

COMP9331 Lab2

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Exercise 3

http-ethereal-trace-1 [Wireshark 1.12.1 (Git Rev Unknown from unknown)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: http Expression... Clear Apply Save

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.htm
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)

Frame 12: 439 bytes on wire (3512 bits), 439 bytes captured (3512 bits) on interface eth0

Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: DellComp_4f:36:23 (00:08:74:4f:36:23)

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

Transmission Control Protocol, Src Port: 80 (80), Dst Port: 4127 (4127), Seq: 1, Ack: 502, Len: 385

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

[Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]

Request Version: HTTP/1.1

Status Code: 200 ← Q1

Response Phrase: OK ← Q1

Date: Tue, 23 Sep 2003 05:29:50 GMT\r\n ← Q2

Server: Apache/2.0.40 (Red Hat Linux)\r\n

Last-Modified: Tue, 23 Sep 2003 05:29:00 GMT\r\n ← Q2

ETag: "1bfed-49-79d5bf00"\r\n

Accept-Ranges: bytes\r\n

Content-Length: 73\r\n ← Q4

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

Connection: Keep-Alive\r\n ← Q3

Content-Type: text/html; charset=ISO-8859-1\r\n ← Q5

\r\n

[HTTP response 1/2]

[Time since request: 0.024143000 seconds]

[\[Request in frame: 10\]](#)

[\[Next request in frame: 13\]](#)

[\[Next response in frame: 14\]](#)

Line-based text data: text/html

<html>\r\n

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

</html>\r\n

0000 00 08 74 4f 36 23 00 06 25 da af 73 08 00 45 00 ..t06#.. %.s..E.

0010 01 a9 b6 fa 40 00 37 06 53 c2 80 77 f5 0c c0 a8@.7. S.w....

0020 01 66 00 50 10 1f 6b a6 54 92 f5 32 66 a7 50 18 .f.P..k. T..2f.P.

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

0040 30 30 20 4f 4b 0d 0a 44 61 74 65 3a 20 54 75 65 00 OK..D ate: Tue

Packets: 17 · Displayed: 4 (23.5%) · Load time...

Profile: Default

Q1

status: 200

phrase: OK

Q2

last modified: Tue, 23 Sep 2003 05:29:00 GMT

date header: Tue, 23 Sep 2003 05:29:50 GMT

The different of two fields is that last-modified shows the latest time of html modified in server as well as date header is the time of response sent. They may be same or date header is later than last-modified.

Q3

The connection between the browser and the server is persistent.

The connection is kept alive, means that the server keep connection open after sending response.

Q4

73 bytes

Q5

text/html

Exercise 4

http-ethereal-trace-2 [Wireshark 1.12.1 (Git Rev Unknown from unknown)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: http Expression... Clear Apply Save

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
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 8: 555 bytes on wire (4440 bits), 555 bytes captured (4440 bits)

▶ Ethernet II, Src: DellComp_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 (192.168.1.102), Dst: 128.119.245.12 (128.119.245.12)

▶ Transmission Control Protocol, Src Port: 4247 (4247), Dst Port: 80 (80), Seq: 1, Ack: 1, Len: 555

▼ 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/5.0.0.10\r\n

Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8,vendor/*;q=0.5\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]

0000 00 06 25 da af 73 00 08 74 4f 36 23 08 00 45 00 ..%.s.. t06#..E.

0010 02 1d 02 5a 40 00 80 06 00 00 c0 a8 01 66 80 77 ...Z@... ..f.w

0020 f5 0c 10 97 00 50 fa 88 01 31 81 6a b3 81 50 18P... .1.j..P.

0030 fa f0 39 a2 00 00 47 45 54 20 2f 65 74 68 65 72 ..9...GE T /ether

0040 65 61 6c 2d 6c 61 62 73 2f 6c 61 62 32 2d 32 2e eal-labs /lab2-2.

Frame (frame), 555 bytes Packets: 20 · Displayed: Profile: Default

Q1
No.

Q2
Yes.

http-ethereal-trace-2 [Wireshark 1.12.1 (Git Rev Unknown from unknown)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: http Expression... Clear Apply Save

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
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
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 (80), Dst Port: 4247 (4247), Seq: 1, Ack: 502, Len: 68

Hypertext Transfer Protocol

HTTP/1.1 200 OK\r\n

[Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]

Request Version: HTTP/1.1

Status Code: 200

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]

[\[Request in frame: 8\]](#)

[\[Next request in frame: 14\]](#)

[\[Next response in frame: 15\]](#)

Line-based text data: text/html

\n

<html>\n

\n

Congratulations again! Now you've downloaded the file lab2-2.html.
\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
\n

will only be sent once by the server due to the inclusion of the IN-MODIFIED-SINCE
\n

field in your browser's HTTP GET request to the server.\n

\n

</html>\n

0090 29 0d 0a 4c 61 73 74 2d 4d 6f 64 69 66 69 65 64)..Last-Modified
00a0 3a 20 54 75 65 2c 20 32 33 20 53 65 70 20 32 30 : Tue, 23 Sep 20
00b0 30 33 20 30 35 3a 33 35 3a 30 30 20 47 4d 54 0d 03 05:35 :00 GMT.
00c0 0a 45 54 61 67 3a 20 22 31 62 66 65 66 2d 31 37 .ETag: " 1bfef-17
00d0 33 2d 38 66 34 61 65 39 30 30 22 0d 0a 41 63 63 3-8f4ae9 00"..Acc

HTTP Last Modified (http.last_... Packets: 20 · Displayed: 4 (20.0%) ... Profile: Default

last modified: Tue, 23 Sep 2003 05:35:00 GMT

Q3

Yes. It is a conditional GET which the response is depends on the request data.

If the object not modified before date, response 304 not modified.

Or response OK and return data.

The screenshot shows the Wireshark 1.12.1 interface. The filter bar is set to 'http'. The packet list shows four packets, with packet 15 selected. The packet details pane shows the expanded 'Hypertext Transfer Protocol' section for packet 15, which is a GET request for '/ethereal-labs/lab2-2.html'. The response status is '304 Not Modified'. The packet bytes pane shows the raw data of the response, including the 'If-Modified-Since' and 'If-None-Match' headers.

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
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
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) on interface 0
Ethernet II, Src: DellComp_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 (192.168.1.102), Dst: 128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 4247 (4247), Dst Port: 80 (80), Seq: 502, Ack: 686, Len: 614

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\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;q=0.5\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]
[Response in frame: 15]

0220 70 2d 61 6c 69 76 65 0d 0a 49 66 2d 4d 6f 64 69 p-alive. .If-Modi
0230 66 69 65 64 2d 53 69 6e 63 65 3a 20 54 75 65 2c fied-Sin ce: Tue,
0240 20 32 33 20 53 65 70 20 32 30 30 33 20 30 35 3a 23 Sep 2003 05:
0250 33 35 3a 30 30 20 47 4d 54 0d 0a 49 66 2d 4e 6f 35:00 GM T..If-No
0260 6e 65 2d 4d 61 74 63 68 3a 20 22 31 62 66 65 66 ne-Match : "1bfef

request line (http.request.line)... Packets: 20 · Displayed: 4 (20.0%) ... Profile: Default

Q4

status code: 304

phrase: not modified

The server didn't return the contents of file.

As the request date is later than If-Modified-Since date, the HTTP response is 304 not modified.

The image shows a Wireshark capture of an HTTP 304 Not Modified response. The packet list at the top shows four packets, with the last one (No. 15) being the HTTP 304 response. The packet details pane shows the structure of the response, including the status code 304 and the response phrase 'Not Modified'. The packet bytes pane at the bottom shows the raw data of the response.

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.htm
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.htm
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: DellComp_4f:36:23 (00:08:74:4f:36:23)
- Internet Protocol Version 4, Src: 128.119.245.12 (128.119.245.12), Dst: 192.168.1.102 (192.168.1.102)
- Transmission Control Protocol, Src Port: 80 (80), Dst Port: 4247 (4247), Seq: 686, Ack: 1116, Len: 189
- Hypertext Transfer Protocol
 - HTTP/1.1 304 Not Modified\r\n
 - [Expert Info (Chat/Sequence): HTTP/1.1 304 Not Modified\r\n]
 - Request Version: HTTP/1.1
 - Status Code: 304
 - 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]
 - [\[Prev request in frame: 8\]](#)
 - [\[Prev response in frame: 10\]](#)
 - [\[Request in frame: 14\]](#)

0000 00 08 74 4f 36 23 00 06 25 da af 73 08 00 45 00 ..t06#.. %.s..E.
0010 00 e5 dc 88 40 00 37 06 2e f8 80 77 f5 0c c0 a8@.7. ...w....
0020 01 66 00 50 10 97 81 6a b6 2e fa 88 05 8c 50 18 .f.P...jP.
0030 1f 2e 89 37 00 00 48 54 54 50 2f 31 2e 31 20 33 ...7..HT TP/1.1 3
0040 30 34 20 4e 6f 74 20 4d 6f 64 69 66 69 65 64 0d 04 Not M odified.

Frame (frame), 243 bytes Packets: 20 · Displayed: 4 (20.0%) · Load tim... Profile: Default

Q5

Etag: "1bfef-173-8f4ae900"

As the If-Modified-Since conditional GET above, the request with date 23/09/2003 05:35:53 went to branch If-None-Match, and then Etag becomes that.

Since the 1st response message was received, the value hasn't changed.

Exercise 5

```
lab2 — java PingServer 8888 — 80x
[appleMacBook-Pro-2:lab2 apple$ java PingServer 8888
Received from 127.0.0.1: PING 0 1533823635861
Reply sent.
Received from 127.0.0.1: PING 1 1533823635995
Reply sent.
Received from 127.0.0.1: PING 2 1533823636147
Reply sent.
Received from 127.0.0.1: PING 3 1533823636217
Reply sent.
Received from 127.0.0.1: PING 4 1533823636364
Reply sent.
Received from 127.0.0.1: PING 5 1533823636372
Reply not sent.
Received from 127.0.0.1: PING 6 1533823637377
Reply sent.
Received from 127.0.0.1: PING 7 1533823637528
Reply sent.
Received from 127.0.0.1: PING 8 1533823637692
Reply sent.
Received from 127.0.0.1: PING 9 1533823637888
Reply sent.
]

lab2 lab3
[appleMacBook-Pro-2:9331 apple$ cd lab2
[appleMacBook-Pro-2:lab2 apple$ ls
PingClient.py          TCPClient.py          http-ethereal-trace-2
PingServer.class       TCPServer.py          lab2pdf
PingServer.java        http-ethereal-trace-1 pic
[appleMacBook-Pro-2:lab2 apple$ python PingClient.py 127.0.0.1 8888
pint to 127.0.0.1, seq = 0, rtt = 134 ms
pint to 127.0.0.1, seq = 1, rtt = 152 ms
pint to 127.0.0.1, seq = 2, rtt = 70 ms
pint to 127.0.0.1, seq = 3, rtt = 147 ms
pint to 127.0.0.1, seq = 4, rtt = 8 ms
pint to 127.0.0.1, seq = 5, time out
pint to 127.0.0.1, seq = 6, rtt = 151 ms
pint to 127.0.0.1, seq = 7, rtt = 164 ms
pint to 127.0.0.1, seq = 8, rtt = 196 ms
pint to 127.0.0.1, seq = 9, rtt = 55 ms
min rtt: 8
max rtt: 196
avg rtt: 119
loss rate: 0.1
appleMacBook-Pro-2:lab2 apple$ ]
```

Left part is PingServer and right part is PingClient.

Below is the codes for PingClient in Python3.

```
*PingClient.py - /Users/apple/Downloads/cse/9331/lab2/PingClient.py (3.6.4)*
import time
from socket import *
from numpy import mean

# host and port
serverName = str(sys.argv[1])
serverPort = str(sys.argv[2])
# establish client socket
clientSocket = socket(AF_INET, SOCK_DGRAM)
# timeout 1 second wait
clientSocket.settimeout(1)

# min, max, avg
rtt = []

# 10 ping requests
for sequence in range(10):
    # message sent: PING sequence_number timestamp
    timestamp = int(round(time.time() * 1000))
    message1 = 'PING'+ ' '+str(sequence)+' '+str(timestamp)
    clientSocket.sendto(message1.encode(),(serverName, int(serverPort)))

    # message recieved: PING sequence_number timestamp CRLF
    try:
        # message recieved
        recieved = clientSocket.recv(20)
        timerecv = int(round(time.time() * 1000))
        message2 = recieved.decode()
        a = message2.split()
        print(f'pint to {serverName}, seq = {a[1]}, rtt = {timerecv-int(a[2])} m
        rtt.append(timerecv-int(a[2]))

    # time out
    except:
        print(f'pint to {serverName}, seq = {sequence}, time out')
        continue

if rtt:
    print(f'min rtt: {min(rtt)}\nmax rtt: {max(rtt)}\navg rtt: {int(mean(rtt))}')
else:
    print('min rtt: None\nmax rtt: None\navg rtt: None')
print(f'loss rate: {(10 - len(rtt))/10}')

clientSocket.close()
```

Ln: 4 Col: 0