

Simple HTTP Proxy

ECEN 602 Network Programming Assignment 4

Team ID: 9

Below are the tests performed on the Simple HTTP Proxy:

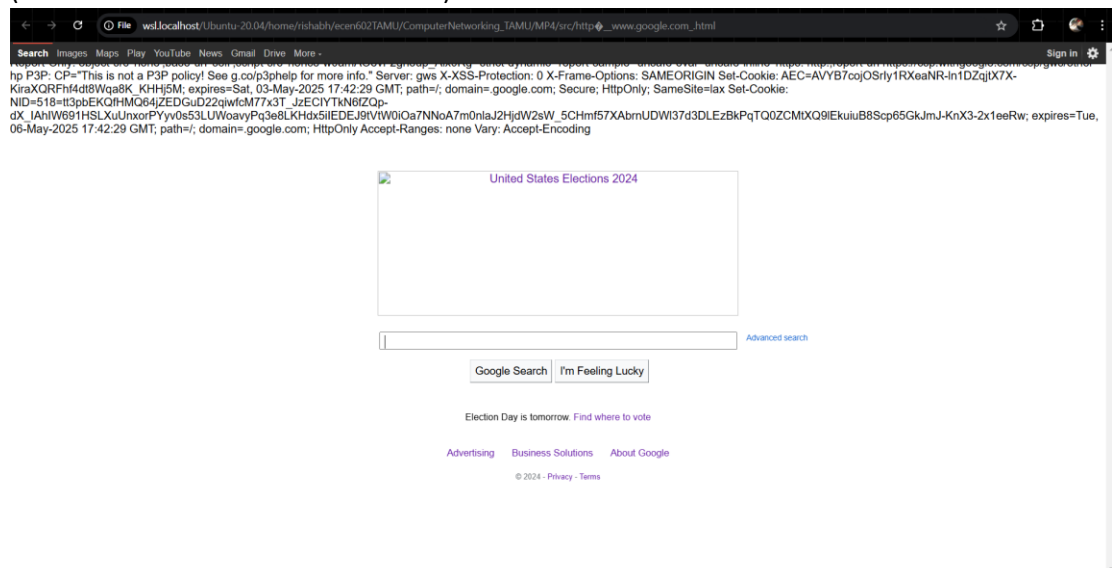
1. A request that is not in the cache is proxied, saved in the cache, and returned to the requester –

We see that there is a cache miss when we request for the URL <http://www.google.com/> and the proxy requests a response, stores it in the cache and sends the response to the client.

```
rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./proxy 127.0.0.1 8081
Starting proxy on 127.0.0.1:8081
Press Ctrl+C to stop the proxy
Send SIGUSR1 to print cache summary
PID: 10234
Request for http://www.google.com/
Cache miss for http://www.google.com/
Response status: 200
Expires header found
Expires: Mon, 04 Nov 2024 17:42:29 GMT
Expires in 0 seconds
Adding response from http://www.google.com/ to cache
[]

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://www.google.com/
Response status: 200
Response headers:
Date: Mon, 04 Nov 2024 19:42:29 GMT
Expires: Mon, 04 Nov 2024 18:42:29 GMT
Cache-Control: private, max-age=0
Content-Type: text/html; charset=ISO-8859-1
Content-Security-Policy-Report-Only: object-src 'none';base-uri 'self';script-src 'nonce-w0amA0evf2ghoup_Alx0Rg' 'strict-dynamic' 'report-sample' 'unsafe-eval' 'unsafe-inline' https: http:;report-uri https://csp.withgoogle.com/csp/gws/other-hp
P3P: CP="This is not a P3P policy! See g.co/p3phelp for more info."
Server: gws
X-XSS-Protection: 0
X-Frame-Options: SAMEORIGIN
Set-Cookie: AEC=AVYB7coj0SrIy1RXeaNR-ln1DZqjtX7X-KiraXQRHf4dt8Wqa8K_KHhJ5M; expires=Sat, 03-May-2025 17:42:29 GMT; path=/; domain=.google.com; Secure; HttpOnly; SameSite=lax
Set-Cookie: NID=518=tt3pbEKQfHMq64jZEDGuD22qiwcM77x3T_JzECiYTkN6fZQp-dX_IaHw691HSLXuUnxorPYyV0s53LUWoavyPq3e8LKHdx5iIEDEJ9tVtW0i0a7NNoA7m0n1aJ2HjdW2sW_5Chmf57XAbmUDWl37d3DLEzBkPqTQ0ZCMTXQ91EkuiiB8Scp65GkjmJ-KnX3-2x1eeRw; expires=Tue, 06-May-2025 17:42:29 GMT; path=/; domain=.google.com; HttpOnly
Accept-Ranges: none
Vary: Accept-Encoding
Response body:
<!doctype html><html itemscope="" itemtype="http://schema.org/WebPage" lang="en"><head><meta content="Search the world's information, including webpages, images, videos and more. Google has many special features to help you find exactly what you're looking for." name="description"><meta content="noodp, " name="robots"><meta content="text/html; charset=UTF-8" http-equiv="Content-Type"><meta content="/logos/doodles/2024/united-states-elections-2024-6753651837110595.2-l.png" itemprop="image"><meta content="United States Elections 2024" property="twitter:title"><meta content="United States Elections 2024! #GoogleDoodle" property="twitter:description"><meta content="United States Electi
```

Below is the response from the above URL viewed in a web browser after saving as HTML file (All the header data + HTML content):



2. A cache hit returns the saved data to the requester -

We see that the cache misses the first time when we request `http://www.gmail.com/` and the response is stored by the HTTP Proxy. When we request for the same URL a second time, there is a cache hit and the proxy re-sends the response stored in the cache.

```
rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4$
4/src$ ./proxy 127.0.0.1 8081
Starting proxy on 127.0.0.1:8081
Press Ctrl+C to stop the proxy
Send SIGUSR1 to print cache summary
PID: 9743
Request for http://www.gmail.com/
Cache miss for http://www.gmail.com/
Response status: 301
Expires header found
Expires: Mon, 04 Nov 2024 18:56:33 GMT
Expires in 5300 seconds
Adding response from http://www.gmail.com/ to cache
Request for http://www.gmail.com/
Cache hit for http://www.gmail.com/
Re-send the response
Expires in 5296 seconds
[]

Response body:
<HTML><HEAD><meta http-equiv="content-type" content="text/html;char
set=utf-8">
<TITLE>301 Moved</TITLE></HEAD><BODY>
<H1>301 Moved</H1>
The document has moved
<A HREF="https://mail.google.com/mail/u/0/">here</A>.
</BODY></HTML>

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/s
rc$ ./client 127.0.0.1 8081 http://www.gmail.com/
Response status: 301
Response headers:
Location: https://mail.google.com/mail/u/0/
Cross-Origin-Resource-Policy: cross-origin
X-Content-Type-Options: nosniff
Server: sffe
Content-Length: 230
X-XSS-Protection: 0
Date: Mon, 04 Nov 2024 19:26:33 GMT
Expires: Mon, 04 Nov 2024 19:56:33 GMT
Cache-Control: public, max-age=1800
Content-Type: text/html; charset=UTF-8
Age: 100
Response body:
<HTML><HEAD><meta http-equiv="content-type" content="text/html;char
set=utf-8">
<TITLE>301 Moved</TITLE></HEAD><BODY>
<H1>301 Moved</H1>
The document has moved
<A HREF="https://mail.google.com/mail/u/0/">here</A>.
</BODY></HTML>

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/s
rc$
```

We also perform the test using an HTTP server running on the localhost on port 8080. The HTTP server sends a response which expires in 60 seconds.

```
rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4$
4/src$ ./proxy 127.0.0.1 8081
Starting proxy on 127.0.0.1:8081
Press Ctrl+C to stop the proxy
Send SIGUSR1 to print cache summary
PID: 9743
Request for http://www.gmail.com/
Cache miss for http://www.gmail.com/
Response status: 301
Expires header found
Expires: Mon, 04 Nov 2024 18:56:33 GMT
Expires in 5300 seconds
Adding response from http://www.gmail.com/ to cache
Request for http://www.gmail.com/
Cache hit for http://www.gmail.com/
Re-send the response
Expires in 5296 seconds
Request for http://localhost:8080/test1
Cache miss for http://localhost:8080/test1
Response status: 200
Expires header found
Expires: Mon, 04 Nov 2024 18:30:28 GMT
Expires in 3660 seconds
Adding response from http://localhost:8080/test1 to cache
Request for http://localhost:8080/test1
Cache hit for http://localhost:8080/test1
Re-send the response
Expires in 3655 seconds
[]

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/s
rc$ ./client 127.0.0.1 8081 http://localhost:8080/test1
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 19:29:28 GMT
Content-Length: 9
Expires: Mon, 04 Nov 2024 19:30:28 GMT
Response body:
Test 1: 1

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/s
rc$ ./client 127.0.0.1 8081 http://localhost:8080/test1
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 19:29:28 GMT
Content-Length: 9
Expires: Mon, 04 Nov 2024 19:30:28 GMT
Response body:
Test 1: 1

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/s
rc$

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/s
erNetworking_TAMU/MP4/src$ ./server 8080
Request for /test1
200
Request for /test1
200
[]
```

3. A cache miss with 10 items already in the cache is proxied, saved in the LRU location in cache, and the data is returned to the requester –
We see that the HTTP Proxy declares “Cache is full” and then goes on to replace the oldest

cache entry (LRU) with the response from the latest URL requested.

```
Request for http://ucsd.edu/
Cache hit for http://ucsd.edu/
Re-send the response
Expires in 3593 seconds
Request for http://www.utdallas.edu/
Cache miss for http://www.utdallas.edu/
Response status: 301
Date header found
Date: Mon, 04 Nov 2024 18:54:19 GMT
Expires in 3600 seconds
Cache is full, removing oldest entry
Adding response from http://www.utdallas.edu/ to cache
Request for http://www.nyu.edu/
Cache miss for http://www.nyu.edu/
Response status: 301
Date header found
Date: Mon, 04 Nov 2024 18:54:29 GMT
Expires in 3600 seconds
Cache is full, removing oldest entry
Adding response from http://www.nyu.edu/ to cache
Request for http://www.mit.edu/
Cache miss for http://www.mit.edu/
Response status: 301
Date header found
Date: Mon, 04 Nov 2024 18:54:38 GMT
Expires in 3600 seconds
Cache is full, removing oldest entry
Adding response from http://www.mit.edu/ to cache
Request for http://www.tamu.edu
Cache miss for http://www.tamu.edu
Response status: 301
Date header found
Date: Mon, 04 Nov 2024 18:54:48 GMT
Expires in 3600 seconds
Cache is full, removing oldest entry
Adding response from http://www.tamu.edu to cache

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src
$ ./client 127.0.0.1 8081 http://www.mit.edu/
Response status: 301
Response headers:
Server: AkamaiGHost
Content-Length: 0
Location: https://www.mit.edu/
Date: Mon, 04 Nov 2024 19:54:38 GMT
Connection: close
Content-Security-Policy: frame-ancestors 'self' https://web.mit.edu h
https://www.mit.edu http://web.mit.edu http://www.mit.edu
X-Frame-Options: SAMEORIGIN
rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src
$ ./client 127.0.0.1 8081 http://www.tamu.edu
Response status: 301
Response headers:
Server: CloudFront
Date: Mon, 04 Nov 2024 19:54:48 GMT
Content-Type: text/html
Content-Length: 167
Connection: close
Location: https://www.tamu.edu/
X-Cache: Redirect from cloudfront
Via: 1.1 6cb2fa1d5087faf89d959c36e8f2fbfa.cloudfront.net (CloudFront)
X-Amz-Cf-Pop: DFW59-P2
X-Amz-Cf-Id: LHt9Ll_32bZ2jehScab1kainQHgyEHweEJsdZVnlhPUwBS72W9t2-A==
Response body:
<html>
<head><title>301 Moved Permanently</title></head>
<body>
<center><h1>301 Moved Permanently</h1></center>
<hr><center>CloudFront</center>
</body>
</html>

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src
```

4. **(Bonus Implemented)** A stale 'Expires' header in the cache is accessed, the cache entry is replaced with a fresh copy, and the fresh data is delivered to the requester –
We see that the HTTP Proxy declares that there is a stale cache entry for the requested URL. Then it sends 'If-Modified-Since' header and replaces the cache entry with a fresh copy of data.

```
rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src
$ ./proxy 127.0.0.1 8081
Starting proxy on 127.0.0.1:8081
Press Ctrl+C to stop the proxy
Send SIGUSR1 to print cache summary
PID: 11806
Request for http://www.tamu.edu/
Cache miss for http://www.tamu.edu/
Response status: 301
Date header found
Date: Mon, 04 Nov 2024 19:08:34 GMT
Expires in 3600 seconds
Adding response from http://www.tamu.edu/ to cache
Request for http://www.google.com/
Cache miss for http://www.google.com/
Response status: 200
Expires header found
Expires: Mon, 04 Nov 2024 18:08:46 GMT
Expires in 0 seconds
Adding response from http://www.google.com/ to cache
Request for http://www.google.com/
Stale cache entry for http://www.google.com/
Sending if modified since header
Response status: 200
Expires header found
Expires: Mon, 04 Nov 2024 18:08:49 GMT
Expires in 1 seconds
Adding response from http://www.google.com/ to cache

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src
$ ./client 127.0.0.1 8081 http://www.google.com/
Response status: 200
Response headers:
Date: Mon, 04 Nov 2024 20:08:48 GMT
Expires: Mon, 04 Nov 2024 19:08:49 GMT
Cache-Control: private, max-age=0
Content-Type: text/html; charset=ISO-8859-1
Content-Security-Policy-Report-Only: object-src 'none';base-uri 'self';script-src 'nonce-lzQPu9AVuo2LutKAnGLwFA' 'strict-dynamic' 'report-sample' 'unsafe-eval' 'unsafe-inline' https: http;report-uri https://csp.withgoogle.com/csp/gws/other-hp
P3P: CP="This is not a P3P policy! See g.co/p3phelp for more info."
Server: gws
X-XSS-Protection: 0
X-Frame-Options: SAMEORIGIN
Set-Cookie: AEC=AVYB7crWZCXwSEBXmIRUK8irSxTR69B8kCB2JNCocVkjotxhhtWH eVEgQ; expires=Sat, 03-May-2025 18:08:48 GMT; path=/; domain=.google.com; Secure; HttpOnly; SameSite=lax
Set-Cookie: NID=518=KjomQbdsE0Ze LPB0IBLDHH-Pz4_8tLw8j_nKkLBTGFqJWmfy ah9PTPoBoTwaWOpL.GUBft0gx2GBfkwn2V2cRNoIhcFI3FO402Wup4HVEinIfz1qh9VUge yLfivmbCwizXLZgvdRnaCevrmQxE3evSUZT-nzocE5L8ybk_IDtPsr_asZV6Fz_u0y2_5V8XkdDDph; expires=Tue, 06-May-2025 18:08:48 GMT; path=/; domain=.google.com; HttpOnly
Accept-Ranges: none
Vary: Accept-Encoding
Response body:
<!doctype html><html itemscope="" itemtype="http://schema.org/WebPage" lang="en"><head><meta content="Search the world's information, including webpages, images, videos and more. Google has many special features to help you find exactly what you're looking for." name="description"><meta content="noindex" name="robots"><meta content="text/html; charset=UTF-8" http-equiv="Content-Type"><meta content="/logos/doodles/2024/united-states-elections-2024-6753651837110595.2-1.png" itempr
```

We also perform the test using an HTTP server running on the localhost on port 8080. The

HTTP server sends a response which expires immediately. When we request the same URL the second time, we see that the HTTP Proxy declares that the cache entry is stale and sends the 'If-Modified-Since' header, replaces the cache entry with a fresh one and sends it to the client.

```

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./proxy 127.0.0.1:8081
Starting proxy on 127.0.0.1:8081
Press Ctrl+C to stop the proxy
Send SIGUSR1 to print cache summary
PID: 14456
Request for http://localhost:8080/test4
Cache miss for http://localhost:8080/test4
Response status: 200
Expires header found
Expires: Mon, 04 Nov 2024 20:08:05 GMT
Expires in -10 seconds
Adding response from http://localhost:8080/test4 to cache
Request for http://localhost:8080/test4
Stale cache entry for http://localhost:8080/test4
Sending if modified since header
Response status: 200
Expires header found
Expires: Mon, 04 Nov 2024 20:08:10 GMT
Expires in -10 seconds
Adding response from http://localhost:8080/test4 to cache
[]

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://localhost:8080/test4
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 20:08:15 GMT
Expires: Mon, 04 Nov 2024 20:08:05 GMT
Content-Length: 9
Response body:
Test 4: 0

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://localhost:8080/test4
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 20:08:20 GMT
Expires: Mon, 04 Nov 2024 20:08:10 GMT
Content-Length: 9
Response body:
Test 4: 1

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$

4/src$ ./server 8080
Request for /test4
200
Request for /test4
200
If-Modified-Since header found
[]

```

5. **(Bonus implemented)** A stale entry in the cache without an 'Expires' header is determined by sending an 'If-Modified-Since' header to use Conditional GET, the Web server responds with 'NOT_MODIFIED' (304) response, and the old cache entry is used to deliver data to the client –

We see that HTTP proxy detects that the expires header was missing, sends an 'If-Modified-Since' header and as the response is NOT_MODIFIED (304), it serves the data from the cache entry.

```

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./proxy 127.0.0.1:8081
Starting proxy on 127.0.0.1:8081
Press Ctrl+C to stop the proxy
Send SIGUSR1 to print cache summary
PID: 15870
Request for http://localhost:8080/test5
Cache miss for http://localhost:8080/test5
Response status: 200
Last-Modified header found
Last-Modified: Mon, 04 Nov 2024 21:16:22 GMT
Expires in -10 seconds
Adding response from http://localhost:8080/test5 to cache
Request for http://localhost:8080/test5
Stale cache entry for http://localhost:8080/test5
Sending if modified since header
Response status: 304
Serving from cache
[]

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://localhost:8080/test5
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 21:16:32 GMT
Last-Modified: Mon, 04 Nov 2024 21:16:22 GMT
Content-Length: 9
Response body:
Test 5: 0

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://localhost:8080/test5
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 21:16:32 GMT
Last-Modified: Mon, 04 Nov 2024 21:16:22 GMT
Content-Length: 9
Response body:
Test 5: 0

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$

4/src$ ./server 8080
Request for /test5
200
Request for /test5
200
If-Modified-Since header found
304
[]

```

6. **(Bonus Implemented)** A cache entry without an 'Expires' header that has been modified since the last request is determined by sending 'If-Modified-Since' header, the cache entry is replaced with a fresh copy, and the fresh data is delivered to the requester –

We see that when we make the request for the first time, we receive response without an 'Expires' header but 'Last-Modified' header is found, the HTTP Proxy stores the data in the cache. When we request the same URL a second time, the HTTP Proxy sends the 'If-Modified-Since' header, receives a fresh response from the HTTP Server, the cache entry is replaced with a fresh copy, and the fresh data is delivered to the requester.

```

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./proxy 127.0.0.1:8081
Starting proxy on 127.0.0.1:8081
Press Ctrl+C to stop the proxy
Send SIGUSR1 to print cache summary
PID: 16324
Request for http://localhost:8080/test6
Cache miss for http://localhost:8080/test6
Response status: 200
Last-Modified header found
Last-Modified: Sat, 05 Oct 2024 21:33:48 GMT
Expires in -2592000 seconds
Adding response from http://localhost:8080/test6 to cache
Request for http://localhost:8080/test6
Stale cache entry for http://localhost:8080/test6
Sending if modified since header
Response status: 200
Last-Modified header found
Last-Modified: Sat, 05 Oct 2024 21:33:53 GMT
Expires in -2592000 seconds
Adding response from http://localhost:8080/test6 to cache
[]

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://localhost:8080/test6
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 21:33:48 GMT
Last-Modified: Sat, 05 Oct 2024 21:33:48 GMT
Content-Length: 9
Response body:
Test 6: 0

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://localhost:8080/test6
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 21:33:53 GMT
Last-Modified: Sat, 05 Oct 2024 21:33:53 GMT
Content-Length: 9
Response body:
Test 6: 1

rishabh@LAPTOP-S9IQMU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$

4/src$ ./server 8080
Request for /test6
200
Request for /test6
200
If-Modified-Since header found
[]

```

7. Three clients can simultaneously access the proxy server and get the correct data –
We see that 3 clients are able to access the proxy server and get the requested data from the respective URLs.

```
rishabh@LAPTOP-S9IQWU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./proxy 127.0.0.1 8081
Starting proxy on 127.0.0.1:8081
Press Ctrl+C to stop the proxy
Send SIGUSR1 to print cache summary
PID: 17523
Request for http://localhost:8080/test7
Cache miss for http://localhost:8080/test7
Request for http://localhost:8080/test7
Cache miss for http://localhost:8080/test7
Request for http://localhost:8080/test6
Cache miss for http://localhost:8080/test6
Response status: 200
Last-Modified header found
Last-Modified: Sat, 05 Oct 2024 21:39:30 GMT
Expires in -2592000 seconds
Adding response from http://localhost:8080/test6 to cache
Response status: 200
Date header found
Date: Mon, 04 Nov 2024 21:39:28 GMT
Expires in 0 seconds
Adding response from http://localhost:8080/test7 to cache
Response status: 200
Date header found
Date: Mon, 04 Nov 2024 21:39:29 GMT
Expires in 0 seconds
Adding response from http://localhost:8080/test7 to cache

rishabh@LAPTOP-S9IQWU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://localhost:8080/test7
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 21:39:28 GMT
Content-Length: 9
Response body:
Test 7: 0

rishabh@LAPTOP-S9IQWU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./client 127.0.0.1 8081 http://localhost:8080/test6
Response status: 200
Response headers:
Content-Type: text/plain
Date: Mon, 04 Nov 2024 21:39:30 GMT
Last-Modified: Sat, 05 Oct 2024 21:39:30 GMT
Content-Length: 9
Response body:
Test 6: 0

rishabh@LAPTOP-S9IQWU7Q:~/ecen602TAMU/ComputerNetworking_TAMU/MP4/src$ ./server 8080
Request for /test7
200
Request for /test7
200
Request for /test6
200
```