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Simulations of the ESA Planck mission in EGEE

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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).

Planck is a cosmological mission of ESA composed of the LFI
instrument covering
frequencies between 30 and 70 GHz and the HFI instrument that works
between 100 and 857 GHz. The two created consortia gather about
700 people
whereof approximately 250 deal with the pipelines data reduction
software. In
2004 the Planck simulations was approved by EGAAP and officially
supported by
EGEE. The applications aims at porting the whole Planck
simulations software
on the EGEE Grid infrastructure.

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.

During the first simulation tests, a complete simulation of the
Planck/LFI
instrument was run on a single, dual-CPU, workstation and in Grid
involving 22
nodes, one for each detector of the LFI instrument. The gain
obtained by using
the Grid was of ˜15 times. Moreover we ran simulations in Grid
many times and
every time with a different number of worker nodes; we achieved
the best
results when we assigned each LFI detector to a different WN; the
execution
time is in this case ˜30 times faster with respect to the worst
case where all
LFI detectors are assigned to the same WN. Results are promising
so both
partial and full simulations of the mission for both instruments
will be ported in
EGEE. Because one of the most challenging aspects of Planck
simulations is the
amount of intermediate data to store and their movement in Grid
we expect full
support in terms of data storage and pieces of Planck software
installed on
WNs, since we will probably move code instead of intermediate data.

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)

We haven't experienced severe technical issues actually using the
Grid for
Planck. The most challenging issue comes from the fact that the
movement of
intermediate data produced by simulations in Grid is practically
hindered.
Waiting for more capable network infrastructures we circumvent
the problem
through an accurate setup of the application. In particular the
code (a piece of
pipeline) has to be moved where data reside so that data
movements doesn't
take place over the WAN.

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

Planck simulations are highly computing demanding and produce a huge
amount of data. Such resources cannot be usually afforded by a
single research
institute, both in terms of computing power and data storage
space. In our
case the federation of resources coming from different providers
plays a crucial
role to tackle the shortage of resources available at single
institutions. Other
added values that it is worth to mention are: a) the Grid
authentication/authorization mechanism; b) the opportunity to easily
monitor/control accesses to software and data; c) The federation
of all Planck
software developers in a single VO fostering in this way the
scientific
collaboration. Up to now a restrict number of Planck developers
made use of
the Grid to run their software. The number of potential users
however is high
and, once trained, it is expected that many of them will port
their software in
Grid.

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