PRACE: Partnership for Advanced Computing in Europe

PRACE: Advanced Computing in Europe for Scientific Leadership

http://www.prace-project.eu

Presentation at SC07
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4 pm Peppermill Hotel - Reno

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http://www.genci.fr

GENCI is Chair of the PRACE Initiative (MoU) until 1/1/08
PRACE: our goals

- PRACE is building a world-class pan-European High Performance Computing (HPC) Service, and involves:
  - governments & funding agencies,
  - centres capable to host and manage the supercomputers,
  - the scientific and industrial user communities with leading edge applications,
  - seamless embedding in an ecosystem enabling HPC and simulation science
The European HPC infrastructure need was recognized in the **ESFRI** Roadmap (2006)

- Estimated construction cost of 200-400 M€
- Indicative running cost of 100-200 M€ / year

« ESFRI » is the « European Strategic Forum for Research Infrastructures »
The vision: leadership class European HPC

The Vision:


The Mission:

- Creation of a persistent pan-European HPC service, consisting of few tier-0 centres providing European researchers with access to capability computers and forming the top level of the European HPC ecosystem.
The PRACE Initiative

The PRACE MoU has been signed by the representatives of 14 European countries.

The goals:

- Prepare an European structure funding and operating a permanent Tier 0 HPC Infrastructure
- Provide a smooth insertion in the European HPC Ecosystem of national and topical centres, networking incl. GEANT and DEISA, user groups and communities.
- Joint endeavours, incl. the FP7 « Preparatory Phase », also participate in or label other FP7 projects improving the useability of the RI (appls., sw, programming models,...).
- Promote the most effective use of Numerical Simulation at the leading edge
- Promote European presence and competitiveness in HPC, including user and IT industries
PRACE preparatory phase

- FP7 Call for Research Infrastructure
  - Awaiting signature, starts 1/1/08, 2 years
  - Coordinator A. Bachem, FZ Jülich

Tasks summary:
- Management
- Organisational concept of RI
- Dissemination, training & outreach
- Distributed system management
- Deployment of prototype systems
- Petascaling & Benchmarking of appls.
- Petaflop/s system for 2010
- Future HPC technologies beyond 2010
The PRACE FP7 Project: the birth of a sustainable evolving RI

Key processes for updating and sustainability being bootstrapped

- Distributed Software
- Application petascaling
- Prototype
- Procurement
- Technology watch
- Dissemination & outreach
Our strategy for implementing the PRACE RI

Sites and Systems

- Capability oriented systems, fully operative.
- Sustainability through renewal process, possibly long term relations with suppliers.
- Likely multiple sites, multiple architectures covering all prioritized needs (ESFRI).

Develop European presence in HPC

- Promote design and development in Europe (HW, SW, Applications).
- Promote development of HPC market in Europe: computational needs of ESFRI RIs, industry, public sector,…
- Cooperate with European IT industry to influence the development of emerging technologies and components for Pflop/s systems.
Interacting with vendors

Cooperative R&D
- With vendor, ISV: prepare for use of innovation
- Push forward science and technology where required for future systems

Risk sharing
- Joint investment in innovative architecture, software, applications, network...
  - Result in prototypes, prepare future procurement
- Precommercial procurement, new tool under study by the European Commission, to support all development phases contributing to first system

Procurement
- As defined by regulations and practice
The PRACE RI: an opportunity to cooperate with vendors

- Market expansion:
  - Tier 0 HPC, growth in HPC pyramid, growth of grid based infrastructures.
  - Requires ease of use, interoperability, standards
- Europe becomes more conscious of HPC
  - Cooperation with European IT industry, to develop key technologies leading to procurement of systems
  - Vendors should consider positioning key facilities for design, development, manufacturing and support in Europe
- Leverage increase in HPC related activities in Europe
- Increasing use of precommercial procurement
Getting Started: excerpts from project plan

1Q2008:
- Procurement Strategy defined
- Requirements for distributed systems mgt

2Q2008
- Selection first prototype systems
- Architecture specifications from user requirements

4Q2008
- Requirements for first Tier0 system(s)
- Advanced HPC Technology Platform start

4Q2009
- Requirements for second Tier0 system(s)
Market Survey: early contacts with vendors

- Under responsability of WP7+WP8
- Expect informal information requests end 2007-1Q2008
- Systematic market survey: 1Q2008
  - Technologies
  - Architectures
  - Vendors
- Continuous assessment of market and technologies 2Q2008-forever
Perspectives: Boosting HPC and Science

- **HPC in Europe**
  - HPC now recognized as a priority for science and industry
  - Cooperations set up to ensure the success of very ambitious plans

- **For European competitiveness & well being:**
  - Tackle most ambitious world class HPC projects in science and engineering
  - Contribute to key public policies (climate, natural risk mitigation, energy)
  - Availability for ambitious user industries
  - Cooperation opportunities for HPC and IT vendors
  - Increase European value added in HPC and IT
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Support by research infrastructures

**DEISA**

DEISA currently deploys and operates the European Supercomputing Grid infrastructure to enable capability computing across remote computing platforms and data repositories at a continental scale.

DEISA considers PRACE as an absolutely necessary and complementary initiative. DEISA offers its services and support for deployment in PRACE.

**HPC-Europa**

HPC-Europa is a pan-European Research Infrastructure on HPC providing HPC access and scientific support to researchers in challenging computational activities.

HPC-Europa expresses its interest in cooperating in the areas of access technologies and integrated advanced computational services.

**OMII-Europe**

OMII-Europe is the interoperability project in Europe providing open standards based interoperability components on top of the four major Grid middleware systems in the world.

OMII-Europe is keen to collaborate with PRACE towards provisioning of High end computing resources within Grid computing frameworks.

**EGI**

The consortium of EGI aims at establishing a sustainable Grid infrastructure in Europe, coordinating national Grid initiatives.

EGI is interested to collaborate with PRACE by receiving requirements from the HPC community towards EGI, concerning governance, legal, and political issues.
### Support by communities

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<th>Community</th>
<th>Description</th>
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<td><strong>EFDA</strong></td>
<td>The European Fusion Development Agreement foresees a huge demand for HPC including tier-0. It is interested in cooperation with PRACE regarding benchmarking and code-scaling and provides the HPC-related requirements for Fusion community.</td>
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<td><strong>EMBL-EBI</strong></td>
<td>The Euro Bioinformatics Institute within the European Molecular Biology Laboratory foresees huge demands for HPC resources in the future and is interested in investigating access policies to European tier-0 systems for life scientists.</td>
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<td><strong>ENES</strong></td>
<td>The European Network for Earth System Modeling has contributed to the scientific case for HPC in Europe and will continue to promote the involvement of the European climate modelling community in PRACE. ENES involvement includes porting of applications on prototype systems of PRACE and defining of facility requirements.</td>
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<td><strong>ESA</strong></td>
<td>ESA is the European Space Agency. The Space and in particular Earth Observation communities have very demanding HPC applications. ESA is pleased to collaborate with PRACE on specific applications.</td>
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<td><strong>ESF</strong></td>
<td>The European Science Foundation is interested to contribute to PRACE, in particular to peer-review process dissemination activities and computer technologies beyond 2010.</td>
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<td><strong>MOLSIMU</strong></td>
<td>MOLSIMU, a COST action on Molecular Simulations to Nanoscale Experiments, is offering its support for PRACE by porting their major applications to the prototype systems installed by PRACE.</td>
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<td><strong>Psi-k Network</strong></td>
<td>The Psi-k network is the European Umbrella Network for Electronic Structure Calculations. Several groups within Psi-k are interested to port their ab-initio codes like CPMD, VASP, SIESTA, CASTEP, ABINIT, and Wien 2k on the prototype system of PRACE.</td>
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