Software Carpentry:

What We've Done, What We've Learned, Where We're Going

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What Would Ya Say Ya Do Here?

TL;DR

- I usually describe myself as a teacher
- My real job is to sell scientists on the idea of better computing practices
- Most don't care about quality or reproducibility because there's no incentive to do so
- But they *do* care—a lot—about productivity
- So my pitch is, "The only way to work faster is to work better."
- Followed by, "And I can prove it."

- Which is mostly untrue...

History

- Did HPC in the 1980s and 1990s
- Eventually realized I was doing more harm than good
- Started teaching at LANL in 1998: "show up or shut up"
- Updated and open sourced materials 2004-06
- April 2010-April 2011: full-time teaching and creating online videos
- Jan 2012-present: full-time again for Mozilla, funded by Sloan Foundation

What We Teach

- Unix shell
- Subversion
- Python
- SQL
- xUnit

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bait and switch

What We *Actually* Teach

- A program is just another piece of lab equipment
- Programming is a human activity
- Little pieces loosely joined
- Let the computer repeat it
- Paranoia makes us productive
- Better algorithms beat better hardware

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how to think like a programmer

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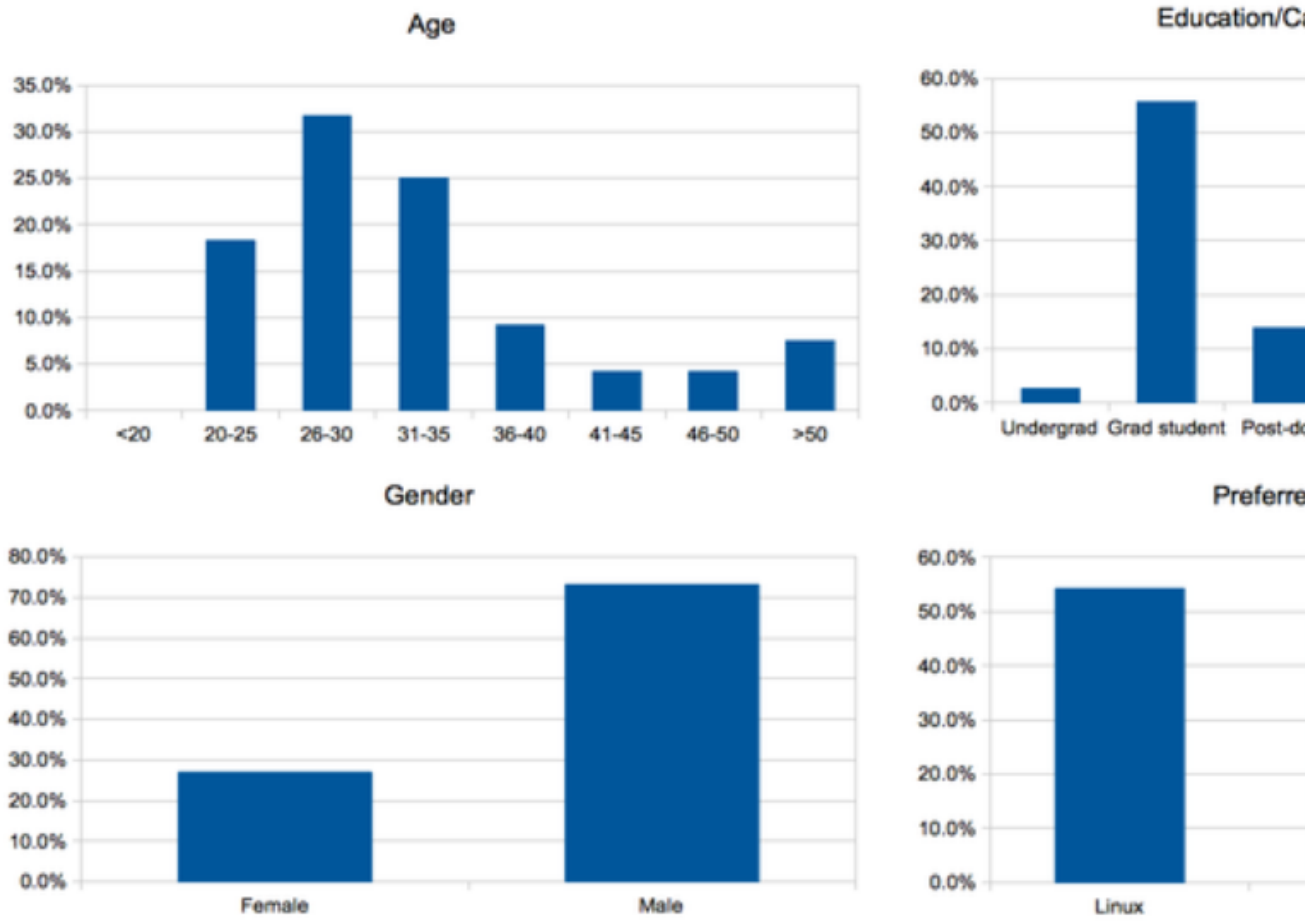

Who We Teach

Who We Are






Where We've Been

Example: Version Control with Subversion

- Check out, write a short biography, add and commit:
  "Look, a better Dropbox"
- Edit someone else's:
  "Look, you can merge conflicts"
- Put `$Revision: 123$` in files and print to output:
  "Look, provenance"
- *A biscuit every 10 minutes*

Counter-Example: Version Control with Git

- Simple things are more complicated (even with `git commit -am`)
- Most tutorials emphasize branching, but that's a step too far for novices
- No simple out-of-the-box support for provenance (version "numbers" aren't)

Counter-Example: Version Control with Git

- The tool is intrinsically more complicated...
- ...because it's doing more (and more complicated) things
- So gratification is delayed and short-term reward/pain is lower
- But all the cool kids are hanging out on GitHub these days...

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- Most don't care about quality or reproducibility
- They *do* care about productivity
- They learn better from and among their peers
- And they respond well to peer-reviewed research

Best Practices

Greg Wilson, D.A. Aruliah, C. Titus Brown, Neil P. Chue Hong, Matt Davis, Richard T. Guy, Steven H.D. Haddock, Katy Huff, Ian M. Mitchell, Mark Plumbley, Ben Waugh, Ethan P. White, and Paul Wilson: "Best Practices in Scientific Computing"
(http://arxiv.org/abs/1210.0530).

Scientists spend an increasing amount of time building and using software. However, most scientists are never taught how to do this efficiently. As a result, many are unaware of tools and practices that would allow them to write more reliable and maintainable code with less effort. We describe a set of best practices for scientific software development that have solid foundations in research and experience, and that improve scientists' productivity and the reliability of their software.

Our Goal

Number of Reviewers	Fraction of Papers
2	10%
3	40%
4	40%
5	10%

P(individual reviewer is a believer)	20%
P(at least one reviewer is a believer)	53.5%

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- *The payoff is distant and uncertain*

So You Wanna Change the World, Eh?

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