

Computer Network Project 3 Simple Proxy Server

CSI4106-01

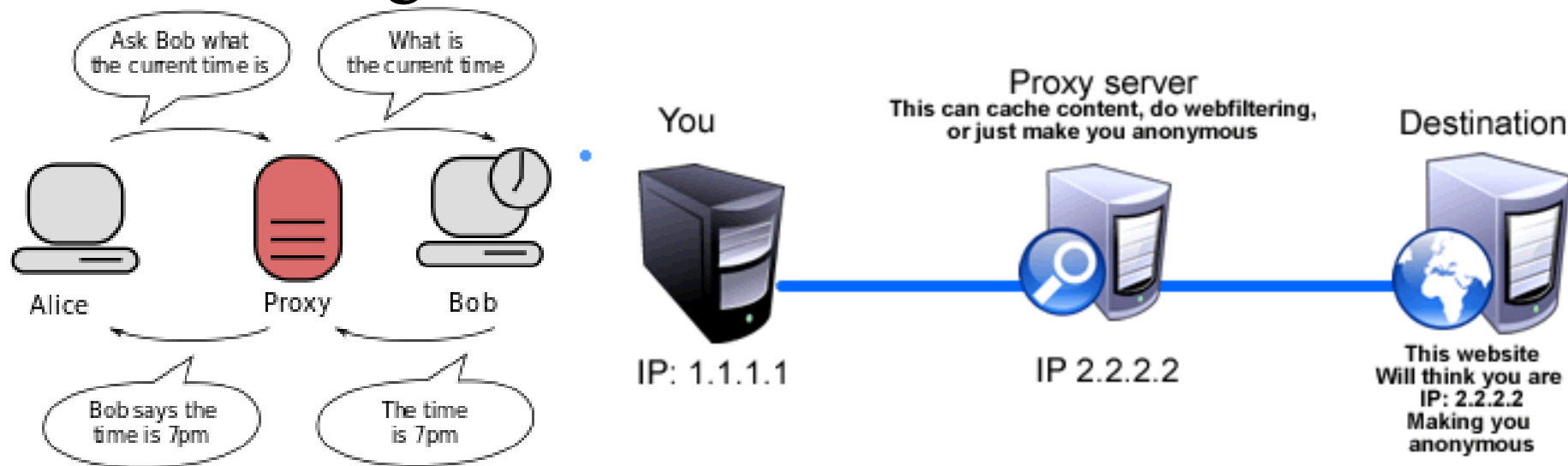
Fall, 2016

Prelim.

- You have total 4 projects in this class.
- Each project has “**Mandatory**” assignment and “**Additional**” assignment (optional).
 - Mandatory(100 pts) + Additional(α pts)
- You should follow the **print format of screen** and the **file format of your deliverables**.
- We provide the example version of deliverables so we can grade your projects automatically.

What is a proxy server?

- An intermediary for requests from clients seeking resources from other servers.
- Resides anywhere, between YOU and destination.
- The fundamental function: intercepting and forwarding traffic.

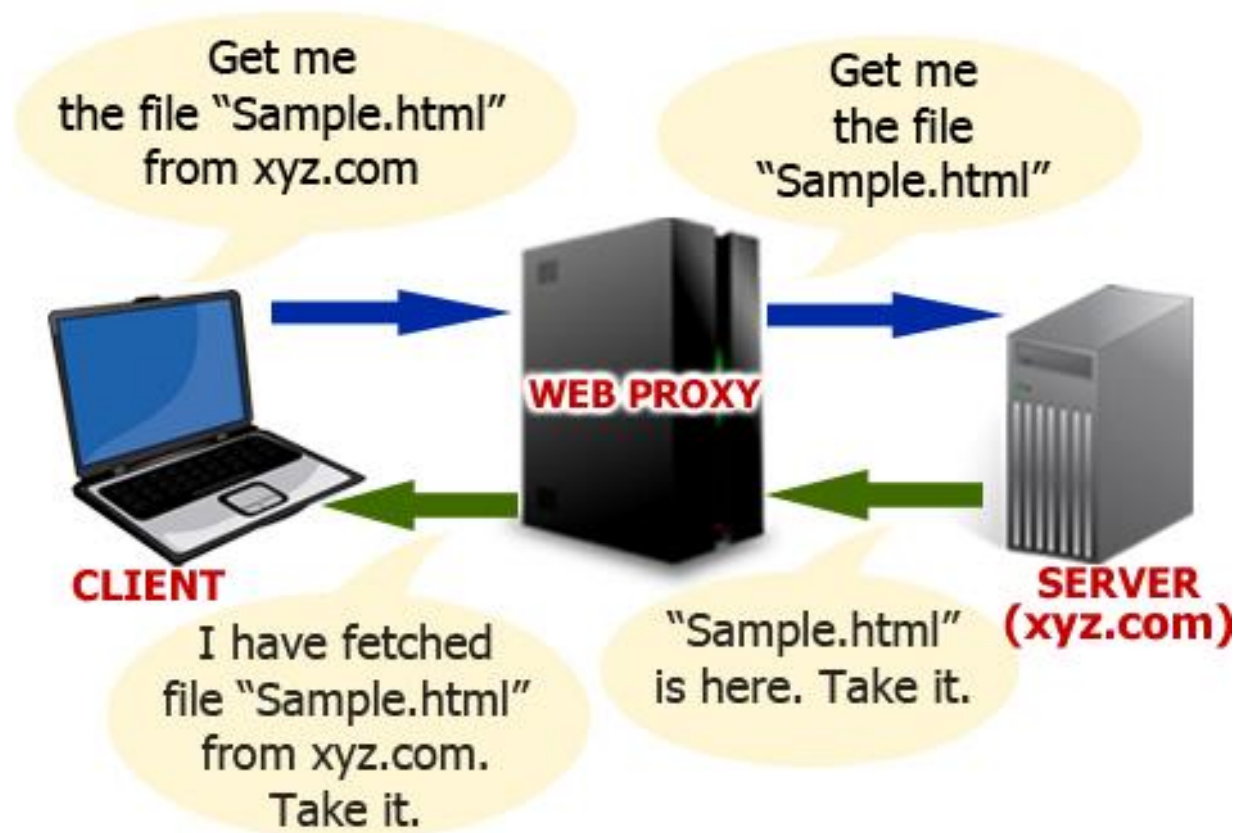


The uses of proxy servers

- Filtering specific data (to block or redirect them)
 - Filtering of encrypted data
 - Bypassing filters and censorship → **Project 3 AA**
 - Translation → **Project 3 AA**
- Logging or eavesdropping for monitoring traffic
 - Transparent Proxy → **Project 3**
- Improving performance (Cache) → **Project 4**
- *(e.g.) SSL/DNS/CGI/HTTP proxy*
- *(further...) Reverse, Anonymous, Tunneling...*

How a http proxy server works?

- **Transparent Proxy on HTTP**



Mandatory Assignment “120pts”

- Write the code of http **transparent** proxy server
- Implement Required Functions (1)~(3)
- Project 2 will help you a lot!
- **The precise logging is important this time!**
- **Consider HTTP Persistent Connection**
 - **See Background and Implementation Scope Slide**
- **HTTP 1.0/1.1 only (not HTTPS)**
- **Do not care Performance issues**

(Format) `./run.sh port`

(Example) `./run.sh 9001`

```
sh-3.2# ./run.sh 9001
```

```
Starting proxy server on port 9001
```

Required Functions

(1) Managing Two Sockets!

- One socket for receiving Client Request!
- Another socket for fetching Response of the client request
- You need to forward Requests/Responses.
- Hint: **Where should requests/responses go?**

Required Functions***

(2) *Handling 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 using the persistent connection.
- Refer to *Background slide*, which explains the persistent connection and why a dumb proxy does not work.

Required Functions

(3) Logging on Command Line

- Your proxy server is running in background.
- When a request from a client is arrived, your proxy server should print out the precise logs.

Starting proxy server on port 9001

```
-----
1 [O] Redirection [O] Mobile [X] Falsification
[CLI connected to 127.0.0.1:4994]
[CLI ==> PRX --- SRV]
  > GET cs.yonsei.ac.kr/a.js
  > Mozilla/5.0 (Windows NT 6.1; WOW64)
[SRV connected to cs.yonsei.ac.kr:80]
[CLI --- PRX ==> SRV]
  > GET yscec.yonsei.ac.kr/a.js
  > Mozilla/5.0 (Linux; Android 4.4.2; Nexus 4)
[CLI --- PRX <== SRV]
  > 200 OK
  > application/javascript 3858bytes
[CLI <== PRX --- SRV]
  > 404 Not Found
[CLI disconnected]
[SRV disconnected]
```

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]
```

Starting proxy server on port 9001

1 [O] Redirection [O] Mobile [X] Falsification

[CLI connected to 127.0.0.1:4994]

[CLI ==> PRX --- SRV]

> GET not.this.time/namy

> Mozilla/5.0 (Windows NT 6.1; WOW64)

[SRV connected to not.this.time:80]

[CLI --- PRX ==> SRV]

> GET yscec.yonsei.ac.kr

> Mozilla/5.0 (Linux; A

Build/KOT49H)

[CLI --- PRX <== SRV]

> 200 OK

> application/mp3 55555

[CLI <== PRX --- SRV]

> 404 Not Found

[CLI disconnected]

[SRV disconnected]

2 - [O] Redirection [O] M

2 [X] Redirection [X] Mobile [X] Falsification

[CLI connected to 127.0.0.1:51207]

[CLI ==> PRX --- SRV]

> GET cs.yonsei.ac.kr/js/jquery.js

> Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_6)

[SRV connected to cs.yonsei.ac.kr:80]

[CLI --- PRX ==> SRV]

> GET cs.yonsei.ac.kr/js/jquery.js

> Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_6)

[CLI --- PRX <== SRV]

> 200 OK

> application/javascript 3858bytes

[CLI <== PRX --- SRV]

> 200 OK

> application/javascript 3858bytes

[CLI disconnected]

Additional Assignment (1) **+10pts**

- **Goal: Make a domain-level redirection**
- `http://[Any URL]?start_redirect=yonsei.ac.kr`
 - From now on, all sites show you **yonsei.ac.kr**
 - **Browser's URL = [Any URL]**
 - **Browser shows yonsei.ac.kr**
- Therefore, `http://yonsei.ac.kr/`
 - `*.yonsei.ac.kr` → OK (no redirection)
 - `*.*` → `yonsei.ac.kr` (redirection)
- **(Warning) This is not HTTP/1.1 302 Moved**
- (Stop) `http://[Any URL]?stop_redirect`

Additional Assignment (2) **+10pts**

- **Goal: Substitute agent to mobile-agent**
- **http://[Any URL]?start_mobile**
 - From now on, all sites will serve you mobile version
 - **Browser's URL = [Any URL]**
 - **Browser shows Mobile version of [Any URL]**
- Therefore, **http://daum.net/**
 - **Also browser shows mobile version of daum**
- (Stop) **http://[Any URL]?stop_mobile**

Additional Assignment (3) +10pts

- **Goal: Falsify responses with injection HTML**
- `http://[Any URL]?start_falsify=0000FF`
 - From now on, all sites will look like... (e.g., naver)
- (Stop) `http://[Any URL]?stop_falsify`



Command Rules for Additional Assignments (1) ~ (3)

- `http://[Any_URL]?[start|stop]_%CMD%=%val%`
- (e.g.) `http://abc.com/abc.html?start_mobile`
- CMD: redirect, mobile, falsify
 - Redirect: Change domain permanently
 - Mobile: Change agent to mobile agent
 - Falsification: Inject HTML tag into response
- **(Warning) These commands are independent to a specific domain.**
- **(O) Start → Stop → Start → Stop...**
- **(X) Start → Start or (X) Stop → Stop**

Additional Assignment (4) +50pts

- Write a review paper of Proxy Server
- 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]
 - **Any ideas to improve client-server performance**
- Directions
 - File name: Your_ID.pdf (e.g., 2012123123.pdf)
 - Should be comprehensive / Max. 10 pages
 - Upload the file to Project 3 – Review Paper (TurnItIn)

Background

- TCP (socket programming)
- HTTP Packet (request and response)
- All of Project 2
- Basic idea of HTML tag with <style>
- https://en.wikipedia.org/wiki/Proxy_server
- Browser' Proxy Setting (How to use proxy)
 - <https://support.google.com/chrome/answer/96815>
- HTTP Persistent Connection **** (Important)**
 - <https://www.safaribooksonline.com/library/view/http-the-definitive/1565925092/ch04s05.html>

Deliverables *(without folder)*

[c|u]_YourID_3.zip

c=CentOS, u=Ubuntu

*e.g. **c_2014123456_3.zip***

- **readme.txt** *(follow the example format)*
- **project_3.[py|c]**
 - Your code with **detail comments block by block**
- **run.sh**
 - This makes your code run
- **setup.sh**
 - This should install dependencies or compile your code
- **report.pdf** *(follow the example format)*

Report Format *(report.pdf)*

- Introduction
 - Idea summary of this project
 - Specify what you have implemented
- Your Code
 - Commentary block by block (+Code Screenshot)
 - How my code works (Block diagram is okay)
- Working Screenshots with your explanation
- What you have learned by this project
- References

Directions

- **This is an individual project**
- You should follow the file and **logging** format
- Language: **C or Python**
 - **C: gcc 4.8.5**
 - **Python: Python 2 ($\geq 2.7.5$) or Python 3 ($\geq 3.5.2$)**
- OS
 - **CentOS 7 (≥ 7.2)**
 - **Ubuntu 14.04.4 LTS (only this version)**
- You must use only *internal* libraries.
- **Any 3rd party framework: NOT ALLOWED**

Due Date / Delay Policy

- **DUE DATE (2weeks)**

28/Nov/2016 23:55:00 KST

- **Delay Policy**

-12pts per day

Remember...

- **DO NOT COPY CODE**

- We run Code-plagiarism Program.

- The fastest way to get 0 points.

- **YOU WILL GET 0 POINTS if you CHEAT**

Score Policy (**tentative*)

Maximum Score = 120+30+50 pts

We will announce the finalized version later on YSCEC

1	Not submitted or not working	0 pts
2	Overdue → Delay	-12pts/day
3	Additional Assignments	+10/10/10/50pts
4	Bad File/Logging Formatting	-15pts each
5	A 3 rd party framework is used	0 pts
6	Over-implementation (Suspicion of Code copy)	0 pts
7	Impolite or poor report (Lack of code commentaries)	0 pts

- Please use YSCEC Q&A board to leave your question.
- Before you ask a question
 - Check project introduction PDF AGAIN.
 - Check others' Q&A.
- Duplicate questions are ignored.