

Lab 1

Step1:

1. What version of HTTP is the server running?

HTTP/1.1

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+ 7 5.046460 10.120.22.62 104.193.90.80 HTTP 967 GET /feed/ac4bd11373f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d521365691f7fa0b7c6269&s=08606984CE33B9CE4AEC049B03004093 HTTP/1.1\r\n
+ 83 5.232508 104.193.90.80 10.120.22.62 HTTP 1313 HTTP/1.1 200 OK (JPEG JFIF image)
+ 85 5.736825 10.120.22.62 104.193.90.80 HTTP 903 GET /favicon.ico HTTP/1.1
+ 86 5.789654 104.193.90.80 10.120.22.62 HTTP 532 HTTP/1.1 200 OK (image/x-icon)
+ 88 8.679235 10.120.22.62 104.193.90.80 HTTP 1016 GET /feed/ac4bd11373f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d521365691f7fa0b7c6269&s=08606984CE33B9CE4AEC049B03004093 HTTP/1.1 304 Not Modified
+ 89 8.727500 104.193.90.80 10.120.22.62 HTTP 526 HTTP/1.1 304 Not Modified

Frame 7: 967 bytes on wire (7736 bits), 967 bytes captured (7736 bits) on interface 0
Ethernet II, Src: Apple_05:d7:85 (a4:83:e7:05:d7:85), Dst: Cisco_9f:f3:3f (00:00:0c:9f:f3:3f)
  Destination: Cisco_9f:f3:3f (00:00:0c:9f:f3:3f)
    Address: Cisco_9f:f3:3f (00:00:0c:9f:f3:3f)
    ....0. .... = LG bit: Globally unique address (factory default)
    ....0. .... = IG bit: Individual address (unicast)
  Source: Apple_05:d7:85 (a4:83:e7:05:d7:85)
    Address: Apple_05:d7:85 (a4:83:e7:05:d7:85)
    ....0. .... = LG bit: Globally unique address (factory default)
    ....0. .... = IG bit: Individual address (unicast)
  Type: IPv4 (0x0800)
  Internet Protocol Version 4, Src: 10.120.22.62, Dst: 104.193.90.80
  Transmission Control Protocol, Src Port: 54320, Dst Port: 80, Seq: 1, Ack: 1, Len: 901
  Hypertext Transfer Protocol
    GET /feed/ac4bd11373f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d521365691f7fa0b7c6269&s=08606984CE33B9CE4AEC049B03004093 HTTP/1.1\r\n
    [Expert Info (Chat/Sequence): GET /feed/ac4bd11373f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d521365691f7fa0b7c6269&s=08606984CE33B9CE4AEC049B03004093 HTTP/1.1\r\n]
    Request Method: GET
    Request URI: /feed/ac4bd11373f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d521365691f7fa0b7c6269&s=08606984CE33B9CE4AEC049B03004093
    Request Version: HTTP/1.1
    Host: pics3.baidu.com\r\n
    Connection: keep-alive\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_6) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/77.0.3865.90 Safari/537.36\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\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-US,en;q=0.9\r\n
    [Truncated]Cookie: BAIDUID=145CF32FB3062E9B7808F2E903E73340:FG=1; BDUSS=XhxbTFpdDfLQm5kemxYYk1-CVRDMmF5NHfXclp5MEHyCUFT0G81emWYxN0LkRVFBQUBJCOAAAAAAAAAAAAAASD5k30IeXlq0TEBMj\r\n
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2. How is the beginning of the content sent by the server recognized by the client?

Because both the client and server are following the HTTP protocol, and there is a HTTP response header that contains various of information about this HTTP request, such as a header field called 'Content-Length', the client could parse this value, then better recognize its content.

3. How does the client know what type of content is returned?

The HTTP response header contains header field called Content-Type, which specifies the type of content that is returned.

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+ 140 8easemleed 1LP segments (35903 bytes): #10(1424), #11(1424), #13(1424), #15(1424), #16(1424), #18(1424), #20(1424), #21(1424), #23(1424), #25(1424), #26(1424), #28(1424), #30(1424), #32(1424), #34(1424), #36(1424), #38(1424), #40(1424), #42(1424), #44(1424), #46(1424), #48(1424), #50(1424), #52(1424), #54(1424), #56(1424), #58(1424), #60(1424), #62(1424), #64(1424), #66(1424), #68(1424), #70(1424), #72(1424), #74(1424), #76(1424), #78(1424), #80(1424), #82(1424), #84(1424), #86(1424), #88(1424), #90(1424), #92(1424), #94(1424), #96(1424), #98(1424), #100(1424), #102(1424), #104(1424), #106(1424), #108(1424), #110(1424), #112(1424), #114(1424), #116(1424), #118(1424), #120(1424), #122(1424), #124(1424), #126(1424), #128(1424), #130(1424), #132(1424), #134(1424), #136(1424), #138(1424), #140(1424), #142(1424), #144(1424), #146(1424), #150(1424), #154(1424), #158(1424), #162(1424), #166(1424), #170(1424), #174(1424), #178(1424), #182(1424), #186(1424), #190(1424), #194(1424), 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No.	Time	Source	Destination	Protocol	Length	Info
7	5.846468	10.120.22.62	104.193.98.80	HTTP	967	GET /feed/ac4bd11373f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d521365691f7fa0b7c6269&s=08060984CE33B9CE4AEC049B03004093 HTTP/1.1\r\n
83	5.232588	104.193.98.80	10.120.22.62	HTTP	1313	HTTP/1.1 200 OK (JPEG JFIF image)
85	5.736825	104.193.98.80	10.120.22.62	HTTP	903	GET /favicon.ico HTTP/1.1
86	5.789654	104.193.98.80	10.120.22.62	HTTP	532	HTTP/1.1 200 OK (image/x-icon)
88	8.679235	10.120.22.62	104.193.98.80	HTTP	1016	GET /feed/ac4bd11373f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d521365691f7fa0b7c6269&s=08060984CE33B9CE4AEC049B03004093 HTTP/1.1\r\n
89	8.727508	104.193.98.80	10.120.22.62	HTTP	526	HTTP/1.1 304 Not Modified
151	367.142664	10.120.22.62	23.63.195.47	HTTP	638	GET / HTTP/1.1
192	367.295358	10.120.22.62	23.63.195.47	HTTP	575	GET /themes/mit/assets/css/main.css?pvkha HTTP/1.1
193	367.298232	10.120.22.62	23.63.195.47	HTTP	596	GET /files/images/201910/MIT-Bayomi-SL.jpg HTTP/1.1
263	367.547596	10.120.22.62	23.63.195.47	HTTP	563	GET /themes/mit/assets/js/modernizr.js?vkha HTTP/1.1
276	367.774198	10.120.22.62	23.63.195.47	HTTP	648	GET /themes/mit/assets/fonts/MessinaSansWeb-Regular.woff2 HTTP/1.1
280	367.791024	10.120.22.62	23.63.195.47	HTTP	641	GET /themes/mit/assets/fonts/MessinaSansWeb-SemiBold.woff2 HTTP/1.1
283	367.791566	10.120.22.62	23.63.195.47	HTTP	558	GET /themes/mit/assets/js/main.js?vkha HTTP/1.1
316	367.846872	23.63.195.47	10.120.22.62	HTTP	1490	[TCP Previous segment not captured] Continuation
339	367.881135	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
341	367.881711	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
342	367.882711	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
344	367.883243	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
377	367.909168	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
378	367.910217	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
380	367.910817	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
382	367.911836	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
383	367.912939	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
385	367.913646	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
387	367.915191	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
388	367.915686	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
415	367.939488	23.63.195.47	10.120.22.62	HTTP	946	HTTP/1.1 200 OK (text/plain)
417	367.940849	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
419	367.941614	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
420	367.942548	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
422	367.943136	23.63.195.47	10.120.22.62	HTTP	1490	Continuation
424	367.945166	23.63.195.47	10.120.22.62	HTTP	1030	Continuation
1105	368.555267	10.120.22.62	23.63.195.47	HTTP	824	GET /spotlights-export/suggested-links/?format=json HTTP/1.1
1106	368.556321	10.120.22.62	23.63.195.47	HTTP	671	GET /themes/mit/assets/js/SpotlightsRecent.baf09381ff39be50fedb.js HTTP/1.1
1108	368.590801	23.63.195.47	10.120.22.62	HTTP	674	HTTP/1.1 200 OK (text/html)
1110	368.633088	10.120.22.62	23.63.195.47	HTTP	724	GET /themes/mit/assets/fonts/MessinaSansWeb-Bold.woff2 HTTP/1.1
1142	368.717873	23.63.195.47	10.120.22.62	HTTP	1042	HTTP/1.1 200 OK (text/plain)
1147	368.739764	23.63.195.47	10.120.22.62	HTTP	872	HTTP/1.1 200 OK (application/javascript)

Ethernet II, Src: Cisco_ea:c7:42 (84:c5:a4:ea:c7:42), Dst: Apple_05:d7:85 (a4:83:e7:05:d7:85)
 Destination: Apple_05:d7:85 (a4:83:e7:05:d7:85)
 Address: Apple_05:d7:85 (a4:83:e7:05:d7:85)

0000 65 65 65 70 20 61 6c 69 76 65 8d 8a 45 54 61 67 keep-alive ETag
 00e0 3a 20 61 64 38 31 65 65 36 39 36 33 30 30 63 30 ad81ee696300c

Response line (http.response.line), 40 bytes

Packets: 1271 - Displayed: 42 (3.3%) - Dropped: 0 (0.0%) - Ignored: 6 (0.5%) - Profile: Default

Step 3:

1. What is the format of a header line? Give a simple description that fits the headers you see?

1). For HTTP request header, the first line is like:

HTTP-Method + SP + Request Target(such as URL) + SP + HTTP-Version + '\r\n',

The rest lines are header fields as Key-Value pairs.

A key that represents a field of the request and its value is to the right side of the colon.

Every line ends up with '\r\n'.

2). For HTTP response header, the first line is in a format:

HTTP-Version + SP + Status-Code + '\r\n'.

The rest lines are also header fields as Key-Value pairs.

hypertext transfer protocol

```

> GET /feed/ac4bd11373f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d521365691f7fa0b7c6269&s=08060984CE33B9CE4AEC049B03004093 HTTP/1.1\r\n
Host: pics3.baidu.com\r\n
Connection: keep-alive\r\n
Upgrade-Insecure-Requests: 1\r\n
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_6) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/77.0.3865.90 Safari/537.36\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\r\n
Accept-Encoding: gzip, deflate\r\n
Accept-Language: en-US,en;q=0.9\r\n
[truncated]Cookie: BAIDUID=145CF32FB3062E9B7808F2E903E73340:FG=1; BDUSS=XhxbTFpdDfLQm5kemxYYkL-cVRDMmFSNHfXeLp5MENyCUFTOG81emNySHLxNDlkRVFBQUFJCQAAAAAA\r\n

```

Hypertext Transfer Protocol

```

> HTTP/1.1 200 OK\r\n
Server: JSP3/2.0.14\r\n
Date: Fri, 04 Oct 2019 18:16:25 GMT\r\n
Content-Type: image/jpeg\r\n
Content-Length: 63449\r\n
Connection: keep-alive\r\n
ETag: ad81ee696300c043c711cad0cb1601b3\r\n
Age: 278994\r\n
Accept-Ranges: bytes\r\n
Cache-Control: 259200\r\n
Tracecode: 22754150010194568970100120\r\n
Traceid: 22754150010194568970100120\r\n
Ohc-File-Size: 63449\r\n
Timing-Allow-Origin: *\r\n
Ohc-Cache-HIT: iad01-sys-jomo6.iad01.baidu.com [4], zhuzuncache92 [1], qdix170 [3]\r\n
\r\n

```

2. What headers are used to indicate the kind and length of content that is returned in a response?

Content-Type and Content-Length

```

> IAD assembled 108 segments (bytes) : #10(19424), #11(19424), #15(19424), #16(19424), #18(19424), #20(19424), #21(19424), #23(19424), #26(19424), #28(19424), #30(19424), #31(19424)\r\n\r\n
+ Hypertext Transfer Protocol
+ HTTP/1.1 200 OK\r\n
  Server: JSP3/2.0.14\r\n
  Date: Fri, 04 Oct 2019 18:16:25 GMT\r\n
  Content-Type: image/jpeg\r\n
  Content-Length: 63449\r\n
  Connection: keep-alive\r\n
  ETag: ad81ee69630bc043c711cad8cb1601b3\r\n
  Age: 278994\r\n
  Accept-Ranges: bytes\r\n
  Cache-Control: 259200\r\n
  Tracecode: 22754150010194568970100120\r\n
  Traceid: 22754150010194568970100120\r\n
  Otc-File-Size: 63449\r\n
  Timing-Allow-Origin: *\r\n
  Otc-Cache-HIT: iad01-sys-jom06.iad01.baidu.com [4], zhuzuncache92 [1], qdix170 [3]\r\n
  \r\n

+ Transmission Control Protocol, Src Port: 80, Dst Port: 54328, Seq: 64370, Ack: 2689, Len: 460
+ Hypertext Transfer Protocol
+ HTTP/1.1 304 Not Modified\r\n
  Server: JSP3/2.0.14\r\n
  Date: Fri, 04 Oct 2019 18:16:29 GMT\r\n
  Content-Type: image/jpeg\r\n
  Content-Length: 0\r\n
  Connection: keep-alive\r\n
  ETag: ad81ee69630bc043c711cad8cb1601b3\r\n
  Age: 278998\r\n
  Accept-Ranges: bytes\r\n
  Cache-Control: 259200\r\n
  Tracecode: 22754150010194568970100120\r\n
  Traceid: 22754150010194568970100120\r\n
  Otc-File-Size: 63449\r\n
  Timing-Allow-Origin: *\r\n
  Otc-Cache-HIT: iad01-sys-jom06.iad01.baidu.com [4], zhuzuncache92 [1], qdix170 [3]\r\n
  \r\n
```

Step4:

1. What is the name of the header the browser sends to let the server work out whether to send fresh content?

If-None-Match: ad81ee696300c043c711cad0cb1601b3\r\n

The value to the right of the colon is ETag of the picture that is cached, it marks the version of a resource. If the resource is unchanged since last visit, then the cached content should have an ETag the same as what server side has. For our case, there is no change, so the server does not send a fresh content, and the response is 304 Not Modified.

```

No.    Time           Source                Destination           Protocol  Length  Info
-----
7      8.1466460      104.193.90.80        104.193.90.80        HTTP      967     GET /feed/ac4bd1137f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d5123656917f7fa0b7c62696s=08606.
83  5.3235980      104.193.90.80        104.120.22.62        HTTP      1313    HTTP/1.1 200 OK (JPEG JFIF image)
85  5.736825      104.193.90.80        104.193.90.80        HTTP      903     GET /favicon.ico HTTP/1.1
86  5.789654      104.193.90.80        104.120.22.62        HTTP      532     HTTP/1.1 200 OK (image/x-icon)
88  8.679235      104.193.90.80        104.193.90.80        HTTP      1016    GET /feed/ac4bd1137f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d5123656917f7fa0b7c62696s=08606.
89  8.727590      104.193.90.80        104.120.22.62        HTTP      526     HTTP/1.1 304 Not Modified

Frame 88: 1016 bytes on wire (8128 bits), 1016 bytes captured (8128 bits) on interface 0
  Ethernet II, Src: Apple_05:d7:85 (a4:83:e7:05:d7:85), Dst: Cisco_9f:f3:3f (00:00:0c:9f:f3:3f)
    Destination: Cisco_9f:f3:3f (00:00:0c:9f:f3:3f)
      Address: Cisco_9f:f3:3f (00:00:0c:9f:f3:3f)
        .... .. = LG bit: Globally unique address (factory default)
        .... .. = IG bit: Individual address (unicast)
      Source: Apple_05:d7:85 (a4:83:e7:05:d7:85)
        Address: Apple_05:d7:85 (a4:83:e7:05:d7:85)
          .... .. = LG bit: Globally unique address (factory default)
          .... .. = IG bit: Individual address (unicast)
      Type: IPv4 (0x0800)
    Internet Protocol Version 4, Src: 10.120.22.62, Dst: 104.193.90.80
    Transmission Control Protocol, Src Port: 54320, Dst Port: 80, Seq: 1739, Ack: 64370, Len: 950
    Hypertext Transfer Protocol
      GET /feed/ac4bd1137f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d5123656917f7fa0b7c62696s=08606984CE43B9CE4AEC049803804093 HTTP/1.1\r\n
Host: p13.baidu.com\r\n
Connection: keep-alive\r\n
Upgrade-Insecure-Requests: 1\r\n
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_6) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/77.0.3865.90 Safari/537.36\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\r\n
Accept-Encoding: gzip, deflate\r\n
Accept-Language: en-US,en;q=0.9\r\n
[Truncated Cookie: BAIDUID=1845C3F7B3862E9B7808F2E903E73340;Pv=1; BDUSS=Xhxb7FdPqL0dm5kemyYK1-CVR0MF5NFHXicLpSMYniCUFTG05IemYSh1XNdLkrBUQFBJCQAAAAAAMAAAAAADSXJ8iXcIQTE0M=
If-None-Match: 816DE963083423113ad8c1601b31v\r\n
\r\n
[Full request URI: http://p13cs.baidu.com/feed/ac4bd1137f082023a16e4b082407de8a9641bfd.jpeg?token=52a3b841b6d5123656917f7fa0b7c62696s=08606984CE43B9CE4AEC049803804093]
[HTTP request 3/3]
[Prev request in frame: 85]
[Response in frame: 89]

```

2. Where exactly does the timestamp value carried by the header come from?

It should come from the 'Last-Modified' header field of the most recent download of the content, which is timestamp given by the server when the content last modified.