CS 485/ECE 440/CS 585 Lab 2, Parts 2 and 3

Due by 11:59pm on Monday, 12 December as an e-mail to the instructor (jedcrandall@gmail.com). Please send only PDF files.

Part 2 is worth 100 points (out of 200 total for Lab 2)

Part 3 is worth 50 points (out of 200 total for Lab 2)

The group will submit one document for Part 2 and then each individual group member will submit one document for Part 3. Please submit all documents as a single PDF, or at least as 4 PDFs attached to a single email, and carbon copy all group members on the email so I can confirm that all of you saw the Part 3 statements of the other group members.

Recall that the purpose of Lab 2, like Lab 1, is to understand resource allocation problems in computer networking, especially in terms of routing, flow control, and congestion control. However, for Lab 2 it is required that you use layer 3 routing in your experiments with more realistic network conditions (*e.g.*, variable delay, congestion, *etc.*) and that you dig deeper into *why* your results turned out the way they did by doing a packet-level analysis of TCP behavior in your experiments.

Part 2 is to carry out the setup and experiments you proposed in lab 2 part 1. Adjustments to your hypothesis, experimental design, experimental setup, *etc.* are okay but you should justify them in your writeup. You should submit a writeup of about 5-10 pages that contains the following information:

- Abstract: In very basic terms, what was your hypothesis, how did you test it, and what did you find out? Keep this to a short paragraph and assume that the audience of the abstract is someone I would show your report to who knows the basics of computer networks (*e.g.*, the department chair, and academic program reviewer, a member of the Tor project, *etc.*).
- Implementation: Describe how your network and hosts were set up in enough detail that another group in this class next year could repeat your experiments independently. Don't talk about experimental methodology or results in this section, except maybe to say how you varied factors (*e.g.*, using a tc netem rule to vary packet loss).
- Experimental methodology: Describe how you set up your experiments. It's okay to repeat text from your proposal here. This is where you say that you had a full-factorial design, what the factors were, what the response was, etc. Don't talk about implementation details here (that should be in the previous section) and don't talk about results yet.
- Results and analysis: What were your results? What do they mean? Calculating interactions and doing statistical hypothesis tests and such are strongly encouraged. Did both factors affect the response result? Lots of graphs and tables and figures would be appropriate in this section. **Be sure to include a detailed packet-level analysis that explains <u>why</u> your results are the way they are. As a general rule of thumb, if your analysis can be done by looking at**

graphs and using Wireshark's GUI, your analysis is probably not detailed enough. I recommend writing custom code to analyze tcpdumps in depth.

- Related work: You must compare your results to the explanations of TCP and IP routing in the textbook and say what you learned that isn't in the textbook or what you demonstrated that is in the textbook. Comparing your work to other works that have been published, *e.g.*, as papers is optional.
- Conclusion: Thumbs up or thumbs down on your hypothesis? Also talk a little bit about interactions and things that were unexpected or affected the results, but keep the conclusion very brief---just a few sentences.

Part 3 is for each group member to attach a one-page personal statement about their contributions to the group lab project. See the syllabus for details, note that there are three specific questions for you to answer. Also be sure to check out the personal statements of your group members. If there are issues (*e.g.*, a group member misrepresents their contributions or there's some problem not reflected in the statements) you can confront the group member and ask them to change their statement or you can let me know in private up to one week after the submission of Parts 2 and 3 of Lab 1. **Please do let me know about any issues, I have no other way of stopping slackers from profiting from your hard work other than calling them out on their personal statements and grading accordingly.**