

E2:

```
z5340468@vx06:~$ ping -4 ec.ho
ping: ec.ho: Name or service not known
z5340468@vx06:~$ ping -4 pin.gs
ping: pin.gs: Name or service not known
z5340468@vx06:~$ ping -4 nasa.gov
PING nasa.gov (52.0.14.116) 56(84) bytes of data.
^C
--- nasa.gov ping statistics ---
9 packets transmitted, 0 received, 100% packet loss, time 8112ms
```

1. For ec.ho, the result for ping is "Name or service not know". I think it is that this host is not exist as I also cannot open it in browser.
2. For pin.gs, same as ec.ho.
3. For nasa.gov, This is obviously the official NASA website, can be open in browser. But 100% packet loss means there is a communication failure between two communicating devices, my local computer and NASA's server. One possibility is that NASA's servers do not allow ping access to unknown computers for security reasons and another reason is the packet loss which causes by the queue. When the queue is full, the coming package will loss, but it is basically impossible to lose 59 packages together.

All other hosts are reachable.

E3:

1.

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z5340468@vx08:~/cs3331/lab1$ traceroute www.tu-berlin.de
traceroute to www.tu-berlin.de (130.149.7.201), 30 hops max, 60 byte packets
 1 cserouter1-server.orchestra.cse.unsw.EDU.AU (129.94.242.251) 0.064 ms 0.052 ms 0.059 ms
 2 129.94.39.17 (129.94.39.17) 0.938 ms 0.944 ms 0.950 ms
 3 * * *
 4 po-3-1902.ombr1.gw.unsw.edu.au (129.94.24.20) 1.152 ms 1.181 ms 1.261 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.235 ms 1.201 ms 1.266 ms
 6 138.44.5.0 (138.44.5.0) 1.425 ms 1.358 ms 1.371 ms
 7 et-2-0-5.bdr1.sing.sin.aarnet.net.au (113.197.15.233) 93.137 ms 92.985 ms 92.880 ms
 8 138.44.226.7 (138.44.226.7) 258.585 ms 258.622 ms 258.587 ms
 9 ae9.mxl.ams.nl.geant.net (62.40.98.128) 263.438 ms 263.408 ms 263.447 ms
10 ael.mxl.ham.de.geant.net (62.40.98.61) 270.945 ms 270.986 ms 270.952 ms
11 dfn-gw.mxl.ham.de.geant.net (62.40.125.171) 274.775 ms 274.998 ms 275.023 ms
12 kr-tub248.x-win.dfn.de (188.1.235.118) 274.418 ms 274.303 ms 274.355 ms
13 enc-fp.gate.tu-berlin.de (130.149.126.189) 274.698 ms 275.010 ms 275.015 ms
14 e-n-dist2-e-n-c.gate.tu-berlin.de (130.149.126.150) 274.960 ms 274.824 ms 274.828 ms
15 e-ns-e-n.gate.tu-berlin.de (130.149.126.78) 275.090 ms 274.831 ms 275.736 ms
16 tu-berlin.de (130.149.7.201) 274.659 ms 274.705 ms 275.442 ms
```

How many routers are there between your workstation and www.tu-berlin.de ?

A: 15(first one is not my workstation and the last one is www.tu-berlin.de)

How many routers along the path are part of the UNSW network?

A: 5

Which router is the first router outside of Australia?

A: router 10

Which router is the first router in Europe?

A: router 7(sing means Singapore)

2.

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z5340468@vx08:~$ traceroute canterbury.ac.nz
traceroute to canterbury.ac.nz (132.181.106.9), 30 hops max, 60 byte packets
 1 cserouter1-server.orchestra.cse.unsw.EDU.AU (129.94.242.251) 0.062 ms 0.069 ms 0.059 ms
 2 129.94.39.17 (129.94.39.17) 0.927 ms 0.894 ms 0.935 ms
 3 172.17.31.154 (172.17.31.154) 2.044 ms 1.643 ms 1.661 ms
 4 po-3-1902.ombcr1.gw.unsw.edu.au (129.94.24.20) 1.309 ms 1.325 ms 1.335 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.346 ms 1.362 ms 1.381 ms
 6 138.44.5.0 (138.44.5.0) 1.533 ms 1.258 ms 1.292 ms
 7 et-0-1-0.bdr1.msct.nsw.aarnet.net.au (113.197.15.109) 1.624 ms 1.551 ms 1.515 ms
 8 210.7.39.22 (210.7.39.22) 2.874 ms 2.468 ms 2.503 ms
 9 210.7.37.209 (210.7.37.209) 49.483 ms 49.413 ms 49.415 ms
10 210.7.37.210 (210.7.37.210) 70.695 ms 70.574 ms 70.481 ms
11 202.36.179.65 (202.36.179.65) 49.416 ms 49.216 ms 49.411 ms
12 132.181.3.236 (132.181.3.236) 59.128 ms 59.124 ms 58.702 ms
13 132.181.106.9 (132.181.106.9) 49.289 ms 49.324 ms 49.253 ms
z5340468@vx08:~$ traceroute stanford.edu
traceroute to stanford.edu (171.67.215.200), 30 hops max, 60 byte packets
 1 cserouter1-server.orchestra.cse.unsw.EDU.AU (129.94.242.251) 0.060 ms 0.076 ms 0.066 ms
 2 129.94.39.17 (129.94.39.17) 0.934 ms 0.949 ms 0.966 ms
 3 172.17.31.154 (172.17.31.154) 2.009 ms 2.050 ms 2.070 ms
 4 po-3-1902.ombcr1.gw.unsw.edu.au (129.94.24.20) 1.412 ms 1.453 ms 1.419 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.316 ms 1.332 ms 1.434 ms
 6 138.44.5.0 (138.44.5.0) 2.240 ms 1.827 ms 1.883 ms
 7 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149) 2.157 ms 2.026 ms 2.027 ms
 8 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99) 94.619 ms 94.645 ms 94.768 ms
 9 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201) 144.777 ms 144.819 ms 144.783 ms
10 cenichpr-1-is-jmb-778.snvaca.pacificwave.net (207.231.245.129) 162.415 ms 162.184 ms 162.331 ms
11 hpr-oak-agg8--svl-hpr3-100g.cenic.net (137.164.25.95) 164.200 ms 164.223 ms 164.372 ms
12 137.164.26.241 (137.164.26.241) 164.551 ms 164.519 ms 164.530 ms
13 woa-west-rtr-vl3.SUNet (171.66.255.132) 163.951 ms 164.055 ms 164.287 ms
14 * * *
15 web.stanford.edu (171.67.215.200) 164.331 ms 164.330 ms 164.313 ms
z5340468@vx08:~$ traceroute reading.ac.uk
traceroute to reading.ac.uk (134.225.0.151), 30 hops max, 60 byte packets
 1 cserouter1-server.orchestra.cse.unsw.EDU.AU (129.94.242.251) 0.149 ms 0.139 ms 0.132 ms
 2 129.94.39.17 (129.94.39.17) 0.872 ms 0.926 ms 0.941 ms
 3 172.17.31.154 (172.17.31.154) 1.683 ms 1.643 ms 1.608 ms
 4 po-3-1902.ombcr1.gw.unsw.edu.au (129.94.24.20) 1.413 ms 1.312 ms 1.420 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.271 ms 1.331 ms 1.298 ms
 6 138.44.5.0 (138.44.5.0) 6.383 ms 6.029 ms 6.043 ms
 7 et-2-0-5.bdr1.sing.sin.aarnet.net.au (113.197.15.233) 92.732 ms 92.661 ms 92.644 ms
 8 138.44.226.7 (138.44.226.7) 256.016 ms 256.037 ms 256.040 ms
 9 ae2.mx1.lon2.uk.geant.net (62.40.98.65) 256.655 ms 256.653 ms 256.629 ms
10 janet-bckp-gw.mx1.lon2.uk.geant.net (62.40.125.58) 270.109 ms 257.265 ms 269.955 ms
11 ae19.readdy-rbr1.ja.net (146.97.37.194) 257.958 ms 257.977 ms 258.064 ms
12 reading-university-1.ja.net (193.63.109.26) 274.661 ms 272.296 ms 272.201 ms
13 xe-0-0-7.fw-ext.net.rdg.ac.uk (134.225.255.38) 258.634 ms 258.512 ms 258.504 ms
14 alumni.reading.ac.uk (134.225.0.151) 259.595 ms 259.474 ms 259.529 ms

```

At which router do the paths from your machine to these three destinations diverge

A: At router 7

Find out further details about this router.

A: Abuse contact for '113.197.15.0 - 113.197.15.255' is 'abuse@aarnet.edu.au', so at route 7, it is in a same server.

Is the number of hops on each path proportional to the physical distance?

A: Not at all, the connection between them is not absolute.

```

z5340468@vx08:~$ traceroute www.speedtest.com.sg
traceroute to www.speedtest.com.sg (202.150.221.170), 30 hops max, 60 byte packets
 1 cserouter1-server.orchestra.cse.unsw.EDU.AU (129.94.242.251) 0.054 ms 0.062 ms 0.053 ms
 2 129.94.39.17 (129.94.39.17) 0.892 ms 0.906 ms 0.922 ms
 3 172.17.31.154 (172.17.31.154) 1.622 ms 2.062 ms 2.079 ms
 4 po-3-1902.ombcr1.gw.unsw.edu.au (129.94.24.20) 1.256 ms 1.306 ms 1.343 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.402 ms 1.369 ms 1.411 ms
 6 138.44.5.0 (138.44.5.0) 1.479 ms 1.460 ms 1.229 ms
 7 et-0-3-0.pel.alxd.nsw.aarnet.net.au (113.197.15.153) 1.710 ms 1.716 ms 1.791 ms
 8 xe-0-2-7.bdr1.a.lax.aarnet.net.au (202.158.194.173) 147.607 ms 147.682 ms 147.656 ms
 9 singtel.as7473.any2ix.coresite.com (206.72.210.63) 147.801 ms 147.778 ms 148.088 ms
10 203.208.172.133 (203.208.172.133) 334.569 ms 203.208.149.253 (203.208.149.253) 155.971 ms 203.208.171.117 (20
3.208.171.117) 148.136 ms
11 203.208.177.110 (203.208.177.110) 347.323 ms 347.079 ms 203.208.151.217 (203.208.151.217) 269.284 ms
12 203.208.182.250 (203.208.182.250) 343.409 ms * 203.208.182.253 (203.208.182.253) 328.851 ms
13 202.150.221.170 (202.150.221.170) 229.186 ms 203.208.177.110 (203.208.177.110) 325.854 ms 203.208.153.246 (20
3.208.153.246) 347.839 ms
z5340468@vx08:~$ traceroute www.traceroute.org
traceroute to www.traceroute.org (193.141.43.158), 30 hops max, 60 byte packets
 1 cserouter1-server.orchestra.cse.unsw.EDU.AU (129.94.242.251) 0.057 ms 0.064 ms 0.082 ms
 2 129.94.39.17 (129.94.39.17) 0.886 ms 0.901 ms 0.945 ms
 3 172.17.31.154 (172.17.31.154) 1.644 ms 1.980 ms 2.010 ms
 4 po-3-1902.ombcr1.gw.unsw.edu.au (129.94.24.20) 1.382 ms 1.400 ms 1.227 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.300 ms 1.266 ms 1.324 ms
 6 138.44.5.0 (138.44.5.0) 1.549 ms 1.272 ms 1.227 ms
 7 et-2-0-5.bdr1.sing.sin.aarnet.net.au (113.197.15.233) 93.678 ms 93.273 ms 93.227 ms
 8 ae1.bdr2.sing.sin.aarnet.net.au (113.197.15.235) 92.888 ms 92.970 ms 92.946 ms
 9 unknown.telstraglobal.net (202.126.129.213) 92.942 ms 93.108 ms 93.143 ms
10 * i-92.sgcnc-core01.telstraglobal.net (202.84.219.174) 95.838 ms 95.842 ms
11 i-92.sgcnc-core01.telstraglobal.net (202.84.219.174) 95.160 ms i-93.istt04.telstraglobal.net (202.84.224.190)
94.257 ms i-92.sgcnc-core01.telstraglobal.net (202.84.219.174) 95.195 ms
12 i-91.istt04.telstraglobal.net (202.84.224.197) 93.730 ms 94.154 ms ae10.cr4-sin1.ip4.gtt.net (67.199.139.109)
104.846 ms
13 ae2.cr2-dus6.ip4.gtt.net (89.149.143.98) 263.588 ms 263.728 ms 263.681 ms
14 traceroute.org (193.141.43.158) 261.100 ms !X ae2.cr2-dus6.ip4.gtt.net (89.149.143.98) 263.684 ms traceroute.
org (193.141.43.158) 261.121 ms !X

z5340468@vx08:~$ traceroute --back www.speedtest.com.sg
traceroute to www.speedtest.com.sg (202.150.221.170), 30 hops max, 60 byte packets
 1 cserouter1-server.orchestra.cse.unsw.EDU.AU (129.94.242.251) 0.104 ms 0.107 ms 0.128 ms
 2 129.94.39.17 (129.94.39.17) 0.961 ms 1.036 ms 1.051 ms
 3 172.17.31.154 (172.17.31.154) 12.276 ms 12.244 ms 12.285 ms
 4 po-3-1902.ombcr1.gw.unsw.edu.au (129.94.24.20) 1.398 ms 1.414 ms 1.492 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.417 ms 1.434 ms 1.452 ms
 6 138.44.5.0 (138.44.5.0) 1.606 ms 1.291 ms 1.315 ms
 7 et-0-3-0.pel.alxd.nsw.aarnet.net.au (113.197.15.153) 1.791 ms 1.779 ms 1.747 ms
 8 xe-0-2-7.bdr1.a.lax.aarnet.net.au (202.158.194.173) 147.711 ms 147.753 ms 147.716 ms
 9 singtel.as7473.any2ix.coresite.com (206.72.210.63) 147.834 ms 147.754 ms 147.844 ms
10 203.208.171.117 (203.208.171.117) 148.116 ms 203.208.149.253 (203.208.149.253) 156.161 ms *
11 203.208.172.225 (203.208.172.225) '-15' 263.160 ms 203.208.182.41 (203.208.182.41) '-15' 253.204 ms *
12 * * *
13 203.208.153.246 (203.208.153.246) '-10' 347.879 ms 353.824 ms *
14 202.150.221.170 (202.150.221.170) '-10' 226.799 ms 221.353 ms *
z5340468@vx08:~$ traceroute --back www.traceroute.org
traceroute to www.traceroute.org (193.141.43.158), 30 hops max, 60 byte packets
 1 cserouter1-server.orchestra.cse.unsw.EDU.AU (129.94.242.251) 0.055 ms 0.065 ms 0.055 ms
 2 129.94.39.17 (129.94.39.17) 0.934 ms 0.950 ms 0.967 ms
 3 172.17.31.154 (172.17.31.154) 2.028 ms 1.618 ms 1.649 ms
 4 po-3-1902.ombcr1.gw.unsw.edu.au (129.94.24.20) 1.325 ms 1.343 ms 1.378 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 11.331 ms 11.290 ms 11.356 ms
 6 138.44.5.0 (138.44.5.0) 1.443 ms 1.226 ms 1.337 ms
 7 et-2-0-5.bdr1.sing.sin.aarnet.net.au (113.197.15.233) 93.161 ms 93.117 ms 93.122 ms
 8 ae1.bdr2.sing.sin.aarnet.net.au (113.197.15.235) 105.267 ms 92.895 ms 92.903 ms
 9 unknown.telstraglobal.net (202.126.129.213) '-8' 123.775 ms 123.808 ms 93.321 ms
10 i-92.sgcnc-core01.telstraglobal.net (202.84.219.174) '-9' 94.819 ms * 95.373 ms
11 i-92.sgcnc-core01.telstraglobal.net (202.84.219.174) 94.774 ms 102.869 ms 94.503 ms
12 ae10.cr4-sin1.ip4.gtt.net (67.199.139.109) '-14' 106.114 ms 105.406 ms i-91.istt04.telstraglobal.net (202.84.
224.197) '-10' 94.125 ms
13 ae10.cr4-sin1.ip4.gtt.net (67.199.139.109) '-14' 105.533 ms 105.323 ms ae2.cr2-dus6.ip4.gtt.net (89.149.143.9
8) 261.151 ms
14 ae2.cr2-dus6.ip4.gtt.net (89.149.143.98) '-13' 261.662 ms 261.143 ms 261.665 ms
15 traceroute.org (193.141.43.158) '-12' 261.276 ms !X 261.430 ms !X 261.133 ms !X

```

What are the IP addresses of the two servers that you have chosen?

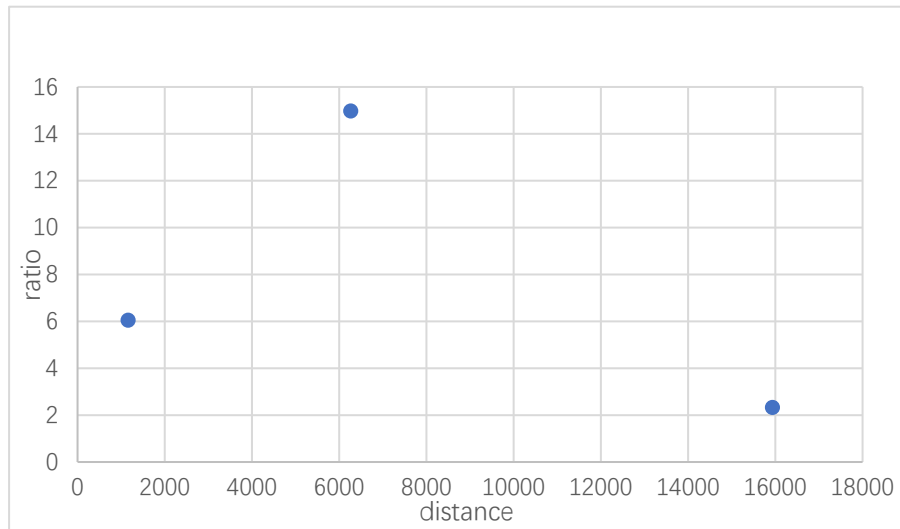
A: www.speedtest.com.sg (202.150.221.170), www.traceroute.org (193.141.43.158)

Does the reverse path go through the same routers as the forward path?

A: So, traceroute is just guessing the reverse path and it is nearly same. But in the real situation, there will be plenty of paths to choose from, depending on the traffic jam etc., it may same or quite different.

E4:

1.



Can you think of at least two reasons why the y-axis values that you plot are greater than 2?

A: In a real transmission, there would be non-physical delays, where queueing delays could be the cause. In the transmission process of these data, some busy routes may have passed, resulting in a long queue time.

Is the delay to the destinations constant, or does it vary over time? Explain why.

A: Basic certainty, first If choose the same path the physical distance doesn't change, even change the path as it travels in light speed, the delay will not change a lot. zSecond, the length of the queue is uncertain during each transmission, which may be none or a little too long, leading to fluctuations in latency.

Which of these delays depend on the packet size and which do not?

A: Transmission delay and queueing delay depend on packet size, propagation delay and processing delay are not