Software Construction Techniques
Writing Good Code

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In this seminar, you will learn about

- *software construction*
- giving presentations
- writing short papers on the topic
- writing reviews on other papers

Seminar Topic

A core problem of writing software, in the abstract

- Software projects can be too complex
- Successful software projects must control that complexity
- Otherwise, programs will be too complex to modify successfully

Good Code & Programmers

- Many programs are equivalent…
- … but not for humans…
- What's the difference?
- How can you write code that others enjoy reading, rather than suffer through?

Prototypical Example: Code Duplication

- If you need the same code twice, you can
  - copy-n-paste
  - abstract the code into reusable form (e.g. a routine)
- Both “work”
- Copy-n-paste will cause lots of pain down the road
  - Why?
    - More effort during maintenance
    - More effort during understanding
  - Is abstraction **always** worthwhile?

Coding Religions

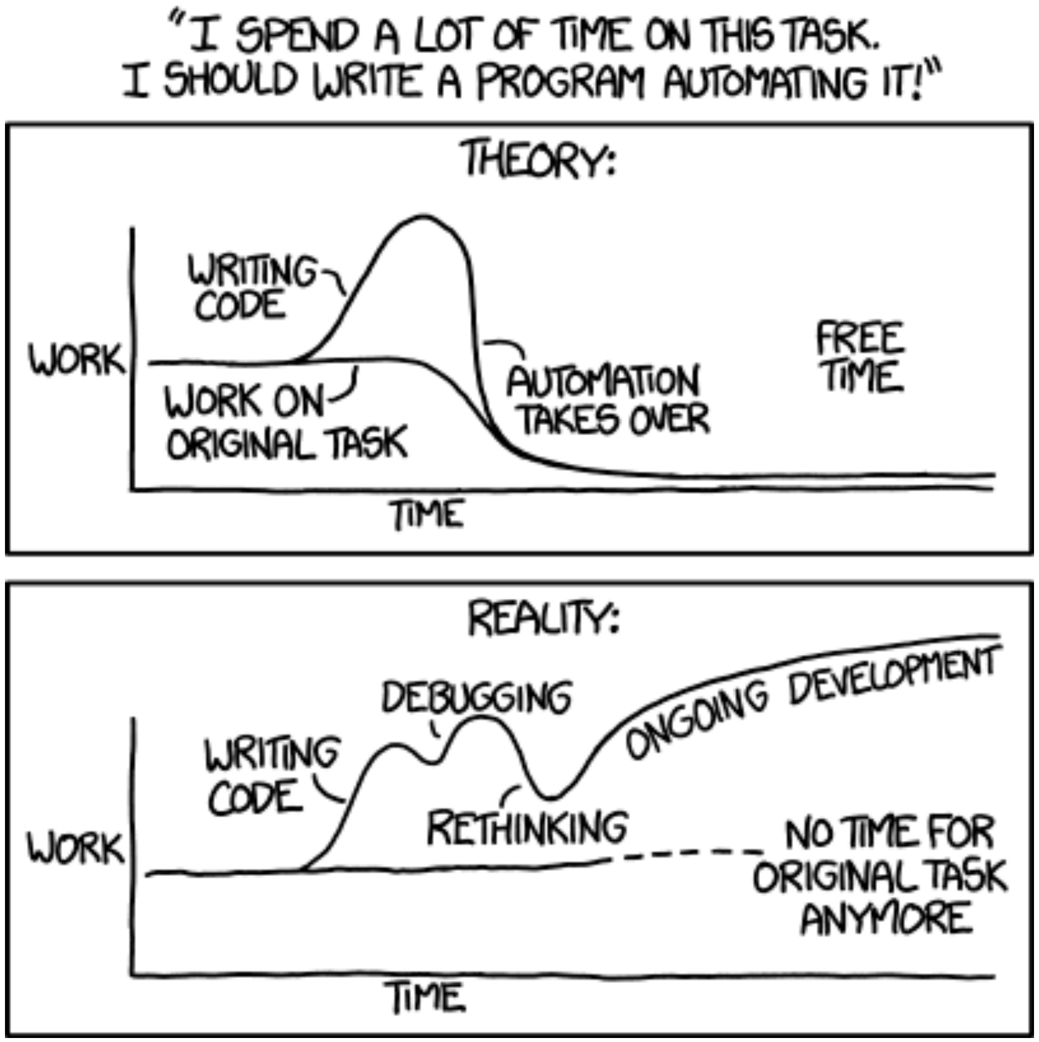
- *Gurus and zealots*…
- … *evangelize* you to follow *mantras*…
- … and promise *salvation* (aka *silver bullets*).

In fact

- few absolute rules
- tradeoffs to understand

Tradeoff Example: Automation

- Automate tasks that can be automated to save developers' time
- But…



https://xkcd.com/1319/

Tradeoff Example: Automation

- Possible Solution: Automate tasks that need be done ***consistently***
  - Building software
  - New releases
  - Testing…

Tradeoffs, Therefore…

- Learn to debate the reasons of practices

Software Construction Versus Software Engineering

- *Software construction* is one task in creating software (*software engineering*)
  - The down-to-Earth part
  - Often neglected
  - The part that happens in every project
- So we will not focus on development process, requirements

Sources

The Pragmatic Programmer

- Lots of programming wisdom
- Guru-like, but mostly right
- Enjoyable read
- Short & a bit chaotic

Sources

Code Complete

- Complete & systematic
- Tries hard to be evidence-based

Sources: Further material

Caveat:

- Both are OOP-based
- These books don't necessarily assume a CS education

Some (Possible) Topics

- High-Quality Routines (CC Ch. 6)
  - Cohesion, naming, size, parameters…
- Organizing Statements (CC Part IV)
  - Including the debate on goto
- Self-documenting code (CC Ch. 32)
- Programming Character (CC Ch. 33)
- Code reviews (CC Ch. 21)

Seminar Format

Seminar Goals

- Learning about the topic
  - Here, about programming
- Learning how to do scientific work
  - Here, reflect upon programming advice, don't trust it blindly

Format

Scientific work consists of:

- Read & understand
- Think & create
- Write & reflect
- Discuss & convey

Seminar…

- Read & understand: ✓
- Think & create: ✗
- Write & reflect: ✓
- Discuss & convey: ✓

…vs thesis work

- Read & understand: ✓
- Think & create: ✓
- Write & reflect: ✓
- Discuss & convey: mostly ✗

- Yet, a seminar can be useful preparation for thesis work.

Tentative Schedule

1. Kick-off
2. (Topic Choice?)
3. Preparation on Writing
4. Preparation on Presentations
5. … your presentations

Grading

- 40% talk
- 40% paper
- 20% reviews & participation