LAB 3 Report:

Socket programming

Adrián González Expósito
(alu0101404813@ull.edu.es)

Daniel Méndez Rodríguez
(alu0101391793@ull.edu.es)

Index

Developed application description

The main goal of this task is the implementation of an FTP server in C++. The server will have the main functions of FTP protocol, such as allowing the download and upload of files from a folder or being able to see the content of a folder.

FTP Protocol

The file transfer protocol is used for transferring files between a client and a server to keep it on the server or retrieve it from it.

FTP use TCP transport protocol and uses the ports 21 and 21:

- 20: Data connection port.
- 21: Control connection port -> This is used to transfer commands and the replies that they produce.

There are two different types of file transfer modes, first, we have the active mode, here the client connects from a unprivileged port N to the server command port (21 as we said before), then the client starts listening to port M and sends the FTP command port M to the server, finally the server will connect back to the client from port 20 to port M.

The other type of file transfer mode is passive mode, once FTP connection is established, the client opens two random unprivileged ports locally, first port contact to the server on port 21, then the client uses PASV command and the server responds with a port number, finally the client connects to that port to transfer the data.

Guide for the compilation of the source code and the source code and the necessary steps to execute the server program

To compile the code for the FTP server you need to enter '.src' directory of the project. Once there, execute 'make' and the code will compile, the executable will be named as 'ftp_server'. To run the server just execute that file and it will start listening for FTP.

On the other hand, on another terminal execute 'ftp' command, with the optional flag '-d' to activate debugging, and input 'open localhost 2121' in order to connect with your running server. Once the connection is established, you will be able to execute all implemented FTP commands such as 'get', 'put', or 'ls'.

Test cases

Getting a file in active mode


```
lapt@adrianglez22-NBLK-WAX9X:~$ cd Escritorio/
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio$ ls
AYEDA   Capturas   Files   PR3_REDES   ULL   ULL-Practicas
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio$ cd PR3_REDES/
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES$ ls
ftp_server
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES$ cd ftp_server/
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server$
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server$ cd src/
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server/src$ make
g++ -g -std=gnu++0x  ClientConnection.cpp FTPServer.cpp ftp_server.cpp -o ftp_server -lpth
read
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server/src$ ./ftp_server
```
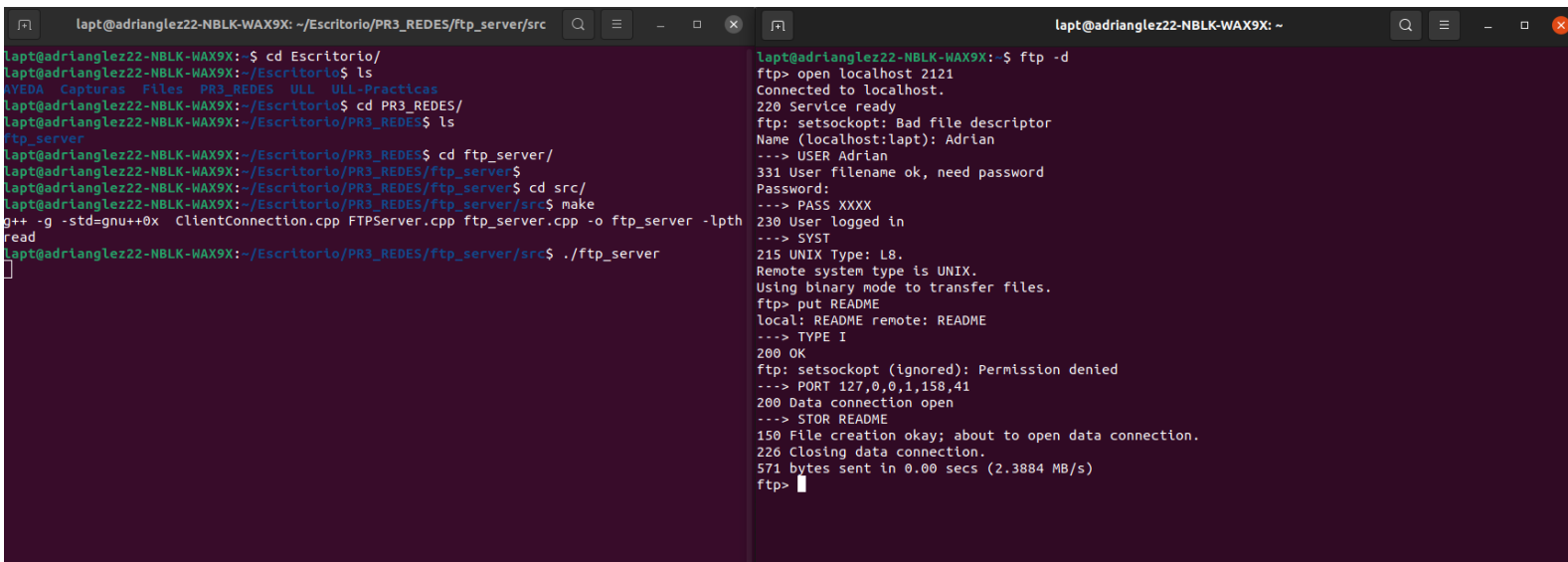
```
lapt@adrianglez22-NBLK-WAX9X:~$ ftp -d
ftp> open localhost 2121
Connected to localhost.
220 Service ready
ftp: setsockopt: Bad file descriptor
Name (localhost:lapt): Adrian
---> USER Adrian
331 User filename ok, need password
Password:
---> PASS XXXX
230 User logged in
---> SYST
215 UNIX Type: L8.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> get README
local: README remote: README
---> TYPE I
200 OK
ftp: setsockopt (ignored): Permission denied
---> PORT 127,0,0,1,179,129
200 Data connection open
---> RETR README
150 File status okay; about to open data connection.
226 Closing data connection.
571 bytes received in 0.00 secs (5.7931 MB/s)
ftp>
```

Getting a file in passive mode


```
lapt@adrianglez22-NBLK-WAX9X:~$ cd Escritorio/
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio$ ls
AYEDA   Capturas   Files   PR3_REDES   ULL   ULL-Practicas
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio$ cd PR3_REDES/
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES$ ls
ftp_server
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES$ cd ftp_server/
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server$
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server$ cd src/
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server/src$ make
g++ -g -std=gnu++0x  ClientConnection.cpp FTPServer.cpp ftp_server.cpp -o ftp_server -lpth
read
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server/src$ ./ftp_server
```

```
lapt@adrianglez22-NBLK-WAX9X:~$ ftp -d
ftp> open localhost 2121
Connected to localhost.
220 Service ready
ftp: setsockopt: Bad file descriptor
Name (localhost:lapt): Adrian
---> USER Adrian
331 User filename ok, need password
Password:
---> PASS XXXX
230 User logged in
---> SYST
215 UNIX Type: L8.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> passive
Passive mode on.
ftp> get README
local: README remote: README
---> TYPE I
200 OK
ftp: setsockopt (ignored): Permission denied
---> PASV
227 Entering Passive Mode (127,0,0,1,203,143)
---> RETR README
150 File status okay; about to open data connection.
226 Closing data connection.
571 bytes received in 0.00 secs (4.5379 MB/s)
ftp>
```
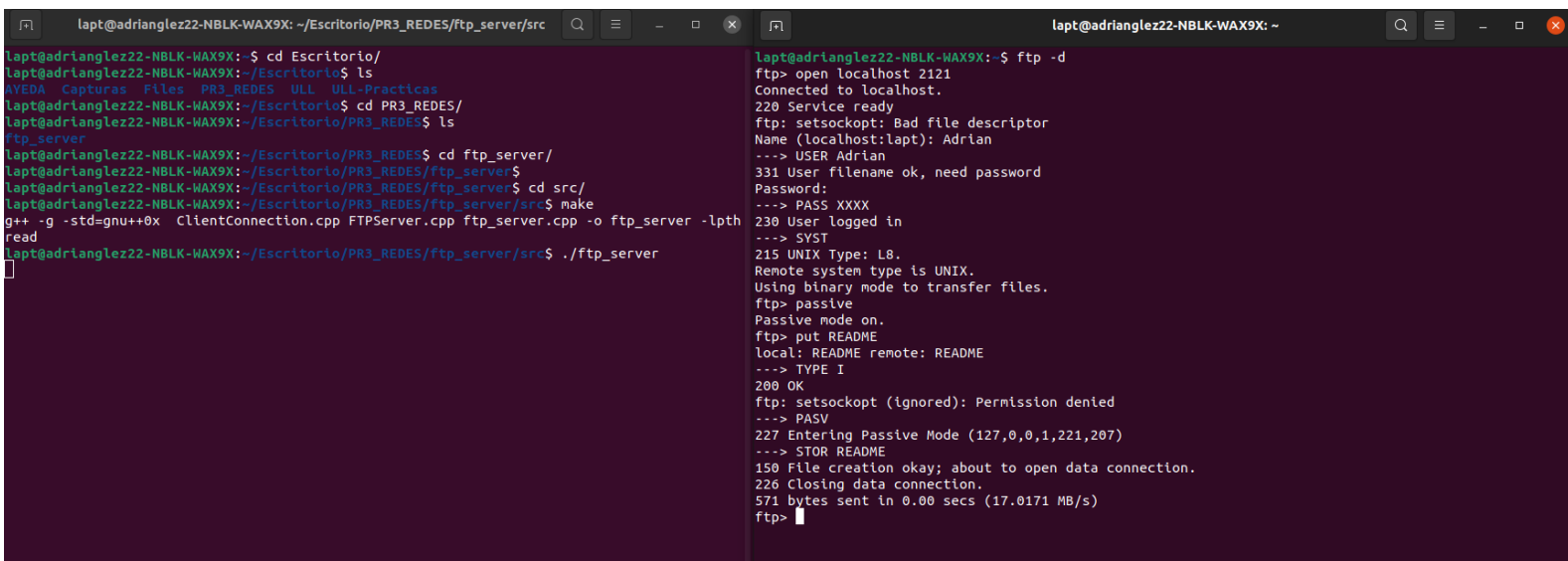
Putting a file in active mode

```
lapt@adrianglez22-NBLK-WAX9X:~$ cd Escritorio/          lapt@adrianglez22-NBLK-WAX9X:~$ ftp -d
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio$ ls           ftp> open localhost 2121
AYEDA  Capturas  Files  PR3_REDES  ULL  ULL-Practicas   Connected to localhost.
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio$ cd PR3_REDES/ 220 Service ready
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES$ ls  ftp: setsockopt: Bad file descriptor
ftp_server                                              Name (localhost:lapt): Adrian
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES$ cd ftp_server/  ---> USER Adrian
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server$  331 User filename ok, need password
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server$ cd src/  Password:
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server/src$ make  ---> PASS XXXX
g++ -g -std=gnu++0x  ClientConnection.cpp FTPServer.cpp ftp_server.cpp -o ftp_server -lpth  230 User logged in
read                                                    ---> SYST
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server/src$ ./ftp_server  215 UNIX Type: L8.
                                                        Remote system type is UNIX.
                                                        Using binary mode to transfer files.
                                                        ftp> put README
                                                        local: README remote: README
                                                        ---> TYPE I
                                                        200 OK
                                                        ftp: setsockopt (ignored): Permission denied
                                                        ---> PORT 127,0,0,1,158,41
                                                        200 Data connection open
                                                        ---> STOR README
                                                        150 File creation okay; about to open data connection.
                                                        226 Closing data connection.
                                                        571 bytes sent in 0.00 secs (2.3884 MB/s)
                                                        ftp>
```

Putting a file in the passive mode

```
lapt@adrianglez22-NBLK-WAX9X:~$ cd Escritorio/          lapt@adrianglez22-NBLK-WAX9X:~$ ftp -d
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio$ ls           ftp> open localhost 2121
AYEDA  Capturas  Files  PR3_REDES  ULL  ULL-Practicas   Connected to localhost.
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio$ cd PR3_REDES/ 220 Service ready
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES$ ls  ftp: setsockopt: Bad file descriptor
ftp_server                                              Name (localhost:lapt): Adrian
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES$ cd ftp_server/  ---> USER Adrian
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server$  331 User filename ok, need password
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server$ cd src/  Password:
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server/src$ make  ---> PASS XXXX
g++ -g -std=gnu++0x  ClientConnection.cpp FTPServer.cpp ftp_server.cpp -o ftp_server -lpth  230 User logged in
read                                                    ---> SYST
lapt@adrianglez22-NBLK-WAX9X:~/Escritorio/PR3_REDES/ftp_server/src$ ./ftp_server  215 UNIX Type: L8.
                                                        Remote system type is UNIX.
                                                        Using binary mode to transfer files.
                                                        ftp> passive
                                                        Passive mode on.
                                                        ftp> put README
                                                        local: README remote: README
                                                        ---> TYPE I
                                                        200 OK
                                                        ftp: setsockopt (ignored): Permission denied
                                                        ---> PASV
                                                        227 Entering Passive Mode (127,0,0,1,221,207)
                                                        ---> STOR README
                                                        150 File creation okay; about to open data connection.
                                                        226 Closing data connection.
                                                        571 bytes sent in 0.00 secs (17.0171 MB/s)
                                                        ftp>
```

Ls in active mode

Ls in passive mode

Appendix: Source code

Source code is located in this Github repository:

https://github.com/Adrian-glz01/REDES_PR3.git