Response to P3-Fall2024 R2

Owen Lutwyche V00977111

Each group contains five *traceroute* trace files, all with the same destination address. For each group:

Group 1 Answers

1. determine the number of probes per TTL used in each trace file.

   TTL 1: 3, TTL 2: 3, TTL 3: 3, TTL 4: 3, TTL 5: 3, TTL 6: 3, TTL 7: 3, TTL 8: 3, TTL 9: 3, TTL 10: 3, TTL 11: 3, TTL 12: 3, TTL 13: 3, TTL 14: 3, TTL 15: 3, TTL 16: 3, TTL 17: 3

   same results for all trace files in group 1.

2. determine whether or not the sequence of intermediate routers is the same in different trace files

   trace1: 142.104.68.167, 192.168.9.5, 142.104.68.1, 192.168.10.1, 192.168.8.6, 142.104.252.37, 142.104.252.246, 207.23.244.242, 199.212.24.64, 206.12.3.17, 206.81.80.17, 74.125.37.91, 72.14.237.123, 209.85.250.121, 209.85.249.155, 209.85.249.153

   trace2: 142.104.68.167, 192.168.9.5, 142.104.68.1, 192.168.8.6, 192.168.10.1, 142.104.252.37, 142.104.252.246, 207.23.244.242, 206.12.3.17, 199.212.24.64, 206.81.80.17, 72.14.237.123, 74.125.37.91, 209.85.249.109, 209.85.250.57, 209.85.246.219

   trace3: 142.104.68.167, 142.104.68.1, 192.168.9.5, 192.168.10.1, 192.168.8.6, 142.104.252.37, 142.104.252.246, 207.23.244.242, 206.12.3.17, 199.212.24.64, 206.81.80.17, 74.125.37.91, 72.14.237.123, 209.85.245.65, 209.85.249.155, 209.85.247.63

   trace4: 142.104.68.167, 142.104.68.1, 192.168.9.5, 192.168.10.1, 192.168.8.6, 142.104.252.37, 142.104.252.246, 207.23.244.242, 206.12.3.17, 199.212.24.64, 206.81.80.17, 74.125.37.91, 72.14.237.123, 209.85.246.219, 209.85.250.123, 209.85.245.65

   trace5: 142.104.68.167, 142.104.68.1, 192.168.9.5, 192.168.10.1, 192.168.8.6, 142.104.252.37, 142.104.252.246, 207.23.244.242, 206.12.3.17, 199.212.24.64, 206.81.80.17, 72.14.237.123, 209.85.250.59, 209.85.249.153, 209.85.247.61

The sequence is different!

3. if the sequence of intermediate routers is different, list the difference and explain why. If the sequence is the same, draw a table to compare the RTTs of different traceroute attempts. From the result, which hop is likely to incur the maximum delay? Explain your conclusion.

The sequence is different! There are numerous differences to the order in which some routers appear. Additionally, trace5 doesn't go through 74.125.37.91, and the other traces have a few differences in the order of routers.

This difference is likely due to the inherent unpredictability of network protocols. Different routers and pathways may be occupied by traffic at different times, causing packets to take different routes.

Group 2 Answers

1. determine the number of probes per TTL used in each trace file.

   TTL 1: 3, TTL 2: 3, TTL 3: 3, TTL 4: 3, TTL 5: 3, TTL 6: 3, TTL 7: 3, TTL 8: 3, TTL 9: 3

   same results for all trace files in group 1.

2. determine whether or not the sequence of intermediate routers is the same in different trace files

   trace1: 192.168.0.16, 192.168.0.1, 24.108.0.1, 64.59.161.197, 66.163.72.26, 66.163.68.18, 72.14.221.102, 108.170.245.113, 209.85.249.249

   trace2: 192.168.0.16, 192.168.0.1, 24.108.0.1, 64.59.161.197, 66.163.72.26, 66.163.68.18, 72.14.221.102, 108.170.245.113, 209.85.249.249

   trace3: 192.168.0.16, 192.168.0.1, 24.108.0.1, 64.59.161.197, 66.163.72.26, 66.163.68.18, 72.14.221.102, 108.170.245.113, 209.85.249.249

   trace4: 192.168.0.16, 192.168.0.1, 24.108.0.1, 64.59.161.197, 66.163.72.26, 66.163.68.18, 72.14.221.102, 108.170.245.113, 209.85.249.249

   trace5: 192.168.0.16, 192.168.0.1, 24.108.0.1, 64.59.161.197, 66.163.72.26, 66.163.68.18, 72.14.221.102, 108.170.245.113, 209.85.249.249

   The sequence is the same!

3. if the sequence of intermediate routers is different, list the difference and explain why. If the sequence is the same, draw a table to compare the RTTs of different traceroute

attempts. From the result, which hop is likely to incur the maximum delay? Explain your conclusion.

time values are in ms.

TTL	Average RTT in trace 1	Average RTT in trace 2	Average RTT in trace 3	Average RTT in trace 4	Average RTT in trace 5	Mean of average RTT for this hop
1	3.33	2.71	7.85	3.42	1.75	3.812
2	15.81	17.12	11.84	13.24	16.15	14.832
3	18.87	20.10	22.58	21.67	21.60	20.964
4	22.84	19.42	19.46	19.75	18.56	20.006
5	26.50	21.56	20.32	35.77	20.72	24.974
6	24.26	19.98	21.85	22.67	43.47	26.446
7	18.41	51.66	22.76	18.34	26.92	27.618
8	22.97	108.74	20.59	24.57	25.62	40.498
9	18.10	21.91	23.14	19.94	21.44	20.906

TTL 8 has the highest mean of average RTT, so it is likely that hop #8 will incur the maximum delay.