
PRACE

Towards a persistent digital research infrastructure

Sanzio Bassini PRACE Council Chair

PRACE History: an Ongoing Success Story

Creation of the Scientific Case

Signature of the MoU

Creation of the PRACE Research Infrastructure

HPCEUR | HET | PRACE Initiative | PRACE RI

2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

PRACE Preparatory Phase Project

PRACE-1IP

PRACE-3IP

PRACE-2IP

The HPC European e-infrastructure

- **25** members, AISBL since 2010
- **530 M€** for 2010-2015 (inc 70M€ from UE)
- **6** supercomputers in **4** hosting countries, different architectures
- research and industrial access (open R&D) for all disciplines **based on excellence in science, free of charge**
- Nearly **15 Pflop/s**
- **8 billion** hours granted since 2010
- European HPC Research Infrastructure in **ESFRI**

Motivations

- EC Communication « HPC : Europe's place in a global race » in Feb. 2012
- Industrial competitiveness as one of the 3 pillars in H2020

EUROPEAN COMMISSION

Brussels, 15.2.2012
COM(2012) 45 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

High-Performance Computing: Europe's place in a Global Race

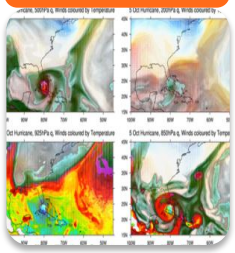
Neelie Kroes,
EC Vice-President responsible for
Digital Agenda

"European Industry is strongly encouraged to make use of the services and know-how offered by PRACE and its partners"

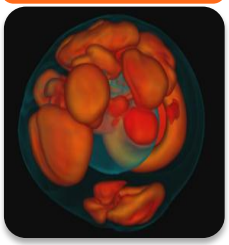
Why is it strategic ?

For science

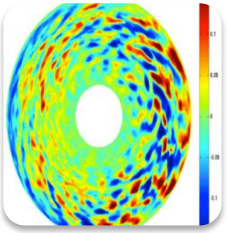
Climate



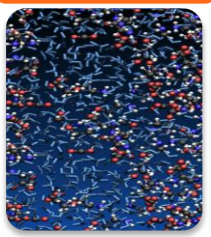
Astrophysics



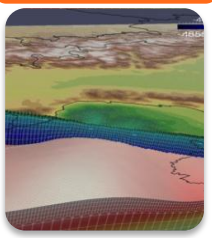
Energy



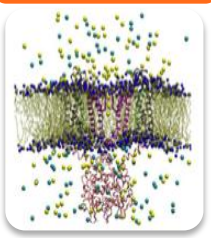
Chemistry



Seismology

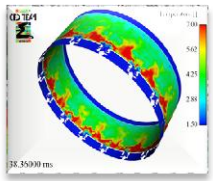


Life Science

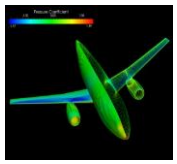


For industry

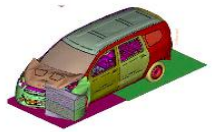
Helicopter Engines



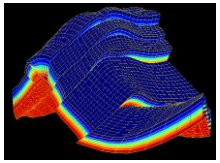
Airplane design



Automotive



Oil search



- **PRACE full digital service for science and innovation**
  - Access for science
  - Access for data
  - Access for industry
  - PRACE for training

PRACE rigid evaluation procedures and close contact with users

Scientific Steering Committee

- **21 European leading scientists**
- **Provides advice and guidance on all matters of a scientific and technical nature**

Access Committee

- **7 world-class researchers experienced in areas of science, engineering and supercomputing**
- **Gives advice to the Board of Directors concerning the allocation of resources**

Industrial Advisory Committee

- **Representatives of 11 different industrial sectors**
- **Provides PRACE with advice on HPC usage for the benefit of European competitiveness and economic growth**

User Forum

- **Forum for users and potential users of PRACE resources**
- **Monitor and support the PRACE research infrastructure user community**

PRACE for Science - Tier-0 Access

In 2014, >15 PFlop/s provided

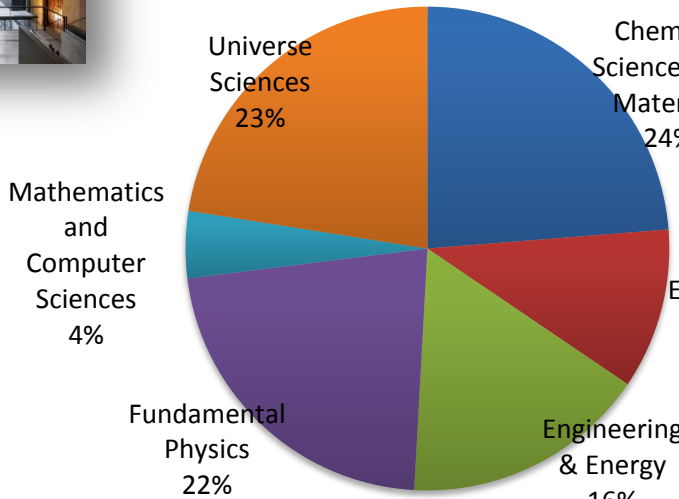
8 BILLION CORE HOURS awarded since 2010

MareNostrum: *IBM BSC Barcelona, Spain*

JUQUEEN: *IBM BlueGene/Q GAUSS/FZJ (Forschungszentrum) Jülich, Germany*

CURIE: *Bull Bullx GENCI/CEA Bruyères-le-Châtel, France*

SuperMUC: *IBM GAUSS/LRZ (Leibniz-Rechenzentrum) Garching, Germany*



HERMIT: *Cray GAUSS/HLRS (High Performance Computing Center Stuttgart) Stuttgart, Germany*

Free access only based on scientific excellence

FERMI: *IBM BlueGene/Q CINECA Bologna, Italy*

Access for Tier-1

- Trough DECI - **Distributed European Computing Initiative**
- Debit – credit, high performance throughput computing, national peer – reviewed open access model
- Parties participating in the “Non-binding memorandum of understanding (MoU) on interim Tier-1 exchange programme”.
- 1 calls a year: Call open in January > Access starting in May
- Allocation period: 1 year for Project Access

- Tier-1 machines available: a range of large clusters including GPU resources made available from Cyprus, Finland, Hungary, Ireland, Poland, Serbia, Sweden, Switzerland, the Czech Republic, the Netherlands, the United Kingdom and Turkey.

Data Management, processing and preservation Pilot

- Second pilot call
- Initially based on technical evaluation
- Further on scientific evaluation especially for what performances matters
- Integrating EUDAT Technology
- In accordance with EUDAT

Scientific impact

By April 2014, 242 papers have been published, reaching a total of 1112 citations

- 4 papers in Nature
- 2 papers in the Proceedings of the National Academy of Sciences

The most highly cited paper has received 50 citations in about 2 years

The h-index of publications arising from PRACE access is 16

The average impact of papers published before 2014 is 3.95 (ignoring non-cited items, it is 4.87)

41 papers published before 2014 has not yet been cited, of which 22 were published 2013

PRACE for industries

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SHAPE Pilot

- 14 companies applied to the Call for Proposals (Summer 2013)
- 10 companies were selected by the Jury (November 2013)
  - Good EU representation: companies from Bulgaria, France, Germany, Ireland, Italy, Spain and the UK
  - Various domains covered: CFD, life sciences, naval, digital media, electromagnetism, pharmaceutics, micro electronics, etc.
- Projects carried out (between December 2013 and Summer 2014)
  - Results showcased during **PRACEdays14** in Barcelona
  - Reports available at: http://www.prace-ri.eu/shape-prototypes/
- PRACE Council voted for a **permanent SHAPE** service
- Second Shape call for proposal is currently open

Access for Centres of Excellence (CoE)

- 0.5% of the total resources available for this call is reserved for Centres of excellence (CoE)
- CoE are selected by the EC, under the E-INFRA-5-2015 call for proposals.
- CoE don't need to apply to this PRACE call – if funded by the EC -> all CoE who requests access to PRACE resources will be awarded PRACE resources from this reserve

PRACE for Training

PATC

- PRACE Advanced Training Centers
- Code-enabling

PATC action

- 125 training class
- 2700 trainees

Summer of HPC

- Summer placements at HPC centres to late stage undergraduates and early stage postgraduate students.
- Up to ten top applicants per year

How can researchers access the HPC resources available via PRACE?

1. **The Preparatory Access call**
2. **The Project access call**
3. **Access for Tier-1**
4. **Access for Centres of Excellence**
5. **Shape Pilot for industries**
   - **Data pilot**

PRACE Strategy for 2015-2020

Provide an e-infrastructure for science and industry

- To maintain Europe as a Science world class contributor
- By offering access to leading edge platforms opened to all disciplines and countries in Europe

Provide an high quality service

- With at least one supercomputer in each major architectural class
- Including High performance data processing and Tier-1 access
- To support world-leading science and innovation

Attract, train and retain competences

- To attract, train and retain highly skilled and innovative workforce in science and engineering
- To share knowledge and expertise

Lead the integration of an highly effective High Performance ecosystem

- A) scientific and industrial communities
- B) national HPC centres and their support for the PRACE systems
- C) training and software development efforts

Association constitued as a binding **contractual agrement between Members State rapresented by delegated institutions**

- Peer reviewed open access of an integrated digital infrastructure
- For long term persistency of services on which do relay the researchers and innovators to attack scientific and socio economical challenges