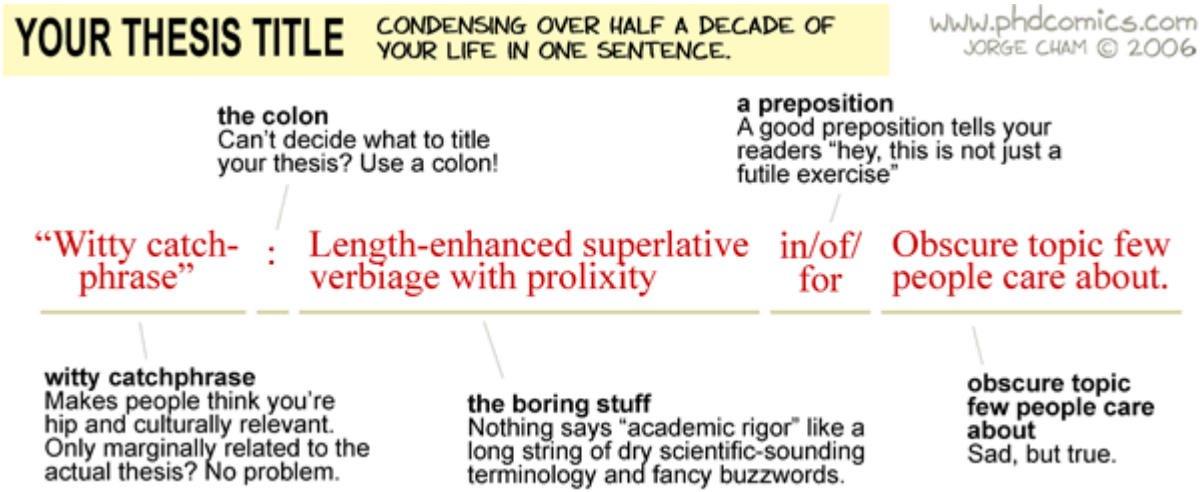
Academic Writing



Writing Research Report/Paper

Research report/paper

Typical structure of a research report/paper:

1. **Title**
2. **Abstract**: brief summary, typically 100-200 words
3. **Introduction**: motivation, context, overview
4. **Related Work**: what are others doing
5. **Requirements**: What are you aiming for? Why?
6. **Design**: the theory / our new ideas
7. **Implementation**: how we did it
8. **Evaluation**: why it is good/useful/better than others
9. **Conclusion**: summing up the results

Short conference papers: typically around 4 pages

Long conference papers: typically about 10 pages

Report/Paper Writing Strategy

1. **Related Work**: get an overview and note down points
2. **Requirements:** from related work or from real users
3. **Design**: collect ideas
    1. Create structure with bullet points / mind map
    2. Create figures
4. **Implementation**: create a prototype
    1. Start small and extend it bit by bit
    2. Experiment and collect results (more bullet points and other data)
5. **Evaluation**: compare and refine your work (if necessary, go back to 2 or 3)
6. **Title**, **Abstract**, **Introduction** and **Summary** can be done last

Finding Related Work

1. Gather phase
   - Keyword search
     (e.g. Google Scholar, ACM, IEEE)
   - Follow up the references
     (cited and citing papers)
2. Filter phase:
   read only abstract and throw blanks out
3. Reading phase

The "someone else has already done it" problem

- Look again, is it really the same?
- Related work is good!

Writing about Related Work

1. **Summarize** in a few bullet points what each related paper is about
   - What did they try to do? What was novel about it?
   - Did they achieve it? Did they evaluate it?
2. **Organize** the related works by grouping them
   - Define categories, write one section per category
   - Possibly subcategories, subsections
   - Alternative: organize by time rather than category
3. **Analyze** & Compare
   - What are the difference between the works?
   - Strengths? Weaknesses?

Requirements

- **What do we want? How important is it? Why?**
- **Where from?**
  - From related work (what do others think/do?)
  - From real users (ask/survey them or read forums)
  - From real products (what do other systems do?)
  - Through analysis (what is logically required?)
- **Organize** in categories (sections and subsections)
  - Functional requirements (what does it do?)
  - Non-functional requirements (how does it do it?)
    E.g. usability, performance, safety, security, …

Design

How do you achieve your requirements?

- Explore the design space of your project analytically
- Start with an overview and then go down into the details
- What are the design alternatives?
- What are the advantages/disadvantages of each alternative?
- Which alternative do you choose and why?
- Always argue with your requirements (they are your aim)

Implementation

How did you build your system?

- What features?
- What tools/technologies were used?
- Implementation challenges and how you solved them
- Advantages and disadvantages of your implementation
- Use screenshots and/or small code snippets for illustration

Introduction

What are you doing? Why are you doing it?

1. Introduce the topic and the context
2. Motivate the research
   - Interesting applications?
   - Significant consequences (e.g. cheaper, faster)?
3. Research questions:
   What are you trying to find out or trying to show?
   What are your contributions (briefly)?
4. Outline of the paper
   ("Section 2 gives an overview of related work…")

Conclusion and Abstract

Conclusion

- Sum up what it is all about
- Sum up your achievements
- Point out some future directions (e.g. new research questions)

Abstract (typically ~200 words)

- What is your project about? -> Problem, Motivation
- How did you do it? -> Methodology
- What are your results and why are they significant? -> Solution/Contribution

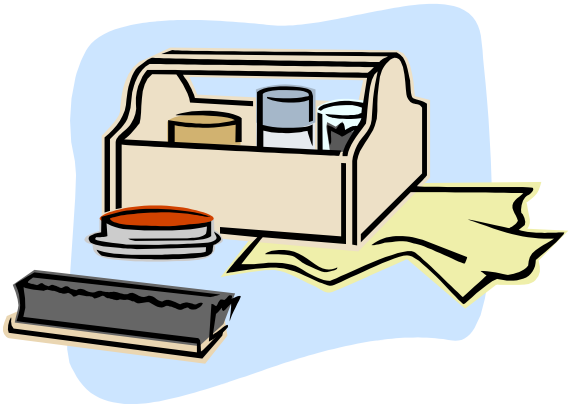
Writing Style

- **Sections:** good overall structure is the first step
- **Paragraphs:**
  - Each expresses one idea clearly
  - Split larger ones, join smaller ones (< 3 sentences)
- **Sentences:**
  - Simplicity and clarity
  - Use examples for explaining complex stuff
  - Split larger ones (no runaway sentences)
- Avoid redundancy

Beating Writer's Block

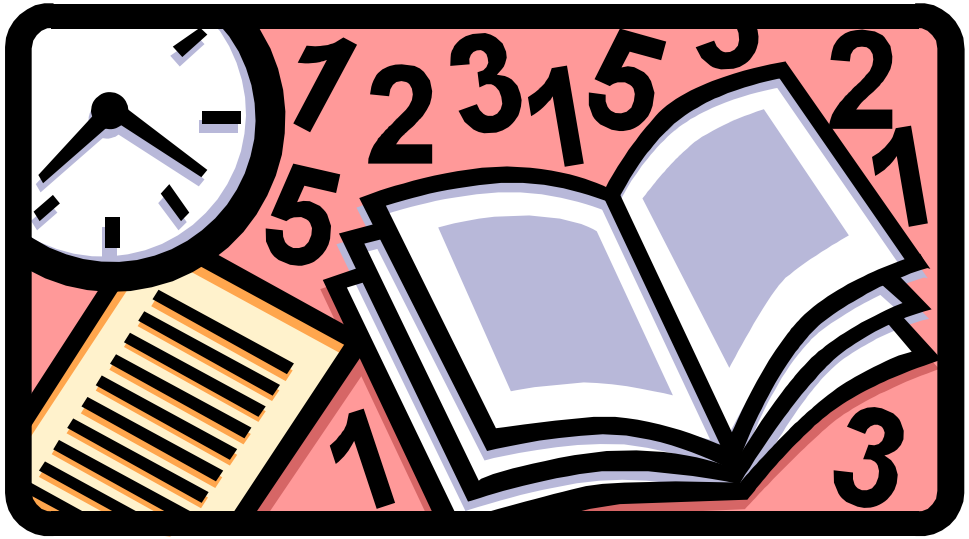
- Vary the **structure**:
  - Just write section/subsection headers
  - Just write bullet points, flesh out later
- Vary the **topic**:
  - Write about anything that comes to your mind (e.g. some related work, design, introduction, …)
  - Organize/ reshuffle the parts later on
- Vary the **modality**:
  - **Visual**: create figures first, the simply describe what you see
  - **Auditive**: talk to others about it; write exactly as you would explain it verbally
  - **Kinesthetic**: Do some development or some experiments, then describe what you have done

Polishing your draft



- Same as with software development: iterative and incremental **refinement**
- Get (early) **feedback** from others:
  - Is it easy to understand?
  - Spelling/grammar
  - Obvious omissions?
  - Could there be more/less figures?
  - Other interesting references?
- Emphasize your **contribution** (abstract, intro, conclusion)
  - How is your work different? Better?
  - How have you evaluated your work?

Research Report in the Assessment-1



Research Report

20% in total for the report

- The research report has to be written **individually**
- 6 pages IEEE style
  IEEE style can be download through google
- Includes text, figures, bibliography
- Submit as Word/latex and PDF file
- Read the assessment document for more details.