Assignment

Due in 4 weeks, on November 9
- Talk to your advisor or potential advisor or a senior student
- Get recommendation of a recent and/or important paper in an area/project that interests you
- Get a sense of the important publication venues in this field
- Get recommendation on document editing, reference management, and literature search tools
- Read the suggested paper
- Find a few (between 2 and 5) related papers; skim them
- Prepare a BibTeX file of all above papers
- Prepare a short document (≤ 2 pages)
- Summarize (in your own words) the paper you read
- Write a few sentences about each related paper

On finding related work

- Ask your advisor, who can offer good starting points and see not-so-obvious connections
- Follow citations (forward & backward)
- Google (Scholar) + online databases (e.g., ACM DL, DBLP)
- Need to build up a list of useful keywords
- Rank using citations/venue prestige
- Routinely check top venues
- Share with fellow students (reading groups, journal clubs)
- Talk to people at seminars, conferences, ...
- Talk to those outside your field
- Start with your fellow grad students!

Deciphering academese

DECIPHERING ACADEMASE

"To the best of the author's knowledge..."  =  "We made too lazy to do a real search...
"It should be noted..." =  "OK, so it corresponds somewhat. Are you happy now?"
"These results suggest that..." =  "If we take a back leap and refer to the data..."
"If you don't know the past, other should have done it..."
"We are no clue either..." =  "We have no idea what this is..."


Tools of the trade

My current choices

Document editing  LaTeX + Emacs + make
Occasionally Word 2010
Reference management  BibTeX + Emacs + make
Presentation software  PowerPoint 2010
Web authoring  Emacs + XML + scripts
Wiki + XML + scripts
Graphing  Gnuplot, Matlab
Drawing  Xfig with LaTeX
PowerPoint 2010 + PDF/EPS export

Again, the “Resources” panel of the course website has many useful pointers!
How to read a paper

Above all, question authority
- Identify the problem being solved
- Attack the problem yourself, without looking at solutions
- At least come up with their "strawman" solution
- Might even get a better solution!
- Read their solution and compare it with yours
- Are you convinced which one is better?
- Write a short, poignant summary; record in your bib db
- Don't just copy their abstract
- Keep additional notes in your bib db when you revisit the paper or discuss it with others

On reading motivation

- Is the problem new?
- Is the problem important?
- Is the problem interesting?
- Is the problem contrived?
- Learn how people make good/bad pitches
  - Some papers overstate/understate their applicability
  - Can you do better?
  - Come back after finishing reading: did they solve the same problem motivated earlier?

On reading evaluation

- Do the experiments tell you anything new?
  - Many simply confirm the obvious!
  - How do you make it more interesting?
- Is the paper trying to hide something?
  - Unexplained "magic sauce"
    - E.g., how to tune a parameter
  - Choices of workloads and parameter ranges
    - E.g., synthetic datasets, unusual uses of real datasets, or x-axis covering a small range
  - Choices of performance metrics
    - E.g., an index costs 1/10 of the I/Os incurred by a full scan—great?

Other reading tips

- Read related work carefully
  - A glimpse at the bigger picture and pointers to follow to learn more about the problem/area
- Think beyond their related work discussion
  - Congrats if you uncover non-obvious connections to other areas!
- After you finish reading
  - What is the "take-away" message?
    - What assumptions can be relaxed or introduced?
    - Learn to appreciate their contributions
  - Don't judge what a paper is about by its abstract
    - Corollary: if you cite it, better read beyond the first page!

Importance of planning

A fictional PhD student: Year 1

- Took many courses and aced them, like he always did
- Courses/TA took most of the time, but he was taking care of quals (and without exams!)—so no time was wasted?
- Met with a couple of professors, got papers to read, showed up in group meetings, but didn’t have time to “do” much
- Thought he could declare Prof. A as advisor at the end of Semester 2, but Prof. A wouldn’t commit
  - Got placed on departmental probation
  - Cursed the other student whom Prof. A did take
  - Couldn’t take advantage of the RIP initiative
  - So what? Got a well-paid programming job in the summer
A fictional PhD student: Year 2

- Thank God Prof. B took him!
- Late RIP proposal was rushed and half-baked; committee wanted an extra progress report!
- After the progress milestone, Prof. B didn’t think the defense would be ready until summer
  - Told by Prof. B to “prove himself” in the summer or else he would get no funding next year!
- Spent the summer finishing RIP while watching other 2nd-years getting cool internships at research labs or working on their prelim

A fictional PhD student: Year 3 ≥ 3

- Had to do more work in Semester 5 to turn RIP results into a submission
- Realized the approaching prelim deadline, but still had no topic
  - Thank God the Grad School extended deadline to Semester 7
- Requested extension again because Prof. B didn’t think prelim was ready
  - No Saved by the Bell in grad school
- Pass by the end of Year 4 or withdraw

A fictional MS student: Year 1

Semester 1
- Enjoyed life: 8+2 courses in 2 years = a piece of cake?

Semester 2
- So far, 4 regular courses: good progress?
  - What? Declare an advisor?
  - Thank God Prof. C took him!

Summer 1
- Enjoyed life: travel + internship
- Prof. C was also traveling anyway!

A fictional MS student: Year 2

Semester 3
- What? Job hunting now?
- Still needed time to warm up to research
  - Why did Prof. C give another MS student RA support?

Semester 4
- Kept busy by courses and interviews, but really needed more time for research
  - Prof. C thought the project wasn’t ready for defense!

Summer 2 and beyond
- Had to stay to wrap up MS project and defense
  - Continued to pay Duke $$$ while watching classmates graduating and moving on

Team discussion (20 min.)

- Knowing what went wrong for these fictional characters, how would you plan your own PhD/MS career?

Team assignment

- Team JARS
  - Jie, Sandeep, Alex, Ralf
- Team Tachikoma
  - Songchun, Puneet, Kyle
- Team Bob
  - Cassi, Ruofan, Razvan
- Team Jymasher
  - JJ, Yuqian, Mahanth
A reasonable PhD schedule

**Year 1**
- Talk to faculty, attend seminars and group meetings this fall
- Declare advisor early in spring
- Form committee and do RIP proposal before summer
- Earn 3 (or least 2) quals credits
- Focus on courses in your area (or related areas) and do projects that impress your potential advisors
- TA in spring

**Summer 1**
- Whatever you do, stay in touch with your advisor
- You may be offered an RA
- RIP initiative makes it easier for advisors to fund you
- Take it—at this stage it’s often better than a higher-paid coding job

**Year 2**
- Full speed ahead with your research
- Goal: publishable piece of work for RIP
- Pass the remaining quals
- Focus on courses useful to your research
  - Follow your advisor’s advice; no need to meet all course requirements yet
  - TA in fall or spring; may even be deferred or waived
  - Confirm future funding arrangement with your advisor

**Summer 2**
- Continue working with your advisor, to get a head start on prelim
- Or, find an internship relevant to your research
  - Use your advisor’s connection

**Year 3**
- In fall, decide on your dissertation direction
- Check with your advisor for classes to take before prelim
- Obtain initial results, and publish more on the way
- Get your committee together by early spring, and write/defend your prelim
  - Part of it is a dissertation proposal; not a contract, but a demonstration that you are “ready,” e.g., able to propose a research agenda suitable for PhD
  - Check with your committee for scope and expectation
  - Extensions must be approval by the Graduate School
- Extensions beyond Year 3.5 are rarely granted

**Years 4 to n – 1**
- Research, research, research...
- Wrap up course requirement; you can always take/audit more to expand your horizon and stay up-to-date

**Year n**
- Your last spring will be packed by interviews, writing, and defense
- Job hunting starts earlier and takes more time than you think
  - For academic jobs, applications start in late fall
- Get bulk of your work done before last fall!

A reasonable MS schedule: Year 1

**Year 1**
- Complete as many regular courses as possible, but make sure you have time for the following
- Do projects that can impress your potential advisors
- Talk to faculty, attend seminars/group meetings this fall
- Declare advisor in spring
- If you don’t start your MS project in spring, at least develop a concrete idea and some steps to take in the summer
- Don’t miss any career fairs

**Summer 1**
- Whatever you do, stay in touch with your advisor, and continue/begin working on your MS project

MS schedule: Year 2

**Year 2**
- Finish the rest of the course requirement
- Form your committee in fall and defend in spring
- Get bulk of your research work done before last fall, because your last spring will be packed by interviews, writing, and defense
- Job hunting starts early and takes a lot of time
- Don’t miss on-campus opportunities