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Large Earthquakes Source & Mechanism Determination

Friday 11 May 2007 11:40 (20 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)

In the beginning of the deployment of the application to EGEE, naïve grid usage led to an unsatisfying situation were tasks required from the user to obtain the application results were much too heavy and frequently needed. This has yet been solved with an external (from the middleware point of view) sotfware based on a master/worker architecture.

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 Institut de Physique du Globe de Paris (IPGP) is the primary user of the application itself while its results are used by a large tectonic and seismological community of scientists.
The application mainly uses data originating from the IPGP-administrated worldwide Geoscope sensor network.
Source Mechanism of large Earthquakes (magnitude > 6.5) is systematically determined on the occurence of such an event.

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.

Speed in determining the results is the key factor that the Grid brings to the application.
Latencies are caused by waiting / aborted / lost jobs and were reduced by a close monitoring of the submitted jobs. Now a (master) software has been developed that sends calculations to effectively running jobs (workers) and ensures that all needed computations are completed, without other user action than jobs submission itself. The required feature is outbound connectivity from the worker nodes, however bulk job submission also significantly shrinked the duration of this first phase of the grid process.

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

Determining the Source Mechanism of large Earthquakes requires an overall computation time ranging from 400 to 1600 hours depending on several factors such as the quantity and quality of collected data and the size of the Earthquake. The grid enables this computing time to be apparently reduced to about half a day, providing the results shortly after the shaking.
No other computing facilities allow this celerity.

These results can be used by the seismological community as inputs for further studies, such as prediction of static ground deformation through synthetic SAR (Small Aperture Radar satellite) interferometry imaging, or refenrence focal mechanism in kinematic source tomography.

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Session Classification: Experience with application domains

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