COMP 3331 Lab 1 Tools of the Trade

Question 1: nslookup

1. IP address: 192.168.1.1#53
   reason: load balancing, so when one IP address went down, will have others to connect
2. It is called the *localhost, refers to the current computer used to access it.*

Exercise 2: Use ping to test host reachability

	reachable using ping	reachable using web browser
• www.unsw.edu.au	yes	yes
• www.getfittest.com.au	no	no
• www.mit.edu	yes	yes
• www.intel.com.au	yes	yes
• www.tpg.com.au	yes	yes
• www.hola.hp	no	no
• www.amazon.com	yes	yes
• www.tsinghua.edu.cn	yes	yes
• www.kremlin.ru	no	yes
• 8.8.8.8	yes	——

With those unreachable is because those organisations disabled their networks from responding to ICMP echo packets used by Ping.

Exercise 3: Use traceroute to understand network topology

1.

```
z5173593@vx7:~/comp3331$ 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)  0.095 ms  0.083 ms  0.069 ms
 2  129.94.39.17 (129.94.39.17)  0.852 ms  0.808 ms  0.872 ms
 3  ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.579 ms  1.579 ms  1.587 ms
 4  ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  1.274 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)  1.313 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  1.213 ms
 5  unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  68.842 ms unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  68.777 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  68.832 ms
 6  138.44.5.0 (138.44.5.0)  1.268 ms  1.446 ms  1.438 ms
 7  et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)  2.142 ms  1.989 ms  2.002 ms
 8  et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)  95.058 ms  94.987 ms  95.058 ms
 9  et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)  146.990 ms  146.949 ms  146.961 ms
10  abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8)  160.867 ms  160.829 ms  160.869 ms
11  ae-1.4079.rtsw.minn.net.internet2.edu (162.252.70.173)  193.523 ms  193.202 ms  194.063 ms
12  ae-1.4079.rtsw.eqch.net.internet2.edu (162.252.70.106)  200.512 ms  209.750 ms  209.646 ms
13  ae-0.4079.rtsw3.eqch.net.internet2.edu (162.252.70.163)  201.465 ms  209.398 ms  209.429 ms
14  ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130)  209.110 ms  209.709 ms  209.276 ms
15  buf-9208-I2-CLEV.nysernet.net (199.109.11.33)  214.092 ms  214.041 ms  213.969 ms
16  syr-9208-buf-9208.nysernet.net (199.109.7.193)  216.587 ms  216.431 ms  216.416 ms
17  nyc111-9204-syr-9208.nysernet.net (199.109.7.94)  225.596 ms  225.538 ms  225.713 ms
18  nyc-9208-nyc111-9204.nysernet.net (199.109.7.165)  226.664 ms  226.407 ms  226.490 ms
19  columbia.nyc-9208.nysernet.net (199.109.4.14)  226.469 ms  226.498 ms  227.552 ms
20  cc-core-1-x-nyser32-gw-1.net.columbia.edu (128.59.255.5)  226.137 ms  226.180 ms  226.190 ms
21  cc-conc-1-x-cc-core-1.net.columbia.edu (128.59.255.21)  226.909 ms  226.829 ms  230.406 ms
22  columbiauniversity.us (128.59.105.24)  226.555 ms  226.744 ms  226.635 ms
```

1) There are 22 routers between my workstation and www.columbia.edu.

2) 5 routers along the path are part of the UNSW network.

The first to the 5th router is from unsay domain.

But the 6th router is from aarnet domin

```
z5173593@vx7:~/comp3331$ dig -x 138.44.5.0

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> -x 138.44.5.0
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NXDOMAIN, id: 8863
;; flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;0.5.44.138.in-addr.arpa.       IN      PTR

;; AUTHORITY SECTION:
5.44.138.in-addr.arpa.  2521    IN      SOA     ns1.aarnet.net.au. hostmaster.aarnet.edu.au. 2017121507 10800 600 1209600 3600

;; Query time: 5 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Tue Jun 16 01:49:11 AEST 2020
;; MSG SIZE  rcvd: 127
```

3) Between 7 - 9 cross the Pacific Ocean, because the delay jump from around 2 ms to around 95 ms from router 7 to router 8.

2. (i) www.ucla.edu (ii) www.u-tokyo.ac.jp and (iii) www.lancaster.ac.uk

i) www.ucla.edu

```
z5173593@vx7:~/comp3331$ 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)  0.105 ms  0.084 ms  0.088 ms
 2  129.94.39.17 (129.94.39.17)  0.840 ms  0.900 ms  0.848 ms
 3  ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.423 ms libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.760 ms  1.
715 ms
 4  libcr1-po-5.gw.unsw.edu.au (149.171.255.165)  1.175 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  1.175 ms  1.183 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.217 ms  1.222 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.230
 ms
 6  138.44.5.0 (138.44.5.0)  1.334 ms  1.249 ms  1.266 ms
 7  et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149)  2.166 ms  2.104 ms  2.035 ms
 8  et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99)  95.054 ms  95.070 ms  95.122 ms
 9  et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201)  147.011 ms  147.034 ms  147.018 ms
10  cenichpr-1-is-jmb-778.snvaca.pacificwave.net (207.231.245.129)  165.013 ms  164.263 ms  164.316 ms
11  hpr-lax-hpr3--svl-hpr3-100ge.cenic.net (137.164.25.73)  160.664 ms  159.903 ms  159.888 ms
12  * * *
13  bd11f1.anderson--cr001.anderson.ucla.net (169.232.4.6)  160.444 ms  160.310 ms  160.991 ms
14  cr00f2.csb1--rtr11f4.mathsci.ucla.net (169.232.8.181)  161.213 ms cr00f1.anderson--rtr11f4.mathsci.ucla.net (169.232.8.185)
  160.477 ms  160.479 ms
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
```

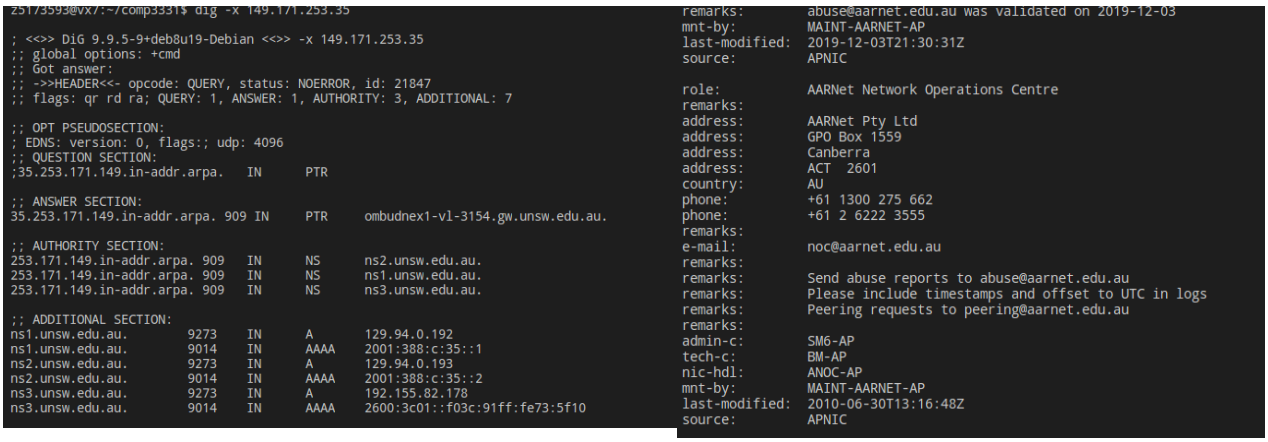
ii) www.u-tokyo.ac.jp

```
 1  cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)  0.123 ms  0.076 ms  0.060 ms
 2  129.94.39.17 (129.94.39.17)  0.837 ms  0.840 ms  0.775 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.311 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.498 ms lib
udnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.522 ms
 4  ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  1.115 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)  1.145 ms  1.163 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.170 ms  1.169 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.177
 ms
 6  138.44.5.0 (138.44.5.0)  1.410 ms  1.335 ms  1.336 ms
 7  et-0-3-0.pe1.bkvl.nsw.aarnet.net.au (113.197.15.147)  1.858 ms  1.802 ms  1.804 ms
 8  ge-4_0_0.bb1.a.pao.aarnet.net.au (202.158.194.177)  155.008 ms  154.966 ms  154.922 ms
 9  paloalto0.iij.net (198.32.176.24)  156.453 ms  156.461 ms  156.501 ms
10  osk004bb00.IIJ.Net (58.138.88.185)  286.910 ms osk004bb01.IIJ.Net (58.138.88.189)  269.288 ms  269.703 ms
11  osk004ip57.IIJ.Net (58.138.106.162)  278.140 ms  278.103 ms osk004ip57.IIJ.Net (58.138.106.166)  269.237 ms
12  210.130.135.130 (210.130.135.130)  269.525 ms  278.311 ms  269.790 ms
13  124.83.228.58 (124.83.228.58)  269.480 ms  274.372 ms  274.317 ms
14  124.83.252.178 (124.83.252.178)  284.168 ms  284.057 ms  284.033 ms
15  158.205.134.26 (158.205.134.26)  284.107 ms  284.103 ms  275.164 ms
16  158.205.121.46 (158.205.121.46)  276.299 ms  276.255 ms  285.294 ms
17  * * *
18  * * *
19  * * *
20  * * *
```

iii) www.lancaster.ac.uk

```
z5173593@vx7:~/comp3331$ 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)  0.071 ms  0.059 ms  0.065 ms
 2  129.94.39.17 (129.94.39.17)  0.882 ms  0.836 ms  0.795 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.821 ms  1.743 ms  1.758 ms
 4  libcr1-po-5.gw.unsw.edu.au (149.171.255.165)  1.073 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169)  17.679 ms libcr1-po-6.
gw.unsw.edu.au (149.171.255.201)  1.125 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.102 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.162 ms  1.170
 ms
 6  138.44.5.0 (138.44.5.0)  1.361 ms  1.274 ms  1.291 ms
 7  et-1-1-0.pe1.rsby.nsw.aarnet.net.au (113.197.15.12)  1.670 ms  1.551 ms  1.585 ms
 8  xe-1-1-0.pe1.eskp.nsw.aarnet.net.au (113.197.15.199)  2.928 ms  2.893 ms  2.909 ms
 9  et-0-3-0.pe1.prka.sa.aarnet.net.au (113.197.15.42)  19.815 ms  19.753 ms  19.854 ms
10  et-0-3-0.pe1.knsg.wa.aarnet.net.au (113.197.15.45)  48.648 ms  48.473 ms  48.472 ms
11  et-2-1-2.bdr2.sing.sin.aarnet.net.au (113.197.15.247)  91.947 ms  91.984 ms  91.899 ms
12  ae1.bdr1.sing.sin.aarnet.net.au (113.197.15.234)  91.664 ms  91.507 ms  91.681 ms
13  138.44.226.7 (138.44.226.7)  255.531 ms  255.519 ms  255.495 ms
14  janet-gw.mx1.lon.uk.geant.net (62.40.124.198)  255.587 ms  255.575 ms  255.536 ms
15  ae29.londpg-sbr2.ja.net (146.97.33.2)  255.992 ms  256.158 ms  256.113 ms
16  ae31.erdiss-sbr2.ja.net (146.97.33.22)  259.660 ms  259.752 ms  259.674 ms
17  ae29.manckh-sbr2.ja.net (146.97.33.42)  264.247 ms  264.172 ms  263.964 ms
18  ae24.lanclu-rbr1.ja.net (146.97.38.58)  269.219 ms  263.696 ms  263.634 ms
19  lancaster-university.ja.net (194.81.46.2)  277.513 ms  277.917 ms  277.877 ms
20  is-border01.bfw01.rtr.lancs.ac.uk (148.88.253.202)  264.388 ms  264.299 ms  264.275 ms
21  bfw01.iss-servers.is-core01.rtr.lancs.ac.uk (148.88.250.98)  269.903 ms  268.727 ms  266.488 ms
22  * * *
23  www.lancs.ac.uk (148.88.65.80)  264.099 ms !X  264.154 ms !X  264.219 ms !X
```

The first 7 are same for all three paths, at the 8th router they diverge, i)is to hnl, ii) is to pao, iii) is to NSW, and all these three 8th routers are belongs to aarnet network.



```
z5173593@vx7:~/comp3331$ dig -x 149.171.253.35

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> -x 149.171.253.35
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 21847
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 3, ADDITIONAL: 7

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;35.253.171.149.in-addr.arpa.   IN      PTR

;; ANSWER SECTION:
35.253.171.149.in-addr.arpa. 909 IN     PTR     ombudnex1-vl-3154.gw.unsw.edu.au.

;; AUTHORITY SECTION:
253.171.149.in-addr.arpa. 909   IN      NS      ns2.unsw.edu.au.
253.171.149.in-addr.arpa. 909   IN      NS      ns1.unsw.edu.au.
253.171.149.in-addr.arpa. 909   IN      NS      ns3.unsw.edu.au.

;; ADDITIONAL SECTION:
ns1.unsw.edu.au.        9273    IN      A       129.94.0.192
ns1.unsw.edu.au.        9014    IN      AAAA    2001:388:c:35::1
ns2.unsw.edu.au.        9273    IN      A       129.94.0.193
ns2.unsw.edu.au.        9014    IN      AAAA    2001:388:c:35::2
ns3.unsw.edu.au.        9273    IN      A       192.155.82.178
ns3.unsw.edu.au.        9014    IN      AAAA    2600:3c01::f03c:91ff:fe73:5f10

remarks:        abuse@aarnet.edu.au was validated on 2019-12-03
mnt-by:         MAINT-AARNET-AP
last-modified:  2019-12-03T21:30:31Z
source:         APNIC

role:           AARNet Network Operations Centre
remarks:
address:        AARNet Pty Ltd
address:        GPO Box 1559
address:        Canberra
address:        ACT  2601
country:        AU
phone:          +61 1300 275 662
phone:          +61 2 6222 3555
remarks:
e-mail:         noc@aarnet.edu.au
remarks:
remarks:        Send abuse reports to abuse@aarnet.edu.au
remarks:        Please include timestamps and offset to UTC in logs
remarks:        Peering requests to peering@aarnet.edu.au
remarks:
admin-c:        SM6-AP
tech-c:         BM-AP
nic-hdl:        ANOC-AP
mnt-by:         MAINT-AARNET-AP
last-modified:  2010-06-30T13:16:48Z
source:         APNIC
```

The number of hops is not proportional to the physical distance. The path to Tokyo takes about 21 hops while that to Los Angeles is only 15 hops, but it is closer to Sydney as compared to LA.

3.

1) http://www.speedtest.com.sg/tr.php

```
traceroute to 129.94.242.251 (129.94.242.251), 30 hops max, 60 byte packets
 1  ge2-8.r01.sin01.ne.com.sg (202.150.221.169)  0.126 ms  0.142 ms  0.155 ms
 2  10.11.34.146 (10.11.34.146)  0.379 ms  0.444 ms  0.678 ms
 3  aarnet.sgix.sg (103.16.102.67)  207.457 ms  207.471 ms  207.484 ms
 4  et-7-1-0.pe1.brwy.nsw.aarnet.net.au (113.197.15.13)  207.611 ms et-5-1-0.pe1.brwy.nsw.aarnet.net.au (113.197.15.5)  21
 5  138.44.5.1 (138.44.5.1)  203.797 ms  203.988 ms  203.826 ms
 6  ombcr1-te-1-5.gw.unsw.edu.au (149.171.255.106)  208.091 ms  208.041 ms  207.774 ms
 7  libudnex1-po-2.gw.unsw.edu.au (149.171.255.198)  211.775 ms  211.891 ms  211.868 ms
 8  ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36)  208.739 ms  208.701 ms  208.398 ms
 9  * * *
10  * * *
```

```
z5173593@vx7:~/comp3331$ 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)  0.077 ms  0.068 ms  0.068 ms
 2  129.94.39.17 (129.94.39.17)  0.865 ms  0.820 ms  0.853 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.407 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.588 ms  1.
594 ms
 4  libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  1.087 ms  1.121 ms ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  1.075 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.136 ms  1.151 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.172
 ms
 6  138.44.5.0 (138.44.5.0)  4.765 ms  4.078 ms  4.045 ms
 7  et-0-3-0.pe1.alxd.nsw.aarnet.net.au (113.197.15.153)  3.538 ms  3.044 ms  3.107 ms
 8  xe-0-2-7.bdr1.a.lax.aarnet.net.au (202.158.194.173)  147.600 ms  147.559 ms  147.570 ms
 9  singtel.as7473.any2ix.coresite.com (206.72.210.63)  147.633 ms  148.727 ms  147.628 ms
10  203.208.171.117 (203.208.171.117)  147.882 ms 203.208.158.29 (203.208.158.29)  316.340 ms 203.208.173.21 (203.208.173.21)
312.437 ms
11  203.208.177.110 (203.208.177.110)  316.452 ms  329.756 ms  329.694 ms
12  203.208.182.253 (203.208.182.253)  323.096 ms * *
13  202-150-221-170.rev.ne.com.sg (202.150.221.170)  208.600 ms 203.208.177.110 (203.208.177.110)  318.875 ms 203.208.182.253 (
203.208.182.253)  313.768 ms
```

2) https://www.telstra.net/cgi-bin/trace

Traceroute

This traceroute commences from **www.telstra.net**, within **AS 1221**.

Enter the desired destination host.domain or IPv4 or IPv6 address:

```
 1  gigabitethernet3-3.exi2.melbourne.telstra.net (203.50.77.53)  0.317 ms  0.201 ms  0.241 ms
 2  bundle-ether3-100.win-core10.melbourne.telstra.net (203.50.80.129)  2.232 ms  1.603 ms  2.487 ms
 3  bundle-ether12.ken-core10.sydney.telstra.net (203.50.11.122)  13.233 ms  12.222 ms  12.734 ms
 4  bundle-ether1.ken-edge903.sydney.telstra.net (203.50.11.173)  12.230 ms  12.348 ms  12.234 ms
 5  aar3533567.lnk.telstra.net (139.130.0.78)  11.607 ms  11.599 ms  11.609 ms
 6  et-7-1-0.pe1.brwy.nsw.aarnet.net.au (113.197.15.13)  11.857 ms  11.847 ms  11.860 ms
 7  138.44.5.1 (138.44.5.1)  12.103 ms  12.100 ms  12.109 ms
 8  ombcr1-te-1-5.gw.unsw.edu.au (149.171.255.106)  12.108 ms  12.099 ms  11.985 ms
 9  libudnex1-po-2.gw.unsw.edu.au (149.171.255.198)  12.602 ms  12.849 ms  12.483 ms
10  ufw1-ae-1-3154.gw.unsw.edu.au (149.171.253.36)  12.730 ms  12.722 ms  12.735 ms
```

There are other traceroute sites listed here.

The traceroute CGI source can be found via:

carpeNet

.

```
z5173593@vx7:~/comp3331$ 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)  0.136 ms  0.126 ms  0.113 ms
 2  129.94.39.17 (129.94.39.17)  0.830 ms  0.843 ms  0.918 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.849 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  32.821 ms li
budnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.877 ms
 4  libcr1-po-5.gw.unsw.edu.au (149.171.255.165)  1.068 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.201)  1.108 ms ombcr1-po-6.g
w.unsw.edu.au (149.171.255.169)  1.070 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.116 ms  1.129 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.160
 ms
 6  138.44.5.0 (138.44.5.0)  1.820 ms  1.381 ms  1.327 ms
 7  et-1-1-0.pe1.rsby.nsw.aarnet.net.au (113.197.15.12)  1.538 ms  1.522 ms  1.708 ms
 8  xe-0-0-3.bdr1.rsby.nsw.aarnet.net.au (113.197.15.31)  1.526 ms  1.500 ms  1.516 ms
 9  HundredGigE0-1-0-4.ken-edge903.sydney.telstra.net (139.130.0.77)  2.298 ms  2.521 ms  2.370 ms
10  bundle-ether17.ken-core10.sydney.telstra.net (203.50.11.172)  2.240 ms  3.756 ms  3.725 ms
11  bundle-ether17.chw-core10.sydney.telstra.net (203.50.11.176)  3.277 ms bundle-ether10.win-core10.melbourne.telstra.net (203
.50.11.123)  14.714 ms  14.667 ms
12  bundle-ether8.exi-core10.melbourne.telstra.net (203.50.11.125)  14.767 ms 203.50.6.40 (203.50.6.40)  14.106 ms  14.053 ms
13  bundle-ether2.exi-ncprouter101.melbourne.telstra.net (203.50.11.209)  13.473 ms  13.319 ms  13.355 ms
14  www.telstra.net (203.50.5.178)  12.772 ms  12.646 ms  12.752 ms
```

From that, the two paths are similar but not the same between my cse machine and the destination for forward and reverse path.
Because the routers have different interfaces.

Exercise 4: Use ping to gain insights into network performance

```
ping -s 22 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p50
^Cping -s 222 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p250
^Cping -s 472 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p500
^Cping -s 722 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p750
^Cping -s 972 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p1000
^Cping -s 1222 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p1250
^Cping -s 1472 -c 50 -i 1 www.uq.edu.au > www.uq.edu.au-p1500
^C

z5173593@vx7:~/comp3331$ ./runping.sh www.dlsu.edu.ph

ping -s 22 -c 50 -i 1 www.dlsu.edu.ph > www.dlsu.edu.ph-p50

^Cping -s 222 -c 50 -i 1 www.dlsu.edu.ph > www.dlsu.edu.ph-p250
^Cping -s 472 -c 50 -i 1 www.dlsu.edu.ph > www.dlsu.edu.ph-p500
^Cping -s 722 -c 50 -i 1 www.dlsu.edu.ph > www.dlsu.edu.ph-p750
^Cping -s 972 -c 50 -i 1 www.dlsu.edu.ph > www.dlsu.edu.ph-p1000
^Cping -s 1222 -c 50 -i 1 www.dlsu.edu.ph > www.dlsu.edu.ph-p1250
^Cping -s 1472 -c 50 -i 1 www.dlsu.edu.ph > www.dlsu.edu.ph-p1500
^C

z5173593@vx7:~/comp3331$ ./runping.sh www.tu-berlin.de

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

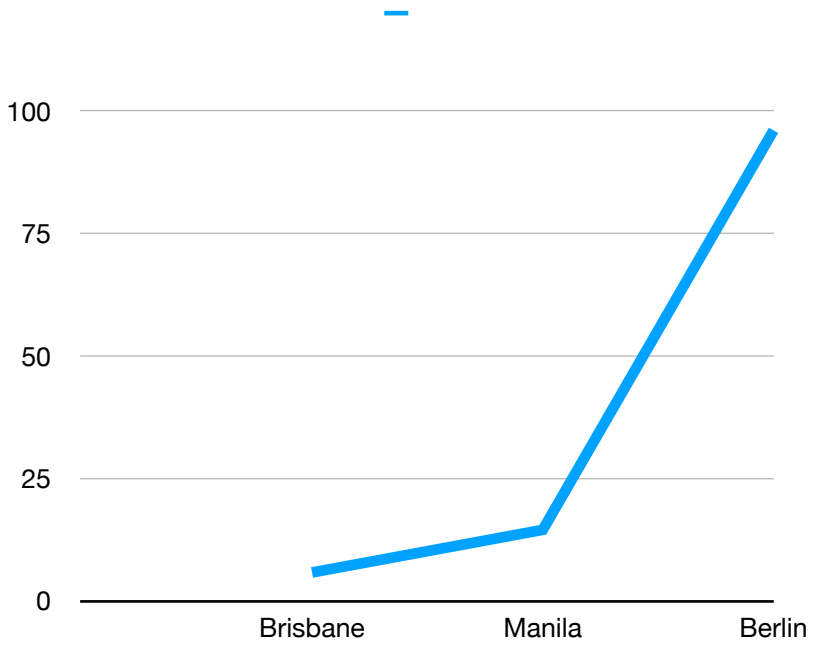
1. The approximate physical distance from UNSW to UQ: 900km, to DLSU is 6250km, to TU is 16050km.

   Propagation speed is about 3 x 10^8 m/s, UQ is 3ms, DLSU is 20.8ms, TU is 53.5ms. The shortest possible time is 3ms from Sydney to UQ.

delay ——UQ is 3ms, DLSU is 20.8ms, TU is 53.5ms

from txt—— uq: 17.068 dlsu: 299.504 tu: 273.263

ratio—— uq: 5.689 dlsu: 14.399 tu: 5.105



The speed of the packet travel is less than speed of light, the time for light travel between and back is 2, so it is bigger than 2.

2. The time are vary, due to the variability of processing and queuing delays.

3.

```
z5173593@vx7:~/comp3331$ traceroute www.epfl.ch
traceroute to www.epfl.ch (172.67.2.106), 30 hops max, 60 byte packets
 1  cserouter1-server.cse.unsw.EDU.AU (129.94.242.251)  0.084 ms  0.081 ms  0.070 ms
 2  129.94.39.17 (129.94.39.17)  0.915 ms  0.851 ms  0.868 ms
 3  libudnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.551 ms ombudnex1-vl-3154.gw.unsw.edu.au (149.171.253.35)  1.403 ms lib
udnex1-vl-3154.gw.unsw.edu.au (149.171.253.34)  1.481 ms
 4  ombcr1-po-5.gw.unsw.edu.au (149.171.255.197)  1.107 ms libcr1-po-5.gw.unsw.edu.au (149.171.255.165)  1.319 ms ombcr1-po-5.g
w.unsw.edu.au (149.171.255.197)  1.109 ms
 5  unswbr1-te-1-9.gw.unsw.edu.au (149.171.255.101)  1.252 ms  1.262 ms unswbr1-te-2-13.gw.unsw.edu.au (149.171.255.105)  1.286
 ms
 6  138.44.5.0 (138.44.5.0)  1.411 ms  1.264 ms  1.278 ms
 7  ae2.bdr1.msc4.nsw.aarnet.net.au (113.197.15.77)  1.905 ms  1.641 ms  1.651 ms
 8  as4826.bdr1.msc4.nsw.aarnet.net.au (138.44.10.45)  2.402 ms  3.542 ms  5.169 ms
 9  be107.cor02.syd04.nsw.vocus.network (114.31.192.82)  2.193 ms  2.736 ms  2.654 ms
10  be101.bdr02.syd03.nsw.vocus.network (114.31.192.37)  2.594 ms be100.bdr02.syd03.nsw.vocus.network (114.31.192.39)  2.662 ms
 be101.bdr02.syd03.nsw.vocus.network (114.31.192.37)  2.667 ms
11  as13335.bdr02.syd03.nsw.VOCUS.net.au (175.45.124.197)  3.469 ms  3.409 ms  3.420 ms
12  172.67.2.106 (172.67.2.106)  1.754 ms  1.746 ms  1.712 ms
```

It is not in Switzerland, it is in San Francisco.

```
OrgName:        Cloudflare, Inc.
OrgId:          CLOUD14
Address:        101 Townsend Street
City:           San Francisco
StateProv:      CA
PostalCode:     94107
Country:        US
RegDate:        2010-07-09
Updated:        2019-09-25
Ref:            https://rdap.arin.net/registry/entity/CLOUD14
```

4. The propagation delay does not depend on the packet size. The queuing delay depends on the congestion in the network, not depend on the packet size. The transmission delay is depend on the packet size. The processing delay can depend on the packet size.