IT441 Spring 2005 Lab A: Routes

You are to complete this project on both a Windows system and a linux\(^1\) system and comment on any differences you see. You are to work by yourself. It is OK to ask for help, but you are to complete each step and answer the questions by yourself. Your report should have a separate set of observations (1 – 3) for each platform (Windows and linux), but you only need to answer the questions once. Submit your report using the normal course upload program.

This lab looks at how traffic is routed between source and destination, and at some of what you can learn about a route (e.g., which hops take unusually long). The tools you will use to examine routes are traceroute (on Windows systems, tracert) and ping. Note that traceroute is used throughout this lab write-up to mean either of traceroute or tracert.

Documentation for the traceroute ping commands is available online. On Windows, use Start→Help to find it; on linux, type `man traceroute`, `man ping`

**Lab Steps:**

1. Do a simple ping on the following hosts and report on the results:
   - netlab.gmu.edu
   - osf1.gmu.edu
   - venera.isi.edu (a host at USC/ISI in Marina Del Rey, CA)
   - www.ieee.org (a host on a hosting service supporting the IEEE)
   - www.nps.navy.mil (a host at the Naval Postgraduate School, Monterey, CA)
   - 127.0.0.1

2. Use ping in repeated mode to ping netlab.gmu.edu 100 times. When you have enough results, type control-C to stop. Report on the ping statistics you get.

3. Run a traceroute to each of the hosts listed in step 1. For each host, report on the number of hops, shortest round trip, and longest round trip.

**Lab Questions:**

1. Explain why minimum, maximum, and average are different in step 2.

2. Provide a plot of the round trip times from step 2 (x-axis is measurement number (1..100) and y-axis is time). Using the average round-trip time as a reference, comment on jitter in the delivery of these packets, e.g., how many packets had less delay? more delay? how many packets were within ±10% of the average delay?

3. The first hop for all but the last of the traceroutes is the same. What is the role of the machine with this IP address? Why is the last one different?

4. Explain why the round-trip time for a given hop number is not always the same.

5. Different hosts have different round-trip times. What factors contribute to the round-trip time?

6. What relationship, if any, do you see between the number of hops and the variation in the round-trip time? Provide an explanation for this observation.

7. In the results reported by traceroute, instead of three time values, you may see “***”... what does this mean?

8. www.nps.navy.mil responds to traceroute but not to ping, because of the way it is configured. Provide a likely reason why it was configured that way.

\(^1\) One of the goals of this lab is to have you compare the use of Windows and a UNIX platform. Throughout this lab we refer to linux, but you can use any UNIX platform to which you have access (e.g., linux, FreeBSD, Solaris, HP-UX, AIX, OSF, ...). You should clearly indicate in the results and work you submit for grading exactly which platform (UNIX and/or Windows) you used.
(9) Describe a way in which a network support person might use `traceroute` in troubleshooting.