

```

Time      Source          Destination         Received Length Size
-----
2.0-0.03177 192.168.1.100       192.168.1.100:12   TCP        62 8100 - 1185 [ACK] Seq=610168616 Win=5686 SACK_PERM_
2.0-0.03177 192.168.1.100       192.168.1.100:12   TCP        62 8100 - 1185 [ACK] Seq=610168616 Win=5686 SACK_PERM_
2.0-0.03205 192.168.1.100       128.100.100.123    TCP        54 1184 - 60 [RST] Seq=610168616 Win=0 Len=7200 Len=0
2.0-0.03205 192.168.1.100       128.100.100.123    TCP        619 1185 - 60 [PSH, ACK] Seq=610168616 Win=7308 Len=665 [TCP segment of
2.0-0.03177 192.168.1.100       128.100.100.123    TCP        54 1184 - 101 [ACK] Seq=610168616 Win=0 Len=7200 Len=0
2.0-0.03205 192.168.1.100       128.100.100.123    TCP        60 80 - 1185 [ACK] Seq=610168616 Win=7308 Len=665 [TCP segment of
2.0-0.04026 192.168.1.100       128.100.100.123    TCP        54 1184 - 101 [ACK] Seq=610168616 Win=0 Len=7200 Len=0
2.0-0.04026 192.168.1.100       128.100.100.123    TCP        619 1185 - 60 [PSH, ACK] Seq=610168616 Win=7308 Len=665 [TCP segment of
2.0-0.07294 192.168.1.100       128.100.100.123    TCP        60 80 - 1185 [ACK] Seq=610168616 Win=7308 Len=665 [TCP segment of
2.0-0.07294 192.168.1.100       128.100.100.123    TCP        54 1184 - 101 [ACK] Seq=610168616 Win=0 Len=7200 Len=0
=====
Frame 1: Ethernet II, Src: VMware, Dst: VMware, Len: 80 bytes captured (480 bytes)
on eth0: bytes 0..79, Src MAC: 08:00:27:0A:70:34, Dst MAC: 08:00:27:0A:70:34
Ethernet Version 2, Src: 192.168.1.100, Dst: 128.100.100.123
Transmission Control Protocol, Src Port: 3456, Dst Port: 80, Seq.: 6, Len.: 8
Source Port: 3456
Destination Port: 80
[Raw data index: 0]
[Conversation completeness: Incomplete, DATA (15)]
[TCP Segment len: 8]
Sequence Number #: 6 (relative sequence number)
Sequence Number (raw): 2312012
Seq. Sequence Number #: 6
Acknowledgment Number #:
Retransmission Number (rxid): 0
Offset ..... = Header Length 20 bytes (7)
=====
Flags: none
window: 3456
[calculated window size: 1024]
Checksum: header [unverified]
[Checksum Status: Unverified]
Event Pointer:

```

[illegible]

No	sequence number	sent time	received time	RTT	EstimatedRTT
1	232129013	0.026477	0.053937	0.027460	0.027460
2	232129578	0.041737	0.077294	0.035557	0.028472
3	232131038	0.054026	0.124085	0.070059	0.033670
4	232132498	0.054690	0.169118	0.114428	0.043765
5	232133958	0.077405	0.217299	0.139894	0.055781
6	232135418	0.078157	0.267802	0.189645	0.072514

#	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.1.102	128.119.245.12	TCP	62	1161 → 80 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1
2	0.023172	128.119.245.12	192.168.1.102	TCP	62	80 → 1161 [SYN, ACK] Seq=0 Ack=1 Win=15840 Len=0 MSS=1460 SACK_PERM=1
3	0.032365	192.168.1.102	128.119.245.12	TCP	54	1161 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
4	0.040077	192.168.1.102	128.119.245.12	TCP	619	1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=565 [TCP segment of a r...
5	0.045337	128.119.245.12	192.168.1.102	TCP	1514	1161 → 80 [PSH, ACK] Seq=1 Ack=1 Win=17520 Len=1460 [TCP segment of a r...
6	0.051737	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=566 Win=6780 Len=0
7	0.054026	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=2026 Ack=1 Win=17520 Len=1460 [TCP segment of a r...
8	0.054690	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a r...
9	0.077294	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=2026 Win=8760 Len=0
10	0.087085	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a r...
11	0.087817	128.119.245.12	192.168.1.102	TCP	1514	1161 → 80 [ACK] Seq=3486 Ack=1 Win=17520 Len=1460 [TCP segment of a r...
12	0.124085	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=3486 Win=11680 Len=0
13	0.124185	192.168.1.102	128.119.245.12	TCP	1201	1161 → 80 [PSH, ACK] Seq=7866 Ack=1 Win=17520 Len=1147 [TCP segment of a r...
14	0.169118	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=4946 Win=14600 Len=0
15	0.217299	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=6406 Win=17520 Len=0
16	0.267682	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=7966 Win=26640 Len=0
17	0.348807	128.119.245.12	192.168.1.102	TCP	60	80 → 1161 [ACK] Seq=1 Ack=9018 Win=23360 Len=0
18	0.305040	192.168.1.102	128.119.245.12	TCP	1514	1161 → 80 [ACK] Seq=2013 Ack=1 Win=17520 Len=1460 [TCP segment of a r...

[illegible]

Q6.No, the sequence number never repeated.

Q7.1460, the server waits for a short time after receiving a packet. If consecutive new packets are received within this period of time, the server directly sends the ACK of the latter and ignores the ACK of the former.

Q8.Throughput=Total data transmission/The total time

$$=(232293103-232129013)/(5.461175-0.026477)=164090/5.434698=30193.03$$

Eexrcise2:

No	Source IP	Destination IP	Protocol	Info
295	10.9.16.201	10.99.6.175	TCP	50045 > 5000 [SYN] Seq=2818463618 win=8192 MSS=1460
296	10.99.6.175	10.9.16.201	TCP	5000 > 50045 [SYN, ACK] Seq=1247095790 Ack=2818463619 win=262144 MSS=1460
297	10.9.16.201	10.99.6.175	TCP	50045 > 5000 [ACK] Seq=2818463619 Ack=1247095791 win=65535
298	10.9.16.201	10.99.6.175	TCP	50045 > 5000 [PSH, ACK] Seq=2818463619 Ack=1247095791 win=65535
301	10.99.6.175	10.9.16.201	TCP	5000 > 50045 [ACK] Seq=1247095791 Ack=2818463652 win=262096
302	10.99.6.175	10.9.16.201	TCP	5000 > 50045 [PSH, ACK] Seq=1247095791 Ack=2818463652 win=262144
303	10.9.16.201	10.99.6.175	TCP	50045 > 5000 [ACK] Seq=2818463652 Ack=1247095831 win=65535
304	10.9.16.201	10.99.6.175	TCP	50045 > 5000 [FIN, ACK] Seq=2818463652 Ack=1247095831 win=65535
305	10.99.6.175	10.9.16.201	TCP	5000 > 50045 [FIN, ACK] Seq=1247095831 Ack=2818463652 win=262144
306	10.9.16.201	10.99.6.175	TCP	50045 > 5000 [ACK] Seq=2818463652 Ack=1247095832 win=65535
308	10.99.6.175	10.9.16.201	TCP	5000 > 50045 [ACK] Seq=1247095831 Ack=2818463653 win=262144

Q1.2818463618

Q2.1247095790, 2818463619, seq+1

Q3. 2818463619, 1247095791,no

Q4. Client which first sent FIN in No.305; simultaneous close

Q5. client to server:2818463653-2818463618-2=33

server to client:1247095831-1247095790-2=39

data=final ACK-Initial Sequence Number-2