On the Development of Research Practice

Kevin Fall, PhD

Intel Research

Berkeley, CA

kfall@intel.com

http://www.intel-research.net http://www.dtnrg.org

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The Typical EE/CS Grad Career

- Year 1 and 2: take some classes, take orals or subject exam (get MS degree)
- Year 2 and 3: begin to focus on a thesis topic
- Year 3 and 4: get some results in the area
- Year 5: advance to candidacy / qualifying exam
- Year 6 or more: complete thesis

Focus on a Topic

- Interesting: to you and those around you
- Opportunity: you can contribute something
- Term: not incredibly far away

Get Some Results

- Try for 1-2 papers published in the area
- First author is preferable
  - Who did what work can be an issue
  - Have it be “your thing”
- Better networking/systems conferences:
  - SIGCOMM, Infocom, NSDI, OSDI, SOSP, SIGMETRICS

Advancing

- Form your committee
  - Scheduling your experts can be hard!
  - You may benefit from people at a different institution
- Your qualifying exam
  - Be very well prepared for this
  - May be the committee's only opportunity to stop you
- What "they" want
  - Is the topic reasonable (not too simple)?
  - Is the scope reasonable (not an over-extension)?
  - How will you know you are done?
  - Are you competent to undertake the work?

Finishing

- Many PhD students lost in the ABD phase
  - Try to avoid losing momentum
  - Keep in contact with others in the field
- Writing
  - Allocate a good chunk of months for this (min. 3-4)
  - Be relentless– don't allow yourself to be interrupted
- The end game
  - Have some idea of where you want to go next
  - Know people in your field by name
  - Get your interviews in line
  - Many places will let you finish your writing after employment
  - Final copyediting may be a little painful– be ready for it

‘Professional Research’

- Some of the same skills from grad school
- Choosing a research topic
  - How applied versus how much ‘pure’ research
  - Who to work with?
  - Topic may be related to grant responses
  - How crowded is the area?
  - What about my institution?
  - Other time commitments?

Flavors of Professional Research

- Industrial research
  - Tends to be more applied (not always)
  - Intellectual property (you will meet lawyers!)
  - Somewhat resistant to cross-fertilization
  - Hard and soft money
- Government research
  - Could be applied or pure
  - Less focus on intellectual property
  - May be working closely with universities (depends)
  - Soft money
- University research
  - Pure research
  - Minimal focus on intellectual property
  - Often in search of money
  - Need to teach
  - More freedom
  - Working with smart students is typical best benefit

Horror Stories/Realizations

- You got scooped
- You were awarded a grant that was then cancelled
- You were awarded an unclassified program that went dark
- You didn’t make tenure
- Your big applied project burned up on entry
- You couldn’t get any grants (esp. university)
- You are a very bad teacher or advisor
- Your ‘pure’ research lab goes ‘applied’

My Current Research Area

- Delay-Tolerant Networking (DTN)
- Started from a trip to NASA/JPL
- ‘Extreme’ networks charter of Intel Lab
  - I really took the ‘extreme’ to heart