



## DEISA

### Distributed European Infrastructure for Supercomputing Applications

The DEISA Consortium continues its work in the DEISA2 project with EU FP7 support from 2008 to 2011. DEISA2 focuses on the provisioning and operation of infrastructure services which allow its users to work efficiently within a distributed high performance computing environment. Through these services and the continued operation of a world-class infrastructure of global importance, DEISA2 contributes to the effective support of world-leading computational science in Europe. As final goal DEISA2 is aiming to advance the existing distributed European HPC environment to a turnkey operational solution for a persistent European HPC ecosystem.

#### **Towards a Pan-European wide HPC *turnkey solution***

During the first project year six new systems, most of them in the Top100, have been successfully integrated into the existing infrastructure. It has to be emphasized that some of these systems are based on hardware architectures previously not existing in DEISA, thus the DEISA software stack and user environment had to be ported. The modular concept of the stack eased this in principle complex task and proves the right concept for the future.

The Pan-European HPC infrastructure operated already consists of:

- Dedicated 10Gbit Network
- Global File System and Fast Data Transfer Tools
- Unified Job Submission and Workflow Management, including Portals
- Global Authentication, Authorization and Accounting Services
- Unified User Environment and Support

This infrastructure is complemented by the tight collaboration of the administrative and user support staff of all sites by having an Operator on Duty and a Helpdesk on Duty switching weekly from one site to the next.

#### **Associate partners**

As first Associate Partner, CEA has been integrated. This is of special relevance since CEA is a PRACE principal partner. Integration of further Associate Partners is in progress.

#### **DEISA Extreme Computing Projects**

The DEISA Extreme Computing Initiative (DECI), launched in 2005, continues to support the most challenging supercomputing projects in Europe which require the special resources and skills of DEISA. A European Call for Extreme Computing Proposals is published annually in spring. By selecting the most appropriate supercomputer architectures for each project,

DEISA is opening up the currently most powerful HPC architectures available in Europe for the most challenging projects. This mitigates the rapid performance decay of a single national supercomputer within its short lifetime cycle of typically about 5 years, as implied by Moore's law.

Based on the infrastructure, 42 scientific projects have been awarded supercomputing resources through DEISA during the last DEISA Extreme Computing Initiative call and will compute more than 49 million processor hours on one or more of the 11 DEISA partner sites, including 12 of the Top 100 most powerful supercomputers in the world.

For all these DECI projects applications support now is more and more distributed over the partner sites, using the specialist knowledge of each site for the improvement.

So far scientists from 15 different European countries with collaborators from four other continents have benefited.

### **Support for European Virtual Scientific Communities**

In DEISA2 the consortium is extending its service provisioning model from individual project support, as in the DEISA Extreme Computing Initiative, to persistent service provision to some specific European user communities.

Here the External Relations Activity was successful in setting up a call for the expression of interest. From that call six important communities could be identified

- EFDA (Fusion)
- Euforia (Fusion)
- LFI-Planck (Space Science)
- Virgo/COSMOCOMP (Cosmology)
- ENES (Climate)
- VPH (Life Science)

These Scientific Communities will be supported in several ways:

- allocation of CPU cycles
- help on technological requests by the Technology Activity
- support on software porting by the Application Enabling Activity
- optimising the program-code by the Enhancing Scalability Activity

### **European Leadership in the HPC domain**

Demonstration of the worldwide *European Leadership* in the HPC domain is reflected in invitations to conferences and collaborations worldwide. Several keynote talks and invited talks to explain the European concepts implemented in DEISA show the interest. These concepts influence other projects in the world and the collaborations of DEISA2. Explicitly to be mentioned are: TeraGrid and DoE of the US, and GridAustralia.

### **Standards and Interoperability**

Interoperation in a Grid context worldwide is seen as an important step for supporting international science communities which acquire computing time traversing existing political boundaries. DEISA2 is actively participating in the evaluation and implementation of standards for interoperation, e.g. in OGF and the Infrastructure Policy Group with members DEISA, EGEE, NAREGI, OSG, and TeraGrid.

## Disseminating knowledge and training

All positive developments of the project and an increased effort of the Dissemination Team lead to a much higher international visibility. There have been six keynote talks and more than 25 invited talks at conferences all around the world. The most prominent keynotes were given by Prof. Gentsch at HiPC 2008, the 15<sup>th</sup> IEEE conference on High Performance Computing, in Bangalore on “Extreme Computing on DEISA”, and by Hermann Lederer at SciDAC 2008, the central conference of the DoE of the US, in Seattle on “DEISA2 engaging for a European HPC Ecosystem”. A major dissemination event was ICT 2008 in Lyon where DEISA was having an exhibition booth. Progress and achievements were presented in the DEISA web page, in the DEISA Newsletters and in various Press releases.

Dissemination culminated in the joint DEISA PRACE Symposium 2009 in Amsterdam with around 200 participants from 19 different countries.

Regular training activities complement the portfolio for supporting the efficient exploitation of the supercomputing technologies and resources.

## Summary of overall progress

Already in the first year of the project the results achieved go beyond the expected status and achievements, related to the integration of CEA, the number of integrated and supported different HPC architectures, the number of integrated top level systems of Europe today available, the number of integrated key HPC centres in Europe, the number of integrated HPC centres with major different expertise, the number of supported European user communities, the number of supported European HPC projects, and the number of international collaborations with top level organizations.

### Features

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#### Supercomputing gets its own superhero

What's faster than the speediest supercomputer? How about a high-speed grid linking 12 world-class supercomputers? That's what a European research consortium has built, catalysing European science with world-class supercomputing services.

Just five years ago, European scientists needing supercomputer time faced a fragmented and frustrating system. A scientist in one country might have access to just that country's supercomputer, which might well be obsolescent or obsolete.

As a result, many European scientists could not pursue cutting-edge research in computationally demanding areas, such as cosmology, climatology, or nuclear fusion.

Europe's supercomputing landscape is completely different today, thanks to [DEISA](#) (Distributed European Infrastructure for Supercomputing Applications), an [EU-funded](#) project that has linked a dozen of the world's fastest supercomputers into one smoothly functioning transcontinental grid.

"Cross-national communication was extremely difficult, and the rules and behaviour for accessing each supercomputer were all different," says Hermann Lederer, in charge of DEISA external relations. "But now, through DEISA, a scientist in Italy can access a new supercomputer, say, in the Netherlands, and in addition have a more comfortable way of addressing it."

DEISA is one of just two top-level supercomputing grids in the world, the other being TERAGRID, in the USA. "In



*Figure: Screenshot of feature story from ICT Results, April 6, 2009*

*(<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&BrowsingType=Features&ID=9047>)*

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