

PRACE: Results of the third Regular Call

The Partnership for Advanced Computing in Europe (PRACE) is offering super-computing resources on the highest level (Tier-0) to European researchers. The Gauss Centre for Supercomputing (GCS) is currently dedicating shares of its IBM Blue Gene/P system JUGENE in Jülich and its Cray XE6 System HERMIT in Stuttgart.

The 3rd call for proposals, this time for computing time on JUGENE in Jülich, HERMIT in Stuttgart, and CURIE in Bruyères-Le-Châtel, France, closed on June 22, 2011. Ten research projects have been awarded about 360 Million compute core hours on JUGENE, and four have been awarded about 194 Million compute core hours on HERMIT. Three of those research projects are from Italy, two are from Germany and the UK, each, while one each are from Belgium, Cyprus, France, the Netherlands, Norway, and Spain. The research projects awarded computing time cover

all scientific areas, from Astrophysics to Medicine and Life Sciences.

More details, also on the projects granted access to Curie, can be found via the PRACE web pages www.prace-ri.eu/PRACE-3rd-Regular-Call.

Evaluation for the 4th call for proposals that closed January 10, 2012 is still under way, as of this writing. Details on the calls, also on the forthcoming fifth call, can be found on www.prace-ri.eu/Calls-for-Proposals.



• Walter Nadler

Jülich
Supercomputing
Centre

PRACE - One, Two, Three

To support the accelerated implementation of the Research Infrastructure established by the Partnership for Advanced Computing in Europe (PRACE) the European Commission decided to issue three individual calls in 2009, 2010 and 2011, resulting in three distinct projects.

The First Implementation Phase project (PRACE-1IP) will be completed in June 2012. It focused on the deployment and operation of the European Tier-0 infrastructure, the related enabling and petascaling of applications, establishing relations with academic and industrial users, advanced training for HPC users, technology watch and prototyping of promising architectures, components and software for future multi-Petaflop/s systems – to name a few.

The following Results exemplify the Achievements of the Project:

Three Tier-0 systems, JUGENE at GCS Partner Jülich, CURIE at GENCI, and HERMIT at GCS partner HLRS were deployed. Three new systems, SuperMUC at GCS partner LRZ, Fermi at CINECA, and a yet unannounced system at BSC will follow shortly. More important than the aggregated Petaflop/s number is the diversity of architectures that enables scientists to execute a wide range of challenging applications on the best suited platform. The consistent services that were defined and implemented present the different PRACE systems as a single entity towards the user.

The single European peer review process that was defined by PRACE allows users to submit applications for resource grants

on any system with minimal administrative effort. In addition, an independent User Forum was initiated as the voice of the users. PRACE invited industrial users to a series of specific seminars to capture the unique requirements of industry, foster further collaboration, and prepare the creation of an Industrial Advisory Committee for PRACE.

To help the users exploiting the unprecedented capabilities for the new machines, a wide range of applications selected through previous surveys were evaluated, ported, and brought into the petascale regime. This unique service of computer experts and application specialists working together helps the researches to focus on their science. This is an ongoing process that will include new architectures and new programming paradigms. All the results will be made available on the PRACE-RI web site. The first 23 white papers on data handling for petascale systems are already published.

PRACE established an education programme consisting of seasonal schools, specialized seminars and workshops to educate users in novel programming techniques, optimisation strategies, and new languages especially for massively parallel architectures. The training material, presentations and videos, is available via the PRACE web site [2].

Annual workshops with data centre specialists and also vendors are an important element in the technology watch necessary to make informed decisions. This will be continued throughout the projects.

Already in the preparatory phase PRACE undertook to evaluate promising architectures for their viability as future Petaflop/s systems. PRACE proposed to evaluate a set of prototypes covering Exascale I/O, new MPI I/O concepts, GPGPU virtualization, NUMA-CIC, and Energy-to-Solution. On recommendation for the EC reviewers some of them were deferred to work with expected new versions of hardware components. Consequently, the prototype assessment will be extended until March 2013.

The Second Implementation Phase project (PRACE-2IP) started in September 2011. During the combined PRACE-1IP all-hands meeting and PRACE-2IP kick-off nearly 200 researchers convened at the Barcelona Supercomputer Center from September 14-16 to plan and synchronize the detailed work in the projects.

The objectives of PRACE-2IP are:

Integration of Tier-1 systems both on the technical and operational level and the support for the European-wide calls for Tier-1 resources as part of the Distributed European Computing Initiative (DECI) including technical evaluation of the proposals.

Identifying best practices for HPC system commissioning and prototyping new architectures, components, and concepts for future multi-Petaflop/s systems in continuation of the work started in PRACE-1IP.

Scaling of new applications for Tier-1 and Tier-0 systems with the intention to use the Tier-1 level as a conveyor belt towards Tier-0. Working with selected communities (Astrophysics, Climate, Material Science, Particle Physics, and Engineering) to bring com-

putational know-how of PRACE into the communities to enable them to exploit future architectures. Key application within these communities will be refactored in joint teams.

Dissemination and Training will be intensified including the establishment of PRACE Advanced Training Centers and the deployment of the PRACE training portal. PRACE-1IP developed the concepts for both.

The first project results are already visible: The community codes for refactoring have been identified and the work is in progress.

In a joint evaluation of potential candidates for prototypes between the two projects a set of six prototypes has been selected with the aid of external experts:

- AMFT – Advanced Multilevel Fault Tolerance evaluation
- ARM+GPU – a low power solution using Nvidia Tegra3 and mobile GPUs
- SHAVE-PRACE – low power solution based on video-processing System on Chip from Movidius
- Scalable-Hybrid – T-Platform hot-water cooled system with Intel MIC and Nvidia Kepler
- EURORA – Eurotech hot-water cooled system with Intel MIC
- CPU+GPU – hybrid system of AMD APUs and GPUs

The first three prototypes will be evaluated as part of PRACE-1IP, the last three within PRACE-2IP¹.

The European Commission approved the prototype proposal based on the results of a focused review in which

the reviewers attested that the project made 'excellent progress and exceeded expectations'.

In February 2012, six PRACE Advanced Training Centres (PATC) were announced. These are hosted by BSC, CINECA, EPCC, GCS, and Maison de La Simulation which includes GENCI. An Operational Management Board has been established and the curricula are being finalized. PRACE now has a permanent infrastructure to provide training across Europe in addition to dedicated schools and workshops. The first training events organised by the PATCs are planned for April.

A proposal for the Third Implementation Phase (PRACE-3IP) has been successfully submitted and the Consortium has been invited to the contract negotiations. They are scheduled to be completed by end of April 2012. It is planned that the project will start on July 1, 2012.

Objectives of PRACE-3IP are:

Continue and expand: outreach and training; scaling and optimization of application codes, exploitation of new tools and techniques for HPC; services for Tier-0 and Tier-1 including support for SMEs and industrial users.

A completely new undertaking will be a pilot on Pre-Commercial Procurement (PCP) in HPC. This will be the first of its kind in Europe. Due to the nature of PCP this part of the project is planned for 48 month, whereas all other work will be completed in two years.

References

[1] <http://www.prace-ri.eu>

[2] <http://www.training.prace-ri.eu/>

• Dietmar Erwin

Forschungszentrum
Jülich



Figure 1: PRACE collaborators convene at Barcelona Supercomputer Center. Copyright picture: BSC