

## Computational Skills for Scientists and Engineers

Dr. Gregory V. Wilson



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Hello, and welcome to Software Carpentry.

Overview



We make scientists and engineers

more productive

by teaching them

fundamental computational skills

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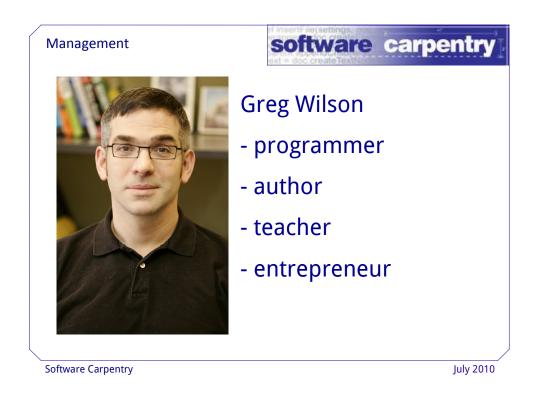
Our goal is to make scientists and engineers more productive by teaching them fundamental computational skills.



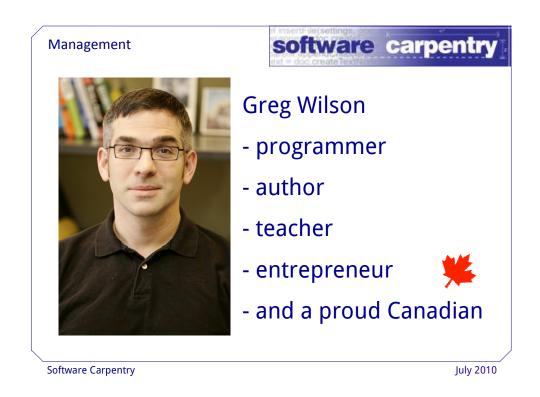
I'm the project lead.



I'm a programmer by training.



But I've also been an author, a university professor, an entrepreneur a couple of times...



...and of course, I'm a proud Canadian.

Questions

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Surveyed 1972 scientists in 2008

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Let's start with a few facts. In 2008, almost 2000 scientists responded to an online survey that we organized.

Questions

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Surveyed 1972 scientists in 2008 "How do you use computers?"

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We asked them, "How do you use computers?"

Questions

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Surveyed 1972 scientists in 2008
"How do you use computers?"
"How did you learn what you know?"

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And, "How did you learn what you know?"

**Answers** 

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## Scientists spend 40% of their time building or using software

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They told us that on average they spend about 40% of their time building or using software. (Remember, this is *all* scientists, not specifically computational scientists.)

**Answers** 



Scientists spend 40% of their time building or using software 53% say that this figure is rising

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53% told us that this number is going up

**Answers** 

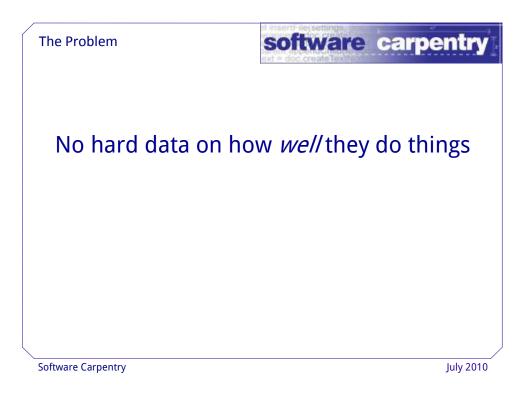
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Scientists spend 40% of their time building or using software 53% say that this figure is rising 96% are mostly self-taught

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And an astonishing 96% told us that they are mostly self-taught.



Now, we weren't able to get any data on how productive or effective they are...



No hard data on how *well* they do things
But anecdotal evidence suggests "not very"

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...but the evidence we *do* have suggests that everything seems to take longer and hurt more than it should

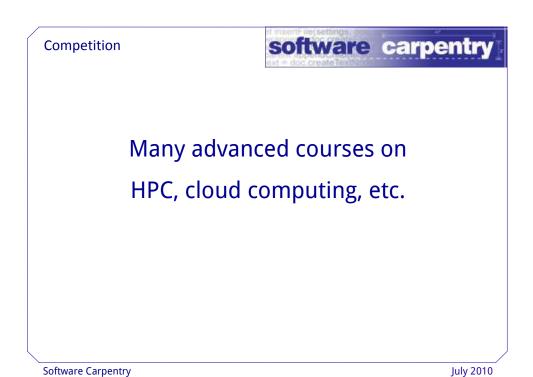
The Problem



No hard data on how *well* they do things
But anecdotal evidence suggests "not very"
Which is hardly surprising

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Which is hardly surprising:



While there are many courses out there on parallel programming, cloud computing, and what-not, there are very few on the prerequisite skills needed to build, maintain, share, and use software efficiently.

Competition

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Many advanced courses on HPC, cloud computing, etc.
Which is like having universities but not high schools

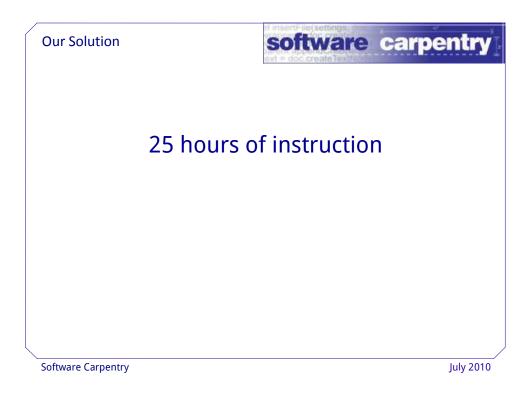
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This is sort of like having universities, but not having high schools to prepare people for them.



Software Carpentry is the solution.



Software Carpentry is an intensive training course that gives scientists and engineers those fundamental skills. We have shown, over and over, that 25 hours of lectures—about the same as a regular one-term course…

**Our Solution** 

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## 25 hours of instruction150-200 hours of practical work

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...plus 150 to 200 hours of lab work...

**Our Solution** 

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## 25 hours of instruction 150-200 hours of practical work Dramatic improvement in productivity

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...can have a dramatic impact on productivity.

**Our Solution** 



25 hours of instruction 150-200 hours of practical work Dramatic improvement in productivity 20% is common, 10X isn't rare

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We can typically save people 20% of their time---that's a day a week---and it's not unusual for students to report a tenfold savings.



Our course is 100% open: the lectures are covered by the Creative Commons Attribution license, and the examples by the MIT open source license.



This means that anyone who wants to use the material can do so free of charge.



So if it's free, how was it created? The answer is that Software Carpentry's development has been funded for over 13 years by people like you: people who *need* this kind of training.



Funded by those who need it

Everyone puts in a little and gets a lot out

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As with most open source projects, if everyone puts in a little, everyone gets a lot out.

**Funding** 

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Funded by those who need it

Everyone puts in a little and gets a lot out

Charge for on-site delivery,

customization, and tech support

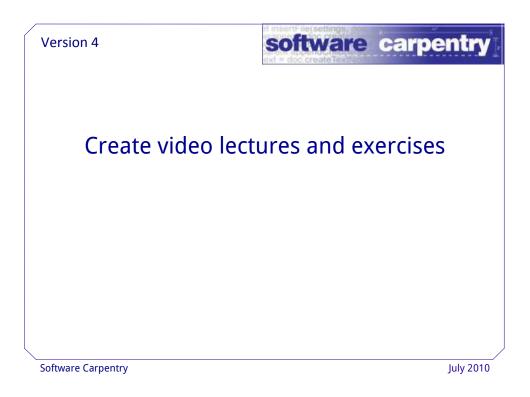
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We do charge for traditional on-site delivery, customization, and tech support, but you don't have to pay for any of this to use the material that's already there.



In the last year alone, we've been funded by all of these universities, companies, research labs, and computing centers. Thanks to them, we're helping thousands of people get more done with less pain --- over 140,000, if you believe the stats from our web site.



So here's what we're doing now to improve the course. We're taking the Version 3 lecture notes, which were static HTML pages, and turning them into video lectures and worked examples.

Version 4

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Create video lectures and exercises

Over-the-web support for early adopters

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We're offering over-the-web support via Skype and desktop sharing to early adopters...

Version 4

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Create video lectures and exercises

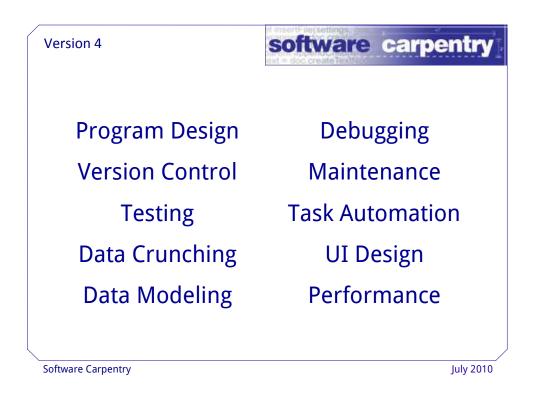
Over-the-web support for early adopters

Building online community

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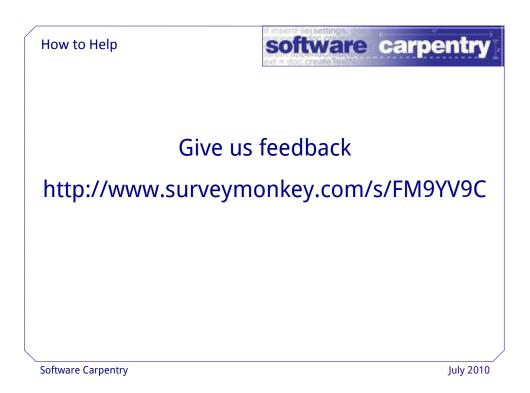
...and building an online community so that we can scale up to reach more people in more disciplines.



As you can see, it's not your usual computational science course.



How can you help? The best way is to give us feedback as new material is posted. Is it what you need? Is it the right pace? What have we missed or gotten wrong?



You can also tell us which of the topics currently slated for addition you'd like us to tackle first.



Give us feedback
http://www.surveymonkey.com/s/FM9YV9C
Sponsorship

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And of course, we're always looking for more sponsorship: our current funding runs to April 2011, and we'd like to be able to carry on after that.

To Learn More

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If you'd like more information, or would like to help us out, please send me email, or have a look at our web site. Thank you for your time.