21st Summer School of PARALLEL COMPUTING

July 2 - 13, 2012 (Italian)
September 3 - 14, 2012 (English)

High Performance Computing at CINECA

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CINECA

CINECA

Non profit Consortium, made up of 51 Italian universities, The National Institute of Oceanography and Experimental Geophysics - OGS, the CNR (National Research Council), and the Ministry of Education, University and Research (MIUR).

SCAI (SuperComputing Applications and Innovation) is the High Performance Computing department of CINECA, the largest computing centre in Italy and one of the largest in Europe.

HPC Department

About 50 people:

- IT specialists
- Chemists
- Physicists
- Mathematicians
- Biologists

Our activities

- **support the scientific community by providing high performance computing resources, data management and storage systems and tools**
- **HPC services and consultant at large, aiming to develop and promote technical and scientific services related to high-performance computing for the Italian and European research community**
- **Research activities on new technologies, e.g. NVIDIA GPUs (**we are currently a CUDA Research Center**), Intel MIC**
- **Scientific visualization**
- **Training on HPC**, in particular we are one of the 6 PRACE PATCs (PRACE Advanced Training Centres) aimed to carry out and coordinate training and education activities that enable the European research community to utilize the computational infrastructure available through PRACE.

Supercomputing history @ CINECA

1969	CDC 6600	**3 MegaFlops**
1985	Cray X-MP/12	**150 MegaFlops**
1994	Cray T3D/64	**250 MegaFlops**
2003	IBM SP POWER4	**2 TeraFlops**
2009	IBM PLX	**24 TeraFlops**
2009	IBM SP POWER6	**100 TeraFlops**
2010	Blue Gene/P	**14 TeraFlops**
2012	Blue Gene/Q	**2 PetaFlops**

PetaFlop =10^15 floating operations per second

Top500 List

TopGreen500 LIst

PLX

Model: IBM iDataPlex DX360M3
Architecture: Linux Infiniband Cluster
Processor Type:

- Intel Xeon (Esa-Core Westmere) E5645 2.4 GHz (Compute)
- Intel Xeon (Quad-Core Nehalem) E5530 2.66 GHz (Service and Login)

Number of nodes: 274 Compute + 1 Login + 1 Service + 8 Fat (reserved) + 6 RVN + 8 Storage + 2 Management
All the nodes are interconnected through a Infiniband network, capable of a maximum bandwidth of 40Gbit/s.
Number of cores: 3288 (Compute)
Number of GPUs: 528 nVIDIA Tesla M2070 + 20 nVIDIA Tesla M2070Q
RAM: 14 TB (48 GB/Compute node + 128GB/Fat node)

PLX system performance

Peak performance: 32 Tflops (3288 cores a 2.40GHz)
Peak performance: 565 TFlops SP or 283 TFlops DP (548 Nvidia M2070)

FERMI

Architecture: 10 BGQ Frame
Model: IBM-BG/Q
Processor Type: IBM PowerA2, 1.6 GHz
Computing Cores: 163840
Computing Nodes: 10240
RAM: 160 TB (1GByte / core)
Internal Network: Network interface with 11 links ->5D Torus
Disk Space: 2PByte of scratch space
Peak Performance: 2PFlop/s

Who we work for

Academia:

- National Italian projects (ISCRA)
- European Projects (PRACE, EUDAT, …)
- Try accounts (to ask superc@cineca.it for)
- Specific agreements (e.g. SISSA, OSG, ...)

ISCRA projects are also available to non-Italian nationals providing the PI is based in an Italian Institution (collaborators can be based anywhere).

Industries:

Eni (geophysics, fluid dynamics)
Dompé (molecular dynamics)
BMW-Oracle (hydrodynamics)
Arpa (meteorology)

ISCRA

CINECA, through the **Italian SuperComputing Resource Allocation**, releases Call for Proposals twice a year, to ensure an adequate supply to scientists and engineers for HPC-related research.

The request for resources may be submitted under different classes:
Class A projects: Large projects - greater than 5Million CPU hours
Class B projects: Standard projects - between 2M and 5Million CPU hours
Class C projects: Small projects - up to 2Million CPU hours

Proposals are evaluated by international reviewers for the scientific aspects and by CINECA experts in order to check the feasibility of the resources requested.

Next deadlines:
February 28th 2013 (classC)
23 October 2012 (classA/B)
The projects selected will be activated in Spring 2013 on BG/Q.

PRACE

Partnership for Advanced Computing in Europe

http://www.prace-project.eu/

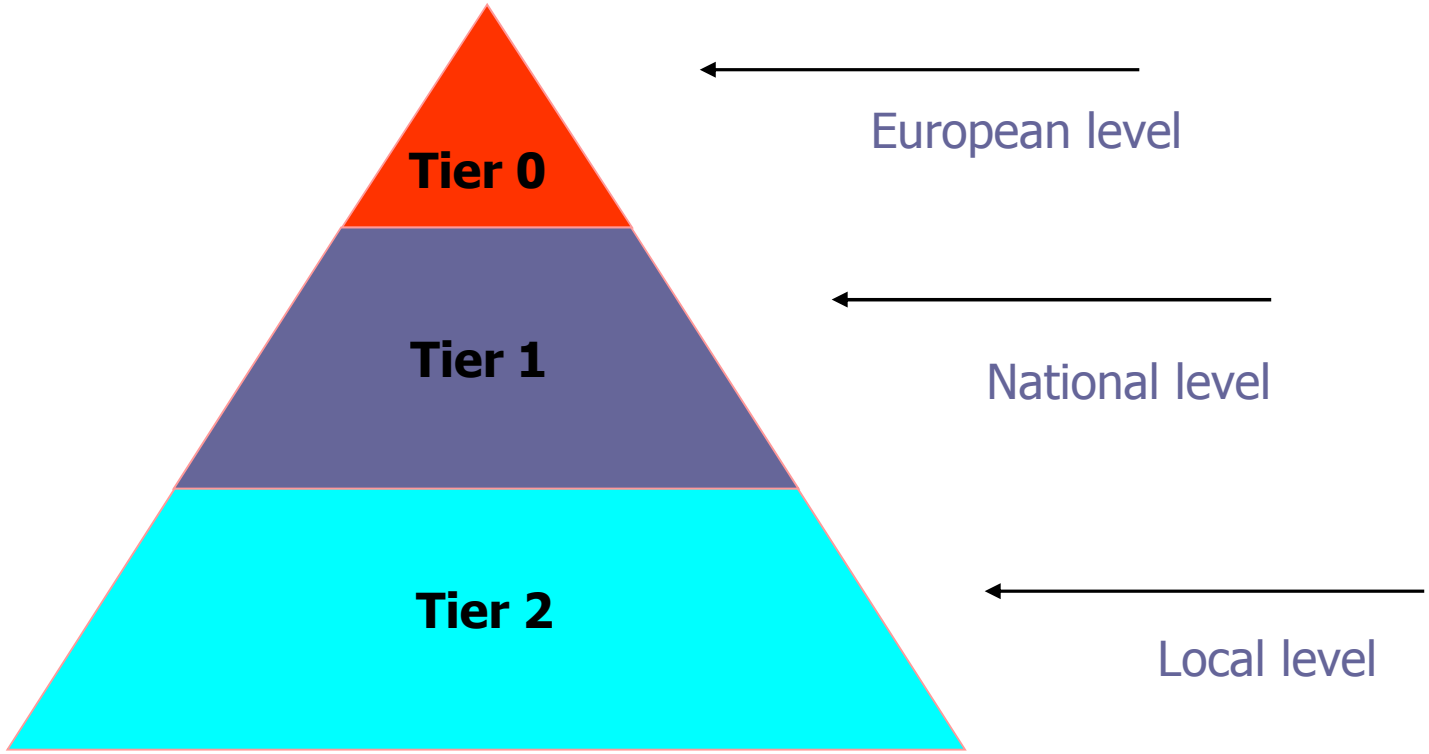
PRACE is has the aim of creating a European Research Infrastructure providing world class systems and services and coordinating their use throughout Europe.

It covers both hardware at the multi petaflop/s level and also very demanding software (parallel applications) to exploit these systems.

20 members representing 20 European countries

HPC Eco-system in Europe

European HPC-facilities at the top of an HPC provisioning pyramid



PRACE offers access to Tier 0 and Tier 1 systems

PRACE Resource Access

Call for Proposals for 5th PRACE Project Access and Multi-year Access (Tier-0) and synchronized Call for DECI-9 (Tier-1)

- IBM Blue Gene/Q “JUQUEEN” (GCS@Jülich, Germany)
- Bull Bullx cluster “CURIE” (GENCI@CEA, France)
- Cray XE6 “HERMIT” (GCS@HLRS, Germany)
- **FERMI (CINECA, Italy)**
- SuperMUC (GCS@LRZ, Germany)
- MareNostrum (BSC, Spain)

About 1.300M core hours available

PRACE Tier 0 Access

Preparatory Access
– Intended for preliminary resource use required to prepare proposals for Project Access
– Technical review

• **Project Access**
– Intended for individual researchers and research groups including multinational research groups
– Technical and Scientific review

• **Program Access**
– Available to major European projects or infrastructures that can benefit from PRACE resources
– Planned for 2 years allocation

Support and documentation

Help desk system

- Email address superc@cineca.it
- Uses a trouble-ticket system to keep track of your request
- Please don't use private email addresses of CINECA staff.

HPC Portal - http://www.hpc.cineca.it/

FOR USERS section contains:
- Status of clusters
- Operator on duty
- Documentation
- Managing accounts (work in progress)

TRAINING section contains:
- Calendar of training events
- Training material
- Online tutorials