

## Status of Fusion Activities in the Grid

*Thursday 10 May 2007 10:00 (20 minutes)*

**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).**

ITER project is going on and the ITER Team is being arranged and installed in the site in Cadarache. The Fusion research continues to improve the understanding of basic Plasma Physics in order to improve the confinement in future reactors. Several pilot applications suitable for running in the grid has been chosen to produce a demonstration effect in Fusion research community.

**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 three above mentioned applications have been developed in close collaboration among the people who are porting the applications to the grid and those who work on Physics, which implies the appearance of synergies. Two methods have been used up to now: Gridway and gLite.

An issue for porting new applications to the grid could be that many of them need to deal with MPI.

**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)**

The main intention is exploit the former applications to produce relevant results from the scientific point of view, in order that a demonstration effect happens and the fusion community realises about the advantages of using the grid. In order to extend the use of grid technologies and infrastructure in the fusion community, DKES (Drift Kinetic Equation solver), a very common code to study collisional Neo Classical Transport in tokamaks and stellarators

**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**

The Fusion VO is working with more that 1,500 CPUs and can be used to run codes. Several applications that are running in EGEE infrastructure are already in production phase and will give us scientifically relevant results:

The Kinetic Transport application consists of a code that follows the trajectories of a large amount of ions that suffer collisions with other ions in complex 3D magnetic structures. An ion-electron collision term has been

introduced and it is being checked now. The grid allows us follow a large number ( $10^7$ ) particles to give us relevant results.

Maratra, which produces massive ray tracing, is useful to study the microwave heating in plasma confinement devices. The basis is to simulate a microwave beam by a bunch with a large number of rays (typically about  $10^4$  rays), which implies the necessity of a large capability distributed computation.

Stellarator Optimization. The genetic algorithm that is running in the Russian grid and is able to produce an opt

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