Introduction to Computer Networks

Assignment 3: My Own Web Server

1. Goal

- Develop a simple web server using socket programming.

2. Development environments

- You can use C/C++ (Visual Studio 2015 or above version) or Python (3.x) language on Linux or Windows
- You have to describe your development environment information in detail in the report. If not, TA cannot evaluate your program and you will get zero points.

3. Functionalities to implement

- Server
  - Develop a standard web server program.
  - The web server program runs with the port number of **10080**, and waits to receive HTTP requests from web browsers that **run on another end system (machine)**.
  - When receiving HTTP request messages, the web server program sends HTTP response messages back to the browser.
  - Users can request any files (e.g. **html** or **image**) which are located in the same directory where web server program runs.
  - The web server must be able to handle concurrent HTTP request messages from multiple browsers.
  - You can extend your web server program to provide a "log in" functionality. (see below)
  - You can extend your web server program to be persistent HTTP mode. (see below)

- Client
  - Use an existing browser (Microsoft Explorer is recommended due to browser local cache issues) that follows the HTTP standard.
  - Write a URL in the browser address bar;
    - http://server_IP:port_number/html_file (e.g. http://115.145.179.59:10080/secret.html)
    - http://server_IP:port_number/object_file (e.g. http://115.145.179.59:10080/1.jpg)

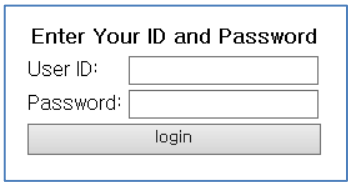
4. Evaluation Scenario (total 100 points)

4.1 Basic HTTP requests & responses (60 points)

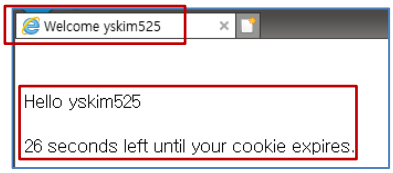
- User requests HTML files or object (e.g. image, PDF, video) files.
  If the HTML file includes objects, the browser requests them automatically. Therefore, your web server program handle those requests.
- Handle concurrent HTTP requests from multiple browsers (on same and/or different machines).
- If you requests a file that is not present in the web server machine, the web server should return a "404 Not Found" error message.
- The web server program can be in non-persistent HTTP mode.

4.2 Log-in functionality (20 points)

- User must access "http://serverIP:10080" for the first time, and the web server sends "index.html".
- The "index.html" file shows the following input forms;



- If a user enters ID & password (and push the login button), the server returns "secret.html".
  - You should create your own "secret.html" file that includes any interesting story (text) about you and related image / video files (more than 3 objects).
- Without the login process, if users try to access any URL directly, the web server program should return a "403 Forbidden" error message.
  - Once you logged in, you can access any content in the web server for 30 seconds. After 30 seconds, you will be logout.
  - After the logout, you have to log in again to access content in the web server.
- When accessing "cookie.html", present "User_ID" in the browser title bar, and display how many seconds left before the cookie expires.



4.3 Persistent HTTP mode (10 points)

- Upgrade your web server program to be persistent HTTP mode.

4.4 Write your Report precisely (10 points)

5. Submission

- The deadline is 10.21(Sun) 23:59.
  - For delayed submissions, a penalty of -15 points applies every 24 hours. After 72 hours, you get zero points.
  - In the case of plagiarism, you will receive 0 points for the first time and ***F*** for the second.
- Submit a zip file in iCampus. The zip file must include a **report**, a **source code**, (at least) **two HTML files** (index.html and secret.html) and **multiple object** (image, PDF, video, etc.) files for your demonstration
  - Name the zip file as flows StudentID_Name.zip (ex: 2017001_홍길동.zip)
  - In your report file;
    1) Describe your development environment information in detail:
    (versions of operating systems, programming languages, compilers/interpreter versions, compile options…)
    2) Present how to design your assignment such as data structures and algorithms.
    3) **Explain how you can test each item in "4. Evaluation Scenarios" (showing the screen capture). If you do NOT describe some of the items, the items will not be evaluated by TA.**

과제 관련 참고 사항

1) HTTP request & response message format 을 정확히 알아야 합니다.

2) HTML 기본 문법 익혀서 필요한 index.html, secret.html 을 만들 수 있어야 합니다.

3) HTML input form 으로 입력 받은 값을 서버로 전달하는 법을 (GET or POST method) 알고 있어야 합니다.

4) 로그인과 같이 사용자의 이전 행동에 따라 다르게 서비스를 제공해 줄 수 있도록 Cookie 를 사용할 수 있어야 합니다.

5) Persistent HTTP mode 를 구현하고 싶다면, 어떤 접근 방법이 있을지 조사가 필요합니다.

6) wireshark / tcpdump 를 사용하면 오고 가는 HTTP or TCP 등의 패킷/트래픽을 쉽게 확인할 수 있습니다.