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Wireshark HTTP

Part 1.

GET Request:

cs.uci.edu gaia.cs.umass.edu HTTP 431 GET /wireshark-labs/
HTTP-wireshark-file1.html HTTP/1.1
Frame 98: 431 bytes on wire (3448 bits), 431 bytes captured (3448 bits) on interface 0
Ethernet II, Src: dhcp-051237.ics.uci.edu (00:00:00:03:19:12), Dst: 314-vl101.ucinet.uci.edu
(00:19:07:f1:c0:00)
Internet Protocol Version 4, Src: dhcp-051237.ics.uci.edu (128.195.51.237), Dst: gaia.cs.umass.edu
(128.119.245.12)
Transmission Control Protocol, Src Port: 51506 (51506), Dst Port: http (80), Seq: 1, Ack: 1, Len: 365
Hypertext Transfer Protocol
GET /wireshark-labs/HTTP-wireshark-file1.html HTTP/1.1\r\n
[Expert Info (Chat/Sequence): GET /wireshark-labs/HTTP-wireshark-file1.html HTTP/1.1\r\n]
Request Method: GET
Request URI: /wireshark-labs/HTTP-wireshark-file1.html
Request Version: HTTP/1.1
Host: gaia.cs.umass.edu\r\n
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:56.0) Gecko/20100101 Firefox/56.0\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-file1.html]
[HTTP request 1/1]
[Response in frame: 100]

HTTP Response message:

100 40.621101716 gaia.cs.umass.edu dhcp-051237.ics.uci.edu HTTP 552 HTTP/1.1 200
OK (text/html)
Frame 100: 552 bytes on wire (4416 bits), 552 bytes captured (4416 bits) on interface 0
Ethernet II, Src: 314-vl101.ucinet.uci.edu (00:19:07:f1:c0:00), Dst: dhcp-051237.ics.uci.edu
(00:00:00:03:19:12)
Internet Protocol Version 4, Src: gaia.cs.umass.edu (128.119.245.12), Dst: dhcp-051237.ics.uci.edu
(128.195.51.237)
Transmission Control Protocol, Src Port: http (80), Dst Port: 51506 (51506), Seq: 1, Ack: 366, Len: 486
Hypertext Transfer Protocol
HTTP/1.1 200 OK\r\n
[Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]
Request Version: HTTP/1.1
Status Code: 200
Response Phrase: OK

Date: Wed, 25 Oct 2017 18:27:01 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, 25 Oct 2017 05:59:01 GMT\r\n
ETag: "80-55c58c09a20eb"\r\n
Accept-Ranges: bytes\r\n
Content-Length: 128\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: 0.077937437 seconds]
[Request in frame: 98]
File Data: 128 bytes

Line-based text data: text/html

1. My browser is running HTTP version 1.1, based on the parts of the GET message highlighted in red. The server is also running HTTP version 1.1, based on the parts of the response message highlighted in red.
2. From the green part of the GET request, my browser indicates that it can accept US English and English.
3. From the blue parts of the GET request and response message, it appears that the IP of my computer is 128.195.51.237. From the magenta parts of the GET request and response message, the IP address of the gaia.cs.umass.edu server is 128.119.245.12.
4. From the orange parts of the response message, the status code returned by the server is 200.
5. From the yellow part of the response message, the html file was last modified on Wed, 25 Oct 2017 05:59:01 GMT.
6. From the purple parts of the response message, 128 bytes of data are being returned to my browser.
7. No, there are no headers that are not displayed.

Part 2.

1st GET:

/tmp/wireshark_enx000000031912_20171025125516_vnFHZE.pcapng 773 total packets, 8 shown
346 7.475872477 dhcp-051237.ics.uci.edu gaia.cs.umass.edu HTTP 431 GET /wireshark-labs/
HTTP-wireshark-file4.html HTTP/1.1
Frame 346: 431 bytes on wire (3448 bits), 431 bytes captured (3448 bits) on interface 0
Ethernet II, Src: dhcp-051237.ics.uci.edu (00:00:00:03:19:12), Dst: 314-vl101.ucinet.uci.edu (00:19:07:f1:c0:00)
Internet Protocol Version 4, Src: dhcp-051237.ics.uci.edu (128.195.51.237), Dst: gaia.cs.umass.edu (128.119.245.12)
Transmission Control Protocol, Src Port: 52202 (52202), Dst Port: http (80), Seq: 1, Ack: 1, Len: 365

Hypertext Transfer Protocol

GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1\r\n

[Expert Info (Chat/Sequence): GET /wireshark-labs/HTTP-wireshark-file4.html HTTP/1.1\r\n]

Request Method: GET

Request URI: /wireshark-labs/HTTP-wireshark-file4.html

Request Version: HTTP/1.1

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

User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:56.0) Gecko/20100101 Firefox/56.0\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-file4.html]

[HTTP request 1/2]

[Response in frame: 349]

[Next request in frame: 351]

1st Response:

349 7.550108951 gaia.cs.umass.edu dhcp-051237.ics.uci.edu HTTP 1139 HTTP/1.1 200 OK (text/html)

Frame 349: 1139 bytes on wire (9112 bits), 1139 bytes captured (9112 bits) on interface 0

Ethernet II, Src: 314-vl101.ucinet.uci.edu (00:19:07:f1:c0:00), Dst: dhcp-051237.ics.uci.edu (00:00:00:03:19:12)

Internet Protocol Version 4, Src: gaia.cs.umass.edu (128.119.245.12), Dst: dhcp-051237.ics.uci.edu (128.195.51.237)

Transmission Control Protocol, Src Port: http (80), Dst Port: 52202 (52202), Seq: 1, Ack: 366, Len: 1073

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

[Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]

Request Version: HTTP/1.1

Status Code: 200

Response Phrase: OK

Date: Wed, 25 Oct 2017 19:55:24 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, 25 Oct 2017 05:59:01 GMT\r\n

ETag: "2ca-55c58c09a1533"\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

[HTTP response 1/2]

[Time since request: 0.074236474 seconds]

[Request in frame: 346]

[Next request in frame: 351]

[Next response in frame: 356]

File Data: 714 bytes

Line-based text data: text/html

```
<html>\n
<head>\n
<title>Lab2-4 file: Embedded URLs</title>\n
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">\n
</head>\n
\n
<body bgcolor="#FFFFFF" text="#000000">\n
\n
<p>\n
 </p>\n
<p>This little HTML file is being served by gaia.cs.umass.edu. \n
It contains two embedded images. <br> The image above, also served from the \n
gaia.cs.umass.edu web site, is the logo of our publisher, Pearson. <br>\n
The image of our 5th edition book cover below is stored at, and served from, the www server
caite.cs.umass.edu:</p>\n
<p align="left"></p>\n
</body>\n
</html>\n/tmp/wireshark_enx000000031912_20171025125516_vnFHzE.pcapng 773 total packets, 8
shown
```

2nd GET:

351 7.607734652 dhcp-051237.ics.uci.edu gaia.cs.umass.edu HTTP 388 GET /pearson.png
HTTP/1.1

Frame 351: 388 bytes on wire (3104 bits), 388 bytes captured (3104 bits) on interface 0
Ethernet II, Src: dhcp-051237.ics.uci.edu (00:00:00:03:19:12), Dst: 314-vl101.ucinet.uci.edu
(00:19:07:f1:c0:00)

Internet Protocol Version 4, Src: dhcp-051237.ics.uci.edu (128.195.51.237), Dst: gaia.cs.umass.edu
(128.119.245.12)

Transmission Control Protocol, Src Port: 52202 (52202), Dst Port: http (80), Seq: 366, Ack: 1074, Len:
322

Hypertext Transfer Protocol

GET /pearson.png HTTP/1.1\r\n

[Expert Info (Chat/Sequence): GET /pearson.png HTTP/1.1\r\n]

Request Method: GET

Request URI: /pearson.png

Request Version: HTTP/1.1

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

User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:56.0) Gecko/20100101 Firefox/56.0\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

[Full request URI: http://gaia.cs.umass.edu/pearson.png]

[HTTP request 2/2]

[Prev request in frame: 346]

[Response in frame: 356]

2nd Response:

356 7.682701758 gaia.cs.umass.edu dhcp-051237.ics.uci.edu HTTP 781 HTTP/1.1 200 OK (PNG)

Frame 356: 781 bytes on wire (6248 bits), 781 bytes captured (6248 bits) on interface 0
Ethernet II, Src: 314-vl101.ucinet.uci.edu (00:19:07:f1:c0:00), Dst: dhcp-051237.ics.uci.edu (00:00:00:03:19:12)

Internet Protocol Version 4, Src: gaia.cs.umass.edu (128.119.245.12), Dst: dhcp-051237.ics.uci.edu (128.195.51.237)

Transmission Control Protocol, Src Port: http (80), Dst Port: 52202 (52202), Seq: 3970, Ack: 688, Len: 715

[3 Reassembled TCP Segments (3611 bytes): #352(1448), #354(1448), #356(715)]

[Frame: 352, payload: 0-1447 (1448 bytes)]

[Frame: 354, payload: 1448-2895 (1448 bytes)]

[Frame: 356, payload: 2896-3610 (715 bytes)]

[Segment count: 3]

[Reassembled TCP length: 3611]

[Reassembled TCP Data: 485454502f312e3120323030204f4b0d0a446174653a2057...]

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

[Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n\r\n]

Request Version: HTTP/1.1

Status Code: 200

Response Phrase: OK

Date: Wed, 25 Oct 2017 19:55:24 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: "cc3-539645c7f1ee7"\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

[HTTP response 2/2]

[Time since request: 0.074967106 seconds]

[Prev request in frame: 346]

[Prev response in frame: 349]

[Request in frame: 351]

File Data: 3267 bytes

Portable Network Graphics

3rd GET:

361 8.577484794 dhcp-051237.ics.uci.edu caite.cs.umass.edu HTTP 402 GET /~kurose/cover_5th_ed.jpg HTTP/1.1

Frame 361: 402 bytes on wire (3216 bits), 402 bytes captured (3216 bits) on interface 0

Ethernet II, Src: dhcp-051237.ics.uci.edu (00:00:00:03:19:12), Dst: 314-vl101.ucinet.uci.edu (00:19:07:f1:c0:00)

Internet Protocol Version 4, Src: dhcp-051237.ics.uci.edu (128.195.51.237), Dst: caite.cs.umass.edu

(128.119.240.90)

Transmission Control Protocol, Src Port: 33702 (33702), Dst Port: http (80), Seq: 1, Ack: 1, Len: 336
Hypertext Transfer Protocol

GET /~kurose/cover_5th_ed.jpg HTTP/1.1\r\n

[Expert Info (Chat/Sequence): GET /~kurose/cover_5th_ed.jpg HTTP/1.1\r\n]

Request Method: GET/tmp/wireshark_enx000000031912_20171025125516_vnFHZE.pcapng 773

total packets, 8 shown

Request URI: /~kurose/cover_5th_ed.jpg

Request Version: HTTP/1.1

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

User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:56.0) Gecko/20100101 Firefox/56.0\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

[Full request URI: http://manic.cs.umass.edu/~kurose/cover_5th_ed.jpg]

[HTTP request 1/1]

[Response in frame: 363]

3rd Response:

363 8.652731404 caite.cs.umass.edu dhcp-051237.ics.uci.edu HTTP 522 HTTP/1.1 302

Found

(text/html)

Frame 363: 522 bytes on wire (4176 bits), 522 bytes captured (4176 bits) on interface 0

Ethernet II, Src: 314-vl101.ucinet.uci.edu (00:19:07:f1:c0:00), Dst: dhcp-051237.ics.uci.edu (00:00:00:03:19:12)

Internet Protocol Version 4, Src: caite.cs.umass.edu (128.119.240.90), Dst: dhcp-051237.ics.uci.edu (128.195.51.237)

Transmission Control Protocol, Src Port: http (80), Dst Port: 33702 (33702), Seq: 1, Ack: 337, Len: 456
Hypertext Transfer Protocol

HTTP/1.1 302 Found\r\n

[Expert Info (Chat/Sequence): HTTP/1.1 302 Found\r\n]

Request Version: HTTP/1.1

Status Code: 302

Response Phrase: Found

Date: Wed, 25 Oct 2017 19:55:25 GMT\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

[HTTP response 1/1]

[Time since request: 0.075246610 seconds]

[Request in frame: 361]

File Data: 234 bytes

Line-based text data: text/html

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">\n

```
<html><head>\n
<title>302 Found</title>\n
</head><body>\n
<h1>Found</h1>\n
<p>The document has moved <a
href="http://caite.cs.umass.edu/~kurose/cover_5th_ed.jpg">here</a>.</p>\n
</body></html>\n
```

4th GET:

371 8.777541915 dhcp-051237.ics.uci.edu caite.cs.umass.edu HTTP 402 GET /~kurose/cover_5th_ed.jpg HTTP/1.1

Frame 371: 402 bytes on wire (3216 bits), 402 bytes captured (3216 bits) on interface 0

Ethernet II, Src: dhcp-051237.ics.uci.edu (00:00:00:03:19:12), Dst: 314-vl101.ucinet.uci.edu (00:19:07:f1:c0:00)

Internet Protocol Version 4, Src: dhcp-051237.ics.uci.edu (128.195.51.237), Dst: caite.cs.umass.edu (128.119.240.90)

Transmission Control Protocol, Src Port: 33704 (33704), Dst Port: http (80), Seq: 1, Ack: 1, Len: 336
Hypertext Transfer Protocol

GET /~kurose/cover_5th_ed.jpg HTTP/1.1\r\n

[Expert Info (Chat/Sequence): GET /~kurose/cover_5th_ed.jpg HTTP/1.1\r\n]

Request Method: GET

Request URI: /~kurose/cover_5th_ed.jpg

Request Version: HTTP/1.1

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

User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:56.0) Gecko/20100101 Firefox/56.0\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

[Full request URI: http://caite.cs.umass.edu/~kurose/cover_5th_ed.jpg]

[HTTP request 1/1]

[Response in frame: 508]

4th Response:

508 9.019305309 caite.cs.umass.edu dhcp-051237.ics.uci.edu HTTP 1366 HTTP/1.1 200
OK (JPEG JFIF image)

Frame 508: 1366 bytes on wire (10928 bits), 1366 bytes captured (10928 bits) on interface 0

Ethernet II, Src: 314-vl101.ucinet.uci.edu (00:19:07:f1:c0:00), Dst: dhcp-051237.ics.uci.edu (00:00:00:03:19:12)/tmp/wireshark_enx000000031912_20171025125516_vnFHZE.pcapng 773 total packets, 8 shown

Internet Protocol Version 4, Src: caite.cs.umass.edu (128.119.240.90), Dst: dhcp-051237.ics.uci.edu (128.195.51.237)

Transmission Control Protocol, Src Port: http (80), Dst Port: 33704 (33704), Seq: 99913, Ack: 337, Len:

1300

[70 Reassembled TCP Segments (101212 bytes): #373(1448), #375(1448), #377(1448), #379(1448), #381(1448),

#383(1448), #385(1448), #387(1448), #389(1448), #391(1448), #393(1448), #395(1448), #397(1448),

#399(1448), #401(1448), #403(1448), #40]

[Frame: 373, payload: 0-1447 (1448 bytes)]
[Frame: 375, payload: 1448-2895 (1448 bytes)]
[Frame: 377, payload: 2896-4343 (1448 bytes)]
[Frame: 379, payload: 4344-5791 (1448 bytes)]
[Frame: 381, payload: 5792-7239 (1448 bytes)]
[Frame: 383, payload: 7240-8687 (1448 bytes)]
[Frame: 385, payload: 8688-10135 (1448 bytes)]
[Frame: 387, payload: 10136-11583 (1448 bytes)]
[Frame: 389, payload: 11584-13031 (1448 bytes)]
[Frame: 391, payload: 13032-14479 (1448 bytes)]
[Frame: 393, payload: 14480-15927 (1448 bytes)]
[Frame: 395, payload: 15928-17375 (1448 bytes)]
[Frame: 397, payload: 17376-18823 (1448 bytes)]
[Frame: 399, payload: 18824-20271 (1448 bytes)]
[Frame: 401, payload: 20272-21719 (1448 bytes)]
[Frame: 403, payload: 21720-23167 (1448 bytes)]
[Frame: 405, payload: 23168-24615 (1448 bytes)]
[Frame: 407, payload: 24616-26063 (1448 bytes)]
[Frame: 409, payload: 26064-27511 (1448 bytes)]
[Frame: 411, payload: 27512-28959 (1448 bytes)]
[Frame: 413, payload: 28960-30407 (1448 bytes)]
[Frame: 415, payload: 30408-31855 (1448 bytes)]
[Frame: 417, payload: 31856-33303 (1448 bytes)]
[Frame: 419, payload: 33304-34751 (1448 bytes)]
[Frame: 421, payload: 34752-36199 (1448 bytes)]
[Frame: 423, payload: 36200-37647 (1448 bytes)]
[Frame: 425, payload: 37648-39095 (1448 bytes)]
[Frame: 427, payload: 39096-40543 (1448 bytes)]
[Frame: 429, payload: 40544-41991 (1448 bytes)]
[Frame: 431, payload: 41992-43439 (1448 bytes)]
[Frame: 433, payload: 43440-44887 (1448 bytes)]
[Frame: 435, payload: 44888-46335 (1448 bytes)]
[Frame: 437, payload: 46336-47783 (1448 bytes)]
[Frame: 439, payload: 47784-49231 (1448 bytes)]
[Frame: 441, payload: 49232-50679 (1448 bytes)]
[Frame: 443, payload: 50680-52127 (1448 bytes)]
[Frame: 445, payload: 52128-53575 (1448 bytes)]
[Frame: 447, payload: 53576-55023 (1448 bytes)]
[Frame: 449, payload: 55024-56471 (1448 bytes)]
[Frame: 451, payload: 56472-57919 (1448 bytes)]
[Frame: 453, payload: 57920-59367 (1448 bytes)]
[Frame: 455, payload: 59368-60815 (1448 bytes)]
[Frame: 457, payload: 60816-62263 (1448 bytes)]
[Frame: 459, payload: 62264-63711 (1448 bytes)]
[Frame: 461, payload: 63712-65159 (1448 bytes)]
[Frame: 463, payload: 65160-66607 (1448 bytes)]
[Frame: 465, payload: 66608-68055 (1448 bytes)]
[Frame: 467, payload: 68056-69503 (1448 bytes)]

[Frame: 469, payload: 69504-70951 (1448 bytes)]
[Frame: 471, payload: 70952-72399 (1448 bytes)]
[Frame: 473, payload: 72400-73847 (1448 bytes)]
[Frame: 475, payload: 73848-75295 (1448 bytes)]
[Frame: 477, payload: 75296-76743 (1448 bytes)]
[Frame: 479, payload: 76744-78191 (1448 bytes)]
[Frame: 481, payload: 78192-79639 (1448 bytes)]
[Frame: 483, payload: 79640-81087 (1448 bytes)]
[Frame: 485, payload: 81088-82535 (1448 bytes)]
[Frame: 487, payload: 82536-83983 (1448 bytes)]
[Frame: 489, payload: 83984-85431 (1448 bytes)]
[Frame: 491, payload: 85432-86879 (1448 bytes)]
[Frame: 493, payload: 86880-88327 (1448 bytes)]
[Frame: 495, payload: 88328-89775 (1448 bytes)]
[Frame: 497, payload: 89776-91223 (1448 bytes)]
[Frame: 499, payload: 91224-92671 (1448 bytes)]
[Frame: 501, payload: 92672-94119 (1448 bytes)]
[Frame: 502, payload: 94120-95567 (1448 bytes)]
[Frame: 504, payload: 95568-97015 (1448 bytes)]
[Frame: 505, payload: 97016-98463 (1448 bytes)]
[Frame: 507, payload: 98464-99911 (1448

bytes)]]/tmp/wireshark_enx000000031912_20171025125516_vnFHZE.pcapng 773 total packets, 8 shown

[Frame: 508, payload: 99912-101211 (1300 bytes)]
[Segment count: 70]
[Reassembled TCP length: 101212]
[Reassembled TCP Data: 485454502f312e3120323030204f4b0d0a446174653a2057...]

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n
[Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]
Request Version: HTTP/1.1
Status Code: 200
Response Phrase: OK
Date: Wed, 25 Oct 2017 19:55:25 GMT\r\n
Server: Apache\r\n
Last-Modified: Tue, 15 Sep 2009 18:23:27 GMT\r\n
ETag: "78004-18a68-473a1e0e6e5c0"\r\n
Accept-Ranges: bytes\r\n
Content-Length: 100968\r\n
Connection: close\r\n
Content-Type: image/jpeg\r\n
\r\n
[HTTP response 1/1]
[Time since request: 0.241763394 seconds]
[Request in frame: 371]
File Data: 100968 bytes

JPEG File Interchange Format

16. The browser sent 4 GET requests. The first 2 were sent to `gaia.cs.umass.edu` (128.119.245.12) and the last 2 were sent to `caite.cs.umass.edu` (128.119.240.90).
17. The browser downloads the two images in parallel because the “Connection” header of the responses for both GET requests are set to “close” as indicated in green. If the connection were serial there would be only one response with “Connection: close”.

11. source port 51379, destination port 53
12. Destination: 128.200.192.202, yes it is the default local dns
13. Type A DNS query, has no answers
14. 3 answer, the host name and two CNAME answers
- 15.

Query:

```

11 5.021755      169.234.46.26      128.200.192.202      DNS      71      Standard query 0x0005 AAAA www.mit.edu
Frame 11: 71 bytes on wire (568 bits), 71 bytes captured (568 bits) on interface 0
Ethernet II, Src: HonHaiPr_f9:11:5f (c4:8e:8f:f9:11:5f), Dst: Cisco_d4:14:00 (00:19:07:d4:14:00)
Internet Protocol Version 4, Src: 169.234.46.26, Dst: 128.200.192.202
User Datagram Protocol, Src Port: 51379, Dst Port: 53
Domain Name System (query)

```

Response:

```

12 5.024218      128.200.192.202      169.234.46.26      DNS      545      Standard query response 0x0005 AAAA www.mit.edu CNAME
www.mit.edu.edgekey.net CNAME e9566.dscb.akamaiedge.net AAAA 2600:1406:3:387::255e AAAA 2600:1406:3:38b::255e NS n7dscb.akamaiedge.net NS
a0dscb.akamaiedge.net NS n6dscb.akamaiedge.net NS n5dscb.akamaiedge.net NS n0dscb.akamaiedge.net NS n3dscb.akamaiedge.net NS
n4dscb.akamaiedge.net NS n1dscb.akamaiedge.net NS n2dscb.akamaiedge.net A 88.221.81.192 A 96.17.70.193 A 96.17.70.194 A 173.223.52.132 A
23.67.56.215 A 96.17.70.188 A 165.254.16.93 A 96.17.70.194 AAAA 2600:1480:e800::c0
Frame 12: 545 bytes on wire (4360 bits), 545 bytes captured (4360 bits) on interface 0
Ethernet II, Src: Cisco_d4:14:00 (00:19:07:d4:14:00), Dst: HonHaiPr_f9:11:5f (c4:8e:8f:f9:11:5f)
Internet Protocol Version 4, Src: 128.200.192.202, Dst: 169.234.46.26
User Datagram Protocol, Src Port: 53, Dst Port: 51379
Domain Name System (response)

```

16. Destination: 128.200.192.202, yes is local DNS
17. Is a NS type Query, has one answer, the host name
18. Provides the name servers: asia1.akam.net, ns1-37.akam.net, use5.akam.net, eur5.akam.net, ns1-173.akam.net , asia2.akam.net , usw2.akam.net , use2.akam.net A

And their ip addresses: 23.74.25.64, 193.108.91.173, 2600:1401:2::ad, 95.101.36.64, 184.26.161.64, 96.7.49.64, 95.100.175.64, 193.108.91.37, 2.16.40.64, 2600:1403:a::40

- 19.

Query:

```

32 8.091044      169.234.46.26      128.200.192.202      DNS      67      Standard query 0x0003 NS mit.edu
Frame 32: 67 bytes on wire (536 bits), 67 bytes captured (536 bits) on interface 0
Ethernet II, Src: HonHaiPr_f9:11:5f (c4:8e:8f:f9:11:5f), Dst: Cisco_d4:14:00 (00:19:07:d4:14:00)
Internet Protocol Version 4, Src: 169.234.46.26, Dst: 128.200.192.202
User Datagram Protocol, Src Port: 62706, Dst Port: 53
Domain Name System (query)

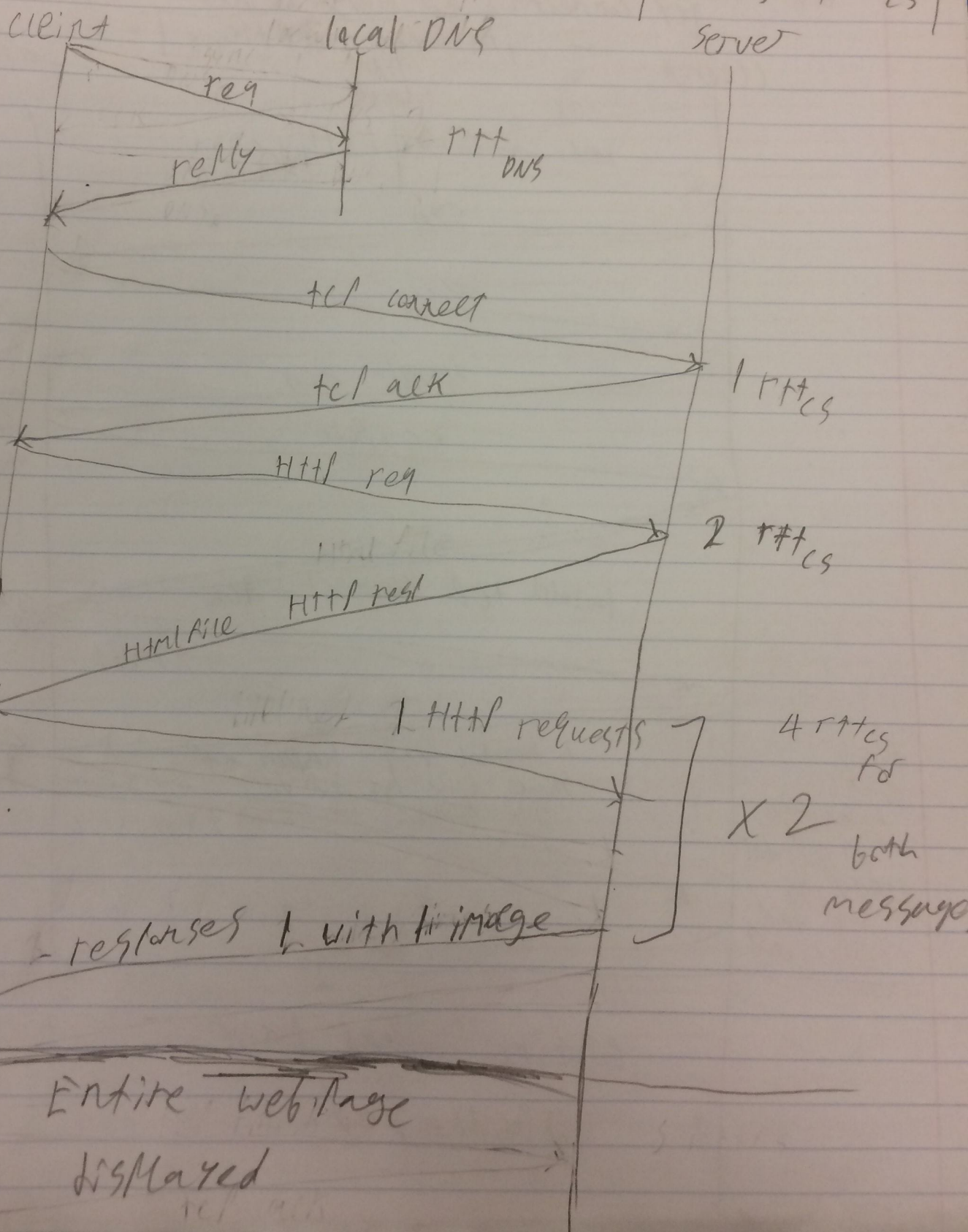
```

Response :

16 4.135319 128.200.192.202 169.234.46.26 DNS 446 Standard query response 0x0003 NS mit.edu NS
asia1.akam.net NS asia2.akam.net NS ns1-173.akam.net NS use2.akam.net NS eur5.akam.net NS ns1-37.akam.net NS usw2.akam.net NS use5.akam.net
A 23.74.25.64 A 96.7.49.64 A 2.16.40.64 A 184.26.161.64 A 95.100.175.64 A 95.101.36.64 A 193.108.91.37 A 193.108.91.173 AAAA
2600:1401:1::40 AAAA 2600:1401:2::25 AAAA 2600:1401:2::ad
Frame 16: 446 bytes on wire (3568 bits), 446 bytes captured (3568 bits) on interface 0
Ethernet II, Src: Cisco_d4:14:00 (00:19:07:d4:14:00), Dst: HonHaiPr_f9:11:5f (c4:8e:8f:f9:11:5f)
Internet Protocol Version 4, Src: 128.200.192.202, Dst: 169.234.46.26
User Datagram Protocol, Src Port: 53, Dst Port: 55316
Domain Name System (response)

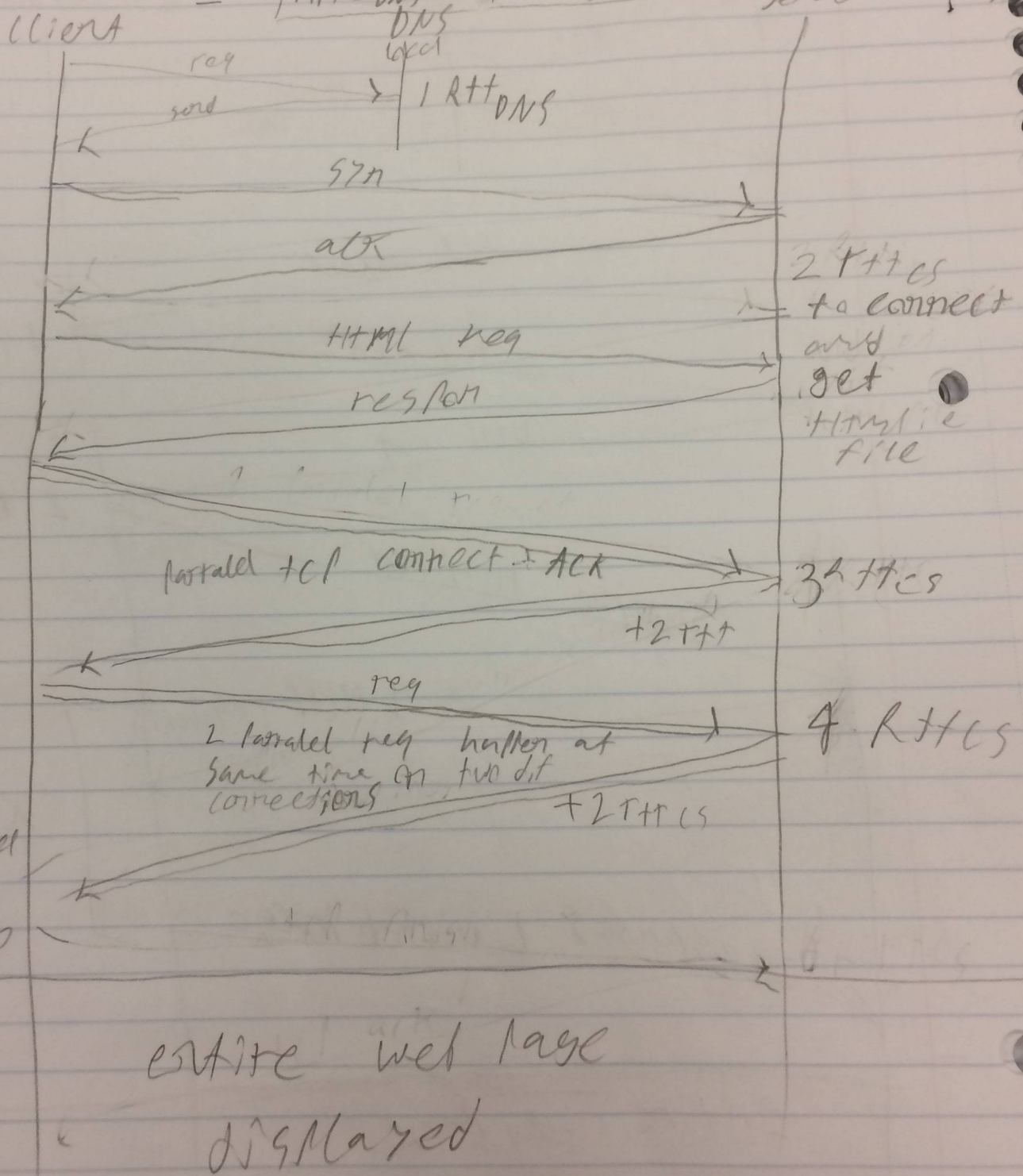
a) persistent no. pipelining =

$$rtt_{DNS} + 4 \cdot rtt_{cs}$$



B) non persistent with 2 parallel connections
 tcp connection for every object

$$= RTT_{DNS} + 4 RTT_{CS}$$



normal

parallel

does each connection in parallel need its own tcp connection?