Proposal to use GiGa

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Daya Bay Simulation Workshop

Overview

1. Motivation for Change
2. What Does GiGa Provide
3. Future Plan

Current State and Motivation for Change

Currently:

- "legacy" project has state-of-the-art G4dyb as a monolithic program.
- "dybgaudi" has G4dyb as a monolithic library driven from a Gaudi Algorithm
- Built-in geometry, ad-hoc configuration
- Tightly coupled code - hard to learn and modify.

Would like:

- Modularity of code and decoupling of individual contributions.
- Same geometry used in simulation and reconstruction.
- Uniform (and easy) configuration.
- Less or no compiling to access new work.

Gaudi Interface to Geant4 Application

run manager subsumes G4 main loop into Gaudi's
- Simulation as read-only event data store possible
- Isolate simulation from analysis/readout

actions configurable at run time

physics list configurable at run time

geometry automatic conversion from DetDesc

kinematics generated in independent algorithms

secondaries access event secondaries and other details from algorithms.

How to get there from here

geometry detector and materials description

- Use new DetDesc XML files and/or
- Wrap "legacy" detector constructor to compare.

physics list required, define what physics to simulate

- Directly give run manager current G4dyb object
- Wrap as a Gaudi Tool to allow run-time config

actions tracking, stacking, event, step

- Use directly or wrap to allow run-time config

generators of initial kinematics

- Wrap current FORTRAN generators in C++:
  - First step, but allows only one generator at a time: wrap as primary generator actions, give directly to run manager.
  - More flexible: wrap as algorithms, run independently, fill event store.

Future Plan

If we reject GiGa:

- Figure out how to convert DetDesc to G4 objects w/out using GiGa.
- Add this to Xingtao's SimAlg (Gaudi Algorithm based G4dyb)
- People migrate from "legacy" G4dyb SimAlg

Otherwise:

- Start putting together a GiGa based system.
- Target April '08 (BNL workshop) as the due date.
- People then migrate to this.
- Help very likely needed.