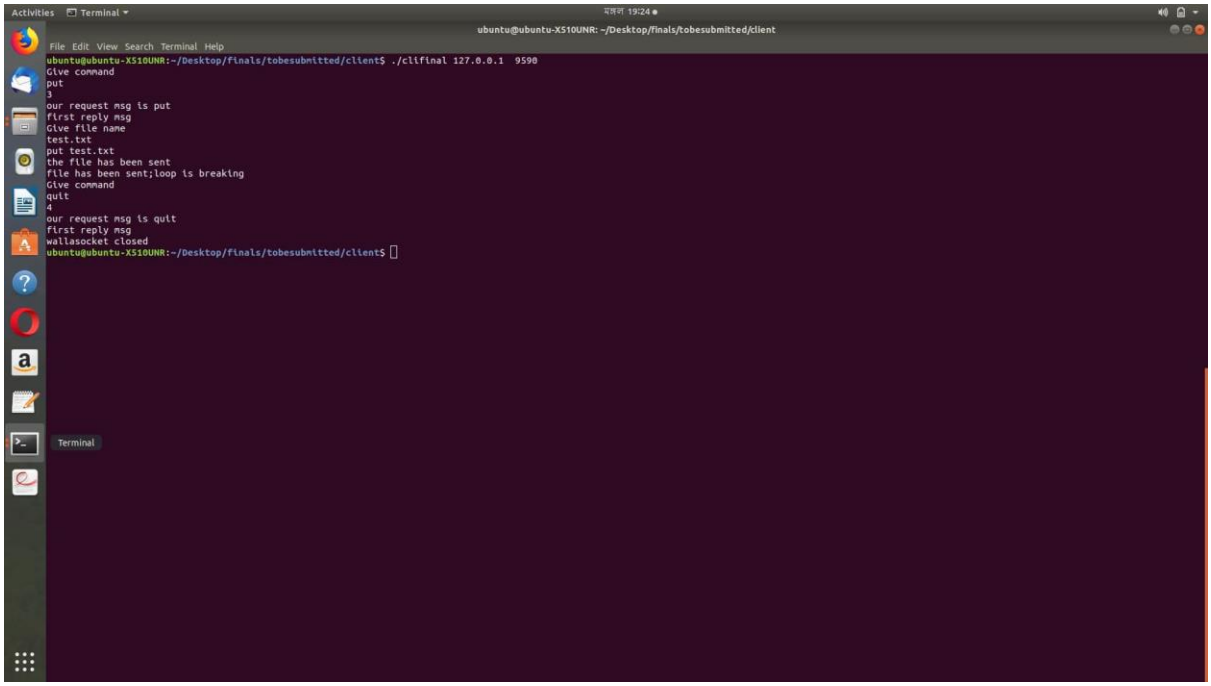



Fig 10 : quit

When the quit command is given the session ends

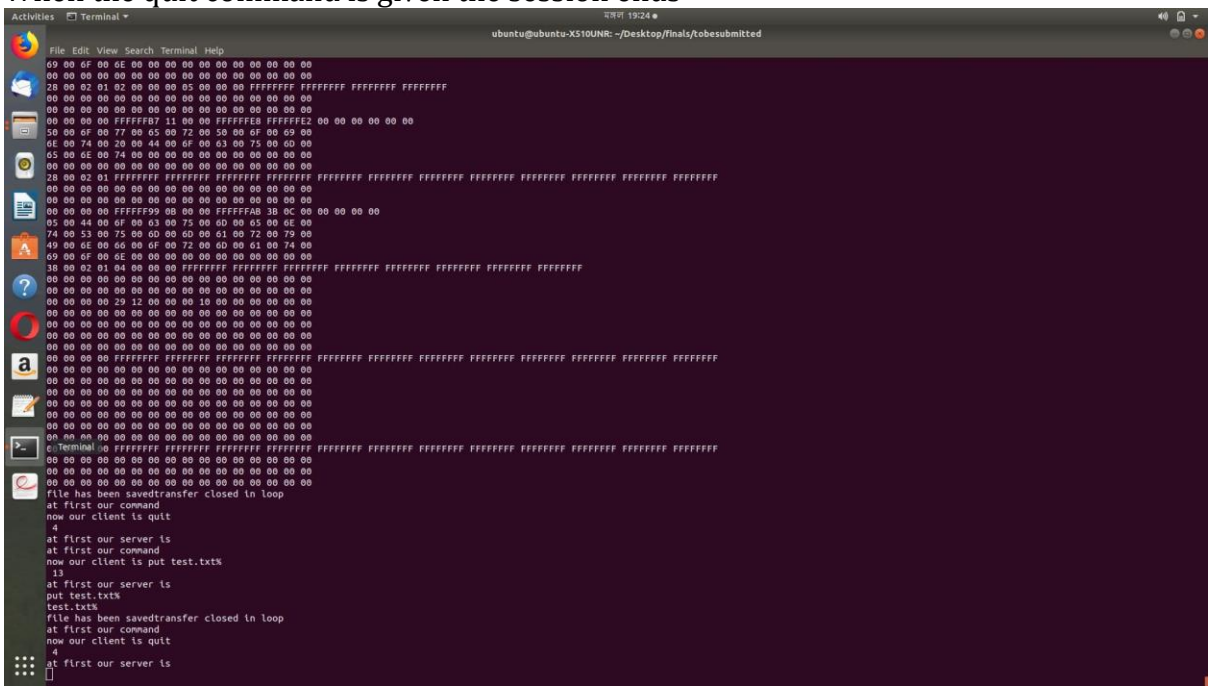



Fig 11: Multiple client

Here though one client has ended his/ her session still due to connections with other clients the server is still on.

## 4.Conclusion

The project is mainly based upon sockets Ftp which are really new topics to me . I had to do some background study in order to do the project . Besides I have handled a large amount of code and besides I have tried different formats to transfer so over all I have made a mark which was suggested to me for this software

## 5.Appendix

Over all I tried to make a file sharing application which will run on the basis of ftp command. I experienced hardships while doing this project but still there are few bugs or areas of improvement for me. But overall this is my software.

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