

Project II: How to succeed

ECE 50863 – Computer Network Systems

Optimizations

- If you aren't sure where to start, I'd begin with a window scheme. This is generally the most crucial.
- Even a basic strategy called “Go Back N” should give a lot of benefits over Stop and Go.
 - However, this is probably not the best final strategy, and is sub-optimal in many ways.
- Start with results without loss/rebuffering. A well designed window scheme should likely give benefits.

What am I looking for?

- Good performance numbers
- Whether you implemented interesting optimizations
- However its not just about whose code gets the best results
 - What did you try (even if it was a negative result)?
 - Does your report show an exploration of trade-offs? Did we learn something interesting in terms of performance nuggets?

Best projects

- Creative, intellectually curious, great effort
 - Do many of the obvious ideas, and even go beyond
 - Explore ideas from papers/other resources [cite them]
- Report things well and systematically
 - Graphs/results to show trade-offs between design choices
 - Report results along with variability.
 - Sensitivity to different conditions.

Example: negative result

- Lets say you put in a lot of effort to try [interesting] idea X, but it didn't perform as well.
- Report what you tried, results to show performance with and without X.
- Explain why X did not work well
- Significant difference between someone who got the same results but did not try idea X, vs. someone who tried an interesting X, and found X did not work well.
- Caveats:
 - X should be an interesting idea with a reasonable chance of working well
 - Make sure you do get reasonable if not the best performance overall though [not all negative results!]
 - Ensure bugs/poor implementation didn't impact results

Example: showing benefit of a design choice

- Lets say you do a first implementation with cumulative ACK, then add selective ACK.
- It would be interesting to compare the two designs.
- How much did adding selective ACK improve over just using cumulative?
- Show graphs to illustrate.

Sensitivity

- Performance may be great with 0% loss 0% rebuffering but not so good in a different regime.
- Ideally, how does the scheme behave in different regimes?
- What about much higher loss/rebuffering?
- Does it work well for different file sizes?

Showing variability

- Performance can vary from run to run.
- How do you show variability?
 - Mean and confidence intervals
 - Mean and standard deviation
 - Boxplots
 - Median (or max) with error bars that show min and max (or 10%ile and 90%ile to be robust to outliers).
 - Cumulative Distribution Functions
- Note:
 - Ensure you get reasonable performance, and implement many optimizations first before going overboard on variability experiments.

Notes on Report Template

- For final report:
 - Feel free to add additional slides after what's asked
 - This is to expand on design choices, interesting negative results, more sensitivity studies etc.
- Note: please do not be verbose.
 - Do: Small number of well chosen and well presented results
 - Don't: Long list of uninteresting/poorly presented results.

Minor

- If you remove some slides in the template, that's ok, but make sure information about configuration tested present.
- For First Report, some students removed the template slides, and just present a performance graph – unclear what the configuration tested is.
- Verbose basic material on TCP not required
 - More important: some specifics to your implementation of cumulative/selective ACKs
 - Examples:
 - Single timer for entire window? One timer per packet?
 - Selective ACK: N out-of-order segments? All?