

TEAM 10(KAVYA AND BOYU)

MP4 TEST CASES:

1. a cache hit returns the saved data to the requester
Initially the client requests a file to the server. The server proxies the request to the web server, caches it and send it to the client. Next time the client requests the same file, the server returns the file from the cache instead of sending a request to the web server.

Server proxies the request to the web

Client:

```
boyu@boyu-virtual-machine: ~/Desktop/Programming_Assignment_4/bin
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0.0.1 1236 man7.org/linux/man-pages/man3/strftime.3.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0.0.1 1236 man7.org/linux/man-pages/man3/strftime.3.html
Receive Error:: Success
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ls -la strftime.3.html
-rw-rw-r-- 1 boyu boyu 0 Nov 16 15:41 strftime.3.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$
```

Server:

```
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./http 127.0.0.1 1236
Waiting for request!
The client sent messages is
GET /linux/man-pages/man3/strftime.3.html HTTP/1.0
Host:man7.org

File not found in cache..
Downloading from man7.org:80

Sending HTTP query to web server
GET /linux/man-pages/man3/strftime.3.html HTTP/1.0
Host: man7.org

Request sent to server.
Received successfull response from server.
Sent file to the client
*****
          Printing Cache Table
*****
          Cache Entry Number 1
URL       : man7.org/linux/man-pages/man3/strftime.3.html
Last Access Time : Tue, 16 Nov 2021 21:40:56 GMT
Expiry    : Tue, 16 Nov 2021 21:42:56 GMT
File Name : strftime.3.html
*****

The client sent messages is
GET /linux/man-pages/man3/strftime.3.html HTTP/1.0
Host:man7.org

File found in cache and its not expired.
Sending file to the client..
Sent file to client successfully.
*****
          Printing Cache Table
*****
          Cache Entry Number 1
URL       : man7.org/linux/man-pages/man3/strftime.3.html
Last Access Time : Tue, 16 Nov 2021 21:41:07 GMT
Expiry    : Tue, 16 Nov 2021 21:42:56 GMT
File Name : strftime.3.html
*****
```

2. a request that is not in the cache is proxied, saved in the cache, and returned to the requester

Initially the client requests a file to the server. The server proxies the request to the web server, caches it and send it to the client.

```
boyu@boyu-virtual-machine: ~/Desktop/Programming_Assig...
File not found in cache..
Downloading from www.netfor2.com:80

Sending HTTP query to web server
GET /checksum.html HTTP/1.0
Host: www.netfor2.com

Request sent to server.
Received successfull response from server.
Sent file to the client
*****
Printing Cache Table
*****
Cache Entry Number 1
URL           : www.netfor2.com/checksum.html
Last Access Time : Tue, 16 Nov 2021 21:44:08 GMT
Expiry        : Tue, 16 Nov 2021 21:46:08 GMT
File Name     : checksum.html
*****
```

```
boyu@boyu-virtual-machine: ~/Desktop/Programming_Assig...
companies-financial-x-ray-10107.html  questions14.html
crc32c.html                          rdtsc.html
deep-learning-with-MATLAB.html       strftime.3.html
http                                 world
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ls -la
total 156
drwxrwxr-x 2 boyu boyu  4096 Nov 16 15:44 .
drwxrwxr-x 6 boyu boyu  4096 Nov 16 15:31 ..
-rw-rw-r-- 1 boyu boyu    0 Nov 16 14:36 best-countries
-rw-rw-r-- 1 boyu boyu 23557 Nov 16 15:44 checksum.html
-rwxrwxr-x 1 boyu boyu 35688 Nov 16 14:47 client
-rw-rw-r-- 1 boyu boyu   221 Nov 16 14:49 companies-financial-x-ray-10107.html
-rw-rw-r-- 1 boyu boyu   245 Nov 16 14:48 crc32c.html
-rw-rw-r-- 1 boyu boyu   388 Nov 16 14:48 deep-learning-with-MATLAB.html
-rw-rw-r-- 1 boyu boyu    0 Apr 26 2019 .gitignore
-rwxrwxr-x 1 boyu boyu 50184 Nov 16 14:47 http
-rw-rw-r-- 1 boyu boyu   256 Nov 16 15:36 index.html
-rw-rw-r-- 1 boyu boyu   385 Nov 16 14:48 loan_evans.html
-rw-rw-r-- 1 boyu boyu   620 Nov 16 14:48 networks.html
-rw-rw-r-- 1 boyu boyu   172 Nov 16 14:56 questions14.html
-rw-rw-r-- 1 boyu boyu   369 Nov 16 14:48 rdtsc.html
-rw-rw-r-- 1 boyu boyu    0 Nov 16 15:41 strftime.3.html
-rw-rw-r-- 1 boyu boyu   317 Nov 16 14:49 world
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$
```

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

It is assumed that the client has already requested 10 files and now if the client request another file, it will be caches in the LRU entry.

Server Cache table with 10 entries

```
boyu@boyu-virtual-machine: ~/Desktop/Programming_Assig...
</body>
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 www.tamu.edu/student-life/index.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 www.netfor2.com/checksum.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 www.evanjones.ca/crc32c.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 www.mcs.anl.gov/~kazutomo/rdtsc.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 library.tamu.edu/about/loan_evans.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 www.mathwoks.com/videos/series/deep-learning-with-MATLAB.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 www.conference-service.com/conferences/networks.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 www.business-standard.com/category/companies-financial-x-ray-10107.htm
l
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 www.foxnews.com/world
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 man7.org/linux/man-pages/man3/strftime.3.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1235 □
```

```
*****
Printing Cache Table
*****
Cache Entry Number 1
URL           : fast-crag-31827.herokuapp.com/tags.html
Last Access Time : Tue, 16 Nov 2021 20:47:53 GMT
Expiry        : Tue, 16 Nov 2021 20:49:53 GMT
File Name     : tags.html
*****

Cache Entry Number 2
URL           : www.netfor2.com/checksum.html
Last Access Time : Tue, 16 Nov 2021 20:48:26 GMT
Expiry        : Tue, 16 Nov 2021 20:50:26 GMT
File Name     : checksum.html
*****

Cache Entry Number 3
URL           : www.evanjones.ca/crc32c.html
Last Access Time : Tue, 16 Nov 2021 20:48:33 GMT
Expiry        : Tue, 16 Nov 2021 20:50:33 GMT
File Name     : crc32c.html
*****

Cache Entry Number 4
URL           : www.mcs.anl.gov/~kazutomo/rdtsc.html
Last Access Time : Tue, 16 Nov 2021 20:48:40 GMT
Expiry        : Tue, 16 Nov 2021 20:50:40 GMT
File Name     : rdtsc.html
*****

Cache Entry Number 5
URL           : library.tamu.edu/about/loan_evans.html
Last Access Time : Tue, 16 Nov 2021 20:48:46 GMT
Expiry        : Tue, 16 Nov 2021 20:50:46 GMT
File Name     : loan_evans.html
*****

Cache Entry Number 6
URL           : www.mathwoks.com/videos/series/deep-learning-with-MATLAB.html
Last Access Time : Tue, 16 Nov 2021 20:48:51 GMT
Expiry        : Tue, 16 Nov 2021 20:50:51 GMT
File Name     : deep-learning-wiwww.conference-service.com/conferences/networks.html
*****
```

```

Cache Entry Number 5
URL      : library.tamu.edu/about/loan_evans.html
Last Access Time : Tue, 16 Nov 2021 20:48:46 GMT
Expiry    : Tue, 16 Nov 2021 20:50:46 GMT
File Name  : loan_evans.html
*****

Cache Entry Number 6
URL      : www.mathwoks.com/videos/series/deep-learning-with-MATLAB.html
Last Access Time : Tue, 16 Nov 2021 20:48:51 GMT
Expiry    : Tue, 16 Nov 2021 20:50:51 GMT
File Name  : deep-learning-wiwww.conference-service.com/conferences/networks.html
*****

Cache Entry Number 7
URL      : www.conference-service.com/conferences/networks.html
Last Access Time : Tue, 16 Nov 2021 20:48:58 GMT
Expiry    : Tue, 16 Nov 2021 20:50:58 GMT
File Name  : networks.html
*****

Cache Entry Number 8
URL      : www.business-standard.com/category/companies-financial-x-ray-10107.html
Last Access Time : Tue, 16 Nov 2021 20:49:08 GMT
Expiry    : Tue, 16 Nov 2021 20:51:08 GMT
File Name  : companies-financwww.foxnews.com/world
*****

Cache Entry Number 9
URL      : www.foxnews.com/world
Last Access Time : Tue, 16 Nov 2021 20:49:17 GMT
Expiry    : Tue, 16 Nov 2021 20:49:17 GMT
File Name  : world
*****

Cache Entry Number 10
URL      : man7.org/linux/man-pages/man3/strftime.3.html
Last Access Time : Tue, 16 Nov 2021 20:49:26 GMT
Expiry    : Tue, 16 Nov 2021 20:51:26 GMT
File Name  : strftime.3.html
*****

```

Client requests 11th file. Server puts the 11th file in LRU entry. In our case, it's the first entry

```

boyu@boyu-virtual-machine: ~/Desktop/Programming_Assig...
Request sent to server.
Received successfull response from server.
Sent file to the client
*****
Printing Cache Table
*****
Cache Entry Number 1
URL      : www.tamu.edu/academics/index.html
Last Access Time : Tue, 16 Nov 2021 20:55:20 GMT
Expiry    : Tue, 16 Nov 2021 20:57:20 GMT
File Name  : index.html
*****

Cache Entry Number 2
URL      : starchild.gsfc.nasa.gov/docs/StarChild/questions/question
s14.html
Last Access Time : Tue, 16 Nov 2021 20:56:54 GMT
Expiry    : Tue, 16 Nov 2021 20:58:54 GMT
File Name  : questions14.html
*****
test
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 www.netfor2.com/checksum.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 www.evanjones.ca/crc32c.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 www.mcs.anl.gov/~kazutomo/rdtsc.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 library.tamu.edu/about/loan_evans.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 www.mathwoks.com/videos/series/deep-learning-with-MATLAB.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 www.conference-service.com/conferences/networks.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 www.business-standard.com/category/companies-financial-x-ray-10107.htm
l
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 www.foxnews.com/world
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 man7.org/linux/man-pages/man3/strftime.3.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 www.tamu.edu/academics/index.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$ ./client 127.0
.0.1 1235 starchild.gsfc.nasa.gov/docs/StarChild/questions/questions14.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assigment_4/bin$

```

4. 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 (**Bonus feature Included**)

When the file is present in the cache and it is expired, the proxy server sends “If-Modified-Since:” request to the web server. The web server responds with a message stating that the file is modified or not. If modified, the proxy server request the file from web server, else the proxy server sends the file from its cache.

Server sends the file for the first time

Client:

```
boyu@boyu-virtual-machine: ~/Desktop/Programming_Assignment_4/bin
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0.0.1 1236 www.netfor2.com/checksum.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0.0.1 1236 www.netfor2.com/checksum.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ls -larth checksum.html
-rw-rw-r-- 1 boyu boyu 24K Nov 16 15:23 checksum.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$
```

Server:

```
boyu@boyu-virtual-machine: ~/Desktop/Programming_Assignment_4/bin
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./http 127.0.0.1 1236
Waiting for request!
The client sent messages is
GET /checksum.html HTTP/1.0
Host:www.netfor2.com

File not found in cache..
Downloading from www.netfor2.com:80

Sending HTTP query to web server
GET /checksum.html HTTP/1.0
Host: www.netfor2.com

Request sent to server.
Received successful response from server.
Sent file to the client
*****
Printing Cache Table
*****
Cache Entry Number 1
URL      : www.netfor2.com/checksum.html
Last Access Time : Tue, 16 Nov 2021 21:21:36 GMT
Expiry    : Tue, 16 Nov 2021 21:23:36 GMT
File Name : checksum.html
*****
The client sent messages is
GET /checksum.html HTTP/1.0
Host:www.netfor2.com

File has expired, Requesting updated file from server.
Sending HTTP query to web server
GET /checksum.html HTTP/1.0
Host:www.netfor2.com
If-Modified-Since: Tue, 16 Nov 2021 21:21:36 GMT

Printing HTTP response
HTTP/1.1 200 OK
Date: Tue, 16 Nov 2021 21:23:59 GMT
Server: Apache
Set-Cookie: vsid=917vr3846434394338630; expires=Sun, 15-Nov-2026 21:23:59 GMT; Max-Age=157680000; path=/; domain=www.netfor2.com; HttpOnly
<AdBlock-Key: MFwDQYJKoZIhvcNAQEBBQADSwAwSAJBAAKX741xpzVYxb3prclFbH4psP4+L2entqr10lzh6pkAaXLPicclV6DQBeJJjGfWfBIFQMyFwXTSCCRyJ52penECawEAAQ==_1wgDd/w1AXA1wqd0+UBHnZon/UHkuYcPQnLz4Wga2JEA/7h7ABa0AMNy3
mbpCvJ08qNf3J00ckayTMDQ==
Connection: close
```

```
sBpPCVJ0BqNtJQ0ckkayIwWdQA==
Connection: close
Content-Type: text/html; charset=UTF-8

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN" "http://www.w3.org/TR/html4/strict.dtd">
<html>
<head><script type="text/javascript">var abp;</script><script type="text/javascript" src="http://www.netfor2.com/pj.js?ch=1"></script><script type="text/javascript" src="http://www.netfor2.com/pj.js?ch=2"></script><script type="text/javascript">function handleABPdetect(){try{if(!abp) return;var lnglog = document.createElement("img");lnglog.style.height="0px";lnglog.style.width="0px";lnglog.src="http://www.netfor2.com/sk-logabpstatus.php?a=VjYrdmYrSVNL3h2QXUwemVodKU0t0Vpc05teG1PNKImWllldnVTC8vTDFZTHXMEdOVkVudE5tN2ZyZnU5dzkxVDNEBStGUXplaUl4b2ZKenRoVWVhZnQ2ScanUwL1BwVNBUXAvbTFCWHzKSUUFNDH2c2czZidPdnIfor2.com" d="entity mapped" /><title=Netfor2.com</title>
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
<style type="text/css">
/* RESET */
body,div,dl,dt,dd,ul,ol,li,h1,h2,h3,h4,h5,h6,pre,form,fieldset,input,textarea,p,blockquote,th,td{margin:0;padding:0;}table{border-collapse:collapse;border-spacing:0;}fieldset,lng{border:0;}address,caption,cite,code,dfn,th,var{font-style:normal;font-weight:normal;}ol,ul {list-style:none;}caption,th {text-align:left;}h1,h2,h3,h4,h5,h6{font-size:100%;font-weight:normal;}q:before,q:after{content:'';}abbr,acronym {border:0;}

body { font-size: 12px; font-family: arial, serif; color: #666; background:url(http://l3.cdn-lnag.com/___media___/pics/646/body-bg.jpg) #d2d2d2 repeat-x; text-align:center; }
a {color: #888;}
a:hover {color: #888;}
a {text-decoration:none; outline:none}
a:hover {text-decoration:underline}
lng {border:none}
: focus {outline:none; border:none}

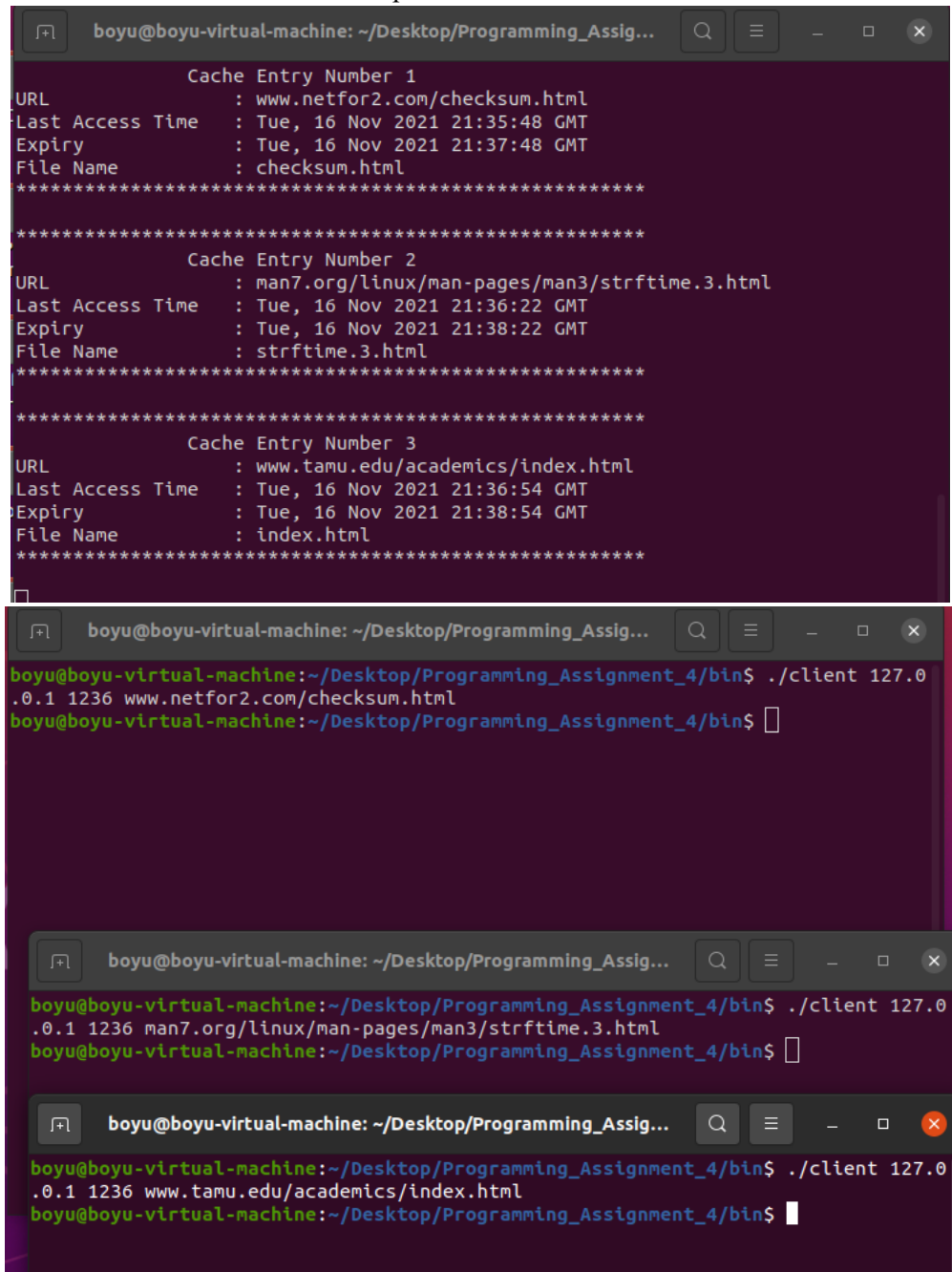
.lng { margin-bottom: 3px;}
.search-bg {padding: 10px 0 20px 20px; background:#194457; margin:8px 12px; border:#2a5a6e 1px solid; overflow:hidden; clear:both}
.search-bg p { color: #ffffff; font-weight:bold; }
.input_field { border: 0 none; background: url(http://l3.cdn-lnag.com/___media___/pics/646/search-covr-top.jpg) #fff no-repeat -16px 0px; padding: 3px 3px 3px 27px; height:24px; width:166px; float:left; line-height:24px }
.go-but {float:left; margin-left:5px; margin-top:1px}
.wrapper { width:960px; margin: 0 auto; text-align:left; }
#header { margin: 0px;}
#header .head-pad { margin:18px 0px; }
#header h1 { }
#header h1 a { font-size: 32px; font-weight: bold; color:#fff; }
#header h1 a:hover { text-decoration:none;}
#header .t-head p { color:#535340; font-size: 12px; font-weight:bold; }
#header .t-head p a { color:#535340; font-size: 12px; text-decoration:underline; }
#header .t-head p a:hover { text-decoration:none; color:#535340; }
#header .nav_right { }
#header .tag-line { color:#737373; font-size:11px; margin-left: 10px; }
#header .whols a { font-size:11px; text-decoration: underline; color:#9d9d9d; padding: 0px; font-weight:normal;}
#header .whols a:hover { text-decoration:none; }
.nav_head { background: url(http://l3.cdn-lnag.com/___media___/pics/646/hotfavorites-new.jpg) no-repeat left top; color:#6dcef8; font-weight: bold; font-size:18px; color: #fff; padding: 17px 0 46px 50px;}
.nav_head h3 { font-size:22px; font-weight:normal; color:#6dcef8;}
#left-column {margin: 0px; }

input_field { border: 0 none; background: url(http://l3.cdn-lnag.com/___media___/pics/646/search-covr-top.jpg) #fff no-repeat -16px 0px; padding: 3px 3px 3px 27px; height:24px; width:166px; float:left; line-height:24px }
.go-but {float:left; margin-left:5px; margin-top:1px}
.wrapper { width:960px; margin: 0 auto; text-align:left; }
#header { margin: 0px;}
#header .head-pad { margin:18px 0px; }
#header h1 { }
#header h1 a { font-size: 32px; font-weight: bold; color:#fff; }
#header h1 a:hover { text-decoration:none;}
#header .t-head p { color:#535340; font-size: 12px; font-weight:bold; }
#header .t-head p a { color:#535340; font-size: 12px; text-decoration:underline; }
#header .t-head p a:hover { text-decoration:none; color:#535340; }
#header .nav_right { }
#header .tag-line { color:#737373; font-size:11px; margin-left: 10px; }
#header .whols a { font-size:11px; text-decoration: underline; color:#9d9d9d; padding: 0px; font-weight:normal;}
#header .whols a:hover { text-decoration:none; }
.nav_head { background: url(http://l3.cdn-lnag.com/___media___/pics/646/hotfavorites-new.jpg) no-repeat left top; color:#6dcef8; font-weight: bold; font-size:18px; color: #fff; padding: 17px 0 46px 50px;}
.nav_head h3 { font-size:22px; font-weight:normal; color:#6dcef8;}
#left-column {margin: 0px; }
#left-column ul { }
#left-column ul li { color:#a7b2; padding:0px; margin:0px;}
#left-column ul li a { display: block; padding: 8px 1px 8px 26px; border-bottom: 1px solid #2d4c64; border-top: 1px solid #892841; background: url(http://l3.cdn-lnag.com/___media___/pics/646/nav-off-bg.gif) no-repeat 5px 10px; font-weight: bold; font-size: 16px; color: #ffffff; text-decoration: none; font-family:arial; height:100%; }
#left-column ul li a:hover { color: #ffffff; background: url(http://l3.cdn-lnag.com/___media___/pics/646/nav-off-bg.gif) #04121c no-repeat 5px 10px; border-right: solid 1px #0a2f4c; }
#searchblock { margin:5px 0; padding: 0px 10px; }
#masthead { border: solid 3px #232323; border-top:0px; }
#masthead .searchblock h3 { color: #0a7b2; font-size:14px; font-weight:bold; }
#right-column-head { color:#0a7b2; font-size:11px; padding:18px 0px; text-align:center; }
#left-block { padding: 10px 20px; }
#related-searches-custom{font-size: 13px; color: #fff; font-family:Arial; margin: 8px 0 8px 5px; display: block; word-break: break-word;}
#left-block h4 { color:#ffffff; font-size:18px; font-weight:normal; padding: 8px 15px; font-family:Arial; }
#left-block h5 { color:#4c4c4c; font-size:15px; font-weight:bold; padding: 4px 0px; font-family:Arial; }
#left-block ul { padding: 11px 0 11px 15px; }
#left-block li { padding: 0 0 1px 0px; }
#left-block li a { padding: 0px 0; font-size:1

new file received from server.
updating cache and sending file to client.
*****
Printing Cache Table
*****
Cache Entry Number 1
URL : www.netfor2.com/checksun.html
Last Access Time : Tue, 16 Nov 2021 21:23:59 GMT
Expiry : Tue, 16 Nov 2021 21:23:59 GMT
File Name : checksun.html
*****
```

- three clients can simultaneously access the proxy server and get the correct data
Three clients request data at the same time and the server process it and sends the file

Multiple clients and server



The image displays three terminal windows from a virtual machine named 'boyu@boyu-virtual-machine'. The top window shows the contents of a cache, listing three entries with their respective URLs, last access times, expiry times, and file names. The middle and bottom windows show the execution of a client program, which sends requests to a proxy server at 127.0.0.1 on port 1236. The client requests three different URLs: 'www.netfor2.com/checksum.html', 'man7.org/linux/man-pages/man3/strftime.3.html', and 'www.tamu.edu/academics/index.html'. The output of the client program matches the cache entries shown in the top window.

```
boyu@boyu-virtual-machine: ~/Desktop/Programming_Assig...
Cache Entry Number 1
URL      : www.netfor2.com/checksum.html
Last Access Time : Tue, 16 Nov 2021 21:35:48 GMT
Expiry   : Tue, 16 Nov 2021 21:37:48 GMT
File Name : checksum.html
*****

Cache Entry Number 2
URL      : man7.org/linux/man-pages/man3/strftime.3.html
Last Access Time : Tue, 16 Nov 2021 21:36:22 GMT
Expiry   : Tue, 16 Nov 2021 21:38:22 GMT
File Name : strftime.3.html
*****

Cache Entry Number 3
URL      : www.tamu.edu/academics/index.html
Last Access Time : Tue, 16 Nov 2021 21:36:54 GMT
Expiry   : Tue, 16 Nov 2021 21:38:54 GMT
File Name : index.html
*****

boyu@boyu-virtual-machine: ~/Desktop/Programming_Assig...
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1236 www.netfor2.com/checksum.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$

boyu@boyu-virtual-machine:~/Desktop/Programming_Assig...
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1236 man7.org/linux/man-pages/man3/strftime.3.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$

boyu@boyu-virtual-machine:~/Desktop/Programming_Assig...
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$ ./client 127.0
.0.1 1236 www.tamu.edu/academics/index.html
boyu@boyu-virtual-machine:~/Desktop/Programming_Assignment_4/bin$
```