HSF Reconstruction and Software Triggers

Introduction

Agnieszka Dziurda (IFJ PAN), Caterina Doglioni (Lund University),
David Lange (Princeton University)

Slide by Graeme Stewart

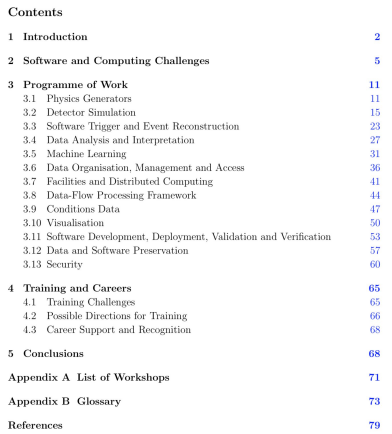
HEP Software Foundation (HSF)

- The LHC experiments, Belle II and DUNE (**and more?**) face the same challenges
  - HEP software must evolve to meet these challenges
  - Need to exploit all the expertise available, inside and outside our community, for parallelisation
  - New approaches needed to overcome limitations in today's code
- Cannot afford any more duplicated efforts
  - Each experiment has its own solution for almost everything (framework*, reconstruction algorithms, ...)
  - New experiments should not be starting from scratch, but building on best-of-breed
- HSF started with a number of workshops and working groups on common topics (packaging, licensing)
- The goal of the HSF is to facilitate coordination and common efforts in software and computing across HEP in general
  - Our philosophy is bottom up, a.k.a. *do-ocracy*

*Gaudi a notable exception!

Slide by Graeme Stewart

HSF Vision: Community White Paper, European Strategy, Snowmass and HL-LHC


Contents

- We wanted to describe a **global vision for software and computing** for the HL-LHC era and HEP in the 2020s
  - This was the *Community White Paper* with 310 authors from 124 institutes, 14 chapters
  - Published in *Computing and Software for Big Science*, https://doi.org/10.1007/s41781-018-0018-8 (and on arXiv)
- We have prepared additional input for European Strategy Update (talk), LHCC review of HL-LHC and US Snowmass process
- We were engaged in both **projecting a voice on the importance of software** to our field and in **building a community** committed to the open and collaborative development

Thank you to those who participated!

Slide by Graeme Stewart

HSF Organisation

- As a do-ocractic inspired organisation we try to have as lightweight as possible structures to support activities
- Coordination Team for oversight and driving overall engagement, organising workshops
  - Modest sized group of motivated individuals who contribute to general running of HSF
  - Ex-officio members from experiments and WLCG as stakeholders
- Working Groups for key areas of HEP activity
  - Event generation, detector simulation, reconstruction*, analysis, frameworks, tools and packaging, education and training, Python in HEP
- The HSF's role here is one of an information conduit and meeting point
  - Report on interesting and common work being done
  - Forum for technical comments and discussion
  - Encourage cooperation across experiments and regions

HSF Reconstruction and Software Trigger

Goals of the Reconstruction & Software Trigger Working Group:

- **address common challenges across HEP** in the area of event reconstruction and software triggering,
- **targets challenges identified during the CWP** process as well as new ones arising in R&D,
- **foster collaboration** on design and implementation challenges, the adoption of common approaches
- **raise awareness of existing solutions known to the community.**
- (recent discussions) wherever useful, **collaborate with communities beyond HEP** (e.g. astro)

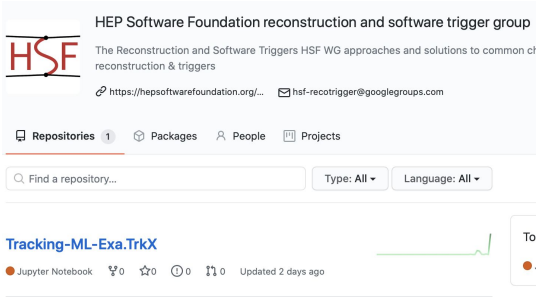
Website: link, Mailing list (google groups): https://groups.google.com/forum/#!forum/hsf-recotrigger

Discussions proceed with **general and topical meetings**: today - topical meeting
Meetings will generally be cross-collaborations, but want to keep them to max 1.5h → multiple instances on similar topics!

Convenors: Caterina Doglioni, Agnieszka Dziurda, David Lange

If something worked well for you, it might work well for others, let them know!

Reconstruction and Software Triggers news



- Public GitHub organization for common trigger & reco code
  - Currently hosting code for tracking with graph ML Exa.trkX
- **Today**: joint meeting with Long-Lived Particle Community on use of reco software in non-LHC experiments & focusing on LLP/forward physics
  - Many of those experiments share hardware/software with LHC experiments, showcase return-on-investment on common software development
  - Small experiments attending this workshop may find common software to use / take inspiration from
  - Today: CODEX-B, FASER, LDMX, CMS; Future: MATHUSLA, HPS, LHCf, MilliQan, MoEDal, ATLAS
- Planning December meeting: summary of FastML workshop
  - Topic: strategies to accelerate trigger and reconstruction with machine learning