

Envisioning Use of Geant4-MT in a Multithreaded CMS Application

Christopher Jones

On behalf of the CMS Offline Organization



Present Application

CMS uses one application for all event processing

Particle generation

Simulation

Online High Level Trigger

Reconstruction

Analysis

Each event processing algorithm is encapsulated into a ‘module’

Geant4 is wrapped by one particular module

CMS’ application controls the processing

It decides which event to process next

It decides the order to call each module and passes it the proper event

Application calls specific *Geant4* functions when it is *Geant4*’s turn to do work



Multithreading

Plan for new multithreaded application

Will process multiple events simultaneously

Will run multiple modules processing the same event simultaneously

This will all be controlled explicitly by the application

All parts need to work within one concurrency model

Present application is memory resource limited

in future may not be able to afford 2GB / CPU core

Each additional thread requires its own stack

default size on SL5 is 10MB/stack

One concurrency model will allow use of only one thread pool

minimizes memory

avoids oversubscribing available cores

Interested in Geant-MT if it can fit with this working model

Where concurrency is controlled by the experiment's application

E.g. Application calls specific Geant methods at proper time from a thread controlled by application

Time Scale



Work is beginning now

Needs to be finished and validated before LHC 2014 restart

Need access to periodic development versions of Geant-MT

Allow steady integration, testing and benchmarking

Best at well defined points over the next 18 months