CSC 102

HOW THE INTERNET WORKS

ASSIGNMENT 1

PLEASE SUBMIT YOUR WORK ON MOODLE AS A PDF FILE.

Preparation

Read appropriate sections for this week in the textbook. Complete the ping and traceroute labs.

Part One: Moodle Quizzes (10%)

To practice taking Moodle quizzes, please go to the course Moodle site and take the first quiz. You do not need to achieve any particular score for this practice quiz, but you must submit a response to the quiz to receive credit on this portion of the homework.

Part One: Ping (20%)

Using ping, compare the following to see which is faster to reach on the Internet:

- a.) mousse.ens.fr (alternate in case that is unreachable: www.univ-paris1.fr)
- b.) sydney.edu.au (alternate in case that is unreachable: www.griffith.edu.au)

Please report on the average packet round trip times to the two hosts. Offer possible explanations of any difference or sameness in the round-trip times you observe. Include in your speculations where in the world these two hosts are. Now try www.uwa.edu.au. Can you explain what you observe?

Part Two: Traceroute (20%)

Using traceroute as explained in the traceroute Lab, determine if IP packets from Smith to Vancouver, specifically to www.ubc.ca (Univ. of British Columbia), go directly northwestward (Vancouver is on the west coast of Canada, north of Seattle), or do they take a more indirect route. Let me know what you learn from the output of traceroute. [If for some reason this host is unreachable, select some other west-coast host, e.g., from the ping Lab list.] Also, specify whether you are working on or off campus.

Part Three: Packet Speed (20%)

The speed of light in a vacuum is 300,000 km/s, and we might conservatively estimate the speed of the signals in a computer network as 2/3 of that (e.g., 200,000 km/s). The circumference of the Earth is 40,000 km. About how many times could such an unhindered email message circumnavigate the globe (at the equator) in one second? Using the results of your ping to sydney.edu.au, figure out how much of the round-trip time is due to signal propagation, and how much is delay by the routers along the way.

Part Four: Music CD (30%)

[This question appeared in the 2nd edition of Web 101.]

When music is recorded on a CD, a digital recording device samples the sound 44,100 times per second. Each sample is 2 bytes (16 bits) long, and a separate sample is taken for each of the two speakers in a stereo system. Therefore each second of sound on the CD requires 44,100 x 2 x 2 = 176,400 bytes of memory. How much memory is this **in bits**? Using these figures, determine how many megabytes of memory are needed to store a 3-minute song. If you could attain the maximal MP3 file reduction of 93%, how much memory would this 3-minute song consume as an MP3 file? This really consists of three sub-questions:

a.) How much memory for one second in bits? [Answer in Kb; round to the nearest 0.1 of a Kb, i.e., 1 decimal place. Don't forget the distinction between Kb and Kib; make sure you get it right.]b.) MB for a 3-min song? [Answer in MB; round to the nearest 0.1 of a MB, i.e., 1 decimal place]

c.) If maximally compressed, in MB? (93% reduction means it is reduced to 7% of its original size, i.e., 93% is 'gone.') [Round to the nearest 0.1 of a MB]

Show me enough of your calculations so that I can see that you know what you are doing (and can assign appropriate partial credit if necessary).