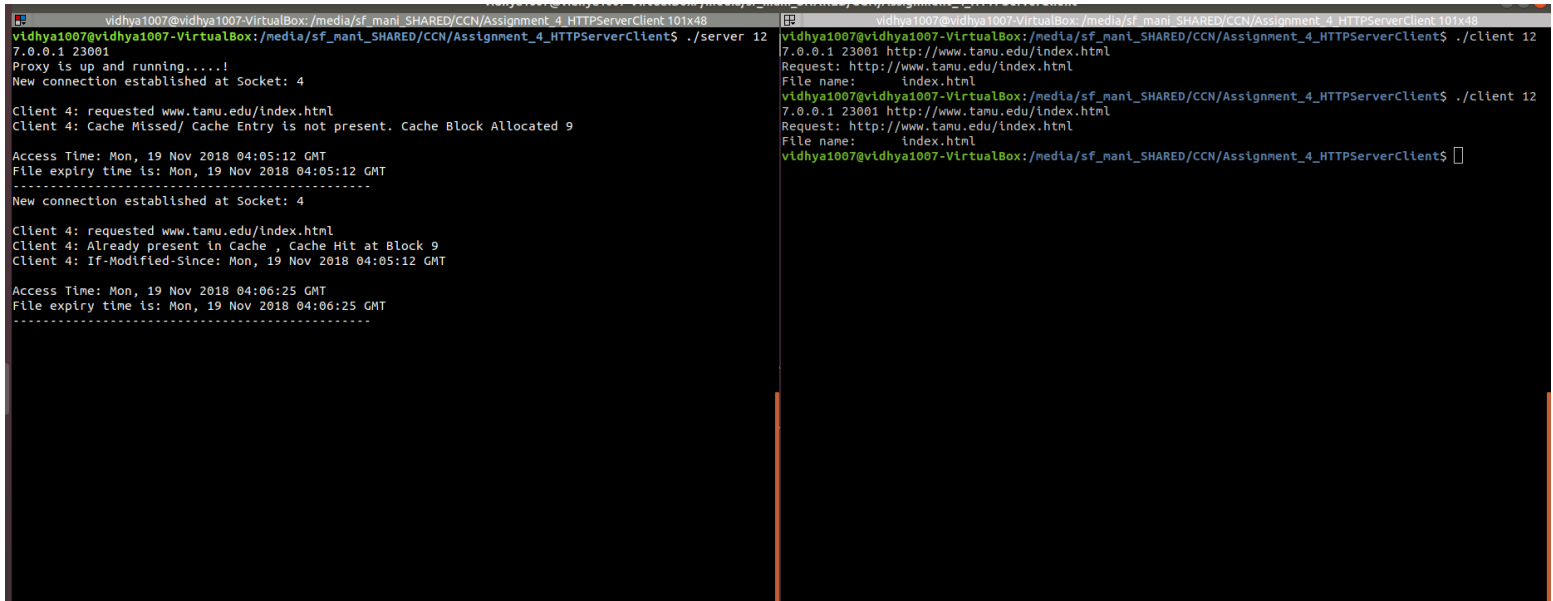


ECEN 602: Network Programming Assignment 4
SIMPLE HTTP PROXY
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1) TESTCASE 1: A cache hit returns the saved data to the requester



```
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$ ./server 12
7.0.0.1 23001
Proxy is up and running.....!
New connection established at Socket: 4

Client 4: requested www.tamu.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9

Access Time: Mon, 19 Nov 2018 04:05:12 GMT
File expiry time is: Mon, 19 Nov 2018 04:05:12 GMT
-----
New connection established at Socket: 4

Client 4: requested www.tamu.edu/index.html
Client 4: Already present in Cache , Cache Hit at Block 9
Client 4: If-Modified-Since: Mon, 19 Nov 2018 04:05:12 GMT

Access Time: Mon, 19 Nov 2018 04:06:25 GMT
File expiry time is: Mon, 19 Nov 2018 04:06:25 GMT
-----
```

```
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.tamu.edu/index.html
Request: http://www.tamu.edu/index.html
File name: index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.tamu.edu/index.html
Request: http://www.tamu.edu/index.html
File name: index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$
```

In this test case, initially the tamu.edu/index.html was accessed and was saved to cache. When it was accessed again from the cache in few minutes, it resulted in a Cache hit which is indicated by the “Cache Hit at Block 9” line.

2) TESTCASE 2: A request that is not in the cache is proxied, saved in the cache and returned to the requester

```
vidhya1007@vidhya1007-VirtualBox: /media/sf_manish/CCN/Assignment_4_HTTPServerClient 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_manish/CCN/Assignment_4_HTTPServerClient$ ./server 12
7.0.0.1 23001
Proxy is up and running.....!
New connection established at Socket: 4

Client 4: requested www.tamu.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9

Access Time: Mon, 19 Nov 2018 04:05:12 GMT
File expiry time is: Mon, 19 Nov 2018 04:05:12 GMT
-----
[]

vidhya1007@vidhya1007-VirtualBox: /media/sf_manish/CCN/Assignment_4_HTTPServerClient 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_manish/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.tamu.edu/index.html
Request: http://www.tamu.edu/index.html
File name: index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_manish/CCN/Assignment_4_HTTPServerClient$
```

In this test case, the first attempt to fetch the URL tamu.edu doesn't is not present in the cache, and hence the request is proxied, saved in the cache and returned to the client.

3) **TESTCASE 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 requestor**

```

vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./server 12
7.0.0.1 23001
Proxy is up and running.....!
New connection established at Socket: 4

Client 4: requested www.tamu.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9

Access Time: Mon, 19 Nov 2018 04:05:12 GMT
File expiry time is: Mon, 19 Nov 2018 04:05:12 GMT
-----
New connection established at Socket: 4

Client 4: requested www.tamu.edu/index.html
Client 4: Already present in Cache , Cache Hit at Block 9
Client 4: If-Modified-Since: Mon, 19 Nov 2018 04:05:12 GMT

Access Time: Mon, 19 Nov 2018 04:06:25 GMT
File expiry time is: Mon, 19 Nov 2018 04:06:25 GMT
-----
New connection established at Socket: 4

Client 4: requested www.ucla.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 8

Access Time: Mon, 19 Nov 2018 04:09:35 GMT
File expiry time is: Mon, 19 Nov 2018 04:09:35 GMT
-----
New connection established at Socket: 4

Client 4: requested www.stanford.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 7

Access Time: Mon, 19 Nov 2018 04:09:41 GMT
File expiry time is: Mon, 19 Nov 2018 04:09:41 GMT
-----
New connection established at Socket: 4

Client 4: requested www.caltech.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 6

Access Time: Mon, 19 Nov 2018 04:09:47 GMT
File expiry time is: Sun, 19 Nov 1978 05:00:00 GMT
-----
New connection established at Socket: 4

Client 4: requested www.utuc.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 5

File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.tamu.edu/index.html
Request: http://www.tamu.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.tamu.edu/index.html
Request: http://www.tamu.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.ucla.edu/index.html
Request: http://www.ucla.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.stanford.edu/index.html
Request: http://www.stanford.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.caltech.edu/index.html
Request: http://www.caltech.edu/index.html
^[[A Unable to find the page HTTP/1.1 404 Not Found
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.utuc.edu/index.html
Request: http://www.utuc.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.ucl.edu/index.html
Request: http://www.ucl.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.mit.edu/index.html
Request: http://www.mit.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.mit.edu/index.html
Request: http://www.mit.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.ucsb.edu/index.html
Request: http://www.ucsb.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.uta.edu/index.html
Request: http://www.uta.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.utd.edu/index.html
Request: http://www.utd.edu/index.html
File name: Index.html

Access Time: Mon, 19 Nov 2018 04:10:11 GMT
File expiry time is: Mon, 19 Nov 2018 04:10:11 GMT
-----
New connection established at Socket: 4

Client 4: requested www.mit.edu/index.html
Client 4: Already present in Cache , Cache Hit at Block 3
Client 4: If-Modified-Since: Mon, 19 Nov 2018 04:10:11 GMT

Access Time: Mon, 19 Nov 2018 04:10:20 GMT
File expiry time is: Mon, 19 Nov 2018 04:10:20 GMT
-----
New connection established at Socket: 4

Client 4: requested www.ucsb.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 2

Access Time: Mon, 19 Nov 2018 04:10:33 GMT
File expiry time is: Mon, 19 Nov 2018 04:10:33 GMT
-----
New connection established at Socket: 4

Client 4: requested www.uta.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 1

Access Time: Mon, 19 Nov 2018 04:10:42 GMT
File expiry time is: Mon, 19 Nov 2018 04:10:42 GMT
-----
New connection established at Socket: 4

Client 4: requested www.utd.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 0

Access Time: Mon, 19 Nov 2018 04:10:51 GMT
File expiry time is: Mon, 19 Nov 2018 04:10:51 GMT
-----
New connection established at Socket: 4

Client 4: requested www.ucsd.edu/index.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9

Access Time: Mon, 19 Nov 2018 04:11:10 GMT
File expiry time is: Mon, 19 Nov 2018 04:11:10 GMT
-----
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.ucl.edu/index.html
Request: http://www.ucl.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.utuc.edu/index.html
Request: http://www.utuc.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.stanford.edu/index.html
Request: http://www.stanford.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.caltech.edu/index.html
Request: http://www.caltech.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.uta.edu/index.html
Request: http://www.uta.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.utd.edu/index.html
Request: http://www.utd.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.ucsb.edu/index.html
Request: http://www.ucsb.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.ucsd.edu/index.html
Request: http://www.ucsd.edu/index.html
File name: Index.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient$

```

Once from block 9 to block 0 was allocated in cache and further requests were made, the initial block 9 was getting replaced thus proving the LRU implementation.

4) TESTCASE 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

<pre>vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient 101x48 vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient\$./server 12 7.0.0.1 23001 Proxy is up and running.....! New connection established at Socket: 4 Client 4: requested www.tamu.edu/index.html Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9 Access Time: Mon, 19 Nov 2018 04:16:47 GMT File expiry time is: Mon, 19 Nov 2018 04:16:47 GMT New connection established at Socket: 4 Client 4: requested www.tamu.edu/index.html Client 4: Already present in Cache , Cache Hit at Block 9 Client 4: If-Modified-Since: Mon, 19 Nov 2018 04:16:47 GMT Access Time: Mon, 19 Nov 2018 04:16:55 GMT File expiry time is: Mon, 19 Nov 2018 04:16:55 GMT □</pre>	<pre>vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient 101x48 vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient\$./client 12 7.0.0.1 23001 http://www.tamu.edu/index.html Request: http://www.tamu.edu/index.html File name: index.html vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient\$./client 12 7.0.0.1 23001 http://www.tamu.edu/index.html Request: http://www.tamu.edu/index.html File name: index.html vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient\$ █</pre>
--	---

Over the expiry time, the entry in the cache is fetched using a CONDITIONAL GET and the cache entry is replaced with the new copy and the fresh data is delivered to the requester.

5) TESTCASE 5 : A stale entry in the cache without an Expires header is determined based on the last Web server access time and last modification time, the stale cache entry is replaced with fresh data, and the fresh data is delivered to the requester

<pre>vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient 101x48 vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient\$./server 12 7.0.0.1 23001 Proxy is up and running.....! New connection established at Socket: 4 Client 4: requested www.netfor2.com/checksum.html Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9 Access Time: Mon, 19 Nov 2018 04:28:02 GMT File expiry time is: Mon, 19 Nov 2018 04:28:02 GMT New connection established at Socket: 4 Client 4: requested www.netfor2.com/checksum.html Client 4: Already present in Cache , Cache Hit at Block 9 Client 4: If-Modified-Since: Mon, 19 Nov 2018 04:28:02 GMT Access Time: Mon, 19 Nov 2018 04:28:12 GMT File expiry time is: Mon, 19 Nov 2018 04:28:12 GMT Serving from the cache block □</pre>	<pre>vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient 101x48 vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient\$./client 12 7.0.0.1 23001 http://www.netfor2.com/checksum.html Request: http://www.netfor2.com/checksum.html File name: checksum.html vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient\$./client 12 7.0.0.1 23001 http://www.netfor2.com/checksum.html Request: http://www.netfor2.com/checksum.html File name: checksum.html vidhya1007@vidhya1007-VirtualBox: /media/sf_man1_SHARED/CCN/Assignment_4_HTTPServerClient\$</pre>
---	---

From the html document, it could be seen that there was there is no expires header and the stale entry is determined based on the last web server access time and modified time.

6) **TESTCASE 6: A cache entry without an Expires header that has been previously accessed from the Web server in the last 24 hours and was last modified more than one month ago is returned to the requester**

<pre>vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient 101x48 vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient\$./server 12 7.0.0.1 23001 Proxy is up and running.....! New connection established at Socket: 4 Client 4: requested www.tamu.edu/index.html Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9 Access Time: Mon, 19 Nov 2018 04:16:47 GMT File expiry time is: Mon, 19 Nov 2018 04:16:47 GMT New connection established at Socket: 4 Client 4: requested www.tamu.edu/index.html Client 4: Already present in Cache , Cache Hit at Block 9 Client 4: If-Modified-Since: Mon, 19 Nov 2018 04:16:47 GMT Access Time: Mon, 19 Nov 2018 04:16:55 GMT File expiry time is: Mon, 19 Nov 2018 04:16:55 GMT []</pre>	<pre>vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient 101x48 vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient\$./client 12 7.0.0.1 23001 http://www.tamu.edu/index.html Request: http://www.tamu.edu/index.html File name: index.html vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient\$./client 12 7.0.0.1 23001 http://www.tamu.edu/index.html Request: http://www.tamu.edu/index.html File name: index.html vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient\$</pre>
---	---

- 7) Three clients can simultaneously access the proxy server and get the correct data (you will need to access large documents to show this)

```
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient
Proxy is up and running.....!
New connection established at Socket: 4

Client 4: requested vfu.bg/en/e-Learning/Math--Bertsekas_Tsitsiklis_Introduction_to_probability.pdf
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9

New connection established at Socket: 6

Client 6: requested vfu.bg/en/e-Learning/Math--Bertsekas_Tsitsiklis_Introduction_to_probability.pdf
Client 6: Cache Missed/ Cache Entry is not present. Cache Block Allocated 8

New connection established at Socket: 8

Client 8: requested vfu.bg/en/e-Learning/Math--Bertsekas_Tsitsiklis_Introduction_to_probability.pdf
Client 8: Cache Missed/ Cache Entry is not present. Cache Block Allocated 7

Access Time: Mon, 19 Nov 2018 04:51:53 GMT
File expiry time is: Mon, 19 Nov 2018 04:51:53 GMT
Access Time: Mon, 19 Nov 2018 04:51:57 GMT
File expiry time is: Mon, 19 Nov 2018 04:51:57 GMT
Access Time: Mon, 19 Nov 2018 04:52:00 GMT
File expiry time is: Mon, 19 Nov 2018 04:52:00 GMT
-----

vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient 101x23
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23000 http://vfu.bg/en/e-Learning/Math--Bertsekas_Tsitsiklis_Introduction_to_probability.pdf
Request: http://vfu.bg/en/e-Learning/Math--Bertsekas_Tsitsiklis_Introduction_to_probability.pdf
File name: Math--Bertsekas_Tsitsiklis_Introduction_to_probablilty.pdf
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$
```

Three clients could be connected simultaneously when a large file was being accessed.

- 8) **BONUS:** if you implement the Bonus feature, develop test cases to show that it works properly; you should modify (5) – (6) above to match the operation of the Bonus.

```
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$ ./server 12
7.0.0.1 23001
Proxy is up and running.....!
New connection established at Socket: 4

Client 4: requested www.netfor2.com/checksum.html
Client 4: Cache Missed/ Cache Entry is not present. Cache Block Allocated 9

Access Time: Mon, 19 Nov 2018 04:28:02 GMT
File expiry time is: Mon, 19 Nov 2018 04:28:02 GMT
-----

New connection established at Socket: 4

Client 4: requested www.netfor2.com/checksum.html
Client 4: Already present in Cache , Cache Hit at Block 9
Client 4: If-Modified-Since: Mon, 19 Nov 2018 04:28:02 GMT

Access Time: Mon, 19 Nov 2018 04:28:12 GMT
File expiry time is: Mon, 19 Nov 2018 04:28:12 GMT
Serving from the cache block
-----

vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient 101x48
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.netfor2.com/checksum.html
Request: http://www.netfor2.com/checksum.html
File name: checksum.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$ ./client 12
7.0.0.1 23001 http://www.netfor2.com/checksum.html
Request: http://www.netfor2.com/checksum.html
File name: checksum.html
vidhya1007@vidhya1007-VirtualBox: /media/sf_mani_SHARED/CCN/Assignment_4_HTTPServerClient$
```

In this test case, if the html file exists in the proxy cache but it is “stale,” then the proxy issues a Conditional GET to the web server using an If-Modified-Since header in its request. The If Modified-Since header contains the date from the

Expires field. If the Expires header is absent, then the Last-Modified or the Date timestamps is be used, in that order, to infer whether the html file has expired or not. As a result of if-Modified error code 304 was obtained.