



Computational Skills for Scientists and Engineers

Dr. Gregory V. Wilson



Copyright © Software Carpentry 2010
This work is licensed under the Creative Commons Attribution License
See <http://software-carpentry.org/license.html> for more information.

Hello, and welcome to Software Carpentry.

We make scientists and engineers
more productive
by teaching them
fundamental computational skills

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

Management



Greg Wilson

Software Carpentry

July 2010

I'm the project lead.

Management



Greg Wilson
- programmer

Software Carpentry

July 2010

I'm a programmer by training.

Management



Greg Wilson

- programmer
- author
- teacher
- entrepreneur

Software Carpentry

July 2010

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

Management



Greg Wilson

- programmer
- author
- teacher
- entrepreneur 
- and a proud Canadian

Software Carpentry

July 2010

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

Questions



Surveyed 1972 scientists in 2008

Software Carpentry

July 2010

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

Questions



Surveyed 1972 scientists in 2008
“How do you use computers?”

Software Carpentry

July 2010

We asked them, “How do you use computers?”

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

And, “How did you learn what you know?”

Scientists spend 40% of their time
building or using software

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.)

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

53% told us that this number is going up

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

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

The Problem



No hard data on how *well* they do things

Software Carpentry

July 2010

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

The Problem



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

Software Carpentry

July 2010

...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

Software Carpentry

July 2010

Which is hardly surprising:

Competition



Many advanced courses on
HPC, cloud computing, etc.

Software Carpentry

July 2010

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



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

Software Carpentry


July 2010

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

So here's our solution

Software Carpentry is the solution.

Our Solution



25 hours of instruction

Software Carpentry

July 2010

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



25 hours of instruction
150-200 hours of practical work

Software Carpentry

July 2010

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

Our Solution



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

Software Carpentry

July 2010

...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

Software Carpentry

July 2010

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.

Content is 100% open

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

Content is 100% open
Free to use and re-mix

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

Funding



Funded by those who need it

Software Carpentry

July 2010

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.

Funding



Funded by those who need it
Everyone puts in a little and gets a lot out

Software Carpentry

July 2010

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

Funding



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

Software Carpentry

July 2010

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.

Version 4



Create video lectures and exercises

Software Carpentry

July 2010

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



Create video lectures and exercises
Over-the-web support for early adopters

Software Carpentry

July 2010

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

Version 4



Create video lectures and exercises
Over-the-web support for early adopters
Building online community

Software Carpentry

July 2010

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

Version 4



Program Design

Debugging

Version Control

Maintenance

Testing

Task Automation

Data Crunching

UI Design

Data Modeling

Performance

Software Carpentry

July 2010

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

How to Help



Give us feedback

Software Carpentry

July 2010

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?

How to Help



Give us feedback

<http://www.surveymonkey.com/s/FM9YV9C>

Software Carpentry

July 2010

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

How to Help



Give us feedback

<http://www.surveymonkey.com/s/FM9YV9C>

Sponsorship

Software Carpentry

July 2010

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



Dr. Gregory V. Wilson
info@software-carpentry.org
<http://software-carpentry.org/blog>

Software Carpentry

July 2010

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.