

Exercise 3:

Q1

The image shows two screenshots of the Wireshark network protocol analyzer. The top screenshot displays the packet list and packet details for an HTTP GET request. The bottom screenshot displays the packet details for the corresponding HTTP 200 OK response.

Top Screenshot: HTTP GET Request (Frame 10)

No.	Time	Source	Destination	Protocol	Length	Info
10	4.694850	192.168.1.102	128.119.245.12	HTTP	555	GET /etherreal-labs/lab2-1.html HTTP/1.1
12	4.718993	128.119.245.12	192.168.1.102	HTTP	439	HTTP/1.1 200 OK (text/html)
13	4.724332	192.168.1.102	128.119.245.12	HTTP	541	GET /favicon.ico HTTP/1.1
14	4.750366	128.119.245.12	192.168.1.102	HTTP	1395	HTTP/1.1 404 Not Found (text/html)

Packet Details for Frame 10:

- Frame 10: 555 bytes on wire (4440 bits), 555 bytes captured (4440 bits)
- Ethernet II, Src: Dell_4f:36:23 (00:08:74:4f:36:23), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
- Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12
- Transmission Control Protocol, Src Port: 4127, Dst Port: 80, Seq: 1, Ack: 1, Len: 501
- Hypertext Transfer Protocol**
 - GET /etherreal-labs/lab2-1.html HTTP/1.1\r\n
 - 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;*/\r\n
 - Accept-Language: en-us,en;q=0.50\r\n
 - Accept-Encoding: gzip, deflate, compress;q=0.9\r\n
 - Accept-Charset: ISO-8859-1, utf-8;q=0.66,*;q=0.66\r\n
 - Keep-Alive: 300\r\n
 - Connection: keep-alive\r\n
 - \r\n
 - [Full request URI: <http://gaia.cs.umass.edu/etherreal-labs/lab2-1.html>]
 - [HTTP request 1/2]
 - [Response in frame: 12]
 - [Next request in frame: 13]

Bottom Screenshot: HTTP 200 OK Response (Frame 12)

Packet Details for Frame 12:

- Frame 12: 439 bytes on wire (3512 bits), 439 bytes captured (3512 bits)
- Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Dell_4f:36:23 (00:08:74:4f:36:23)
- Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
- Transmission Control Protocol, Src Port: 80, Dst Port: 4127, Seq: 1, Ack: 502, Len: 385
- Hypertext Transfer Protocol**
 - HTTP/1.1 200 OK\r\n
 - Date: Tue, 23 Sep 2003 05:29:50 GMT\r\n
 - Server: Apache/2.0.40 (Red Hat Linux)\r\n
 - Last-Modified: Tue, 23 Sep 2003 05:29:00 GMT\r\n
 - ETag: "1bfed-49-79d5bf00"\r\n
 - Accept-Ranges: bytes\r\n
 - Content-Length: 73\r\n
 - Keep-Alive: timeout=10, max=100\r\n
 - Connection: Keep-Alive\r\n
 - Content-Type: text/html; charset=ISO-8859-1\r\n
 - \r\n
 - [HTTP response 1/2]
 - [Time since request: 0.024143000 seconds]
 - [Request in frame: 10]
 - [Next request in frame: 13]
 - [Next response in frame: 14]

The status code is 200 and the phrase is OK.

Q2

1) The HTML file that the browser is retrieving was last modified on Tue, 23 Sep 2003 05:29:00 GMT, it was indicated from the Last-Modified header.

2)Yes, there is a DATE header. The DATE header indicates the date and time when this response message is generated by the server and sent to the client. The Last-Modified header stores the latest date and time when HTML file was changed.

Q3

The connection is persistent because the Connection header is "Keep-Alive". The Connection general header controls whether or not the network connection stays open after the current transaction finishes. If the value sent is keep-alive, the connection is persistent and not closed, allowing for subsequent requests to the same server to be done.

Q4

According to content-length header,the length of the content being returned to the client is 73 bytes.

Q5

According to Content-Type header, the data contained inside the HTTP response packet is HTML text file.

Exercise 4

Q1

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http
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

> Frame 8: 555 bytes on wire (4440 bits), 555 bytes captured (4440 bits)
> Ethernet II, Src: Dell_4f:36:23 (00:08:74:4f:36:23), Dst: Linksys_6d:a:f:73 (00:06:25:da:f:73)
> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 4247, Dst Port: 80, Seq: 1, Ack: 1, Len: 501
> Hypertext Transfer Protocol
  GET /etherreal-labs/lab2-2.html HTTP/1.1\r\n
    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=0.50\r\n
    Accept-Encoding: gzip, deflate, compress;q=0.9\r\n
    Accept-Charset: ISO-8859-1, utf-8;q=0.66, */q=0.66\r\n
    Keep-Alive: 300\r\n
    Connection: keep-alive\r\n
  \r\n
  [Full request URI: http://gaia.cs.umass.edu/etherreal-labs/lab2-2.html]
  [HTTP request 1/2]
  [Response in frame: 10]
  [Next request in frame: 14]
```

No, there is not a line called “IF-MODIFIED-SINCE”.

Q2

```
http-etherreal-trace-2
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http
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

> Frame 10: 739 bytes on wire (5912 bits), 739 bytes captured (5912 bits)
> Ethernet II, Src: Linksys_6d:a:f:73 (00:06:25:da:f:73), Dst: Dell_4f:36:23 (00:08:74:4f: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: 1, Ack: 502, Len: 685
> Hypertext Transfer Protocol
  HTTP/1.1 200 OK\r\n
    Date: Tue, 23 Sep 2003 05:35:50 GMT\r\n
    Server: Apache/2.0.40 (Red Hat Linux)\r\n
    Last-Modified: Tue, 23 Sep 2003 05:35:00 GMT\r\n
    ETag: "1bfef-173-8f4ae900"\r\n
    Accept-Ranges: bytes\r\n
    Content-Length: 371\r\n
    Keep-Alive: timeout=10, max=100\r\n
    Connection: Keep-Alive\r\n
    Content-Type: text/html; charset=ISO-8859-1\r\n
  \r\n
  [HTTP response 1/2]
  [Time since request: 0.026634000 seconds]
  [Request in frame: 8]
  [Next request in frame: 14]
  [Next response in frame: 15]
```

Yes, the response message indicates the last time that the requested file was modified.

Q3

No.	Time	Source	Destination	Protocol	Length	Info
8	2.331268	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-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 /ethereal-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

> Frame 14: 668 bytes on wire (5344 bits), 668 bytes captured (5344 bits)
> Ethernet II, Src: Dell_4f:36:23 (00:08:74:4f:36:23), Dst: Linksys_G_d:a:f:73 (00:06:25:da:af:73)
> Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12
> Transmission Control Protocol, Src Port: 4247, Dst Port: 80, Seq: 502, Ack: 686, Len: 614
▼ **Hypertext Transfer Protocol**
 > GET /ethereal-labs/lab2-2.html HTTP/1.1\r\nHost: gaia.cs.umass.edu\r\nUser-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.0.2) Gecko/20021120 Netscape/7.01\r\nAccept: 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\nAccept-Language: en-us,en;q=0.50\r\nAccept-Encoding: gzip, deflate, compress;q=0.9\r\nAccept-Charset: ISO-8859-1, utf-8;q=0.66,*;q=0.66\r\nKeep-Alive: 300\r\nConnection: keep-alive\r\nIf-Modified-Since: Tue, 23 Sep 2003 05:35:00 GMT\r\nIf-None-Match: "1bfef-173-8f4ae900"\r\nCache-Control: max-age=0\r\n\r\n[Full request URI: http://gaia.cs.umass.edu/ethereal-labs/lab2-2.html]
[HTTP request 2/2]
[\[Prev request in frame: 8\]](#)

Yes, there is a “If-Modified-Since” header and a “If-None-Match” header. The information in “If-Modified-Since” header indicates the date and time of the modification of the object being requested, the value in this line is stored on a proxy server when a previous request is sent to a server through this proxy server.

The “If-None-Match” header contains an Etag. The ETag HTTP response header is an identifier for a specific version of a resource.

Q4

No.	Time	Source	Destination	Protocol	Length	Info
8	2.331268	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-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 /ethereal-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

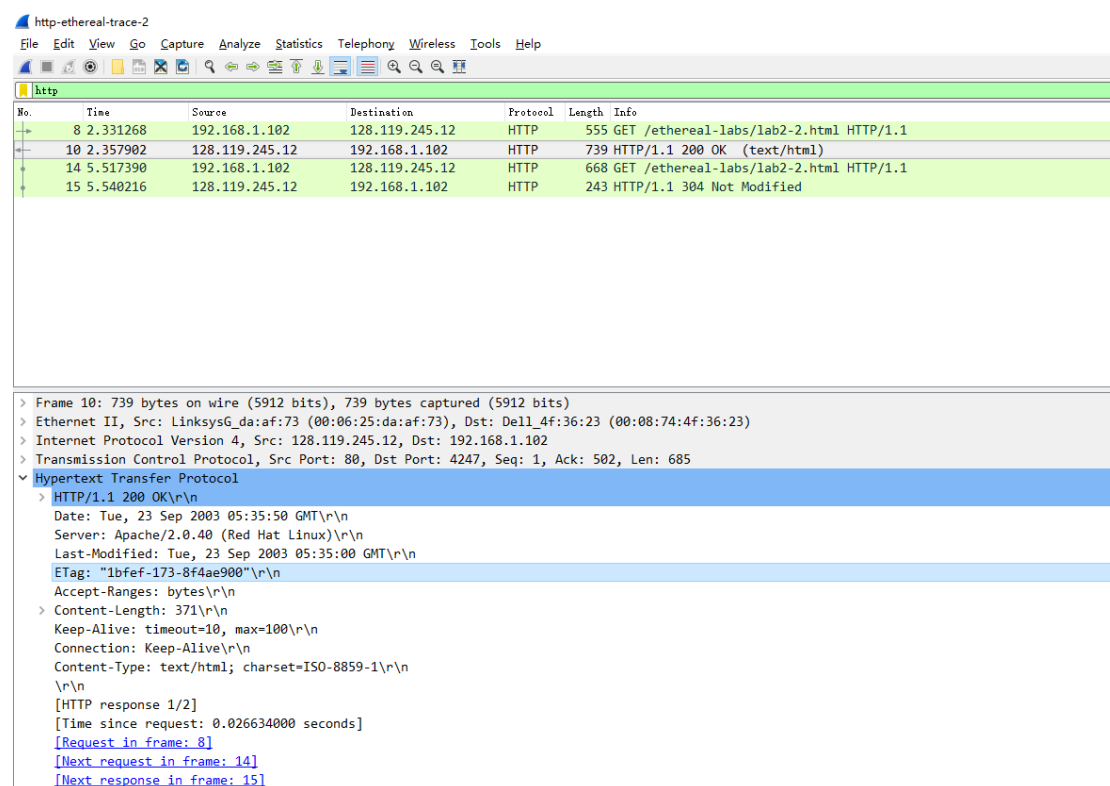
> Frame 15: 243 bytes on wire (1944 bits), 243 bytes captured (1944 bits)
> Ethernet II, Src: Linksys_G_d:a:f:73 (00:06:25:da:af:73), Dst: Dell_4f:36:23 (00:08:74:4f:36:23)
> Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.102
> Transmission Control Protocol, Src Port: 80, Dst Port: 4247, Seq: 686, Ack: 1116, Len: 189
▼ **Hypertext Transfer Protocol**
 > HTTP/1.1 304 Not Modified\r\nDate: Tue, 23 Sep 2003 05:35:53 GMT\r\nServer: Apache/2.0.40 (Red Hat Linux)\r\nConnection: Keep-Alive\r\nKeep-Alive: timeout=10, max=99\r\nETag: "1bfef-173-8f4ae900"\r\n\r\n[HTTP response 2/2]
[Time since request: 0.022826000 seconds]
[\[Prev request in frame: 8\]](#)
[\[Prev response in frame: 10\]](#)
[\[Request in frame: 14\]](#)

The status code is 304 and phrase is Not Modified. The server did not return the content of the file, because “304 Not Modified” indicates that the file being requested has not been changed since Tue, 23 Sep 2003 05:35:00 GMT, and that means the version of the file stored on the proxy server is able to be sent to the client without any loss of modifications. So there is no need for the server to send the whole file again, which may cause waste of bandwidth.

Q5

The value of the Etag field in the 2nd response message is 1bfef-173-8f4ae900. Etags are used to identify a specific version of a resource and similar to fingerprints and might also be used for tracking purposes by some servers.

It has not changed since the 1st response message was received.



http-ethereal-trace-2

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No.	Time	Source	Destination	Protocol	Length	Info
8	2.331268	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-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 /ethereal-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

> Frame 10: 739 bytes on wire (5912 bits), 739 bytes captured (5912 bits)
> Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Dell_4f:36:23 (00:08:74:4f: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: 1, Ack: 502, Len: 685
v Hypertext Transfer Protocol
 > HTTP/1.1 200 OK\r\n
 Date: Tue, 23 Sep 2003 05:35:50 GMT\r\n
 Server: Apache/2.0.40 (Red Hat Linux)\r\n
 Last-Modified: Tue, 23 Sep 2003 05:35:00 GMT\r\n
 ETag: "1bfef-173-8f4ae900"\r\n
 Accept-Ranges: bytes\r\n
 > Content-Length: 371\r\n
 Keep-Alive: timeout=10, max=100\r\n
 Connection: Keep-Alive\r\n
 Content-Type: text/html; charset=ISO-8859-1\r\n
 \r\n [HTTP response 1/2]
 [Time since request: 0.026634000 seconds]
 [Request in frame: 8]
 [Next request in frame: 14]
 [Next response in frame: 15]

http-ethereal-trace-2

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

http

No.	Time	Source	Destination	Protocol	Length	Info
8	2.331268	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-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 /ethereal-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

> Frame 15: 243 bytes on wire (1944 bits), 243 bytes captured (1944 bits)

> Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Dell_4f:36:23 (00:08:74:4f: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

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: 0.022826000 seconds]

[\[Prev request in frame: 8\]](#)

[\[Prev response in frame: 10\]](#)

[\[Request in frame: 14\]](#)

Exercise 5

The code is included in the tar file.