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 (automated)
- ☐ 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 (ATLAS)
      DOI 10.1016/j.physletb.2012.08.021 (CMS)
  - 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
  - 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