Basic & Extended Examples Status Report

I. Hrivnacova, IJCLab Orsay (CNRS/IN2P3)
For N&E Examples WG

[Virtual] 26th Geant4 Collaboration Meeting,
24 September 2021

Outline

- New extended examples since the last CM
- Update of Coding Guidelines
- Ongoing Common Tasks

New Extended Examples - 1

- geometry/vecGeomNavigation
- John Apostolakis
  - Demonstrates integration of the **navigation elements of VecGeom** (https://gitlab.cern.ch/VecGeom/VecGeom), to investigate the performance benefits
- eventGenerator/../py8decayer
- Julia Yarba
  - Demonstrates how to outfit **Pythia8-based decay** features to those resonances in Geant4 where decay tables are not implemented by default.
  - In addition, it shows how to replace existing Geant4 decay tables to such resonances as tau+/- or B+/- with the Pythia8-based ones.

New Extended Examples - 2

- hadronic/Hadr05
- Michel Maire
  - Longitudinal sampling calorimeter, **hadronic equivalent of TestEm3**
  - It demonstrates how to collect energy deposition, how to survey energy flow
- hadronic/Hadr10
  - Alberto Ribon
  - An example that aims to **test the treatment of decays** in Geant4. In particular, we want to test the decays of the tau lepton, charmed and bottom hadrons, and the use of pre-assigned decays.

New Extended Examples - 3

- exoticphysics/saxs
- G. Paternò (University and INFN section of FerraraMichel Maire) and L. Pandola
  - Already in 10.7. It implements the typical setup of a **Small Angle X-ray Scattering (SAXS) experiment**.
  - It is meant to illustrate the usage of molecular interference (MI) of Rayleigh (coherent) scattering of photons inside the matter, which is implemented in the G4PenelopeRayleighModelMI model
- medical/dna
- N. H. Tran, L. Desorgher, F. Chappuis and S. Incerti
  - G4DNA chemistry example for **Water radiolysis with Scavengers**
  - Not yet included in the Git repository

Coding Guidelines Update - 1

- Examples Coding Guidelines were defined in 2011
- Update needed to be updated to cope with new C++11,14,17 recommendations
- The proposal for the update
  - https://gitlab.cern.ch/ihrivnac/geant4-dev/-/blob/examples-guidelines-update/examples/.doxygen/coding_guidelines_2021.md (link)
  - Discussed in the parallel session last week
- Further improvements can be achieved using clang-format, clang-tidy
  - The examples developers are invited to join the discussion items in Git:
  - Clang-format [https://gitlab.cern.ch/geant4/geant4-dev/-/issues/97]
  - Clang-tidy [https://gitlab.cern.ch/geant4/geant4-dev/-/issues/94]

Coding Guidelines Update - 2

New/Updated rules:

- Naming rules:

  - Class names are defined within a single **namespace**, specific to each example. Eg. B1, B2, etc. for the basic examples. (Class names without a prefix can be still defined in the categories where this convention is already in use.)

- Coding rules:

  - Declare overriding virtual functions in the header files with keyword **override**.

  - Initialize class data members using **default member initializer in the class definition** (.hh)

  - The **UI commands commands** defined in the example should be used in the cdash test macro(s) as much as possible.

Coding Guidelines Update - 3

- Style rules:
  - Long lines limit **100 characters** (was 80)
- Documentation:
  - **All macros** provided with the example should be **documented in README**.
- Application conventions:
  - **G4UIExecutive** should be **instantiated at the same beginning of main()** if interactive mode is enabled, just after arguments processing if present. This makes possible to handle the output and eventual exception via the Geant4 UI since the beginning of running example.

Common Ongoing Tasks

- Followed at the WG wiki:
  - https://twiki.cern.ch/twiki/bin/view/Geant4/NoviceExtendedExamples
- Coding Guidelines
  - Reasonably low number of violations, except for 1 example (planned to be fixed for 11.0)
- Macro and UI Commands Review
  - Progressing slowly, the optical examples commands/macros reviewed for 10.7 release

Conclusions

- The number of extended examples is growing
  - 5 new examples since the last CM, + 1 to be committed
  - 143 (in today's master)
- See also presentations at the examples parallel session
  https://indico.cern.ch/event/1052654/sessions/405789/#20210916