Software tasks

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The Software and Computing WG Conveners:
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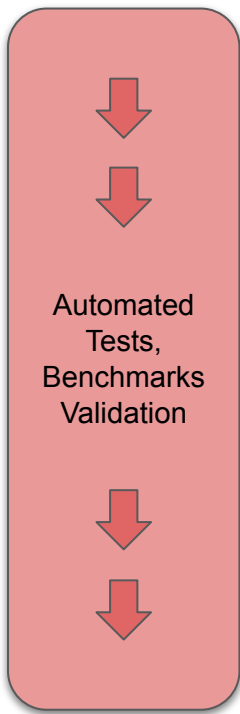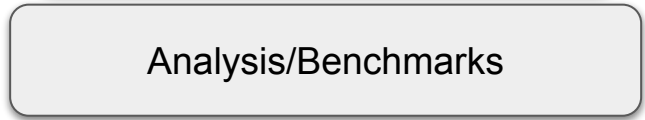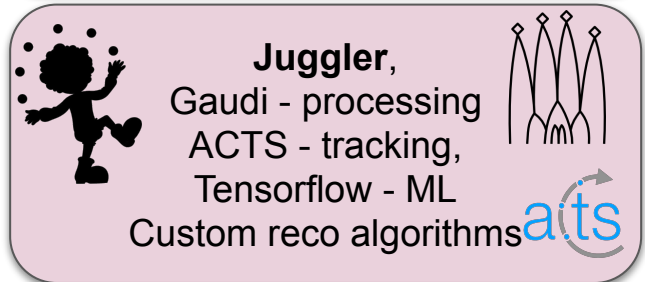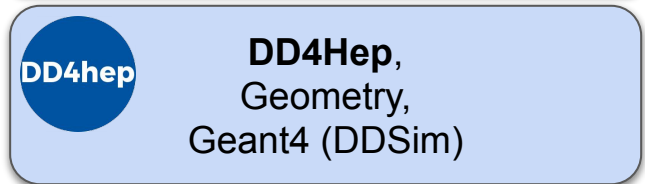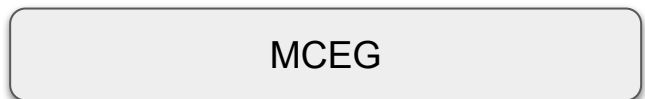
Oversimplified software stack

DD4hep: Geant4, geometry, detector

Juggler: Digitization + reconstruction (Gaudi, Podio, ACTS for tracking)

Gaudi: Processing framework

ACTS: Experiment-independent tracking toolkit (ACTS' geometry constructed from DD4hep via plugin)

Podio: Robust data model definition

MCEG

DD4hep

DD4Hep,
Geometry,
Geant4 (DDSim)

Juggler,
Gaudi - processing
ACTS - tracking,
Tensorflow - ML
Custom reco algorithms

acts

Analysis/Benchmarks

Automated Tests, Benchmarks Validation

GitLab

Spack

docker

Potential (incomplete) task lists from SWG

Reconstruction (C++, Gaudi, ACTS, Python)
- Simple electron PID (medium/expert)
- Advanced electron PID (expert)
- Jet reconstruction (expert)
- Event subcomponent matching (medium/expert)
- RICH reconstruction (medium/expert)
- MRICH reconstruction (medium/expert)
- DIRC reconstruction (medium/expert)
- Holistic calorimeter reconstruction (expert)
- Vertexing (medium/expert)
- Optimize tracking (medium/expert)
- Kinematic reconstruction (easy/medium)
- Far-forward reconstruction (easy/medium)
- Far-backward reconstruction (easy/medium)
- ML-accelerated algorithms (medium/expert)

Reconstruction Benchmarks (ROOT, Python, ...)
- Validate/optimize digitization algorithms (easy)
- Clustering performance (medium)
- Subsystem performance (easy/medium)
- Overall reconstruction performance (medium)
- Study reconstructed acceptance (easy)

Geometry/full simulation (XML, C++, DD4hep, GEANT)
- Detector color scheme (easy)
- Automatic marketing/publication figures (easy/medium)
- Optimize parametrization of subsystems (medium)
- Implement additional technology options (easy/medium/expert)
- Add extra support & service material (easy/medium)

Detector Benchmarks (ROOT, Python)
- Validate hit multiplicities in subsystems (easy)
- Energy calibrations for calorimeters (easy/medium)
- Validate optics in DRICH (medium/expert)
- Study raw acceptance (easy)
- Validate detector material budget (easy/medium)
- Render results on dashboard webpage (all benchmarks)

Physics Benchmarks (ROOT, Python)
- Integrate analyses from PWGs into CI framework (easy)
- Validation figures on kinematic variables (easy)
- Collect and integrate available event samples (easy)