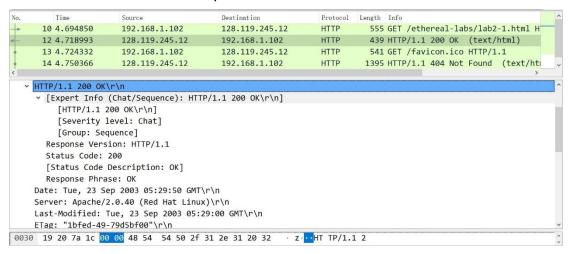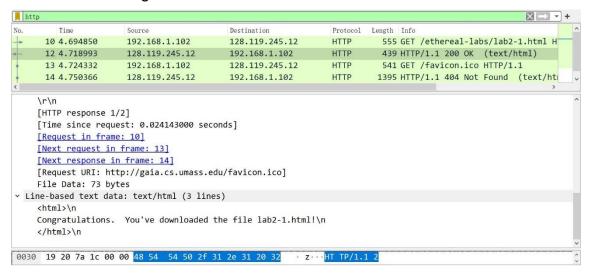Exercise 3

1. The status code is 200. The returned phrase is "OK".
2. It was last modified on 23 September 2003.

No.	Time	Source	Destination	Protocol	Length	Info
10	4.694850	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-labs/lab2-1.html H
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/ht

```
v HTTP/1.1 200 OK\r\n
    v [Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]
        [HTTP/1.1 200 OK\r\n]
        [Severity level: Chat]
        [Group: Sequence]
    Response Version: HTTP/1.1
    Status Code: 200
    [Status Code Description: OK]
    Response Phrase: OK
  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
```

```
0030  19 20 7a 1c 00 00 48 54  54 50 2f 31 2e 31 20 32    · z··HT TP/1.1 2
```
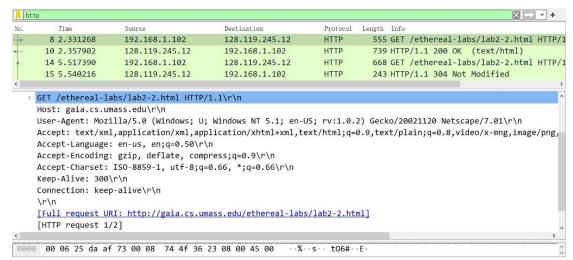
3. Because the request and response version is 1.1, the connection is persistent.
4. 73 bytes are returned.
5. It is a line: Congratulations. You've download the file lab2-1.html!

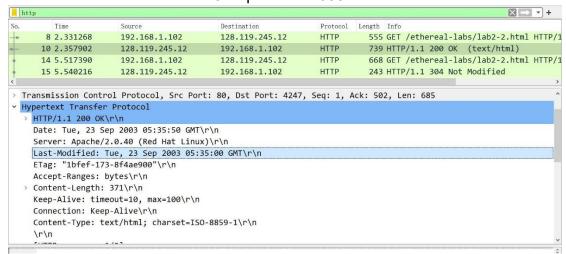| http						
No.	Time	Source	Destination	Protocol	Length	Info
10	4.694850	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-labs/lab2-1.html H
12	4.718993	128.119.245.12	192.168.1.102	HTTP	439	HTTP/1.1 200 OK (text/html)
13	4.724332	192.168.1.102	128.119.245.12	HTTP	541	GET /favicon.ico HTTP/1.1
14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

```
  \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]
  [Request URI: http://gaia.cs.umass.edu/favicon.ico]
  File Data: 73 bytes
v Line-based text data: text/html (3 lines)
    <html>\n
    Congratulations.  You've downloaded the file lab2-1.html!\n
    </html>\n
```

```
0030  19 20 7a 1c 00 00 48 54  54 50 2f 31 2e 31 20 32    · z···HT TP/1.1 2
```

Exercise 4

1. No. I did not find "IF-MODIFIED-SINCE".

```
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
     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
     15 5.540216    128.119.245.12    192.168.1.102     HTTP      243 HTTP/1.1 304 Not Modified
```
```
> GET /ethereal-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,
  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/ethereal-labs/lab2-2.html]
  [HTTP request 1/2]
```
```
0000  00 06 25 da af 73 00 08  74 4f 36 23 08 00 45 00     ··%··s·· tO6#··E·
```

2. Yes. The last modified date 23 September 2003.


```
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
     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
     15 5.540216    128.119.245.12    192.168.1.102     HTTP      243 HTTP/1.1 304 Not Modified
```
```
> 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
```

3. Yes. "IF-MODIFIED-SINCE" line contains the last modified date. "IF-NONE-MATCH" line contains an Etag from first response.


```
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
     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
     15 5.540216    128.119.245.12    192.168.1.102     HTTP      243 HTTP/1.1 304 Not Modified
```
```
  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,
  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
  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/ethereal-labs/lab2-2.html]
```

4. The status code is 304. The returned phrase is "Not Modified". It did not return the contents of the file back, because the response said nothing has changed, which means there is no need to send the file back.

```
http                                                                    X → ▾ +
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
    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
    15  5.540216     128.119.245.12   192.168.1.102    HTTP      243  HTTP/1.1 304 Not Modified

> 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]
```

5. The value of the Etag is "1bfef-173-8f4ae900". This is used to check is the file changed or not. If it hasn't change, the response Etag should be the same as request Etag, which means the response only need to reply nothing has changed and do not need to send the file again, which saves time and data.

Exercise 5

This is a screen shot of terminal running client. There are 5 responses that are time out. The maximum RTT is 192 ms, the minimum RTT is 5 ms, and average RTT is 98 ms.


```
TERMINAL    PORTS    PROBLEMS    OUTPUT    DEBUG CONSOLE

z5305298@corelli:~/3331/lab/week02$ python3 PingClient.py 127.0.0.1 2000
ping to 127.0.0.1, seq = 1, rtt = 18.46933364868164 ms
ping to 127.0.0.1, seq = 2, rtt = 165.3909683227539 ms
ping to 127.0.0.1, seq = 3, rtt = time out
ping to 127.0.0.1, seq = 4, rtt = time out
ping to 127.0.0.1, seq = 5, rtt = 5.402326583862305 ms
ping to 127.0.0.1, seq = 6, rtt = 52.60491371154785 ms
ping to 127.0.0.1, seq = 7, rtt = 148.64158630371094 ms
ping to 127.0.0.1, seq = 8, rtt = 6.486415863037109 ms
ping to 127.0.0.1, seq = 9, rtt = 192.55304336547852 ms
ping to 127.0.0.1, seq = 10, rtt = 147.52554893493652 ms
ping to 127.0.0.1, seq = 11, rtt = time out
ping to 127.0.0.1, seq = 12, rtt = 108.80589485168457 ms
ping to 127.0.0.1, seq = 13, rtt = 138.685941696167 ms
ping to 127.0.0.1, seq = 14, rtt = time out
ping to 127.0.0.1, seq = 15, rtt = time out
maximum RTT is 192.55304336547852 ms, minimum RTT is 5.402326583862305 ms, average RTT is 98.45659732818604 ms
z5305298@corelli:~/3331/lab/week02$ ▮
```