Computer Network Project 3

Due date

28/Nov/2016 23:55:00
(delay - -10pts per day)

Goal

- Understanding how proxy server works
- Implementing a transparent proxy server which is bypassed by http requests and responses

OS & Language

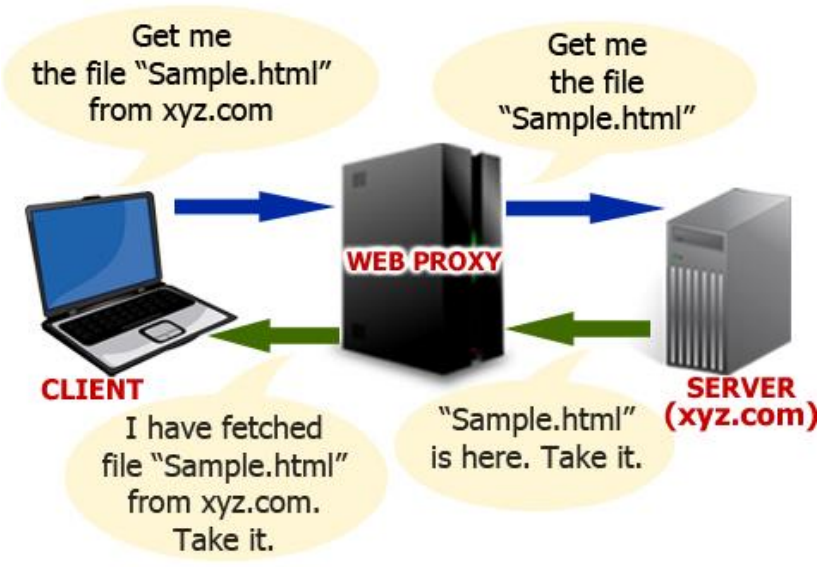
- Linux Ubuntu 14.04.4 LTS or CentOS7(>=7.2)
- C (gcc 4.8.5) or Python2,3 (>=2.7.5 or >=3.5.2)

Restraints

- It's allowed to refer to any examples on internet but you must write your own codes
    - The plagiarism detection program will be used to grade

Basic Requirement (120pts)

1. Building a transparent proxy server



- Bind a socket listening on a specific port so that your proxy server should get HTTP requests from the client
    - Port number should be set when you run your program
        - ./run.sh [port number]

- Whenever the client make a request to a server, establish two new socket connections, one of which is for the client and another is for the server
- After a request and response are fully bypassed, the connections should be closed

2. Logging on command line

- Log all actions such as socket connection, receiving and sending packets and so on like below

```
Starting proxy server on port PORT_NUMBER
-----------------------------------------------
NO [?] Redirection [?] Mobile [?] Falsification
// ? is O or X (mode indicators)
[CLI connected to CLI_IP:CLI_PORT]
[CLI ==> PRX --- SRV]
  > Request_1st_Line_from_Client
  > User-Agent_1st_Line_from_Client
[SRV connected to DST_DOMAIN:DST_PORT]
[CLI --- PRX ==> SRV]
  > Request_1st_Line_to_Server
  > User-Agent_1st_Line_to_Server
[CLI --- PRX <== SRV]
  > Response_Status_Code_from_Server
  > Response_MIME_Type Response_Sizebytes
[CLI <== PRX --- SRV]
  > Response_Status_Code_to_Client
  > MIME_Type_to_Client Size_to_Clientbytes
[CLI disconnected]
[SRV disconnected]
```

- Line splitting a pair of request and response

PORT_NUMBER

- Port number proxy server listening

NO [?] Redirection [?] Mobile [?] Falsification

- NO – index of HTTP communication
- ? should be ‘o’ when the functionality is activated or ‘x’
- Redirection, Mobile and Falsification are the functionalities for the additional assignment

[CLI connected to CLI_IP:CLI_PORT]
- Client <-> Proxy connection has been established
- CLI_IP – IP address of client
- CLI_PORT – port number of client
-

[CLI ==> PRX --- SRV]
- Proxy server has received data from client

> Request_1st_Line_from_Client
- Method Url+ Path

> User-Agent_1st_Line_from_Client
- user-agent field

[SRV connected to DST_DOMAIN:DST_PORT]
- Proxy <-> Server connection has been established

[CLI --- PRX ==> SRV]
- Proxy has sent data to server

[CLI --- PRX <== SRV]
- Proxy has received data from server

> Response_Status_Code_from_Server
- Status_Code Reason

> Response_MIME_Type Response_Sizebytes

[CLI <== PRX --- SRV]
- Proxy has sent data to client

[CLI disconnected]
- Client <-> Proxy has been disconnected

[SRV disconnected]
- Proxy <-> Server has been disconnected

Tips

- Testing your program
    - Configurate your proxy server on the web browser and try accessing a web page

    - If your proxy server works properly, web pages will be shown
    - Ex) chrome proxy setting

      https://support.google.com/chrome/answer/96815?hl=ko

- HTTP Persistent Connection
    - You do not have to implement persistent connection, but your proxy server may not work properly if you access a web server supporting the persistent connection
    - You have to modify HTTP header so that your proxy server does not communicate with the client or server with persistent connection
    - Refer to below link, which explains persistent connection and why dumb proxy does not work

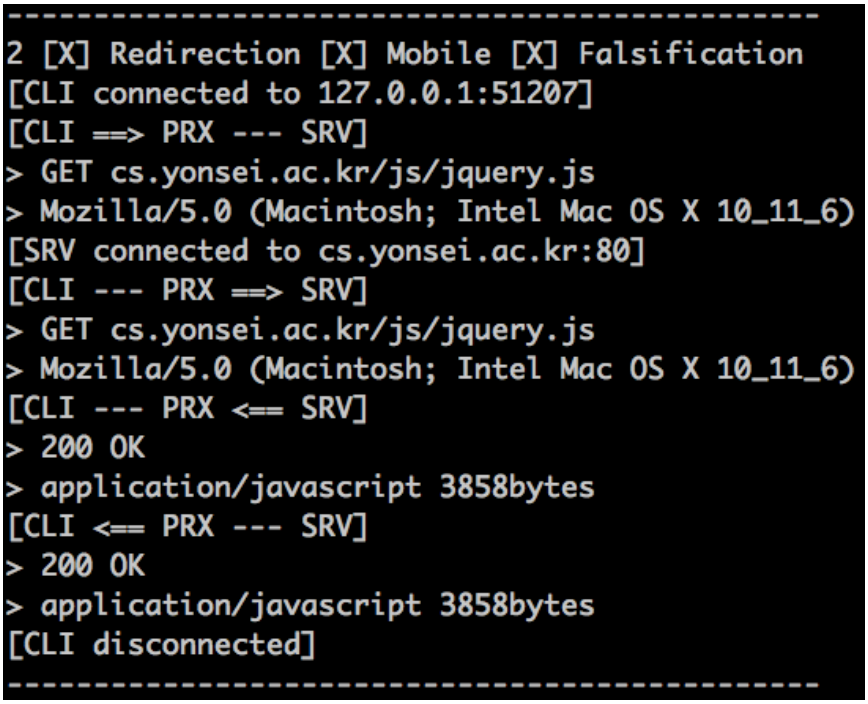
      https://www.safaribooksonline.com/library/view/http-the-definitive/1565925092/ch04s05.html

Result Example

- Running Program

```
sh-3.2# ./run.sh 9001
Starting proxy server on port 9001
```

- Accessing Webpage



Additional assignment (30pts + 50pts)

1. Domain-level Redirection (10pts)

- Activation and deactivation of Redirection should be worked, when client make requests like below
  - [any domain URL]?start_redirect=[redirection url]
    - activate redirection and set redireton url
  - [any domain URL]?stop_redirect
    - deactivate redirection
  - ex) redirection url = http://yonsei.ac.kr
    - http://yonsei.ac.kr/ -> no redirection
    - http://naver.com -> redirection to http://yonsei.ac.kr

2. Substituting agent to mobile agent (10pts)

- Activation and deactivation of mobile proxy server serving mobile web pages, when client make requests like below
  - [any domain URL]?start_mobile
    - activate mobile proxy server so that all web pages should be served as mobile page
  - [any domain URL]?stop_mobile
    - deactivate mobile proxy server
- [Hint] It is different from redirection. Refer to 'user-agent' field

3. Response Falsification (10pts)

- Activation and deactivation of coloring web pages, when client make requests like below
    - [any domain URL]?start_falsify=[RGB value]
        - activate coloring so that all backgrounds of web pages should be colored in [RGB value]
    - [any domain URL]?stop_falsify
        - deactivate coloring
    - ex) RGB value = 0000FF
      http://naver.com should be shown like below

- [Hint] Style tag should be added to html
    - <style>body{background-color}</style>

4. Additional Report (50pts)

- Write a review paper of Proxy Server.
- This paper is free format but you should include
    - What is a proxy server? and How it works?
    - Proxy Types and Uses.
    - *Cache / Transparent Proxy Server [for Project 4]
        - This part is important, you may learn this later if you are not going to do this additional assignment.
    - **Any ideas to improve client-server performance**
- Directions
    - File name: Your_ID.pdf (e.g., 2012123123.pdf)
    - Max. 10 pages
    - **Upload the file to Project 3 – Review Paper (TurnItIn)**