Access to HPC resources in Italy and Europe

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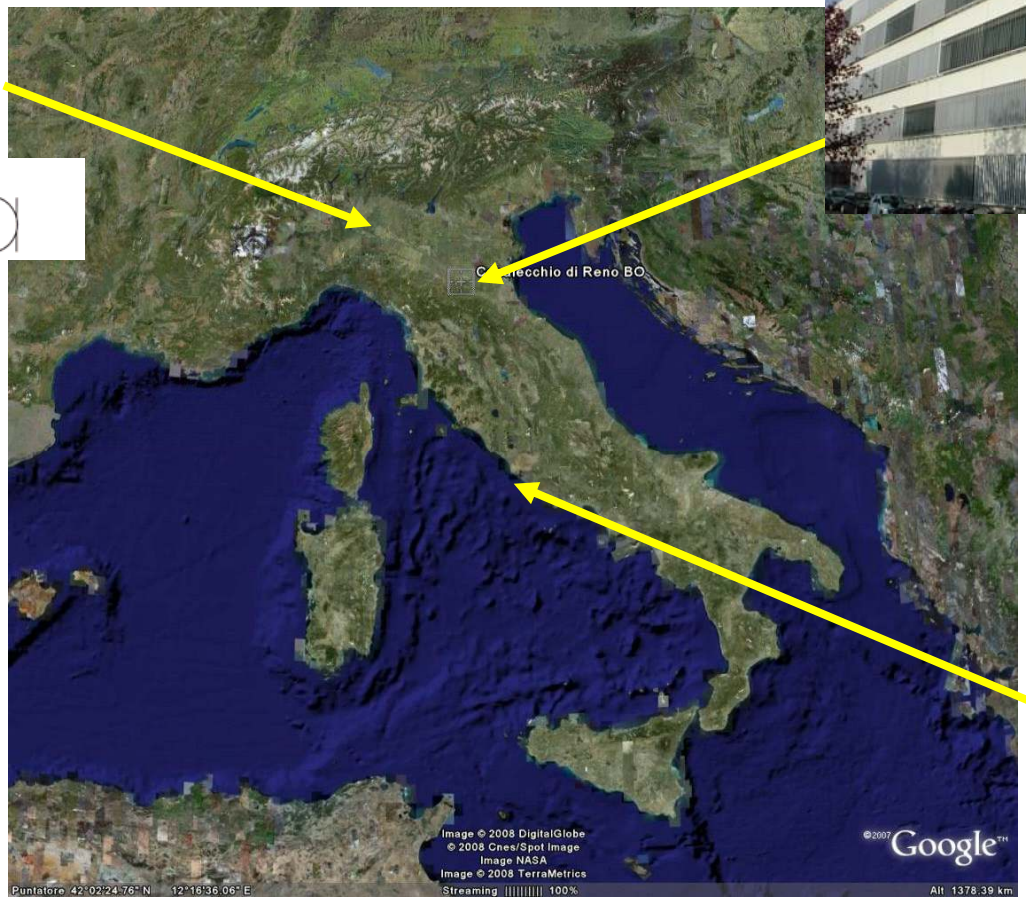
CINECA 2.0

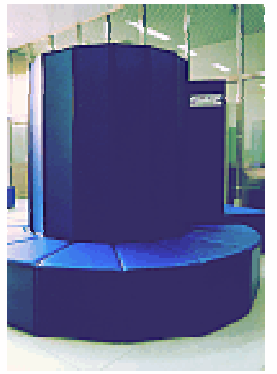


CINECA

CASPUR

The Story

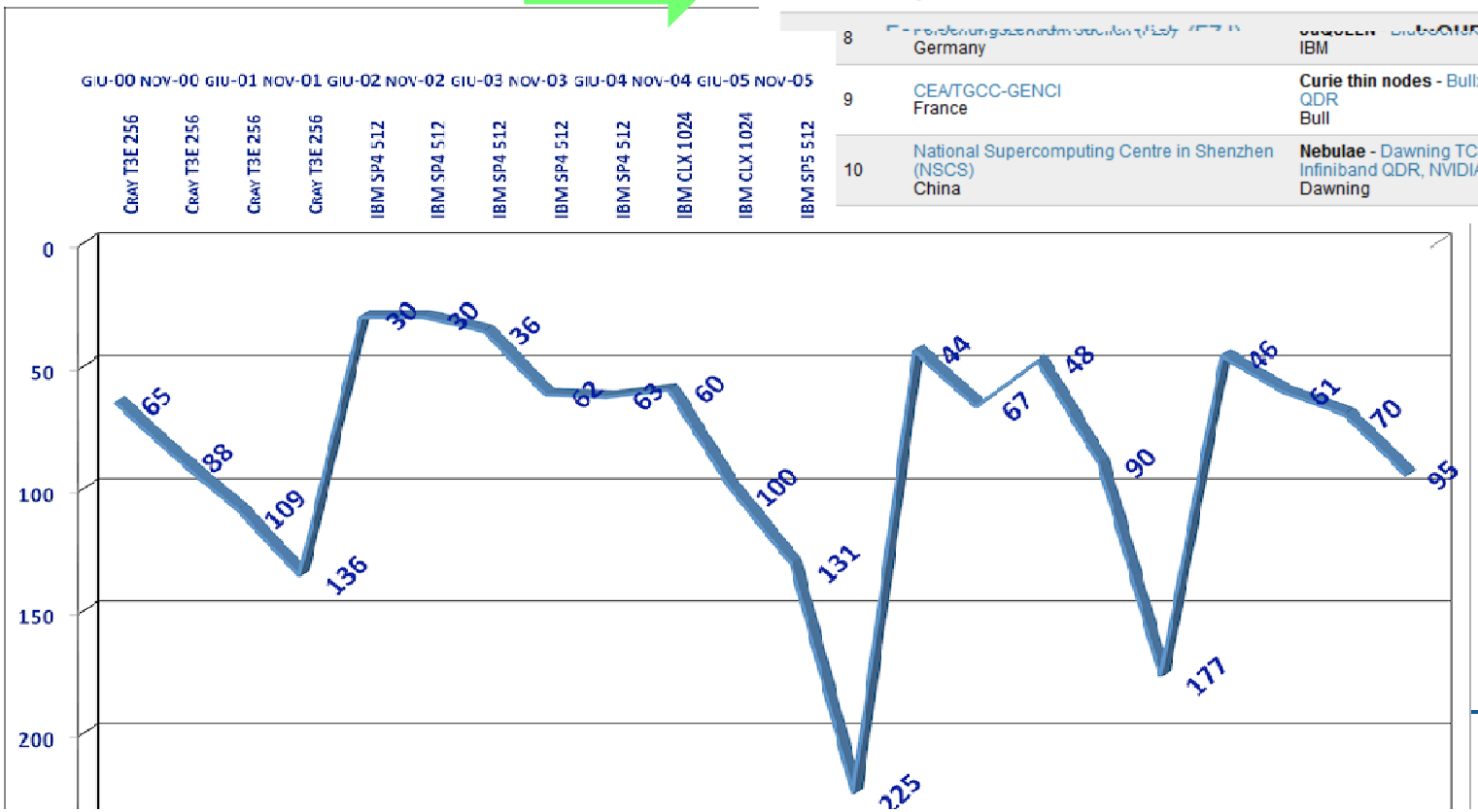
1969:	CDC 6600	1st system for scientific computing
1975:	CDC 7600	1st supercomputer
1985:	Cray X-MP / 4 8	1st vector supercomputer
1989:	Cray Y-MP / 4 64	
1993:	Cray C-90 / 2 128	
1994:	Cray T3D 64	1st parallel supercomputer
1995:	Cray T3D 128	
1998:	Cray T3E 256	1st MPP supercomputer
2002:	IBM SP4 512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



TOP500

#7 june 2012

Rank	Site	Computer
1	DOE/NNSA/LLNL United States	**Sequoia** - BlueGene/Q, Power BQC 16C 1.60 GHz, Custom IBM
2	RIKEN Advanced Institute for Computational Science (AICS) Japan	K computer, SPARC64 VIIIfx 2.0GHz, Tofu interconnect Fujitsu
3	DOE/SC/Argonne National Laboratory United States	**Mira** - BlueGene/Q, Power BQC 16C 1.60GHz, Custom IBM
4	Leibniz Rechenzentrum Germany	**SuperMUC** - iDataPlex DX360M4, Xeon E5-2680 8C 2.70GHz, Infiniband FDR IBM
5	National Supercomputing Center in Tianjin China	**Tianhe-1A** - NUDT YH MPP, Xeon X5670 6C 2.93 GHz, NVIDIA 2050 NUDT
6	DOE/SC/Oak Ridge National Laboratory	**Jaguar** - Cray XK6, Opteron 6274 16C 2.200GHz, Cray Gemini interconnect, NVIDIA 2090
7	CINECA Italy	**Fermi** - BlueGene/Q, Power BQC 16C 1.60 IBM
8	[illegible] Germany	[illegible] IBM
9	CEA/TGCC-GENCI France	**Curie thin nodes** - Bullx B510, Xeon E5-2680 8C 2.700GHz, Infiniband QDR Bull
10	National Supercomputing Centre in Shenzhen (NSCS) China	**Nebulae** - Dawning TC3600 Blade System, Xeon X5650 6C 2.66GHz, Infiniband QDR, NVIDIA 2050 Dawning



FERMI@CINECA

Architecture: 10 BG/Q Frames
Model: IBM-BG/Q
Processor type: IBM PowerA2 @1.6 GHz
Computing Cores: 163840
Computing Nodes: 10240
RAM: 1GByte / core (163 PByte total)
Internal Network: 5D Torus
Disk Space: 2PByte of scratch space
Peak Performance: 2PFlop/s

N. 7 in Top 500 rank (June 2012)

National and PRACE Tier-0 calls

EURORA@CINECA

EUROTECH Cluster linux

Processor type: 2 eight-cores Intel Xeon *E5-2687W* Sandy Bridge-EP 3.1GHz

N. of nodes / cores: 64 / 1024

RAM: 16 GB/Compute node

Internal Network: Infiniband & Custom

Accelerators: NVIDIA Tesla K20

(INTEL Xeon Phi coming soon)

Peak performance: 110 TFlops

GALILEO@CINECA

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
Internal Network: Infiniband 4xQDR switches (40 Gb/s)
Accelerators: 768 Intel Phi 7120p (2 per node on 384 nodes + 80 Nvidia K80
Peak Performance: 1.2 PFlops

- National and PRACE Tier-1 calls

X86 based system for production of medium scalability applications

PICO@CINECA

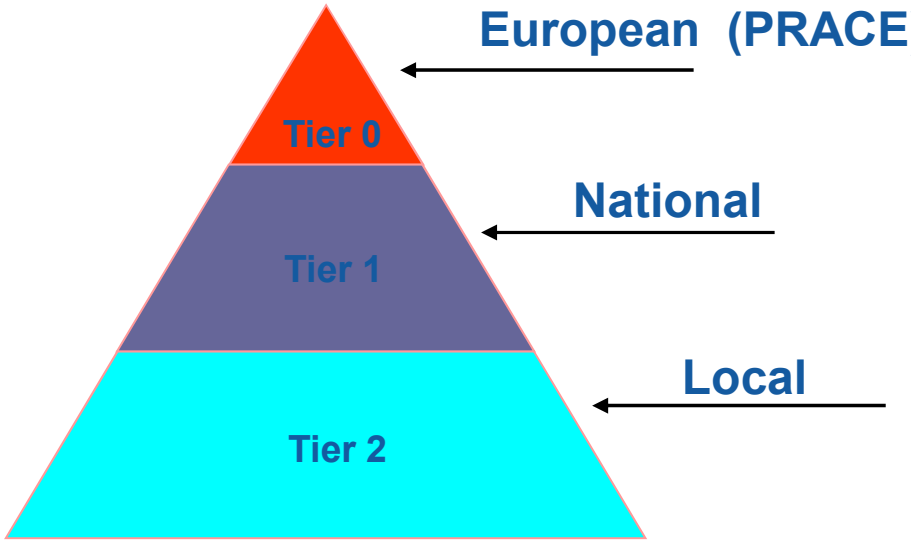
Storage and processing of large volumes of data

Name: Pico
Model: IBM NeXtScale
Architecture: Linux Infiniband cluster
Processor type: Intel Xeon E5 2670 v2 @2,5Ghz
Computing Nodes: 66+
Each node: 20 cores, 128 GB of RAM + 2 accelerators
Computing Cores: 1.320+
RAM: 6,4 GB/core

plus

2 Visualization nodes
2 Big Mem nodes
4 BigInsight nodes

The European HPC-Ecosystem



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

  BG/Q 2 PFlop/s
- - Tier-1 system

  > 5 % GALILEO

- involved in PRACE 1IP, 2IP,3IP
- PRACE 2IP prototype EoI

Access to HPC resources: CINECA aims and basic principles

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

L'offerta HPC

Italy

Europe

HPC in Italy

HPC offer in Italy: ISCRA
Italian SuperComputing Resource Allocation

The aim of ISCRA is to ensure adequate support to Italian scientists and engineers.

The allocation is of 600M core hours per year on

- FERMI

The access is by

- Online submission of proposals
- Peer-review process by an international panel

The proposal are scientifically evaluated by international reviewers and technically evaluated by Cineca experts.

Applications and codes are evaluated on the basis of their computational readiness.

HPC offer in Italy: ISCRA

Class B: Standard Projects; two calls / year

1-10M core hours

duration: 12 months

FERMI only

HPC offer in Italy: ISCRA

Class C: Small Projects

continuous submission, 12 selections per year

>50K core hours

up to 1M core hours on FERMI

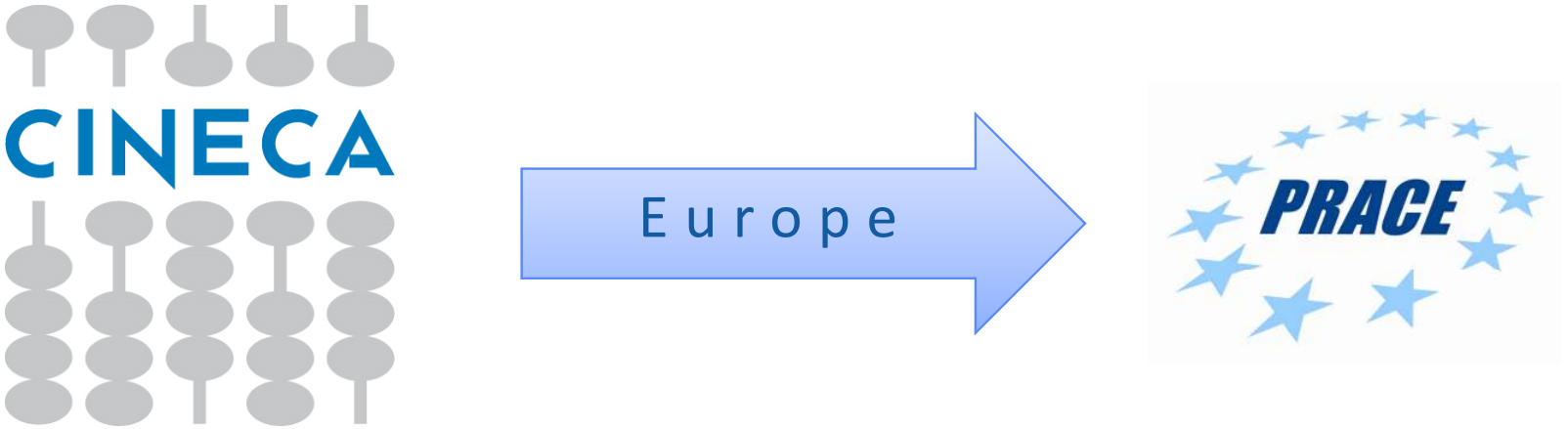
up to 200K core hours on GALILEO

only two C projects approved per year per user

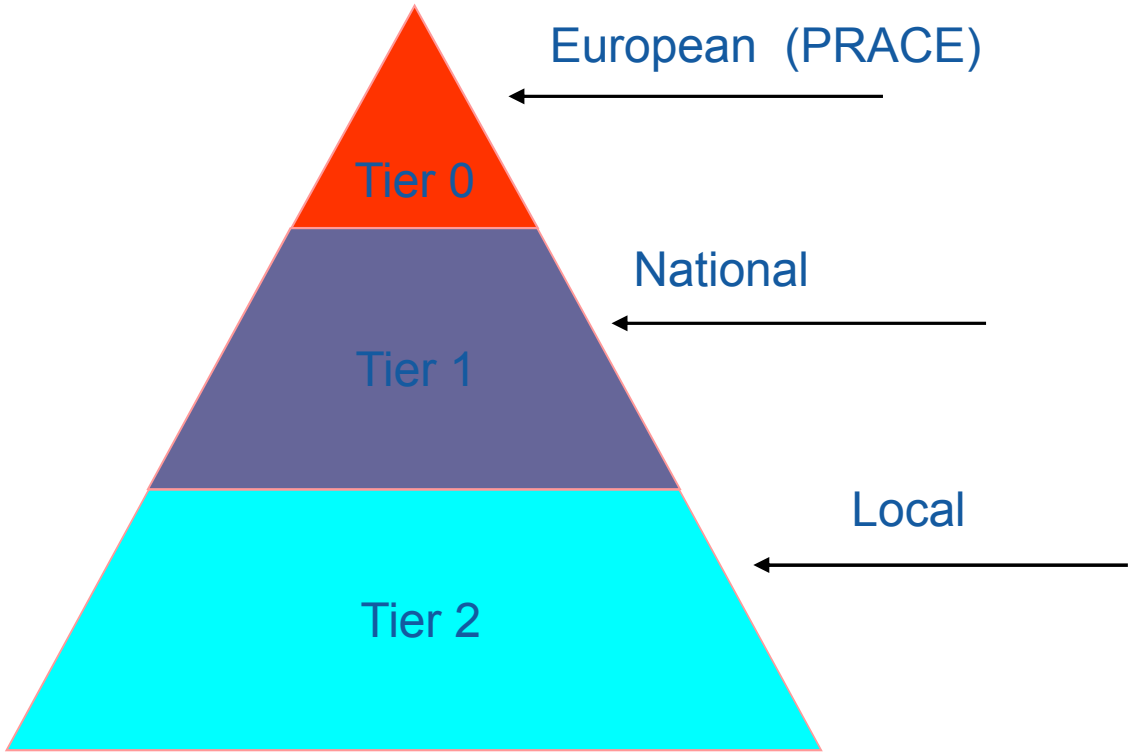
duration: 9 months

Trial: on demand

L'offerta HPC in Europa: PRACE



Computing provisioning pyramid



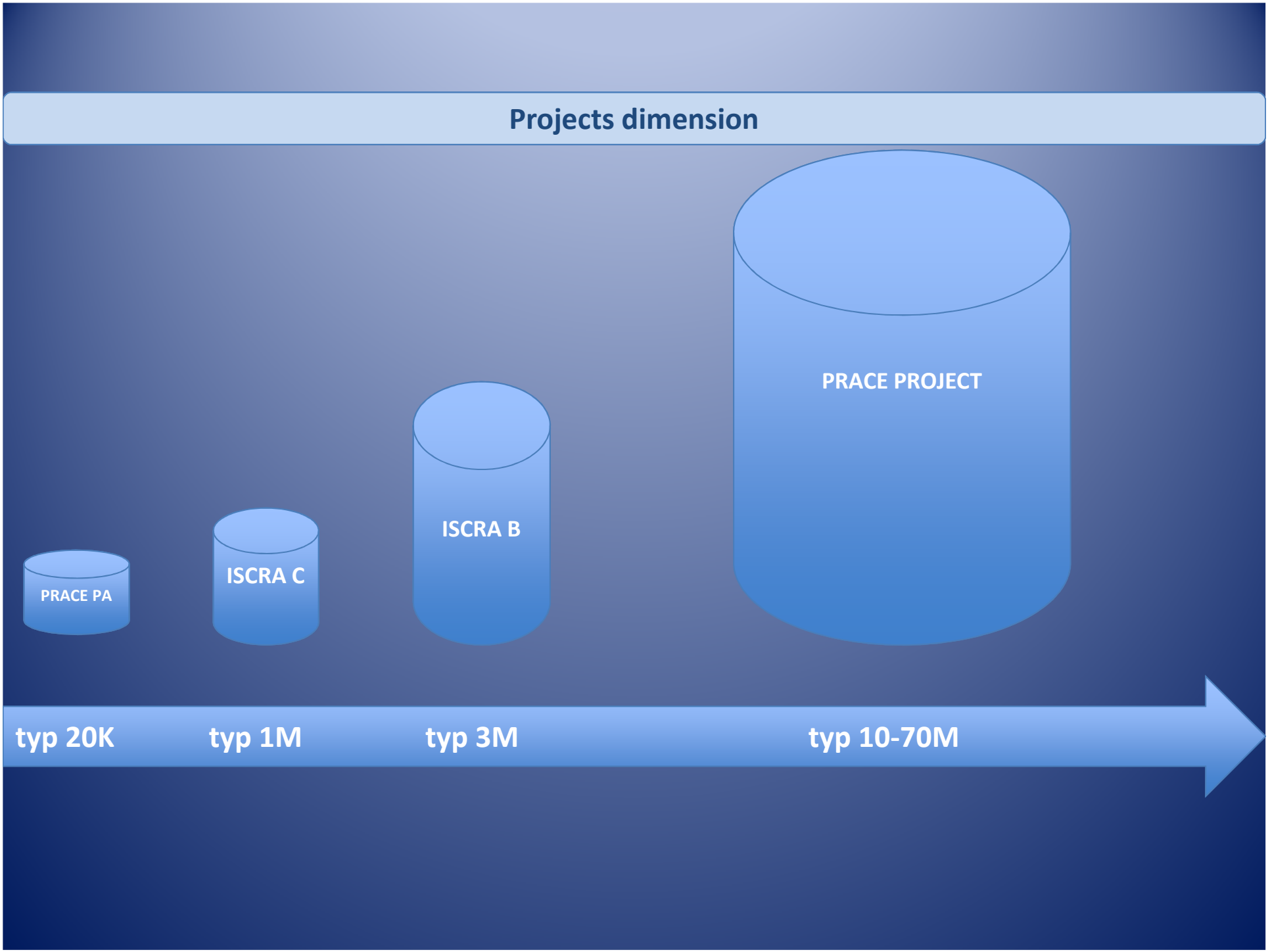
PRACE offers access to Tier 0 (and Tier 1) systems

- **Preparatory Access**
  - Intended for preliminary resource use required to prepare proposals for Project Access
  - Technical review
  - Continuously open calls

- **Project Access**
  - Intended for individual researchers and research groups including multi-national research groups
  - Technical and Scientific review

PRACE Tier 0 Access: CURRENT CALL

- Applications accepted on call
- For projects which use codes that have been previously tested and must have demonstrated high scalability and optimisation


Projects dimension
PRACE PROJECT
ISCRA B
ISCRA C
PRACE PA
typ 20K
typ 1M
typ 3M
typ 10-70M

Useful links

- ISCRA: http://www.hpc.cineca.it/services/iscra
- PRACE: www.prace-ri.eu/hpc-access?lang=en