



CMS: Remark on computing performance

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21th Geant4 Collaboration Workshop

12-16 September 2016

University of Ferrara, Italy

Geant4 status in CMS

- Production version of Geant4 for run-2 (2015-2016)
 - Geant4 version 10.0p02 built in sequential mode + number of private patches
 - Production platform slc6_amd64_gcc491
 - Default physics list: **QGSP_FTFP_BERT_EML**
 - ~10 billion events already produced

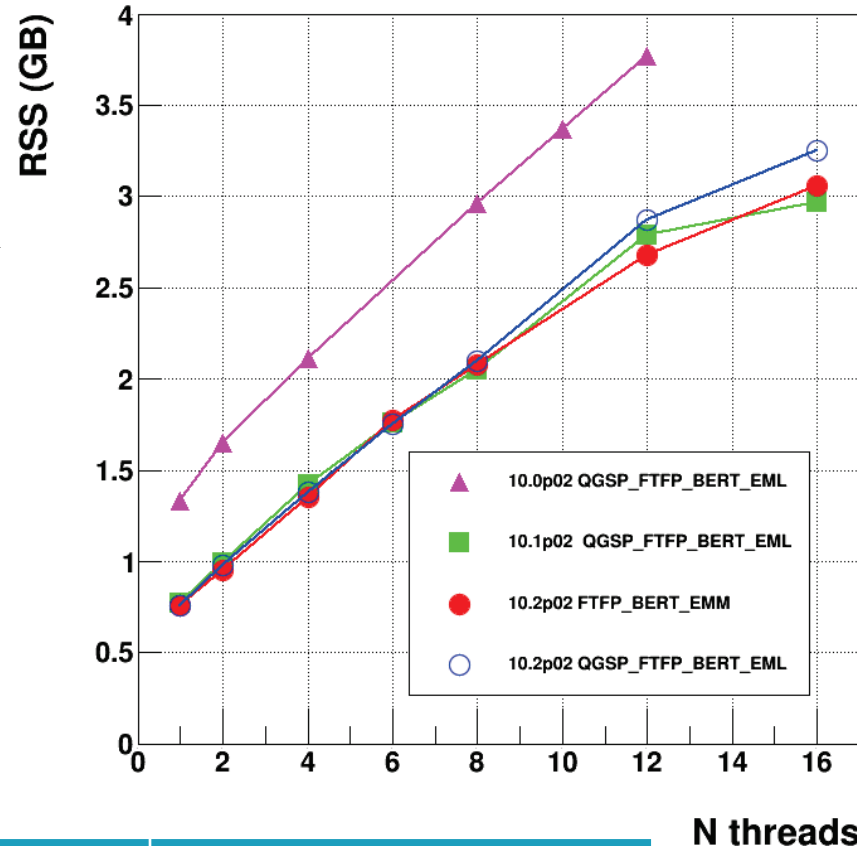
- Current development versions of Geant4 in CMSSW
 - Geant4 10.2p02 built in MT mode + private patches:
 - FTF model parameters as in 10.1p03
 - Recent G4SubtractedSolid fix
 - Production platform slc6_amd64_gcc530
 - Default physics list: FTFP_BERT_EMM
 - **EMM means:**
 - EM Opt1 physics in all detectors (simplified msc step limit)
 - EM Opt0 physics inside HCAL (default msc step limit)
 - **Test CPU performance for t \bar{t} with 8-threaded CMSSW run**

• FTFP_BERT/QGSP_FTFP_BERT_EML	0.87
• FTFP_BERT_EMM/QGSP_FTFP_BERT_EML	0.99

Memory for Geant4 10.2p02

- A node with 12 Intel cores was used to study memory utilisation
- 13 TeV hard scattering event were simulated
 - Results after 1000 events are shown
 - CMS private patches to 10.0 include backports of fixes of memory leak and memory optimisation
 - Results for 10.1 and 10.2 are practically the same
 - No dependency on Physics List
- No problems to run CMS SIM production in the MT mode

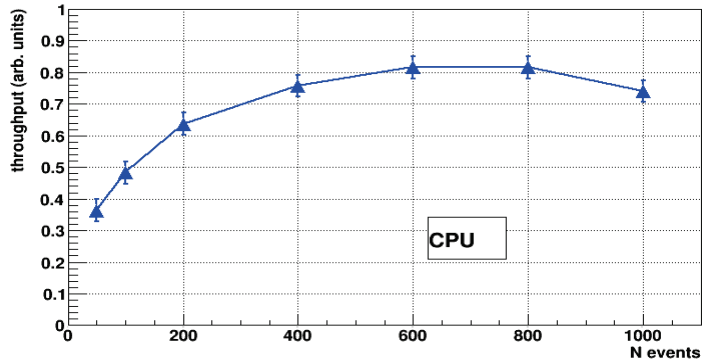
Memory for ttbar events



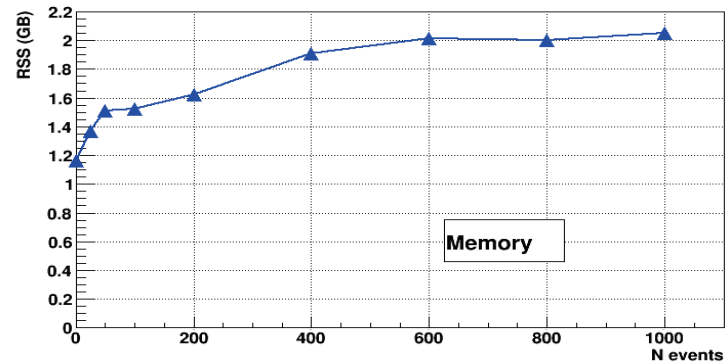
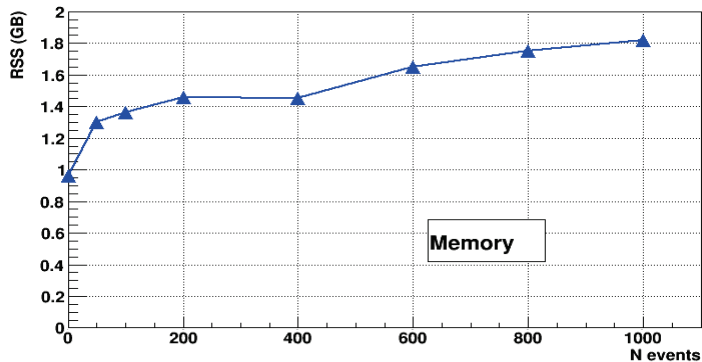
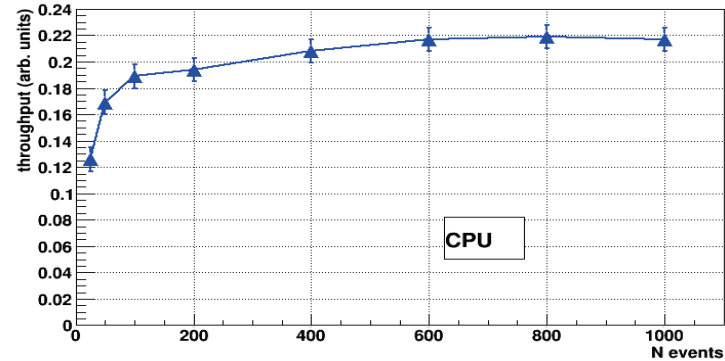
Release	1st thread (GB)	Delta per thread (GB)
10.0p02+CMS patches	1.33	0.23
10.2p02	0.76	0.19

Dynamic of CPU and RSS for 13 TeV CMS simulation run in MT mode with 8 threads, Geant4 10.2p02

QCD at 13 TeV for 8 threads run



ttbar at 13 TeV for 8 threads run



- Dynamic of effective CPU and RSS memory are similar for events of different type
- Maximum CPU efficiency is achieved after simulation ~500 events
 - The shape be explain by influence of Geant4 initialisation before 1st event and lazy initialization of hadron physics classes