2. The HTTP CONDITIONAL GET/response interaction

8. Inspect the contents of the first HTTP GET request from your browser to the server. Do you see an "IF-MODIFIED-SINCE" line in the HTTP GET?

9. Inspect the contents of the server response. Did the server explicitly return the contents of the file? How can you tell?

10. Now inspect the contents of the second HTTP GET request from your browser to the server. Do you see an "IF-MODIFIED-SINCE:" line in the HTTP GET? If so, what information follows the "IF-MODIFIED-SINCE:" header?

11. What is the HTTP status code and phrase returned from the server in response to this second HTTP GET? Did the server explicitly return the contents of the file? Explain.

8. **Answer: First time, there isn't an "IF-MODIFIED-SINCE" line in the HTTP GET**

No.	Time	Source	Destination	Protocol	Length	Info
101	13:08:04.351937	222.16.62.151	128.119.245.12	HTTP	568	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
113	13:08:04.633627	128.119.245.12	222.16.62.151	HTTP	785	HTTP/1.1 200 OK (text/html)

```
> Frame 101: 568 bytes on wire (4544 bits), 568 bytes captured (4544 bits) on interface \Device\NPF_{F4F6F9D4-FAEC-4D22-ACE7-746265CB46EA}, id 0
> Ethernet II, Src: LCFCHeFe_54:b0:06 (54:e1:ad:54:b0:06), Dst: Hangzhou_49:1d:00 (0c:da:41:49:1d:00)
> Internet Protocol Version 4, Src: 222.16.62.151, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 8260, Dst Port: 80, Seq: 1, Ack: 1, Len: 514
∨ Hypertext Transfer Protocol
  > GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    Connection: keep-alive\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/84.0.4147.125 Safari/537.36 Edg/84.0.522.59\r\n
    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\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: zh-CN,zh;q=0.9,en;q=0.8,en-GB;q=0.7,en-US;q=0.6\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html]
    [HTTP request 1/1]
    [Response in frame: 113]
```

9. **Answer: the server explicitly return the contents of the file**

No.	Time	Source	Destination	Protocol	Length	Info
77	13:09:01.308112	222.16.62.151	128.119.245.12	HTTP	682	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
94	13:09:01.580937	128.119.245.12	222.16.62.151	HTTP	783	HTTP/1.1 200 OK (text/html)

```
  ∨ Content-Length: 371\r\n
      [Content length: 371]
    Keep-Alive: timeout=5, max=100\r\n
    Connection: Keep-Alive\r\n
    Content-Type: text/html; charset=UTF-8\r\n
    \r\n
    [HTTP response 1/1]
    [Time since request: 0.272825000 seconds]
    [Request in frame: 77]
    [Request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html]
    File Data: 371 bytes
∨ Line-based text data: text/html (10 lines)
    \n
    <html>\n
    \n
    Congratulations again!  Now you've downloaded the file lab2-2.html. <br>\n
    This file's last modification date will not change.  <p>\n
    Thus  if you download this multiple times on your browser, a complete copy <br>\n
    will only be sent once by the server due to the inclusion of the IN-MODIFIED-SINCE<br>\n
    field in your browser's HTTP GET request to the server.\n
    \n
    </html>\n
```

10. **Answer: there is an "IF-MODIFIED-SINCE:" line in the HTTP GET**

```
No.      Time              Source            Destination       Protocol  Length  Info
     77 13:09:01.308112 222.16.62.151     128.119.245.12    HTTP        682 GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
     94 13:09:01.580937 128.119.245.12    222.16.62.151     HTTP        783 HTTP/1.1 200 OK  (text/html)

> Frame 77: 682 bytes on wire (5456 bits), 682 bytes captured (5456 bits) on interface \Device\NPF_{F4F6F9D4-FAEC-4D22-ACE7-746265CB46EA}, id 0
> Ethernet II, Src: LCFCHeFe_54:b0:06 (54:e1:ad:54:b0:06), Dst: Hangzhou_49:1d:00 (0c:da:41:49:1d:00)
> Internet Protocol Version 4, Src: 222.16.62.151, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 8274, Dst Port: 80, Seq: 1, Ack: 1, Len: 628
∨ Hypertext Transfer Protocol
  > GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    Connection: keep-alive\r\n
    Cache-Control: max-age=0\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/84.0.4147.125 Safari/537.36 Edg/84.0.522.59\r\n
    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\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: zh-CN,zh;q=0.9,en;q=0.8,en-GB;q=0.7,en-US;q=0.6\r\n
    If-None-Match: W/"173-5acf7a37db50e"\r\n
    If-Modified-Since: Sun, 16 Aug 2020 05:08:03 GMT\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html]
    [HTTP request 1/1]
    [Response in frame: 94]
```

11. **Answers:**

   - **the HTTP status code: 304 Not Modified**
   - **the server didn't explicitly return the contents of the file**

```
No.      Time              Source            Destination       Protocol  Length  Info
    100 13:11:47.281989 222.16.62.151     128.119.245.12    HTTP        680 GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
    118 13:11:47.559096 128.119.245.12    222.16.62.151     HTTP        293 HTTP/1.1 304 Not Modified

> Frame 118: 293 bytes on wire (2344 bits), 293 bytes captured (2344 bits) on interface \Device\NPF_{F4F6F9D4-FAEC-4D22-ACE7-746265CB46EA}
> Ethernet II, Src: Hangzhou_49:1d:00 (0c:da:41:49:1d:00), Dst: LCFCHeFe_54:b0:06 (54:e1:ad:54:b0:06)
> Internet Protocol Version 4, Src: 128.119.245.12, Dst: 222.16.62.151
> Transmission Control Protocol, Src Port: 80, Dst Port: 8321, Seq: 1, Ack: 627, Len: 239
∨ Hypertext Transfer Protocol
  > HTTP/1.1 304 Not Modified\r\n
    Date: Sun, 16 Aug 2020 05:11:46 GMT\r\n
    Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.9 mod_perl/2.0.11 Perl/v5.16.3\r\n
    Connection: Keep-Alive\r\n
    Keep-Alive: timeout=5, max=100\r\n
    ETag: "173-5acf7ae3ffe63"\r\n
    \r\n
    [HTTP response 1/1]
    [Time since request: 0.277107000 seconds]
    [Request in frame: 100]
    [Request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html]
```

Conclusion:

An HTTP request message is a so-called conditional GET message if

- the request message uses the GET method and
- the request message includes an If-Modified-Since: header line.

the value of the **If-modified-since:** header line is exactly equal to the value of the **Last-Modified:** header line that was sent by the server before. This conditional GET is telling the server to send the object only if the object has been modified since the specified date.

this last response message has **304 Not Modified** in the status line, which tells the cache that it can go ahead and forward its (the proxy cache's) cached copy of the object to the requesting browser.