

Lab Exercise 2: HTTP & Socket Programming

Exercise 3: Using Wireshark to understand basic HTTP request/response messages

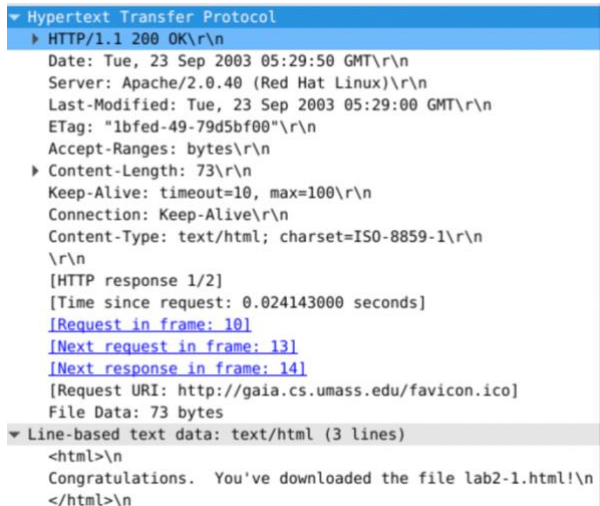
Question 1: What is the status code and phrase returned from the server to the client browser?

The status code: 200

Phrase: OK

Question 2: When was the HTML file that the browser is retrieving last modified at the server? Does the response also contain a DATE header? How are these two fields different?

Last-Modified: Tue, 23 Sep 2003 05:29:00 GMT\r\n



The image shows a Wireshark packet capture of an HTTP response. The packet list on the left shows a packet of type 'Hypertext Transfer Protocol' with status '200 OK'. The packet details pane on the right shows the following fields: 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, [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. The packet bytes pane at the bottom shows the HTML content: <html>\r\n, Congratulations. You've downloaded the file lab2-1.html!\r\n, </html>\r\n.

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

The response does indeed contain a DATE header, which is that indicates the time when a packet is generated on the source server which can be viewed how long the packet has been cached.

Last-modified is that indicates the time when the resource was last modified on the source server.

Question 3: Is the connection established between the browser and the server persistent or non-persistent? How can you infer this?

Keep-Alive: timeout=10, max=100\r\n

The connection between the browser and the server is persistent, it can be inferred by checking the request and response connection header is Keep-Alive.

Question 4: How many bytes of content are being returned to the browser?

File Data: 73 bytes

Question 5: What is the data contained inside the HTTP response packet?

<html>

Congratulations. You've downloaded the file lab2-1.html!

</html>

Exercise 4: Using Wireshark to understand the HTTP CONDITIONAL GET/response interaction

Question 1: Inspect the contents of the first HTTP GET request from the browser to the server. Do you see an “IF-MODIFIED-SINCE” line in the HTTP GET?

No.

```
Hypertext Transfer Protocol
  GET /ethereal-labs/lab2-2.html HTTP/1.1\r\n
  [Expert Info (Chat/Sequence): GET /ethereal-labs/lab2-2.html HTTP/1.1\r\n]
    Request Method: GET
    Request URI: /ethereal-labs/lab2-2.html
    Request Version: HTTP/1.1
    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/ethereal-labs/lab2-2.html]
    [HTTP request 1/2]
    [Response in frame: 10]
    [Next request in frame: 14]
```

Question 2: Does the response indicate the last time that the requested file was modified?

Yes. Last-Modified: Tue, 23 Sep 2003 05:35:00 GMT\r\n

```
Hypertext Transfer Protocol
  HTTP/1.1 200 OK\r\n
  [Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]
    Response Version: HTTP/1.1
    Status Code: 200
    [Status Code Description: OK]
    Response Phrase: OK
    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]
    [Request URI: http://gaia.cs.umass.edu/ethereal-labs/lab2-2.html]
    File Data: 371 bytes
```

Question 3: Now inspect the contents of the second HTTP GET request from the browser to the server. Do you see an “IF-MODIFIED-SINCE:” and “IF-NONE-MATCH” lines in the HTTP GET? If so, what information is contained in these header lines?

If-Modified-Since: Tue, 23 Sep 2003 05:35:00 GMT\r\n

If-None-Match: "1bfef-173-8f4ae900"\r\n

If-Modified-Since includes the date, daytime, time, and time zone. If-None-Match contains Etag value.

```
Hypertext Transfer Protocol
  GET /ethereal-labs/lab2-2.html HTTP/1.1\r\n
  [Expert Info (Chat/Sequence): GET /ethereal-labs/lab2-2.html HTTP/1.1\r\n]
    Request Method: GET
    Request URI: /ethereal-labs/lab2-2.html
    Request Version: HTTP/1.1
    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
    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]
    [HTTP request 2/2]
    [Prev request in frame: 8]
    [Response in frame: 15]
```

Question 4: What is the HTTP status code and phrase returned from the server in response to this second HTTP GET? Did the server explicitly return the contents of the file? Explain.

Status code: 304

Phrase: Not modified

This indicates to the browser that the server has not modified the page after “If-Modified-Since” time in the request. The “If-Modified-Since” value and “If-None-Match” value are the same with the value return from the server. Therefore, the phrase is Not Modified.

```
▼ Hypertext Transfer Protocol
  ▼ HTTP/1.1 304 Not Modified\r\n
    ▶ [Expert Info (Chat/Sequence): HTTP/1.1 304 Not Modified\r\n]
      Response Version: HTTP/1.1
      Status Code: 304
      [Status Code Description: Not Modified]
      Response Phrase: Not Modified
      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]
      [Request URI: http://gaia.cs.umass.edu/ethereal-labs/lab2-2.html]
```

Question 5: What is the value of the Etag field in the 2nd response message and how it is used? Has this value changed since the 1st response message was received?

Etag Value: 1bfef-173-8f4ae900

The Etag value has not changed since the 1st response showing that the content has not been modified.

Exercise 5: Ping Client Sample Output

<p>PingClient Output 1</p> <pre> ping to 127.0.0.1, seq = 0, rtt = 92 ms ping to 127.0.0.1, seq = 1, rtt = 188 ms ping to 127.0.0.1, seq = 2, rtt = 108 ms ping to 127.0.0.1, seq = 3, rtt = 131 ms ping to 127.0.0.1, seq = 4, rtt = 13 ms ping to 127.0.0.1, seq = 5, rtt = 181 ms ping to 127.0.0.1, seq = 6, Time Out ping to 127.0.0.1, seq = 7, rtt = 60 ms ping to 127.0.0.1, seq = 8, Time Out ping to 127.0.0.1, seq = 9, Time Out ping to 127.0.0.1, seq = 10, rtt = 197 ms ping to 127.0.0.1, seq = 11, Time Out ping to 127.0.0.1, seq = 12, Time Out ping to 127.0.0.1, seq = 13, rtt = 48 ms ping to 127.0.0.1, seq = 14, rtt = 71 ms --- ping localhost statistics --- 15 packets transmitted, 10 packets received, 33.0% packet loss round trip min/avg/max = 13.0/108.0/197.0 ms </pre>	<p>PingServer Output 1</p> <pre> Received from 127.0.0.1: PING 0 1646142983144 Reply sent. Received from 127.0.0.1: PING 1 1646142983242 Reply sent. Received from 127.0.0.1: PING 2 1646142983431 Reply sent. Received from 127.0.0.1: PING 3 1646142983539 Reply sent. Received from 127.0.0.1: PING 4 1646142983670 Reply sent. Received from 127.0.0.1: PING 5 1646142983683 Reply sent. Received from 127.0.0.1: PING 6 1646142983864 Reply not sent. Received from 127.0.0.1: PING 7 1646142984475 Reply sent. Received from 127.0.0.1: PING 8 1646142984535 Reply not sent. Received from 127.0.0.1: PING 9 1646142985136 Reply not sent. Received from 127.0.0.1: PING 10 1646142985738 Reply sent. Received from 127.0.0.1: PING 11 1646142985936 Reply not sent. Received from 127.0.0.1: PING 12 1646142986539 Reply not sent. Received from 127.0.0.1: PING 13 1646142987140 Reply sent. Received from 127.0.0.1: PING 14 1646142987188 Reply sent. </pre>
<p>PingClient Output 2</p> <pre> ping to 127.0.0.1, seq = 0, Time Out ping to 127.0.0.1, seq = 1, rtt = 124 ms ping to 127.0.0.1, seq = 2, rtt = 184 ms ping to 127.0.0.1, seq = 3, Time Out ping to 127.0.0.1, seq = 4, rtt = 51 ms ping to 127.0.0.1, seq = 5, Time Out ping to 127.0.0.1, seq = 6, Time Out ping to 127.0.0.1, seq = 7, rtt = 35 ms ping to 127.0.0.1, seq = 8, rtt = 124 ms ping to 127.0.0.1, seq = 9, rtt = 205 ms ping to 127.0.0.1, seq = 10, rtt = 119 ms ping to 127.0.0.1, seq = 11, Time Out ping to 127.0.0.1, seq = 12, rtt = 141 ms ping to 127.0.0.1, seq = 13, rtt = 73 ms ping to 127.0.0.1, seq = 14, rtt = 154 ms --- ping localhost statistics --- 15 packets transmitted, 10 packets received, 33.0% packet loss round trip min/avg/max = 35.0/121.0/205.0 ms </pre>	<p>PingServer Output 2</p> <pre> Received from 127.0.0.1: PING 0 1646143325532 Reply not sent. Received from 127.0.0.1: PING 1 1646143326154 Reply sent. Received from 127.0.0.1: PING 2 1646143326290 Reply sent. Received from 127.0.0.1: PING 3 1646143326475 Reply not sent. Received from 127.0.0.1: PING 4 1646143327076 Reply sent. Received from 127.0.0.1: PING 5 1646143327127 Reply not sent. Received from 127.0.0.1: PING 6 1646143327731 Reply not sent. Received from 127.0.0.1: PING 7 1646143328333 Reply sent. Received from 127.0.0.1: PING 8 1646143328368 Reply sent. Received from 127.0.0.1: PING 9 1646143328493 Reply sent. Received from 127.0.0.1: PING 10 1646143328699 Reply sent. Received from 127.0.0.1: PING 11 1646143328818 Reply not sent. Received from 127.0.0.1: PING 12 1646143329420 Reply sent. Received from 127.0.0.1: PING 13 1646143329561 Reply sent. Received from 127.0.0.1: PING 14 1646143329634 Reply sent. </pre>