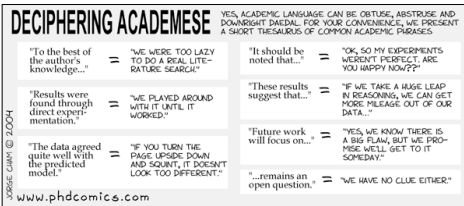


Introduction to Programming Languages and Techniques



Technical Writing

11/2/09

HW #6: technical writing

First draft due online:
Monday 11/9, 11AM

Comments returned by 11/16

Final draft due **in class**:
Wednesday 11/23, 11 AM
(no late period)

Why a writing assignment?

- Writing is a necessary skill
- Just because you can write about literature doesn't mean you can write about Java
- It will give you a chance to approach the course material from a different angle
- There is a strong connection between good programming and good writing

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Positive feedback

Becoming a better **programmer** will make you a better **writer**

Becoming a better **writer** will make you a better **programmer**

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Both writing and programming...

- Require logical thinking, precision, and attention to detail
- Require thought about structure
- Require clarity of expression
- Are skills that improve with practice

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WHY GOOD WRITING IS IMPORTANT

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Writing is ubiquitous

in engineering, just like in every other walk of life

- Software requirements and specifications
- Documentation
- User manuals
- Teaching materials
- Grant proposals
- Business plans

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You are judged by your writing

- The way you write is a social signal: it tells people a lot about who you are
 - careful writing → careful thinking → pay attention
 - sloppy writing → sloppy thinking → tune out
- People respond these signals very powerfully, both consciously and unconsciously

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Excellent writing is better than good writing

- Being able to articulate your ideas lucidly and persuasively in written form will enormously amplify your impact

→ aim for excellence

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But most importantly...

Because writing is an integral part of thinking

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Writing is not the expression of thought; it is thought itself. Papers are not containers for ideas, containers that need only to be well formed for those ideas to emerge clearly. Papers are the working out of ideas. The thought and the container take shape simultaneously (and develop slowly, with revision).

Mark Richardson,
Writing is Not Just a Basic Skill

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You never really understand something until you can explain it.

– Anonymous

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THE ASSIGNMENT

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HW6

- **Task:** Write a *homework assignment* on the linked implementation of the SimpleCollection interface
 - Construct a sequence of explanations and tasks that leads a student through constructing the LinkedSimpleCollection and LinkedSimpleIterator classes
- **Audience:** Yourself and your classmates on October 22
- **Objective:** Create a good learning experience for your reader

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Trivial?

- At first glance, this task may seem easy
- Not so...

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Bad Strategy I

1. Show the SimpleCollection and SimpleIterator interfaces
2. Briefly explain what a linked list structure is
3. Say “Now you assemble the pieces”

Many of your readers won't know where to begin
→ no learning

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Bad Strategy II

1. Walk the reader through every step of every class and method definition
 - (“... Now create a method called `next`. The first step in this method is to check whether the `current` pointer is `null`...”)

Readers have no chance to figure anything out for themselves
→ no learning

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Strategy III

1. Draw pictures showing how each of the methods works
2. Ask the reader to turn these pictures into code

Reasonable, but doesn't exercise your writing ability
→ no pictures allowed: just words

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Good Strategy

1. Explain the *ideas* behind the code, at a high level
2. Suggest a good order for filling in the parts
3. Explain how to test that things are working

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WHY WRITING IS HARD

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The Main Point

- The goal of a piece of technical writing is to cause a change of state in the reader's mind
 - From: not knowing X
 - To: knowing X
- Doing this effectively requires *imagination*

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Writing is hard...

- ... because it involves many acts of *imagination*
- imagining who your audience *is* in the first place
 - imagining *not knowing* something that you do, in fact, know
 - imagining *how your reader will react* to what you're saying at each point
 - comprehension
 - confusion
 - scepticism
 - boredom
 - ...

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HOW TO DO IT

(Not just this assignment, but technical writing in general)

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What is good writing?

“Easy reading is damned hard writing.”
— Nathaniel Hawthorne.

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What makes hard reading?

- Confusing organization and logic
- Too much or not enough detail
- Awful paragraphs and sentences
 - Awkward, lengthy sentences
 - Ambiguous wording
 - Spelling, grammar and punctuation errors

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Organization process

- Think before you write
 - Jot down notes, diagrams, outlines, etc.
 - Try different arrangements of your ideas
- Write several drafts
 - Get something on paper quickly, then revise
 - Once the structure is working, start tightening and polishing

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Organizing paragraphs

- For each paragraph ask:
 - What is the purpose of this paragraph?
 - How well does it fulfill its purpose?
- Paragraphs can be very short
 - One topic per paragraph

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Organization & Consistency

- Keep tense consistent
 - Stick to the present tense throughout
- Rationalize naming
 - Use only one term for an idea so readers can keep track
 - Don't use the same term for two different ideas
- Make your examples build off one another

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Level of detail: Identify your audience

- Who are you writing for?
- What do they know (context)?
- What do they want/need to know?
- At every point in the text:
 - What is the reader thinking?
 - What does she expect to be discussed next?
 - How is the reader going to misunderstand me here?

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Good sentences: Use simple language

- The object under study was displaced horizontally
- The ball moved sideways
- On an annual basis
- Yearly
- Endeavor to ascertain
- Find out
- It could be considered that the speed of storage reclamation left something to be desired
- The garbage collector was too slow

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Good sentence process: Do a lot of cutting

- Write more text than you need, then cut it down
- Rewrite complicated sentences to simpler ones
- Remove redundant modifiers, extraneous sentences, etc.

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Yes, spelling counts

- So does grammar!
- Unlike poetry, fiction, etc., technical writing always uses standard, formal English, with all its conventions and rules
- Goal: reduce “friction” so the reader can spend all their energy on your *ideas*

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Process: Read out loud to yourself

- Not always the most fun thing to do
- Helps you put yourself in your reader’s place
- Especially useful for punctuation, grammar, sentence flow, etc.

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CONCRETELY...

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Recommended process for HW6

1. **Write** a draft
2. **Evaluate** it
 1. Rewind your brain to October 22
 2. Read it through, as if you were seeing the ideas for the first time
 3. Literally try to *follow* the steps it describes
 4. **Repeat** from (1) as necessary
3. **Polish**: Tighten, improve sentences, check grammar and spelling, etc.
4. Let it sit overnight and **re-read** it to see how many more improvements you can find

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GENERAL ADVICE

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The biggest difference between excellent writers and everybody else is that excellent writers (a) understand how hard it is and (b) are willing to keep going after someone else would have said "That's good enough."

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Never stop learning

- It is not possible to be a "good enough" writer
- Even after >20 years of writing almost every day, I am not as good a writer as I want to be

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Never stop learning

- Take writing classes
- Read books on writing
- Read good writing
- Disassemble pieces of good writing to figure out how they work

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References (on writing)

- Williams, *Style: Toward Clarity and Grace*
- Dupré, *Bugs in Writing*
- Simon Peyton Jones, "How to write a good research paper"

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SEAS TECHNICAL COMMUNICATION PROGRAM

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Introducing Mary Westervelt...

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