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VO VOCE – Numerical Trip to the Galactic Centre

Wednesday 9 May 2007 17:30 (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).

The young massive stars in the Galactic Centre represent one of
the challenges of
modern astrophysics. We can study such stellar system either by
near infra red (NIR)
observations or by numerical simulations. We study dynamics of
young massive stars in
the central parsec region around the galactic super-massive black
hole (SMBH)
surrounded by several stellar structures which act as a
perturbing component to the
central SMBH potential.

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.

We performed test of availability and stability of VOCE resources
with bunches of
ultra-short jobs (running few seconds of CPU time) in order to
get percentage of
successfully computed jobs and its distribution over the VOCE
resources. We performed
short jobs computations (few minutes to few hours of CPU time) in
order to test the
Grid suitability to our activity. From this testing we got an
impression that it is
possible to perform such computations in the Grid environment.
The most important
Grid tools we need to solve our problem on the Grid are
successful submission of the
job and job flow control in general, gcc compiler at our disposal
on each Computing
Element (CE), access to the Storage Elements (SE) and accessible
data on the SEs.

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)

One of the possible limitations to our computations should be a
given upper limit on
CPU time consumption per job. The stability of the Grid

environment is the most
crucial part of our long-lasting computations.

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 study of young stellar cluster in the Galactic Centre helps
us to better
understand the conditions in vicinity of SMBHs in the galactic
centres in general. We
study motion of test particles (single young massive stars) in
the composed
gravitational potential – potential of the SMBH plus the
perturbation potential from
those surrounding stellar structures, therefore we can study the
effect of the Kozai
resonance on the orbits of young massive stars (test particles).
This study includes
scanning the huge parameter-space of the system by means of
numerical integration of
trajectories of testing particles. The lower limit on basic
computations CPU time
consumption is of the order of months (normalised to 2 GHz CPU),
the added value of
the Grid is in its computational power and in the possibility to
"paralelize" the
computation. The Grid provides us with the possibility scan
larger volume of the
parameter space in sufficiently shorter time.

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