

Week 2 – February 1/3, 2022

Modern Software Tools

Version Control and Collaborative Projects




Objectives

- Understand role of computing in High Energy Physics research
- Obtain accounts to and familiarize oneself with github/gitlab on browser
- Familiarize with documentation for gitlab/github
- Understand how to look for documentation online, ask for help
- Be able to read/interpret YAML file for CI/CD
- Understand potential of version-control tools for your own work

Weekly Checklist

- Ensure account fully ready, workstation works reliably (including git)
- Configure environment on lxplus (.bash_profile, aliases, etc)
- Run a CI/CD test successfully on your own forked repository

Exercises

-  Create and edit text files locally and remotely (lxplus)
 - Public vs work vs scratch spaces
-  Setup an *alias* to log into lxplus
 - What is .bash_profile, .bashrc?
-  “Actually Add A Test” from HSF Tutorials ([link](#))

HW due Tuesday Feb 8th 8:15am Pacific:

- Read ATLAS and CMS papers
 - It’s ok if you don’t understand it fully. Read through it, write questions you have.
 - We will read this a few times, so don’t get hung up on understanding every detail
 - Send your questions via email
- Start going through CI/CD tutorial

HW due Tuesday Feb 8th 8:15am Pacific:

- Complete [HSF CI/CD Training Tutorial](#), the [Youtube Channel](#)
 - A few hours work!
 - Post questions on Discord channel ([join link](#))
- When done, send an email to Johan with a link to your branch/repository

Class Outline

- Check-in on accounts, workstation
 - In the interest of time, let's skip the workstation elevator pitch. If interested, can email Johan a prepared statement (or recording) for feedback.
 - Quickly, do remote vs local exercise (point out use in git) and setup any aliases/environment you may need (profiles)
- “Understand role of computing in High Energy Physics research”, from last week
 - Tough to check this off, takes many years to be an expert and the field keeps evolving w/ technology
 - Highly collaborative and distributed research
 - Let's watch this video from CERN IT: <https://videos.cern.ch/record/1541893>
 - Discuss possible projects (won't know for sure until Spring)
- Review summary of survey
 - Varied research experience
 - All new to HEP-ex!
 - Will study past HEP-ex analyses, explore tutorials, end with a toy analysis you will design
 - Will develop scientific literacy
 - Let's begin with a popular article:
[DOI 10.1016/j.physletb.2012.08.020](https://doi.org/10.1016/j.physletb.2012.08.020) (ATLAS)
[DOI 10.1016/j.physletb.2012.08.021](https://doi.org/10.1016/j.physletb.2012.08.021) (CMS)
 - CERN Document Server (cds.cern.ch)
 - So far, all have done *some* computer science coursework
 - Will lay foundations of object-oriented architectures
 - Continue to gain experience with the terminal
 - Version control (git) is used widely in HEP-ex, start with good habits
 - See [HSF CI/CD Training Tutorial](#), [Youtube Channel](#), [GitHub exercise](#)
 - [Gitlab documentation](#), [GitHub documentation](#)
 - Will cover ML basics
 - See [HSF ML Training Tutorial](#)
 - Solid confidence in SM -> go into details
 - Will cover 'diagram-level' particle physics, including process cross-section, allowed decays, branching fractions and widths, etc.
 - Will cover accelerator physics, including detectors/machines, proton pdfs, etc.
 - Dig deep into jets: hadronization -> clustering -> calibration -> tagging
 - Will understand how objects (electrons, photons, muons, taus, MET) are reconstructed