计算机网络实验报告

课程名称_		计算	肌网络			成绩评定	
实验项目名	3称	TCP †	办议		_指导教师	张伟	
实验项目编	3号 <u>实</u> 3	<u> </u>		实验项目	目类型	实验地点	
学生姓名_	密语	E.		学号	20220046	0104	
学院	网络空间	安全		专业	网络空间	安全	
实验时间	2024 🖆	₹ 4	月 3	80 日			

一、 实验目的

- 1. 熟悉 TCP 的协议格式。
- 2. 理解 TCP 对序列号和确认号的使用。
- 3. 理解 TCP 的流量控制算法和拥塞控制算法。

二、 实验步骤与结果

任务一:

1. 首先使用 ping 指令,我们可以得知 gaia.cs.umass.edu.com 对应的 IP 地址

```
C:\Users\86135>ping gaia.cs.umass.edu

正在 Ping gaia.cs.umass.edu [128.119.245.12] 具有 32 字节的数据:
来自 128.119.245.12 的回复: 字节=32 时间=285ms TTL=37
来自 128.119.245.12 的回复: 字节=32 时间=286ms TTL=37
请求超时。
来自 128.119.245.12 的回复: 字节=32 时间=298ms TTL=37

128.119.245.12 的 Ping 统计信息:
数据包:已发送 = 4,已接收 = 3,丢失 = 1 (25%丢失),
往返行程的估计时间(以毫秒为单位):最短 = 285ms,最长 = 298ms,平均 = 289ms
```

2. 然后使用 Wireshark 抓包得到计算机与 gaia.cs.umass.edu.com 之间的一系列 TCP 通信和 HTTP 通信:

76 3.012005 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0 77 3.012232 172.25.170.244 128.119.245.12 TCP 66 58772 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM 78 3.012371 172.25.170.244 128.119.245.12 HTTP 993 POST /wireshark-labs/lab3-1-reply.htm HTTP/1.1 79 3.017741 128.119.245.12 172.25.170.244 TCP 60 80 → 58694 [ACK] Seq=1 Ack=2 Win=229 Len=0 80 3.049020 20.54.232.160 172.25.170.244 TLSV1.2 544 Application Data 81 3.095517 172.25.170.244 20.54.232.160 TCP 54 58767 → 443 [ACK] Seq=5922 Ack=9394 Win=131840 Len=0 82 3.095529 172.25.170.244 128.119.245.12 TCP 54 [TCP_Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0						
76 3.012095 172.25.170.244 128.119.245.12 TCP 54 58768 + 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0 77 3.012232 172.25.170.244 128.119.245.12 TCP 66 58772 + 80 [SVN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM 78 3.012371 172.25.170.244 128.119.245.12 HTTP 93 POST VARSHARL-labs/13ba3-1-reply.htm HTTP/1.1 79 3.017741 128.119.245.12 172.25.170.244 TCP 66 80 + 58694 [ACK] Seq=1 Ack=2 Win=229 Len=0 80 3.049020 20.54.232.160 172.25.170.244 TLSV1.2 544 Application Data 81 3.095517 172.25.170.244 20.54.232.160 TCP 54 [TCP 66 80 + 58764 Application Data 82 3.085529 172.25.170.244 128.119.245.12 TCP 54 [TCP 66 80 + 58772 FM [ACK] Seq=0 Ack=1 Win=2920 Len=0 MSS=1460 SACK_PERM WS- 84 3.263997 172.25.170.244 128.119.245.12 TCP 54 [SCR] Seq=1 Ack=0 Win=31328 Len=0 85 3.260913 128.119.245.12 172.25.170.244 TCP 66 80 + 58772 FM [ACK] Seq=1 Ack=0 Win=31328 Len=0 86 3.267941 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 OK (text/html) 87 3.322706 172.25.170.244 128.119.245.12 TCP 54 SER72 FM [ACK] Seq=0 Ack=778 Win=130560 Len=0 88 3.704229 172.25.170.244 128.119.245.12 TCP 54 SER788 + 80 [ACK] Seq=0 Ack=1 Win=30560 Len=0 89 3.727426 172.25.170.244 51.105.71.137 TLSV1.2 93 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSV1.2 93 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSV1.2 93 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSV1.2 1464 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSV1.2 93 Application Data 94 3.838377 172.25.170.244 51.105.71.137 TLSV1.2 93 Application Data 95 4.0836296 51.105.71.137 172.25.170.244 TCP 60 443 + \$820 + 8088 [PSH, ACK] Seq=1 Ack=1 Win=515 Len=0 96 4.083295 51.105.71.137 172.25.170.244 TCP 60 443 + \$8484 [ACK] Seq=1 Ack=1 Win=16381 Len=0 97 4.0836296 51.105.71.137 172.25.170.244 TCP 60 443 + \$8484 [ACK] Seq=1 Ack=1 Win=16381 Len=0 14 4.787541 51.105.71.137 172.25.170.244 TCP 60 443 + \$8484 [ACK] Seq=1 Ack=104 Win=16381 Len=0 14 4.787541 51.105.71.137 172.25.170.244 TCP 60 443 + \$8484 [ACK] Seq=1 Ack=104 Win=16381 Len=0 140 4.787541 51.10	i	74 2.992922	113.240.75.252	172.25.170.244	TCP	60 443 → 58769 [ACK] Seq=363 Ack=7408 Win=64128 Len=0
77 3.012232 172.25.170.244 128.119.245.12 TCP 66 5877.2 + 80 [SVN] Seq=0 kin=64240 Len=0 MSS=1460 WS=256 SACK_PERM 78 3.012371 172.25.170.244 128.119.245.12 HTTP 93 POST /wireshark-labs/12b3-1-reply.htm HTTP/1.1 179 3.017741 128.119.245.12 172.25.170.244 TCP 66 80 + 58694 [ACK] Seq=1 Ack=2 Win=229 Len=0 80 3.049020 20.54.232.160 172.25.170.244 TLSv1.2 544 Application Data 81 3.095517 172.25.170.244 128.119.245.12 TCP 54 \$8767 + 443 [ACK] Seq=5922 Ack=9394 Win=131840 Len=0 82 3.055529 172.25.170.244 128.119.245.12 TCP 54 \$8767 + 443 [ACK] Seq=6 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM WS: 84 3.263997 172.25.170.244 128.119.245.12 TCP 54 \$8772 [SVN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM WS: 85 3.266013 128.119.245.12 172.25.170.244 TCP 66 80 + 58768 [ACK] Seq=1 Ack=0 Win=311328 Len=0 83 3.263997 127.25.170.244 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 OK (text/html) 87 3.322706 172.25.170.244 128.119.245.12 TCP 54 \$8767 & 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 88 3.704229 172.25.170.244 128.119.245.12 TCP 54 \$8768 & 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 188 3.704229 172.25.170.244 128.119.245.12 TCP 54 \$8768 & 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 188 3.704229 172.25.170.244 128.119.245.12 TCP 54 \$8768 & 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 188 3.704229 172.25.170.244 128.119.245.12 TCP 54 \$8768 & 80 [ACK] Seq=940 Ack=178 Win=130560 Len=0 188 3.704229 172.25.170.244 128.119.245.12 TCP 54 \$8768 & 80 [ACK] Seq=940 Ack=178 Win=1506 Len=0 188 3.704229 172.25.170.244 128.119.245.12 TCP 184 8080 [FSH, ACK] Seq=1 Ack=1 Win=517 Len=0 188 3.704229 172.25.170.244 111.30.169.83 TCP 174 \$8220 + 8806 [FSH, ACK] Seq=1 Ack=1 Win=517 Len=0 19 4.306296 51.105.71.137 172.25.170.244 TCP 134 8080 + \$8220 + 8080 [FSH, ACK] Seq=1 Ack=1 Win=517 Len=0 19 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + \$8484 [ACK] Seq=1 Ack=12 Win=518 Len=0 19 4.036296 51.105.71.137 172.25.170.244 TCP 64 434 + \$8484 [ACK] Seq=1 Ack=12 Win=1638 Len=0 19 4.036296 51.105.71.137 172.25.170.244 TCP 64 434 + \$8484 [A	i	75 3.011903	128.119.245.12	172.25.170.244	TCP	66 80 → 58768 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM WS=
78 3.012371 172.25.170.244 128.119.245.12 HTTP 993 POST /wireshark-labs/lab3-1-reply.htm HTTP/1.1 79 3.017741 128.119.245.12 172.25.170.244 TCP 60 80 + 58694 [ACK] Seq=1 Ack=2 Win=229 Len=0 80 3.049020 20.54.232.160 TCP 54 58767 + 443 [ACK] Seq=5922 Ack=9394 Win=131840 Len=0 81 3.095517 172.25.170.244 20.54.232.160 TCP 54 58767 + 443 [ACK] Seq=1 Ack=1 Win=2900 Len=0 MSS=1460 SACK_PERM WSS=3 8.095529 172.25.170.244 128.119.245.12 TCP 54 58772 [SM] ACK] Seq=1 Ack=1 Win=2900 Len=0 MSS=1460 SACK_PERM WSS=3 8.06893 128.119.245.12 172.25.170.244 170	1	76 3.012005	172.25.170.244	128.119.245.12	TCP	54 58768 → 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0
79 3.017741 128.119.245.12 172.25.170.244 TCP 60 80 → 58694 [ACK] Seq=1 Ack=2 Win=229 Len=0 80 3.049020 20.54.232.160 172.25.170.244 TLSV1.2 544 Application Data 81 3.095517 172.25.170.244 128.119.245.12 TCP 54 58774 743 [ACK] Seq=5922 Ack=9394 Win=131840 Len=0 82 3.095529 172.25.170.244 128.119.245.12 TCP 54 [CP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 83 3.263893 128.119.245.12 172.25.170.244 TCP 66 80 → 58772 [SVN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM WS: 84 3.263997 172.25.170.244 128.119.245.12 TCP 54 58772 → 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0 85 3.266013 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [ACK] Seq=1 Ack=940 Win=31104 Len=0 86 3.267941 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 OK (text/html) 87 3.322706 172.25.170.244 128.119.245.12 TCP 54 58768 + 80 [ACK] Seq=940 Ack=78 Win=130560 Len=0 88 3.747429 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 89 3.727357 172.25.170.244 51.105.71.137 TLSV1.2 138 Application Data 90 3.727426 172.25.170.244 51.105.71.137 TLSV1.2 138 Application Data 91 3.77467 172.25.170.244 51.105.71.137 TLSV1.2 1464 Application Data 92 3.771489 172.25.170.244 111.30.169.83 TCP 174 58220 → 8880 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 93 3.795046 111.30.169.83 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=12 Win=16381 Len=0 94 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 104 4.797541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=160 Win=513 Len=0 104 4.797541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=160 Win=513 Len=0 104 4.797541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=10 Win=510 Len=0 105 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 106 4.905515 172.25.170.244 128.119.245.12 TCP 60 88 → 58		77 3.012232	172.25.170.244	128.119.245.12	TCP	66 58772 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
80 3.049020 20.54.232.160 172.25.170.244 71.25.170.245 71.25.170.244 71.25.170.245 71.25.170.244 71.25.170.245 71.		78 3.012371	172.25.170.244	128.119.245.12	HTTP	993 POST /wireshark-labs/lab3-1-reply.htm HTTP/1.1
81 3.095517 172.25.170.244 20.54.232.160 TCP 54 58767 → 443 [ACK] Seq=5922 Ack=9394 Win=131840 Len=0 82 3.095529 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] S8693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 83 3.095529 172.25.170.244 128.119.245.12 TCP 66 80 → 58772 [SVN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERW WSc 84 3.263997 172.25.170.244 128.119.245.12 TCP 54 58772 + 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0 85 3.266913 128.119.245.12 172.25.170.244 TCP 66 80 → 58768 [ACK] Seq=1 Ack=40 Win=31104 Len=0 86 3.267941 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 OK (text/html) 87 3.322706 172.25.170.244 128.119.245.12 TCP 54 58768 + 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 88 3.704229 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] S8693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 89 3.727357 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 99 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.771489 172.25.170.244 111.30.169.83 TCP 174 58220 → 8080 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 93 3.795046 111.30.169.83 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=1 Win=517 Len=0 94 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=1 Win=517 Len=0 95 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=16381 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=40 Win=16384 Len=0 105 4.378551 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 105 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 106 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] S8693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.24		79 3.017741	128.119.245.12	172.25.170.244	TCP	60 80 → 58694 [ACK] Seq=1 Ack=2 Win=229 Len=0
82 3.095529 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 83 3.263893 128.119.245.12 172.25.170.244 TCP 66 80 → 58772 [SVN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM WS- 84 3.263997 172.25.170.244 128.119.245.12 TCP 54 58772 → 80 [ACK] Seq=1 Ack=1 Win=313328 Len=0 85 3.266013 128.119.245.12 172.25.170.244 TCP 60 80 → 58786 [ACK] Seq=1 Ack=0 Win=31104 Len=0 86 3.267941 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 0K (text/html) 87 3.322706 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=9.40 Ack=778 Win=130560 Len=0 88 3.704229 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=9.40 Ack=778 Win=130560 Len=0 88 3.727357 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 99 3.727426 172.25.170.244 51.105.71.137 TLSv1.2 93 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.771489 172.25.170.244 111.30.169.83 TCP 174 58220 → 8080 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 93 3.795046 111.30.169.83 172.25.170.244 TCP 134 8080 → 58220 [PSH, ACK] Seq=1 Ack=121 Win=755 Len=80 94 3.838377 172.25.170.244 111.30.169.83 TCP 174 58220 → 8080 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=134 Ack=1569 Win=16385 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 105 4.095515 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1364 Ack=1569 Win=16384 Len=0 106 4.095515 172.25.170.244 51.105.71.137 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 107 4.378551 51.105.71.137 172.25.170.244 TCP		80 3.049020	20.54.232.160	172.25.170.244	TLSv1.2	544 Application Data
83 3.263893 128.119.245.12 172.25.170.244 TCP 66 80 → 58772 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM WS=84 3.263997 172.25.170.244 128.119.245.12 TCP 54 58772 → 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0 85 3.266013 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [ACK] Seq=1 Ack=940 Win=31104 Len=0 86 3.267941 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 0K (text/ntml) 87 3.322706 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 88 3.703429 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 172.25.170.244 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 19.3.727467 172.25.170.244 51.105.71.137 TLSv1.2 128.3 Application Data 19.3.727467 172.25.170.244 111.30.169.83 TCP 174 58220 → 8080 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 19.3.795046 111.30.169.83 172.25.170.244 TCP 19.4 8080 → 58220 [PSH, ACK] Seq=1 Ack=121 Win=557 Len=80 19.4 ×036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 19.4 ×036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 19.4 ×036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 19.4 ×037851 51.05.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 19.4 ×037851 51.05.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16384 Len=0 19.4 ×037851 51.05.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=1569 Win=16384 Len=0 19.4 ×037851 51.05.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=169 Win=16384 Len=0 19.4 ×037851 51.05.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=169 Win=16384 Len=0 19.4 ×037851 51.05.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 19.4 ×037851 51.05.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 19.4 ×037851 51.05.71.137 172.25.170.244 TCP 60 443	L	81 3.095517	172.25.170.244	20.54.232.160	TCP	54 58767 → 443 [ACK] Seq=5922 Ack=9394 Win=131840 Len=0
84 3.263997 172.25.170.244 128.119.245.12 TCP 54 58772 → 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0 85 3.266013 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [ACK] Seq=1 Ack=940 Win=31104 Len=0 86 3.267941 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 OK (text/html) 87 3.322706 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 88 3.704229 172.25.170.244 128.119.245.12 TCP 54 [TCP Retrensmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 89 3.727357 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 99 3.727426 172.25.170.244 51.105.71.137 TLSv1.2 93 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.771489 172.25.170.244 111.30.169.83 TCP 174 58220 + 8080 [PSH, ACK] Seq=1 Ack=121 Win=517 Len=120 133 3.795046 111.30.169.83 TCP 174 58220 + 8080 [ACK] Seq=1 Ack=121 Win=755 Len=80 94 3.838377 172.25.170.244 111.30.169.83 TCP 54 58220 + 8080 [ACK] Seq=1 Ack=121 Win=517 Len=0 96 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 104 4.378551 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 104 4.787541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 104 4.787541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 105 4.395515 172.25.170.244 51.105.71.137 TCP 54 58484 A43 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 105 4.3965515 172.25.170.244 51.105.71.137 TCP 54 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 105 4.3905515 172.25.170.244 51.105.71.137 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 105 4.3905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 105 4.7825040 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 105 4.7825040 128.119.245.12 TCP 54 [TCP Retran		82 3.095529	172.25.170.244	128.119.245.12	TCP	54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0
85 3.266013 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [ACK] Seq=1 Ack=940 Win=31104 Len=0 86 3.267941 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 0K (text/html) 73.322706 172.25.170.244 128.119.245.12 TCP 54 58768 + 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 93.727426 172.25.170.244 51.105.71.137 TLSv1.2 93 Application Data 91.3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92.3.771489 172.25.170.244 111.30.169.83 TCP 174 582.20 + 8080 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 13.3.95946 111.30.169.83 172.25.170.244 TCP 134 8080 → 582.20 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=0 94.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=121 Ack=81 Win=517 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 191 4.378551 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 191 4.378551 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 191 4.378551 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1634 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1634 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1634 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1634 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1634 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1634 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 473 → 58484 [ACK] Seq=1634 Ack=1569 Wi		83 3.263893	128.119.245.12	172.25.170.244	TCP	66 80 → 58772 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM WS=
86 3.267941 128.119.245.12 172.25.170.244 HTTP 831 HTTP/1.1 200 OK (text/html) 87 3.322706 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 88 3.704229 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 88 3.704229 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 99 3.727426 172.25.170.244 51.105.71.137 TLSv1.2 93 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.7771489 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 93 3.795046 111.30.169.83 172.25.170.244 TCP 134 8080 → 58220 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 94 3.838377 172.25.170.244 111.30.169.83 TCP 14 8080 → 58220 [PSH, ACK] Seq=1 Ack=121 Win=755 Len=80 94 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 184 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1534 Ack=169 Win=16384 Len=0 105 4.905515 172.25.170.244 51.105.71.137 TCP 54 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 106 4.905515 172.25.170.244 51.105.71.137 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 108 4.707541 51.105.71.137 172.25.170.244 TCP 60 843 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 108 4.707541 51.105.71.137 172.25.170.244 TCP 60 843 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 108 4.707541 51.105.71.137 172.25.170.244 TCP 60 843 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 10		84 3.263997	172.25.170.244	128.119.245.12	TCP	54 58772 → 80 [ACK] Seq=1 Ack=1 Win=131328 Len=0
87 3.322706 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0 88 3.704229 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 89 3.727357 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 99 3.727466 172.25.170.244 51.105.71.137 TLSv1.2 93 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.771489 172.25.170.244 111.30.169.83 TCP 174 58220 → 8080 [PSH, ACK] Seq=1 Ack=121 Win=517 Len=120 93 3.795046 111.30.169.83 TCP 174 58220 → 8080 [ACK] Seq=1 Ack=121 Win=755 Len=80 94 3.838377 172.25.170.244 111.30.169.83 TCP 54 58220 → 8080 [ACK] Seq=1 Ack=121 Win=757 Len=0 96 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=4 Ack=124 Win=16381 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=40 Ack=124 Win=16385 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TCP 64 434 → 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TCP 54 58484 → 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 105 4.3905515 172.25.170.244 51.105.71.137 TCP 54 78484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 106 4.905515 172.25.170.244 51.105.71.137 TCP 54 78484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 106 4.905515 172.25.170.244 51.105.71.137 TCP 54 78484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 106 4.905515 172.25.170.244 51.105.71.137 TCP 54 78484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 106 4.905515 172.25.170.244 51.105.71.137 TCP 54 78484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 105 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 106 4.707541 51.105.71.137 172.25.170.244 TCP 60 843 → 58768 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 107 4.707541 51.105.		85 3.266013	128.119.245.12	172.25.170.244	TCP	60 80 → 58768 [ACK] Seq=1 Ack=940 Win=31104 Len=0
88 3.704229 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 89 3.727357 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.771489 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 93 3.795046 111.30.169.83 TCP 174 58220 + 8080 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 143.838377 172.25.170.244 111.30.169.83 TCP 54 58220 + 8080 [ACK] Seq=21 Ack=121 Win=755 Len=80 14.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 14.376551 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=4 Ack=124 Win=16381 Len=0 14.376551 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=4 Ack=1534 Win=16385 Len=0 14.376551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 14.376551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 14.376551 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 14.376551 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 14.376551 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1534 Ack=10 Win=510 Len=0 166 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 + 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 1638 8.27200 128.119.245.12 172.25.170.244 TCP 60 80 + 58768 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 1638 8.27200 128.119.245.12 172.25.170.244 TCP 60 80 + 58768 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 1638 8.27200 128.119.245.12 172.25.170.244 TCP 60 80 + 58768 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 1638 8.27200 128.119.245.12 172.25.170.244 TCP 60 80 + 58768 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 1638 8.27200 128.119.245.12 172.25.170.244 TCP 60 80 + 58768 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 1638 8.27200 128.119.245.12 1		86 3.267941	128.119.245.12	172.25.170.244	HTTP	831 HTTP/1.1 200 OK (text/html)
89 3.727357 172.25.170.244 51.105.71.137 TLSv1.2 138 Application Data 99 3.727426 172.25.170.244 51.105.71.137 TLSv1.2 93 Application Data 91 3.727426 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.771489 172.25.170.244 111.30.169.83 TCP 174 582.20 + 8888 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 93 3.795046 111.30.169.83 172.25.170.244 TCP 134 8080 → 582.20 [PSH, ACK] Seq=1 Ack=121 Win=755 Len=80 94 3.838377 172.25.170.244 111.30.169.83 TCP 54 582.20 + 8888 [ACK] Seq=121 Ack=81 Win=517 Len=0 96 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TLSv1.2 93 Application Data 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 → 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TLSv1.2 99 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1534 Ack=40 Win=513 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1534 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 105 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=1 Ack=90 Win=31104 Len=0		87 3.322706	172.25.170.244	128.119.245.12	TCP	54 58768 → 80 [ACK] Seq=940 Ack=778 Win=130560 Len=0
90 3.727426 172.25.170.244 51.105.71.137 TLSv1.2 93 Application Data 91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.771489 172.25.170.244 111.30.169.83 TCP 174 58220 + 8080 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 93 3.795046 111.30.169.83 172.25.170.244 TCP 134 8080 + 58220 [PSH, ACK] Seq=1 Ack=121 Win=755 Len=80 94 3.838377 172.25.170.244 111.30.169.83 TCP 54 58220 + 8080 [ACK] Seq=1 Ack=121 Win=757 Len=0 96 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=40 Ack=124 Win=16381 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 189 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TCP 54 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 105 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 + 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 + 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		88 3.704229	172.25.170.244	128.119.245.12	TCP	54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0
91 3.727467 172.25.170.244 51.105.71.137 TLSv1.2 1464 Application Data 92 3.771489 172.25.170.244 111.30.169.83 TCP 174 58220 + 8080 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 93 3.795046 111.30.169.83 172.25.170.244 TCP 134 8080 + 58220 [PSH, ACK] Seq=1 Ack=121 Win=755 Len=80 94 3.838377 172.25.170.244 111.30.169.83 TCP 54 58220 + 8080 [ACK] Seq=121 Ack=81 Win=517 Len=0 96 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=40 Ack=124 Win=16381 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TCP 148 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=134 Ack=169 Win=16384 Len=0 105 4.395515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 + 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 + 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		89 3.727357	172.25.170.244	51.105.71.137		
92 3.771489 172.25.170.244 111.30.169.83 TCP 174 50220 + 8080 [PSH, ACK] Seq=1 Ack=1 Win=517 Len=120 93 3.795046 111.30.169.83 172.25.170.244 TCP 134 8080 + 58220 [PSH, ACK] Seq=1 Ack=121 Win=755 Len=80 94 3.838377 172.25.170.244 111.30.169.83 TCP 54 58220 + 8080 [PSH, ACK] Seq=1 Ack=121 Win=755 Len=80 95 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=40 Ack=124 Win=16385 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 89 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 105 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 + 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		90 3.727426	172.25.170.244	51.105.71.137	TLSv1.2	93 Application Data
93 3.795046 111.30.169.83 172.25.170.244 TCP 134 8080 → 58220 [PSH, ACK] Seq=1 Ack=121 Win=755 Len=80 94 3.838377 172.25.170.244 111.30.169.83 TCP 54 58220 + 8080 [ACK] Seq=121 Ack=81 Win=517 Len=0 96 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 → 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 14.378551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TCP 148 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 172.25.170.244 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 173.825943 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		91 3.727467	172.25.170.244	51.105.71.137	TLSv1.2	
94 3.838377 172.25.170.244 111.30.169.83 TCP 54 58220 + 8080 [ACK] Seq=121 Ack=81 Win=517 Len=0 96 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=40 Ack=124 Win=16381 Len=0 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSV1.2 148 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TLSV1.2 89 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 + 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 105 4.305515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 + 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 + 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		92 3.771489	172.25.170.244	111.30.169.83	TCP	
96 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=1 Ack=124 Win=16381 Len=0 97 4.036296 51.105.71.137 172.25.170.244 TLSV1.2 93 Application Data 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSV1.2 188 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TLSV1.2 89 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 106 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0						
97 4.036296 51.105.71.137 172.25.170.244 TLSv1.2 93 Application Data 98 4.036296 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 → 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 89 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TLSv1.2 89 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 106 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		94 3.838377	172.25.170.244	111.30.169.83	TCP	54 58220 → 8080 [ACK] Seq=121 Ack=81 Win=517 Len=0
98 4.036296 51.105.71.137 172.25.170.244 TCP 60 4d3 → 58484 [ACK] Seq=40 Ack=1534 Win=16385 Len=0 99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 + 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TLSv1.2 89 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 4d3 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 105 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 119 7.325943 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		96 4.036296	51.105.71.137	172.25.170.244		
99 4.092382 172.25.170.244 51.105.71.137 TCP 54 58484 → 443 [ACK] Seq=1534 Ack=40 Win=513 Len=0 101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TLSv1.2 89 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 106 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 119 7.325943 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0						
101 4.378551 51.105.71.137 172.25.170.244 TLSv1.2 148 Application Data 102 4.379635 172.25.170.244 51.105.71.137 TLSv1.2 89 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 106 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 119 7.325943 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		98 4.036296	51.105.71.137	172.25.170.244		
102 4.379635 172.25.170.244 51.105.71.137 TLSv1.2 89 Application Data 104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 106 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		99 4.092382	172.25.170.244	51.105.71.137	TCP	
104 4.707541 51.105.71.137 172.25.170.244 TCP 60 443 → 58484 [ACK] Seq=134 Ack=1569 Win=16384 Len=0 106 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 119 7.325943 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		101 4.378551	51.105.71.137	172.25.170.244	TLSv1.2	
106 4.905515 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 119 7.325943 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0		102 4.379635	172.25.170.244	51.105.71.137	TLSv1.2	
119 7.325943 172.25.170.244 128.119.245.12 TCP 54 [TCP Retransmission] 58693 → 80 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0 123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0						
123 8.272200 128.119.245.12 172.25.170.244 TCP 60 80 → 58768 [FIN, ACK] Seq=778 Ack=940 Win=31104 Len=0						
		and the second second	MALE AND A MALE AND A STATE OF THE A	WHI T. A. M. W. C. M. C. M. W. W.	10.000	
124 8.272262 172.25.170.244 128.119.245.12 TCP 54 58768 → 80 [ACK] Seq=940 Ack=779 Win=130560 Len=0						
		124 8.272262	172.25.170.244	128.119.245.12	TCP	54 58768 → 80 [ACK] Seq=940 Ack=779 Win=130560 Len=0

任务二:

1. 将文件传输到 gaia.cs.umass.edu 的客户端计算机(源)使用的 IP 地址和 TCP 端口号是什么?

从 wireshark 抓包信息中可以看到,源 IP 地址是 172.25.170.244, TCP 端口号为 60305

- > Frame 206: 535 bytes on wire (4280 bits), 535 bytes captured (4280 bits) on interface \Device\NPF_{8E4
- > Ethernet II, Src: HaiyingZhili_3f:32:a0 (08:26:ae:3f:32:a0), Dst: JuniperNetwo_f6:12:a0 (28:a2:4b:f6:1
- > Internet Protocol Version 4, Src: 172.25.170.244, Dst: 128.119.245.12
- > Transmission Control Protocol, Src Port: 60305, Dst Port: 80, Seq: 152595, Ack: 1, Len: 481
- > [[truncated]106 Reassembled TCP Segments (153075 bytes): #48(754), #49(1460), #50(1460), #51(1460), #
- 2. gaia.cs.umass.edu 的 IP 地址是什么? 在哪个端口号上发送和接收此连接的 TCP 报文段?

由上图和上面 ping 的信息可以得知, gaia.cs.umass.edu.com 的 IP 地址是 128.119.245.12, 接收端接口号为 80

任务三:

1. 用于在客户端计算机和 gaia.cs.umass.edu 之间启动 TCP 连接的 TCP SYN 报文段的序列号 (sequence number) 是什么? TCP SYN 报文段有什么作用?

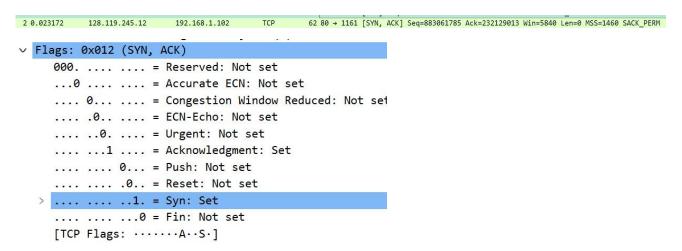
TCP SYN 报文段的序列号是 232129012

SYN 报文段表示客户端发起连接,是三次握手的第一次握手。

2. gaia.cs.umass.edu 发送给客户端计算机以回复 SYN 的 SYN-ACK 报文段的序列号是多少? SYN ACK 报文段中的 Acknowledgment number 栏位的值是多少? gaia.cs.umass.edu 是如何确定此 Acknowledgment number 的数值的? TCP SYN-ACK 报文段有什么作用?

gaia.cs.umass.edu 发送给客户端计算机以回复 SYN 的 SYN-ACK 报文段的序列号是883061785, SYN ACK 报文段中的 Acknowledgment number 栏位的值是 1, 从 flags 中可以看出。gaia.cs.umass.edu 通过客户端发送的 SYN 的 Acknowledgment number 值加一得到此Acknowledgment number 的值。

SYN ACK 区段是 TCP 三次握手中的第二次握手、表明服务器接受连接。



3. 包含 HTTP POST 命令的 TCP 报文段的序列号是多少? 请注意,为了找到 POST 命令,你需要深入了解 Wireshark 窗口底部的数据包内容字段,在其 DATA 栏位中查找带有"POST"的报文段。

包含 HTTP POST 命令的 TCP 报文段的序列号为 232129013。

```
44 70 1f bd 00 00 50 4f 53 54 20 2f 65 74 68 65
                                                   Dp····PO ST /ethe
                                                   real-lab s/lab3-1
72 65 61 6c 2d 6c 61 62 73 2f 6c 61 62 33 2d 31
2d 72 65 70 6c 79 2e 68
                        74 6d 20 48 54 54 50 2f
                                                   -reply.h tm HTTP/
31 2e 31 0d 0a 48 6f 73
                        74 3a 20 67 61 69 61 2e
                                                    1.1··Hos t: gaia.
63 73 2e 75 6d 61 73 73
                        2e 65 64 75 0d 0a 55 73
                                                   cs.umass .edu…Us
65 72 2d 41 67 65 6e 74
                        3a 20 4d 6f 7a 69 6c 6c
                                                   er-Agent : Mozill
61 2f 35 2e 30 20 28 57
                         69 6e 64 6f 77 73 3b 20
                                                    a/5.0 (W indows;
55 3b 20 57 69 6e 64 6f
                         77 73 20 4e 54 20 35 2e
                                                   U; Windo ws NT 5
31 3b 20 65 6e 2d 55 53
                        3b 20 72 76 3a 31 2e 30
                                                   1; en-US ; rv:1.0
                                                    .2) Geck o/200302
2e 32 29 20 47 65 63 6b
                        6f 2f 32 30 30 33 30 32
30 38 20 4e 65 74 73 63
                         61 70 65 2f 37 2e 30 32
                                                    08 Netsc ape/7.02
0d 0a 41 63 63 65 70 74  3a 20 74 65 78 74 2f 78
                                                    ··Accept : text/x
```

在第四条流量中发现 POST 命令。

4. 观察编号 (No.) 3 和 4 的 TCP 报文段的序列号, 你有什么发现? 请解释这个现象的原因。

3 0.023265	192.168.1.102	128.119.245.12	TCP	54 1161 → 80 [ACK] Seq=232129013 Ack=883061786 Win=17520 Len=0
4 0.026477	192.168.1.102	128.119.245.12	TCP	619 1161 → 80 [PSH. ACK] Seg=232129013 Ack=883061786 Win=17520 Len=565

编号(No.) 3 和 4 的 TCP 报文段的序列号是一样的, 都是 232129013

原因: 3号报文的 len 为 0。

5. 将包含 HTTP POST 的 TCP 报文段视为 TCP 连接中的第一个报文段。在这个 TCP 连接中前六个用于数据发送的 TCP 报文段是那些(列出编号,即查看"No."这一列)?序列号分别是多少(包括包含 HTTP POST 的报文段)?这六个报文段发送的时间是什么时候?

NO	序列号	发送时间	
4	232129013	0.026477	
5	232129578	0.041737	
7	232131038	0.054026	
8	232132498	0.054690	
10	232133958	0.077405	
11	232135418	0.078157	

6. 收到的对应前六个数据发送 TCP 报文段的确认 ACK 分别是在那些 TCP 报文段里 (列出编号,即查看"No."这一列)? 是什么时候收到的?

NO	收到时间
6	0.053937
9	0.077294
12	0.124085

7. 鉴于发送每个 TCP 报文段的时间与收到确认的时间之间的差异,前六个数据发送 TCP 报文段中每个报文段的往返时间(RTT)是多少?加权平均往返时延(RTTS)是多少?

用收到时间减发送时间得到往返时间 RTT

NO	RTT	RTTS		
4	0.026477	0.026477		
5	0.035557	0.028472125		
7	0.070059	0.033670484375		
8	0.114428	0.043765173828125		
10	0.139894	0.05578127709960937		
11	0.189645	0.07251424246215821		

8. 前六个数据发送 TCP 报文段的长度是多少?

4 0.026477	192.168.1.102	128.119.245.12	TCP	619 1161 → 80 [PSH, ACK] Seq=232129013 Ack=883061786 Win=17520 Len=565
5 0.041737	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [PSH, ACK] Seq=232129578 Ack=883061786 Win=17520 Len=1460
6 0.053937	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=883061786 Ack=232129578 Win=6780 Len=0
7 0.054026	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232131038 Ack=883061786 Win=17520 Len=1460
8 0.054690	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232132498 Ack=883061786 Win=17520 Len=1460
9 0.077294	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=883061786 Ack=232131038 Win=8760 Len=0
10 0.077405	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232133958 Ack=883061786 Win=17520 Len=1460
11 0.078157	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232135418 Ack=883061786 Win=17520 Len=1460

由图可知, 长度为 565、1460、1460、1460、1460、1460

9. 对于整个抓包过程,收到的服务器声明的最小可用接收缓冲区空间(接收窗口)大小是

多少?整个过程中,声明的接收缓冲区空间是否限制了发送方传送 TCP 报文段?

2 0.023172 128.119.245.12 192.168.1.102 TCP 62 80 → 1161 [SYN, ACK] Seq=883061785 Ack=232129013 Win=5840 Len=0 MSS=1460 SACK_PERM

由上图,最小的接收窗口大小为 5840, 没有限制发送方传送 TCP 报文段, 因为接收窗口的大小远大干发送的报文的数量。

10. 在抓包文件中是否有重传的报文段? 为了回答这个问题, 你检查了什么(在抓包文件中)?

使用 ip.src==192.168.1.102,检查了主机发送的所有的报文,发现序号(NO.)一直是增加的,证明没有重传的报文段。

11. 接收方通常在 ACK 中确认多少数据(确认收到的多少个报文段)? 你是否可以识别接收方每隔一个接收到的报文段才发送确认 ACK 的情况?

ACK 通常确认 1048 字节数据. 跟每个报文段发送的数据一致。

78 1.758227	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=883061786 Ack=232181905 Win=62780 Len=0
79 1.860063	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=883061786 Ack=232184825 Win=62780 Len=0
80 1.930880	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=883061786 Ack=232187177 Win=62780 Len=0
81 1.931099	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232187177 Ack=883061786 Win=17520 Len=1460
82 1.931879	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232188637 Ack=883061786 Win=17520 Len=1460
83 1.932757	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232190097 Ack=883061786 Win=17520 Len=1460
84 1.933636	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232191557 Ack=883061786 Win=17520 Len=1460
85 1.934770	192.168.1.102	128.119.245.12	TCP	1514 1161 → 80 [ACK] Seq=232193017 Ack=883061786 Win=17520 Len=1460
86 1.935586	192.168.1.102	128.119.245.12	TCP	946 1161 → 80 [PSH, ACK] Seq=232194477 Ack=883061786 Win=17520 Len=892
87 2.029069	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=883061786 Ack=232190097 Win=62780 Len=0
88 2.126682	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=883061786 Ack=232193017 Win=62780 Len=0
89 2.203195	128.119.245.12	192.168.1.102	TCP	60 80 → 1161 [ACK] Seq=883061786 Ack=232195369 Win=62780 Len=0

图中情况即为隔一个报文段才确认。

12. TCP 连接的吞吐量 (每单位时间传输的字节数) 是多少? 解释你如何计算这个值。

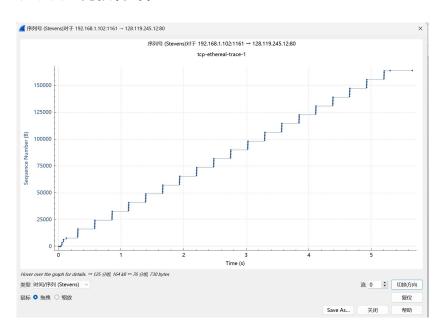
发送的字节数为 164091. 时间为 5.651141s

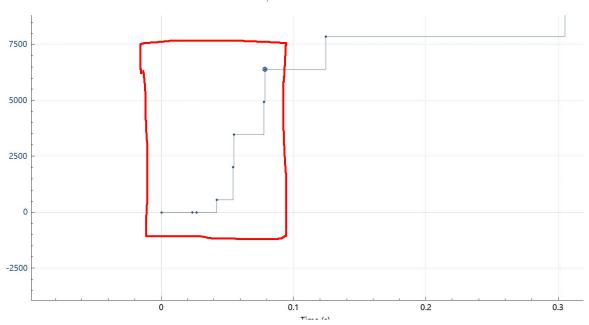
故, 吞吐量为: 29.036 KByte/s

29,036.79097725574

任务四:

1. 使用时间序列图(Stevens)绘图工具查看从客户端发送到 gaia.cs.umass.edu 服务器的报文段的序列号与时间关系图。你能否确定 TCP 的慢启动阶段的开始和结束位置,以及拥塞避免接管的位置?





红框是 TCP 的慢启动阶段,之后是拥塞避免接管的位置。

2. 评论测量数据与我们在书本中研究的 TCP 的理想化行为的不同之处。

在 TCP 的理想化行为中,拥塞窗口应该会增大,但是在测量数据中,拥塞窗口保持不变。