

Grid and Cloud Computing: Opportunities and challenges for e-Science

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A new science paradigm has emerged in the last few years referred to as electronic Science (e-Science). It extensively uses simulation techniques based on software modeling which run on distributed computing infrastructures. In addition, it makes use of huge amounts of distributed and shared data captured by instruments or sensors and/or stored in databases, analyzed to provide new results for science. This distributed HPC and data environment allows sharing the acquired knowledge, accessing remote resources and enabling world-wide scientific collaboration.

The EU Datagrid project was one of the first paradigms of Grid computing working in this direction, which was followed by the EGEE (Enabling Grids for E-science) project. The research community and the High Energy Physicists at CERN were the first to adopt Grid computing. The EGEE projects has integrated more than 50.000 CPUs in Europe and beyond, and 10 Peta Bytes (millions of GigaBytes) of storage, serving multiple application communities including HEP, Bioinformatics, Astrophysics, Computational Chemistry, Earth Sciences, Fusion. Some business/industrial applications are also adopting the distributed HPC computing such as the automotive, finance, multimedia, and there a few examples of e-Government ones such as in the civil protection area.

Thus, Grid computing has delivered an affordable and high performance computing infrastructure to scientists all over the world to solve intense computing problems within constrained research budget. Business or industrial entities have also used similar technologies to increase the usage of their computing infrastructure and reduce their total cost of ownership (TCO). In addition, Grid computing is leveraging the advanced research networks to deliver an effective and irreplaceable channel for international collaboration.

Issues which hinder the wide adoption of the grid in e-Science and industry have to do with the cost of operations and the overall complexity of the Grid, which aims at delivering secure and reliable services. The EGEE project is spending more than 30

million Euros per year operational expenditures (around half is covered by the EC) to run and support the 50.000 CPUs infrastructure (operations, middleware development and certification, application support, training, dissemination, etc.) Power consumption and heat dissipation are also becoming an important factor that needs to be considered seriously.

Elastic computing, Computing on the Cloud, Data Centres and Service hosting are offering on demand CPUs and storage with a simple interfaces. In addition, many multi-cores and CPU accelerators promise potential breakthroughs, without needing to rely only on computer clusters and complex grid infrastructures.

Microsoft is investigating this area, and the Technical Computing Programme in Microsoft Research, is supporting e-Science initiatives in collaboration with leading scientists around the world.

We need to advance in making computing easy to use for the scientists to concentrate their energy in real science and not the computing tools!

- Technical Programme announcement and rationale

<http://www.eage.org/events/index.php?evp=1013&ActiveMenu=15&Opendivs=s2>

- List of Workshops:

<http://www.eage.org/events/index.php?evp=1137&ActiveMenu=16&Opendivs=s2,s15,s16#>

- Specific workshop: Computing Trends in Oil & Gas

<http://www.eage.org/events/index.php?evp=1207&ActiveMenu=22&Opendivs=s2,s14,s15>

In particular relevant to us are:

. how leading-edge HPC solutions can address new O&G application requirements

. Workshop Format

_It will be a limited attendance meeting, which will provide an informal interchange of technical information and ideas

_Presentations by invited speakers will be used to illustrate the challenges and opportunities for HPC in the O&G industry

_All participants are encouraged to share their experiences to promote improved understanding of all aspects of HPC

. Who Should Attend

This workshop is intended for professionals in the O&G and HPC industries and academic researchers who are interested in the application of HPC technology to O&G computer-intensive applications.