Updates on B & E Examples

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28th Geant4 Collaboration Meeting, Sapporo,
27 September 2023

Outline

- New extended examples since the last CM
- Ongoing Common Tasks

- See also presentations in the Parallel 2A session

New Extended Examples - 1

- analysis/AnaEx03 (in 11.1)
- Ivana Hrivnacova
  - It demonstrates usage of the analysis commands for file management (new since Geant4 11.1), in particular writing histograms and ntuples in a file multiple times
  - and commands for histogram deleting (new since Geant4 11.2)
- medical/dna/jetcounter (in 11.1)
- M. Pietrzak, M. Mietelska, A. Bancer, A. Rucinski and B. Brzozowska
  - It provides a setup for simulation of a typical experiment with the Jet Counter nanodosemeter

New Extended Examples - 2

- medical/dna/dnadamage2 (in 11.1)
- J. Naoki D. Kondo, J. Ramos-Mendez, B. Faddegon
  - This example provides scoring of plasmid DNA strand breaks using the IRT method. It extends the chem6 example by adding DNA molecule information and the scoring of Strand Breaks.

- medical/dna/UHDR (ultra-high dose rate)
- Hoang Tran
  - This example shows how to activate the mesoscopic model in chemistry and combine with SBS mode.
  - It allows to simulate chemical reactions long time (beyond 1 us) of post-irradiation.

New Extended Examples - 3

- In preparation (for Geant4 11.2), not yet merged
- medical/radiobiology
- Pablo Cirrone
  - Radiobiology is an application realized for dosimetric and radiobiological applications of proton and ion beams.
  - Specific tools were built to evaluate primaries and secondary energy spectra and a set of classes, dedicated to the computation of biological quantities, such as LET (Linear Energy Transfer), RBE (Relative Biological Effectiveness), Survival Fraction, and physical (as dose and fluence), were implemented

Common Ongoing Tasks

- Coding Guidelines
  - Updated in 2021 - **Version 2.1** (available from the new Geant4 web site)
  - Scripts for checking of selected rules provided in `geant4/tests/tools/bin` were merged to a single script: `check_example.sh`
    - Checking: tabulations, separators, long lines and, new in this script, documentation of macros in README
      - Documentating of test macros (example_name.in) is not required
      - Macros with name `run*.mac` are not excluded from checking as we have no agreed convention of providing `run.mac` in the examples
  - A new GitLab issue !183 has been open with the list of examples that need to be fixed
    - The check script output file is attached

- Previous reports
  - GitLab issue !144 - naming guidelines violations (2022) – all violations were fixed, no new violations detected this year
  - WG wiki - guidelines violations up to 2021

Clang-tidy

- https://clang.llvm.org/extra/clang-tidy/
- Tool providing an extensible framework for diagnosing and fixing typical programming errors, like style violations, interface misuse, or bugs that can be deduced via static analysis.
- The list of recommended checks was discussed at Gitlab Issue #94 and the agreed lists of checks are now included in the Geant4 Coding Guidelines document
- Already done:
  - basic examples, analysis - in 10.1
  - medical/dna/moleculardna, parameterisation/gflash, physicslists – 10.2
- In the Work Plan for this year:
  - biasing, parameterisation

Work Plan 2023 - 1

- **New examples:**
  - Biasing: DXTRAN (MCNP-like option), occurrence interaction of charged particles

  - Parameterisation: gflash example for sampling calorimeter (all existing examples show usage in homogeneous media)

  - RunAndEvent: example for sub-event parallelism

  - Medical/dna examples:

    - **microdosimetry2**: calculation of microdosimetry spectra in a cylindrical domain at the specific water depth imitating silicon detector (in the existing example there is randomly placed spherical volume)

    - **UHDR** - example for ultra-high dose rate - DONE

Work Plan 2023 - 2

- **Existing examples improvements:**
  - Biasing category: Resolve the overlap in biasing B02/B03 and GB03 examples which implement the same use case.

  - Errorpropagation: Porting errProp (Geant4e) to MT.

  - Medical: Extend the DICOM reader with the RT Dose format.

  - Parameterisation: Improvements of Par04 example

  - Medical/dna:
    - icsd: include new cross-sections for gas materials (propane) in the already existing icsd example
    - scavenger: improve the example so that the user can choose between the IRT or SBS method
    - dnadamage1: DNA damage in plasmids with IRT - DONE (dnadamage2)
    - molecularDNA: validation and development with protons and He4 ions - DONE (?)
    - dna chemistry: maintenance and improving chem* examples

Work Plan 2023 - 2

- **Common tasks:**
  - clang-tidy checks on selected extended examples categories: IN PROGRESS
    - analysis, biasing, parameterisation, physicslists
  - Macros and tests review in new examples: ONGOING
    - Continue to make sure that provided macros cover all commands implemented in example and the cdash test covers all important example use cases
  - Coding guidelines: DONE
    - Review the status and open a GitLab issue with the violations before the next collaboration meeting
  - Existing examples maintenance ONGOING