CS 549: Performance Analysis of Computer Networks
Lab Assignment 1

Date: February 9, 2024   *Due date*: February 21, 2024

Solutions to be submitted as pdf document through Moodle.

Design an experiment to measure the delay-throughput characteristics of the connection to an Internet server and to determine the bottleneck.

Use `ping` to determine the delay, compute the throughput using the number of packets, packet size and time taken. If possible, find the route taken and the geographical locations of intermediate routers.

Select 3 servers: one within IIT Mandi, one in a distant part of India and one outside India. Repeat the experiment for each of the servers, and run 3 sets of experiments at different times of day. Write a script to automatically run the experiments. Use tools such as Python, Perl, Scilab, OO Calc to analyse the data. Look for correlation between the computed throughput, ping delay and traceroute information.

Submit a neatly formatted document containing:

(i) a description of your experiment; including system definition, machine (and OS) and tools used, factors and their levels.

(ii) a line graph with time on the x-axis, delay and throughput on the y-axis

(iii) a line graph with delay on the y-axis and throughput on the x-axis

(iv) conclusions - an explanation of the salient features of your graphs and conclusions that you can draw.

Optionally:

(a) add a bar graph showing traceroute delay on the y-axis and hop count on the x-axis. Label the x-axis with the locations of the routers.

(b) add a geographical map showing the routes taken

(c) experiment with multiple simultaneous downloads from the same server to investigate whether the bottleneck is in the server or the network.