

Status of the offline software

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An alternative Gaudi-based framework

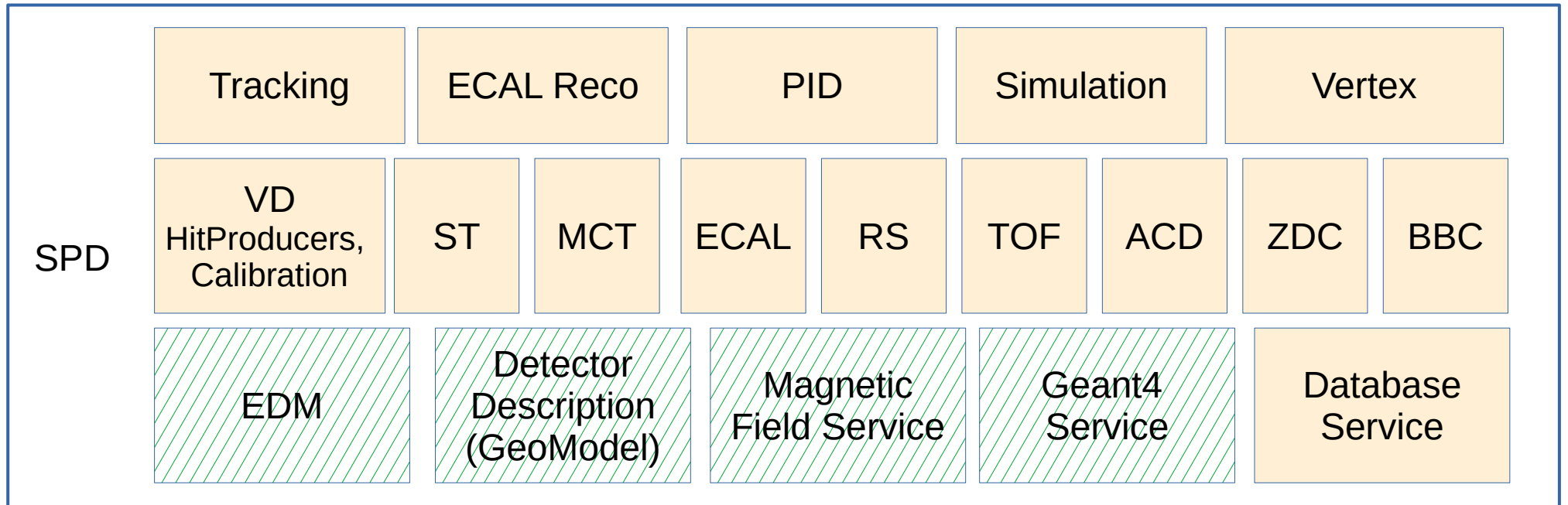
SpdRoot remains the main tool for the physics studies in the coming years. However, it requires significant developments before it can be used for the real data processing after SPD starts operation.

A new Gaudi-based framework is an alternative solution.

- ~~CentOS7, gcc-11.3.0, python-3.9.6~~ **AlmaLinux9.3, gcc-11.4.1, python-3.9.18**
- ***cmake* as a building tool**
- **Container with Gaudi installation is available**
`docker pull jemtchou/gaudi-alma9`
- **How to run:**
 - `docker run -it jemtchou/gaudi-alma9`**
 - *source /cvmfs/spd.jinr.ru/offline/setup.sh*
 - *Gaudi jobOptions.py*

Packaging

User's code



Gaudi

External libs (18 for Gaudi + Pythia8 + Geant4 + OTHER)

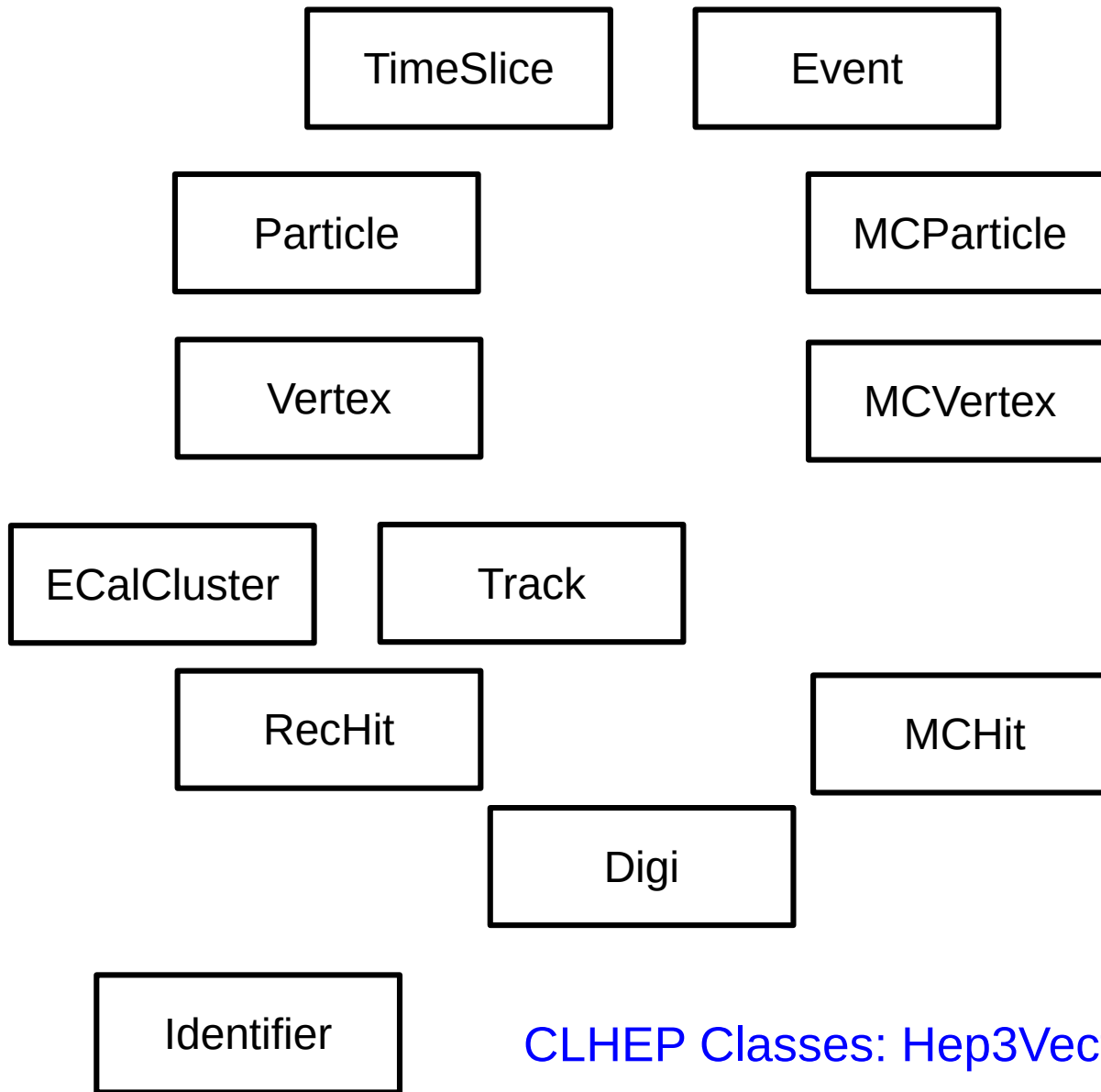
Framework organization

/home/user/spdworkarea/MyAlg/MyAlg.hh ...
/src/MyAlg.cxx ...
CMakeLists.txt

- */cvmfs/spd.jinr.ru/offline/sampo/*
 - *build/*
 - *lib/*
 - *python/*
 - *source/*
 - *setup.sh*
 - LICENSE*
 - *README.md*
 - *Apps/*
 - *Reconstruction/*
 - *Simulation/*
 - *Generators/*
 - *Event/*
 - *Detector/*
 - CMakeLists.txt*
-

- */cvmfs/spd.jinr.ru/offline/gaudi*
- */cvmfs/spd.jinr.ru/offline/externals*

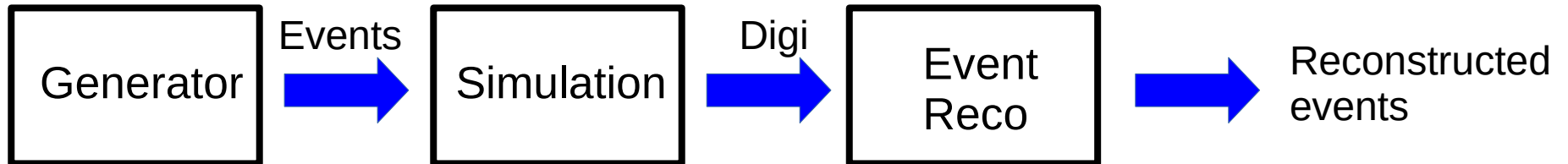
Event Data Model



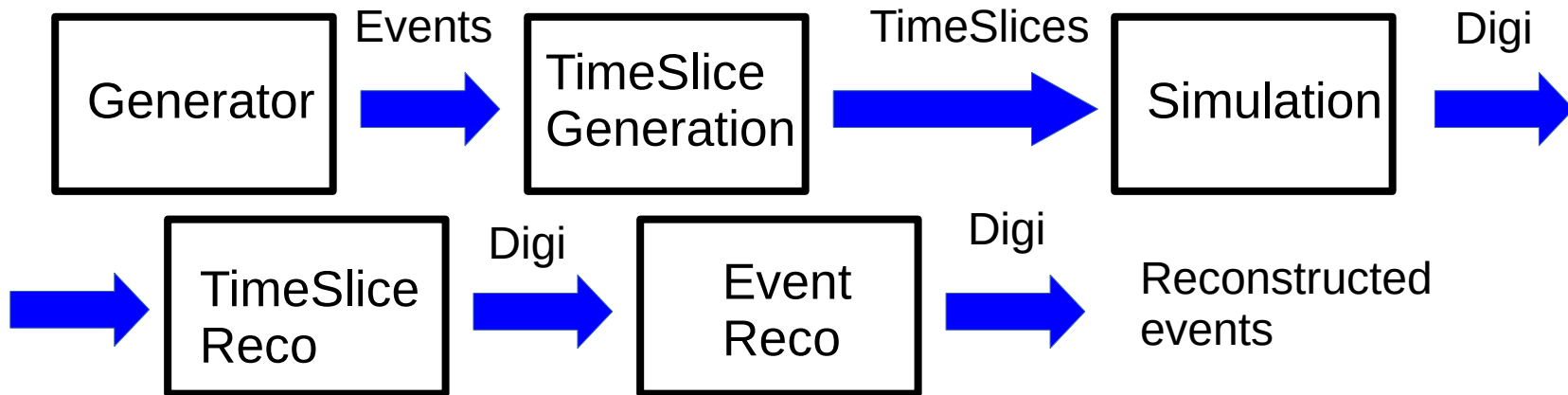
CLHEP Classes: Hep3Vector, HepDiagMatrix

TimeSlice

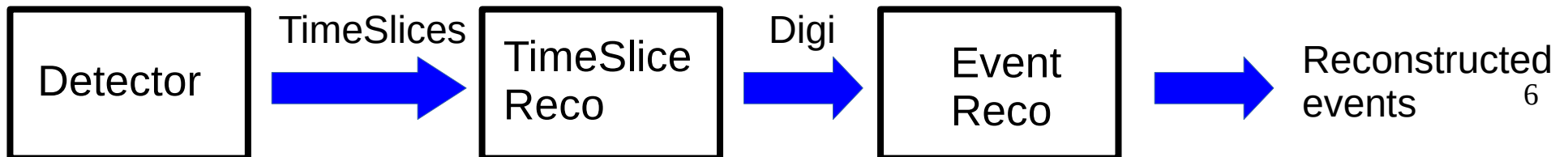
- MC1 (physics studies)



- MC2 (online filter optimization, ML training)



- Real data



Pythia

- A Gaudi algorithm
- Pythia 8.3 — external package
- *Generators/Pythia8/*
- Algorithm **Pythia8_i**
 - Initialization of Rndm generator
 - Initialization of Pythia (options are read from ASCII file)
 - Execute: generate one event, store to TDS as a HepMC record (*Pythia8event* — *not part of EDM yet!*)

GeoModelSvc

- A Gaudi Service
- GeoModel — external package, depends on Geant4
- *Detector/GeoModelSvc/*
 - Read GeoModel from the database
 - Create Geant4 geometry and materials by request
 - Return geometry and material parameters for Reconstruction — not implemented yet, depends on Reco algorithms

Geant4Alg

- A Gaudi Algorithm
- *Simulation/Geant4Alg/*
- *Depends on Geant4, GeoModelSvc, MagFieldSvc*
- *Geant4Alg*
 - *Initialize geometry, materials, physlist and interface to HepMC record in TDS (no builtin generators)*
 - *Run event loop*
 - *Call hit producers in sensitive detectors and store MCHits to TDS*
- *At work now ...*

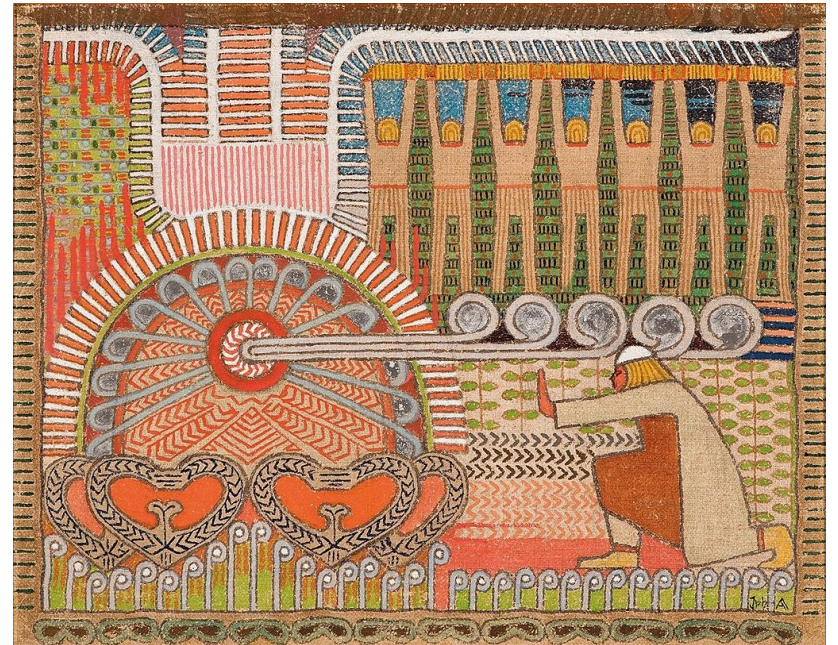
Next steps

- Before the end of June:
 - Finalize Geant4Svc and EDM
 - Implement MagFieldSvc
 - Develop a preliminary version of ROOT IO
- Before the end of August
 - Implement hit production for main detectors
 - Release the alpha version of SAMPO software
- The goal is to have a simulation chain operational by September 2024

SAMPO

The SPD's long-Awaited Main Platform for Offline

In Finnish mythology, the Sampo (pronounced ['sampo]) is a magical device or object described in many different ways that was constructed by the blacksmith Ilmarinen and that brought riches and good fortune to its holder. Sometimes it is interpreted to be a quern or mill of some sort that made flour, salt, and gold out of thin air.



The Forging of the Sampo
Joseph Alanen, 1910-1911