LAPORAN

TCP HEADER

Dosen :

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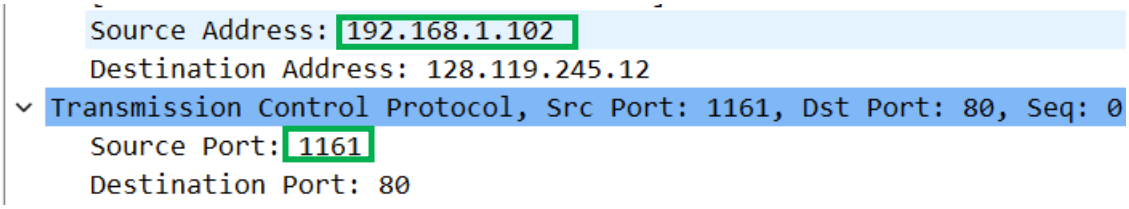
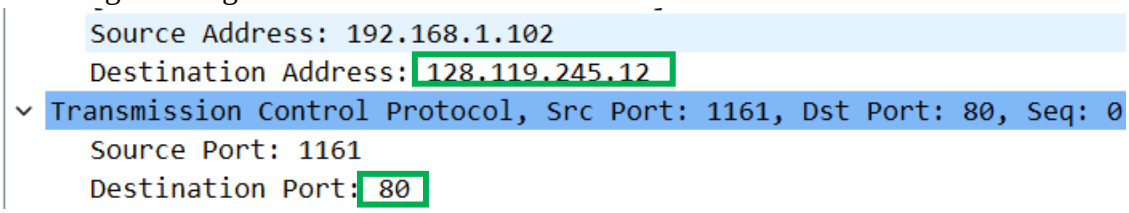
POLITEKNIK ELEKTRONIKA NEGERI SURABAYA

Question.

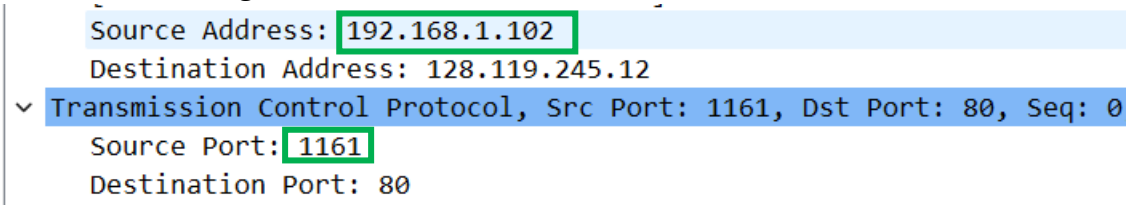
1. What is the IP address and TCP port number used by the client computer (source) that is transferring the file to gaia.cs.umass.edu? To answer this question, it's probably easiest to select an HTTP message and explore the details of the TCP packet used to carry this HTTP message, using the "details of the selected packet header window" (refer to Figure 2 in the "Getting Started with Wireshark" Lab if you're uncertain about the Wireshark windows.



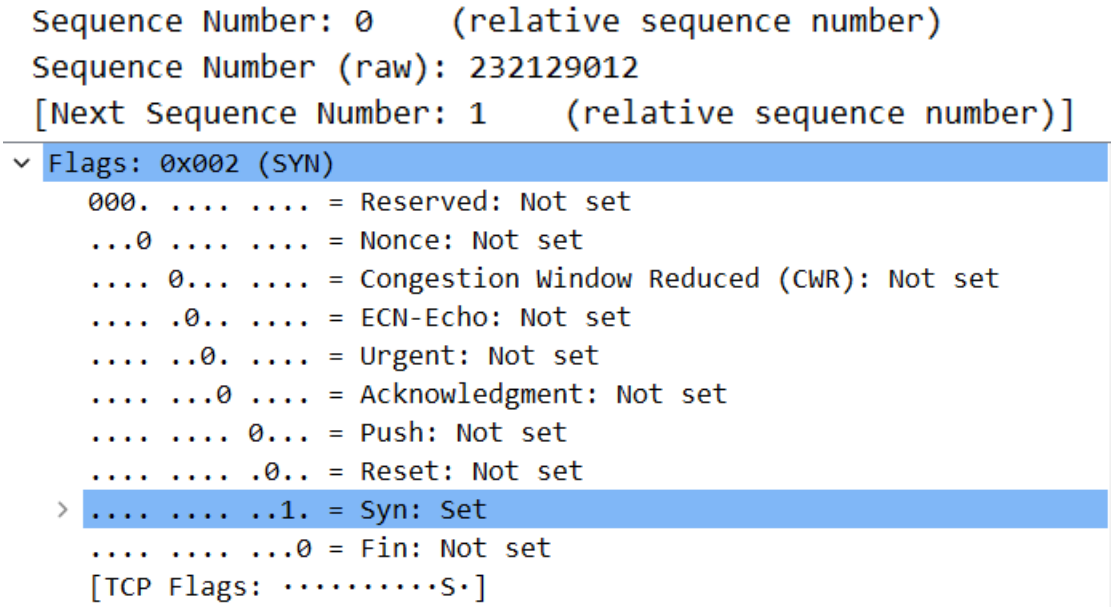
2. What is the IP address of gaia.cs.umass.edu? On what port number is it sending and receiving TCP segments for this connection?



3. What is the IP address and TCP port number used by your client computer (source) to transfer the file to gaia.cs.umass.edu?



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



5. What is the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN? What is the value of the Acknowledgement field in the SYNACK segment? How did gaia.cs.umass.edu determine that value? What is it in the segment that identifies the segment as a SYNACK segment?
    a. What is the sequence number of the SYNACK segment sent by gaia.cs.umass.edu to the client computer in reply to the SYN?

```
Sequence Number: 0    (relative sequence number)
Sequence Number (raw): 883061785
[Next Sequence Number: 1    (relative sequence number)]
```

    b. What is the value of the Acknowledgement field in the SYNACK segment?

```
Acknowledgment Number: 1    (relative ack number)
Acknowledgment number (raw): 232129013
```

    c. How did gaia.cs.umass.edu determine that value?
    Sequence Number diambil acak
    ACK Number didapat dari SYN paket dari PC->gaia + 1
    d. What is it in the segment that identifies the segment as a SYNACK segment?

```
Flags: 0x012 (SYN, ACK)
    000. .... .... = Reserved: Not set
    ...0 .... .... = Nonce: Not set
    .... 0... .... = Congestion Window Reduced (CWR): Not set
    .... .0.. .... = ECN-Echo: Not set
    .... ..0. .... = Urgent: Not set
    .... ...1 .... = Acknowledgment: Set
    .... .... 0... = Push: Not set
    .... .... .0.. = Reset: Not set
    .... .... ..1. = Syn: Set
    .... .... ...0 = Fin: Not set
    [TCP Flags: ·····A··S·]
```

6. What is the sequence number of the TCP segment containing the HTTP POST command? Note that in order to find the POST command, you'll need to dig into the packet content field at the bottom of the Wireshark window, looking for a segment with a "POST" within its DATA field.

```
Sequence Number: 164041    (relative sequence number)
Sequence Number (raw): 232293053
```

7. Consider the TCP segment containing the HTTP POST as the first segment in the TCP connection. What are the sequence numbers of the first six segments in the TCP connection (including the segment containing the HTTP POST)? At what time was each segment sent? When was the ACK for each segment received? Given the difference between when each TCP segment was sent, and when its acknowledgement was received, what is the RTT value for each of the six segments? What is the EstimatedRTT value (see Section 3.5.3, page 242 in text) after the receipt of each ACK? Assume that the value of the EstimatedRTT is equal to the measured RTT for the first segment, and then is computed using the EstimatedRTT equation on page 242 for all subsequent segments.
    a. What are the sequence numbers of the first six segments in the TCP connection (including the segment containing the HTTP POST)?

```
[122 Reassembled TCP Segments (164090 bytes): #4(565), #5(1460), #7(1
    [Frame: 4, payload: 0-564 (565 bytes)]
    [Frame: 5, payload: 565-2024 (1460 bytes)]
    [Frame: 7, payload: 2025-3484 (1460 bytes)]
    [Frame: 8, payload: 3485-4944 (1460 bytes)]
    [Frame: 10, payload: 4945-6404 (1460 bytes)]
    [Frame: 11, payload: 6405-7864 (1460 bytes)]
```

i. Segment pertama

```
Sequence Number: 1    (relative sequence number)
Sequence Number (raw): 232129013
[Next Sequence Number: 566    (relative sequence number)]
```

ii. Segment Kedua

```
Sequence Number: 566    (relative sequence number)
Sequence Number (raw): 232129578
```

iii. Segment Ketiga

```
Sequence Number: 2026    (relative sequence number)
Sequence Number (raw): 232131038
[Next Sequence Number: 3486    (relative sequence number)]
```

iv. Segment Keempat

```
Sequence Number: 3486    (relative sequence number)
Sequence Number (raw): 232132498
[Next Sequence Number: 4946    (relative sequence number)]
```

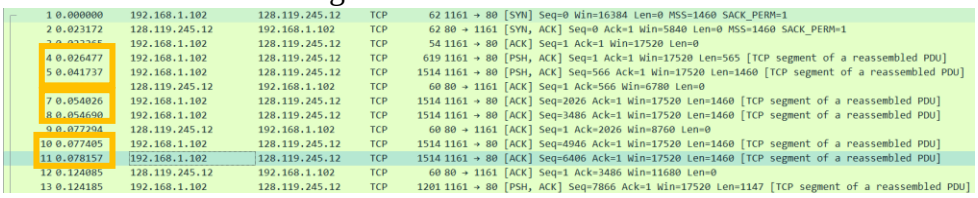
v. Segment Kelima

```
Sequence Number: 4946    (relative sequence number)
Sequence Number (raw): 232133958
[Next Sequence Number: 6406    (relative sequence number)]
```

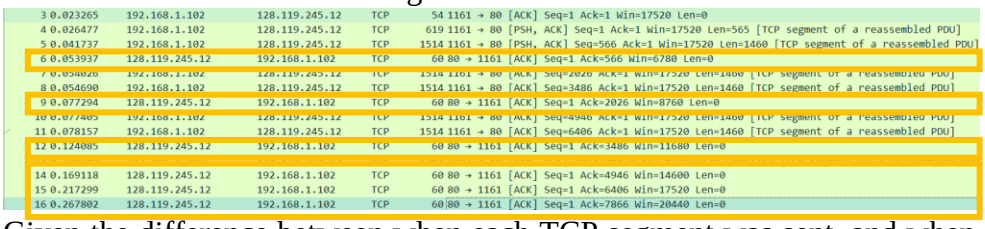
vi. Segment Keenam

```
Sequence Number: 6406    (relative sequence number)
Sequence Number (raw): 232135418
[Next Sequence Number: 7866    (relative sequence number)]
```

b. At what time was each segment sent?



c. When was the ACK for each segment received

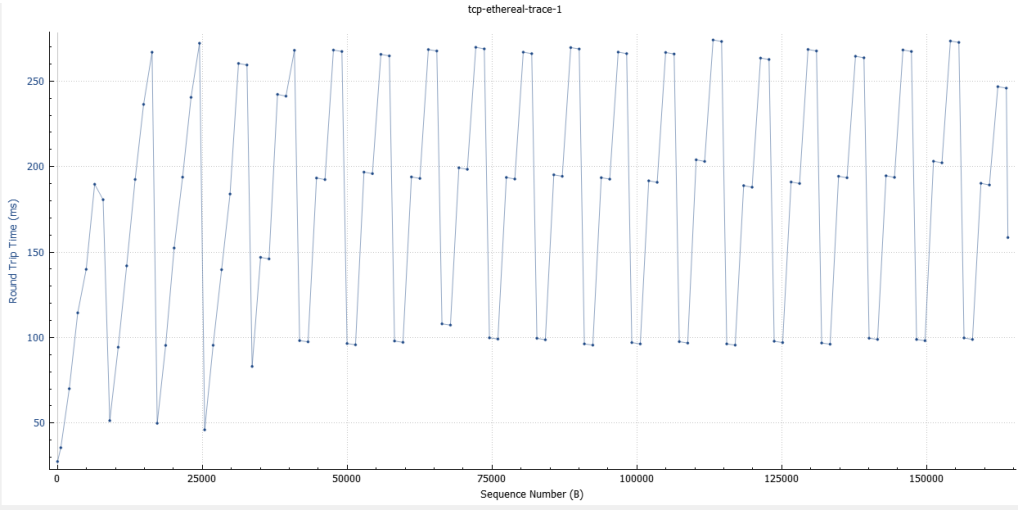


d. Given the difference between when each TCP segment was sent, and when its acknowledgement was received, what is the RTT value for each of the six segments?

Frame	Sent	Received	RTT
Segment1	0,026477	0,053937	0,053937 - 0,026477 = 0,02746
Segment2	0,041737	0,077294	0,077294 - 0,041737 = 0,035557
Segment3	0,054026	0,124085	0,124085 - 0,054026 = 0,070059

Segment4	0,054690	0,169118	0,169118 - 0,054690 = 0,114428
Segment5	0,077405	0,217299	0,217299 - 0,077405 = 0,139894
Segment6	0,078157	0,267802	0,267802 - 0,078157 = 0,189645

e. What is the EstimatedRTT value (see Section 3.5.3, page 242 in text) after the receipt of each ACK?



8. What is the length of each of the first six TCP segments?

```
Transmission Control Protocol, Src Port: 1161, Dst Por
    Source Port: 1161
    Destination Port: 80
    [Stream index: 0]
    [Conversation completeness: Incomplete, DATA (15)]
    [TCP Segment Len: 565]
```

Len first frame = 565

```
Transmission Control Protocol, Src Port: 1161, Dst Pc
    Source Port: 1161
    Destination Port: 80
    [Stream index: 0]
    [Conversation completeness: Incomplete, DATA (15)]
    [TCP Segment Len: 1460]
```

Len more frames = 1460

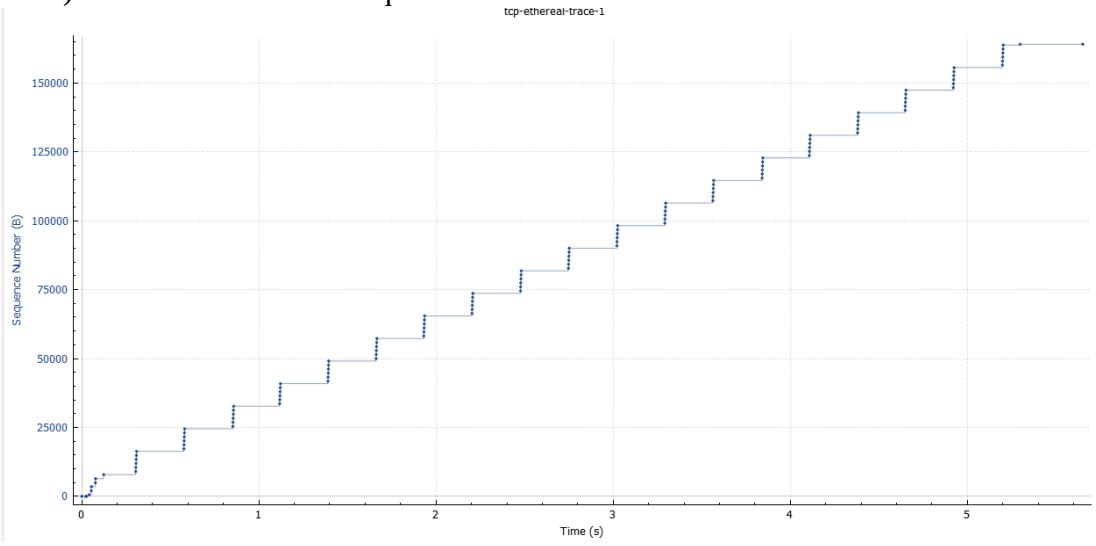
9. What is the minimum amount of available buffer space advertised at the received for the entire trace? Does the lack of receiver buffer space ever throttle the sender?

```
Window: 5840
```

Jumlah minimum ruang penyangga yang tersedia yang diiklankan pada penerimaan untuk seluruh jejak adalah ditunjukkan ACK pertama dari server, nilainya 5792 byte (ditunjukkan pada gambar di atas).

Jendela kebangkitan ini tumbuh hingga mencapai ukuran buffer penerima maksimum 62780 byte. Menurut jejaknya, pengirim tidak pernah dicekik karena kekurangan ruang buffer penerima.

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



Tidak ada segmen yang ditransmisikan ulang dalam file jejak karena dalam grafik urutan waktu (stevens), grafik naik secara monoton.

11. How much data does the receiver typically acknowledge in an ACK? Can you identify cases where the receiver is ACKing every other received segment (see Table 3.2 on page 250 in the text)

	acknowledged sequence number	acknowledged data
ACK 1	566	566
ACK 2	2026	1460
ACK 3	3486	1460
ACK 4	4946	1460
ACK 5	6406	1460
ACK 6	7866	1460
ACK 7	9013	1147
ACK 8	10473	1460
ACK 9	11933	1460
ACK 10	13393	1460
ACK 11	14853	1460
ACK 12	16313	1460

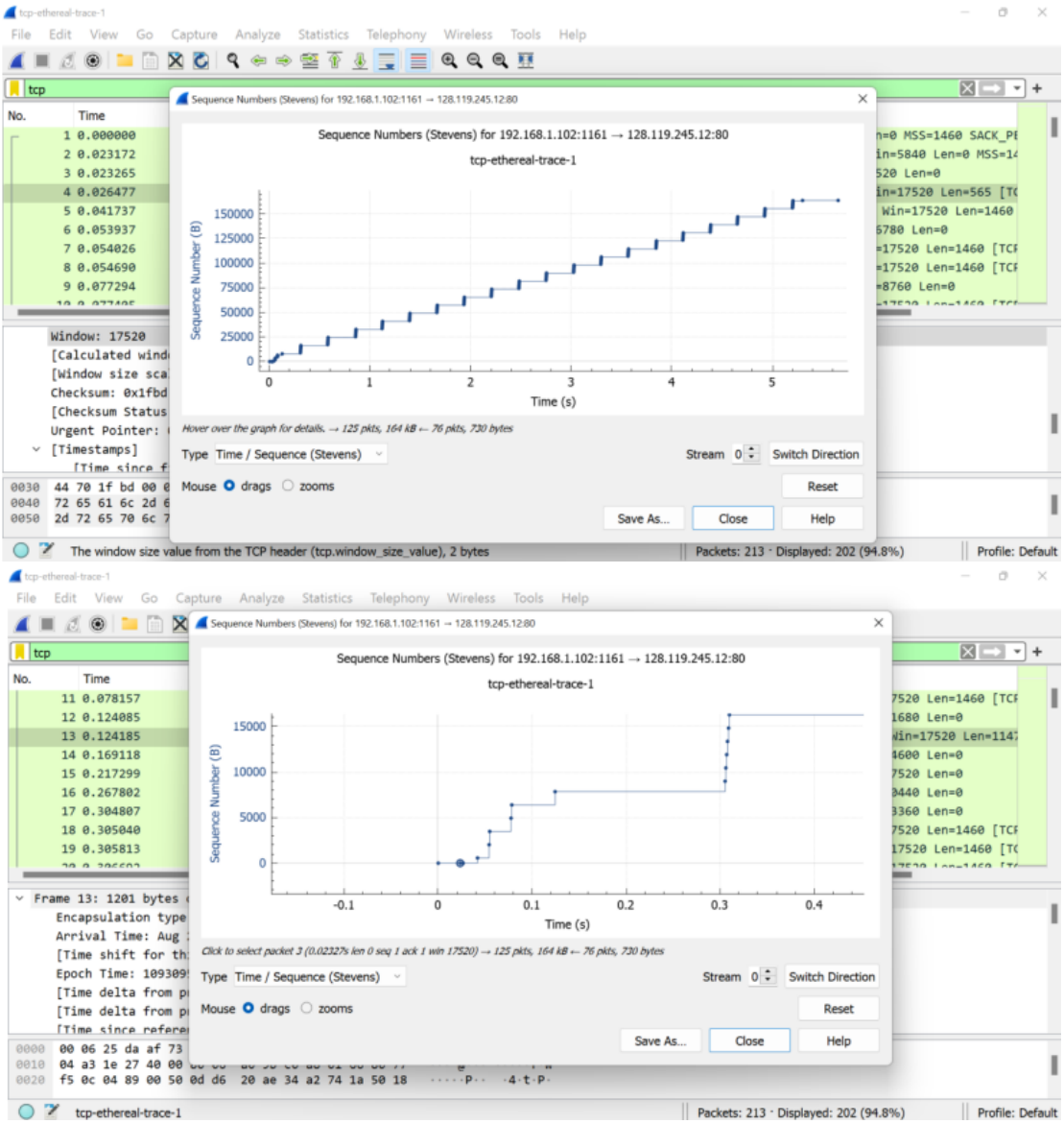
The difference between the acknowledged sequence numbers of two consecutive ACKs indicates the data received by the server between these two ACKs. By inspecting the amount of acknowledged data by each ACK, there are cases where the receiver is ACKing every other segment. For example, segment of No. 80 acknowledged data with 2920 bytes = 1460*2 bytes.

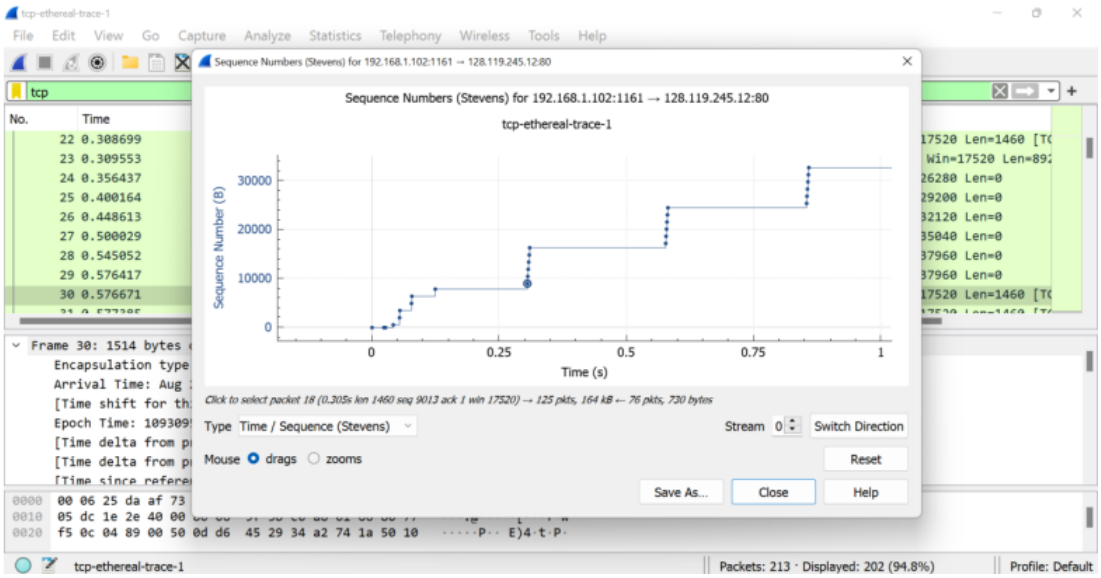
12. What is the throughput (bytes transferred per unit time) for the TCP connection? Explain how you calculated this value.

The computation of TCP throughput largely depends on the selection of averaging time period. As a common throughput computation, in this question, we select the average time period as the whole connection time. Then, the average throughput for this TCP connection is computed as the ratio between the total amount data and the total transmission time. The total amount data transmitted can be computed by the difference

between the sequence number of the first TCP segment (i.e. 1 byte for No. 4 segment) and the acknowledged sequence number of the last ACK (164091 bytes for No. 202 segment). Therefore, the total data are 164091 - 1 = 164090 bytes. The whole transmission time is the difference of the time instant of the first TCP segment (i.e., 0.026477 second for No.4 segment) and the time instant of the last ACK (i.e., 5.455830 second for No. 202 segment). Therefore, the total transmission time is 5.455830 - 0.026477 = 5.4294 seconds. Hence, the throughput for the TCP connection is computed as 164090/5.4294 = 30.222 KByte/sec.

13. 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. Can you identify where TCP's slowstart phase begins and ends, and where congestion avoidance takes over? Comment on ways in which the measured data differs from the idealized behavior of TCP that we've studied in the text.
Dimulai sekitar 0 detik dan kemudian berakhir sekitar 0,02327 detik. Penghindaran kemacetan memakan waktu sekitar 0,305 detik karena mengurangi jumlah yang dikirim.





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