

# COMP3331 Musings

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## Lab 02 - HTTP & Socket Programming

2020-03-06

### Using Telnet to interact with a Web Server

#### Code

```
1  $> telnet vision.ucla.edu 80
2  Trying 131.179.176.147...
3  Connected to vision.ucla.edu.
4  Escape character is '^]'.
5  GET / HTTP/1.1
6  host: www.vision.ucla.edu
7
8  HTTP/1.1 200 OK
9  Date: Fri, 06 Mar 2020 00:17:42 GMT
10 Server: Apache/2.4.29 (Ubuntu)
11 Last-Modified: Thu, 01 Nov 2018 00:17:53 GMT
12 ETag: "12e7-5798f598e178e"
13 Accept-Ranges: none
14 Vary: Accept-Encoding
15 Keep-Alive: timeout=5, max=100
16 Content-Type: text/html
17 Content-Length: 4839
18 Via: HTTP/1.1 forward.http.proxy:3128
19 Connection: keep-alive
20
21 <!DOCTYPE html>
22 <html lang="en" class="h-100">
23 ...
24 </html>
25
26 Connection closed
```

### What is the content type of the response?

The response is a `text/html` type (Content-Type)

### What is the size of the response?

`4839` bytes (Content-Length)

### When was the webpage last modified?

`Thu, 01 Nov 2018 00:17:53 GMT` (Last-Modified)

## Do you see an “Accept-Ranges” header field? What may this be used for?

It is currently set to **none** .

This header is used to indicate whether the server is able to send partial parts of the document.

For example, if downloading a large file - If you pause a download, there is no need to download the already saved parts of the file.

## Perform a HEAD request on the same address

### Code

```
1  $> telnet vision.ucla.edu 80
2  Trying 131.179.176.147...
3  Connected to vision.ucla.edu.
4  Escape character is '^]'.
5  HEAD / HTTP/1.1
6  host: www.vision.ucla.edu
7
8  HTTP/1.1 200 OK
9  Date: Fri, 06 Mar 2020 00:22:49 GMT
10 Server: Apache/2.4.29 (Ubuntu)
11 Last-Modified: Thu, 01 Nov 2018 00:17:53 GMT
12 ETag: "12e7-5798f598e178e"
13 Accept-Ranges: bytes
14 Content-Length: 4839
15 Vary: Accept-Encoding
16 Keep-Alive: timeout=5, max=100
17 Content-Type: text/html
18 Via: HTTP/1.1 forward.http.proxy:3128
19 Connection: keep-alive
```

## What is the content type of the response?

text/html (Content-Type)

## What is the size of the response?

4839 bytes (Content-Length)

## Using telnet, find a way to get the people.html webpage from vision.ucla.edu

We can do the following:

### Code

```
1  $> telnet vision.ucla.edu 80
2  GET /people.html HTTP/1.1
3  host: www.vision.ucla.edu
```

Results:

Code

```
1 $> telnet vision.ucla.edu 80
2 Trying 131.179.176.147...
3 Connected to vision.ucla.edu.
4 Escape character is '^]'.
5 GET /people.html HTTP/1.1
6 host: www.vision.ucla.edu
7
8 HTTP/1.1 200 OK
9 Date: Fri, 06 Mar 2020 00:25:29 GMT
10 Server: Apache/2.4.29 (Ubuntu)
11 Last-Modified: Sun, 16 Jun 2019 00:49:00 GMT
12 ETag: "c87b-58b663ed787b0"
13 Accept-Ranges: none
14 Vary: Accept-Encoding
15 Keep-Alive: timeout=5, max=100
16 Content-Type: text/html
17 Content-Length: 51323
18 Via: HTTP/1.1 forward.http.proxy:3128
19 Connection: keep-alive
20
21 ...
```

## Why is there the need to include the host in the GET (and HEAD) HTTP 1.1 request messages?

A webserver may be hosting several websites on the same machine, so there needs to be a way for clients to access the correct site.

## Exercise 2: Understanding Internet Cookies

Cookies are bits of data that are stored locally on the client's browser. When a client visits a website, they append the respective cookies in their requests to the website. Cookies have several uses: e.g. to identify a user, or to register that a user has performed an action (as to not show a prompt again).

Websites will have a **Set-Cookie** header in their response if they want to store cookies on the client's browser.

## Exercise 3: Using Wireshark to understand basic HTTP request/response messages

File: [http-ethereal-trace-1](#)

| Request | Response |
|---------|----------|
|---------|----------|

**Request**

| No | Type | Source        | Destination   | Protocol | Length |
|----|------|---------------|---------------|----------|--------|
| 1  | TCP  | 192.168.1.100 | 192.168.1.1   | 80       | 60     |
| 2  | TCP  | 192.168.1.1   | 192.168.1.100 | 80       | 60     |

**Response**

| No | Type | Source        | Destination   | Protocol | Length |
|----|------|---------------|---------------|----------|--------|
| 1  | TCP  | 192.168.1.1   | 192.168.1.100 | 80       | 60     |
| 2  | TCP  | 192.168.1.100 | 192.168.1.1   | 80       | 60     |

What is the status code and phrase returned from the server to the client browser?

200 OK

When was the HTML file that the browser is retrieving last modified at the server?

Tue, 23 Sep 2003 05:29:00 GMT

Does the response also contain a DATE header? How are these two fields different?

Yes, it has a value of Tue, 23 Sep 2003 05:29:50 GMT .

These two fields differ, as the `Date` header is the time the server responds to the request, whereas the `Last-Modified` header refers to the time the file was modified.

Is the connection established between the browser and the server persistent or non-persistent? How can you infer this?

We can infer that the connection is persistent, from the headers in the request.

### Code

```
1 Keep-Alive: 300
2 Connection: keep-alive
```

There are also headers in the response, as seen below

### Code

```
1 Keep-Alive: timeout=10, max=100
2 Connection: Keep-Alive
```

Which suggests that the established connection is persistent.

How many bytes of content are being returned to the browser?

73 bytes (Content-Length)

## What is the data contained inside the HTTP response packet?

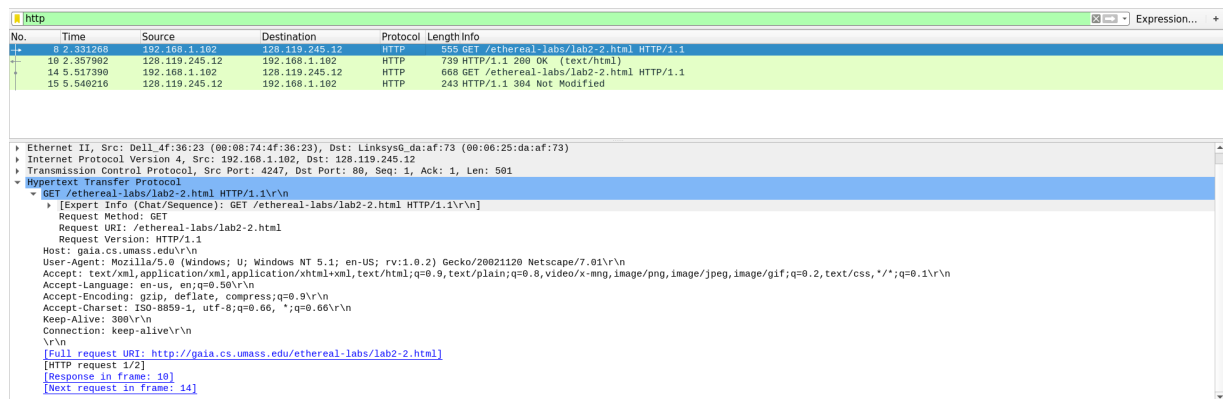
### Code

```
1 <html>\n
2 Congratulations. You've downloaded the file lab2-1.html!\n
3 </html>\n
```

## Exercise 4: Using Wireshark to understand the HTTP CONDITIONAL GET/response interaction

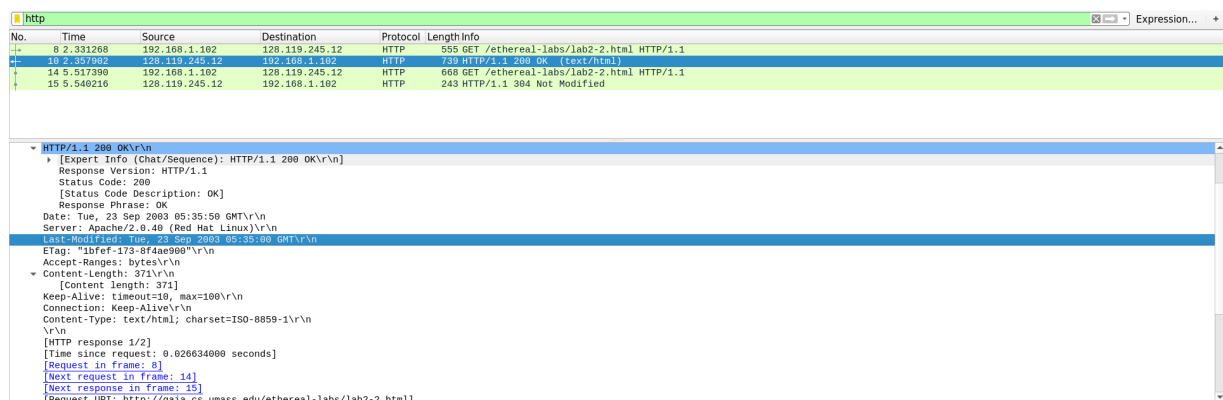
File: [http-ethereal-trace-2](#)

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



Nope

Does the response indicate the last time that the requested file was modified?



Yes, Tue, 23 Sep 2003 05:35:00 GMT

Now inspect the contents of the second HTTP GET request from the

browser to the server. Do you see an “IF-MODIFIED-SINCE” and “IF-NONE-MATCH” lines in the HTTP GET? If so, what information is contained in these header lines?

| No. | Time     | Source         | Destination    | Protocol | Length | Info                                     |
|-----|----------|----------------|----------------|----------|--------|--|
| 8   | 2.331268 | 192.168.1.102  | 128.119.245.12 | HTTP     | 555    | GET /etherreal-labs/lab2-2.html HTTP/1.1 |
| 10  | 2.357902 | 128.119.245.12 | 192.168.1.102  | HTTP     | 739    | HTTP/1.1 200 OK (text/html)              |
| 14  | 5.517390 | 192.168.1.102  | 128.119.245.12 | HTTP     | 668    | GET /etherreal-labs/lab2-2.html HTTP/1.1 |
| 15  | 5.540216 | 128.119.245.12 | 192.168.1.102  | HTTP     | 243    | HTTP/1.1 304 Not Modified                |

  
`Hypertext Transfer Protocol
 GET /etherreal-labs/lab2-2.html HTTP/1.1\r\n
 [Expert Info (Chat/Sequence): GET /etherreal-labs/lab2-2.html HTTP/1.1\r\n]
 Request Method: GET
 Request URI: /etherreal-labs/lab2-2.html
 Request Version: HTTP/1.1
 Host: gaia.cs.umass.edu\r\n
 User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.0.2) Gecko/20021120 Netscape/7.01\r\n
 Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8,video/x-mng,image/png,image/jpeg,image/gif;q=0.2,text/css,*/*;q=0.1\r\n
 Accept-Language: en-us,en;q=0.5\r\n
 Accept-Encoding: gzip, deflate, compress;q=0.9\r\n
 Accept-Charset: ISO-8859-1, utf-8;q=0.66,*q=0.60\r\n
 Keep-Alive: 300\r\n
 Connection: keep-alive\r\n
 If-Modified-Since: Tue, 23 Sep 2003 05:35:00 GMT\r\n
 If-None-Match: "1bfef-173-8f4ae900"\r\n
 Cache-Control: max-age=0\r\n
 \r\n
 [Full request URI: http://gaia.cs.umass.edu/etherreal-labs/lab2-2.html]
 [HTTP request 2/2]
 [Prev request in frame: 8]
 [Response in frame: 15]`

Yes, the information contained is as follows

#### Code

- 1 If-Modified-Since: Tue, 23 Sep 2003 05:35:00 GMT
- 2 If-None-Match: "1bfef-173-8f4ae900"

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.

| No. | Time     | Source         | Destination    | Protocol | Length | Info                                     |
|-----|----------|----------------|----------------|----------|--------|--|
| 8   | 2.331268 | 192.168.1.102  | 128.119.245.12 | HTTP     | 555    | GET /etherreal-labs/lab2-2.html HTTP/1.1 |
| 10  | 2.357902 | 128.119.245.12 | 192.168.1.102  | HTTP     | 739    | HTTP/1.1 200 OK (text/html)              |
| 14  | 5.517390 | 192.168.1.102  | 128.119.245.12 | HTTP     | 668    | GET /etherreal-labs/lab2-2.html HTTP/1.1 |
| 15  | 5.540216 | 128.119.245.12 | 192.168.1.102  | HTTP     | 243    | HTTP/1.1 304 Not Modified                |

  
`Ethernet II, Src: Linksys6 da:af:73 (00:06:25:da:af:73), Dst: Dell 4f:36:23 (00:06:74:4f:36:23)
Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
Transmission Control Protocol, Src Port: 80, Dst Port: 4247, Seq: 686, Ack: 1116, Len: 189
Hypertext Transfer Protocol
 HTTP/1.1 304 Not Modified\r\n
 [Expert Info (Chat/Sequence): HTTP/1.1 304 Not Modified\r\n]
 Response Version: HTTP/1.1
 Status Code: 304
 [Status Code Description: Not Modified]
 Response Phrase: Not Modified
 Date: Tue, 23 Sep 2003 05:35:53 GMT\r\n
 Server: Apache/2.0.40 (Red Hat Linux)\r\n
 Connection: Keep-Alive\r\n
 Keep-Alive: timeout=10, max=99\r\n
 ETag: "1bfef-173-8f4ae900"\r\n
 \r\n
 [HTTP response 2/2]
 [Time since request: 0.022820000 seconds]
 [Prev request in frame: 8]
 [Prev response in frame: 10]
 [Request in frame: 14]
 [Request URI: http://gaia.cs.umass.edu/etherreal-labs/lab2-2.html]`

A **304 Not Modified** response was returned.

The server did not explicitly return the contents of the file, rather the client should respond to this message by using the locally stored copy of the requested file.s

What is the value of the Etag field in the 2nd response message and how it is used? Has this value changed since the 1st response message was received?

ETag in first response: **1bfef-173-8f4ae900**

Etag in second response: `1bfef-173-8f4ae900`

The Etag field has not changed in value.

## Exercise 5: Ping Client

Server: `PingServer.java` - `LOSS_RATE = 0.5` , `AVERAGE_DELAY = 100`

Client: `PingClient.py`

### Server

#### Code

```
1  $> java PingServer 1025
2  Received from 127.0.0.1: PING 0 1583458445519
3      Reply not sent.
4  Received from 127.0.0.1: PING 1 1583458446521
5      Reply sent.
6  Received from 127.0.0.1: PING 2 1583458446591
7      Reply not sent.
8  Received from 127.0.0.1: PING 3 1583458447593
9      Reply sent.
10 Received from 127.0.0.1: PING 4 1583458447768
11     Reply not sent.
12 Received from 127.0.0.1: PING 5 1583458448769
13     Reply not sent.
14 Received from 127.0.0.1: PING 6 1583458449771
15     Reply sent.
16 Received from 127.0.0.1: PING 7 1583458449795
17     Reply not sent.
18 Received from 127.0.0.1: PING 8 1583458450795
19     Reply sent.
20 Received from 127.0.0.1: PING 9 1583458450888
21     Reply not sent.
```

### Client

#### Code

```
1  $> python3 PingClient.py localhost 1025
2  ping to localhost, seq = 0, time out
3  ping to localhost, seq = 1, rtt = 70ms
4  ping to localhost, seq = 2, time out
5  ping to localhost, seq = 3, rtt = 174ms
6  ping to localhost, seq = 4, time out
7  ping to localhost, seq = 5, time out
8  ping to localhost, seq = 6, rtt = 24ms
9  ping to localhost, seq = 7, time out
10 ping to localhost, seq = 8, rtt = 93ms
11 ping to localhost, seq = 9, time out
12
13 Minimum RTT: 24ms
14 Maximum RTT: 174ms
15 Average RTT: 90.25ms
```

### < Delay



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