PARTNERSHIP FOR ADVANCED COMPUTING IN EUROPE

PRACE in building the HPC Ecosystem
Kimmo Koski, CSC
Petaflop computing First Steps and Achievements

Production of the HPC part of the ESFRI Roadmap; Creation of a vision, involving 15 European countries

Signature of the MoU
Submission of the project proposal
Approval of the project
Kick-off

Bringing scientists together
Creation of the Scientific Case

HPCEUR | HET | PRACE Initiative
2004 | 2005 | 2006 | 2007 | 2008
PRACE general information

Partnership for Advanced Computing in Europe

PRACE
EU Project of the European Commission 7th Framework Program Construction of new infrastructures - preparatory phase
FP7-INFRASTRUCTURES-2007-1

Partners are 16 Legal Entities from 14 European countries
Budget: 20 Mio €
EU funding: 10 Mio €

Duration: January 2008 – December 2009
Grant no: RI-211528
<table>
<thead>
<tr>
<th></th>
<th>Partner</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forschungszentrum Juelich GmbH</td>
<td>FZJ Germany</td>
</tr>
<tr>
<td>2</td>
<td>Universität Stuttgart – HLRS</td>
<td>USTUTT-HLRS Germany</td>
</tr>
<tr>
<td>3</td>
<td>LRZ der Bay. Akademie der Wissenschaften</td>
<td>BADW-LRZ Germany</td>
</tr>
<tr>
<td>4</td>
<td>Grand Equipement national pour le Calcul I.</td>
<td>GENCI France</td>
</tr>
<tr>
<td>5</td>
<td>Engineering and Phys. Sciences Research C.</td>
<td>EPSRC United Kingdom</td>
</tr>
<tr>
<td>6</td>
<td>Barcelona Supercomputing Center</td>
<td>BSC Spain</td>
</tr>
<tr>
<td>7</td>
<td>CSC Scientific Computing Ltd.</td>
<td>CSC Finland</td>
</tr>
<tr>
<td>8</td>
<td>ETH Zürich - CSCS</td>
<td>ETHZ Switzerland</td>
</tr>
<tr>
<td>9</td>
<td>Netherlands Computing Facilities Foundation</td>
<td>NCF Netherlands</td>
</tr>
<tr>
<td>10</td>
<td>Joh. Kepler Universitaet Linz</td>
<td>GUP Austria</td>
</tr>
<tr>
<td>11</td>
<td>Swedish National Infrastructure for Comp.</td>
<td>SNIC Sweden</td>
</tr>
<tr>
<td>12</td>
<td>CINECA Consorzio Interuniversitario</td>
<td>CINECA Italy</td>
</tr>
<tr>
<td>13</td>
<td>Poznan Supercomputing and Networking C.</td>
<td>PSNC Poland</td>
</tr>
<tr>
<td>14</td>
<td>UNINETT Sigma AS</td>
<td>SIGMA Norway</td>
</tr>
<tr>
<td>15</td>
<td>Greek Research and Technology Network</td>
<td>GRNET Greece</td>
</tr>
<tr>
<td>16</td>
<td>Universidade de Coimbra</td>
<td>UC-LCA Portugal</td>
</tr>
</tbody>
</table>
PRACE Work Packages

• WP1 Management
• WP2 Organizational concept
• WP3 Dissemination, outreach and training
• WP4 Distributed computing
• WP5 Deployment of prototype systems
• WP6 Software enabling for prototype systems
• WP7 Petaflop systems for 2009/2010
• WP8 Future petaflop technologies
Organisational concept of the RI – Objectives:

- Definition of the **Legal Form** of the Research Infrastructure
- Definition of the **Governance Structure**
- Specification of **Funding and Usage** strategies
- Establishment of the **Peer-Review Process**
- Establishing **Links with the HPC Ecosystem**
- Development of the **Operation Model**
- **Selection of Prototypes** and Production Systems
Performance Pyramid

- **PRACE**: European HPC center(s)
- **DEISA-2**: National/regional centers, Grid-collaboration
- **EGEE-III**: Local centers

Levels:
- **TIER 0**: PRACE
- **TIER 1**: DEISA-2
- **TIER 2**: Local centers
Roadmap to an ESFRI e-Infrastructure eco-system

- e-IRG building the e-Science e-Infrastructure
- Crossing the boundaries of science
- Resources/services (such as supercomputers, sensors, data)
- Middleware and organisation
- Networking infrastructure
- Computer Data Treatment, Particles and Space Physics

ESFRI addressing seven fields of Research and major challenges
HPC Ecosystem to support the top

- The upper layers of the pyramid
  - HPC centers / services
  - European projects (HPC/Grid, networking, …)
- Activities which enable efficient usage of upper layers
  - Inclusion of national HPC infrastructures
  - Software development and scalability issues
  - Competence development
- Interoperability between the layers
Roles in the EU-level e-infrastructure
examples of positioning
Stakeholder categories in PRACE

- Providers of HPC services
- European HPC and grid projects
- Networking infrastructure providers
- Hardware vendors
- Software vendors and the software developing academic community
- End users and their access through related Research Infrastructures
- Funding bodies on a national and international level
- Policy setting organisations directly involved in developing the research infrastructure and political bodies like parliaments responsible for national and international legislation
Advice for HPC vendors: Europe wants to develop HPC Ecosystem in Europe

• What can you do in Europe?
  – Manufacturing
  – Research
  – Software development
  – Integration work
  – Training
  – Other

• Pre-commercial procurement used increasingly

• Prototyping is part of the petaflop/s project
  – The prototypes for tomorrow’s petaflop systems are sometimes today’s production systems
  – Innovation is both in scalable software and hardware
Summary

- There is a high demand and synergy opportunity of HPC in the European research community
- PRACE intends to strengthen the European HPC Ecosystem by providing the high-end computing capability closely linked to the other layers of the performance pyramid
- Successful implementation requires active collaboration with all stakeholders
- Actions are taken to guarantee sustainable infrastructure beyond the preparatory phase