

Ping et traceroute

- Le but ici est d'illustrer la conversion nom de machine vers adresse IP et de voir les informations sur le routage qu'on peut récupérer avec traceroute
- On peut le faire sans trop de crainte en live
- Pour traceroute il faut trouver des sites dont la plus part des serveurs répondent au message ICMP
- Remarques : les étudiants ne savent pas comment fonctionne ping et traceroute.
- L'exemple suivant me paraît pas mal

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145)  1.771 ms  1.702 ms  1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98)  1.745 ms  1.633 ms  1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0)  1.571 ms  1.601 ms  1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13)  1.846 ms  1.819 ms  1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1)  1.753 ms  1.358 ms  1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30)  2.586 ms  1.596 ms  1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130)  10.101 ms  10.074 ms  10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69)  2.482 ms  2.480 ms  2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178)  11.826 ms  11.425 ms  11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36)  9.893 ms  9.861 ms  9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45)  83.588 ms  83.530 ms  83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137)  84.500 ms  84.371 ms  84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74)  84.563 ms  84.465 ms  84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129)  92.090 ms  92.201 ms  95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131)  98.150 ms  97.575 ms  97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104)  98.174 ms  98.668 ms  98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141)  108.324 ms  107.871 ms  108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145)  128.200 ms  127.778 ms  128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114)  140.420 ms  139.970 ms  140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200)  140.061 ms  142.687 ms  141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4)  140.775 ms  152.642 ms  152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7)  140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.436 ms
24 128.97.27.37 (128.97.27.37)  140.421 ms !X  140.502 ms !X  140.573 ms !X
weisser@speedy2:~$

```

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms 1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.358 ms 1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.596 ms 1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

On travaille sur
la machine speedy2
qui est sur le réseau de
CentraleSupélec à Gif

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145)  1.771 ms  1.702 ms  1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98)  1.745 ms  1.633 ms  1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0)  1.571 ms  1.601 ms  1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13)  1.846 ms  1.819 ms  1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1)  1.753 ms  1.358 ms  1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30)  2.586 ms  1.596 ms  1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130)  10.101 ms  10.074 ms  10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69)  2.482 ms  2.480 ms  2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178)  11.826 ms  11.425 ms  11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36)  9.893 ms  9.861 ms  9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45)  83.588 ms  83.530 ms  83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137)  84.500 ms  84.371 ms  84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74)  84.563 ms  84.465 ms  84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129)  92.090 ms  92.201 ms  95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131)  98.150 ms  97.575 ms  97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104)  98.174 ms  98.668 ms  98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141)  108.324 ms  107.871 ms  108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145)  128.200 ms  127.778 ms  128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114)  140.420 ms  139.970 ms  140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200)  140.061 ms  142.687 ms  141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4)  140.775 ms  152.642 ms  152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7)  140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.436 ms
24 128.97.27.37 (128.97.27.37)  140.421 ms !X  140.502 ms !X  140.573 ms !X
weisser@speedy2:~$

```

Ping vers le site de
UCLA (université en
Californie)


```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145)  1.771 ms  1.702 ms  1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98)  1.745 ms  1.633 ms  1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0)  1.571 ms  1.601 ms  1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13)  1.846 ms  1.819 ms  1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1)  1.753 ms  1.358 ms  1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30)  2.586 ms  1.596 ms  1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130)  10.101 ms  10.074 ms  10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69)  2.482 ms  2.480 ms  2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178)  11.826 ms  11.425 ms  11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36)  9.893 ms  9.861 ms  9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45)  83.588 ms  83.530 ms  83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137)  84.500 ms  84.371 ms  84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74)  84.563 ms  84.465 ms  84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129)  92.090 ms  92.201 ms  95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131)  98.150 ms  97.575 ms  97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104)  98.174 ms  98.668 ms  98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141)  108.324 ms  107.871 ms  108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145)  128.200 ms  127.778 ms  128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114)  140.420 ms  139.970 ms  140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200)  140.061 ms  142.687 ms  141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4)  140.775 ms  152.642 ms  152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7)  140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.436 ms
24 128.97.27.37 (128.97.27.37)  140.421 ms !X  140.502 ms !X  140.573 ms !X
weisser@speedy2:~$

```

Résolution de l'adresse,
on cherche donc à
joindre la machine d'IP :
128.97.27.37

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms 1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.358 ms 1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.596 ms 1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

Ping est un outil qui
 permet de faire des
 statistiques, en
 particulier d'obtenir le
 round trip time


```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms 1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.358 ms 1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.596 ms 1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

On effectue un
traceroute pour
connaître les routeurs
intermédiaires vers
ucla.edu

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms 1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.358 ms 1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.596 ms 1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

Premier routeur
rencontré fait le lien
entre le réseau de CS et
celui de l'UPS


```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1  centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145)  1.771 ms  1.702 ms  1.686 ms
 2  backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98)  1.745 ms  1.633 ms  1.707 ms
 3  backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0)  1.571 ms  1.601 ms  1.870 ms
 4  renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13)  1.846 ms  1.819 ms  1.779 ms
 5  renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1)  1.753 ms  1.358 ms  1.775 ms
 6  vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30)  2.586 ms  1.596 ms  1.575 ms
 7  et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130)  10.101 ms  10.074 ms  10.021 ms
 8  renater-lb1.mx1.par.fr.geant.net (62.40.124.69)  2.482 ms  2.480 ms  2.444 ms
 9  ae5.mx1.lon2.uk.geant.net (62.40.98.178)  11.826 ms  11.425 ms  11.399 ms
10  ae6.mx1.lon.uk.geant.net (62.40.98.36)  9.893 ms  9.861 ms  9.825 ms
11  internet2-gw.mx1.lon.uk.geant.net (62.40.124.45)  83.588 ms  83.530 ms  83.666 ms
12  ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137)  84.500 ms  84.371 ms  84.363 ms
13  ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74)  84.563 ms  84.465 ms  84.435 ms
14  ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129)  92.090 ms  92.201 ms  95.139 ms
15  ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131)  98.150 ms  97.575 ms  97.710 ms
16  ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104)  98.174 ms  98.668 ms  98.400 ms
17  ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141)  108.324 ms  107.871 ms  108.073 ms
18  ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145)  128.200 ms  127.778 ms  128.208 ms
19  ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114)  140.420 ms  139.970 ms  140.344 ms
20  hpr-lax-aggr10--i2.cenic.net (137.164.26.200)  140.061 ms  142.687 ms  141.743 ms
21  * * *
22  bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4)  140.775 ms  152.642 ms  152.270 ms
23  cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.666 ms
    cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7)  140.805 ms
    cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.436 ms
24  128.97.27.37 (128.97.27.37)  140.421 ms !X  140.502 ms !X  140.573 ms !X
weisser@speedy2:~$

```

On navigue dans le
réseau de l'UPS

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.35
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.5
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.43
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-agg10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

Le réseau de l'UPS est
connecté à RENATER.

*Le REseau NATional de
Télécommunications pour la
technologie, l'Enseignement et la
Recherche est le réseau de
télécommunications français reliant les
différents établissements
enseignement recherche entre eux en
France métropolitaine et dans les
départements d'outre-mer. Il a été créé
en 1993.*


```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.35
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.5
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rts.w.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.
13 ae-2.4079.rts.w.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.43
14 ae-20.4079.rts.w.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95.
15 ae-3.4079.rts.w.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.
16 ae-1.4070.rts.w.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400
17 ae-3.4079.rts.w.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 10
18 ae-5.4079.rts.w.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 12
19 ae-1.4079.rts.w.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 14
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.2
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

On part ensuite vers
GEANT.

GÉANT est une association issue de la fusion de DANTE et de TERENA. DANTE (Delivery of Advanced Network Technology to Europe) était une organisation à but non lucratif établie à Cambridge en Angleterre en 1993 et dont la mission est de définir, bâtir et gérer des réseaux de recherche et d'éducation pour le compte des réseaux nationaux pour la recherche et l'éducation (National Research and Education Networks, NREN) en Europe.

En octobre 2014, DANTE et TERENA fusionnent pour former l'association GÉANT


```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.633 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.8) 1.571 ms 1.601 ms 1.601 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.819 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.35 ms 1.35 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.5 ms 1.5 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.074 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.326 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.371 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.43 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95. ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97. ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 10 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 12 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 14 ms
20 hpr-lax-agg10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

De GEANT on va vers Internet2. On a probablement franchi l'atlantique par un câble sous marin partant de grande bretagne

Internet2 ou University Corporation for Advanced Internet Development, abrégé sous le sigle UCAID, est un consortium à but non lucratif conduit par plus de 200 universités des États-Unis et par des partenaires commerciaux issus du domaine des réseaux et de l'informatique, afin de développer les technologies permettant de faire atteindre de très hauts débits au réseau Internet.

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.633 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms 1.601 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.819 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.35 ms 1.35 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.5 ms 1.5 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.074 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rts.w2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.371 ms
13 ae-2.4079.rts.w2.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.43 ms
14 ae-20.4079.rts.w2.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95. ms
15 ae-3.4079.rts.w2.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rts.w2.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rts.w2.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rts.w2.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 128.208 ms
19 ae-1.4079.rts.w2.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-agg10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

On arrive en Californie

La Corporation for Education Network Initiatives en Californie est une société à but non lucratif créée en 1997 pour fournir des services de mise en réseau hautes performances à large bande passante aux universités et instituts de recherche californiens.


```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.633 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms 1.601 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.819 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.35 ms 1.35 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.5 ms 1.5 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.074 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.530 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.371 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.43 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95. ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-agg10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

On a ici un routeur qui
ne répond pas au
message ICMP

La Corporation for Education Network
Initiatives en Californie est une société
à but non lucratif créée en 1997 pour
fournir des services de mise en réseau
hautes performances à large bande
passante aux universités et instituts de
recherche californiens.

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145)  2.771 ms  1.702 ms  1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98)  1.745 ms  1.633 ms  1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0)  1.571 ms  1.601 ms  1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13)  1.846 ms  1.819 ms  1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1)  1.753 ms  1.358 ms  1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30)  2.586 ms  1.596 ms  1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130)  10.101 ms  10.074 ms  10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69)  2.482 ms  2.480 ms  2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178)  11.826 ms  11.425 ms  11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36)  9.893 ms  9.861 ms  9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45)  83.588 ms  83.530 ms  83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137)  84.500 ms  84.371 ms  84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74)  84.563 ms  84.465 ms  84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129)  92.090 ms  92.201 ms  95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131)  98.150 ms  97.575 ms  97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104)  98.174 ms  98.668 ms  98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141)  108.324 ms  107.871 ms  108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145)  128.200 ms  127.778 ms  128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114)  140.420 ms  139.970 ms  140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200)  140.061 ms  142.687 ms  141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4)  140.775 ms  152.642 ms  152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7)  140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53)  140.436 ms
24 128.97.27.37 (128.97.27.37)  140.421 ms !X  140.502 ms !X  140.573 ms !X
weisser@speedy2:~$

```

On arrive enfin sur le
réseau de UCLA


```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms 1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.358 ms 1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.596 ms 1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.588 ms 83.630 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 95.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 123.700 ms 127.778 ms 128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-agg10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.305 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

On a envoyé 3 sondes à chaque fois. Jusqu'à présent on arrivait toujours au meme endroit. Pour la 23ieme étape, on voit qu'on passe par 2 routeurs différents, c'est sans doute du load balancing

```

weisser@speedy2:~$
weisser@speedy2:~$ ping ucla.edu
PING ucla.edu (128.97.27.37) 56(84) bytes of data.
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=1 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=2 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=3 ttl=41 time=141 ms
64 bytes from 128.97.27.37 (128.97.27.37): icmp_seq=4 ttl=41 time=141 ms
^C
--- ucla.edu ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 8ms
rtt min/avg/max/mdev = 140.635/140.951/141.229/0.348 ms
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$
weisser@speedy2:~$ traceroute ucla.edu
traceroute to ucla.edu (128.97.27.37), 30 hops max, 60 byte packets
 1 centralesupelec-vl950-vss2.universite-paris-saclay.net (129.175.127.145) 1.771 ms 1.702 ms 1.686 ms
 2 backbone-vl1361-vss5.universite-paris-saclay.net (193.55.21.98) 1.745 ms 1.633 ms 1.707 ms
 3 backbone-vl2527-vss3.universite-paris-saclay.net (193.55.14.0) 1.571 ms 1.601 ms 1.870 ms
 4 renater-vl2508-vss5.universite-paris-saclay.net (193.55.22.13) 1.846 ms 1.819 ms 1.779 ms
 5 renater-vl2500-orsay-6k1.universite-paris-saclay.net (193.55.22.1) 1.753 ms 1.358 ms 1.775 ms
 6 vl20-te0-0-0-13-ren-nr-orsay-rtr-091.noc.renater.fr (193.51.183.30) 2.586 ms 1.596 ms 1.575 ms
 7 et-3-1-0-paris1-rtr-131.noc.renater.fr (193.51.180.130) 10.101 ms 10.074 ms 10.021 ms
 8 renater-lb1.mx1.par.fr.geant.net (62.40.124.69) 2.482 ms 2.480 ms 2.444 ms
 9 ae5.mx1.lon2.uk.geant.net (62.40.98.178) 11.826 ms 11.425 ms 11.399 ms
10 ae6.mx1.lon.uk.geant.net (62.40.98.36) 9.893 ms 9.861 ms 9.825 ms
11 internet2-gw.mx1.lon.uk.geant.net (62.40.124.45) 83.583 ms 83.530 ms 83.666 ms
12 ae-0.4079.rtsw2.ashb.net.internet2.edu (162.252.70.137) 84.500 ms 84.371 ms 84.363 ms
13 ae-2.4079.rtsw.ashb.net.internet2.edu (162.252.70.74) 84.563 ms 84.465 ms 84.435 ms
14 ae-20.4079.rtsw.clev.net.internet2.edu (162.252.70.129) 92.090 ms 92.201 ms 95.139 ms
15 ae-3.4079.rtsw3.eqch.net.internet2.edu (162.252.70.131) 98.150 ms 97.575 ms 97.710 ms
16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 98.174 ms 98.668 ms 98.400 ms
17 ae-3.4079.rtsw.kans.net.internet2.edu (162.252.70.141) 108.324 ms 107.871 ms 108.073 ms
18 ae-5.4079.rtsw.salt.net.internet2.edu (162.252.70.145) 128.200 ms 127.778 ms 128.208 ms
19 ae-1.4079.rtsw.losa.net.internet2.edu (162.252.70.114) 140.420 ms 139.970 ms 140.344 ms
20 hpr-lax-aggr10--i2.cenic.net (137.164.26.200) 140.061 ms 142.687 ms 141.743 ms
21 * * *
22 bd11f1.anderson--cr00f2.csb1.ucla.net (169.232.4.4) 140.775 ms 152.642 ms 152.270 ms
23 cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.666 ms
   cr00f2.csb1--sr02f2.csb1.ucla.net (169.232.8.7) 140.805 ms
   cr00f1.anderson--sr02fb.jsei.ucla.net (169.232.8.53) 140.436 ms
24 128.97.27.37 (128.97.27.37) 140.421 ms !X 140.502 ms !X 140.573 ms !X
weisser@speedy2:~$

```

On arrive enfin sur le
serveur ucla.edu