



PRACE

**PARTNERSHIP
FOR ADVANCED COMPUTING
IN EUROPE**



TOWARDS A PERMANENT RESEARCH INFRASTRUCTURE

PRACE, THE PARTNERSHIP FOR ADVANCED COMPUTING IN EUROPE, IS PREPARING THE CREATION OF A PERSISTENT, PAN-EUROPEAN RESEARCH INFRASTRUCTURE THAT WILL PROVIDE A LEADING HPC SERVICE TO ENABLE WORLD-CLASS SCIENCE. THE OBJECTIVE OF THE TWO YEAR PROJECT IS THE COMPLETION OF THE NECESSARY LEGAL, ADMINISTRATIVE, AND TECHNICAL WORK THAT WILL ALLOW THE PERMANENT RESEARCH INFRASTRUCTURE TO START OPERATION IN 2010.

This infrastructure will be managed as a single European entity. European scientists and technologists will be provided with world-class leadership supercomputers with capabilities equal or better than those available in the USA and Japan. The service will be hosted by three to five Tier-0 level HPC centers. They build the apex of the European performance pyramid strengthened by regional and national super-computing centers working in tight collaboration through grid technologies. In other words, the Partnership will become a unique entity of the pan-European HPC ecosystem. The infrastructure will be complemented with network and grid access, and the services required to enable applications.

The objectives of the PRACE project are to:

- Prepare the creation of a persistent, sustainable pan-European HPC service
- Prepare the deployment of three to five Petaflop/s systems at different European sites
- Define and establish a legal and organisational structure involving HPC centers, national funding agencies, and scientific user communities
- Develop funding and usage models and establish a peer review process
- Provide training for European scientists and create a permanent education programme



PRACE RESEARCH INFRASTRUCTURE OPERABLE IN 2010

Achievements of the first project year

PRACE has analysed close to 70 scientific applications from 24 systems – a snapshot of current European HPC usage – with the following objectives:

- To map them to architecture specifications that were used to select the prototype systems
- Select a subset which will serve as the nucleus of a benchmark suite to evaluate the prototypes and the future production systems
- Port the applications to most prototypes
- Optimise and scale suitable applications

Based on the analysis of applications, PRACE has identified a comprehensive set of architectures and selected six related prototypes. The IBM BlueGene/P at FZJ, the CRAY XT5 at CSC, the IBM Power6 at SARA, and the IBM Cell at BSC have been installed and evaluated using synthetic benchmarks to measure system performance, I/O bandwidth and communication characteristics. The NEC SX-9 at HLRS has also been installed. The Intel components for HLRS's hybrid system and the Intel systems at CEA and FZJ will be installed during 2009. The BULL systems at GENCI-CEA and FZJ will be installed during 2009.

PRACE conducted a survey among Europe's top HPC users about their training needs. Over 90% stated that they need advanced training. In addition, this survey raised great interest in the USA and Asia where organisations requested to use it to identify their training needs. To teach programming for the prototype architectures, PRACE organised a Summer School in Stockholm and a Winter School in Athens including hands-on usage of the prototypes. These two events attracted already far more applicants than could be accommodated. In 2009 a series of code-porting workshops will be arranged.

PRACE work in 2009

PRACE will continue to optimise relevant scientific applications and important codes, evaluate and enhance libraries and tools, and finalise the benchmark suite. The prototype evaluation will be completed, resulting in a compendium describing the systems and their characteristics. This will be used to guide the procurement of the production systems.

Access to the prototypes to port and evaluate applications can be requested following a lightweight process described at <http://www.prace-project.eu/prototype-access>

PRACE is evaluating components and technologies for future multi-petaflop/s systems. A set of nine prototypes will be installed at the following PRACE partner sites during 2009: CINECA, EPSRC-EPCC, ETHZ-CSCS, FZJ, GENCI-CEA, BAdW-LRZ, NCF-SARA, KTH and a joint prototype of BAdW-LRZ and GENCI-CINES.

STRATOS, the PRACE advisory group on Strategic Technologies, was created as the initial step in a continuous process to watch for promising hardware and software components for use in future multi-petaflop/s systems and to foster collaborations with industry in order to increase HPC expertise in Europe.

Equally important is the completion of the legal and administrative work in preparation for the pan-European legal entity. This includes: deciding the legal form; finalising the governance structure; confirming the funding and usage models; strengthening the links within the HPC ecosystem; establishing a peer-review process; creating a procurement strategy and process.



Principal Partners

- **France:** GENCI – Grand Equipement National de Calcul Intensif
www.genci.fr
- **Germany:** GCS – GAUSS Centre for Supercomputing
www.gauss-centre.de
- **The Netherlands:** NCF – Netherlands Computing Facilities Foundation
www.nwo.nl/ncf
- **Spain:** BSC – Barcelona Supercomputing Center – Centro Nacional de Supercomputación
www.bsc.es
- **UK:** EPSRC – Engineering and Physical Sciences Research Council
www.epsrc.ac.uk

General Partners

- **Austria:** GUP – Institut für Graphische und Parallele Datenverarbeitung der Johannes Kepler Universität
www.gup.uni-linz.ac.at
- **Finland:** CSC – IT Center for Science
www.csc.fi
- **Greece:** GRNET – Greek Research and Technology Network
www.grnet.gr
- **Italy:** CINECA – Consorzio Interuniversitario
www.cineca.it
- **Norway:** UNINETT Sigma AS – UNINETT Sigma AS – The Norwegian Metacenter for Computational Science
sigma.uninett.no

- **Poland:** PSNC – Poznan Supercomputing and Networking Center
www.psnc.pl
- **Portugal:** FCTUC – Faculdade Ciencias e Tecnologia da Universidade de Coimbra
www.fct.uc.pt
- **Sweden:** SNIC – Swedish National Infrastructure for Computing
www.snic.vr.se
- **Switzerland:** CSCS – Swiss National Supercomputing Centre
www.cscs.ch

Additional members of the PRACE Initiative

The following countries have signed the PRACE Memorandum of Understanding:

- **Cyprus:** CSTRC – The Computation-based Science and Research Center
cstrc.cyi.ac.cy
- **Ireland:** ICHEC – Irish Centre for High-End Computing
www.ichec.ie
- **Serbia:** IP – The Institute of Physics, Belgrade
www.phy.bg.ac.yu
- **Turkey:** UYBHM – Ulusal Yuksek Basarimli Hesaplama Merkezi – National Center for High Performance Computing
www.uybhm.itu.edu.tr

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The PRACE project receives funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° RI-211528.