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Lab 2 – HTTP

Part 1: Basic HTTP GET/response interaction

Wireshark Traces:

219 17.334100   192.168.0.100   128.119.245.12   HTTP   421   GET /wireshark-labs/HTTP-wireshark-filel.html
HTTP/1.1
Frame 219: 421 bytes on wire (3368 bits), 421 bytes captured (3368 bits) on interface 0
Ethernet II, Src: RivetNet_el:f0:cf (9c:b6:d0:el:f0:cf), Dst: Tp-LinkT_97:5f:e8 (60:e3:27:97:5f:e8)
Internet Protocol Version 4, Src: 192.168.0.100, Dst: 128.119.245.12   ◄——————————— Computer's IP Address is 192.168.0.100
Transmission Control Protocol, Src Port: 64817, Dst Port: 80, Seq: 1, Ack: 1, Len: 367 Hypertext
Transfer Protocol
     GET /wireshark-labs/HTTP-wireshark-filel.html HTTP/1.1\r\n ◄——————— Browser is running HTTP 1.1
     Host: gaia.cs.umass.edu\r\n
     User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n
     Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n
     Accept-Language: en-US,en;q=0.5\r\n ◄——————————— The Browser can accept English
     Accept-Encoding: gzip, deflate\r\n
     Connection: keep-alive\r\n
     Upgrade-Insecure-Requests: 1\r\n
     \r\n
     [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-filel.html] [HTTP
     request 1/3]
     [Response in frame: 224]
     [Next request in frame: 353]

224 17.345729   128.119.245.12   192.168.0.100   HTTP   540   HTTP/1.1 200 OK (text/html)
Frame 224: 540 bytes on wire (4320 bits), 540 bytes captured (4320 bits) on interface 0
Ethernet II, Src: Tp-LinkT_97:5f:e8 (60:e3:27:97:5f:e8), Dst: RivetNet_el:f0:cf (9c:b6:d0:el:f0:cf) Internet
Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.0.100
Transmission Control Protocol, Src Port: 80, Dst Port: 64817, Seq: 1, Ack: 368, Len: 486
Hypertext Transfer Protocol
     HTTP/1.1 200 OK\r\n ◄——————————— Server running HTTP 1.1   /   Server returned status code 200
     Date: Thu, 15 Feb 2018 03:12:05 GMT\r\n
     Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n Last-
     Modified: Wed, 14 Feb 2018 06:59:01 GMT\r\n ◄——————— File was last updated on Wed, Feb 14 2018
     ETag: "80-56526a5620b2e"\r\n
     Accept-Ranges: bytes\r\n
     Content-Length: 128\r\n ◄——————— The server returned 128 bytes of code
     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 1/3]
     [Time since request: 0.011629000 seconds]
     [Request in frame: 219]
     [Next request in frame: 353]
     [Next response in frame: 355]
     File Data: 128 bytes
Line-based text data: text/html
     <html>\n
     Congratulations. You've downloaded the file \n
     http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-filel.html!\n
     </html>\n

Questions:
1. Both the browser and server are running HTTP 1.1
2. The browser indicates that it can accept English
3. The IP Address of the computer is 192.168.0.100
4. The server returned a status code of 200.
5. The HTML file was last modified on Wednesday February 14, 2018 at 06:59 GMT
6. 128 bytes of content are being returned by the server
7. The packet listing window does not display the content type of the message.

Part 2: HTTP Conditional GET

Wireshark Traces:

75 1.515773   192.168.100   128.119.245.12   HTTP   464   GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
Frame 75: 464 bytes on wire(3712 bits), 464 bytes captured (3712 bits) on interface 0
EthernetII, Src: RivetNet_el:f0:cf(9c:b6:d0:el:f0:cf), Dst: Tp-LinkT_97:5f:e8(60:e3:27:97:5f:e8) Internet
Protocol Version 4, Src: 192.168.100,Dst: 128.119.245.12
TransmissionControlProtocol,SrcPort:50176,DstPort:80,Seq:1,Ack:1,Len:410 Hypertext Transfer
Protocol
    GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    User-Agent: Mozilla/50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n
    Accept:text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n
    Accept-Language: en-
    US,en;q=0.5\r\n Accept-
    Encoding: gzip, deflate\r\n
    Connection: keep-alive\r\n
    Upgrade-Insecure-Requests:
    1\r\n Pragma: no-cache\r\n
    Cache-Control: no-cache\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html]
    [HTTP request 1/2]
    [Response in frame: 77]
    [Next request inframe:95]

77 1.561250   128.119.24152   192.168.100   HTTP   784   HTTP/1.1 200 OK (text/html)
Frame 77: 784 bytes on wire(6272 bits), 784 bytes captured (6272 bits) on interface 0
EthernetII,Src:Tp-LinkT_97:5f:e8(60:e3:27:97:5f:e8),Dst: RivetNet_el:f0:cf(9c:b6:d0:el:f0:cf) Internet
Protocol Version 4, Src: 128.119.2452,Dst: 192.168.0.100
TransmissionControlProtocol,SrcPort:80,DstPort:50176,Seq:1,Ack:411,Len:730 Hypertext
Transfer Protocol
    HTTP/1.1 200 OK\r\n
    Date: Thu, 15 Feb 2018 03:46:29 GMT\r\n
    Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n
    Last-Modified: Wed, 14 Feb 2018 06:59:01 GMT\r\n
    ETag: "173-56526a562035e"\r\n
    Accept-Ranges: bytes\r\n
    <mark>Content-Length: 371</mark>\r\n   Explicit content in response to first GET request
    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 1/2]
    [Time since request: 0.045477000 seconds]
    [Request in frame:75]
    [Nextrequestinframe:95]
    [Next response inframe:96]
    File Data: 371 bytes
Line-based text data: text/html
    \n
    <html>\n
    \n
    Congratulationsagain! Nowyou'vedownloadedthefilelab2-2.html.
\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
\n
    willonlybesentoncebytheserverduetotheinclusionoftheIN-MODIFIED-SINCE
\n field in
    your browser's HTTPGETrequesttotheserver.\n
    \n
    </html>\n

95 3.241306   192.168.100   128.119.245.12   HTTP   533   GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
Frame95: 533 bytes on wire(4264 bits), 533 bytes captured (4264 bits) on interface 0
EthernetII, Src: RivetNet_el:f0:cf(9c:b6:d0:el:f0:cf), Dst: Tp-LinkT_97:5f:e8(60:e3:27:97:5f:e8) Internet
Protocol Version 4, Src: 192.168.100,Dst: 128.119.245.12
TransmissionControlProtocol,SrcPort:50176,DstPort:80,Seq:411,Ack:731,Len:479 Hypertext
Transfer Protocol
    GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    User-Agent: Mozilla/50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n
    Accept:text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n

Accept-Language: en-
US,en;q=0.5\r\n Accept-
Encoding: gzip, deflate\r\n
Connection: keep-alive\r\n
Upgrade-Insecure-Requests: 1\r\n
If-Modified-Since: Wed, 14 Feb 2018 06:59:01 GMT\r\n   If-Modified-Since header in second GET request
If-None-Match: "173-56526a562035e"\r\n
Cache-Control: max-age=0\r\n
\r\n
[Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html]
[HTTP request 2/2]
[Prev request inframe:75]
[Response in frame:96]

96 3.290142   128.119.24.152   192.168.0.100   HTTP   293   HTTP/1.1 304 NotModified
Frame96: 293 bytes on wire(2344 bits), 293 bytes captured (2344 bits) on interface 0
EthernetII,Src:Tp-LinkT_97:5f:e8(60:e3:27:97:5f:e8),Dst: RivetNet_el:f0:cf(9c:b6:d0:el:f0:cf) Internet
Protocol Version 4,Src:128.119.248.12,Dst: 192.168.0.100
HTTP/1.1 304 Not Modified\r\n   Server responded with 304 Not Modified
Date: Thu, 15 Feb 2018 03:46:31 GMT\r\n
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n
Connection: Keep-Alive\r\n
Keep-Alive: timeout=5,
max=99\r\n ETag:"173-
56526a562035e"\r\n
\r\n
[HTTP response 2/2]
[Time since request: 0.048836000 seconds]
[Prev request in frame: 75]
[Prev response inframe:77]
 [Request in frame:95]

Questions:

8. No, there is no "IF-MODIFIED-SINCE" line in the first HTTP GET
9. The server did explicitly return the contents of the file as indicated by the content length header and content type header
10. There is a "IF-MODIFIED-SINCE" line in the second HTTP GET and it has the value of Wednesday, 14 February, 2018 06:59, the value listed as the "Last-Modified" header in the previous response.
11. The status code of the second response was a 304 Not Modified. The server did not explicitly return the contents of the file as there is no Content-Length or Content-Type headers to indicate such.

Part 3: Retrieving Long Documents

Wireshark Traces:

  827.991616   192.168.0.100   128.119.245.12   HTTP   421   GET /wireshark-labs/HTTP-wireshark-file3.html
          HTTP/1.1
Frame 82: 421 bytes on wire(3368 bits), 421 bytes captured (3368 bits) on interface 0   Frame 82 contained GET request
EthernetII, Src: RivetNet_el:f0:cf(9c:b6:d0:el:f0:cf), Dst: Tp-LinkT_97:5f:e8(60:e3:27:97:5f:e8)
Internet Protocol Version 4, Src: 192.168.0.100, Dst: 128.119.245.12
TransmissionControlProtocol,SrcPort:50898,DstPort:80,Seq:1,Ack:1,Len:367 Hypertext Transfer Protocol
    GET /wireshark-labs/HTTP-wireshark-file3.html HTTP/1.1\r\n
    Host: gaia.cs.umass.edu\r\n
    User-Agent: Mozilla/50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n
    Accept:text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n
    Accept-Language: en-US,en;q=0.5\r\n
    Accept-Encoding: gzip, deflate\r\n
    Connection: keep-alive\r\n
    Upgrade-Insecure-Requests: 1\r\n
    \r\n
    [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file3.html]
    [HTTP request 1/1]
    [Response in frame:88]

888.039821   128.119.2.4152   192.168.100   HTTP   535   HTTP/1.1 200 OK (text/html)

`Frame 88`: 535 bytes on wire(4280 bits), 535 bytes captured (4280 bits) on interface 0

Packet 88 contained response

EthernetII, Src: Tp-LinkT_97:5f:e8(60:e3:27:97:5f:e8), Dst: RivetNet_el:f0:cf(9c:b6:d0:el:f0:cf)\

Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.0.100

Transmission Control Protocol, Src Port: 80, Dst Port: 50898, Seq: 4381, Ack: 368, Len: 481

`[4 Reassembled TCP Segments` (4861 bytes): #84(1460), #85(1460), #87(1460), #88(481)]

    [Frame: 84, payload: 0-1459 (1460 bytes)]

    [Frame: 85, payload: 1460-2919 (1460 bytes)]   4 TCP Segments were used

    [Frame: 87, payload: 2920-4379 (1460 bytes)]

    [Frame: 88, payload: 4380-4860 (481 bytes)]

    [Segment count: 4] [Reassembled TCP length:4861]

    [Reassembled TCP Data: 485454502f312e3120323030204f4b0d0a446174653a2054...]

Hypertext Transfer Protocol   Server responds with 200 OK

   `HTTP/1.1 200OK\r\n`

   Date: Thu, 15 Feb 2018 04:04:03 GMT\r\n

   Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n

   Last-Modified: Wed, 14 Feb 2018 06:59:01 GMT\r\n

   ETag: "1194-56526a561d095"\r\n

   Accept-Ranges: bytes\r\n

   Content-Length: 4500\r\n

   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: 0.048205000 seconds]

   [Request in frame:82]

   File Data: 4500 bytes

Questions:

12. The browser only sent one GET request, packet number 82
13. Packet 88 contains the status code and phrase associated with the initial GET request.
14. The response is 200 OK
15. Four separate TCP segments were needed to carry the single HTTP response and text of the Bill of Rights.

Part 4: HTML Documents with Embedded Objects

Wireshark Traces:

7813.625248   192.168.100   128.119.245.12   HTTP   421   GET /wireshark-labs/HTTP-wireshark-file4.html
HTTP/1.1

Frame 78: 421 bytes on wire(3368 bits), 421 bytes captured (3368 bits) on interface 0

Hypertext Transfer Protocol

   `GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1\r\n` 1st GET request

   Host: gaia.cs.umass.edu\r\n

   User-Agent: Mozilla/50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n

   Accept:text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8\r\n

   Accept-Language: en-U5,en;q=0.5\r\n

   Accept-Encoding: gzip, deflate\r\n

   Connection: keep-alive\r\n

   Upgrade-Insecure-Requests: 1\r\n

   \r\n

8213.644101   128.119.2.4152   192.168.100   HTTP   1127   HTTP/1.1 200 OK (text/html)

Frame 82: 1127 bytes on wire(9016 bits), 1127 bytes captured (9016 bits) on interface 0

Hypertext Transfer Protocol

   HTTP/1.1 200 OK\r\n

   Date: Thu, 15 Feb 2018 04:12:06 GMT\r\n

   Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n\

   Last-Modified: Wed, 14 Feb 2018 06:59:01 GMT\r\n

   ETag: "2ca-56526a561fb8e"\r\n

   Accept-Ranges: bytes\r\n

   Content-Length: 714\r\n

   Keep-Alive: timeout=5, max=100\r\n

   Connection: Keep-Alive\r\n

   Content-Type: text/html; charset=UTF-8\r\n

   \r\n

8413.856106   192.168.100   128.119.245.12   HTTP   378   GET /pearson.png HTTP/1.1

Frame 84: 378 bytes on wire(3024 bits), 378 bytes captured (3024 bits) on interface 0
Hypertext Transfer Protocol
   GET/pearson.png HTTP/1.1\r\n Host:gaia.cs.umass.edu\r\n   **2nd GET request**
   User-Agent: Mozilla/50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n
   Accept: */*\r\n
   Accept-Language: en-U5,en;q=0.5\r\n
   Accept-Encoding: gzip, deflate\r\n
   Referer: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n
   Connection: keep-alive\r\n
   \r\n

  9113.894861   128.119.2.4152   192.168.100   HTTP   745   HTTP/1.1 200 OK (PNG)
Frame91: 745 bytes on wire(5960 bits), 745 bytes captured (5960 bits) on interface 0
[3 Reassembled TCP Segments (3611 bytes): #87(1460), #89(1460), #91(691)]
Hypertext Transfer Protocol HTTP/1.1 200OK\r\n
   Date: Thu, 15 Feb 2018 04:12:06 GMT\r\n
   Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/v5.16.3\r\n
   Last-Modified: Sat, 06 Aug 2016 10:08:14 GMT\r\n
   ETag: "cc3-539645c7flee7"\r\n
   Accept-Ranges: bytes\r\n
   Content-Length: 3267\r\n
   Keep-Alive: timeout=5, max=99\r\n
   Connection: Keep-Alive\r\n
   Content-Type: image/png\r\n
   \r\n
Portable Network Graphics

  9913.907007   192.168.100   128.119.240.90   HTTP   392   GET/-kurose/cover_5th_ed.jpgHTTP/1.1
Frame 99: 392 bytes on wire(3136 bits), 392 bytes captured (3136 bits) on interface 0
Hypertext Transfer Protocol   **3rd GET request**
   GET /-kurose/cover_5th_ed.jpg HTTP/1.1\r\n Host: manic.cs.umass.edu\r\n
   User-Agent: Mozilla/50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n
   Accept: */*\r\n
   Accept-Language: en-US,en;q=0.5\r\n
   Accept-Encoding: gzip, deflate\r\n
   Referer: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n
   Connection: keep-alive\r\n
   \r\n

  102 13.919199   128.119.240   192.168.100   HTTP   510   HTTP/1.1 302 Found (text/html)
Frame 102: 510 bytes on wire (4080 bits), 510 bytes captured (4080 bits) on interface 0
Hypertext Transfer Protocol
   HTTP/1.1 302 Found\r\n
   Date:Thu,15Feb201804:12:06GMT\r\n Server: Apache\r\n
   Location: http://caite.cs.umass.edu/-kurose/cover_5th_ed.jpg\r\n
   Content-Length: 234\r\n
   Connection: close\r\n
   Content-Type: text/html; charset=iso-8859-1\r\n
   \r\n   **Browser requests second image at 11313 seconds, after already receiving previous image response**
Line-based text data: text/html

  11313.954683   192.168.100   128.119.240.90   HTTP   392   GET/-kurose/cover_5th_ed.jpgHTTP/1.1
Frame 113: 392 bytes on wire(3136 bits), 392 bytes captured (3136 bits) on interface 0
Hypertext Transfer Protocol   **4th GET request**
   GET /-kurose/cover_5th_ed.jpg HTTP/1.1\r\n Host: caite.cs.umass.edu\r\n
   User-Agent: Mozilla/50 (Windows NT 10.0; Win64; x64; rv:58.0) Gecko/20100101 Firefox/58.0\r\n
   Accept: */*\r\n
   Accept-Language: en-US,en;q=0.5\r\n
   Accept-Encoding: gzip, deflate\r\n
   Referer: http://gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file4.html\r\n
   Connection: keep-alive\r\n
   \r\n

  20414.126289   128.119.240   192.168.100   HTTP   526   HTTP/1.1 200 OK (JPEG JFIF image)
Frame 204: 526 bytes on wire (4208 bits), 526 bytes captured (4208 bits) on interface 0
70Reassembled TCPSegments(101212 bytes)
HypertextTransferProtocol
   HTTP/1.1 200OK\r\n
   Date:Thu,15Feb201804:12:06GMT\r\n Server: Apache\r\n
   Last-Modified:Tue,15Sep200918:23:27GMT\r\n ETag:"78004-18a68-473ale0e6e5c0"\r\n
   Accept-Ranges: bytes\r\n
   Content-Length: 100968\r\n Connection: close\r\n

Content-Type: image/jpeg\r\n
\r\n

Questions:

16. The browser sent a total of 4 HTTP GET Requests
17. The browser downloaded the imaged serially because the time stamps on the images GET requests are not the same and one occurs after the other received a 200 OK response from the server with the image file contents.

Part 5: HTTP Authentication

Wireshark Traces:

86 1.979607   192.168.100   128.119.245.12   HTTP   452   GET /wireshark-labs/protected_pages/HTTP-wireshark- files.html HTTP/1.1
Frame 86: 452 bytes on wire(3616 bits), 452 bytes captured (3616 bits) on interface 0
Hypertext Transfer Protocol
    GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.htmlHTTP/1.1\r\n
    Accept:text/html,application/xhtml+xml,image/jxr,*/*\r\n
    Accept-Language: en-US,en;q=0.7,ko;q=0.3\r\n
    User-Agent: Mozilla/50(Windows NT 10.0; Win64; x64)AppleWebKit/537.36(KHTML, like Gecko)Chrome/580.3029.110Safari/537.36 Edge/16.16299\r\n
    Accept-Encoding:gzip,deflate\r\n Host: gaia.cs.umass.edu\r\n Connection: Keep-Alive\r\n
    \r\n

90 1.992323   128.119.24152   192.168.100   HTTP   771   HTTP/1.1 401 Unauthorized(text/html)
Frame90: 771 bytes on wire(6168 bits), 771 bytes captured (6168 bits) on interface 0
Hypertext Transfer Protocol
    HTTP/1.1 401Unauthorized\r\n   Server responds to first GET request with 401 Unauthorized
    Date: Thu, 15 Feb 2018 04:22:05 GMT\r\n
    Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/vS.16.3\r\n
    WWW-Authenticate: Basic realm="wireshark-students only"\r\n
    Content-Length: 381\r\n
    Keep-Alive: timeout=S, max=100\r\n
    Connection: Keep-Alive\r\n
    Content-Type: text/html; charset=iso-8859-1\r\n
    \r\n

122318.479785   192.168.100   128.119.245.12   HTTP   511   GET /wireshark-labs/protected_pages/HTTP-wireshark- file5.html HTTP/1.1
Frame 1223: 511 bytes on wire(4088 bits), 511 bytes captured (4088 bits) on interface 0
Hypertext Transfer Protocol
    GET /wireshark-labs/protected_pages/HTTP-wireshark-file5.htmlHTTP/1.1\r\n Accept:text/html,application/xhtml+xml,image/jxr,*/*\r\n
    Accept-Language: en-US,en;q=0.7,ko;q=0.3\r\n
    User-Agent: Mozilla/50(Windows NT 10.0; Win64; x64)AppleWebKit/537.36(KHTML, like Gecko)Chrome/580.3029.110Safari/537.36 Edge/16.16299\r\n
    Accept-Encoding:gzip,deflate\r\n Host: gaia.cs.umass.edu\r\n Connection: Keep-Alive\r\n
    Authorization: Basic d2IyZXNoYXJrLXN0dWRIbnRzOm5ldHdvcms=\r\n
    \r\n   Authorization is the new header added to the next GET request

122518.525535   128.119.24152   192.168.100   HTTP   544   HTTP/1.1 200 OK (text/html)
Frame 1225: 544 bytes on wire(4352 bits), 544 bytes captured (4352 bits) on interface 0
Hypertext Transfer Protocol
    HTTP/1.1 200 OK\r\n
    Date: Thu, 15 Feb 2018 04:22:22 GMT\r\n
    Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/5.4.16 mod_perl/2.0.10 Perl/vS.16.3\r\n
    Last-Modified: Wed, 14 Feb 2018 06:59:01 GMT\r\n
    ETag: "84-56526a56212fe"\r\n Accept-Ranges: bytes\r\n
    Content-Length: 132\r\n
    Keep-Alive: timeout=S, max=100\r\n
    Connection: Keep-Alive\r\n
    Content-Type: text/html; charset=UTF-8\r\n

Questions:

18. The server's initial response to the first GET message was 401: Unauthorized
19. The next GET requests includes the field "Authorization"