



CS696 Research Project Preparation(1) — How to Conduct Research in CS?

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Key Elements

- Reading
- Writing
- Working with others
- Talking
- Steps for a project

Reading Is Fundamental

- Finding and reading related work is the foundation of good research.
- Two critical resources: ACM Guide to Computing Literature and Computing Reviews.
- Identify resources that are important to your field.
- Read the **top** and **recent** journals and proceedings.

For example, IEEE Digital Library, ACM Digital Library, and USENIX. SDSU has IEEE/ACM digital library.

Top Conferences

- ACM International Symposium on High-Performance Distributed Computing (HPDC)
- The International Conference on Distributed Computing Systems (ICDCS)
- ACM Symposium on Principles of Distributed Computing (PODC)
- The IEEE International Parallel and Distributed Processing Symposium (IPDPS)

Top Journals

- IEEE Transactions on Parallel and Distributed Systems (TPDS)
- Journal of Parallel and Distributed Computing (JPDC)
- ACM Transactions on Computer Systems (TOCS)
- IEEE Transactions on Computers (TC)

Reading Method

- A broad reading for many related papers
Focusing on **Abstract**, **Introduction**, and **Conclusion**
- Concentrate on papers on your short list
What is the contribution of this research?
How does this contribution relate to work previously accomplished?
What are the important references cited in this paper?
- Write a summary for papers on your short list
In a research career, summarizing work (yours as well as that of others) is a common task; doing it concisely is an art.

Considering these after reading

- What makes this paper easy to read?
- What level of detail is provided?
- What examples are used to demonstrate important concepts?
- What questions are left unanswered?
- Can the results be generalized?

Reading Consequences

- **Unfortunately**, technical literature is often obscurely written.
- The pace may be slow, but in the end the potential of a well written article will have been realized.
- Your comprehension of the article will be improved.

Writing Is Fundamental Too

- Good writing is the only lasting medium of the scientific process.
- Reread a paper you enjoyed with an eye to integrating stylistic qualities into your writing.
- Keep a journal as the journal is a simple tool for organizing your research and it is a valuable record of progress you make.
- Keep a summary of results encountered in related readings.
- Reserve a good portion of time for writing.

A Good Paper to Read

- Atdelzater, T.F.; Atkins, E.M.; Shin, K.G., QoS negotiation in real-time systems and its application to automated flight control, IEEE Transactions on Computers, Volume 49, Issue 11, Nov. 2000 Page(s):1170 – 1183.
- You can find it from SDSU Library online.

Work with Others

- For many, success comes from work with others.
- Keep to a regular schedule of meetings.
- Carefully consider criticism.

Talk Isn't Cheap

- In any serious research you will find yourself giving a talk.
- Good talks require considerable preparation
- Slides should contain illustrative examples with the level of detail that is appropriate for your audience.

The Research Project

- Research in computer science often leads to a "project" involving programming.
- Programming is **not** computer science research.
(only for experiments)

Project Steps (1)

- Establish goals.
 - If you cannot formulate concise goals, you should stop and reconsider the motivations for the project.
 - Develop a list of milestones which demonstrate progress, and strive to accomplish them.
- Think simple.
 - Design your projects so that they may be completed within a reasonable period of time.
- Build prototypes or simulators.
 - A well considered prototype validates assumptions, tests the value of abstractions, and motivates reconsideration of weak ideas.

Project Steps (2)

- Use tools.
- Such as matlab, mathematica, bison, etc.
- Document results.
- Finished projects should be documented.
- The document should describe the problem, your assumptions, your approach, and an honest evaluation of your results.
- Well written documentation greatly increases the impact of a project.
- Write a technical paper

Useful Links

- Hints for research students

<http://www.virtosphere.de/schillo/research/tips.html>

- Guidelines on Research Practice in Computer Science

<http://goanna.cs.rmit.edu.au/~jz/conduct.html>

- Graduate Research, Writing, and Careers in Computer Science

<http://www.cs.iastate.edu/~honavar/grad-advice.html>

Acknowledgment

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A Letter to Research Students

Dr. Duane A. Bailey

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Project Proposal Guide and Sample

- <http://www-rohan.sdsu.edu/~taoxie/cs666/projects.htm>
- Email me one paragraphs or two, describing your proposed project. In the email, please specify the following:
- Which topic you choose?
- Within that topic, what is your rough idea?
- Full names of the two or three team members
- Who is the team contact?
- Note that each group only needs to send me one email from the contact.

Paper Reading

- All papers in blue color are important ones and must be read if you choose that area.