Access to HPC resources in Italy and Europe
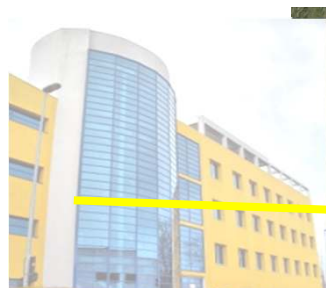
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www.hpc.cineca.it

CINECA 2.0

CINECA
is a non profit Consortium, made up of 70 Italian Universities, 4 research Institutions and MIUR.

CINECA is now the largest Italian computing centre, one of the most important worldwide. .
The High Performance Systems department (SCAI: SuperComputing Applications and Innovation) offers support to scientific and technological research through supercomputing and its applications.

The Story

Year	System	Description
1969:	CDC 6600	1st system for scientific computing
1975:	CDC 7600	1st supercomputer
1985:	Cray X-MP / 4 8	1st vector supercomputer
1989:	Cray Y-MP / 4 64	
1993:	Cray C-90 / 2 128	
1994:	Cray T3D 64	1st parallel supercomputer
1995:	Cray T3D 128	
1998:	Cray T3E 256	1st MPP supercomputer
2002:	IBM SP4 512	1 Teraflops
2005:	IBM SP5 512	
2006:	IBM BCX	10 Teraflops
2009:	IBM SP6	100 Teraflops
2012:	IBM BG/Q	2 Petaflops
2015:	IBM GALILEO	1 Petaflops
2017:	Lenovo MARCONI	>16 Petaflops
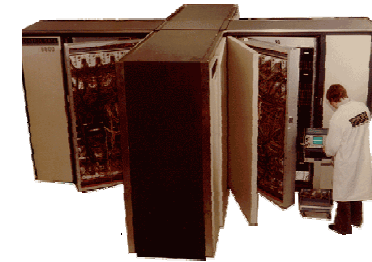
GALILEO

Name: Galileo

Model: IBM NeXtScale

- **Architecture:** IBM NeXtScale

Processor type: Intel Xeon Haswell@ 2.4 GHz

Computing Nodes: 516

Each node: 16 cores, 128 GB of RAM

- **Computing Cores:** 8.256

RAM: 66 TByte

Peak Performance: 1.2 PFlops

Internal Network: Infiniband 4xQDR switches (40 Gb/s)

Accelerators: 768 Intel Phi 7120p (2 per node on 384 nodes)

+ 80 Nvidia K80 (2 per node on 40 nodes)

- **National and PRACE Tier-1 calls**

X86 based system for production of medium scalability applications

MARCONI-A1

Name: Marconi-A1

Model: Lenovo NeXtScale

- **Architecture: Intel OmniPath Cluster**

Processor type: Intel Xeon Broadwell @ 2.3 GHz

Computing Nodes: 1.512

Each node: 36 cores, 128 GB of RAM

- **Computing Cores: 54.432**

RAM: 193 TByte

Peak Performance: 2 PFlops

Internal Network: Intel OmniPath

- **National and PRACE Tier-1 calls**

X86 based system for production of medium scalability applications

MARCONI-A2

Name: Marconi-A2

Model: Lenovo Adam Pass

- **Architecture: Intel OmniPath Cluster**

Processor type: Intel Xeon Phi 7250 @1.40 GHz

Computing Nodes: 3.600

Each node: 68 cores, 96+16 GB of RAM

- **Computing Cores: 244.800**

RAM: 403 TByte

Peak Performance: 11 PFlops

Internal Network: Intel OmniPath Architecture 2:1

- **National and PRACE Tier-0 calls**

MARCONI

System as a whole:

- >16 PFs peak performance,

- 10 PB storage

- 3 MW electric absorbed power

Technical characteristics:

- Internal network: Intel OmniPath

- Architecture: Lenovo NeXtScale

- A1: Broadwell 2x18 cores, 2.3 GHz; 1500 nodes, 2 PFlops

- A2: KnightsLanding 68 cores, 1.4 GHz; 3600 nodes, 11 PFlops

- A3: SkyLake 2x20 cores, 2.3 GHz; 1500 nodes, 4,5 PFlops

BigData - PICO

**Storage and processing
of large volumes of data**

Name: Pico
Model: IBM NeXtScale
Processor type: Intel Xeon Ivy Bridge@2,5Ghz
Computing Nodes: 66+
Each node: 20 cores, 128 GB of RAM
Computing Cores: 1.320+
RAM: 6,4 GB/core

plus

2 Visualization nodes (with 2 GPU NVIDIA K40)
2 Big Mem nodes (512 GB RAM)
4 BigInsight nodes (32 TB of local disk)
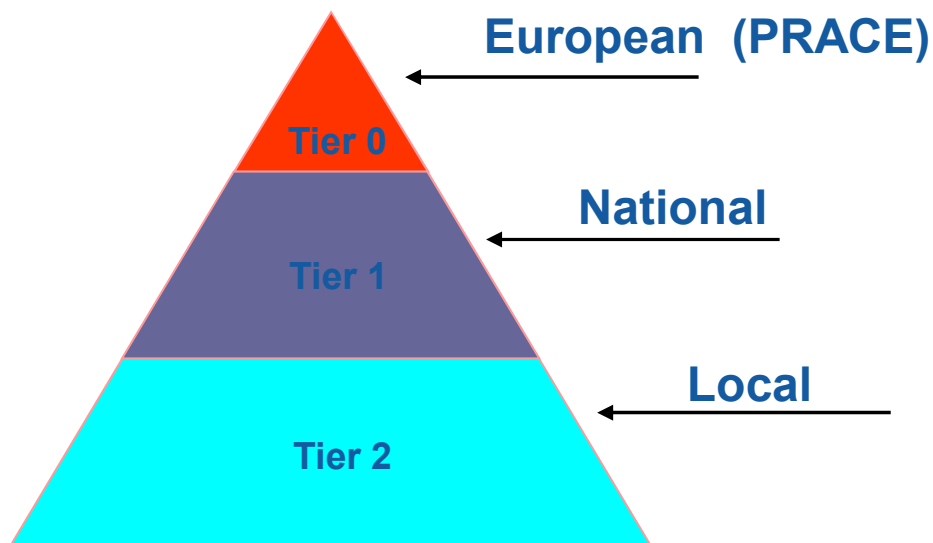2 Very Large Mem nodes (1TB RAM)

The European HPC-Ecosystem

- European (PRACE) → Tier 0
- National → Tier 1
- Local → Tier 2

Creation of a European HPC ecosystem involving all stakeholders
- ✓ HPC service providers on all tiers
- ✓ Scientific and industrial user communities
- ✓ The European HPC hw and sw industry

- PRACE Research Infrastructure (www.prace-ri.eu): the top level of the European HPC ecosystem

- **CINECA:**
- - represents Italy in PRACE
- - hosting member in PRACE
    - Tier-0 system
    - Tier-1 system
  involved in PRACE 1IP, 2IP,3IP
- PRACE 2IP prototype EoI

Our objectives:

✓ Providing Italian and European researchers with an advanced computational environment

✓ Supporting Italian researcher for increasing their competitiveness

✓ Following Italian researchers in their path towards Tier 0

✓ Soliciting large-scale and computationally intensive projects

Basic principles:

✓ Transparency
✓ Fairness
✓ Conflict of Interest management
✓ Confidentiality

- Peer reviewed projects:

  you can submit a project that will be reviewed. If you win you will get the needed resources for free

  Local (Lombardy), National, Europe

- No selection:

  some Institutions buy an amount of resources to be distributed among the research staff

- Resources payed by
  - Lombardy   ->   LISA

    http://www.hpc.cineca.it/services/lisa

  - Italy   ->   ISCRA

    http://www.hpc.cineca.it/services/iscra

  - Italy/Europe   ->   ELIXIR

    http://elixir-italy.org/singolo-servizio/?blog=1&id=664

  - Europe   ->   PRACE

    http://www.prace-ri.eu/call-announcements/

Peer reviewed projects

- On race with other researchers

- Define required resources and expected results

- Write final report and possibly justify unattained objectives

Two classes of proposals:

- A "**production**" project is characterized by a mature proposal, ready to run on the HPC machines, based on methods and software already tested, with duration 12 months and a request of core hours between 200K and 2M (BDW) or between 400K and 4M on KNL;

- A "**development**" project is a proposal with a low request of HPC resources, but a high impact on the development aspects of software and/or computational methods and/or on porting on Cineca HPC infrastructure and a maximum duration of 6 months.

Class B: Standard Projects
- two calls / year
- max 2M core hours (BDW) / 4M core-h (KNL)
- project gets access to HPC resources in 3 months
- duration: 12 months

Class C: Small Projects
- continuous submission, 1 selection per month
- max 200K core-h (Galileo, BDW) / 400K core-h (KNL)
- about 15 days before activating the project.
- duration: 9 months

Trial: on demand

Total budget of 2M core hours and 200 TB storage for small
bioinformatics projects only

- continuous submission
- 50K core-h (PICO) + 5 TB storage
- about 14 working days before activating the project.
- duration: 12 months

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 multi-national research groups
- Technical and Scientific review

Call for proposals calendar

ISCRA Call:

- Class B: Next call: June 1st - July 21st 2017
- Class C: cut-off dates each month at the 15th.

PRACE Call:

- Project Access: open in September 2017
- Preparatory access: continuously open call

LISA Call: no open call

No selection resources

Conventions/ collaborations/ agreements

– no need to present a project

– no need to write relations

– no consumption of resources obtained by selection

No selection resources

Conventions / collaborations / agreements reserved to ResearchEntities

Convenzione INFN

Convenzione Università degli studi di Milano Bicocca

Convenzione Fondazione Istituto Italiano Tecnologia

Convenzione Politecnico di Milano

Convenzione Scuola Internazionale Superiore di Studi Avanzati, SISSA

Convenzione Università degli Studi di Milano

Convenzione International Centre for Theoretical Physics, ICTP

Convenzione Azienda Ospedaliera Lazzaro Spallanzani

Convenzione Consiglio Nazionale Ricerche, CNR –cnrS3

Convenzione Università degli Studi di Trieste

Convenzione Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, OGS

Convenzione Università degli Studi di Bergamo

Convenzione Università degli studi di Brescia

Convenzione Università Luigi Bocconi

Convenzione European University Institute-EUI

Convenzione Ospedale Bambin Gesù –ISS

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