Software framework for a future $\mu \rightarrow e\gamma$ experiment

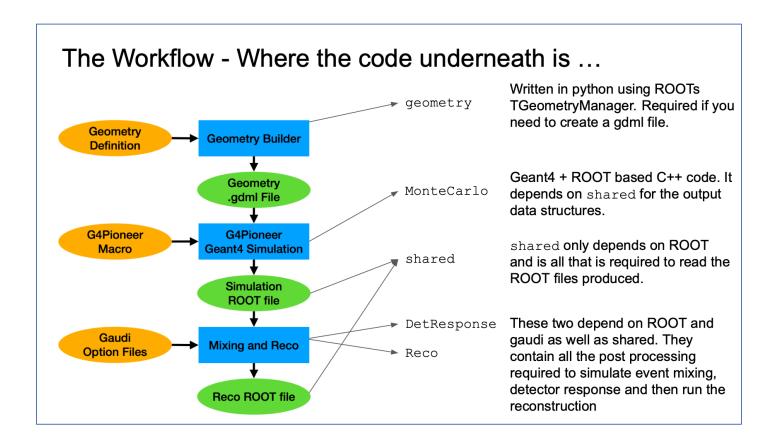
Lukas Gerritzen 2024-10-02

The current solution in MEG II

- Dependencies on legacy code (small changes done by Yusuke)
- Use some developments in the HEP field (root, geant4) but not others

For MEG III, strong inspiration by PIONEER

PIONEER's Framework



P. Schwendimann

More information: https://indico.psi.ch/event/15146/overview

Key4hep

turnkey

adjective [before noun] US

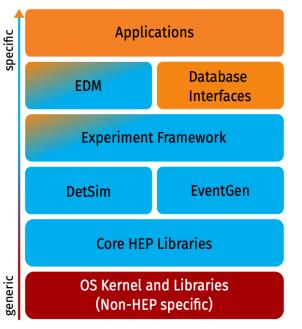
UK **◄**) /'tɜːŋ.kiː/ US **◄**) /'tɜ·ːn.kiː/

Add to word list :≡

(of a property or a piece of equipment) ready to be used immediately by the person who is buying or renting it, or relating to this arrangement:

- Some people hire a contractor to build turnkey houses ready to move into with no renovations or repairs required.
- We have developed turnkey solutions designed specifically for small business owners.
- Gaudi is actually part of Key4hep, "turnkey software for future accelerators"

HEP Software Stack



Application layer of modules / algorithms / processors performing physics tasks (PandoraPFA, FastJet, ACTS, ...)

Data access and representation layer including Event Data Model

Experiment core orchestration layer (Marlin, Gaudi, CMSSW, ...)

Specific components reused by many experiments (DD4hep, Delphes, Pythia, ...)

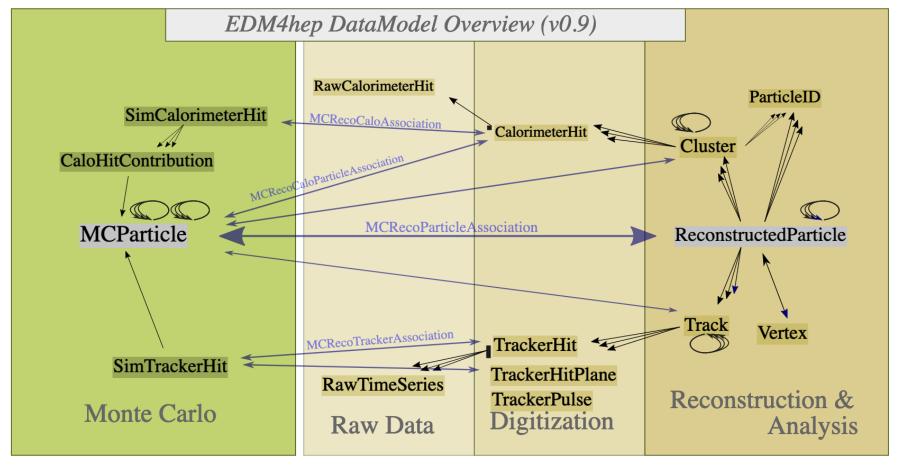
Commonly used HEP core libraries (ROOT, Geant4, CLHEP, ...)

Commonly used tools and libraries (Python, CMake, boost, ...)

DESY. | Key4HEP | Thomas Madlener | Jan 10, 2021

Page 3

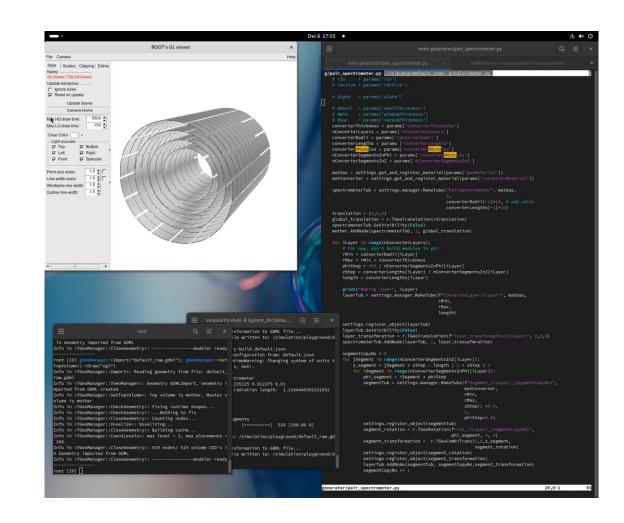
EDM4HEP (Event Data Model)



Is it useful for us?

Our Experience

- Implemented converter geometry
- Tracking + simple studies possible
 - Conversion efficiency
 - Energy loss
 - Scattering
- Currently reproducing results from former student
- Long way to go



Summary

- Work on a modern framework has started
- Development and support by the HEP community
- Contributions are appreciated (e.g. merge Francesco's tracker code)

