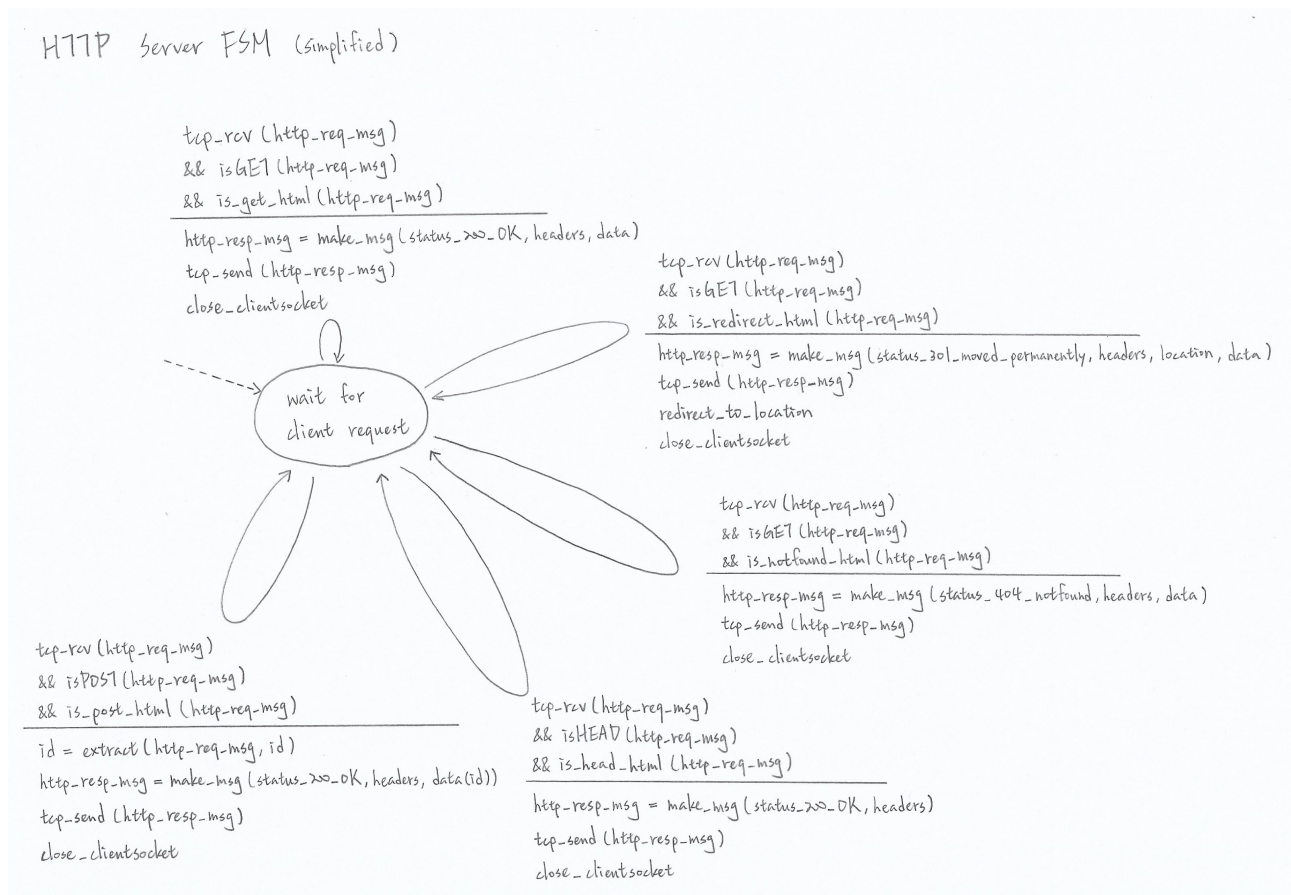


1. HTTP Server FSM



2. HTTP Packets

- * The "Date" header is a real time date by using `time.strftime()` in python.
- * Since the original question asked us to reply a html message whose body is 'good.html', I do not change it to 'get.html'.
- * Professor announced that the redirected page should be 'get.html' instead of 'good.html', so I redirect 'redirect.html' to 'get.html'.
- * I suppose GET /head.html would reply a '200 OK' message, so there is no header of 'Location'.
- * I only screenshot layer 7 contents in HTTP response messages because we do not asked to write code of HTTP client in this assignment (and for saving pages). But I did screenshot the browser and TCP stream to let you know how I tested my HTTP server.
- * If HTTP request messages are also required, I have upload the packets I captured to github.
https://github.com/angel870326/Socket_Programming/blob/main/HTTP%20server/Wireshark/TA01_http_20201206_original.pcap

(1) GET /get.html

200 OK Response Message

TA01_http_20201206_edit.pcap

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
4	0.000762	127.0.0.1	127.0.0.1	HTTP	91	HTTP/1.0 200 OK (text/html)
5	15.912471	127.0.0.1	127.0.0.1	HTTP	621	GET /redirect.html HTTP/1.1
9	15.931291	127.0.0.1	127.0.0.1	HTTP	97	HTTP/1.0 301 Moved Permanently (text/html)
10	15.935379	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
12	15.945995	127.0.0.1	127.0.0.1	HTTP	244	HTTP/1.0 200 OK (text/html)
13	42.050268	127.0.0.1	127.0.0.1	HTTP	621	GET /notfound.html HTTP/1.1
17	42.062065	127.0.0.1	127.0.0.1	HTTP	93	HTTP/1.0 404 Not Found (text/html)
18	55.196620	127.0.0.1	127.0.0.1	HTTP	141	HEAD /head.html HTTP/1.0
20	55.197745	127.0.0.1	127.0.0.1	HTTP	189	HTTP/1.0 200 OK
21	64.721035	127.0.0.1	127.0.0.1	HTTP	153	POST /post.html HTTP/1.0
23	64.721760	127.0.0.1	127.0.0.1	HTTP	222	HTTP/1.0 200 OK (text/html)

Frame 4: 91 bytes on wire (728 bits), 91 bytes captured (728 bits)
▶ Null/Loopback
▶ Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
▶ Transmission Control Protocol, Src Port: 80, Dst Port: 51027, Seq: 171, Ack: 561, Len: 35
▶ [3 Reassembled TCP Segments (205 bytes): #2(17), #3(153), #4(35)]
▼ Hypertext Transfer Protocol
▶ HTTP/1.0 200 OK\r\n
Date: Sun, 06 Dec 2020 02:07:14 GMT\r\n
Server: local\r\n
Connection: close\r\n
Accept-Ranges: bytes\r\n
Content-Type: text/html; charset=UTF-8\r\n
▶ Content-Length: 33\r\n\r\n
[HTTP response 1/1]
[Time since request: 0.000762000 seconds]
[\[Request in frame: 1\]](#)
[Request URI: http://127.0.0.1/get.html]
File Data: 33 bytes
▼ Line-based text data: text/html (1 lines)
<html><body>good.html<body><html>

0000 02 00 00 00 45 00 00 57 c8 e7 40 00 40 06 00 00 ...E..W..@.e..

Frame (91 bytes) Reassembled TCP (205 bytes)
Hypertext Transfer Protocol: Protocol Packets: 23 · Displayed: 12 (52.2%) Profile: Default

Browser (Chrome)

Chrome 檔案 編輯 檢視 歷史記錄 書籤 人員 分頁 視窗 說明

127.0.0.1/get.html

127.0.0.1/get.html

應用程式 YouTube Facebook Twitter github 其他書籤

good.html

(2) GET /redirect.html

301 Moved Permanently & 200 OK Response Message

The image displays two screenshots of a Wireshark packet capture for the file TA01_http_20201206_edit.pcap. The first screenshot shows the packet list and details for a 301 Moved Permanently response (Frame 9). The second screenshot shows the packet list and details for a 200 OK response (Frame 12).

Packet List (Frame 9):

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
4	0.000762	127.0.0.1	127.0.0.1	HTTP	91	HTTP/1.0 200 OK (text/html)
5	15.912471	127.0.0.1	127.0.0.1	HTTP	621	GET /redirect.html HTTP/1.1
9	15.931291	127.0.0.1	127.0.0.1	HTTP	97	HTTP/1.0 301 Moved Permanently (text/html)
10	15.935379	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
12	15.945995	127.0.0.1	127.0.0.1	HTTP	244	HTTP/1.0 200 OK (text/html)
13	42.050268	127.0.0.1	127.0.0.1	HTTP	621	GET /notfound.html HTTP/1.1
17	42.062065	127.0.0.1	127.0.0.1	HTTP	93	HTTP/1.0 404 Not Found (text/html)
18	55.196620	127.0.0.1	127.0.0.1	HTTP	141	HEAD /head.html HTTP/1.0
20	55.197745	127.0.0.1	127.0.0.1	HTTP	189	HTTP/1.0 200 OK
21	64.721035	127.0.0.1	127.0.0.1	HTTP	153	POST /post.html HTTP/1.0
23	64.721760	127.0.0.1	127.0.0.1	HTTP	222	HTTP/1.0 200 OK (text/html)

Frame 9 Details:

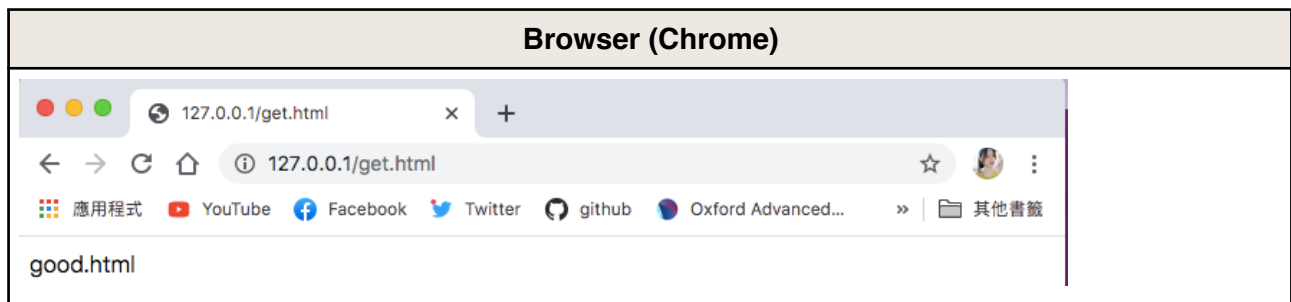
- Frame 9: 97 bytes on wire (776 bits), 97 bytes captured (776 bits)
- Null/Loopback
- Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
- Transmission Control Protocol, Src Port: 80, Dst Port: 51029, Seq: 188, Ack: 566, Len: 41
- [4 Reassembled TCP Segments (228 bytes): #6(32), #7(153), #8(2), #9(41)]
- Hypertext Transfer Protocol
 - HTTP/1.0 301 Moved Permanently\r\n
 - Date: Sun, 06 Dec 2020 02:07:30 GMT\r\n
 - Server: local\r\n
 - Connection: close\r\n
 - Location: http://127.0.0.1/get.html\r\n
 - Content-Type: text/html\r\n
 - Content-Length: 41\r\n
 - \r\n
 - [HTTP response 1/1]
 - [Time since request: 0.018820000 seconds]
 - [Request in frame: 5]
 - [Request URI: http://127.0.0.1/redirect.html]
 - File Data: 41 bytes
- Line-based text data: text/html (1 lines)
 - <html><body>Moved to get.html</body></html>

Packet List (Frame 12):

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
4	0.000762	127.0.0.1	127.0.0.1	HTTP	91	HTTP/1.0 200 OK (text/html)
5	15.912471	127.0.0.1	127.0.0.1	HTTP	621	GET /redirect.html HTTP/1.1
9	15.931291	127.0.0.1	127.0.0.1	HTTP	97	HTTP/1.0 301 Moved Permanently (text/html)
10	15.935379	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
12	15.945995	127.0.0.1	127.0.0.1	HTTP	244	HTTP/1.0 200 OK (text/html)
13	42.050268	127.0.0.1	127.0.0.1	HTTP	621	GET /notfound.html HTTP/1.1
17	42.062065	127.0.0.1	127.0.0.1	HTTP	93	HTTP/1.0 404 Not Found (text/html)
18	55.196620	127.0.0.1	127.0.0.1	HTTP	141	HEAD /head.html HTTP/1.0
20	55.197745	127.0.0.1	127.0.0.1	HTTP	189	HTTP/1.0 200 OK
21	64.721035	127.0.0.1	127.0.0.1	HTTP	153	POST /post.html HTTP/1.0
23	64.721760	127.0.0.1	127.0.0.1	HTTP	222	HTTP/1.0 200 OK (text/html)

Frame 12 Details:

- Frame 12: 244 bytes on wire (1952 bits), 244 bytes captured (1952 bits)
- Null/Loopback
- Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
- Transmission Control Protocol, Src Port: 80, Dst Port: 51031, Seq: 18, Ack: 561, Len: 188
- [2 Reassembled TCP Segments (205 bytes): #11(17), #12(188)]
- Hypertext Transfer Protocol
 - HTTP/1.0 200 OK\r\n
 - Date: Sun, 06 Dec 2020 02:07:30 GMT\r\n
 - Server: local\r\n
 - Connection: close\r\n
 - Accept-Ranges: bytes\r\n
 - Content-Type: text/html; charset=UTF-8\r\n
 - Content-Length: 33\r\n
 - \r\n
 - [HTTP response 1/1]
 - [Time since request: 0.010616000 seconds]
 - [Request in frame: 10]
 - [Request URI: http://127.0.0.1/get.html]
 - File Data: 33 bytes
- Line-based text data: text/html (1 lines)
 - <html><body>good.html</body></html>



(3) GET /notfound.html

404 Not Found Response Message

TA01_http_20201206_edit.pcap

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
4	0.000762	127.0.0.1	127.0.0.1	HTTP	91	HTTP/1.0 200 OK (text/html)
5	15.912471	127.0.0.1	127.0.0.1	HTTP	621	GET /redirect.html HTTP/1.1
9	15.931291	127.0.0.1	127.0.0.1	HTTP	97	HTTP/1.0 301 Moved Permanently (text/html)
10	15.935379	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
12	15.945995	127.0.0.1	127.0.0.1	HTTP	244	HTTP/1.0 200 OK (text/html)
13	42.050268	127.0.0.1	127.0.0.1	HTTP	621	GET /notfound.html HTTP/1.1
17	42.062065	127.0.0.1	127.0.0.1	HTTP	93	HTTP/1.0 404 Not Found (text/html)
18	55.196620	127.0.0.1	127.0.0.1	HTTP	141	HEAD /head.html HTTP/1.0
20	55.197745	127.0.0.1	127.0.0.1	HTTP	189	HTTP/1.0 200 OK
21	64.721035	127.0.0.1	127.0.0.1	HTTP	153	POST /post.html HTTP/1.0
23	64.721760	127.0.0.1	127.0.0.1	HTTP	222	HTTP/1.0 200 OK (text/html)

Frame 17: 93 bytes on wire (744 bits), 93 bytes captured (744 bits)

- Null/Loopback
- Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
- Transmission Control Protocol, Src Port: 80, Dst Port: 51033, Seq: 158, Ack: 566, Len: 37
- [4 Reassembled TCP Segments (194 bytes): #14(24), #15(131), #16(2), #17(37)]
- Hypertext Transfer Protocol
 - HTTP/1.0 404 Not Found\r\n
 - Date: Sun, 06 Dec 2020 02:07:56 GMT\r\n
 - Server: local\r\n
 - Connection: close\r\n
 - Content-Type: text/html; charset=UTF-8\r\n
 - Content-Length: 37\r\n
 - \r\n
 - [HTTP response 1/1]
 - [Time since request: 0.011797000 seconds]
 - [Request in frame: 13]
 - [Request URI: http://127.0.0.1/notfound.html]
 - File Data: 37 bytes
 - Line-based text data: text/html (1 lines)
 - <html><body>404 Not Found<body><html>

0000 02 00 00 00 45 02 00 59 61 12 40 00 40 06 00 00 ...E..Y a @.@...

Frame (93 bytes) Reassembled TCP (194 bytes)

Hypertext Transfer Protocol: Protocol Packets: 23 · Displayed: 12 (52.2%) Profile: Default



(4) HEAD /head.html

HEAD Response Message

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
4	0.000762	127.0.0.1	127.0.0.1	HTTP	91	HTTP/1.0 200 OK (text/html)
5	15.912471	127.0.0.1	127.0.0.1	HTTP	621	GET /redirect.html HTTP/1.1
9	15.931291	127.0.0.1	127.0.0.1	HTTP	97	HTTP/1.0 301 Moved Permanently (text/html)
10	15.935379	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
12	15.945995	127.0.0.1	127.0.0.1	HTTP	244	HTTP/1.0 200 OK (text/html)
13	42.050268	127.0.0.1	127.0.0.1	HTTP	621	GET /notfound.html HTTP/1.1
17	42.062065	127.0.0.1	127.0.0.1	HTTP	93	HTTP/1.0 404 Not Found (text/html)
18	55.196620	127.0.0.1	127.0.0.1	HTTP	141	HEAD /head.html HTTP/1.0
20	55.197745	127.0.0.1	127.0.0.1	HTTP	189	HTTP/1.0 200 OK
21	64.721035	127.0.0.1	127.0.0.1	HTTP	153	POST /post.html HTTP/1.0
23	64.721760	127.0.0.1	127.0.0.1	HTTP	222	HTTP/1.0 200 OK (text/html)

▶ Frame 20: 189 bytes on wire (1512 bits), 189 bytes captured (1512 bits)
 ▶ Null/Loopback
 ▶ Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
 ▶ Transmission Control Protocol, Src Port: 80, Dst Port: 51080, Seq: 18, Ack: 86, Len: 133
 ▶ [2 Reassembled TCP Segments (150 bytes): #19(17), #20(133)]
 ▼ Hypertext Transfer Protocol
 ▶ HTTP/1.0 200 OK\r\n
 Date: Sun, 06 Dec 2020 02:08:10 GMT\r\n
 Server: local\r\n
 Connection: close\r\n
 Content-Type: text/html; charset=UTF-8\r\n
 ▶ Content-Length: 33\r\n
 \r\n
 [HTTP response 1/1]
 [Time since request: 0.001125000 seconds]
 [Request in frame: 18]
 [Request URI: http://127.0.0.1/head.html]

0000 02 00 00 00 45 00 00 b9 8b f4 40 00 40 06 00 00 ...E...@.

Frame (189 bytes) Reassembled TCP (150 bytes)
 Hypertext Transfer Protocol: Protocol Packets: 23 · Displayed: 12 (52.2%) Profile: Default

TCP Stream

```

HEAD /head.html HTTP/1.0
Host: 127.0.0.1
Content-Type: text/html; charset=UTF-8

HTTP/1.0 200 OK
Date: Sun, 06 Dec 2020 02:08:10 GMT
Server: local
Connection: close
Content-Type: text/html; charset=UTF-8
Content-Length: 33

close
  
```

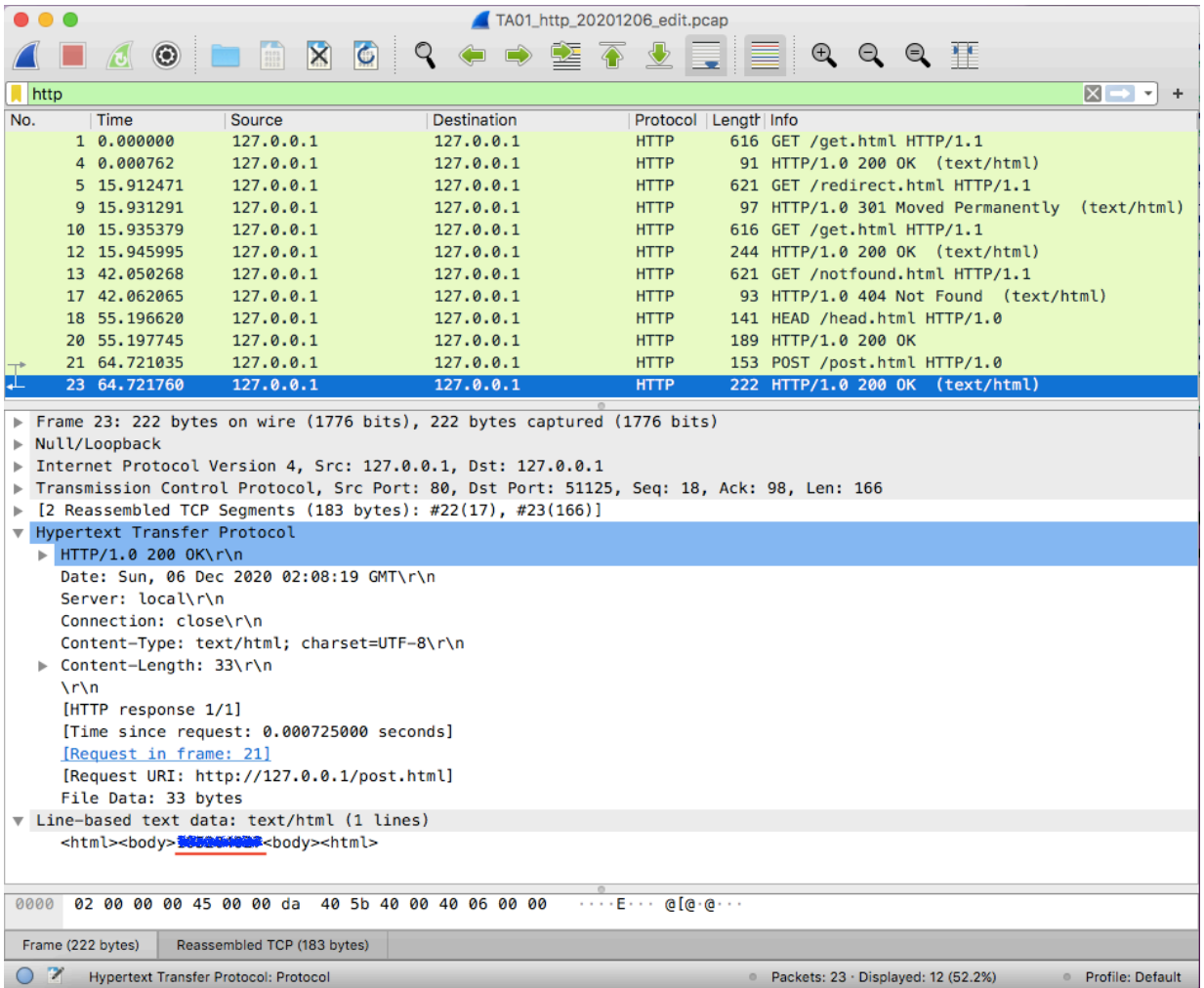
2 client pkt(s), 2 server pkt(s), 2 turn(s).
 Entire conversation (240 bytes) Show and save data as ASCII Stream 69

Find: Find Next

Help Filter Out This Stream Print Save as... Back Close

(5) POST /post.html

POST Response Message



TA01_http_20201206_edit.pcap

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
4	0.000762	127.0.0.1	127.0.0.1	HTTP	91	HTTP/1.0 200 OK (text/html)
5	15.912471	127.0.0.1	127.0.0.1	HTTP	621	GET /redirect.html HTTP/1.1
9	15.931291	127.0.0.1	127.0.0.1	HTTP	97	HTTP/1.0 301 Moved Permanently (text/html)
10	15.935379	127.0.0.1	127.0.0.1	HTTP	616	GET /get.html HTTP/1.1
12	15.945995	127.0.0.1	127.0.0.1	HTTP	244	HTTP/1.0 200 OK (text/html)
13	42.050268	127.0.0.1	127.0.0.1	HTTP	621	GET /notfound.html HTTP/1.1
17	42.062065	127.0.0.1	127.0.0.1	HTTP	93	HTTP/1.0 404 Not Found (text/html)
18	55.196620	127.0.0.1	127.0.0.1	HTTP	141	HEAD /head.html HTTP/1.0
20	55.197745	127.0.0.1	127.0.0.1	HTTP	189	HTTP/1.0 200 OK
21	64.721035	127.0.0.1	127.0.0.1	HTTP	153	POST /post.html HTTP/1.0
23	64.721760	127.0.0.1	127.0.0.1	HTTP	222	HTTP/1.0 200 OK (text/html)

Frame 23: 222 bytes on wire (1776 bits), 222 bytes captured (1776 bits)

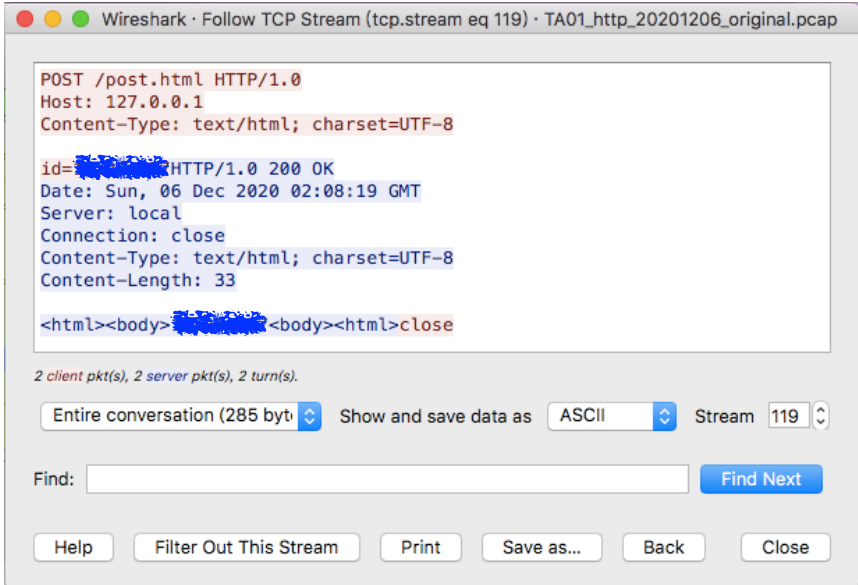
- Null/Loopback
- Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
- Transmission Control Protocol, Src Port: 80, Dst Port: 51125, Seq: 18, Ack: 98, Len: 166
- [2 Reassembled TCP Segments (183 bytes): #22(17), #23(166)]
- Hypertext Transfer Protocol
 - HTTP/1.0 200 OK\r\n
 - Date: Sun, 06 Dec 2020 02:08:19 GMT\r\n
 - Server: local\r\n
 - Connection: close\r\n
 - Content-Type: text/html; charset=UTF-8\r\n
 - Content-Length: 33\r\n
 - \r\n
 - [HTTP response 1/1]
 - [Time since request: 0.000725000 seconds]
 - [Request in frame: 21]
 - [Request URI: http://127.0.0.1/post.html]
 - File Data: 33 bytes
- Line-based text data: text/html (1 lines)
 - <html><body>[REDACTED]</body></html>

0000 02 00 00 00 45 00 00 da 40 5b 40 00 40 06 00 00 ...E... @[@@...

Frame (222 bytes) Reassembled TCP (183 bytes)

Hypertext Transfer Protocol: Protocol Packets: 23 · Displayed: 12 (52.2%) Profile: Default

TCP Stream



Wireshark · Follow TCP Stream (tcp.stream eq 119) · TA01_http_20201206_original.pcap

```
POST /post.html HTTP/1.0
Host: 127.0.0.1
Content-Type: text/html; charset=UTF-8

id=[REDACTED] HTTP/1.0 200 OK
Date: Sun, 06 Dec 2020 02:08:19 GMT
Server: local
Connection: close
Content-Type: text/html; charset=UTF-8
Content-Length: 33

<html><body>[REDACTED]</body></html>close
```

2 client pkt(s), 2 server pkt(s), 2 turn(s).

Entire conversation (285 byt) Show and save data as ASCII Stream 119

Find: Find Next

Help Filter Out This Stream Print Save as... Back Close