

1. 웹 서버 구축

C 언어 TCP 소켓프로그래밍으로 HTTP 통신을 할 수 있는 서버 코드를 작성하였다. 서버 소켓과 클라이언트 소켓을 선언하고 서버를 실행할 때 인자 값으로 포트 번호를 입력 받을 수 있도록 구현하였다. 각종 오류가 발생하였을 때 오류에 대응할 수 있도록 코드를 작성하였다. 클라이언트 연결 후, 클라이언트가 요청한 파일을 제공할 수 있도록 클라이언트 request에서 파일 이름을 불러와 HTTP 응답 코드와 content-type 헤더를 같이 전달한다. 서버 내에 클라이언트가 원하는 파일이 없으면 404 NOT FOUND 에러를 전달한다.

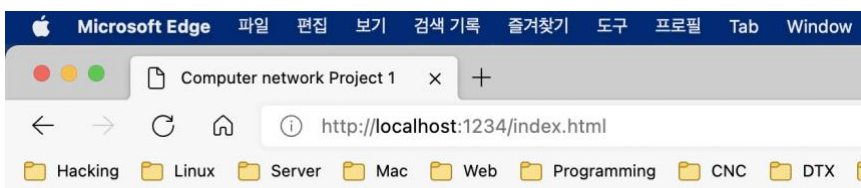
2. 문제점

소켓 버퍼 구현 시 처음엔 버퍼의 크기를 1024로 구현하였지만 일정 크기가 넘어가는 파일을 전송하면 파일 뒷부분이 잘려나가거나 오류가 발생하여 파일 로딩이 실패하는 경우가 있었다. 이 문제를 해결하기 위해 소켓의 버퍼를 int의 최대값으로 지정하였다가 컴파일 오류가 발생하여 구글에 검색한 결과, IBM 문서에 따르면 send buffer의 최대 크기는 1,048,576 bytes라고 하여 버퍼 사이즈를 해당 크기로 맞추었다. 이후 약 15메가 정도의 pdf파일을 전송하는데 문제없었지만 이 이상 넘어가는 크기의 파일은 위와 동일한 파일 잘림 현상이 발생하였다.

3. HTTP Request 와 Response 예시

A. html

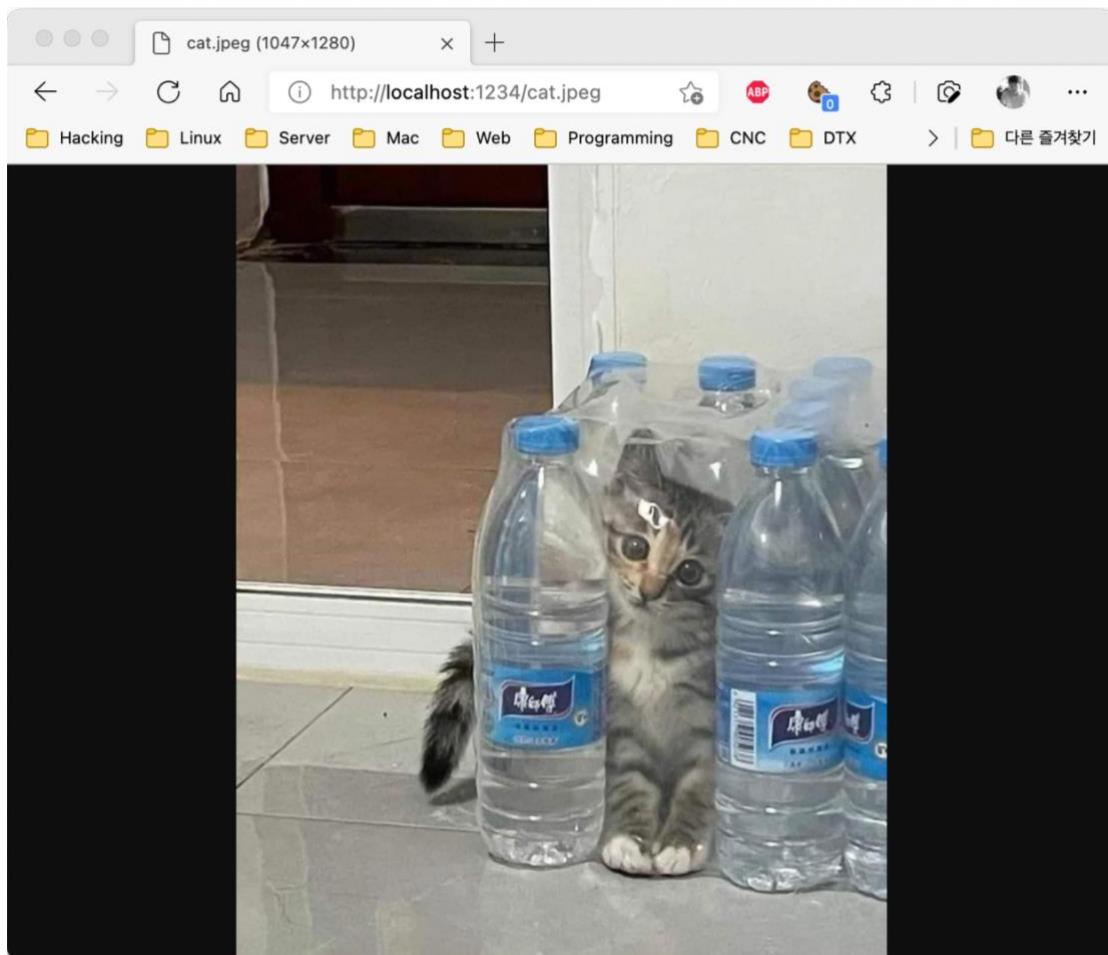
```
GET /index.html HTTP/1.1
Host: localhost:1234
Connection: keep-alive
sec-ch-ua: " Not A;Brand";v="99", "Chromium";v="100", "Microsoft Edge";v="100"
sec-ch-ua-mobile: ?0
sec-ch-ua-platform: "macOS"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/100.0.4896.127 Safari/537.36 Edg/100.0.1185.44
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Accept-Language: ko,en;q=0.9,en-US;q=0.8
Cookie: username-localhost-8888="2|1:0|10:1649314987|23:username-localhost-8888|44:YWQ4M2RmYWlzMDA5NDk1OGZlODM1NmM1YWZjZTdZjA=|1b1f5ea7c85cace4449387a8474cd284cff35f5ee2400d545ce4f6bf45ef7273"; username-localhost-2357="2|1:0|10:1649375579|23:username-localhost-2357|44:ZWYxNzY4YzY4YmJlNGJlODk3Mjk0YjIwMTUzZDM3MWE=|e8c7971c4708c014b6ecc257b330092b15ce1aba41e0a22e41e9910dbcef2e57"; _xsrf=2|ac17b9b2|190f34ed780dac4f3ba908aeb3f1a821|1649403879
```



Computer network Project 1 HTTP server

B. jpg

```
GET /cat.jpeg HTTP/1.1
Host: localhost:1234
Connection: keep-alive
sec-ch-ua: " Not A;Brand";v="99", "Chromium";v="100", "Microsoft Edge";v="100"
sec-ch-ua-mobile: ?0
sec-ch-ua-platform: "macOS"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/100.0.4896.127 Safari/537.36 Edg/100.0.1185.44
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Accept-Language: ko,en;q=0.9,en-US;q=0.8
Cookie: username=localhost-8888="2;1:0;10:1649314987;23:username=localhost-8888;44:YWQ4M2RmYWlzMdA5NDk10GEzODM1NmM1YWZjZTdZjA=;1b1f5ea7c85cace4449387a8474cd284cff35f5ee2400d545ce4f6bf45ef7273"; username=localhost-2357="2;1:0;10:1649375579;23:username=localhost-2357;44:ZWYxNzY4YzM4YmJlNGJlODk3Mjk0YjIwMTUzZDM3MWE=;e8c7971c4708c014b6ecc257b330092b15ce1aba41e0a22e41e9910dbcef2e57"; _xsrf=2;ac17b9b2;190f34ed780dac4f3ba908aeb3f1a821;1649403879
```

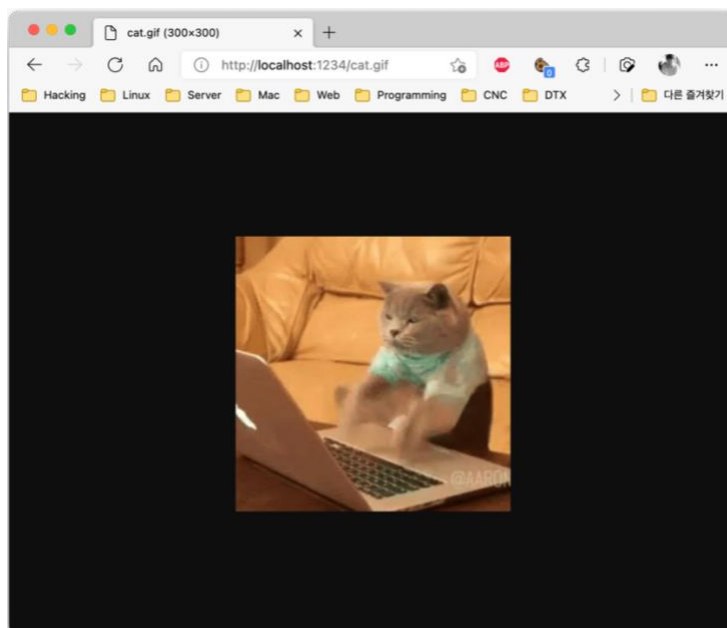


C. gif

```

GET /cat.gif HTTP/1.1
Host: localhost:1234
Connection: keep-alive
sec-ch-ua: " Not A;Brand";v="99", "Chromium";v="100", "Microsoft Edge";v="100"
sec-ch-ua-mobile: ?0
sec-ch-ua-platform: "macOS"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/100.0.4896.127 Safari/537.36 Edg/100.0.1185.44
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Accept-Language: ko,en;q=0.9,en-US;q=0.8
Cookie: username-localhost-8888="2|1:0|10:1649314987|23:username-localhost-8888|44:YWQ4M2RmYWIZMDA5NDk10GEzODM1NmM1YWZjZTdZjA=|1b1f5ea7c85cace4449387a8474cd284cff35f5ee2400d545ce4f6bf45ef7273"; username-localhost-2357="2|1:0|10:1649375579|23:username-localhost-2357|44:ZWYxNzY4YzM4YmJlNGJiODk3Mjk0YjIwMTUzZDM3MWE=|e8c7971c4708c014b6ecc257b330092b15ce1aba41e0a22e41e9910dbcef2e57"; _xsrf=2|ac17b9b2|190f34ed780dac4f3ba908aeb3f1a821|1649403879

```

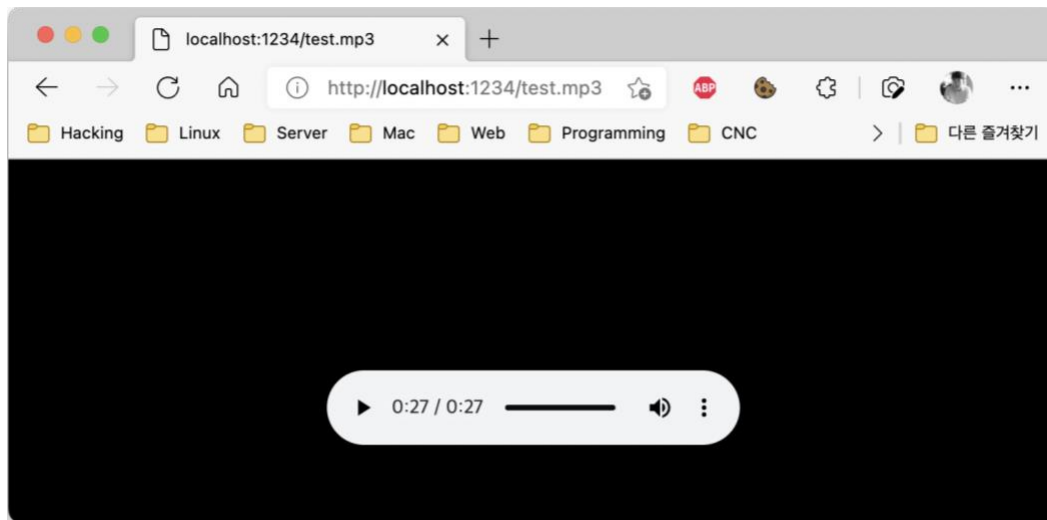


D. mp3

```

GET /test.mp3 HTTP/1.1
Host: localhost:1234
Connection: keep-alive
sec-ch-ua: " Not A;Brand";v="99", "Chromium";v="100", "Microsoft Edge";v="100"
Accept-Encoding: identity;q=1, */q=0
sec-ch-ua-mobile: ?0
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/100.0.4896.127 Safari/537.36 Edg/100.0.1185.44
sec-ch-ua-platform: "macOS"
Accept: */*
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: no-cors
Sec-Fetch-Dest: video
Referer: http://localhost:1234/test.mp3
Accept-Language: ko,en;q=0.9,en-US;q=0.8
Cookie: username-localhost-8888="2|1:0|10:1649314987|23:username-localhost-8888|44:YWQ4M2RmYWIZMDA5NDk10GEzODM1NmM1YWZjZTdZjA=|1b1f5ea7c85cace4449387a8474cd284cff35f5ee2400d545ce4f6bf45ef7273"; username-localhost-2357="2|1:0|10:1649375579|23:username-localhost-2357|44:ZWYxNzY4YzM4YmJlNGJiODk3Mjk0YjIwMTUzZDM3MWE=|e8c7971c4708c014b6ecc257b330092b15ce1aba41e0a22e41e9910dbcef2e57"; _xsrf=2|ac17b9b2|190f34ed780dac4f3ba908aeb3f1a821|1649403879
Range: bytes=0-

```



E. pdf

```
GET /test.pdf HTTP/1.1
Host: localhost:1234
Connection: keep-alive
sec-ch-ua: " Not A;Brand";v="99", "Chromium";v="100", "Microsoft Edge";v="100"
sec-ch-ua-mobile: ?0
sec-ch-ua-platform: "macOS"
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/100.0.4896.127 Safari/537.36 Edg/100.0.1185.44
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Accept-Language: ko,en;q=0.9,en-US;q=0.8
Cookie: username-localhost-8888="2|1:0|10:1649314987|23:username-localhost-8888|44:YWQ4M2RmYWIZMDA5NDk10GEzODM1NmM1YWZjZTdZjA=|1b1f5ea7c85cace4449387a8474cd284cff35f5ee2400d545ce4f6bf45ef7273"; username-localhost-2357="2|1:0|10:1649375579|23:username-localhost-2357|44:ZWYxNzY4YzY4M4YmJlNGJiODk3Mjk0YjIwMTUzZDM3MWE=|e8c7971c4708c014b6ecc257b330092b15ce1aba41e0a22e41e9910dbcef2e57"; _xsrf=2|ac17b9b2|190f34ed780dac4f3ba908aeb3f1a821|1649403879
```

