

Exercise 1:

Part 1:

```
z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ nslookup www.koala.com.au
Server:      129.94.242.45
Address:     129.94.242.45#53

Non-authoritative answer:
Name:   www.koala.com.au
Address: 172.67.219.46
Name:   www.koala.com.au
Address: 104.21.45.210
```

IP addresses are 172.67.219.46 and 104.21.45.210.

The reason of having several IP addresses is there are several physical serves to achieve load balancing.

Part 2:

```
1.0.0.127.in-addr.arpa  name = localhost.
```

The name of the IP address 127.0.0.1 is localhost. It's the loopback IP address that we used internally.

Exercise 2:

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.unsw.edu.au
PING cdn.prod65.unsw.adobecqms.net (13.35.145.116) 56(84) bytes of data.
64 bytes from server-13-35-145-116.syd1.r.cloudfront.net (13.35.145.116): icmp_seq=1 ttl=244 time=1.07 ms
64 bytes from server-13-35-145-116.syd1.r.cloudfront.net (13.35.145.116): icmp_seq=2 ttl=244 time=1.04 ms
64 bytes from server-13-35-145-116.syd1.r.cloudfront.net (13.35.145.116): icmp_seq=3 ttl=244 time=1.06 ms
64 bytes from server-13-35-145-116.syd1.r.cloudfront.net (13.35.145.116): icmp_seq=4 ttl=244 time=1.08 ms
64 bytes from server-13-35-145-116.syd1.r.cloudfront.net (13.35.145.116): icmp_seq=5 ttl=244 time=1.08 ms
64 bytes from server-13-35-145-116.syd1.r.cloudfront.net (13.35.145.116): icmp_seq=6 ttl=244 time=1.05 ms
^C
--- cdn.prod65.unsw.adobecqms.net ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5006ms
rtt min/avg/max/mdev = 1.049/1.069/1.089/0.035 ms
```

www.unsw.edu.au is reachable through both ping and web browser.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.getfittest.com.au
ping: unknown host www.getfittest.com.au
```

www.getfittest.com.au is unreachable by ping and by web browser. The reason is this host doesn't exist.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.mit.edu
PING e9566.dscb.akamaiedge.net (23.77.154.132) 56(84) bytes of data.
64 bytes from a23-77-154-132.deploy.static.akamaitechnologies.com (23.77.154.132): icmp_seq=1 ttl=56 time=1.33 ms
64 bytes from a23-77-154-132.deploy.static.akamaitechnologies.com (23.77.154.132): icmp_seq=2 ttl=56 time=1.34 ms
64 bytes from a23-77-154-132.deploy.static.akamaitechnologies.com (23.77.154.132): icmp_seq=3 ttl=56 time=1.37 ms
64 bytes from a23-77-154-132.deploy.static.akamaitechnologies.com (23.77.154.132): icmp_seq=4 ttl=56 time=1.37 ms
^Z
```

www.mit.edu is reachable through both ping and web browser.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.intel.com.au
PING e19235.dsca.akamaiedge.net (104.98.21.56) 56(84) bytes of data.
64 bytes from a104-98-21-56.deploy.static.akamaitechnologies.com (104.98.21.56): icmp_seq=1 ttl=56 time=1.29 ms
64 bytes from a104-98-21-56.deploy.static.akamaitechnologies.com (104.98.21.56): icmp_seq=2 ttl=56 time=1.30 ms
64 bytes from a104-98-21-56.deploy.static.akamaitechnologies.com (104.98.21.56): icmp_seq=3 ttl=56 time=1.23 ms
^C
--- e19235.dsca.akamaiedge.net ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
```

www.intel.com.au is reachable through both ping and web browser.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.tpg.com.au
PING www.tpg.com.au (203.26.27.38) 56(84) bytes of data.
64 bytes from www.tpg.com.au (203.26.27.38): icmp_seq=1 ttl=119 time=1.78 ms
64 bytes from www.tpg.com.au (203.26.27.38): icmp_seq=2 ttl=119 time=1.75 ms
64 bytes from www.tpg.com.au (203.26.27.38): icmp_seq=3 ttl=119 time=1.82 ms
64 bytes from www.tpg.com.au (203.26.27.38): icmp_seq=4 ttl=119 time=1.66 ms
```

www.tpg.com.au is reachable through both ping and web browser.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.hola.hp
ping: unknown host www.hola.hp
```

www.hola.hp is unreachable by ping and by web browser. The reason is this host doesn't exist.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.amazon.com
PING d3ag4hukkh62yn.cloudfront.net (13.35.146.198) 56(84) bytes of data.
64 bytes from server-13-35-146-198.syd1.r.cloudfront.net (13.35.146.198): icmp_seq=1 ttl=244 time=1.01 ms
64 bytes from server-13-35-146-198.syd1.r.cloudfront.net (13.35.146.198): icmp_seq=2 ttl=244 time=1.09 ms
64 bytes from server-13-35-146-198.syd1.r.cloudfront.net (13.35.146.198): icmp_seq=3 ttl=244 time=1.08 ms
^Z
```

www.amazon.com is reachable through both ping and web browser.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.tsinghua.edu.cn
PING www.tsinghua.edu.cn (166.111.4.100) 56(84) bytes of data.
64 bytes from www.tsinghua.edu.cn (166.111.4.100): icmp_seq=1 ttl=44 time=196 ms
64 bytes from www.tsinghua.edu.cn (166.111.4.100): icmp_seq=2 ttl=44 time=196 ms
^C
--- www.tsinghua.edu.cn ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 196.421/196.489/196.558/0.448 ms
```

www.tsinghua.edu.cn is reachable through both ping and web browser.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping www.kremlin.ru
PING www.kremlin.ru (95.173.136.72) 56(84) bytes of data.
^C
--- www.kremlin.ru ping statistics ---
8 packets transmitted, 0 received, 100% packet loss, time 7166ms
```

www.kremlin.ru is reachable through web browser but not ping. This might because www.kremlin.ru is preventing non-secure icmp packet.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=115 time=1.37 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=115 time=1.34 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=115 time=1.31 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=115 time=1.36 ms
^Z
```

8.8.8.8 is reachable through ping but not web browser. This is because it doesn't have web app.

Exercise 3:

Part 1:

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ traceroute www.columbia.edu
traceroute to www.columbia.edu (128.59.105.24), 30 hops max, 60 byte packets
 1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.121 ms 0.110 ms 0.099 ms
 2 129.94.39.17 (129.94.39.17) 0.875 ms 0.881 ms 0.872 ms
 3 ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 2.121 ms 2.128 ms 2.137 ms
 4 libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.078 ms 1.149 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197) 1.074 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.180 ms 1.213 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.270 ms
 6 138.44.5.0 (138.44.5.0) 1.300 ms 1.199 ms 1.270 ms
 7 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149) 2.019 ms 1.825 ms 1.915 ms
 8 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99) 95.286 ms 95.301 ms 95.336 ms
 9 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201) 149.873 ms 149.842 ms 149.859 ms
10 abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8) 178.537 ms 178.497 ms 178.050 ms
11 ae-1.4079.rtsw.minn.net.internet2.edu (162.252.70.173) 202.117 ms 202.117 ms 202.186 ms
12 ae-1.4079.rtsw.eqch.net.internet2.edu (162.252.70.106) 209.814 ms 209.882 ms 209.920 ms
13 ae-0.4079.rtsw3.eqch.net.internet2.edu (162.252.70.163) 207.102 ms 207.090 ms 206.930 ms
14 ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130) 212.871 ms 212.827 ms 213.199 ms
15 buf-9208-I2-CLEV.nysernet.net (199.109.11.33) 216.289 ms 216.368 ms 216.317 ms
16 syr-9208-buf-9208.nysernet.net (199.109.7.193) 219.419 ms 219.461 ms 219.408 ms
17 syr-55a1-syr-9208.nysernet.net (199.109.7.198) 220.001 ms 219.808 ms 219.742 ms
18 nyc32-55a1-syr-55a1.nysernet.net (199.109.7.206) 225.525 ms 225.509 ms 225.323 ms
19 nyc32-9208-nyc32-55a1.nysernet.net (199.109.7.201) 224.900 ms 224.858 ms 224.925 ms
20 columbia.nyc-9208.nysernet.net (199.109.4.14) 224.889 ms 224.912 ms 224.834 ms
21 cc-core-1-x-nyser32-gw-1.net.columbia.edu (128.59.255.5) 225.233 ms 225.241 ms 225.179 ms
22 cc-conc-1-x-cc-core-1.net.columbia.edu (128.59.255.21) 225.266 ms 225.349 ms 225.297 ms
23 www-ttm.cc.columbia.edu (128.59.105.24) 225.179 ms 224.901 ms 224.847 ms
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$
```

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ whois 129.94.39.17
```

```
role:      NSWUNIVERSITY Hostmaster
address:   University of New South Wales
address:   SYDNEY, NSW 2052
country:   AU
phone:     +61 2 9385 3333
fax-no:    +61 2 9385 1112
```

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ whois 138.44.5.0
```

```
person:    Steve Maddocks
remarks:   Director Operations
address:   AARNet Pty Ltd
address:   26 Dick Perry Avenue
address:   Kensington
address:   Perth
```

There are 22 routers in between and 5 of them are part of the UNSW network.

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ whois 113.197.15.201
```

```
address:   AARNet Pty Ltd
address:   GPO Box 1559
address:   Canberra
address:   ACT 2601
country:   AU
```

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ whois 207.231.240.8
```

```
OrgName:   Pacific Wave
OrgId:     PACIF-24
Address:   c/o Pacific Northwest Gigapop
Address:   113 Cherry St #30685
City:      Seattle
StateProv: WA
PostalCode: 98104-2205
Country:   US
```

Between router7 and 11 packets cross the Pacific Ocean since there is a relatively large trip time interval. By using whois command we can confirm between router 9 and 10 packets cross the Pacific Ocean.

Part 2:

```
z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ traceroute www.ucla.edu
traceroute to www.ucla.edu (164.67.228.152), 30 hops max, 60 byte packets
 1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.078 ms 0.062 ms 0.070 ms
 2 129.94.39.17 (129.94.39.17) 0.812 ms 0.884 ms 0.841 ms
 3 libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.419 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.597 ms 1.607 ms
 4 libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.111 ms 1.130 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.136 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.156 ms 1.192 ms 1.203 ms
 6 138.44.5.0 (138.44.5.0) 1.884 ms 1.289 ms 1.285 ms
 7 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149) 1.899 ms 2.037 ms 2.151 ms
 8 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99) 95.365 ms 95.297 ms 95.311 ms
 9 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201) 146.767 ms 146.773 ms 146.763 ms
10 cenichpr-1-is-jmb-778.snvac.pacificwave.net (207.231.245.129) 164.643 ms 164.722 ms 163.979 ms
11 svl-aggl0-hpr--svl-hpr3--100g.cenic.net (137.164.25.106) 167.756 ms 167.115 ms 167.076 ms
12 hpr-lax-aggl0--svl-aggl0-100ge.cenic.net (137.164.25.73) 160.951 ms 160.661 ms 160.630 ms
13 * * *
14 bd11f1.anderson--cr001.anderson.ucla.net (169.232.4.6) 160.402 ms bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 160.241 ms
   bd11f1.anderson--cr001.anderson.ucla.net (169.232.4.6) 160.235 ms
15 cr00f1.anderson--rtr11f4.mathsci.ucla.net (169.232.8.185) 160.361 ms 160.289 ms cr00f2.csb1--rtr11f4.mathsci.ucla.net (169.232.8.181) 161.016 ms
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```



```

z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ traceroute www.u-tokyo.ac.jp
traceroute to www.u-tokyo.ac.jp (210.152.243.234), 30 hops max, 60 byte packets
 1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.118 ms 0.114 ms 0.115 ms
 2 129.94.39.17 (129.94.39.17) 0.985 ms 0.942 ms 0.977 ms
 3 ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.553 ms 1.996 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.654 ms
 4 ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.242 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.255 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.265 ms
 5 unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.288 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.319 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.338 ms
 6 138.44.5.0 (138.44.5.0) 1.508 ms 1.394 ms 1.344 ms
 7 et-0-3-0.pel.bkvl.nsw.aarnet.net.au (113.197.15.147) 1.915 ms 1.955 ms 1.673 ms
 8 ge-4 0 0.bb1.a.pao.aarnet.net.au (202.158.194.177) 155.116 ms 155.131 ms 155.102 ms
 9 paloalto0.iiij.net (198.32.176.24) 156.499 ms 156.505 ms 156.570 ms
10 osk004bb01.IIJ.Net (58.138.88.189) 269.138 ms 269.100 ms osk004bb00.IIJ.Net (58.138.88.185) 265.064 ms
11 osk004ip57.IIJ.Net (58.138.106.162) 267.022 ms osk004ip57.IIJ.Net (58.138.106.166) 267.083 ms osk004ip57.IIJ.Net (58.138.106.162) 266.851 ms
12 210.130.135.130 (210.130.135.130) 267.075 ms 267.190 ms 267.163 ms
13 124.83.228.58 (124.83.228.58) 265.168 ms 265.200 ms 265.140 ms
14 124.83.252.178 (124.83.252.178) 271.211 ms 273.429 ms 273.416 ms
15 158.205.134.26 (158.205.134.26) 271.007 ms 273.220 ms 271.170 ms
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```

```

z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ traceroute www.lancaster.ac.uk
traceroute to www.lancaster.ac.uk (148.88.65.80), 30 hops max, 60 byte packets
 1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.084 ms 0.076 ms 0.064 ms
 2 129.94.39.17 (129.94.39.17) 0.814 ms 0.854 ms 0.866 ms
 3 libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.338 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.501 ms 1.507 ms
 4 libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.193 ms 1.146 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197) 1.102 ms
 5 unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.172 ms 1.196 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.229 ms
 6 138.44.5.0 (138.44.5.0) 1.340 ms 1.269 ms 1.269 ms
 7 et-1-3-0.pel.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149) 2.213 ms 1.923 ms 2.002 ms
 8 et-0-0-0.pel.a.hnl.aarnet.net.au (113.197.15.99) 95.936 ms 95.298 ms 95.199 ms
 9 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201) 146.776 ms 146.785 ms 146.790 ms
10 abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8) 177.293 ms 177.298 ms 177.317 ms
11 ae-1.4079.rtsw.minn.net.internet2.edu (162.252.70.173) 202.258 ms 202.263 ms 202.331 ms
12 ae-1.4079.rtsw.eqch.net.internet2.edu (162.252.70.106) 230.543 ms 230.486 ms 229.662 ms
13 ae-0.4079.rtsw3.eqch.net.internet2.edu (162.252.70.163) 207.166 ms 207.571 ms 207.679 ms
14 ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130) 213.906 ms 213.095 ms 213.161 ms
15 ae-0.4079.rtsw.ashb.net.internet2.edu (162.252.70.128) 220.643 ms 220.691 ms 220.739 ms
16 ae-2.4079.rtsw2.ashb.net.internet2.edu (162.252.70.75) 220.396 ms 220.638 ms 220.629 ms
17 ae-2.4079.rtsw.wash.net.internet2.edu (162.252.70.136) 221.333 ms 220.197 ms 220.604 ms
18 internet2-gw.mx1.lon.uk.geant.net (62.40.124.44) 294.661 ms 294.604 ms 294.588 ms
19 janet-gw.mx1.lon.uk.geant.net (62.40.124.198) 295.364 ms 294.613 ms 304.097 ms
20 ae29.londpg-sbr2.ja.net (146.97.33.2) 300.285 ms 298.579 ms 295.323 ms
21 ae31.erdiss-sbr2.ja.net (146.97.33.22) 299.037 ms 298.982 ms 299.204 ms
22 ae29.manckh-sbr2.ja.net (146.97.33.42) 301.627 ms 300.969 ms 300.763 ms
23 ae25.manckh-ban1.ja.net (146.97.35.50) 300.905 ms 300.912 ms 300.901 ms
24 lancaster-uni.ja.net (146.97.40.178) 323.567 ms 322.804 ms 317.174 ms
25 * * *
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30 * * *

```

The paths diverge at this router 129.94.39.17. Here is more info about this router.

```

z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ whois 129.94.39.17

```

```

organisation:  ORG-UONS1-AP
org-name:      University of New South Wales
country:      AU
address:       IT Infrastructure, IT at UNSW
address:       The University of New South Wales
phone:        +61-2-9385-1025
e-mail:        hostmaster@unsw.edu.au
mnt-ref:       APNIC-HM
mnt-by:        APNIC-HM
last-modified: 2018-02-23T12:57:06Z
source:        APNIC

```



Network Location Tool

approximate geophysical location



network information

IP Address
169.232.8.181
Base Domain
ucla.net
Country
United States
Region
CA
City
Los Angeles
Latitude
33.7866
Longitude
-118.2987
Area Code
310
Postal Code
90095
Distance from Last
(as the crow flies)
7499.0 miles
Source
MaxMind

locate a network

Remote Address
[Use Current IP](#)

Distance from www.ucla.edu is 7499 miles and it takes 15 hops,



Network Location Tool

approximate geophysical location



network information

IP Address
158.205.134.26
Base Domain
158.205.134.26
Country
Japan
Region
Unknown
City
Unknown
Latitude
36
Longitude
138
Area Code
Unknown
Postal Code
Unknown
Distance from Last
(as the crow flies)
4908.7 miles
Source
MaxMind

locate a network

Remote Address
[Use Current IP](#)
Source ☒ MaxMind ☐ Hostip.info

Distance from www.u-tokyo.ac.jp is 4908.7 miles and it takes 15 hops,

you get signal



Network Location Tool

approximate geophysical location

Visually Trace the Route to a Network

Address

地图 卫星图像

地形

剑桥 Cambridge
伊普斯威奇 Ipswich
科尔切斯特 Colchester
牛津 Oxford
雷丁 Reading
伦敦 London
坎特伯雷 Canterbury
南安普敦 Southampton
布赖顿 Brighton
布里斯托尔 Bristol
巴斯 Bath
斯温顿 Swindon
布赖顿 Brighton
加来 Calais
阿姆斯特丹 Amsterdam

网络信息

IP Address
146.97.40.178

Base Domain
ja.net

Country
United Kingdom

Region
H9

City
London

Latitude
51.5

Longitude
-0.11670000000001

Area Code
Unknown

Postal Code
Unknown

Distance from Last (as the crow flies)
10572.2 miles

Source
MaxMind

locate a network

Remote Address

☒ Use Current IP

Source ☒ MaxMind ☐ Hostip.info

Distance from www.lancaster.ac.uk is 1572.2 miles and it takes 24 hops.
Therefore the number of hops and the physical distance is not proportional.

Part 3:

Traceroute Result:

```
traceroute to 129.94.242.121 (129.94.242.121), 30 hops max, 60 byte packets
 1  ge2-8.r01.sin01.ne.com.sg (202.150.221.169)  0.134 ms  0.155 ms  0.184 ms
 2  10.11.34.146 (10.11.34.146)  0.399 ms  0.461 ms  0.523 ms
 3  aarnet.sgix.sg (103.16.102.67)  0.934 ms  0.892 ms  0.908 ms
 4  et-7-3-0.pel.nsw.brwy.aarnet.net.au (113.197.15.232)  92.219 ms  92.234 ms  92.140 ms
 5  138.44.5.1 (138.44.5.1)  92.387 ms  92.365 ms  92.374 ms
 6  libcr1-te-1-5.gw.unsw.edu.au (149.171.255.102)  92.236 ms  92.254 ms  92.208 ms
 7  libudnex1-po-1.gw.unsw.edu.au (149.171.255.166)  92.764 ms  92.826 ms  92.839 ms
 8  ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36)  93.113 ms  93.095 ms  93.007 ms
 9  129.94.39.23 (129.94.39.23)  93.170 ms  93.226 ms  93.149 ms
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
```



```

z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ traceroute www.speedtest.com.sg
traceroute to www.speedtest.com.sg (202.150.221.170), 30 hops max, 60 byte packets
 1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.078 ms 0.066 ms 0.052 ms
 2 129.94.39.17 (129.94.39.17) 0.932 ms 0.966 ms 0.924 ms
 3 ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.415 ms 1.509 ms 1.913 ms
 4 ombcr1-po-5.gw.unsw.edu.au (149.171.255.197) 1.254 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.207 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.294 ms
 5 unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.253 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.262 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.295 ms
 6 138.44.5.0 (138.44.5.0) 1.431 ms 1.252 ms 1.365 ms
 7 et-2-0-5.bdr1.sing.sin.aarnet.net.au (113.197.15.233) 93.010 ms 92.836 ms 92.864 ms
 8 ael.bdr2.sing.sin.aarnet.net.au (113.197.15.235) 93.228 ms 102.015 ms 102.022 ms
 9 newmedia-express.sgix.sg (103.16.102.22) 93.376 ms 93.382 ms 93.474 ms
10 * * *
11 202-150-221-170.rev.ne.com.sg (202.150.221.170) 93.145 ms 92.989 ms 93.093 ms

```

```

 1 gigabitethernet3-3.exi2.melbourne.telstra.net (203.50.77.53) 0.331 ms 0.202 ms 0.242 ms
 2 bundle-ether3-100.win-core10.melbourne.telstra.net (203.50.80.129) 1.740 ms 1.601 ms 2.242 ms
 3 bundle-ether12.ken-core10.sydney.telstra.net (203.50.11.122) 13.110 ms 12.725 ms 13.483 ms
 4 bundle-ether1.ken-edge903.sydney.telstra.net (203.50.11.173) 12.109 ms 12.224 ms 12.113 ms
 5 aar3533567.lnk.telstra.net (139.130.0.78) 11.629 ms 11.590 ms 12.795 ms
 6 et-7-1-0.pe1.brwy.nsw.aarnet.net.au (113.197.15.13) 11.859 ms 11.848 ms 11.986 ms
 7 138.44.5.1 (138.44.5.1) 12.109 ms 12.101 ms 12.110 ms
 8 libcr1-te-1-5.gw.unsw.edu.au (149.171.255.102) 12.109 ms 12.098 ms 12.111 ms
 9 ombudnex1-po-1.gw.unsw.edu.au (149.171.255.202) 12.483 ms
10 ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36) 12.734 ms 12.848 ms 12.859 ms
11 129.94.39.23 (129.94.39.23) 12.860 ms 12.973 ms 12.985 ms

```

```

z5266153@vx8:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ traceroute www.telstra.net
traceroute to www.telstra.net (203.50.5.178), 30 hops max, 60 byte packets
 1 cserouter1-server.cse.unsw.EDU.AU (129.94.242.251) 0.070 ms 0.060 ms 0.070 ms
 2 129.94.39.17 (129.94.39.17) 0.871 ms 0.878 ms 0.887 ms
 3 libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34) 1.879 ms 1.886 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35) 1.365 ms
 4 libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.150 ms 1.159 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197) 1.090 ms
 5 unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.225 ms 1.230 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.242 ms
 6 138.44.5.0 (138.44.5.0) 3.832 ms 3.230 ms 3.181 ms
 7 et-1-1-0.pe1.rsby.nsw.aarnet.net.au (113.197.15.12) 1.615 ms 2.556 ms 2.668 ms
 8 xe-0-0-3.bdr1.rsby.nsw.aarnet.net.au (113.197.15.31) 1.548 ms 1.781 ms 1.789 ms
 9 HundredGigE0-1-0-4.ken-edge903.sydney.telstra.net (139.130.0.77) 2.359 ms 2.473 ms 2.548 ms
10 bundle-ether2.chw-edge903.sydney.telstra.net (203.50.11.175) 2.554 ms bundle-ether17.ken-core10.sydney.telstra.net (203.50.11.172) 3.397 ms 3.095 ms
11 bundle-ether17.chw-core10.sydney.telstra.net (203.50.11.176) 2.427 ms 4.075 ms bundle-ether10.win-core10.melbourne.telstra.net (203.50.11.123) 13.709 ms
12 bundle-ether1-2.exi-core10.melbourne.telstra.net (203.50.6.40) 14.970 ms 14.915 ms bundle-ether8.exi-core10.melbourne.telstra.net (203.50.11.125) 15.027 ms
13 203.50.11.209 (203.50.11.209) 13.273 ms 13.378 ms 13.258 ms
14 www.telstra.net (203.50.5.178) 12.511 ms 12.579 ms 12.648 ms

```

These IP addresses are 202.150.221.170 and 203.50.5.178.

The reverse path and the forward path are not the same. This is because there are many routers on the way that could be chose.

There are common routers like 138.44.5.0 and 138.44.5.1 but with different IP addresses because one router can have multiple interface and multiple IP address. They may just happen to be the same IP address but not in this case.

Exercise 4:

```

z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ./runping.sh www.uq.edu.au
ping -s 22 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p50
ping -s 222 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p250
ping -s 472 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p500
ping -s 722 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p750
ping -s 972 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p1000
ping -s 1222 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p1250
ping -s 1472 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p1500

z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ./plot.sh www.uq.edu.au-p*
www.uq.edu.au
processing www.uq.edu.au-p1000
1000 25.113 17.462
processing www.uq.edu.au-p1250
1250 17.957 17.579
processing www.uq.edu.au-p1500
1500 18.975 17.619
processing www.uq.edu.au-p250
250 21.387 17.191
processing www.uq.edu.au-p500
500 19.749 16.958
processing www.uq.edu.au-p500
500 24.367 17.225
processing www.uq.edu.au-p750
750 19.283 17.388
ps2pdf www.uq.edu.au_delay.ps
ps2pdf www.uq.edu.au_scatter.ps

```

```

z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ./runping.sh www.upm.edu.my

ping -s 22 -c 50 -i 1 www.upm.edu.my > www.upm.edu.my-p50
ping -s 222 -c 50 -i 1 www.upm.edu.my > www.upm.edu.my-p250
ping -s 472 -c 50 -i 1 www.upm.edu.my > www.upm.edu.my-p500
ping -s 722 -c 50 -i 1 www.upm.edu.my > www.upm.edu.my-p750
ping -s 972 -c 50 -i 1 www.upm.edu.my > www.upm.edu.my-p1000
ping -s 1222 -c 50 -i 1 www.upm.edu.my > www.upm.edu.my-p1250
ping -s 1472 -c 50 -i 1 www.upm.edu.my > www.upm.edu.my-p1500

z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ./plot.sh www.upm.edu.my-p*
www.upm.edu.my
processing www.upm.edu.my-p1000
1000 100.207 99.948
processing www.upm.edu.my-p1250
1250 100.230 100.096
processing www.upm.edu.my-p1500
1500 100.472 100.212
processing www.upm.edu.my-p250
250 99.793 99.622
processing www.upm.edu.my-p50
50 99.684 99.442
processing www.upm.edu.my-p500
500 99.918 99.734
processing www.upm.edu.my-p750
750 100.245 99.871
ps2pdf www.upm.edu.my_delay.ps
ps2pdf www.upm.edu.my_scatter.ps

```

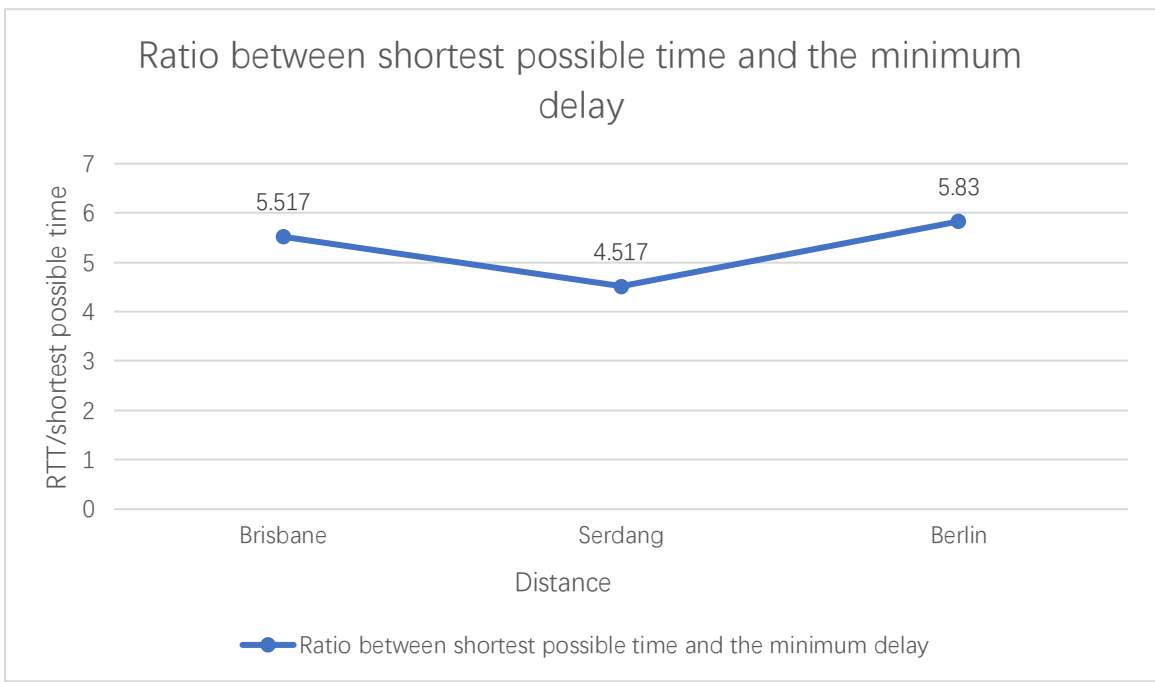
```

z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ./runping.sh www.tu-berlin.de

ping -s 22 -c 50 -i 1 www.tu-berlin.de > www.tu-berlin.de-p50
ping -s 222 -c 50 -i 1 www.tu-berlin.de > www.tu-berlin.de-p250
ping -s 472 -c 50 -i 1 www.tu-berlin.de > www.tu-berlin.de-p500
ping -s 722 -c 50 -i 1 www.tu-berlin.de > www.tu-berlin.de-p750
ping -s 972 -c 50 -i 1 www.tu-berlin.de > www.tu-berlin.de-p1000
ping -s 1222 -c 50 -i 1 www.tu-berlin.de > www.tu-berlin.de-p1250
ping -s 1472 -c 50 -i 1 www.tu-berlin.de > www.tu-berlin.de-p1500

z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ ./plot.sh www.tu-berlin.de-p*
www.tu-berlin.de
processing www.tu-berlin.de-p1000
1000 315.444 313.067
processing www.tu-berlin.de-p1250
1250 313.330 313.221
processing www.tu-berlin.de-p1500
1500 313.406 313.267
processing www.tu-berlin.de-p250
250 312.950 312.809
processing www.tu-berlin.de-p50
50 312.881 312.690
processing www.tu-berlin.de-p500
500 313.028 312.900
processing www.tu-berlin.de-p750
750 313.181 313.007
ps2pdf www.tu-berlin.de_delay.ps
ps2pdf www.tu-berlin.de_scatter.ps

```



Part 1:

The reason that the y-value is greater than 2 is that transmit packet may using different path, so it may not be a straight line. And another reason is that there are queuing delay and transmission delay on the way.

Part 2:

The delay to the destinations varies over time because the delay is affected by the network condition and the congestion. www.uq.edu.au_delay.pdf also give evidence.

Part 3:

```
z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ nslookup www.epfl.ch
Server:      129.94.242.45
Address:     129.94.242.45#53
```

```
Non-authoritative answer:
www.epfl.ch      canonical name = www.epfl.ch.cdn.cloudflare.net.
Name:   www.epfl.ch.cdn.cloudflare.net
Address: 172.67.2.106
Name:   www.epfl.ch.cdn.cloudflare.net
Address: 104.20.228.42
Name:   www.epfl.ch.cdn.cloudflare.net
Address: 104.20.229.42
```

```
z5266153@vx3:/tmp_amd/kamen/export/kamen/4/z5266153/Documents/comp3331/lab01$ whois 172.67.2.106
```

```
OrgName:      Cloudflare, Inc.
OrgId:        CLOUD14
Address:      101 Townsend Street
City:         San Francisco
StateProv:    CA
PostalCode:   94107
Country:      US
RegDate:      2010-07-09
Updated:      2021-01-11
Ref:          https://rdap.arin.net/registry/entity/CLOUD14
```

the website www.epfl.ch is hosted in 101 Townsend Street, San Francisco CA 94107 US not in Switzerland.

Part 4:

Only transmission delay depends on the packet size.

Packet size may affect processing delay but processing delay is depends on header size. There is no proportional relation between packet size and header size.

Queueing delay depends on congestion level of router.

propagation delay depends on physical distance and propagation speed in medium.