Status of branch LCG 97

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Outline

Upgrade external libraries from 97.0.0 to 97.0.1

- In order to use the latest EDM4hep features, a new deployment 97.0.1 is released (OS: SLC 6).
  - /cvmfs/cepcsw.ihep.ac.cn/prototype/releases/externals/97.0.1
- The new release of EDM4hep is not ready yet, so the master version of EDM4hep is used in this deployment.
  - Still waiting for the dict related fixes.
- The latest external libraries include:
  - EDM4hep (from 0.1.0 to master)
  - PODIO (from 0.9.1 to master)
  - plcio, not compiled
  - Gaudi (v33r1)
  - K4FWCore (v0r1)
  - Pandora (PFA 3.13.3, SDK 3.3.3, LC Content 3.1.4)
- Notes: the methods addXXX are renamed to addToXXX in EDM4hep.

Bug fixed in simulation

- ▶ The problem reported by Wenxing is caused by a bug in the legacy DDG4 sensitive detector.
  - ▶ Bug in converting CLHEP::mm (Geant4) to dd4hep::mm (DD4hep).
- ▶ I have opened a pull request to DD4hep:
  - ▶ https://github.com/AIDASoft/DD4hep/pull/677
  - ▶ The latest commit: https://github.com/AIDASoft/DD4hep/commit/ fbb34839feea6f0462a1c55fad9ba1c21584b6ee
- ▶ Markus Frank suggests us to remove the dependencies on the legacy sensitive detectors.
  - ▶ The legacy SD will be removed in the future version.
- ▶ Hence my current solution is COPYING the legacy SD code (Calo) into CEPCSW.
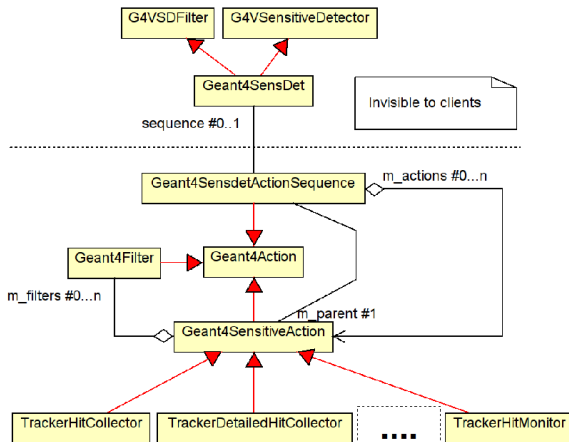 - ▶ Need further discussion. See slides SD in DDG4 and FCCSW.

Changes related to sensitive detectors in CEPCSW

- A new tool interface `ISensDetTool` is added in package `DetSimInterface`.
    - `Simulation/DetSimInterface/DetSimInterface`
- The SD tool is invoked during detector construction.
    - Path: `Simulation/DetSimGeom/src`
    - In the original code, the `dd4hep::PluginService` is invoked.
- A new package `DetSimSD` is added.
    - `Simulation/DetSimSD`
    - Base class `DDG4SensitiveDetector`: reuse part interfaces in `DDG4/Geant4SensitiveDetector`.
        - provides two helper methods `getVolumeID` and `getCellID`.
    - Class `CaloSensitiveDetector`: implementation for the Calo related.
    - The hit objects in Geant4 still depend on DDG4.
- `Edm4hepWriterAnaElemTool` in package `DetSimAna` is updated.
    - Add the mapping between each track and its primary track.
    - Used in the Calo contribution.

SD in DDG4

- Doc:
  `https://dd4hep.web.cern.ch/dd4hep/usermanuals/DDG4Manual/DDG4Manualse3.html#x4-90003.5`

SD in FCCSW

- Doc: `https://github.com/HEP-FCC/FCCSW/blob/master/Detector/doc/DD4hepInFCCSW.md`
- Hit objects are defined in FCC: `Detector/DetCommon/DetCommon/Geant4CaloHit.h`
- SDs are defined in: `Detector/DetSensitive`
- All the SDs are registered into DD4hep using macro `DECLARE_EXTERNAL_GEANT4SENSITIVEDETECTOR`.
  - `https://github.com/HEP-FCC/FCCSW/blob/master/Detector/DetSensitive/src/SDWrapper.cpp`
- Then in Detector construction, the SDs are constructed:
  - `https://github.com/HEP-FCC/FCCSW/blob/master/Detector/DetComponents/src/GeoConstruction.cpp`

The issue and plan

Issue

- ▶ Reading the output of EDM4hep is not fixed yet.
  - ▶ Even though the variables could accessed by ROOT scripts directly, the issue still exists in K4FWCore.
- ▶ So Wenxing needs to chain the simulation and reconstruction in the same job.

Plan

- ▶ If people agree to adopt the current SD solution, I will start to migrate the Tracker SD.
- ▶ Continue to debug the issue.