Socket Programming Report

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2014-11-14

Preface:

Socket programming is one of the most essential and important coding skills in today's network software development. The project brings much inspiration and delight after finishing the two tasks which also tires me a lot.

In this report, I talk about how to implement the UDP programming and FTP and some confusion about socket working that takes much time debugging.

Programming Environment

IDE: eclipse

System: Ubuntu 14.04 LTS

Programming Language: Java

Report Editor: LibreOffice Writer

UDP programming

In UDP programming, I implemented the programs using Java which are placed in one project naming UDPDemo.

Client and Server communicate with each other by means of UDP. Each string server received will be numbered into a sequence, then responses to client the message client have sent out with the number as a header, during this process, the server parse the client's ip address automatically .The message from client is a number between zero and fifty, the server should return all the messages it received with number headers.

To terminate Client, you can use command QUIT, but you must input target ip address firstly.

Not so much difficulty as FTP in UDP programming, but messages rely on network condition and it does not make any guarantees for them. if in the client a wrong ip address was put, then it will wait for response infinitely. Finally it comes with some difficulties in chatting and file transferring, which optional questions are answered in another document.

FTP Programming

FTP is implemented in two projects called FTPClient and FTPServer, which act as client and server in the socket connection.

Functions Implemented

As required, server port is twenty one and it is able to support multiple clients connections, using multiple threads in which server make some listeners which designated as one hundred waiting connection request .When server needs to establish a connection it set up a new thread, each thread is separated with others.

Commands from clients for USER, PASS, RETR, STOR, QUIT, SYST, TYPE, PORT, PASV ,CWD, CDUP, DELE, LIST, MKD, PWD, RMD, RNFR and RNTO are accepted by server, such as downloading, uploading files and change filenames.

Commands Pipeline

Client have already tested by ftp.ntu.edu.tw, a ftp server from National Taiwan University, and Server is designated and implemented to cooperate with it.

Usually each command sent to server expected a response,other than some exceptions occurred,also some of them is considered as an error message returned to the client. Successful commands require correct format and characters as space in commands is essential.

A user must log in first, only command as USER anonymous is accepted and also password which format is an email address with PASS header.

With SYST command sent to server, a message about the server's system will be returned, for TYPE command, only TYPE I is valid.

After logged in, a user may use commands to upload and download file, which requiring an established connection under either PASV mode or PORT mode. Note that PORT or PASV command may fail for unable to establish the connection, such as PORT command refers an address different from client.

RETR and STOR are commands for upload and download files transferred under binary mode, every successful or failed file operation will close connection established by PASV or PORT.

Optional Commands CWD, CDUP, DELE, LIST, MKD, PWD, RMD, RNFR and RNTO are implemented, and for security, command CWD cannot change to upper directory than primary directory which is /home/qiaocy/ftp_shareserver in my project. For LIST command, server returns present file names or directory names with suffix File or Directory.

With a QUIT or ABOR command, the Client disconnects and terminating with some bye messages.

Difficulties And Solutions

Little acknowledge about socket programming did I know before, that makes usually confused

about how it works and that takes much time designing the project by reading some primary books. Also Internet helps a lot.

So the situation using Java, however, after some learning and discussing with roommates I find that Java is so similar to C++ and the character handling is more simple and easily operate.

Testing is a boring but essential working, usually I need to modify relevant functions and responding messages' sequence, also header judge.

For the reason use of blocking programming, debug takes a large part of time, many bugs occurred during messages transferred,including files and commands, which is usually hard to find out.

Requirements For Using FTP

Since the project is implemented and tested under UNIX, I strongly recommend that it should be executed under UNIX, too,

The server support “-d directory” command that directory is the root directory for server, and user will be denied if he uses CDUP command to reach upper directory for security.

Some exceptions such as connection failed may cause client terminated, user should restart client for further using.

Summary

The task brings me much knowledge about socket programming，but honestly speaking I focused on the programming and only learned little comprehension about socket and net working. However, finishing the ftp brought me delight and confidence, I expect further study.

Thanks For Your Patience

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