An Evaluation of the Ninth SOSP Submissions [Levin83a]

CSci551: Computer Networks
SP2006 Thursday Section
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Background: Research

- Primary aim of class
  - Exposure to *research*
  - Through paper readings
- Research as discovery
  - Advances knowledge in some way
  - Different from survey
- Different from an undergraduate class
  - those are how-things-work classes
  - this class?
    - why

Research Process

- community converges on few interesting problems
  - critical mass and feedback needed
  - sometimes picked from new technology, or marketing, funding agencies
- lots of parallel activity
- very risky
  - only 10% of ideas should really work
  - and 10% (?) of working ideas become products

Hot topics and why

- consider wireless sensornets
- why now and not 10 20 30 years ago?
  - wireless? not really
  - new applications? not really
  - cost and availability of equipment
    - availability of cheap computers
  - size of available computers
  - availability of small, cheap sensors

Key ideas (in [Levin83a])

- question everything in papers
  - does it all hang together, from problem, to solution, to experiments that demonstrate the result, to the conclusion
- cosmetic things
  - does the author really care about the reader?
- think about paper organization
- types of paper (idea, analysis, simulation, experimentation, etc.)
- ask what's new?
  - need to know the current state-of-the art
  - need look in the paper at what's new
    - both what's claimed to be new
    - and what you think

What makes a paper important?

- reality
  - does it really get used?
  - is it implementable or realizable
  - how does it work in a mixed old/new world?
- the idea is new
  - revolutionary idea vs. incremental
- impact overall
  - big change affecting few people
  - small change affecting many people
- quality of work (complete, descisive, etc.)

What makes a paper clear?

- flow, organization
- illustrations
- technically sounds support for the claims
  - mix of tests, experiments, etc.
- lanaguage, mechanics
- context
- background about alternatives and why
- more-or-less self-contained

Theory vs. Experimentation

- theory is incredibly important
  - can predict general results
  - help understand systems
- experimentation is incredibly important
  - explore *real-world* contstraints (sometimes abstracted away in theory)
- best papers tend to have *both*
- *neither* is sufficient
  - ex: Ethernet performance: theory says can only reach 36% utilization. true?
  - ex: cryptography: distributed.net broke the RC5-64 challenge in 1757 days

Science vs. Engineering

- what are the roles of science and engineering in networking and systems?
- huge amount of engineering ("construction")
  - what can we *really* build
- really important science ("discovery")
  - the Internet is a *complex* system with many interactions we don't understand
  - and there are *principals* that affect all possible systems

Examples of Important Contributions

- contribution [theory / experimentation / science / engineering]
- examples:
  - IPv6: experiment, engineering
    - important to allow more addresses, hosts
    - provides backwards compatibility
    - limit impact so far
  - OSI 7-model: theory, engineering
    - useful to discuss networks
    - in all the textbooks
    - not large practical impact
  - VOIP: Voice over IP: experimentation, engineering
    - being widely used (more than half of class)
    - also having economic impact (on telephone call prices)
    - not really new intellectually (work done much earlier), but new engineering

Other questions/observations?

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