

10th e-Infrastructure Concertation Meeting

Abstract ID : 20

PRACE: How e-research infrastructures can catalyse European industrial competitiveness

Name of project :

PRACE Open R model for industry

Description :

PRACE (Partnership for Advanced Computing in Europe) is a pan-European research infrastructure spanning 25 countries, offering European scientists access to world-class resources and services in HPC (High Performance Computing) and advanced numerical simulation. Established since April 2010 as an international non-profit association with a seat in Brussels (Belgium), PRACE is providing in 2012 a unique computing capacity of more than 15 PetaFlops (one PetaFlop means 10¹⁵ computational operations per second) across 6 complementary supercomputers based in France, Germany, Italy and Spain.

Following what was already available for academia since mid 2010, PRACE is now proposing to European companies an industrial offer based on a unique set of complementary high-level services spanning from information and networking, training, access to leading HPC resources and expertise, to code enabling of open-source applications.

Project success :

After a pilot phase where 6 companies coming from multiple countries with different profiles and needs have evaluated the complete set of services to be provided by PRACE, the access to PRACE resources has been open widely to any European companies on May 2012.

Twice a year, European companies or companies having a significant R activity located in Europe can now apply to a PRACE call for the support of proposals with an innovative scientific project in which they are able to publish some of the results at the end of the grant period (Open R). All the projects coming from academia and industry are peer-reviewed by an external panel of recognized scientists using the same single criteria: scientific excellence.

If the project is selected, companies awarded will get access to PRACE resources free of charge during a one-year allocation period.

Incentive measures have also been taken in order to increase the number of joint proposals between teams from academia and industry in a way to foster technological transfer.

One of the first companies which have been selected is a French SME called HydrOcean which received an allocation of 5 million CPU hours on Hermit, a Cray system at the GCS site HLRS (Stuttgart/Germany). This grant will allow HydrOcean R to push the limits of their CFD code to more than 32 000 cores on more accurate complex simulations applied to ship survivability under wave impact and increase its visibility within the European market.

Impact :

By offering a unique aggregated computing power of more than 15 PetaFlops in 2012, PRACE is allowing its scientific and industrial users to have access to similar capacities and services as their competitors in USA, China, Japan or Russia. Since this level of resources and diversity of HPC architectures was clearly unreachable for any single European country, the rationale of PRACE was to unite efforts from European countries in order to sustain scientific and industrial competitiveness of Europe.

In order to increase the impact toward industrial communities, it is also mandatory to surround this computing capacity by high-level services. For this reason, PRACE has since 2009 been organising yearly Industrial Seminars which attracted a cumulated audience of more than 400 executives from 120 companies across Europe. These seminars are a unique networking opportunity for the attendees to learn about the PRACE industrial offer and to share their experience of using HPC facilities for addressing industrial challenges. The next seminar will be organised in Stuttgart on April 15 and 16, 2013. The event will launch an open competition for end-user industrial HPC applications challenging the traditional way of doing business in Europe.

PRACE is also delivering training services through 6 different PATC (PRACE Advanced Training Centres) localised at the Barcelona Supercomputing Center (Spain), CINECA - Consorzio Interuniversitario (Italy), CSC - IT Center for Science Ltd (Finland), EPCC at the University of Edinburgh (UK), Gauss Centre for Supercomputing (Germany) and Maison de la Simulation (France).

These trainings sessions, open to industry, are covering themes such as programming languages and models, code optimisation, pre/post processing, visualisation of large volumes of data, use of open source tools for industry as well as best practises for using its large-scale HPC systems.

As a complement to the PATC training activity, PRACE is also offering an Online Training Portal (<http://www.training.prace-ri.eu>) where PRACE users from academia and industry can watch videos of recorded past training sessions and download training materials.

Finally, PRACE is also benefitting from the hundreds of years of accumulated experience by its HPC experts across the 25 partners for providing code enabling services on Open-Source software. Industrial users of PRACE can be enrolled into co-design activities of Open Source software with users from academia as well as PRACE HPC experts. They can provide pertinent industrial test cases and geometries that can be used to steer the development/optimisation of Open-Source applications, and they can use such optimised applications and provide feedback to the developers.

Such a virtuous development circle is already applied with Open Source applications in CFD (Computational Fluids Dynamics) like OpenFoam and Code_Saturne, structural mechanics applications like ELMER, risk and uncertainties analysis with URANIE and SPEED or with Delft3D, a modelling suite to investigate hydrodynamics, sediment transport and morphology and water quality for fluvial, estuarine and coastal environments.

Strategic benefits :

Increasing industrial competitiveness is one of the biggest challenges that Europe now now to face in order to maintain and retain employment, increase innovation and face societal and scientific grand challenges.

“Competitive Industries” will be one of the 3 pillars of the next European framework programme Horizon 2020 starting 2014 along with excellent science and better society.

97% of the industrial companies that employ HPC consider it indispensable for their ability to innovate, compete, and survive and it is said today that to “Out Compute is to Out Compete”. This has been acknowledged for a long time by countries such as the US and Japan, and more recently by China as well as Russia, where HPC now is recognized as a strategic tool for ensuring the competitiveness of the country. In some countries like China, Russia and India, massive R budgets of more than 1 billion euros are already allocated for developing the next generation of supercomputers able to perform in 2020 one thousand times more computations than current machines or more than 10¹⁸ operations per second (also called one ExaFlop).

Like similar programs running in US or Japan, the PRACE Open R model is now allowing European companies access to world-class HPC resources and services in order to increase their competitiveness by reducing the time-to-market, improving reliability and safety of their products and developing innovative industrial processes.

The Open R model is also a strong tool for boosting technological transfer between academia and industry by fostering close collaborations between “historical” HPC users from academia and industry. This link, that was distorted in the past, is essential for leveraging new software platforms, developing innovative products, fuelling companies with new skills and views and more globally industrializing fundamental and applied research.

The PRACE research infrastructure is thus becoming an essential tool for helping European companies to deploy Open Innovation strategies in order to increase their competitiveness, leverage development of new products by working with academia or others industries through joint R platforms and retain highly skilled engineers and scientists in Europe.

By developing its industrial offer for European large companies as well as SMEs (Small and Medium-sized Enterprises) PRACE will be able to strengthen the full supply chain of big industries like aeronautics, automotive, materials, etc. and to foster the rise of new European champions in emerging and highly societal sectors such as digital media, personalized

medicine and renewable energies.

Finally, by developing the use of HPC by industries for R purposes, PRACE will also catalyse the commercial Cloud HPC market since these companies will be interested in using HPC not only for R but also for performing commercial activities which are not doable by using public funded research infrastructures.

Summary :

Since the PRACE Council voted the Open R industrial offer in January 2012, PRACE has been able to attract more than 10 European companies, large companies as well as SMEs for using its HPC facilities as well as the others high-value services. PRACE is considering to extend the industrial offer by designing a new specially tailored programme for engaging SMEs on using HPC and numerical simulation. This programme called SHAPE (SME HPC Adoption Programme in Europe) will be based on an integrated set of services spanning from networking, training, expertise provided by HPC experts and well as domain-specific or applied mathematics experts, access to PRACE HPC systems and support for identifying funding sources.

The goal of SHAPE is really to allow SMEs to assess the potential and the ROI (Return on Investment) of using HPC for being more competitive and creating new value. Such assessment will be performed by SMEs by co-developing a concrete industrial project with experts and demonstrating it using PRACE HPC resources.

After this demonstration companies will have a clear view about the potential of HPC, the investments to perform, the skills to hire, the software or methodologies to develop, and they could either continue to use PRACE services for Open R services or to take advantage of commercial activities by buying their own HPC facilities or access remote HPC services on commercial Cloud platforms.

In order to strengthen its relations with industrial users, PRACE has also established an Industrial Advisory Committee which aims to gather feedback from executives from European companies and to help PRACE to tailor its industrial offer.

Finally, in order to give to the HPC vendors key directions on the development of competitive technology for addressing future academic and industrial challenges, PRACE has also engaged collaboration with the newly created European HPC Technology Platform (ETP4HPC).

Website :

<http://www.prace-ri.eu>

Primary authors : Dr. REQUENA, Stephane (GENCI) ; Dr. ERBACCI, Giovanni (CINECA)

Co-authors :

Presenter : Dr. REQUENA, Stephane (GENCI)

Track classification : Competitive industries

Contribution type : Success story

Submitted by : EICKERMANN, Thomas

Submitted on Monday 11 February 2013

Last modified on : Monday 11 February 2013

Comments :