# Experiences on Grid Production for GEANT4

*Thursday 10 May 2007 09:45 (15 minutes)*

## With a forward look to future evolution, discuss the issues you have encountered (or that you expect) in using the EGEE infrastructure. Wherever possible, point out the experience limitations (both in terms of existing services or missing functionality)

Geant4 production series encompass the need to submit a vast number of Grid jobs within 2 to 3 weeks, where delays are not acceptable due to fixed release dates. Thus, particular attention has to be given to provide a stable computing environment and to ensure an uncompromising performance of basic services. This includes an instantaneous service support, since a missing response to performance problems might cause significant interruptions of the regression testing.

## Describe the scientific/technical community and the scientific/technical activity using (planning to use) the EGEE infrastructure. A high-level description is needed (neither a detailed specialist report nor a list of references).

Geant4 is a world-wide collaboration of scientists and software engineers whose goal is to develop, maintain and provide support for the Geant4 package, representing a general purpose Monte Carlo toolkit for simulating the propagation of particles through matter. Geant4 is currently employed in a row of particle physics experiments (BaBar, HARP, ATLAS, CMS, LHCb), and is also applied in other areas like space science, medical applications, and radiation studies.

## Report on the experience (or the proposed activity). It would be very important to mention key services which are essential for the success of your activity on the EGEE infrastructure.

The first Geant4 production on the Grid was performed in December 2004, and since December 2005 Geant4 is officially recognized as WLCG/EGEE VO. Basically, the test series compare a reference and candidate version of the Geant4 toolkit to detect any significant difference between them, by looking at calorimeter observables. In order to guarantee the successful and complete testing of the release candidates within the required period of time, both, a minimum amount of dedicated computational resources (of the order of 100 CPU's) and dedicated, robust and fully supported services, are vital. This includes in particular RB's and batch systems being in an unconditional stable shape throughout the entire period. Involved sites are required to provide a shared file system to the Geant4 VO, to prevent a time-consuming multiple reinstallation of the Geant4 reference (and other required software) at each worker node, since only the candidate version changes throughout the testing period.

## Describe the added value of the Grid for the scientific/technical activity you (plan to) do on the Grid. This should include the scale of the activity and of the potential user community and the relevance for other scientific or business applications

Due to the complexity of the Geant4 code and due to the broad spectrum of possible configurations, involving a variety of physical processes for different source

particles, particle energies and target or shielding materials, an intensive testing
of new release candidates is mandatory to carefully and thoroughly test each of its
components, especially before major releases, generally twice a year. Regression
tests are required to be performed by the Geant4 team within a short period of time
(2 to 3 weeks), basically demanding vast computational resources (equivalent to
approximately 4 CPU-years). In order to cope with this abrupt rise in numbers of
required CPU's, EGEE Grid resources are utilized, where in general several EGEE sites
provide CPU's primarily dedicated for these Geant4 production series.

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