Porting Scientific Software to the Web

Prepared by Nicola B. DiPalma for LVRUG 4/9/14 meetup

Reasons I bring this up:

- The creation and dissemination of knowledge among members of the scientific community is what makes it thrive.
- Web-based software might be the future, but “To Do” apps and CRMs don’t push the limits of the technology.
- Many scientists are so caught up in their work that they limit communication about it to written words, videos (rarely), and esoteric diagrams.

Photo Credit: http://www.designntrend.com/articles/4930/20130617/extraterrestrial-life-communication-project-lone-signal-gifs-tweets-gliese-526.htm

Which is to say, many are so caught up in what they're doing, they can't really communicate how they do it.

...well, at least in a way that can engender interest from a motivated student.

Potential Setbacks

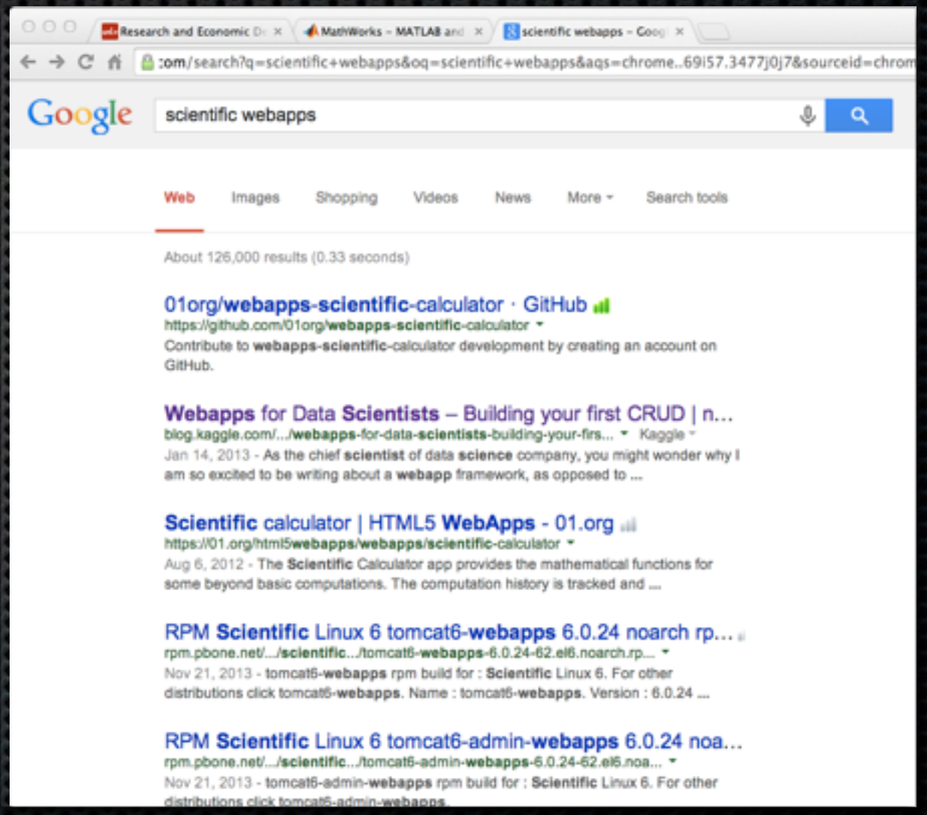
- “Trade-Secrets” implemented when competing for grant money.
- Lack of computing knowledge, despite high technical efficacy.
- For students below graduate level, lack of interest in the details.
- Any environment that provides relatively low computing capacity is avoided for processing serious simulations.

Potential Benefits

- Induces the student's direct engagement in the subject matter.
- When given the tools, motivated students will experiment and ask questions they wouldn't otherwise address outside of the lab.
- Students are exposed to the life of the discipline and can actively begin dissecting its parts.
- If research universities begin deploying data-centric webapps to share and show off their work, could other entities be incentivized to further improve their efficiency?

[End of Sermon]

- Amongst a few dozen searches that were performed I found thousands of articles and talks on the subject.
- ...however, very few attempted what they were talking about with intent to put something into production.



Search numero uno. Creative, huh?

Let’s Make an App! (or two!)

Things to consider before we start...

- Physicists like simple tools. (As do most users.)
- Unless they're making an approximation, physicists tend to think in details. (A cruise ship is spherical, duh.)
- Once adjustments are made, repetitive workflows are avoided. (Like the plague.)

Photo Credit: http://news.nationalgeographic.com/news/2012/07/pictures/120730-future-floating-cities-science-green-environment/

Where do we start?

- PHP, Javascript, Ruby, C#/ASP?
- Rails, Entity Framework, data.JS?
- If the calculation is relatively simple, can it get by with a client-side focus?

This time, let's try JavaScript

- With AngularJS, the developer is provided with a framework that maps data and method returns directly to HTML markup in a style very similar to MVVM in .Net
- Even when other libraries are added, this functionality allows the developer to focus on the equations and, separately, their display without worrying about a mess in-between. ("Would you like a chaser with your DOM manipulation?")

Stuff to port/create

- Shock Property Calculator
- Griggs Sample Pressure and Temperature Calculator
- Relativistic Orbit Modeling
- IDL Detector Output Analysis Software
- Stonybrook Plot85 Automation
- (Others to come)

Let’s [finally] look at some code!


L
Let's get down to business

Outcomes

- Gotten a better feel for what AnguarJS is and its uses.
- Developed a greater understanding of the factors involved in the development of scientific software.
- Developed a greater understanding of the Presentation Model architecture.
- Has given you inspiration to create great software with these technologies!!!

Outcomes (personal)

- Should’ve treated this as a research project going in instead of a 15-minute discussion.
- Incentive to dive into this over the course of the coming months.
- Incentive to learn the ins-and-out of AngularJS.
- Incentive to learn more web-frameworks.
- Incentive to learn more about optimizing the efficiency of web applications.

But wait... There's more!

- Specifically: http://blog.kaggle.com/2013/01/14/webapps-for-data-scientists-building-your-first-crud/
- It's basically this talk, but with MUCH more detail.

Photo Credit: http://www.buzzfeed.com/thesaccattack/105-gifs-that-should-have-been-sent-into-space-5o2x

Questions? Comments?