
BSC
Barcelona
Supercomputing
Center
Centro Nacional de Supercomputación

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EXCELENCIA SEVERO OCHOA

EU Research Infra Integration: a vision from the BSC

Josep M. Martorell, PhD

Associate Director

11/2017

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Ideas on 3 topics:

1. The BSC as a Research Infrastructure
2. The added-value of an European RI for local research communities.
3. How to promote collaborations between PT stakeholders and the BSC

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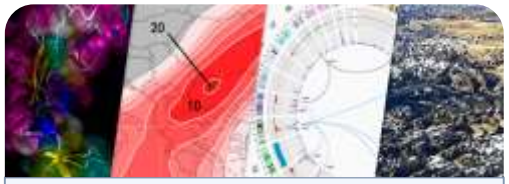
Supercomputing services to Spanish and EU researchers



R&D in Computer, Life, Earth and Engineering Sciences

PhD programme, technology transfer, public engagement

BSC-CNS is a consortium that includes

Spanish Government	60%
Catalonian Government	30%
Univ. Politècnica de Catalunya (UPC)	10%

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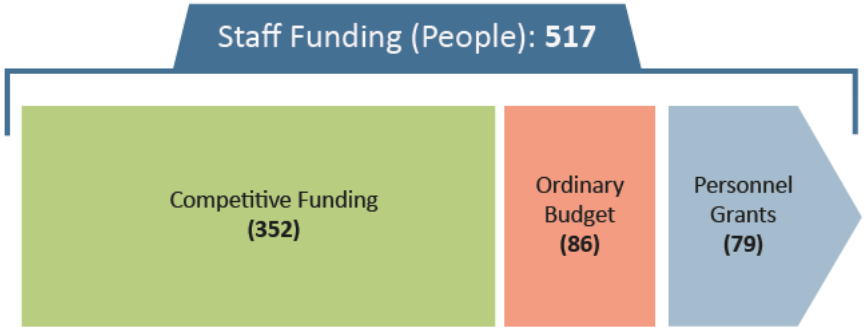
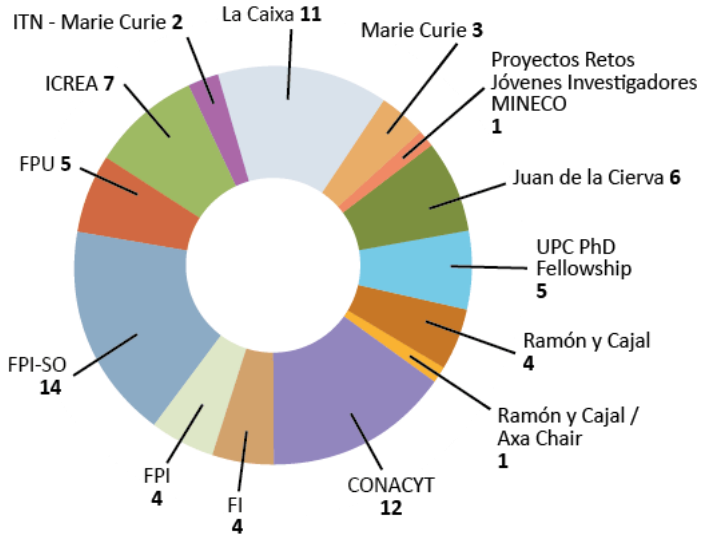
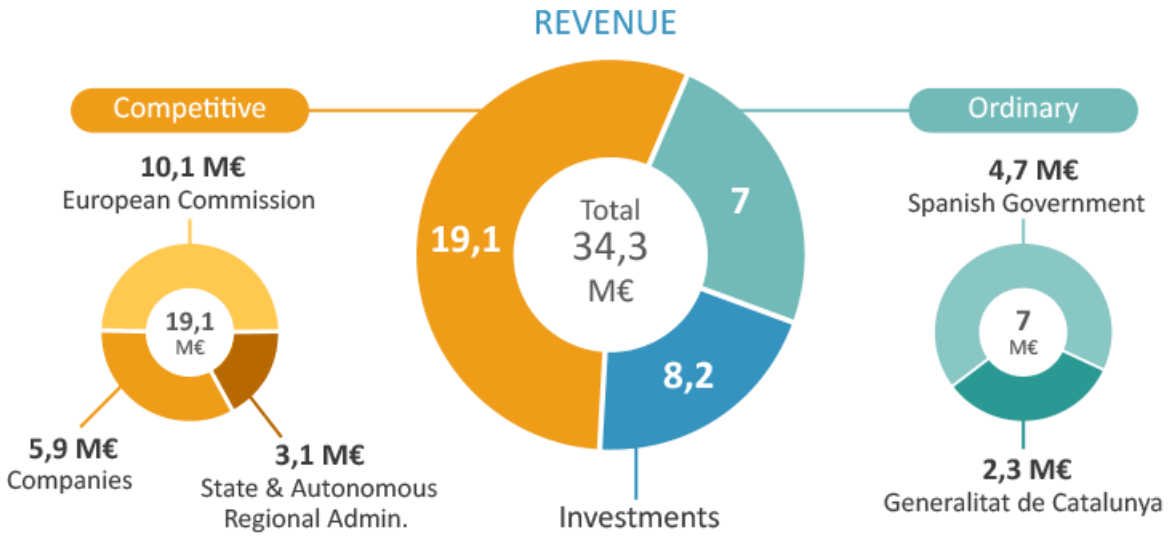
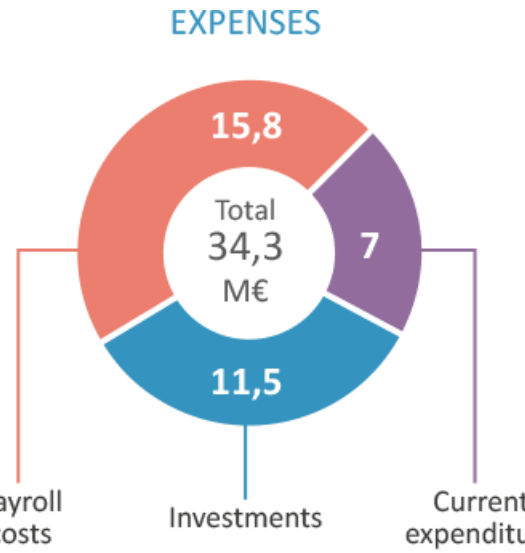
People and Resources



Data as of 31st of May 2017

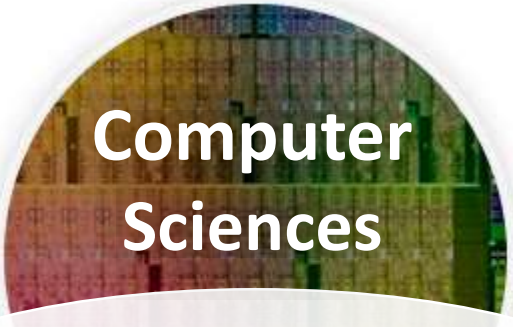




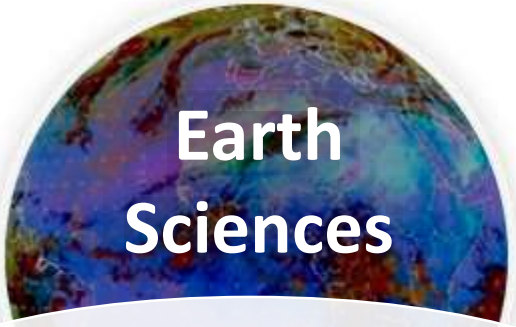


UPC contributes, in terms of assigned staff and room space, the equivalent of 10% of regular income

Mission of BSC Scientific Departments



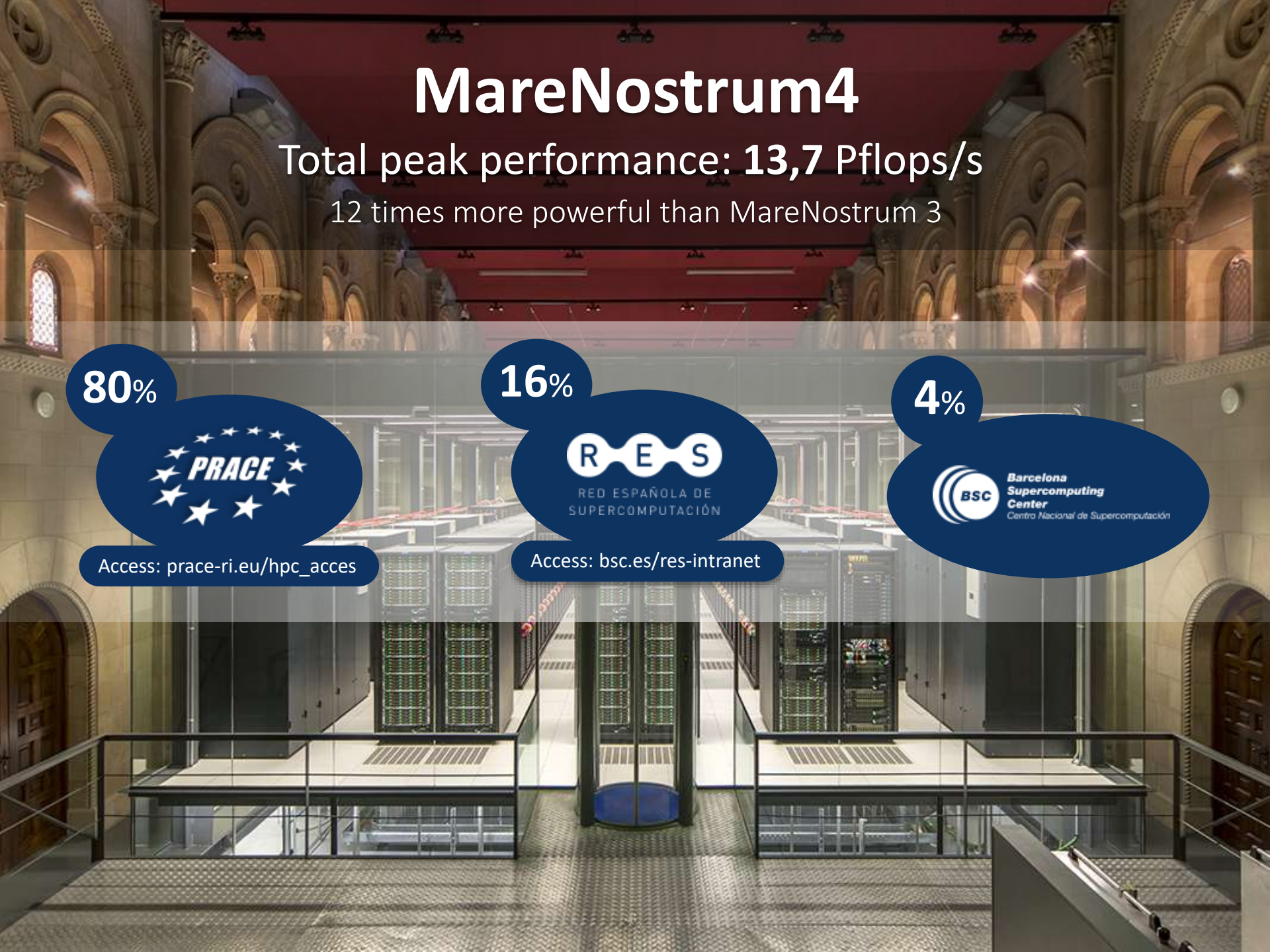
To influence the way machines are built, programmed and used: programming models, performance tools, Big Data, computer architecture, energy efficiency



To develop and implement global and regional state-of-the-art models for short-term air quality forecast and long-term climate applications

To understand living organisms by means of theoretical and computational methods (molecular modeling, genomics, proteomics)

To develop scientific and engineering software to efficiently exploit super-computing capabilities (biomedical, geophysics, atmospheric, energy, social and economic simulations)


MareNostrum4
Total peak performance: 13,7 Pflops/s
12 times more powerful than MareNostrum 3
80%
PRACE
Access: prace-ri.eu/hpc_acces
16%
RES
RED ESPAÑOLA DE SUPERCOMPUTACIÓN
Access: bsc.es/res-intranet
4%
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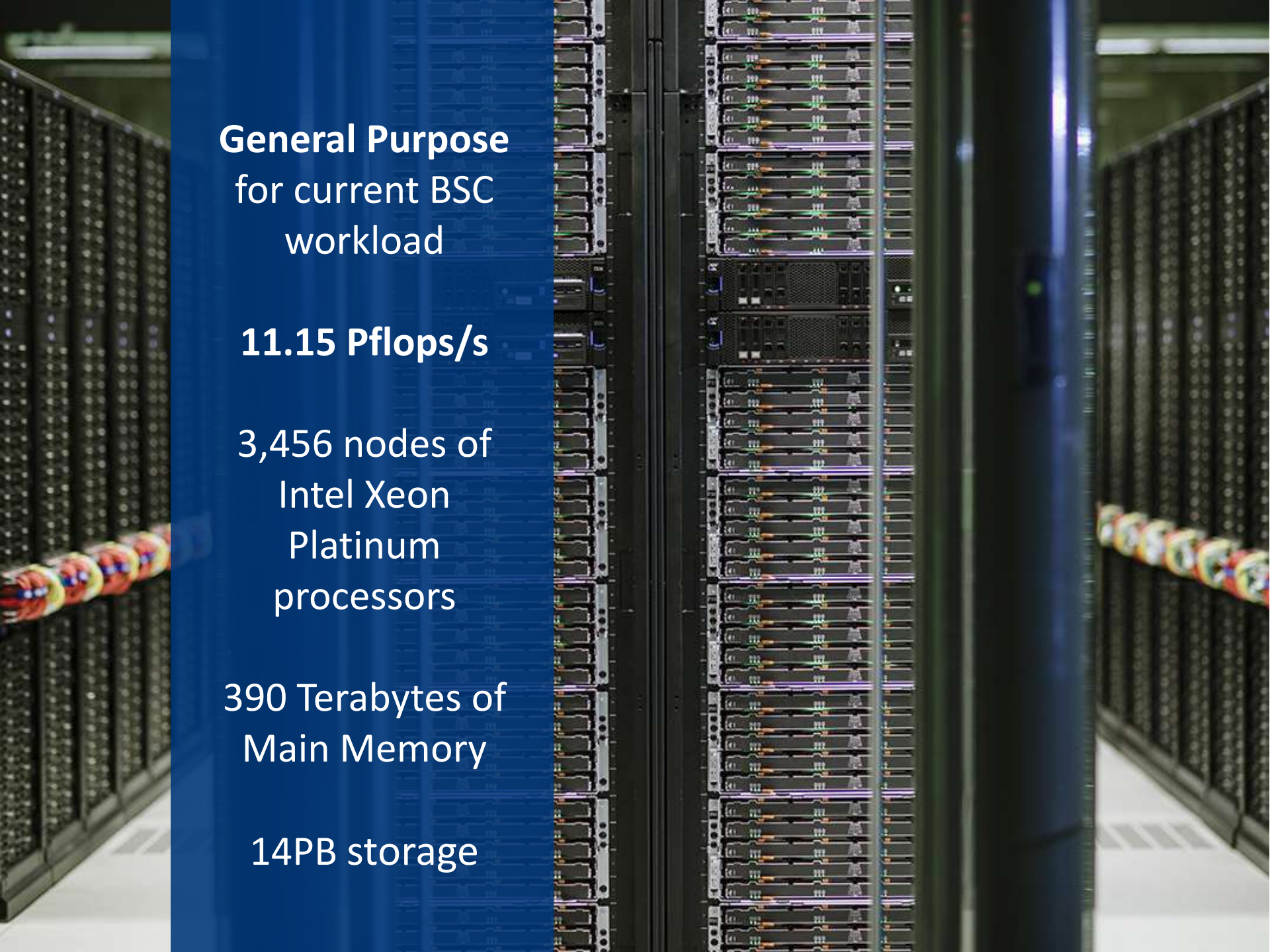

General Purpose for current BSC workload

11.15 Pflops/s

3,456 nodes of Intel Xeon Platinum processors

390 Terabytes of Main Memory

14PB storage

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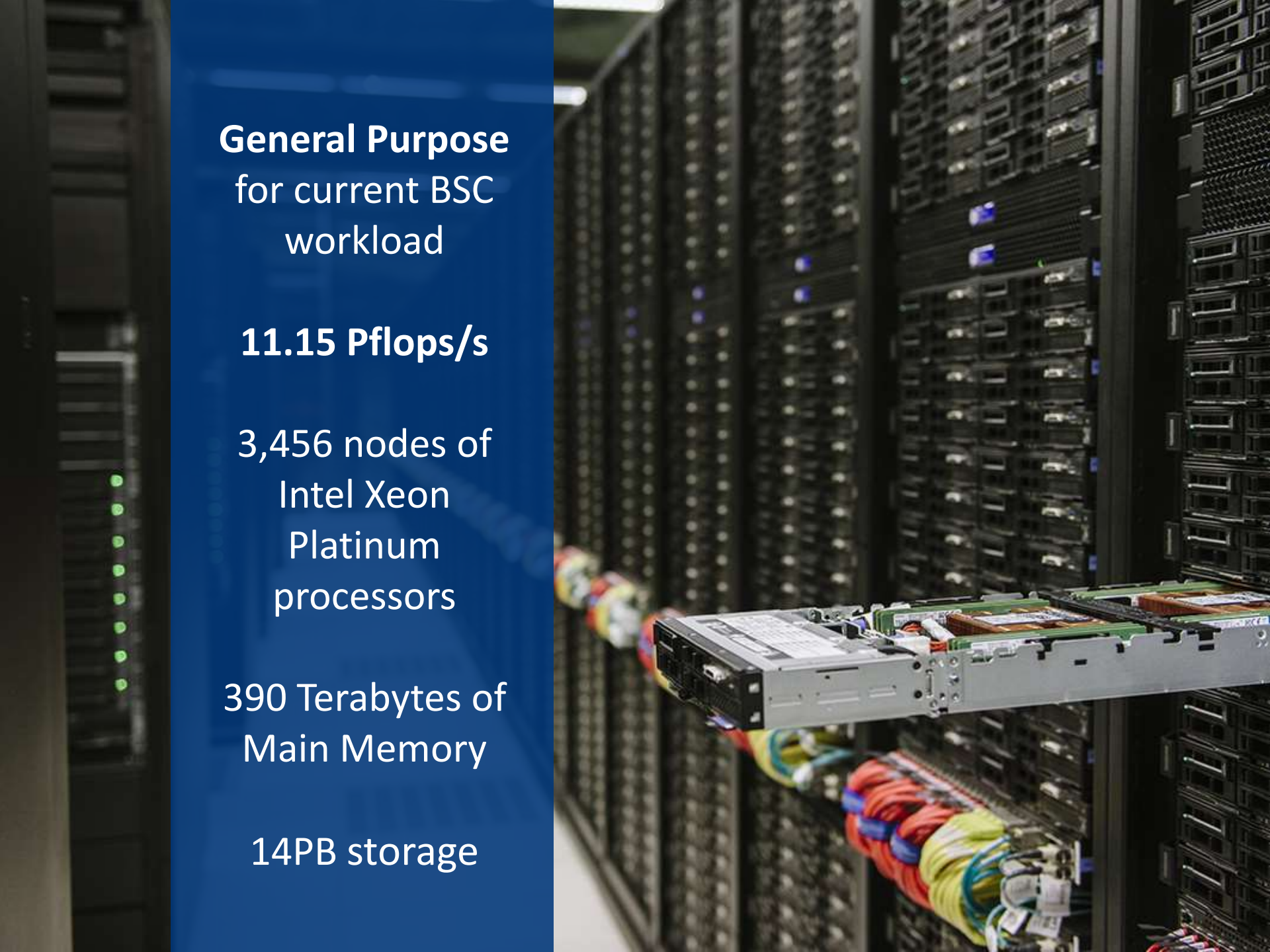

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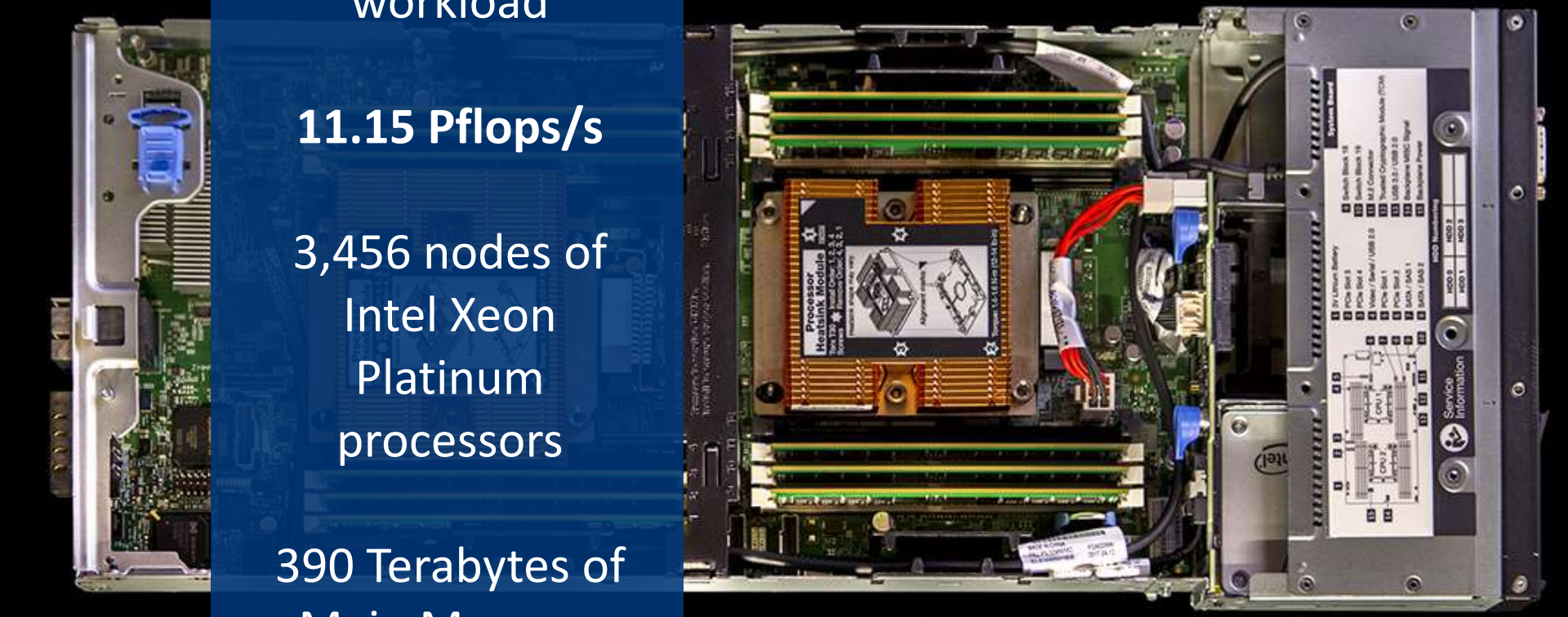


Interconnected
with OmniPath
network


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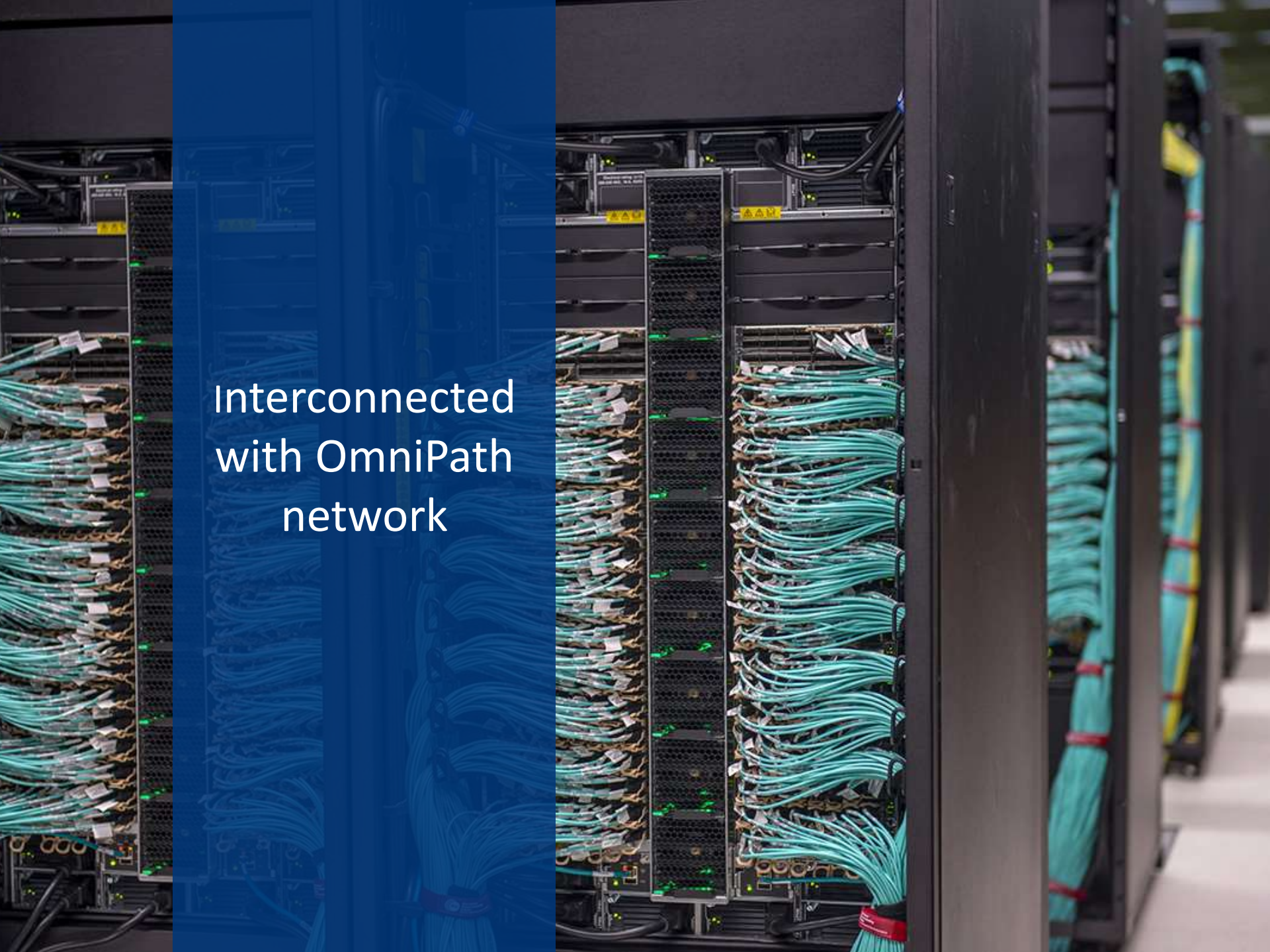
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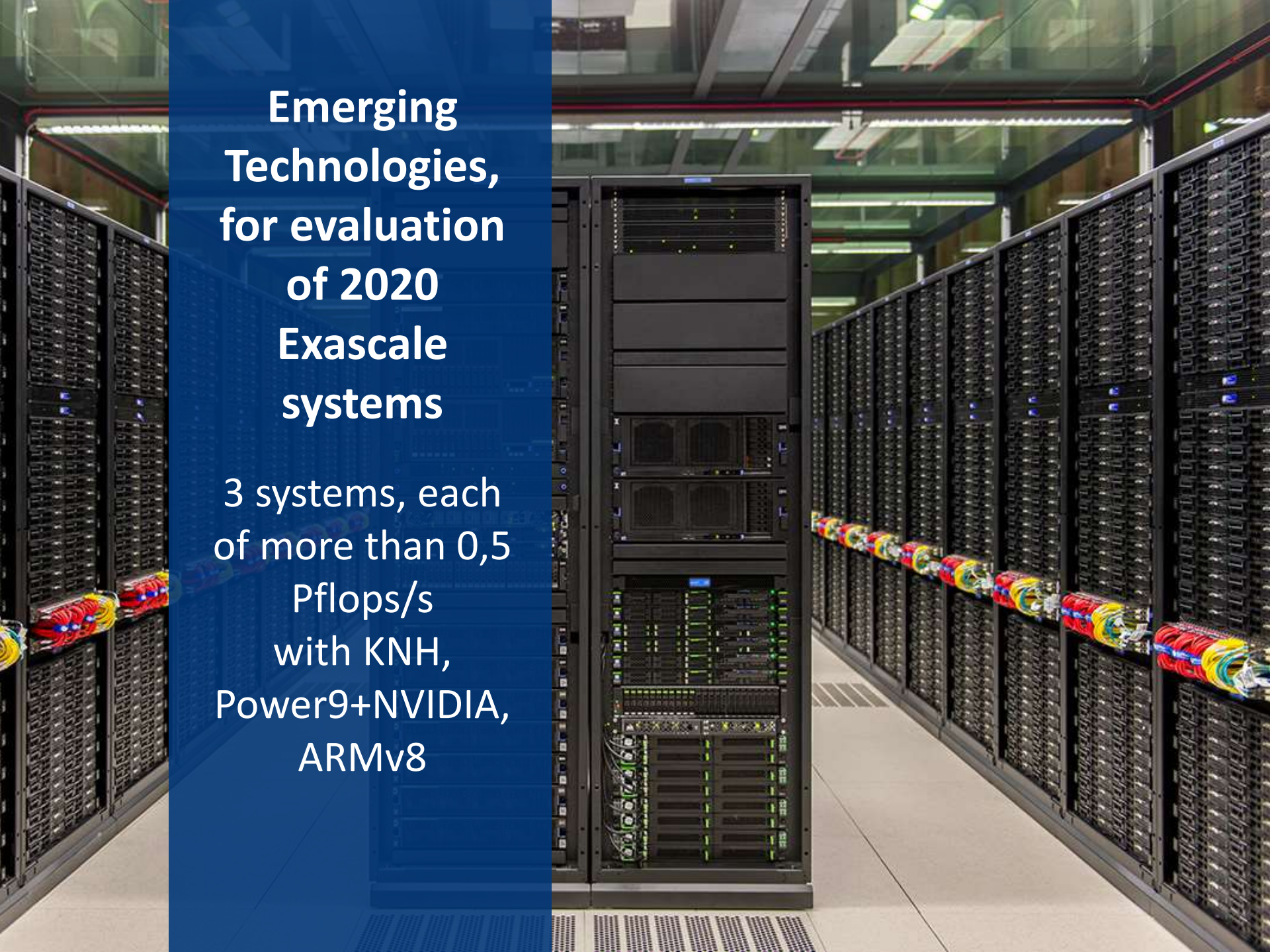
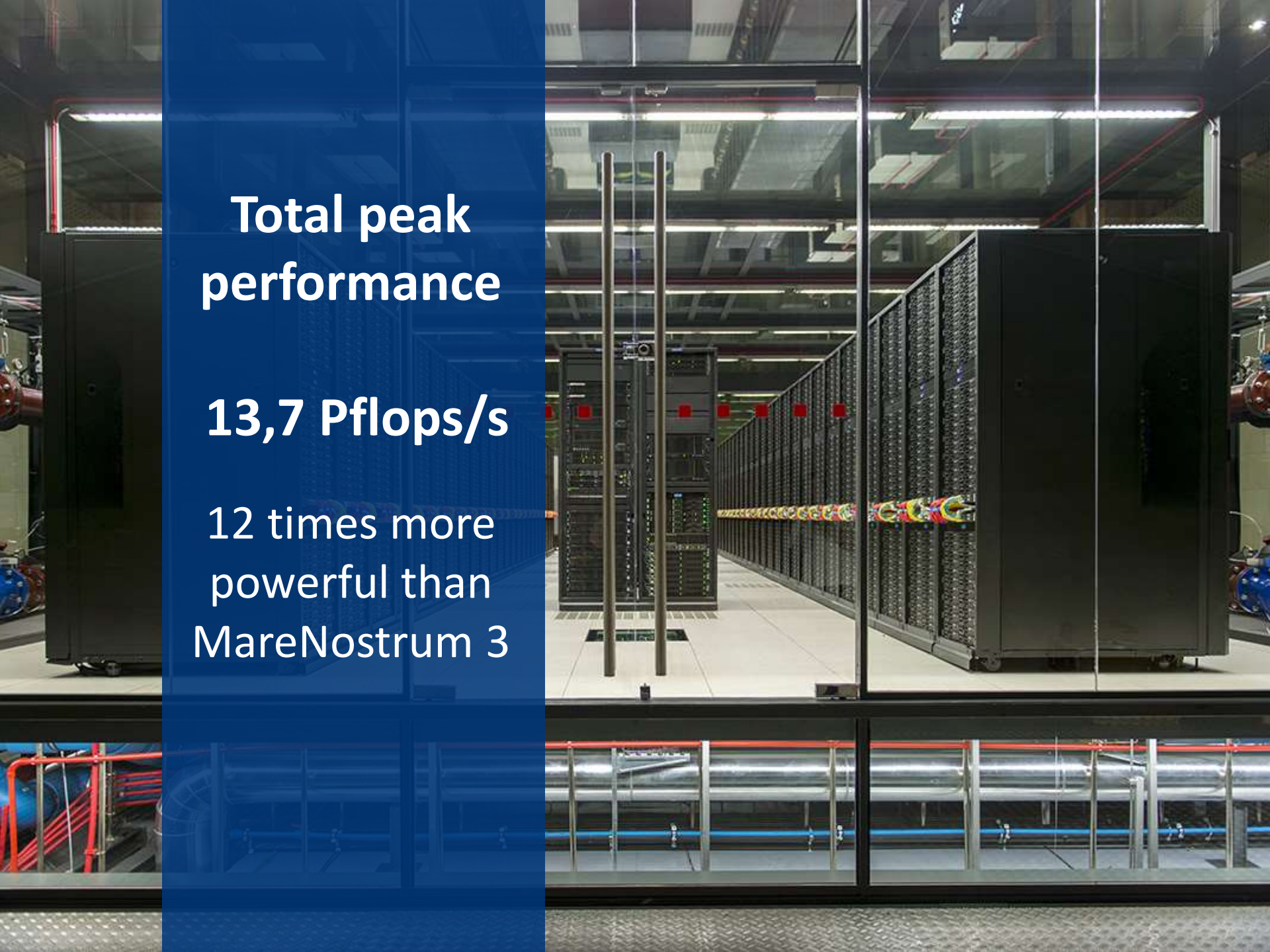


Emerging Technologies, for evaluation of 2020 Exascale systems

3 systems, each of more than 0,5 Pflops/s with KNH, Power9+NVIDIA, ARMv8



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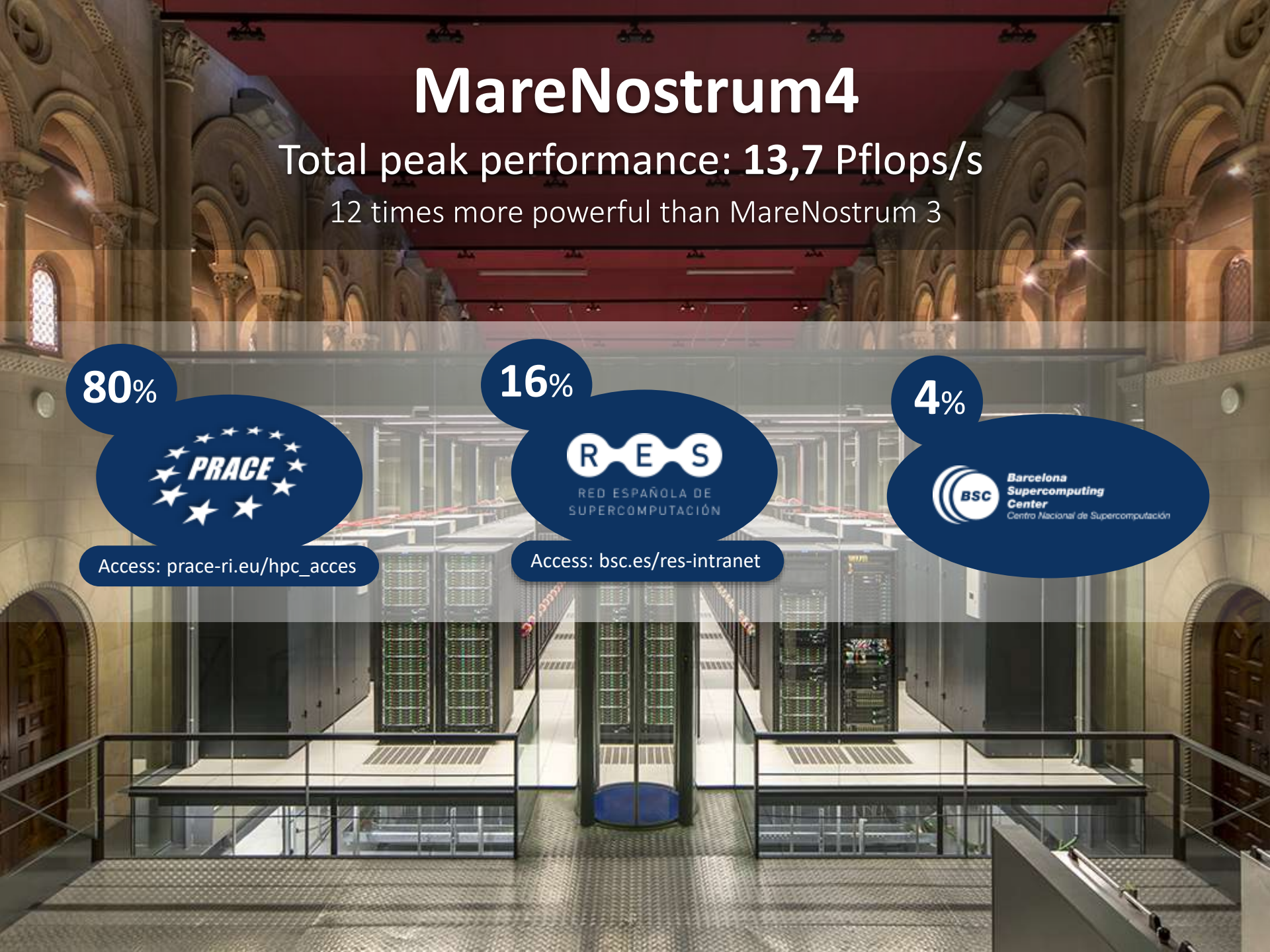
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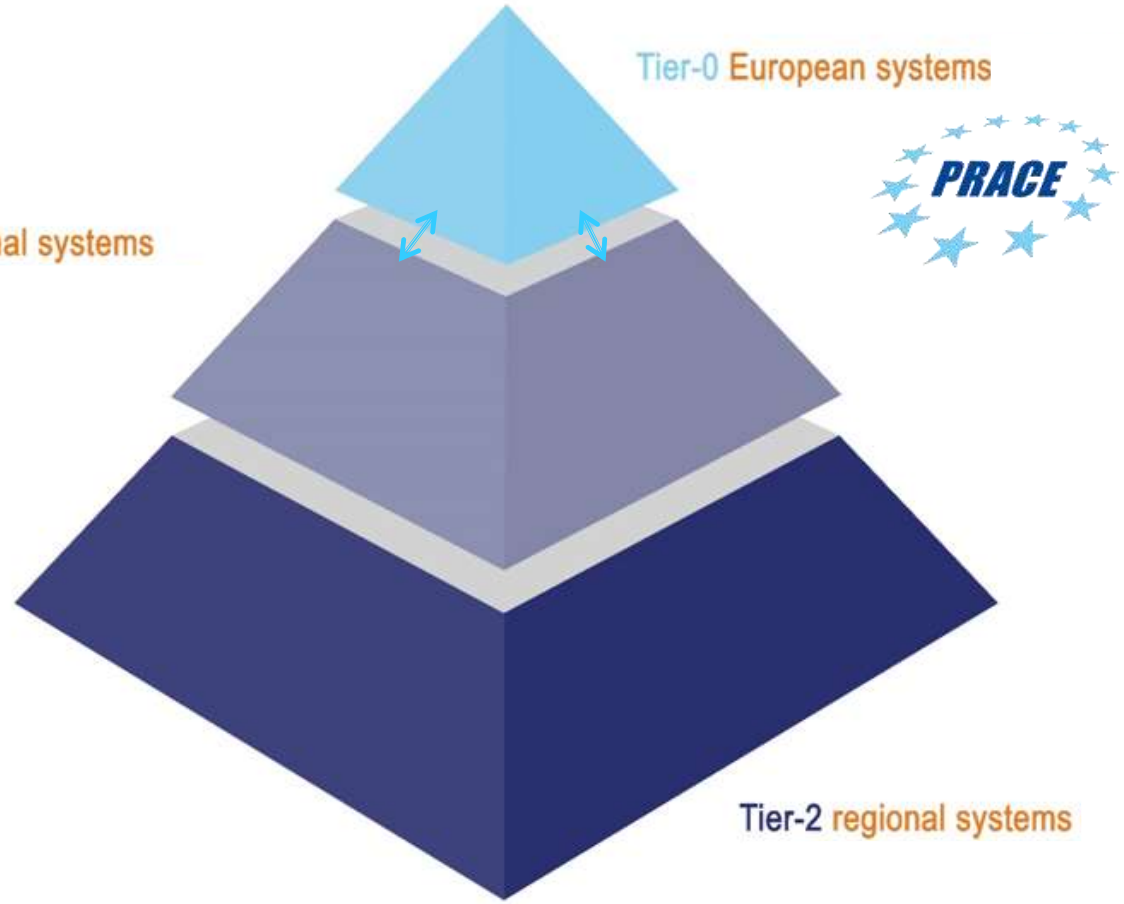
HPC ecosystem



Distributed Supercomputing Infrastructure

25 members, including

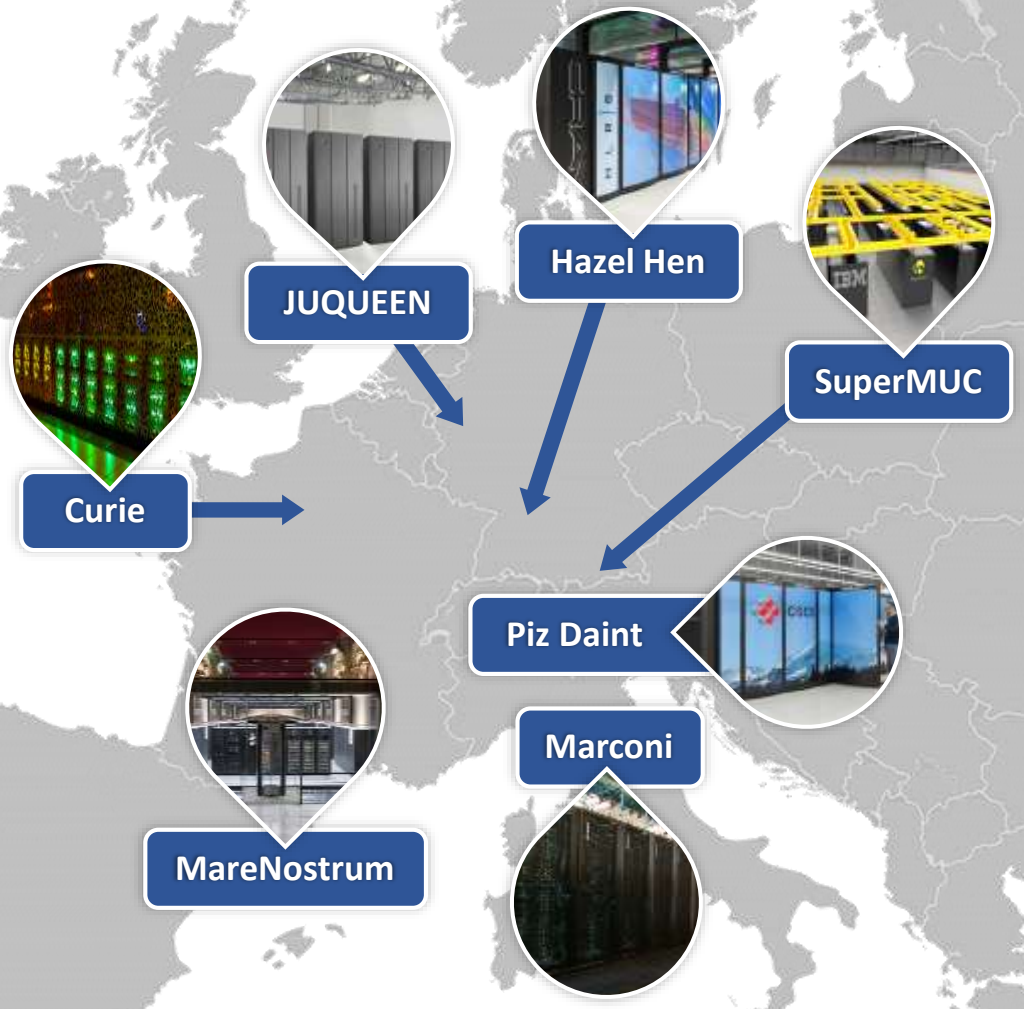
5 Hosting Members

(Switzerland, France, Germany, Italy and Spain)

570 scientific projects **enabled**

70 PFlops/s of peak performance on **7 world-class systems**

>10.000 people trained by **6 PRACE Advanced Training Centers** and others events



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Access prace-ri.eu/hpc_acces

PRACE HPC services

PRACE aims at providing Tier-0 capacity, capability and architectural diversity. PRACE also coordinates a fraction of the Tier-1 ecosystem

- **Scope:** open research projects from academy and industry, free at the point of usage
- Tier-0 (large scale) Projects Access
- Tier-0 Support programs
- Support to SMEs
- Tier-1 for Tier-0 support program
- Tier-1 Projects Access (DECI)
- Training to HPC users

Criterion: Scientific Excellence

PRACE SHAPE
SME HPC Adoption Programme in Europe

RES now made up of **thirteen** supercomputers

RED ESPAÑOLA DE SUPERCOMPUTACIÓN

- **Finis Terrae II**, Centro de Supercomputación de Galicia (CESGA);
- **Pirineus**, Consorcio de Servicios Universitarios de Cataluña (CSUC);
- **Lusitania**, Fundación Computación y Tecnologías Avanzadas de Extremadura;
- **Caléndula**, Centro de Supercomputación de Castilla y León,y
- **Cibeles**, Universidad Autónoma de Madrid

Infraestructuras Científicas y Técnicas Singulares

Access

bsc.es/res-intranet

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Portuguese participation in PRACE

- ✓ **22** scientific projects enabled, **9 of which** lead by Portuguese researchers
- ✓ **300 million** core hours awarded since 2010
- ✓ Prof. Luis Silva, **3 projects awarded** for nearly **80 million** core hours in German and Spanish PRACE systems, including keynote lectures in PRACEdays2014

The context: Worldwide HPC roadmaps

Executive Order – Creating a National Strategic Computing Initiative

EXECUTIVE ORDER

CREATING A NATIONAL STRATEGIC COMPUTING INITIATIVE

with domestic technology.

From K computer...

... to Post K

with domestic technology.

From Tianhe-2..

...to Tianhe-2A

with domestic technology.

HPC: at the top of the EU political agenda

European Commission President Jean-Claude Juncker

Our ambition is that by 2020, Europe ranks in the top 3 HPC powers worldwide

- **04/2016: European Cloud Initiative** COM(2016) 178

  A world-class HPC, data & network ***infrastructure*** *and a leading HPC and Big Data* ***ecosystem***

- **05/2017: Mid-Term Review of the Digital Single Market Strategy** COM(2017) 228

  by end-2017, propose a ***legal instrument*** *providing a* ***procurement framework*** *for an exascale supercomputing & data infrastructure*

  (EuroHPC)

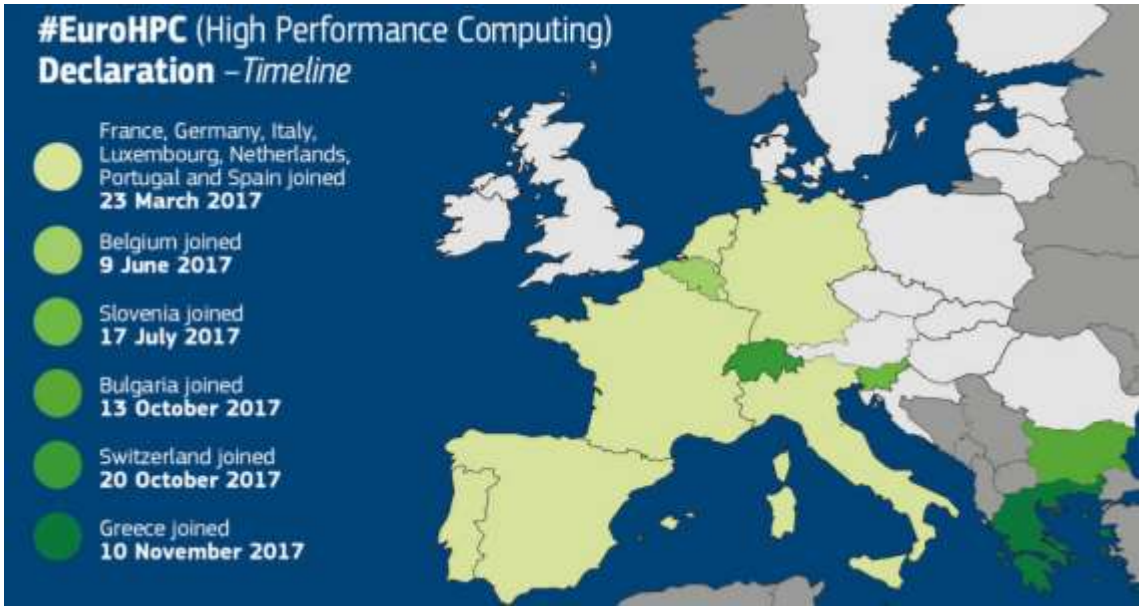
EuroHPC: a new legal instrument for HPC in Europe

EuroHPC

European Commission

Declaration signed in Rome, March 23rd, 2017 by:

France | Germany | Italy | Luxembourg | Netherlands | Portugal | Spain



Agree to work towards the establishment of a **cooperation framework** - EuroHPC - for **acquiring and deploying an integrated exascale supercomputing infrastructure** that will be **available across the EU** for scientific communities as well as public and private partners

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EuroHPC: Four Pillars

European Commission

WORK IN PROGRESS

- **Pillar 1: Infrastructure**
  - Acquisition of infrastructure (linked to R&I) and providing and managing access to research users
- **Pillar 2: Applications & Skills**
  - Excellence in HPC applications; Supporting Industry (incl. SMEs); Training and Outreach
- **Pillar 3: Research and Innovation**
  - Technologies and systems developed in Europe
- **Pillar 4: Operating the Machines**
  - Installation, deployment and operation via hosting entities

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Thank you

martorell@bsc.es

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