

# Wireshark Lab 3

ComputerSoftware

2020001658 이유민

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Time           Source                Destination                Protocol  Length  Info
106 2022-11-22 21:12:13.383908 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=67884 Win=1289 Len=0
107 2022-11-22 21:12:13.383908 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=69344 Win=1312 Len=0
108 2022-11-22 21:12:13.383958 192.168.200.149  128.119.245.12  HTTP     6375    POST /vireshark-labs/1ab3-l3-reply.htm HTTP/1.1 (text/plain)
109 2022-11-22 21:12:13.384149 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=70804 Win=1335 Len=0
110 2022-11-22 21:12:13.384071 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=72264 Win=1358 Len=0
111 2022-11-22 21:12:13.385763 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=73724 Win=1381 Len=0
112 2022-11-22 21:12:13.385986 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=75184 Win=1403 Len=0
113 2022-11-22 21:12:13.385986 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=76644 Win=1426 Len=0
114 2022-11-22 21:12:13.387004 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=78104 Win=1432 Len=0
115 2022-11-22 21:12:13.387348 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=79564 Win=1432 Len=0
116 2022-11-22 21:12:13.387692 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=81024 Win=1432 Len=0
117 2022-11-22 21:12:13.388807 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=82484 Win=1432 Len=0
118 2022-11-22 21:12:13.388807 128.119.245.12  192.168.200.149  TCP      54      80 -> 12719 [ACK] Seq=1 Ack=83944 Win=1432 Len=0

# Frame 108: 6375 bytes on wire (51080 bits), 6375 bytes captured (51080 bits) on interface DeviceNPF_{A835628B-E844-4206-890A-85A4303BC1E}, id 0
# Ethernet II, Src: Intel(R) Ethernet Controller (88:E3:1B:35:45:B5), Dst: Mac-Tech-31:92:04 (54:d1:63:13:92:04)
# Internet Protocol Version 4, Src: 192.168.200.149, Dst: 128.119.245.12
# Transmission Control Protocol, Src Port: 12719, Dst Port: 80, Seq: 146724, Ack: 1, Len: 6321
# [26 Reassembled TCP Segments (153844 bytes) : #38(723), #39(1318), #41(1460), #43(2920), #45(2920), #47(2920), #49(2920), #51(2920), #53(2920), #55(2920), #57(5840), #59(2920), #76(52560), #79(5840), #81(2920), #83(2920), #85(2920), #87(2920), #89(2920), #91(2920), #93(2920), #95(2920), #97(2920), #99(2920), #101(2920), #103(2920), #105(2920), #107(2920), #109(2920), #111(2920), #113(2920), #115(2920), #117(2920), #119(2920), #121(2920), #123(2920), #125(2920), #127(2920), #129(2920), #131(2920), #133(2920), #135(2920), #137(2920), #139(2920), #141(2920), #143(2920), #145(2920), #147(2920), #149(2920), #151(2920), #153(2920), #155(2920), #157(2920), #159(2920), #161(2920), #163(2920), #165(2920), #167(2920), #169(2920), #171(2920), #173(2920), #175(2920), #177(2920), #179(2920), #181(2920), #183(2920), #185(2920), #187(2920), #189(2920), #191(2920), #193(2920), #195(2920), #197(2920), #199(2920), #201(2920), #203(2920), #205(2920), #207(2920), #209(2920), #211(2920), #213(2920), #215(2920), #217(2920), #219(2920), #221(2920), #223(2920), #225(2920), #227(2920), #229(2920), #231(2920), #233(2920), #235(2920), #237(2920), #239(2920), #241(2920), #243(2920), #245(2920), #247(2920), #249(2920), #251(2920), #253(2920), #255(2920), #257(2920), #259(2920), #261(2920), #263(2920), #265(2920), #267(2920), #269(2920), #271(2920), #273(2920), #275(2920), #277(2920), #279(2920), #281(2920), #283(2920), #285(2920), #287(2920), #289(2920), #291(2920), #293(2920), #295(2920), #297(2920), #299(2920), #301(2920), #303(2920), #305(2920), #307(2920), #309(2920), #311(2920), #313(2920), #315(2920), #317(2920), #319(2920), #321(2920), #323(2920), #325(2920), #327(2920), #329(2920), #331(2920), #333(2920), #335(2920), #337(2920), #339(2920), #341(2920), #343(2920), #345(2920), #347(2920), #349(2920), #351(2920), #353(2920), #355(2920), #357(2920), #359(2920), #361(2920), #363(2920), #365(2920), #367(2920), #369(2920), #371(2920), #373(2920), #375(2920), #377(2920), #379(2920), #381(2920), #383(2920), #385(2920), #387(2920), #389(2920), #391(2920), #393(2920), #395(2920), #397(2920), #399(2920), #401(2920), #403(2920), #405(2920), #407(2920), #409(2920), #411(2920), #413(2920), #415(2920), #417(2920), #419(2920), #421(2920), #423(2920), #425(2920), #427(2920), #429(2920), #431(2920), #433(2920), #435(2920), #437(2920), #439(2920), #441(2920), #443(2920), #445(2920), #447(2920), #449(2920), #451(2920), #453(2920), #455(2920), #457(2920), #459(2920), #461(2920), #463(2920), #465(2920), #467(2920), #469(2920), #471(2920), #473(2920), #475(2920), #477(2920), #479(2920), #481(2920), #483(2920), #485(2920), #487(2920), #489(2920), #491(2920), #493(2920), #495(2920), #497(2920), #499(2920), #501(2920), #503(2920), #505(2920), #507(2920), #509(2920), #511(2920), #513(2920), #515(2920), #517(2920), #519(2920), #521(2920), #523(2920), #525(2920), #527(2920), #529(2920), #531(2920), #533(2920), #535(2920), #537(2920), #539(2920), #541(2920), #543(2920), #545(2
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Apply a display filter - Ctrl+F

No.	Time	Source	Destination	Protocol	Length	Info
215	2022-11-23 00:03:16.797505	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=66424 Win=162048 Len=0
216	2022-11-23 00:03:16.797505	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=67884 Win=164992 Len=0
217	2022-11-23 00:03:16.797556	192.168.200.149	128.119.245.12	TCP	5894	12916 → 80 [PSH, ACK] Seq=144527 Ack=1 Win=131328 Len=5848 [TCP segment of a reassembled PDU]
218	2022-11-23 00:03:16.799412	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=69344 Win=167936 Len=0
219	2022-11-23 00:03:16.799412	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=72264 Win=173824 Len=0
220	2022-11-23 00:03:16.799412	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=73724 Win=176768 Len=0
221	2022-11-23 00:03:16.799460	192.168.200.149	128.119.245.12	HTTP	2732	POST /elasticsearch-labs/lab3-1-reply.htm HTTP/1.1 (text/plain)
222	2022-11-23 00:03:16.800419	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=75184 Win=179584 Len=0
223	2022-11-23 00:03:16.800997	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=76644 Win=183528 Len=0
224	2022-11-23 00:03:16.801561	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=78104 Win=183296 Len=0
225	2022-11-23 00:03:16.801561	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=79564 Win=183296 Len=0
226	2022-11-23 00:03:16.802207	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=81024 Win=183296 Len=0
227	2022-11-23 00:03:16.802784	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=82484 Win=183296 Len=0
228	2022-11-23 00:03:16.803254	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=83207 Win=183296 Len=0
229	2022-11-23 00:03:16.803254	128.119.245.12	192.168.200.149	TCP	54	80 → 12916 [ACK] Seq=1 Ack=84667 Win=183296 Len=0
Ethernet II, Src: IntelCor_25:55:00:00:00:00, Dst: Max-Tech_13:92:04 (54:d1:63:13:92:04)						
Internet Protocol Version 4, Src: 192.168.200.149, Dst: 128.119.245.12						
Transmission Control Protocol, Src Port: 12916, Dst Port: 80, Seq: 150367, Ack: 1, Len: 2678						
Source Port: 12916						
Destination Port: 80						
[Stream index: 1]						
[TCP Segment Len: 2678]						
Sequence Number: 150367 (relative sequence number)						
Sequence Number (raw): 3762127764						
[next Sequence Number: 153845 (relative sequence number)]						
Acknowledgment Number: 1 (relative ack number)						
Acknowledgment number (raw): 3982951850						
0101 ... = Header Length: 20 bytes (5)						
Flags: 0x01B (PSH, ACK)						
Window: 513						
[Calculated window size: 131328]						
[Window size scaling factor: 256]						
Checksum: 0xfec8 [Unverified]						
[Checksum Status: Unverified]						
Urgent Pointer: 0						
[SEQ/ACK analysis]						
[Timestamps]						
TCP payload (2678 bytes)						
TCP segment data (2678 bytes)						
[14 Reassembled TCP Segments (153844 bytes): #119(723), #120(13148), #141(27740), #152(2928), #154(2920), #157(5840), #159(2920), #162(5840), #164(2920), #166(2920), #168(2920), #170(2920), #173(5840), #175(2920), #176(723), #178(2920)						

1. What is the IP address and TCP port number used by the client computer (source) that is transferring the alice.txt file to gaia.cs.umass.edu?

➔ IP Address: 192.168.200.149

➔ port: 12916

2. What is the IP address of gaia.cs.umass.edu? On what port number is it sending and receiving TCP segments for this connection?

➔ IP Address: 128.119.245.12

➔ Port: 80

3. What is the sequence number of the TCP SYN segment that is used to initiate the TCP connection between the client computer and gaia.cs.umass.edu?

➔ the sequence number: 0 in the trace

No.	Time	Source	Destination	Protocol	Length	Info
1	2021-02-03 11:43:26.692875	192.168.86.68	128.119.245.12	TCP	78	55639 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 SACK_PERM=1
2	2021-02-03 11:43:26.715289	128.119.245.12	192.168.86.68	TCP	74	80 → 55639 [SYN, ACK] Seq=0 Ack=1 Win=28960 Len=0 MSS=1460 SACK_PERM=1 TSval=725607509 TSecr=725607509 WS=128
3	2021-02-03 11:43:26.715300	192.168.86.68	128.119.245.12	TCP	66	55639 → 80 [ACK] Seq=1 Ack=1 Min=131712 Len=0 TSval=725607531 TSecr=3913851370
4	2021-02-03 11:43:26.716922	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=1449 Ack=1 Min=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
5	2021-02-03 11:43:26.716923	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=1449 Ack=1 Min=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
6	2021-02-03 11:43:26.716924	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=2897 Ack=1 Min=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
7	2021-02-03 11:43:26.745546	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=1449 Min=131712 Len=0 TSval=3913851399 TSecr=725607532
8	2021-02-03 11:43:26.745551	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=2897 Min=131712 Len=0 TSval=3913851400 TSecr=725607532
9	2021-02-03 11:43:26.745649	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=4345 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851399 [TCP segment of a reassembled PDU]
10	2021-02-03 11:43:26.745650	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=5793 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851399 [TCP segment of a reassembled PDU]
11	2021-02-03 11:43:26.745729	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=7241 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
12	2021-02-03 11:43:26.745730	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=8089 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
13	2021-02-03 11:43:26.746501	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=4345 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
14	2021-02-03 11:43:26.746585	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=10137 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
15	2021-02-03 11:43:26.746586	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=11585 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
16	2021-02-03 11:43:26.773643	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=5793 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
17	2021-02-03 11:43:26.773646	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=7241 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
18	2021-02-03 11:43:26.773647	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=8089 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
19	2021-02-03 11:43:26.773647	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=10137 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
20	2021-02-03 11:43:26.773720	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=13033 Ack=1 Min=131712 Len=1448 TSval=725607588 TSecr=3913851421 [TCP segment of a reassembled PDU]

Frame 1: 78 bytes on wire (624 bits), 78 bytes captured (624 bits) on interface en0, id 0  
Ethernet II, Src: Apple\_98:d9:27 (78:4f:43:98:d9:27), Dst: Google\_89:0e:c8 (3c:28:6d:89:0e:c8)  
Internet Protocol Version 4, Src: 192.168.86.68, Dst: 128.119.245.12  
Transmission Control Protocol, Src Port: 55639, Dst Port: 80, Seq: 0, Len: 0  
Source Port: 55639  
Destination Port: 80  
[Stream Index: 0]  
[TCP Segment Len: 0]  
Sequence Number: 0 (relative sequence number)  
Sequence Number (raw): 4236649187  
[Next Sequence Number: 1 (relative sequence number)]  
Acknowledgment Number: 0  
Acknowledgment Number (raw): 0  
1011 ... = Header Length: 44 bytes (11)  
Flags: 0x002 (SYN)  
Window: 65535  
0000 3c 28 6d 89 0e c8 78 4f 43 98 d9 27 08 00 45 00 <m <P <G <V D w  
0010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 <P <G <V D w  
0020 f5 0c d9 57 00 50 f6 8c 22 e3 00 00 00 00 00 02 <P <G <V D w  
0030 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff <P <G <V D w  
0040 00 0a 20 3f e4 55 00 00 00 00 04 02 00 00 00 00 <P <G <V D w

4. What is the sequence number of the SYN ACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN?

No.	Time	Source	Destination	Protocol	Length	Info
1	2021-02-03 11:43:26.692875	192.168.86.68	128.119.245.12	TCP	78	55639 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 SACK_PERM=1
2	2021-02-03 11:43:26.715289	128.119.245.12	192.168.86.68	TCP	74	80 → 55639 [SYN, ACK] Seq=0 Ack=1 Win=28960 Len=0 MSS=1460 SACK_PERM=1 TSval=725607509 TSecr=725607509 WS=128
3	2021-02-03 11:43:26.715300	192.168.86.68	128.119.245.12	TCP	66	55639 → 80 [ACK] Seq=1 Ack=1 Min=131712 Len=0 TSval=725607531 TSecr=3913851370
4	2021-02-03 11:43:26.716922	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=1449 Ack=1 Min=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
5	2021-02-03 11:43:26.716923	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=1449 Ack=1 Min=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
6	2021-02-03 11:43:26.716924	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=2897 Ack=1 Min=131712 Len=1448 TSval=725607532 TSecr=3913851370 [TCP segment of a reassembled PDU]
7	2021-02-03 11:43:26.745546	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=1449 Min=131712 Len=0 TSval=3913851399 TSecr=725607532
8	2021-02-03 11:43:26.745551	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=2897 Min=131712 Len=0 TSval=3913851400 TSecr=725607532
9	2021-02-03 11:43:26.745649	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=4345 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851399 [TCP segment of a reassembled PDU]
10	2021-02-03 11:43:26.745650	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=5793 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851399 [TCP segment of a reassembled PDU]
11	2021-02-03 11:43:26.745729	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=7241 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
12	2021-02-03 11:43:26.745730	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=8089 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
13	2021-02-03 11:43:26.746501	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=4345 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
14	2021-02-03 11:43:26.746585	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=10137 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
15	2021-02-03 11:43:26.746586	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=11585 Ack=1 Min=131712 Len=1448 TSval=725607560 TSecr=3913851400 [TCP segment of a reassembled PDU]
16	2021-02-03 11:43:26.773643	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=5793 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
17	2021-02-03 11:43:26.773646	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=7241 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
18	2021-02-03 11:43:26.773647	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=8089 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
19	2021-02-03 11:43:26.773647	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=10137 Min=131712 Len=0 TSval=3913851422 TSecr=725607560
20	2021-02-03 11:43:26.773720	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=13033 Ack=1 Min=131712 Len=1448 TSval=725607588 TSecr=3913851421 [TCP segment of a reassembled PDU]

Acknowledgment Number (raw): 4236649188  
1010 ... = Header Length: 40 bytes (10)  
Flags: 0x012 (SYN, ACK)  
0000 ..... = Reserved: Not set  
...0 ..... = Reset: Not set  
...0 ..... = Congestion Window Reduced (CWR): Not set  
...0 ..... = ECH Echo: Not set  
...0 ..... = Urgent: Not set  
...1 ..... = Acknowledgment: Set  
...0 ..... = Push: Not set  
...0 ..... = Retransmit: Not set  
...1 ..... = SYN: Set  
...0 ..... = FIN: Not set  
[TCP Flags] .....  
Window: 28960  
78 4f 43 98 d9 27 08 00 3c 28 6d 89 0e c8 78 4f 43 98 d9 27 08 00 45 00 <m <P <G <V D w  
0010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 <P <G <V D w  
0020 56 44 06 00 00 57 34 07 2f 18 f6 8c 22 e3 00 00 02 <P <G <V D w  
0030 71 20 47 04 00 00 02 04 05 04 02 00 00 00 00 00 00 <P <G <V D w  
0040 e1 aa 20 3f e4 55 01 01 01 07 <P <G <V D w

What is it in the segment that identifies the segment as a SYN ACK segment?

→ the sequence number: 0

What is the value of the Acknowledgement field in the SYNACK segment? How did gaia.cs.umass.edu determine that value?

→ 1

5. What is the sequence number of the TCP segment containing the header of the HTTP POST command? Note that in order to find the POST message header, you'll need to dig into the packet content field at the bottom of the Wireshark window, looking for a segment with the ASCII text "POST" within its DATA field. How many bytes of data are contained in the payload (data) field of this TCP segment? Did all of the data in the transferred file alice.txt fit into this single segment?

The image shows a Wireshark packet capture. The top pane displays a list of packets. Packet 153 is highlighted, showing it is an HTTP POST request from 192.168.86.68 to 192.168.86.68. The bottom pane shows the details of this packet, specifically the Transmission Control Protocol (TCP) segment. The sequence number is 153426, and the acknowledgment number is 1. The data field contains the ASCII text "POST /jreeshark-labs/lab3-1-reply.htm HTTP/1.1 (text/plain)".

No.	Time	Source	Destination	Protocol	Length	Info
142	2021-02-03 11:43:26.034111	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=143353 Ack=1 Win=131712 Len=1448 TSval=725607645 TSecr=3913851498 [TCP segment of a reassembled PDU]
143	2021-02-03 11:43:26.039576	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=72480 Win=173824 Len=0 TSval=3913851497 TSecr=725607629
144	2021-02-03 11:43:26.039644	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=144801 Ack=1 Win=131712 Len=1448 TSval=725607650 TSecr=3913851497 [TCP segment of a reassembled PDU]
145	2021-02-03 11:43:26.039644	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=146249 Ack=1 Win=131712 Len=1448 TSval=725607650 TSecr=3913851497 [TCP segment of a reassembled PDU]
146	2021-02-03 11:43:26.040436	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=73849 Win=176768 Len=0 TSval=3913851497 TSecr=725607629
147	2021-02-03 11:43:26.040436	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=75297 Win=179584 Len=0 TSval=3913851497 TSecr=725607630
148	2021-02-03 11:43:26.040440	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=76745 Win=182528 Len=0 TSval=3913851498 TSecr=725607630
149	2021-02-03 11:43:26.040441	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=78193 Win=182528 Len=0 TSval=3913851498 TSecr=725607630
150	2021-02-03 11:43:26.040495	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=147697 Ack=1 Win=131712 Len=1448 TSval=725607650 TSecr=3913851497 [TCP segment of a reassembled PDU]
151	2021-02-03 11:43:26.040496	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=149145 Ack=1 Win=131712 Len=1448 TSval=725607650 TSecr=3913851497 [TCP segment of a reassembled PDU]
152	2021-02-03 11:43:26.040555	192.168.86.68	128.119.245.12	TCP	1514	55639 → 80 [ACK] Seq=149593 Ack=1 Win=131712 Len=1448 TSval=725607650 TSecr=3913851497 [TCP segment of a reassembled PDU]
153	2021-02-03 11:43:26.040557	192.168.86.68	128.119.245.12	HTTP	1451	POST /jreeshark-labs/lab3-1-reply.htm HTTP/1.1 (text/plain)
154	2021-02-03 11:43:26.042501	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=81089 Win=182528 Len=0 TSval=3913851498 TSecr=725607630
155	2021-02-03 11:43:26.042504	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=82537 Win=183296 Len=0 TSval=3913851498 TSecr=725607630
156	2021-02-03 11:43:26.047908	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=86881 Win=181632 Len=0 TSval=3913851504 TSecr=725607637
157	2021-02-03 11:43:26.048277	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=88329 Win=183296 Len=0 TSval=3913851505 TSecr=725607637
158	2021-02-03 11:43:26.048279	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=94121 Win=179584 Len=0 TSval=3913851505 TSecr=725607637
159	2021-02-03 11:43:26.048280	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=95569 Win=183296 Len=0 TSval=3913851505 TSecr=725607637
160	2021-02-03 11:43:26.048280	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=99913 Win=188608 Len=0 TSval=3913851505 TSecr=725607637
161	2021-02-03 11:43:26.048595	128.119.245.12	192.168.86.68	TCP	66	80 → 55639 [ACK] Seq=1 Ack=102809 Win=182528 Len=0 TSval=3913851506 TSecr=725607637

Transmission Control Protocol, Src Port: 55639, Dst Port: 80, Seq: 153426, Ack: 1, Len: 1385

Source Port: 55639  
Destination Port: 80  
[Stream index: 0]  
[TCP Segment Len: 1385]  
Sequence Number: 153426 (relative sequence number)  
Sequence Number (raw): 4219801228  
[Next Sequence Number: 153426 (relative sequence number)]  
Acknowledgment Number: 1 (relative ack number)  
Acknowledgment number (raw): 1068969753  
1000 ..... = Header Length: 32 bytes (8)  
Flags: 0x018 (PSH, ACK)  
000 ..... = Reserved: Not set  
...0 ..... = Nonce: Not set  
...0 ..... = Congestion Window Reduced (CWR): Not set

153426 65 0c 0d 57 00 58 fc 08 74 cc 3f b7 2f 19 80 18 ...H P...t ? /...  
0030 08 0a bd 46 00 00 01 01 08 0a 2b 3f e4 e2 e9 48 ...P... ..e...H  
0040 a2 69 20 75 70 20 77 69 74 68 20 74 68 65 20 64 ...i up ul th the d  
0050 69 73 74 61 66 74 20 73 6f 62 73 20 6f 66 20 74 ...stant's obs of t  
0060 68 65 20 6d 69 73 65 72 61 62 6c 65 0d 0a dd 6f ...he miser-able Ho  
0070 63 6b 20 54 75 72 74 6c 65 2a 0d 0a 0d 0a 20 20 ...ck Turf! a...  
0080 53 6f 20 73 68 65 20 73 61 74 20 6f 6e 2c 20 77 ...So she's at on, w  
0090 69 74 68 20 63 6c 6f 73 65 6a 20 69 79 65 73 2c ...ith clos ed eyes,  
Frame (1451 bytes) : Reassembled TCP (153426 bytes)

→ the sequence number: 153426

→ 1451bytes

6. Consider the TCP segment containing the HTTP "POST" as the first segment in the data transfer part of the TCP connection.

- At what time was the first segment (the one containing the HTTP POST) in the data-transfer part of the TCP connection sent?

➔ 12:20:26.175345

- At what time was the ACK for this first data-containing segment received?

➔ 12:20:26.194966

- What is the RTT for this first data-containing segment?

➔  $20.26.194966 - 20.26.175345 = 0.019621$

- What is the RTT value the second data-carrying TCP segment and its ACK?

➔  $12:20:26.175345 - 12:20:26.175084 = 0.000261$

- What is the EstimatedRTT value (see Section 3.5.3, in the text) after the ACK for the second data-carrying segment is received? Assume that in making this calculation after the received of the ACK for the second segment, that the initial value of EstimatedRTT is equal to the measured RTT for the first segment, and then is computed using the EstimatedRTT equation on page 242, and a value of  $\alpha = 0.125$ .

➔  $(0.875 \cdot 0.019621) + (0.125 \cdot 0.000261) = 0.017168375 + 0.000032625 = 0.017201$

7. What is the length (header plus payload) of each of the first four data-carrying TCP segments?

No.	Time	Source	Destination	Protocol	Length	Info
2	2021-02-16 12:20:26.160859	192.168.1.187	128.119.245.12	TCP	54	61686 → 80 [FIN, ACK] Seq=1 Ack=1 Win=512 Len=0
3	2021-02-16 12:20:26.161659	192.168.1.187	128.119.245.12	TCP	66	61689 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
4	2021-02-16 12:20:26.174417	128.119.245.12	192.168.1.187	TCP	66	80 → 61689 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM=1 WS=128
5	2021-02-16 12:20:26.174479	192.168.1.187	128.119.245.12	TCP	54	61689 → 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0
6	2021-02-16 12:20:26.174759	128.119.245.12	192.168.1.187	TCP	54	80 → 61686 [ACK] Seq=1 Ack=2 Win=238 Len=0
7	2021-02-16 12:20:26.175084	192.168.1.187	128.119.245.12	TCP	765	61689 → 80 [PSH, ACK] Seq=1 Ack=1 Win=131328 Len=711 [TCP segment of a reassembled PDU]
8	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=712 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
9	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=2172 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
10	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=3632 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
11	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=5092 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
12	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=6552 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
13	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=8012 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
14	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=9472 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
15	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=10932 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
16	2021-02-16 12:20:26.175345	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=12392 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
17	2021-02-16 12:20:26.184966	128.119.245.12	192.168.1.187	TCP	54	80 → 61689 [ACK] Seq=1 Ack=712 Win=30720 Len=0
18	2021-02-16 12:20:26.189085	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=13852 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
19	2021-02-16 12:20:26.195118	128.119.245.12	192.168.1.187	TCP	54	80 → 61689 [ACK] Seq=1 Ack=5092 Win=39424 Len=0
20	2021-02-16 12:20:26.195152	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [ACK] Seq=15312 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]
21	2021-02-16 12:20:26.195152	192.168.1.187	128.119.245.12	TCP	1514	61689 → 80 [PSH, ACK] Seq=16772 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]

0101 ..... = Header Length: 20 bytes (5)	
Flags: 0x018 (PSH, ACK)	
Window: 513	
[Calculated window size: 131328]	
[Window size scaling factor: 256]	
Checksum: 0xc96 [Unverified]	
[Checksum Status: Unverified]	
Urgent Pointer: 0	
[SEQ/ACK analysis]	
[Timestamps]	
[Time since first frame in this TCP stream: 0.013425000 seconds]	
[Time since previous frame in this TCP stream: 0.000605000 seconds]	
TCP payload (711 bytes)	
[Reassembled PDU in frame: 128]	
TCP segment data (711 bytes)	

19	2021-02-16 12:20:26.195118	128.119.245.12	192.168.1.187	TCP	54 80 → 61689 [ACK] Seq=1 Ack=5092 Win=39424 Len=0	
20	2021-02-16 12:20:26.195152	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=15312 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
21	2021-02-16 12:20:26.195152	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [PSH, ACK] Seq=16772 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
0101 .... = Header Length: 20 bytes (5) > Flags: 0x018 (PSH, ACK) Window: 513 [Calculated window size: 131328] [Window size scaling factor: 256] Checksum: 0x2d8f [unverified] [Checksum Status: Unverified] Urgent Pointer: 0 > [SEQ/ACK analysis] < [Timestamps] [Time since first frame in this TCP stream: 0.053493000 seconds] [Time since previous frame in this TCP stream: 0.000000000 seconds] TCP payload (1460 bytes) <u>Reassembled PDU in frame: 128</u> TCP segment data (1460 bytes)						
33	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=31372 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
34	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [PSH, ACK] Seq=32832 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
35	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=34292 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
36	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=35752 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
37	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=37212 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
38	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=38672 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
39	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=40132 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
0101 .... = Header Length: 20 bytes (5) > Flags: 0x018 (PSH, ACK) Window: 513 [Calculated window size: 131328] [Window size scaling factor: 256] Checksum: 0x3370 [unverified] [Checksum Status: Unverified] Urgent Pointer: 0 > [SEQ/ACK analysis] < [Timestamps] [Time since first frame in this TCP stream: 0.053421000 seconds] [Time since previous frame in this TCP stream: 0.000000000 seconds] TCP payload (1460 bytes) <u>Reassembled PDU in frame: 128</u> TCP segment data (1460 bytes)						
34	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [PSH, ACK] Seq=32832 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
35	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=34292 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
36	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=35752 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
37	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=37212 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
38	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=38672 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
39	2021-02-16 12:20:26.215080	192.168.1.187	128.119.245.12	TCP	1514 61689 → 80 [ACK] Seq=40132 Ack=1 Win=131328 Len=1460 [TCP segment of a reassembled PDU]	
0101 .... = Header Length: 20 bytes (5) > Flags: 0x018 (PSH, ACK) Window: 513 [Calculated window size: 131328] [Window size scaling factor: 256] Checksum: 0x3370 [unverified] [Checksum Status: Unverified] Urgent Pointer: 0 > [SEQ/ACK analysis] < [Timestamps] [Time since first frame in this TCP stream: 0.053421000 seconds] [Time since previous frame in this TCP stream: 0.000000000 seconds] TCP payload (1460 bytes) <u>Reassembled PDU in frame: 128</u> TCP segment data (1460 bytes)						

- ➔ 1th: 711 bytes
- ➔ 2th: 1460 bytes
- ➔ 3th: 1460 bytes
- ➔ 4th: 1460 bytes



8. What is the minimum amount of available buffer space advertised to the client by gaia.cs.umass.edu among these first four data-carrying TCP segments? Does the lack of receiver buffer space ever throttle the sender for these first four data-carrying segments?

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.10	128.119.245.12	TCP	78	55639 → 80 [SYN] Seq=0 Win=0 Len=0 MSS=1460 WS=0 SACK_PERM=1
2	0.000000	128.119.245.12	192.168.1.10	TCP	78	80 → 55639 [SYN, ACK] Seq=0 Ack=1 Win=0 Len=0 MSS=1460 SACK_PERM=1 TSVol=3913851378 TSrc=725687509 WS=128
3	0.000000	128.119.245.12	192.168.1.10	TCP	66	55639 → 80 [ACK] Seq=1 Ack=1 Win=131312 Len=0 TSVol=725687531 TSrc=3913851378
4	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=1 Ack=1 Win=131312 Len=1460 TSVol=725687532 TSrc=3913851378 [TCP segment of a reassembled PDU]
5	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=1449 Ack=1 Win=131312 Len=1460 TSVol=725687532 TSrc=3913851378 [TCP segment of a reassembled PDU]
6	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=2897 Ack=1 Win=131312 Len=1460 TSVol=725687532 TSrc=3913851378 [TCP segment of a reassembled PDU]
7	0.000000	128.119.245.12	192.168.1.10	TCP	66	80 → 55639 [ACK] Seq=1 Ack=1449 Win=131312 Len=0 TSVol=3913851399 TSrc=725687532
8	0.000000	128.119.245.12	192.168.1.10	TCP	66	80 → 55639 [ACK] Seq=1 Ack=2897 Win=131312 Len=0 TSVol=3913851400 TSrc=725687532
9	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=4345 Ack=1 Win=131312 Len=1460 TSVol=725687560 TSrc=3913851399 [TCP segment of a reassembled PDU]
10	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=5793 Ack=1 Win=131312 Len=1460 TSVol=725687560 TSrc=3913851399 [TCP segment of a reassembled PDU]
11	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=7241 Ack=1 Win=131312 Len=1460 TSVol=725687560 TSrc=3913851400 [TCP segment of a reassembled PDU]
12	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=8689 Ack=1 Win=131312 Len=1460 TSVol=725687560 TSrc=3913851400 [TCP segment of a reassembled PDU]
13	0.000000	128.119.245.12	192.168.1.10	TCP	66	80 → 55639 [ACK] Seq=1 Ack=4345 Win=131312 Len=0 TSVol=3913851400 TSrc=725687532
14	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=10137 Ack=1 Win=131312 Len=1460 TSVol=725687560 TSrc=3913851400 [TCP segment of a reassembled PDU]
15	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=11585 Ack=1 Win=131312 Len=1460 TSVol=725687560 TSrc=3913851400 [TCP segment of a reassembled PDU]
16	0.000000	128.119.245.12	192.168.1.10	TCP	66	80 → 55639 [ACK] Seq=1 Ack=5793 Win=131312 Len=0 TSVol=3913851421 TSrc=725687560
17	0.000000	128.119.245.12	192.168.1.10	TCP	66	80 → 55639 [ACK] Seq=1 Ack=7241 Win=131312 Len=0 TSVol=3913851421 TSrc=725687560
18	0.000000	128.119.245.12	192.168.1.10	TCP	66	80 → 55639 [ACK] Seq=1 Ack=8689 Win=131312 Len=0 TSVol=3913851421 TSrc=725687560
19	0.000000	128.119.245.12	192.168.1.10	TCP	66	80 → 55639 [ACK] Seq=1 Ack=10137 Win=131312 Len=0 TSVol=3913851421 TSrc=725687560
20	0.000000	128.119.245.12	192.168.1.10	TCP	1514	55639 → 80 [ACK] Seq=13033 Ack=1 Win=131312 Len=1460 TSVol=725687560 TSrc=3913851421 [TCP segment of a reassembled PDU]

➔ 28960 bytes, not throttled.

9. Are there any retransmitted segments in the trace file? What did you check for (in the trace) in order to answer this question?

➔ There are not.

10. How much data does the receiver typically acknowledge in an ACK among the first ten data-carrying segments sent from the client to gaia.cs.umass.edu? Can you identify cases where the receiver is ACKing every other received segment (see Table 3.2 in the text) among these first ten data-carrying segments?

9	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=712 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]
9	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=2172 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]
10	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=3632 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]
11	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=5092 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]
12	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=6552 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]
13	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=8012 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]
14	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=9472 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]
15	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=10932 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]
16	0.000000	128.119.245.12	192.168.1.10	TCP	1514	61689 → 80 [ACK] Seq=12392 Ack=1 Win=131312 Len=1460 [TCP segment of a reassembled PDU]

➔ ACK 숫자가 1460씩 증가.

➔ Receiver가 1460bytes씩 acknowledging.

11. What is the throughput (bytes transferred per unit time) for the TCP connection?

Explain how you calculated this value.

→ Throughput = Amount of data transmitted / time incurred.

The image shows two screenshots of a Wireshark packet capture. The top screenshot displays a series of TCP segments (packets 15-23) from 192.168.1.187 to 128.119.245.12. These segments are part of a reassembled PDU, with sequence numbers ranging from 1514 to 1516. The bottom screenshot shows a later point in the capture, including an HTTP POST request (packet 128) from 192.168.1.187 to 128.119.245.12, which is also part of a reassembled PDU. The request is for the URL /wireshark-labs/lab3-1-reply.htm. Subsequent TCP segments (packets 129-132) are shown, with sequence numbers ranging from 64 to 66.

→ time incurred: 26.302022 – 26.194966 = 0.107056

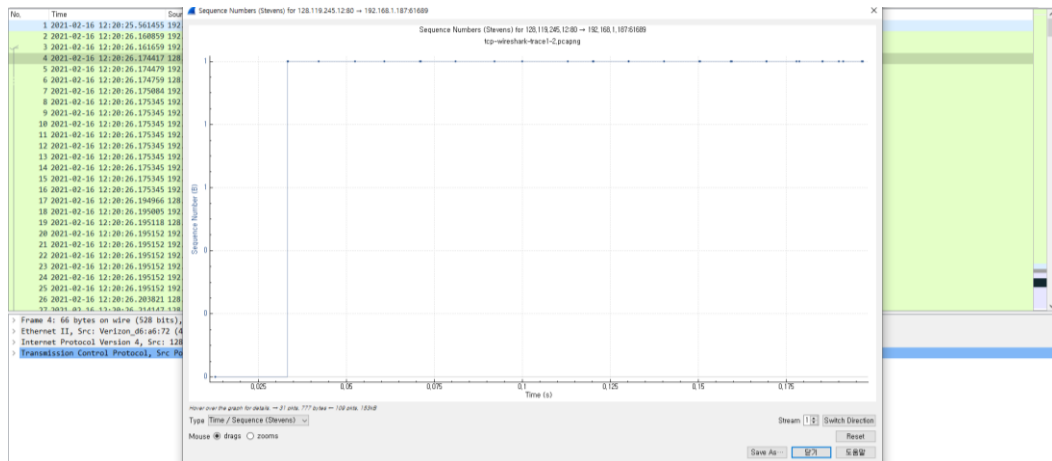
→ 152,138 / 0.107056 =(대략) 142,111 (1,421,106.7105067)

12. Use the Time-Sequence-Graph(Stevens) plotting tool to view the sequence number versus time plot of segments being sent from the client to the gaia.cs.umass.edu server. Consider the “fleets” of packets sent around  $t = 0.025$ ,  $t = 0.053$ ,  $t = 0.082$  and  $t = 0.1$ . Comment on whether this looks as if TCP is in its slow start phase, congestion avoidance phase or some other phase. Figure 6 shows a slightly different view of this data.

13. These “fleets” of segments appear to have some periodicity. What can you say about the period?

14. Answer each of two questions above for the trace that you have gathered when you transferred a file from your computer to gaia.cs.umass.edu.

→ 12, 13, 14 answer.



- ➔ TCP slowstart: 0.037sec end.
- ➔ 선형 증가가 관찰되지 않는다.
- ➔ TCP transmit window가 선형적으로 증가하지 않는다.
- ➔ http의 속도제한 때문일 가능성이 있다.