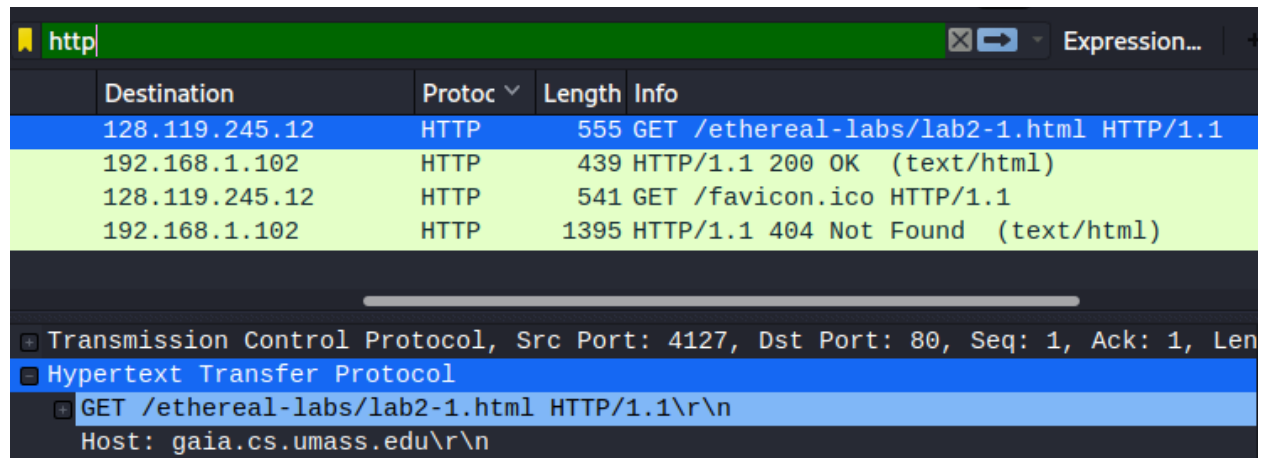


1. The Basic HTTP GET/response interaction

1. Is your browser running HTTP version 1.0 or 1.1? What version of HTTP is the server running?



The image shows a Wireshark packet capture of an HTTP interaction. The top pane displays a list of packets with columns for Destination, Protocol, Length, and Info. The bottom pane shows the details of the selected packet (Frame 12), which is an HTTP GET request.

Destination	Protoc	Length	Info
128.119.245.12	HTTP	555	GET /ethereal-labs/lab2-1.html HTTP/1.1
192.168.1.102	HTTP	439	HTTP/1.1 200 OK (text/html)
128.119.245.12	HTTP	541	GET /favicon.ico HTTP/1.1
192.168.1.102	HTTP	1395	HTTP/1.1 404 Not Found (text/html)

Transmission Control Protocol, Src Port: 4127, Dst Port: 80, Seq: 1, Ack: 1, Len: 555

Hypertext Transfer Protocol

GET /ethereal-labs/lab2-1.html HTTP/1.1\r\nHost: gaia.cs.umass.edu\r\n

Both my browser and server are running HTTP 1.1

2. What languages (if any) does your browser indicate that it can accept to the server?

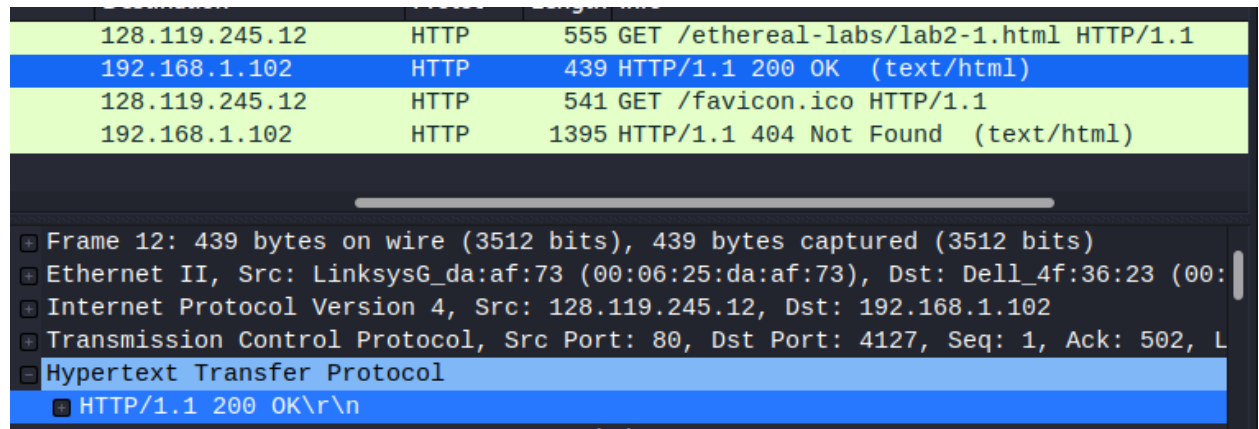
```
Accept-Language: en-us, en;q=0.50\r\n
```

3. What is the IP address of your computer? Of the gaia.cs.umass.edu server?

```
Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12
```

My IP address is 192.168.1.102, Gaia's server IP address is 128.119.245.12

4. What is the status code returned from the server to your browser?



The image shows a Wireshark packet capture of an HTTP interaction. The top pane displays a list of packets with columns for Destination, Protocol, Length, and Info. The bottom pane shows the details of the selected packet (Frame 12), which is an HTTP GET request.

Destination	Protocol	Length	Info
128.119.245.12	HTTP	555	GET /ethereal-labs/lab2-1.html HTTP/1.1
192.168.1.102	HTTP	439	HTTP/1.1 200 OK (text/html)
128.119.245.12	HTTP	541	GET /favicon.ico HTTP/1.1
192.168.1.102	HTTP	1395	HTTP/1.1 404 Not Found (text/html)

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 (00:01:80:c0:00:00)

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: 439

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

Return status: 200

5. When was the HTML file that you are retrieving last modified at the server?

```
Server: Apache/2.0.40 (Red Hat Linux)\r\nLast-Modified: Tue, 23 Sep 2003 05:29:00 GMT\r\nETag: "1bfed_40_79d5bf00"\r\n
```

2003/9/23 Tuesday 05:29:00 GMT

6. How many bytes of content are being returned to your browser?

```
Accept-Ranges: bytes\r\n
Content-Length: 73\r\n\r\n
Keep-Alive: timeout=10, max=1000\r\n
```

73 bytes

7. By inspecting the raw data in the packet content window, do you see any headers within the data that are not displayed in the packet-listing window? If so, name one.

No, I don't see any.

2. The HTTP CONDITIONAL GET/response interaction

8. Inspect the contents of the first HTTP GET request from your browser to the server. Do you see an "IF-MODIFIED-SINCE" line in the HTTP GET?

The image shows a Wireshark packet capture of an HTTP GET request. The packet list on the left shows a table of captured packets:

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	200 OK
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	200 OK

The packet details pane on the right shows the selected packet (No. 8) with the following structure:

- Transmission Control Protocol, Src Port: 4247, Dst Port: 80, Seq: 1, Ack: 1, Len: 555
- Hypertext Transfer Protocol
 - GET /ethereal-labs/lab2-2.html HTTP/1.1
 - Host: gaia.cs.umass.edu
 - User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.0.2) Gecko/20060208 Firefox/1.0.2
 - Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8,image/png;q=0.8
 - Accept-Language: en-us,en;q=0.5

The packet bytes pane at the bottom shows the raw data of the packet, with the first few bytes highlighted in blue.

No, I didn't see any if modified since line.

9. Inspect the contents of the server response. Did the server explicitly return the contents of the file? How can you tell?

```

Line-based text data: text/html (10 lines)
\n
<html>\n
\n
Congratulations again! Now you've downloaded the file lab2-2.html. <br>\n
This file's last modification date will not change. <p>\n
Thus if you download this multiple times on your browser, a complete copy <br>
will only be sent once by the server due to the inclusion of the IN-MODIFIED-S
field in your browser's HTTP GET request to the server.\n
\n
</html>\n

```

Yes, from the response package, in the line-based text data, there's 10 lines of html text.

10. Now inspect the contents of the second HTTP GET request from your browser to the server. Do you see an "IF-MODIFIED-SINCE:" line in the HTTP GET? If so, what information follows the "IF-MODIFIED-SINCE:" header?

No.	Time	Source	Destination	Protoc	Length	Info
8	2.331268	192.168.1.102	128.119.245.12	HTTP	555	GET /
10	2.357902	128.119.245.12	192.168.1.102	HTTP	739	HTTP/
14	5.517390	192.168.1.102	128.119.245.12	HTTP	668	GET /
15	5.540216	128.119.245.12	192.168.1.102	HTTP	243	HTTP/


```

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

```

Yes, it follows "Tue, 23 Sep 2003 05:35:00 GMT\r\n"

11. 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.

14	5.517390	192.168.1.102	128.119.245.12	HTTP	668	GET
15	5.540216	128.119.245.12	192.168.1.102	HTTP	243	HTTP

Transmission Control Protocol, Src Port: 80, Dst Port: 4247, Seq: 686, Ack: 1116

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]

The file has not been modified. The text of the file is not returned in the HTTP message.

3. Retrieving Long Documents

12. How many HTTP GET request messages did your browser send? Which packet number in the trace contains the GET message for the Bill or Rights?

No.	Time	Source	Destination	Protocol	Length	Info
8	4.623732	192.168.1.102	128.119.245.12	HTTP	555	GET
9	4.652711	128.119.245.12	192.168.1.102	TCP	60	80
10	4.657569	128.119.245.12	192.168.1.102	TCP	1514	80
11	4.658792	128.119.245.12	192.168.1.102	TCP	1514	80
12	4.658828	192.168.1.102	128.119.245.12	TCP	54	427

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: LinksysG_da:af:73 (00:06:23:af:73:00)

Internet Protocol Version 4, Src: 192.168.1.102, Dst: 128.119.245.12

Transmission Control Protocol, Src Port: 4272, Dst Port: 80, Seq: 1, Ack: 1, Len: 50

Hypertext Transfer Protocol

GET /ethereal-labs/lab2-3.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/20021107\r\n

Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8\r\n

Accept-Language: en-us,en;q=0.5\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

8

13. Which packet number in the trace contains the status code and phrase associated with the response to the HTTP GET request?

No.	Time	Source	Destination	Protocol	Length	Info
8	4.623732	192.168.1.102	128.119.245.12	HTTP	555	GET /ethereal-labs/lab2-3.html HTTP/1.1
9	4.652711	128.119.245.12	192.168.1.102	TCP	60	80 → 4272 [ACK] Seq=1 Ack=502 Win=6432 Len=0
10	4.657569	128.119.245.12	192.168.1.102	TCP	1514	80 → 4272 [ACK] Seq=1 Ack=502 Win=6432 Len=1460
11	4.658792	128.119.245.12	192.168.1.102	TCP	1514	80 → 4272 [ACK] Seq=1461 Ack=502 Win=6432 Len=1460
12	4.658828	192.168.1.102	128.119.245.12	TCP	54	4272 → 80 [ACK] Seq=502 Ack=2921 Win=64240 Len=0

[Frame 10: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 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: 4272, Seq: 1, Ack: 502, Len: 1460]
 Source Port: 80
 Destination Port: 4272
 [Stream index: 0]
 [TCP Segment Len: 1460]
 Sequence number: 1 (relative sequence number)
 [Next sequence number: 1461 (relative sequence number)]
 Acknowledgment number: 502 (relative ack number)
 0101 = Header Length: 20 bytes (5)
 [Flags: 0x010 (ACK)]

Packet 10

14. What is the status code and phrase in the response?

No.	Time	Source	Destination	Protocol	Length	Info
11	4.658792	128.119.245.12	192.168.1.102	TCP	1514	80 → 4272 [ACK] Seq=1461 Ack=502 Win=6432 Len=1460
12	4.658828	192.168.1.102	128.119.245.12	TCP	54	4272 → 80 [ACK] Seq=502 Ack=2921 Win=64240 Len=0
13	4.680438	128.119.245.12	192.168.1.102	TCP	1514	80 → 4272 [ACK] Seq=1461 Ack=502 Win=6432 Len=1460
14	4.680920	128.119.245.12	192.168.1.102	HTTP	490	HTTP/1.1 200 OK
15	4.680948	192.168.1.102	128.119.245.12	TCP	54	4272 → 80 [ACK] Seq=502 Ack=2921 Win=64240 Len=0

[Frame is ignored: False]
 [Protocols in frame: eth:ethertype:ip:tcp:http:data-text-lines]
 [Coloring Rule Name: HTTP]
 [Coloring Rule String: http || tcp.port == 80 || http2]
 [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: 4272, Seq: 4381, Ack: 502, Len: 490]
 [4 Reassembled TCP Segments (4816 bytes): #10(1460), #11(1460), #13(1460), #14(436)]
 [Hypertext Transfer Protocol]
 HTTP/1.1 200 OK
 Date: Tue, 23 Sep 2003 05:37:02 GMT
 Server: Apache/2.0.40 (Red Hat Linux)
 Last-Modified: Tue, 23 Sep 2003 05:37:01 GMT

200 OK

15. How many data-containing TCP segments were needed to carry the single HTTP response and the text of the Bill of Rights?

10	4.657569	128.119.245.12	192.168.1.102	TCP	1514 80 → 42
11	4.658792	128.119.245.12	192.168.1.102	TCP	1514 80 → 42
12	4.658828	192.168.1.102	128.119.245.12	TCP	54 4272 → 8
13	4.680438	128.119.245.12	192.168.1.102	TCP	1514 80 → 42

Frame 10: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 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: 4272, Seq: 1, Ack: 502, Len: 1

Three packets: 10,11,13

4. HTML Documents with Embedded Objects

16. How many HTTP GET request messages did your browser send? To which Internet addresses were these GET requests sent?

3 request browser send. 10,17,20

Packet 10 was sent to 128.119.245.12

Time	Source	Destination	Protocol	Length	Info
10	7.236929	192.168.1.102	128.119.245.12	HTTP	555 GET /ethe
12	7.260813	128.119.245.12	192.168.1.102	HTTP	1057 HTTP/1.1
17	7.305485	192.168.1.102	165.193.123.218	HTTP	625 GET /cata
20	7.308803	192.168.1.102	134.241.6.82	HTTP	609 GET /~kur
25	7.333054	165.193.123.218	192.168.1.102	HTTP	912 HTTP/1.1

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: 4307, Dst Port: 80, Seq: 1, Ack: 1, Len: 50
 Hypertext Transfer Protocol
 GET /ethereal-labs/lab2-4.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/200211
 Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;
 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
 Keen-Alive: 300\r\n

Packet 17 was sent to 165.193.123.218

10	7.236929	192.168.1.102	128.119.245.12	HTTP	555 GET /ethe
12	7.260813	128.119.245.12	192.168.1.102	HTTP	1057 HTTP/1.1
17	7.305485	192.168.1.102	165.193.123.218	HTTP	625 GET /cata
20	7.308803	192.168.1.102	134.241.6.82	HTTP	609 GET /~kur
25	7.333054	165.193.123.218	192.168.1.102	HTTP	912 HTTP/1.1

Frame 17: 625 bytes on wire (5000 bits), 625 bytes captured (5000 bits)

Ethernet II, Src: Dell_4f:36:23 (00:08:74:4f:36:23), Dst: LinksysG_da:af:73 (00:06:2)

Internet Protocol Version 4, Src: 192.168.1.102, Dst: 165.193.123.218

Transmission Control Protocol, Src Port: 4308, Dst Port: 80, Seq: 1, Ack: 1, Len: 5

Hypertext Transfer Protocol

GET /catalog/images/pearson-logo-footer.gif HTTP/1.1\r\n
Host: www.aw-bc.com\r\n
User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.0.2) Gecko/20021
Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain
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

Packet 20 was sent to 134.241.6.82

Time	Source	Destination	Protocol	Length	Info
10	7.236929	192.168.1.102	128.119.245.12	HTTP	555 GET /ethe
12	7.260813	128.119.245.12	192.168.1.102	HTTP	1057 HTTP/1.1
17	7.305485	192.168.1.102	165.193.123.218	HTTP	625 GET /cata
20	7.308803	192.168.1.102	134.241.6.82	HTTP	609 GET /~kur
25	7.333054	165.193.123.218	192.168.1.102	HTTP	912 HTTP/1.1

Frame 20: 609 bytes on wire (4872 bits), 609 bytes captured (4872 bits)

Ethernet II, Src: Dell_4f:36:23 (00:08:74:4f:36:23), Dst: LinksysG_da:af:73 (00:06:2)

Internet Protocol Version 4, Src: 192.168.1.102, Dst: 134.241.6.82

Transmission Control Protocol, Src Port: 4309, Dst Port: 80, Seq: 1, Ack: 1, Len: 55

Hypertext Transfer Protocol

GET /~kurose/cover.jpg HTTP/1.1\r\n
Host: manic.cs.umass.edu\r\n
User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.0.2) Gecko/200211
Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;
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

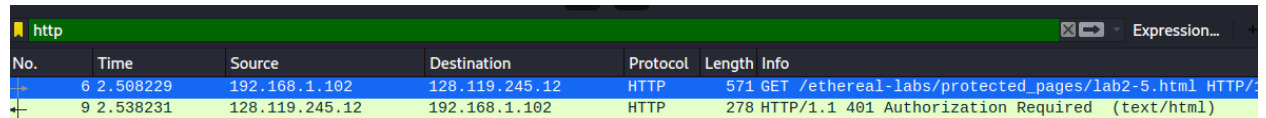
17. Can you tell whether your browser downloaded the two images serially, or whether they were downloaded from the two web sites in parallel? Explain.

25	7.333054	165.193.123.218	192.168.1.102	HTTP	912 HTTP/1.1 200 OK (GIF89a)
54	7.589877	134.241.6.82	192.168.1.102	HTTP	1096 HTTP/1.0 200 Document follows (JPEG JFIF image)

From the two web sites in parallel. Packet 17 and 20 gets images. From packet 25 and 54 we can see 200 OK reply. The request for the second image file was made before packet 25, the first image file was received.

5 HTTP Authentication

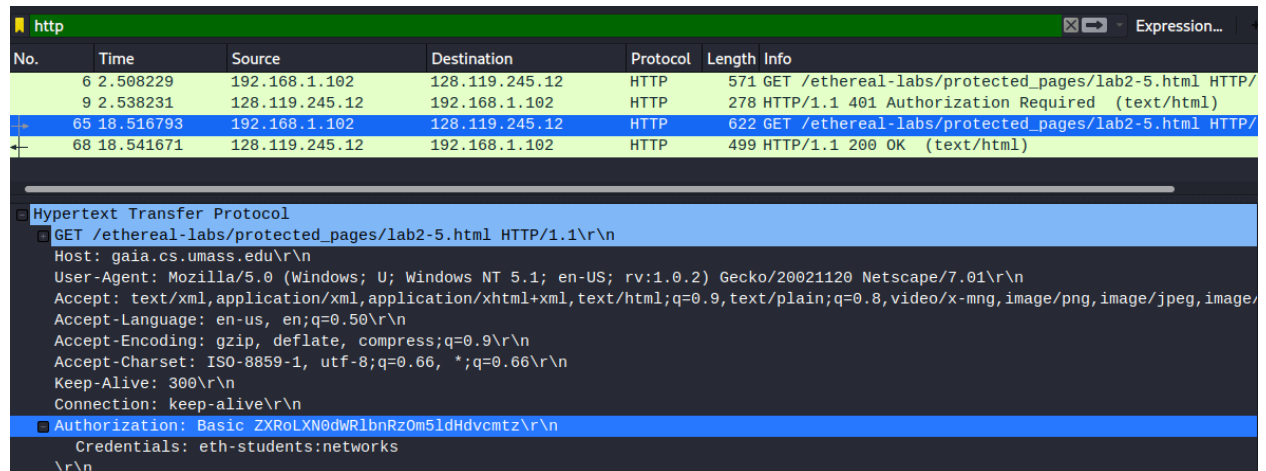
18. What is the server's response (status code and phrase) in response to the initial HTTP GET message from your browser?



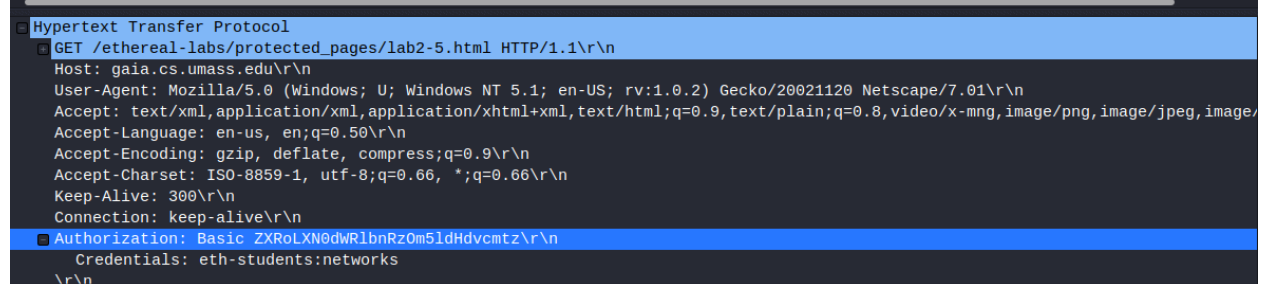
No.	Time	Source	Destination	Protocol	Length	Info
6	2.508229	192.168.1.102	128.119.245.12	HTTP	571	GET /ethereal-labs/protected_pages/lab2-5.html HTTP/1.1
9	2.538231	128.119.245.12	192.168.1.102	HTTP	278	HTTP/1.1 401 Authorization Required (text/html)

Packet 6 has the first GET and packet 9 has reply. And the server's in packet 9 is: Authorization Required

19. When your browser's sends the HTTP GET message for the second time, what new field is included in the HTTP GET message?



No.	Time	Source	Destination	Protocol	Length	Info
6	2.508229	192.168.1.102	128.119.245.12	HTTP	571	GET /ethereal-labs/protected_pages/lab2-5.html HTTP/1.1
9	2.538231	128.119.245.12	192.168.1.102	HTTP	278	HTTP/1.1 401 Authorization Required (text/html)
65	18.516793	192.168.1.102	128.119.245.12	HTTP	622	GET /ethereal-labs/protected_pages/lab2-5.html HTTP/1.1
68	18.541671	128.119.245.12	192.168.1.102	HTTP	499	HTTP/1.1 200 OK (text/html)



```
Hypertext Transfer Protocol
  GET /ethereal-labs/protected_pages/lab2-5.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=0.7\r\n
    Accept-Language: en-us,en;q=0.5\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
    Authorization: Basic ZXRoLXN0dWR1bnRzOm5ldHdvcmVz\r\n
    Credentials: eth-students:networks\r\n
  \r\n
```

The HTTP GET includes the Authorization: Basic