University of Virginia   28 November 2011
cs1120: Introduction of Computing
Explorations in Language, Logic, and Machines

Class 38: Networking

Upcoming (Remaining!) Schedule
- **Wednesday, 30 November:** Exam 2 due (will be handed out on **Monday, 21 November**)
- **Friday, 2 December:** If you would like to present something for your PS8 in the final class, send me email before 5pm Friday. Your email should cc: all of your team members, and include a request for how much time you need and what you want to do. Remember that there are only 50 minutes in class and there may be many groups presenting, so your time may be limited.
- **Monday, 5 December (last class):** PS8, Final Submission due
- **Monday, 12 December (1:00pm):** Final Exam due

Why should interpreters follow the *Principle of Least Astonishment*?

What are advantages and disadvantages of *manifest* types over *latent* types?

What are advantages and disadvantages of *statically-checked* types over *dynamically-checked* types?

Networking

Latency: time it takes between when a bit is sent and when it arrives at its destination (milliseconds)

Bandwidth: how much data can be transmitted per unit time (bits per second)

You can think of latency as the *length* of the pipe, and bandwidth as the *width* of the pipe.

How can we improve latency of a network?

How can we improve bandwidth of a network?

What things that you do on the Internet would be better if latency was lower (faster) and bandwidth was reduced?

What things you do on the Internet would be better if latency was higher (slower) and bandwidth was increased?

In the next 5 years, do you expect a more noticeable improvement in the latency or bandwidth of the Internet?

Tracing Routes on the Internet

In Unix (including MacOS): traceroute *hostname*
In a Windows shell: tracert *hostname*

How close are we to achieving Licklider and Taylor's vision (1968) for the Internet?

> *Available within the network will be functions and services to which you subscribe on a regular basis and others that you call for when you need them. In the former group will be investment guidance, tax counseling, selective dissemination of information in your field of specialization, announcement of cultural, sport, and entertainment events that fit your interests, etc. In the latter group will be dictionaries, encyclopedias, indexes, catalogues, editing programs, teaching programs, testing programs, programming systems, data bases, and - most important - communication, display, and modeling programs. All these will be - at some late date in the history of networking - systematized and coherent; you will be able to get along in one basic language up to the point at which you choose a specialized language for its power or terseness.*

From Tim Berners-Lee's *Answers for Young People:* http://www.w3.org/People/Berners-Lee/Kids.html: **So do you think the Web is basically been a good idea or a bad one?**

Some people point out that the Web can be used for all the wrong things. For downloading pictures of horrible, gruesome, violent or obscene things, or ways of making bombs which terrorists could use. Other people say how their lives have been saved because they found out about the disease they had on the Web, and figured out how to cure it.

I think the main thing to remember is that any really powerful thing can be used for good or evil. Dynamite can be used to build tunnels or to make missiles. Engines can be put in ambulances or tanks. Nuclear power can be used for bombs or for electrical power.

So what is made of the Web is up to us. You, me, and everyone else. Here is my hope.

The Web is a tool for communicating. With the Web, you can find out what other people mean. You can find out where they are coming from. The Web can help people understand each other. Think about most of the bad things that have happened between people in your life. Maybe most of them come down to one person not understanding another. Even wars.

Let's use the web to create neat new exciting things. Let's use the Web to help people understand each other.