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**Lab4**

**Exercise1:**1、

The IP address of gaia.cs.umass.edu(destination) is 128.119.245.12, and the port is 80;

The IP address of client computer (source) is 192.168.1.102 and the port is 1161.



2、

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描述已自动生成

The sequence number which contains the HTTP command is 232129013.

This value is the same as the ACK segment that was sent prior to this segment, because this segments didn’t contain any data, therefore the server keep the sequence unchanged.

3、

If we consider HTTP post as the first segment.

The segments 1-6 are No.4,5,7,8,10,11 in this trace; and the ACKs of each segments is No.6,9,12,14,15,16 in this trace.

No.4 , segment 1, sequence number: 232129013;

No.5 , segment 2, sequence number: 232129578;

No.7 , segment 3, sequence number: 232131038;

No.8 , segment 4, sequence number: 232132498;

No.10 ,segment 5, sequence number: 232133958;

No.11, segment 6, sequence number: 232135418;

The sending time and the received time of ACKs are shown below:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sent time | ACK received time | RTT(s) |
| Segement1 | 0.026477 | 0.053937 | 0.02746 |
| Segement2 | 0.041737 | 0.077294 | 0.035557 |
| Segement3 | 0.054026 | 0.124085 | 0.070059 |
| Segement4 | 0.054690 | 0.169118 | 0.11443 |
| Segement5 | 0.077405 | 0.217299 | 0.13989 |
| Segement6 | 0.078157 | 0.267802 | 0.18964 |

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the sent time show above

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the ACK received time show above.

EstimatedRTT = 0.875 \* EstimatedRTT + 0.125 \* SampleRTT EstimatedRTT

after the receipt of the ACK of segment 1:

EstimatedRTT = RTT for Segment 1 = 0.02746 s

EstimatedRTT after the receipt of the ACK of segment 2:

EstimatedRTT = 0.875 \* 0.02746 + 0.125 \* 0.035557 = 0.0285 s

EstimatedRTT after the receipt of the ACK of segment 3:

EstimatedRTT = 0.875 \* 0.0285 + 0.125 \* 0.070059 = 0.0337 s

EstimatedRTT after the receipt of the ACK of segment 4:

EstimatedRTT = 0.875 \* 0.0337+ 0.125 \* 0.11443 = 0.0438 s

EstimatedRTT after the receipt of the ACK of segment 5:

EstimatedRTT = 0.875 \* 0.0438 + 0.125 \* 0.13989 = 0.0558 s

EstimatedRTT after the receipt of the ACK of segment 6:

EstimatedRTT = 0.875 \* 0.0558 + 0.125 \* 0.18964 = 0.0725 s

4、

No.4 , segment 1, segment length: 565 ;

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No.5 , segment 2, segment length: 1460;

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No.7 , segment 3, segment length: 1460

No.8 , segment 4, segment length: 1460

No.10 ,segment 5, segment length: 1460

No.11, segment 6, segment length: 1460

5、

The minimum amount of available buffer space is 5840.

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The lack of receiver buffer space didn’t throttle the sender, the buffer space go up to 62780, until the connection stopped.

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6、

In this trace file, there are no retransmitted segments, all the segments received successfully to the client in one transmitted. By checking the sequence number from the source to the destination, the segments number grows larger than the last one, if there something wrong, we will find a smaller segment number compare to the last one.

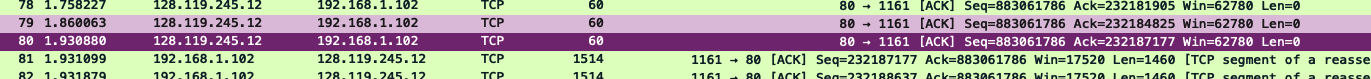
7、

In this continuous ACK, the sequence number of each one is 232129578, 232131038, 232132498, 232133958, 232135418, 232136878 respectively , we can find that the acknowledged data of ACK are all 1460

电脑屏幕的截图

描述已自动生成

And there are cases where the receiver is ACKing every other segments, from checking the acknowledged data by each ACK. In the segment of No.80, the acknowledged data is 2920bytes.



8、

The throughput for the TCP connection = the total amount data transmitted/ the total data transmission time

The total amount data transmitted can be calculated by the difference between the first segment(No.4) and the acknowledged sequence of the last ACK (No.202), which is 232293103 – 232129013 = 164090bytes

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The total data transmission time are similar as the data transmission, which can be calculated by the difference between the First TCP segments time and the last ACK time, which is 5.455830 – 0.26477 = 5.4294s.

一些文字和图案

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In conclusion, the throughout of the TCP connection is 164090 / 5.4294 = 30.222 kbyte/s

**Exercise2**

1、

The sequence number of the TCP SYN segment initiate the TCP connection is 2818463618.

2、

The sequence number of SYNACK is 1247095790, the value of the acknowledgement filed is 28218463619, the server determine this number by increasing 1 from the sequence number receive from the client.(which is 50045 in this question)

3、

The sequence number is 2818463619, which sent by the client computer in response to the SYNACK, the acknowledgement field in this ACK segment is 1247095791. This segment didn’t contain any data.

4、

The type of closure is simultaneous close. Both client and server didn’t sent FIN to the other one, we can know that by checking the ACK numbers of these FIN segments.

5、

Client:

The data transferred is :2818463653 - 2818463618 -2= 35 – 1 -1 = 33 bytes

In this equation the “1” are SYN and “FIN” respectively

Server:

The data transferred is :1247095832 – 1247095790 -2 = 42 – 1 -1 = 40 bytes

In this equation the “1” are SYN and “FIN” respectively

The data is equal to the difference between first TCP initial sequence number and the final ACK, and minus the SYK and FIN.