2017 ITCN Final Project

2017/12/11

Description

In this project, your team need to implement a FTP proxy.

- It should be able to control the transmission rate.
- Your team should brainstorm together to come up with an approach.
  (You could think about the approaches professor mentioned in class)
- The performance of your approach will direct impact your grade.
  - TAs will compare your FTP proxy with other teams' proxy
  - If you want to get higher score, try to improve the performance of your FTP proxy to the best.

Architecture

Three main components:

- FTP server
  We provide a FTP server where you can upload and download files.
- FTP proxy
  It controls download and upload rate between client and server.
- FTP client
  The client could be any kind of FTP clients such as Filezilla, CuteFTP. It depends on you.

Architecture

FTP Server

Information about our FTP server:

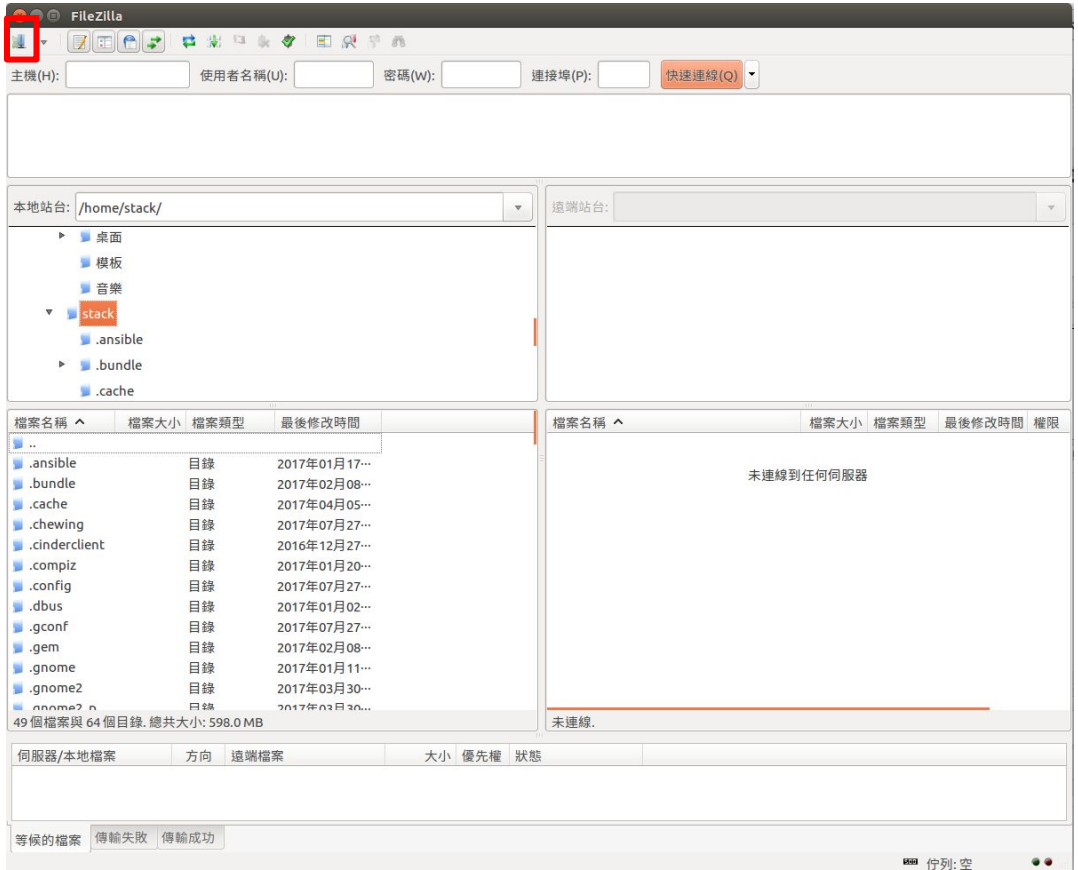
- IP address and port: **140.114.71.159:8740**
- User/Password: **lab/lab**
- Please use **Passive mode** to connect to the server.
- FTP without TLS (no encryption).

FTP Proxy

TAs will provide an incomplete sample code of FTP proxy.

- You must trace the code, try to figure out how the proxy works and finish the incomplete part.
- You can run localhost (127.0.0.1) proxy on your own Unix-like or Linux machine.

FTP client


FileZilla
主機(H):
使用者名稱(U):
密碼(W):
連接埠(P):
快速連線(Q)
本地站台:
/home/stack/
桌面
模板
音樂
stack
.ansible
.bundle
.cache
遠端站台:
檔案名稱
檔案大小
檔案類型
最後修改時間
..
.ansible 目錄 2017年01月17…
.bundle 目錄 2017年02月08…
.cache 目錄 2017年04月05…
.chewing 目錄 2017年07月27…
.cinderclient 目錄 2016年12月27…
.compiz 目錄 2017年01月20…
.config 目錄 2017年07月27…
.dbus 目錄 2017年01月02…
.gconf 目錄 2017年07月27…
.gem 目錄 2017年02月08…
.gnome 目錄 2017年01月11…
.gnome2 目錄 2017年03月30…
49 個檔案與 64 個目錄. 總共大小: 598.0 MB
檔案名稱
檔案大小
檔案類型
最後修改時間
權限
未連線到任何伺服器
未連線.
伺服器/本地檔案
方向
遠端檔案
大小
優先權
狀態
等候的檔案
傳輸失敗
傳輸成功
佇列: 空

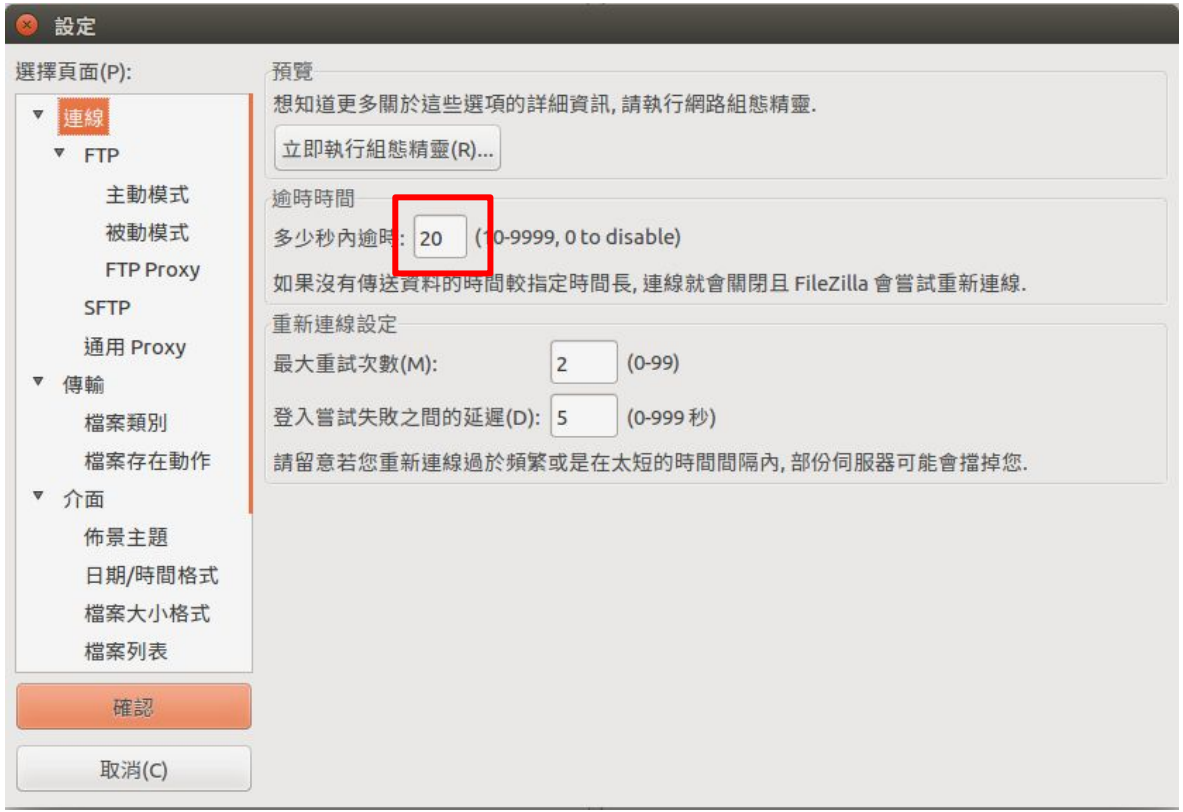
FTP client

If you have run up a proxy on localhost with port 8888 (127.0.0.1:8888) and want to use Filezilla to connect to your proxy, following are setting examples:

FTP client

If you have run up a proxy on localhost with port 8888 (127.0.0.1:8888) and want to use Filezilla to connect to your proxy, following are setting examples:

You cannot modify this value



FTP Proxy Specfication

1. **It must be written in C/C++**. Any other languages will **not** be accecpted.
2. Following configurations can be specify with the command line interface when the proxy begins.
    - Proxy IP address and port.
    - Downloading rate.
    - Uploading rate.
3. It can transfer requests from a client to a specified FTP server and from a specified FTP server to a client.
4. It can control the rate of downloading and uploading as close as users expect.

Grading

- ✓ 25%: Your FTP proxy can meet all requrements of FTP proxy specfication.
- ✓ 40%: Ranking:
  - The performance of your FTP proxy will be compared to other teams.
  - If your proxy can’t meet **all requirements** of FTP proxy specification, your team will **get zero in this part**.
- ✓ 35%: Report

Ranking (40%)

- Performance definition:
  {Actual average transmission rate via proxy} - {expected transmission rate}

- There are **5 test cases**
  Two of them will be released **before** demo.
  1. Expected **downloading rate: 50 KBtyes/s** (400 kbits/sec).
     File: You can download the testcase file from the download folder in FTP.
  2. Expected **uploading rate: 100 KBytes/s** (800 kbits/sec).
     File: Upload the test case file (You can download it from download folder) to the upload folder.

Ranking

3. There are also **two hidden test cases**, which will be released **on** demo time.
4. One more thing, we have a **BOSS test case**:
   Expected uploading rate: **25 KBytes/s** (200 kbits/sec).

- For each test case, your team have only **two chances** to run your proxy, TA will chose the one with the better performance. Then, your rank will be mapped to a score with following table.

Rank	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-43
score	100	95	90	85	80	75	70	65	60

Ranking

- **For BOSS test case, your approach have to reach 20~30 Kbytes to get ranked or you will get 0 point for this test case.**

- Then your score in this part will be:

  40% * (average score of the first 2 test cases) + 50% * (average score of 2 hidden test cases) + 10% * (BOSS test case)

Report (35%)

Your report **must** includes the following contents.

1. Architectire of the project. (ex: Flow of program)
2. **Trace Code**: The understanding of the proxy
    - EX: How the proxy works? How the proxy communicates with the server and the client.
    - Try your best to express your understanding and thought to get higher score.
3. How do you implement the approach of controlling transmission rate?
4. Problems you confronted and how did you solve them?
5. How to run your code?
6. Show some experimental results.
7. What is the responsibility of each member?

Submission

- **Code Submission deadline: 2018/1/14 23:59.**
  Late submission is NOT accepted.

- **Demo time: 2018/1/15.**
  We will announce the detailed time and place later.

- Please compress all your code file as a ZIP file and upload to iLMS.
  - Name of the zip file: **<team_number>.zip**
    - Name of the report: **<team_number>.pdf**
    - Name of the code: **<team_number>.c**
  - Team leaders have to submit it.

Note

1. TAs will test your code on **Ubuntu 14.04** system.

2. **DO NOT copy other's code, or your team will get zero point.**

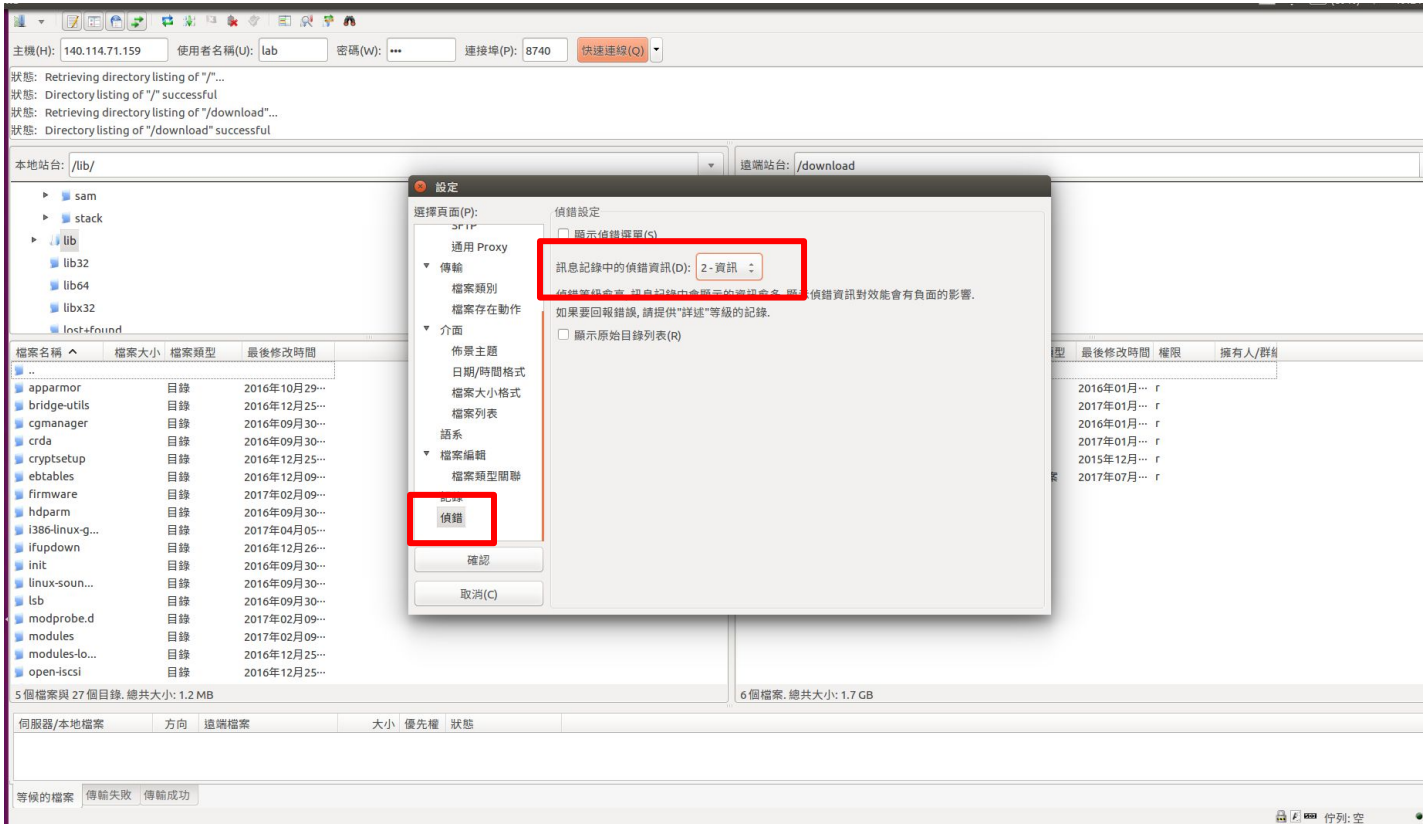
3. Please do some researches and **start this project early**.
4. Ask questions about spec of final project on **iLMS**.

Demo SOP

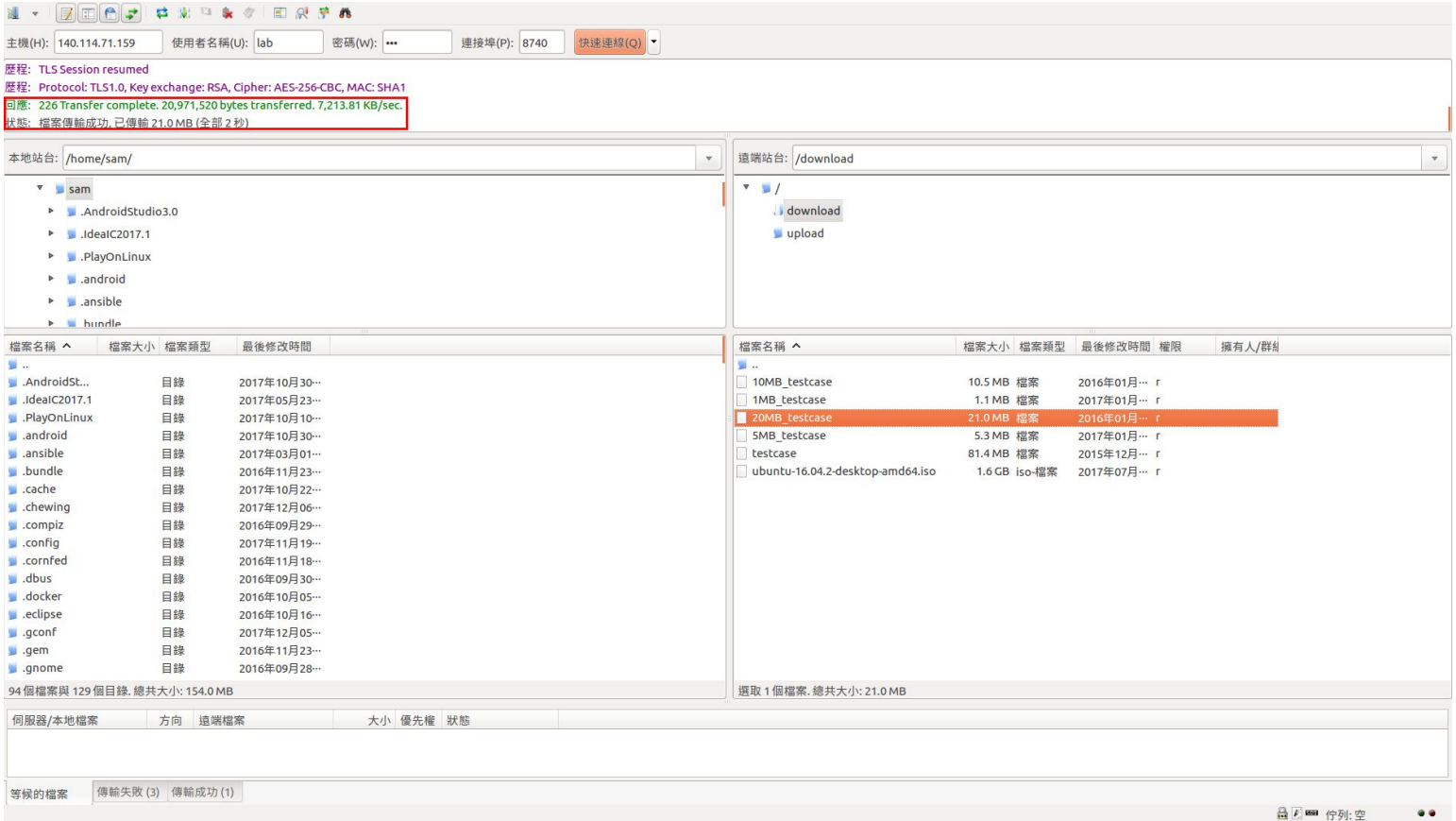
- Before demo
  - TAs will prepare the demo environment.
  - TAs will use our machine to test your program.
    - TAs will download your code before demo and **you cannot modify it**.
    - If you have trouble running your proxy,
      - ➢ **you cannot ask TAs**
      - ➢ **make up demo is not possible**
- Demo
  - TAs will use Filezilla’s log to check your average transfer rate(second decimal place)
    ex: 226 Transfer complete. 10,485,760 bytes transferred. 98.84 KB/sec
  - After you complete your demo, please sign your name

TAs will use the following setting to measure time.

偵錯 -> “2-資訊”



Actual average transmission rate via proxy



Reference and Hint

- If you have trouble uploading files, change the debug level of FileZilla to see the error messages.

Reference and Hint

You may read the following material about FTP protocol and you may notice that there are data channels and signal channels in FTP transmission.

- https://www.ietf.org/rfc/rfc959.txt
- http://www.linuxhowtos.org/Misc/ftpmodes.htm
- http://blogs.msdn.com/b/webtopics/archive/2014/09/06/revisiting-ftp-basics.aspx

Reference and Hint

You may use a function called select() to transmit requests from a client to a specified FTP server and from a specified FTP server to a client concurrently.

- http://www.gnu.org/software/libc/manual/html_node/Server-Example.html
- https://www.gnu.org/software/libc/manual/html_node/Waiting-for-I_002fO.html

Reference and Hint

You may use forking child processes to handle multiple clients and handling data channels and signal channels concurrently.

- http://www.chemie.fu-berlin.de/chemnet/use/info/libc/libc_23.html