Link to the actual workshop material

Sam Meehan
(obo the instructors and participants who gave feedback)
13 September 2019
Goal: What they tell you

- Analyses (often students/contacts) show workflows like this
  - This looks very nice and makes it feel “straightforward” to do analysis

Histograms

“Results”
Goal: What they (don’t) tell you

- ... but they don’t highlight all of the frustrating aspects that are rarely taught
  - cause (unnecessary) holdups/inefficiency/frustration

- We aimed to mitigate these inefficiencies/frustrations via formal education
  - Thank you to those who support this and encouraged/allows their students/post-docs to attend

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**xAOD Wjets**

- Is the code on one student's laptop? Is it on Git but 6 months out of date? [Version Control/Git]
- Can I only play with xAOD and Athena on lxplus/tier3? [Docker]

**xAOD Zjets**

- What if multiple people are contributing? Who changed the code? Why doesn’t it work anymore? Why are the results different? [Continuous Integration]

**xAOD ttbar**

- Ahhhhhhh! Athena is a huge codebase! How can we use it efficiently? How do we tie things together? [CMake]

**xAOD Sig1**

**xAOD Sig2**

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**“Results”**

- Is this the only model that we will ever want to constrain? Will we need to resurrect/rerun horrible code? [Docker/Yadage/Recast/(pyhf)]

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EXOT-2016-27
Who: Participants
Who came?

- We had a rather diverse audience
  - (gender, age, native location/language)
Who came? - Career Stage

- We reached the intended target!
  - Who: graduate students who can put these skills to work
- And they came for the entire workshop! ➔ Did not waste anyones time!

**Are you a qualified ATLAS member?**
31 responses

- 29%: I have not begun working on my qualification task.
- 12.9%: I am currently working on my qualification task.
- 12.9%: I have recently finished my qualification task.
- 45.2%: It has been over one year since I finished my qualification task.

**Academic Level**
31 responses

- 51.6%: Bachelors Student (Undergraduate)
- 25.5%: Masters Student
- 7.7%: PhD Student (1st or 2nd year)
- 9.7%: PhD Student (3rd year or more senior)
- 6.7%: Post-doctoral Researcher

**Attendance**
31 responses

- 80.6%: The full workshop (modulo being late by some small amount of time because I was walking back from lunch or something and got caught up in Building 2 and confused about where to go ... etc).
- 16.1%: I missed a few hours or sessions here and there due to other commitments.
- 0.6%: I only attended a few sessions but had to miss most of the workshop.
What did they know?

- The **most common tools currently in ATLAS**
  - AnalysisBase and Athena are >99% written in **c++**
  - We steer our code (i.e. jobOptions) with **python**
  - We build our code with **CMake**
- Is this allowing us to reach our full potential
What did they know?

- Git is something that is being used
  - Basic skills (merge request) are “alright”
  - Advanced skills (conflict res.) are “shaky”

I have used version control before.
31 responses

- True: 83.9%
- False: 12.9%
- Minimally: 1.2%

How comfortable are you when making a merge request (also called a pull request by some) to someone else’s repository?
31 responses

- I am a beginner: 2 (6.5%), 7 (22.6%), 15 (48.4%), 6 (19.4%), 1 (3.2%)

How comfortable are you when resolving conflicts when committing and merging code?
31 responses

- I am a beginner: 6 (19.4%), 10 (32.3%), 9 (29%), 5 (16.1%), 1 (3.2%)

- I am an expert: 6 (19.4%), 10 (32.3%), 9 (29%), 5 (16.1%), 1 (3.2%)
What did they know?

- Everyone knows you *should* implement automated tests
- ... but noone really knows *how* to do this

Automated tests are a good thing to develop for your code.

I have used continuous integration and automated testing when developing code in the past.
**Schedule**

**Monday**
- **Git** [Kelly/Kunal]
- **CMake** [Henry]
- **ATLAS-Git** [Dan]
- **Jupiter Pizza**
- **Lunch**

**Tuesday**
- **CMake** [Karol]
- **Testing/CI** [Giordon]
- **Cultural Event: Berkeley Bowl**
- **Lunch**

**Wednesday**
- **Docker** [Matthew]
- **ATLAS-Recast** [Danika]
- **Career Panel**
  - **Send questions!**
- **Free/Worktime**
- **Dinner: 19h30 @ Great China**

**Thursday**
- **pyhf Fitting**
- **Documentation**
- **Machine Learning**
- **RDataFrames**
- **EventLoop**

**Friday**
- **Free/Worktime**
- **Lunch**
**Welcome Surveys!**

**Monday**
- **Git** [Kelly/Kunal]
- **Lunch**
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**Career Panel**

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Friday:
- Free/Worktime
Who: Instructors

Danika MacDonell
Univ. of Victoria

Nils Krumnack
Iowa State

Matthew Feickert
Univ. of Illinois

Giordon Stark
UC Santa Cruz

Dan Guest
UC Irvine

Adam Parker
Cal State East Bay

Sam Meehan
Univ. Washington/CERN

Henry Schreiner
Princeton

Karol Krizka
LBNL
Who: Support Elsewhere

Zach Marshall
LBNL

Lukas Heinrich
New York Univ. / CERN

Shih Chieh Hsu
Univ. of Washington
Survey Feedback

- Pre/Post workshop surveys allow for a derivative: #success

**Before**

**Question:** How comfortable are you when making a merge request (also called a pull request by some) to someone else's repository?

- 31 responses

<table>
<thead>
<tr>
<th>Option</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am a beginner</td>
<td>2 (6.5%)</td>
<td>22.6%</td>
</tr>
<tr>
<td>I am an expert</td>
<td>15 (48.4%)</td>
<td>61.3%</td>
</tr>
<tr>
<td>I am a beginner</td>
<td>6 (19.4%)</td>
<td>22.6%</td>
</tr>
<tr>
<td>I am an expert</td>
<td>1 (3.2%)</td>
<td>3.2%</td>
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**After**

**Question:** How comfortable are you when making a merge request (also called a pull request by some) to someone else's repository?

- 31 responses

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<tr>
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</thead>
<tbody>
<tr>
<td>I am a beginner</td>
<td>0 (0%)</td>
<td>0%</td>
</tr>
<tr>
<td>I am an expert</td>
<td>18 (58.1%)</td>
<td>58.1%</td>
</tr>
<tr>
<td>I am a beginner</td>
<td>3 (9.7%)</td>
<td>9.7%</td>
</tr>
<tr>
<td>I am an expert</td>
<td>10 (32.3%)</td>
<td>32.3%</td>
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**I know how to use the CMake utility to build a C++ project.**

- 31 responses

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</thead>
<tbody>
<tr>
<td>True</td>
<td>19 (61.3%)</td>
<td>64.5%</td>
</tr>
<tr>
<td>False</td>
<td>11 (35.5%)</td>
<td>35.5%</td>
</tr>
<tr>
<td>Not exactly but partially</td>
<td>1 (3.2%)</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

**How comfortable are you to build a code project using CMake?**

- 31 responses

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<tbody>
<tr>
<td>I am a beginner</td>
<td>1 (3.2%)</td>
<td>3.2%</td>
</tr>
<tr>
<td>I am an expert</td>
<td>9 (29%)</td>
<td>29%</td>
</tr>
<tr>
<td>I am a beginner</td>
<td>4 (12.9%)</td>
<td>12.9%</td>
</tr>
<tr>
<td>I am an expert</td>
<td>8 (25.8%)</td>
<td>25.8%</td>
</tr>
</tbody>
</table>
Survey Feedback

Other good stuff!

How comfortable are you with implementing Continuous Integration for your analysis in GitLab?
31 responses

How comfortable are you when working with docker images/containers?
31 responses
We did real work!

- Hands on relied on two aspects
  - [1]: Scroll through Software Carpentry formatted website - NOT SLIDES!!!!!!!!!
  - [2]: Work through exercise in parallel - “coding on the fly”
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  - [1]: Scroll through Software Carpentry formatted website - NOT SLIDES!!!!!!!!!!
  - [2]: Work through exercise in parallel - “coding on the fly”
We did real work

- Ratio of **Student : Instructor = 4**
  - This was *essential* to allow for the “hands on” aspect of the workshop to be successful
- Large time commitment on behalf of the instructors
  - Can’t just “do your talk” and then leave

Zach: “I’m confused that ...”
Zach: “Yeah, I already tried that ...”
Zach: “Ahhhh, that makes sense!”
We got results!

- Produced a mu-scan of CLs to reinterpret a (toy) di-bjet bumphunt using a docker image produced using continuous integration that builds the analysis with CMake contained within a GitLab repository
Career Reflections

- Thursday afternoon/evening panel discussion with former ATLAS/CERN folks
- Discussion continued at the bootcamp dinner afterwards

Kathy Copic, Michaela Paganini, Luke de Oliveira, Francesco Rubbo, Mariana Rihl, Andrew Hard
Funding: How Much

- 20k was awarded for the original ATC proposal - THANK YOU!
- Peter Loch suggested/helped re-purpose the HFSF leftover funds (3.5k)
- Partnering with FIRST-HEP greatly helped facilitate success!

Total Cost = 27000
Funding: Was it “enough”?

- We wanted to assure that any student who *wants* to learn *can* learn
  - Within “uncertainties” I think that our approach to assisting participants worked well

Did you apply for travel funding?
31 responses

If you applied for funding, did you/do you expect to also receive support from your institution?
28 responses

If you applied for funding, was the amount of funding received sufficient?
24 responses
Future: Location

- Success of the workshop is highly dependent on the location
  - Is this event “vidyo-able” and can be held remotely? - No [my opinion]
Future : Instructors

- We didn’t scare them all off!
- We should reach out and ask if these people want to be involved!

Would you be interested in being involved in the USATLAS Computing Bootcamp (this thing) next year in 202...who are enthusiastic experts to help.]

31 responses

- Yes - Please contact me: 54.8%
- No - I am not interested: 38.7%
- Perhaps, but I feel like I probably don't really know enough yet
Opinions

- [1] We need to have particular locations for hands-on events
  - Needs forethought: >6 months at LBNL apparently (but there are fantastic rooms there if we could have gotten them)

- [2] We should use the SWC approach to preserve/reuse our work
  - Fantastic interface and result for tutorial - systematized to provide a uniform interface for students
  - Preserved in Git! (Practice what we preach)
  - Can feed back *into* the open source community

- [3] We have plenty of in-house enthusiasm to help prepare these
  - I get the sense that many of these people/students/post-docs have not felt encouraged by their superiors to invest time in training → who changes this? [Us, I suppose]

- [4] Technicalities
  - e.g. Use a white terminal with dark text
  - Can mitigate with Software Carpentry Training