

Specifications of IT systems

Article Reading & Report Writing

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Acknowledgement

- This lecture is mostly based on
 - *Writing for Computer Science, Second Edition. Justin Zobel. Springer, 2005*
 - Chapter 9, Writing up
 - *The Thinker's Guide to Engineering Requirements. Richard Paul, Robert Niewoehner, Linda Elder. Foundation for Critical Thinking, 2007.*

Agenda

- ✓ Handin intro
 - Reading Scientific Articles
 - Writing Structure
 - Example Articles
 - Actually Writing
 - Handin (more...)

The survey report

- First, pick a set of articles
 - See CampusNet for the list
 - Email jwc@eng.au.dk with your group's selection by 10:00 Tuesday 4 Feb
 - I will confirm or indicate which are still available
- For each article, answer the questions on p12–13 of The Thinker's Guide to Engineering Reasoning
- Then, give a comparison of the three articles on how they are related and how they differ.
- Limit: 6 pages

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Not a novel...

- How do you read a scientific/engineering article?
 - Read with intent
 - Question what you read
 - Skip back and forth
 - Make notes

Reading an article

- Read the **abstract** to see if the paper is of interest
- Read the **introduction**
- Read the **conclusion**
- **Ask questions**
 - What is the focus?
 - What are the main results?
- **Cross read** the body of the paper
- Read in detail and **take notes**
- If a section seems difficult or too technical, skip it and **come back to it later**

Analysis of an engineering document

1. The main purpose of this engineering article is ____.
2. The key question that the author is addressing is ____.
3. The most **important information** in this engineering article is ____.
4. The main inferences/conclusions in this article are ____.

Analysis of an engineering document

5. The key concepts we need to understand in this engineering article are ____.
6. The **main assumptions** underlying the author's thinking are ____.
7. The implications of this line of reasoning are _____. (And, if the reasoning is incorrect, the implications are ____.)
8. The main points of view presented in this engineering article are _____.

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Telling a story (to help the reader)

- What should the reader **learn** from the report?
- An effective paper educates its readers:
it leads readers from **what they already know** to new knowledge you **want them to learn**
- This is achieved by the logical flow embedded in a narrative
- Common ways of structuring the narrative
 - As a chain
 - By specificity
 - By **example**
 - By complexity

Results may dictate structure

- A chain:
 - Problem statement
 - Review of previous solutions and their drawbacks
 - The new solution (not available for the survey report)
 - Comparison of solutions with respect to problem statement
- By specificity: Add detail gradually, in particular, if the material is technical
- By example: explain problem or solution in concrete terms
- By complexity: lead reader from easy to difficult

Organization

- Many readers accept or reject conclusions based on a quick scan. This should be accommodated by having important statements as near the beginning as possible
- Scientific papers follow a standard structure
- Look for templates!
- Components:
 - Title and author
 - Abstract
 - Introduction
 - Body
 - Literature review
 - Conclusions
 - Bibliography
 - Appendices

Title and author

- In the beginning state
 - Title
 - Author(s)
 - Affiliations(s)
 - Date!
- Specific standardized formats may require more information to be supplied

Abstract

- Typically a single paragraph of about 50 to 200 words
- Purpose of an abstract: allow readers to judge whether or not the paper is of **relevance** to them
- It is a concise summary of the paper's aims, scope and conclusions – **nothing more!**

On Using Conditional Definitions in Formal Theories

Jean-Raymond Abrial¹ and Louis Mussat²

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Abstract. In this paper, our intention is to explore the notion of definition in formal theories and, in particular, that of conditional definitions. We are also interested in analyzing the consequences of the latter on the structure of corresponding proof systems. Finally, we shall investigate the various ways such proof systems can be simplified.

Introduction

- The **introduction** should expand on the abstract,
 - Describe the paper's topic,
 - The **problem** being studied,
 - **References** to key papers,
 - The approach,
 - The **scope and limitations**,
 - The outcomes
- The introduction should include a **motivation**:
 - Why the problem is **interesting**,
 - What are the **relevant** scientific issues

Introduction (cut off)

- Present conclusion **without** supporting evidence
 - Cite relevant literature **without** in-depth discussion
 - **No** unnecessary jargon
 - **No** complex mathematics
-
- **But:** a paper is not a story in which results are kept secret until a surprise ending.
 - Outcomes should be stated **upfront**
 - Otherwise the readers might assume that there are **none**


Body

- The **body** of the paper should present the result
- Provide necessary **background** and **terminology**
- Explain the chain of **reasoning** leading to the conclusions
- Provide **details** of central facts or proofs
- **Summarize** experimental outcomes
- State in detail the conclusions outlined in the introduction
- **The structure should be evident from the section headings!**
- The body should be reasonably independent of other papers – **self contained!**

Body (example section headings)

1. Introduction
 2. External sorting
 3. Compression techniques for database systems
 4. Sorting with compression
 5. Experimental setup
 6. Results and discussion
 7. Conclusion
- The story can be told following the **headings**
 - Create headings **early** and update continually!

Literature review

- Work is usually based on **previous work**
- A literature review, or survey,
 - Compares previously published results 
 - Describes existing knowledge
- A survey can also help a reader who is not an expert
- **Beware** of differing nomenclature and notation!
- Important to chose consistent terminology

Conclusions

- **Concise** statement of important results and **explanation** of their significance
- Statement of **limitations** of the work
- Mention open questions that seem relevant
- May contain **speculation** about uses and consequence
 - Do not speculate too much!
- Conclusions must **not** introduce new material
- If no conclusions can be drawn, you may close with a summary

Bibliography

- Complete list of theses, papers, books and reports cited in the text
- If possible, include references to **accessible work**
- Use a consistent **style** for stating references

Example:

Reference:

[1] T. Wendell, “Completeness of open negation in quasi-inductive programs”, ICSS Journal of Deductive Languages, 34(3): 217 – 222, November 1994.

Citation:

As discussed in Wendell [1] this ...

Appendices

- Purpose: hold bulky material that would otherwise interfere with the narrative flow of the paper
 - Program listings
 - Detailed proofs
 - Large diagrams
 - Tables
- Appendices are rarely necessary

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Example

Proof of a recursive program: Quicksort.

M. Foley and C. A. R. Hoare, 1971

<http://comjnl.oxfordjournals.org/content/14/4/391.full.pdf>

Example

Deriving Specifications for Systems That Are Connected to the Physical World. Cliff B. Jones, Ian J. Hayes, Michael A. Jackson. Lecture Notes in Computer Science, Springer, 2007

[http://link.springer.com/chapter/
10.1007%2F978-3-540-75221-9](http://link.springer.com/chapter/10.1007%2F978-3-540-75221-9) 16

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What to write on empty paper?

- Write **something** to get started
- **Do not worry** too much about structure and style at first
- **Usually**, passages written early on are poor
- Always consider **deleting text** you wrote before
- **Revise** frequently and thoroughly
- **Start writing** (very) early while working on the subject

Some hints on style

- Don't write **too much!**
- Don't write **too little!**
- Tone:
 - **One idea** per sentence or paragraph,
one topic per section
 - **Simple**, logical organization
 - **Short sentences** with simple structure
 - **Avoid** buzzwords, clichés and slang
 - **Omit** unnecessary material
 - **Be specific**, not vague or abstract
 - Break these rules if there is a **good reason**

Some hints on style

- Obfuscation:
 - **Eschew obfuscation, espouse elucidation!**
- English translation:
 - Avoid being unclear, support being clear
- Avoid negation: **not not good is not good**

Punctuation and lack thereof:

'In the event that the Purchaser defaults in the payment of any instalment of purchase price, taxes, insurance, interest, or the annual charge described elsewhere herein, or shall default in the performance of any other obligations set forth in this Contract, the Seller may: at his option: (a) Declare immediately due and payable the entire unpaid balance of purchase price, with accrued interest, taxes, and annual charge, and demand full payment thereof, and enforce conveyance of the land by termination of the contract or according to the terms hereof, in which case the Purchaser shall also be liable to the Seller for reasonable attorney's fees for services rendered by any attorney on behalf of the Seller, or (b) sell said land and premises or any part thereof at public auction, in such manner, at such time and place, upon such terms and conditions, and upon such public notice as the Seller may deem best for the interest of all concerned, consisting of advertisement in a newspaper of general circulation in the county or city in which the security property is located at least once a week for Three (3) successive weeks or for such period as applicable law may require and, in case of default of any purchaser, to re-sell with such postponement of sale or resale and upon such public notice thereof as the Seller may determine, and upon compliance by the Purchaser with the terms of sale, and upon judicial approval as may be required by law, convey said land and premises in fee simple to and at the cost of the Purchaser, who shall not be liable to see to the application of the purchase money; and from the proceeds of the sale: First to pay all proper costs and charges, including but not limited to court costs, advertising expenses, auctioneer's allowance, the expenses, if any required to correct any irregularity in the title, premium for Seller's bond, auditor's fee, attorney's fee, and all other expenses of sale occurred in and about the protection and execution of this contract, and all moneys advanced for taxes, assessments, insurance, and with interest thereon as provided herein, and all taxes due upon said land and premises at time of sale, and to retain as compensation a commission of five percent (5%) on the amount of said sale or sales; SECOND, to pay the whole amount then remaining unpaid of the principal of said contract, and interest thereon to date of payment, whether the same shall be due or not, it being understood and agreed that upon such sale before maturity of the contract the balance thereof shall be immediately due and payable; THIRD, to pay liens of record against the security property according to their priority of lien and to the extent that funds remaining in the hands of the Seller are available; and LAST, to pay the remainder of said proceeds, if any, to the vendor, his heirs, personals representatives, successors or assigns upon the delivery and surrender to the vendee of possession of the land and premises, less costs and excess of obtaining possession.'

Quote from <http://www.plainenglish.co.uk/examples/long-sentences.html>

Quoting others' work

- Quotes:
 - **Short text in double quotes:**

Computer security forensics is “the study of matching an intrusion event to an IP address, location, and individual” (Brinton 1997)
 - **Long text as indented block:**

As described by Kang [16], there are three stages:
First, each distinct word is extracted from the data. During this phase, statistics are gathered about frequency of occurrence. Second, the set ...

Differing terminology

- **Bad:**

Hamad and Quinn (1990) show that “similarity [sic] is functionally equivalent to identity”; note that similarity in this context means homology only, not the more general meaning used in this paper.

⇒ **The quote is not helpful.**

- **Good:**

Hamad and Quinn (1990) show that homology “is functionally equivalent to identity”.

Insertions and omissions

- Insertions in brackets: []
- Omissions indicated by ellipses: ...

They describe the methodology as “a hideous mess ... that somehow manages to work in the cases considered [but] shouldn’ t”.

- Don’ t use ellipses for long omissions,
- Better use separate quotes

Quoting and paraphrasing

- Bad:

According to Fier and Byke such an approach is “simple and ... fast, [but] fairly crude and ... could be improved” [8].

- Good:

Fier and Byke describe the approach as simple and fast, but fairly crude and open to improvement [8].

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The page limit

- The page limit for your review is 6 pages
- **Do not overrun the limit!**
- **Think early** about how many pages you want to give to different sections
- It is easier to write **as many as** 12 pages rather than **only** 6 pages
- Focus on the **essential!**

Checklist

- Have you identified your aims and scope?
- Does the report follow a narrative?
- What other papers should your write-up resemble?
- Are you writing to a well-defined structure and organization?
- Have you chosen a form for the argument and results?
- Have you established a clear connection between background and results?

Checklist (continued)

- How are results being selected for presentation?
- How do the results relate to your original aims?
- Have you used any unusual patterns of organization?
- Have the results been critically analyzed?
- Is the content satisfactory?
- Do you and your co-authors have an agreed methodology for sharing the work of completing the write-up?

Possible structure

- Introduction
- Analysis of article 1
- Analysis of article 2
- Analysis of article 3
- Comparison of the articles
 - This is where you need to tell a story
- Conclusion

Next Week

- Remember: survey due by 16:00 Saturday