Writing Good Systems Papers

Gernot Heiser

NICTA and University of New South Wales

Sydney, Australia

Australian Government
Department of Broadband, Communications and the Digital Economy
Australian Research Council

NICTA Funding and Supporting Members and Partners

Disclaimers

- This is about good papers, not good talks
  - … didn't have the time to do a good one (or at least good slides)
- I've been around the traps longer than you, but I don't know it all!
  - I get papers rejected just as you do

Rule 1: Reviewers are Pot Luck

- … even at top conferences
  - even good papers get rejected, sometimes for the wrong reasons
- Rejection is part of life, get used to it!
- Reviewers' top reasons for rejection
  - I'm not convinced you're solving a *real problem*
  - I'm not convinced you're *solving* the problem
  - *I don't understand* – your paper is too badly written
  - Your paper is just not competitive for {SOSP, OSDI, EuroSys…}

Rule 2: Presentation Matters!

The best work is useless if you can't convince the reviewers

Important bits:

- Introduction: sell the idea, the significance and the approach
- build tension, make reader interested
- convincing argumentation
- top-down, not bottom-up
- maintain reader state
- convincing eval
- state assumption/limitations honestly
- thorough and honest eval

Introduction: Most Important Part of the Paper!

- Explain the problem you're solving
- Outline your approach
- Indicate results/outcomes
- State contributions

General hints for intro:

- Capture the reader's interest: sell your idea
- Be concise: Stay within about one page!
- Make sure the paper delivers what you promise
  - Reviewers hate "bate and switch"

Other Parts

- Background: set the scene in more detail
  - cite related work as needed, don't discuss more than necessary
- Describe problem in detail
- Explain solution in detail
  - be honest and forthcoming with limitations and assumptions
- Evaluation: often largest part
- Related work
- Conclusions
- Abstract
  - used to steer to the right reviewers

Evaluation

NICTA

- Show that your solution actually works
  - significant improvements in important situations
  - no (or insignificant) degradation elsewhere
- Be careful about the scenarios you benchmark
  - artificial/construed best cases will be discounted
  - think of ways in which your approach could fail/deteriorate
  - go out of your way to be fair, anticipate any scepticism of your work
- Avoid benchmarking crimes!

Benchmarking Crimes

- Pretend microbenchmarks are representative of real performance
- Sub-setting benchmark suites
- Same dataset for calibration and evaluation
- No indication of significance of data
- “Measuring” simplified simulated system
- Relative numbers only
- No proper baseline
- Only compare to yourself
- Unfair benchmarking of competitors
- Silly games with numbers
  - throughput reduced 10% ⇒ overhead is 10%
  - 6%→ 13% overhead ⇒ 7% increase

Style and Form

- Write in engaging style, lead reader though the paper
  - avoid bottom-up structure, present ideas top-down
  - Use active voice!!!!
- Be mindful of reader's brain state (which is lossy)
  - maintain reader state
  - don't assume every reviewer is expert in your narrow area
  - but don't think you can hide stuff from reviewers!
- Follow formatting rules
  - don't play with margin, baseline skip etc
  - don't use microscopic fonts, >40y olds have problems with <8pt font
- Spell-check, proof-read, proof-read
  - get native speaker to proof-read if you aren't
  - get outsider to read it – great way to spot holes before it's too late!

Further Reading

- Levin & Redell: An evaluation of the 9th SOSP submissions, or How (and how not) to write a good systems paper
- Simon Peyton Jones (MSRC): How to write a great research paper
  - http://research.microsoft.com/en-us/um/people/simonpj/papers/giving-a-talk/giving-a-talk-slides.pdf
- My paper/thesis writing guide
  - http://gernot-heiser.org/benchmarking-crimes.html
- My list of benchmarking crimes:
  - http://gernot-heiser.org/style-guide.html

Thank You!

mailto:gernot@nicta.com.au

Twitter: @GernotHeiser