

Lab Exercise 1: Tools of the Trade

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Exercise 1: nslookup

1. The IP address of the website www.koala.com.au:

- 129.94.242.2#53
- 172.67.219.46
- 104.18.60.21
- 104.18.61.21

In my opinion,

```
wagner % nslookup www.koala.com.au
Server:      129.94.242.2
Address:     129.94.242.2#53

Non-authoritative answer:
Name:   www.koala.com.au
Address: 172.67.219.46
Name:   www.koala.com.au
Address: 104.18.60.21
Name:   www.koala.com.au
Address: 104.18.61.21
```

2.

Exercise 2: Use ping to test host reachability

host	reachable by ping	Reachable from the Web
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	No

```
wagner % ping www.unsw.edu.au
PING cdn.prod65.unsw.adobecqms.net (13.226.107.113) 56(84) bytes of data.
64 bytes from server-13-226-107-113.syd4.r.cloudfront.net (13.226.107.113): icmp_seq=1 ttl=244 time=1.24 ms
```

```
wagner % ping www.getfittest.com.au
ping: unknown host www.getfittest.com.au
```

```
wagner % 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=1.41 ms
```

```
wagner % ping www.intel.com.au
PING e19235.dscb.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=1.20 ms
```

```
wagner % 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=1.66 ms
```

```
wagner % ping www.hola.hp
ping: unknown host www.hola.hp ↵
```

```
wagner % ping www.amazon.com
PING d3ag4hukkh62yn.cloudfront.net (99.86.215.39) 56(84) bytes of data.
64 bytes from server-99-86-215-39.syd4.r.cloudfront.net (99.86.215.39): icmp_seq=1 ttl=244 time=1.21 ms
```

```
wagner % 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=42 time=242 ms
```

```
wagner % ping www.kremlin.ru
PING www.kremlin.ru (95.173.136.71) 56(84) bytes of data.
AC
--- www.kremlin.ru ping statistics ---
34 packets transmitted, 0 received, 100% packet loss, time 33768ms
```

```
wagner % 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=1.28 ms ↵
```

Exercise 3: Use traceroute to understand network topology

- There are 22 routers between my workstation and www.columbia.edu, there are 4 routers along the path are part of the UNSW network. Between et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149) and et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99), the round-trip times from my machine to the routers change from 1.9ms to 95.1ms. which means it packets cross the Pacific Ocean. However, according to my research of the IP address, the router address change from Australia to America is between et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201) and abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8).

```
wagner % 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) 0.188 ms 0.164 ms 0.144 ms
 2 129.94.39.17 (129.94.39.17) 0.954 ms 0.953 ms 0.951 ms
 3 libudnex1-v1-3154.gw.unsw.edu.au (149.171.253.34) 1.854 ms 1.851 ms 1.851 ms
 4 libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.242 ms 1.242 ms 1.242 ms
 5 libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.147 ms 1.147 ms 1.147 ms
 6 libcr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.226 ms 1.223 ms 1.221 ms
 7 138.44.5.0 (138.44.5.0) 1.466 ms 1.339 ms 1.365 ms
 8 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149) 2.482 ms 2.278 ms 2.267 ms
 9 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99) 95.253 ms 95.140 ms 95.154 ms
10 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201) 146.725 ms 146.728 ms 146.685 ms
11 abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8) 146.889 ms 146.690 ms 146.676 ms
12 ae-1.4079.rtsw.minn.net.internet2.edu (162.252.70.173) 179.387 ms 179.429 ms 179.298 ms
13 ae-1.4079.rtsw.eqch.net.internet2.edu (162.252.70.106) 187.258 ms 187.236 ms 187.226 ms
14 ae-0.4079.rtsw3.eqch.net.internet2.edu (162.252.70.163) 191.819 ms 187.531 ms 187.347 ms
15 ae-1.4079.rtsw.clev.net.internet2.edu (162.252.70.130) 193.196 ms 193.167 ms 193.203 ms
16 buf-9208-12-clev.nysernet.net (199.109.11.33) 196.677 ms 196.543 ms 196.520 ms
17 syr-9208-buf-9208.nysernet.net (199.109.7.193) 199.746 ms 200.066 ms 199.955 ms
18 nyc111-9204-syr-9208.nysernet.net (199.109.7.94) 215.691 ms 208.869 ms 208.889 ms
19 nyc-9208-nyc111-9204.nysernet.net (199.109.7.165) 209.141 ms 209.080 ms 209.122 ms
20 columbia.nyc-9208.nysernet.net (199.109.4.14) 209.008 ms 208.868 ms 209.457 ms
21 cc-core-1-x-nyser2-gw-1.net.columbia.edu (128.59.255.5) 209.543 ms 209.139 ms 209.279 ms
22 cc-core-1-x-cc-core-1.net.columbia.edu (128.59.255.21) 209.451 ms 209.437 ms 209.393 ms
23 www-ltm.cc.columbia.edu (128.59.105.24) 209.254 ms 209.152 ms 209.048 ms
wagner %
```

- At the router IP address 138.44.5.0 the paths from your machine to these three destinations diverge.

```
wagner % 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) 0.170 ms 0.144 ms 0.119 ms
 2 129.94.39.17 (129.94.39.17) 0.935 ms 0.947 ms 0.911 ms
 3 ombudnex1-v1-3154.gw.unsw.edu.au (149.171.253.35) 1.831 ms 1.782 ms 1.802 ms
 4 libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.106 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.098 ms
 5 ombcr1-po-5.gw.unsw.edu.au (149.171.255.197) 1.107 ms
 6 unswwbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.114 ms unswwbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.144 ms
 7 138.44.5.0 (138.44.5.0) 1.259 ms 1.305 ms 1.300 ms
 8 et-1-3-0.pe1.sxt.bkvl.nsw.aarnet.net.au (113.197.15.149) 2.155 ms 1.890 ms 20.588 ms
 9 et-0-0-0.pe1.a.hnl.aarnet.net.au (113.197.15.99) 96.143 ms 96.151 ms 96.213 ms
10 et-2-1-0.bdr1.a.sea.aarnet.net.au (113.197.15.201) 146.949 ms 146.953 ms 146.886 ms
11 cenichpr-1-is-jmb-778.snvaca.pacificwave.net (207.231.245.129) 163.906 ms 163.160 ms 163.871 ms
12 svl-agg10-hpr--svl-hpr3--100g.cenic.net (137.164.25.106) 163.399 ms 163.394 ms 164.039 ms
13 hpr-lax-agg10--svl-agg10-100ge.cenic.net (137.164.25.73) 160.492 ms 159.855 ms 159.797 ms
13 * * *

wagner % 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) 0.185 ms 0.162 ms 0.143 ms
 2 129.94.39.17 (129.94.39.17) 0.984 ms 0.909 ms 1.019 ms
 3 ombudnex1-v1-3154.gw.unsw.edu.au (149.171.253.35) 1.340 ms libudnex1-v1-3154.gw.unsw.edu.au (149.171.253.35) 1.688 ms
 4 ombcr1-po-5.gw.unsw.edu.au (149.171.255.197) 1.120 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.120 ms
 5 unswwbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.119 ms 1.242 ms 1.123 ms
 6 138.44.5.0 (138.44.5.0) 2.186 ms 1.761 ms 1.779 ms
 7 et-0-3-0.pe1.bkvl.nsw.aarnet.net.au (113.197.15.147) 1.843 ms 2.027 ms 2.890 ms
 8 ge-4_0_0.bb1.a.pao.aarnet.net.au (202.158.194.177) 155.138 ms 155.125 ms 155.121 ms
 9 paloalto0.iij.net (198.32.176.24) 156.464 ms 156.412 ms 156.494 ms
10 osk004bb01.IIJ.Net (58.138.88.189) 269.206 ms osk004bb00.IIJ.Net (58.138.88.185) 269.206 ms
11 osk004ip57.IIJ.Net (58.138.106.162) 278.074 ms osk004ip57.IIJ.Net (58.138.106.166) 278.074 ms
12 210.130.135.130 (210.130.135.130) 269.406 ms 269.362 ms 278.243 ms
13 124.83.228.58 (124.83.228.58) 289.840 ms 269.465 ms 278.247 ms
14 124.83.252.178 (124.83.252.178) 275.317 ms 275.409 ms 275.375 ms
15 158.205.134.26 (158.205.134.26) 292.912 ms 293.083 ms 292.967 ms

wagner % 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) 0.201 ms 0.171 ms 0.147 ms
 2 129.94.39.17 (129.94.39.17) 0.880 ms 0.875 ms 0.993 ms
 3 ombudnex1-v1-3154.gw.unsw.edu.au (149.171.253.35) 1.477 ms libudnex1-v1-3154.gw.unsw.edu.au (149.171.253.34) 1.426 ms 1.772 ms
 4 libcr1-po-5.gw.unsw.edu.au (149.171.255.165) 1.159 ms ombcr1-po-6.gw.unsw.edu.au (149.171.255.169) 1.194 ms libcr1-po-6.gw.unsw.edu.au (149.171.255.201) 1.143 ms
 5 unswwbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.195 ms unswwbr1-te-1-9.gw.unsw.edu.au (149.171.255.101) 1.226 ms unswwbr1-te-2-13.gw.unsw.edu.au (149.171.255.105) 1.231 ms
 6 138.44.5.0 (138.44.5.0) 1.470 ms 1.348 ms 1.346 ms
 7 et-2-0-5.bdr1.sing.sin.aarnet.net.au (113.197.15.233) 92.710 ms 92.890 ms 92.788 ms
 8 138.44.226.7 (138.44.226.7) 263.823 ms 263.781 ms 263.802 ms
 9 janet-gw.mx1.lon.uk.geant.net (62.40.124.198) 263.812 ms 263.815 ms 263.763 ms
10 ae29.londpg-sbr2.ja.net (146.97.33.2) 264.379 ms 264.335 ms 264.348 ms
11 ae31.erdis-sbr2.ja.net (146.97.33.22) 268.144 ms 268.012 ms 267.968 ms
12 ae29.manckh-sbr2.ja.net (146.97.33.42) 269.807 ms 269.931 ms 269.854 ms
13 ae25.manckh-ban1.ja.net (146.97.35.50) 269.908 ms 270.028 ms 269.986 ms
14 lancaster-uni.ja.net (146.97.40.178) 287.978 ms 287.914 ms 287.908 ms
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- Need to do

Exercise 4: Use ping to gain insights into network performance