HSF Reconstruction and Software Triggers

Introduction

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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!

CWP: Reconstruction and Software Trigger

- CWP Reconstruction and Software Trigger: link
- Research and Development Roadmap
  - Enhanced vectorization programming techniques
  - Algorithms and data structures to efficiently exploit many-core architectures
  - Algorithms and data structures for non-x86 computing architectures (e.g., GPUs, FPGAs)
  - Enhanced quality assurance (QA) and quality control (QC) for reconstruction techniques
  - Real-time analysis
  - Precision physics-object reconstruction, identification and measurement techniques
  - Fast software trigger and reconstruction algorithms for high-density environments

Today

If you would like to present anything related to the above topics,
please get in touch with us

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- CWP Reconstruction and Software Trigger: link
- **Algorithms and data structures to efficiently exploit many-core architectures**
  - **Goal:** To evolve current event models, toolkits and algorithm implementations, and best programming techniques to improve the throughput of multithreaded software trigger and event reconstruction applications.
  - **Today** we focus on **CPU (x86)** solutions

16:00 → 16:10 **Set up and Introduction** 10m
Speakers: Agnieszka Dziurda (Polish Academy of Sciences (PL)), Caterina Doglioni (Lund University (SE)), David Lange (Princeton University (US))

16:10 → 16:30 **Efficiently exploit multicore architecture - the LHCb experience** 20m
Speaker: Sebastien Ponce (CERN)

16:30 → 16:50 **SIMD and data structures for efficient reconstruction algorithms** 20m
Speaker: Arthur Hennequin (Centre National de la Recherche Scientifique (FR))

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We are here for you!
However...

Please **get in touch** with us,
if you would like to present your work
in our meetings

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Possible topics for future meetings:

- Meaningful benchmarking for different architectures (FPGA, CPU, GPU)
- How to ensure the same reconstruction when running on different architectures (CPU, GPU), Data Quality
- Packages that help go from cuda-->CPU or c++-> GPU (eg, alpaka, raja)
- Algorithms and data structures for GPU, FPGA
- Benefits from using the timing information in the reconstruction
- Enhanced QA/QC for reconstruction techniques
- Fast software trigger and reconstruction algorithms for high-density environments
- Precision physics-object reconstruction, identification and measurement techniques
- Trainings for FPGA, GPU
- Cross-talks from different experiments
- …
- and many more

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Meetings so far:

- Summary of ATLAS / CMS trigger April/May cross-talks
  - Indico: https://indico.cern.ch/event/815233/
  - Live notes: https://docs.google.com/document/d/1sjPazZzVTy6aPyznCokC2gcYmS1kigorPdW8DIqGOoE/edit
  - Other cross-talks on this topic will be organized as well!