

We are a Severo Ochoa Center of Excellence and a hosting member of the European research infrastructure PRACE (Partnership for Advanced Computing in Europe). We also manage the Spanish Supercomputing Network (RES).

We are a research center with more than 450 scientists into four main areas: computer sciences, life sciences, earth sciences and computer applications in science and engineering.



Barcelona Supercomputing Center – Centro Nacional de Supercomputación (BSC-CNS) leads the way in supercomputing innovation in Spain.

We are specialized in high performance computing, also known as HPC, and our mission is two-fold: to provide infrastructure and supercomputing services to European scientists, and to generate knowledge and technology to transfer to business and society.

Computing for science and society

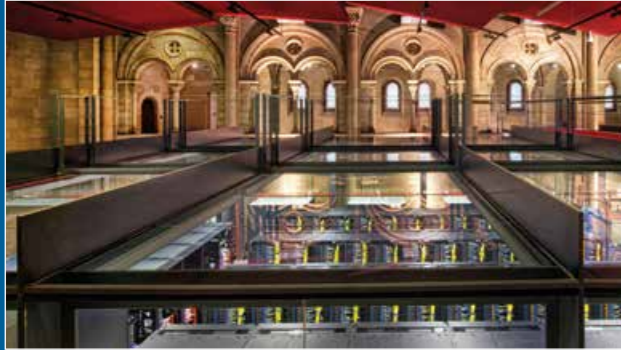


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Facilities



MareNostrum

Peak performance: 1.1 Petaflop/s

48,896 distributed processors:

- 6,112 chips Intel SandyBridge 2.6 GHz

- 3,056 nodes

84 chips MIC

100.8 TB main memory

3 PB storage file-system

Interconnection networks: Infiniband FDR10

and Gigabit Ethernet

Operating system: Linux - SuSe Distribution



MinoTauro

NVIDIA GPU is a heterogeneous cluster with 64 Bull B505 blades plus 39 bullt R421-E4 servers

B505 characteristics :

- 2 Intel E5649 (6-Core) and 24GB RAM

- 2 M2090 NVIDIA GPUs

- Peak Performance: 92.8 TFlops

R421-E4

- 2 Intel Xeon E5-2630 v3 (8-core) and 128GB RAM

- 2 K80 NVIDIA GPUs

- Peak Performance: 250.94 TFlops

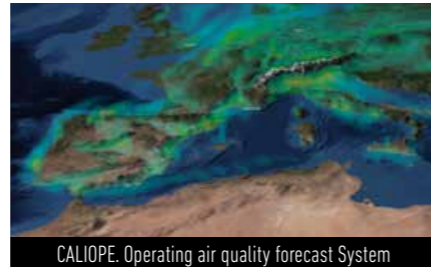


Big data infrastructures

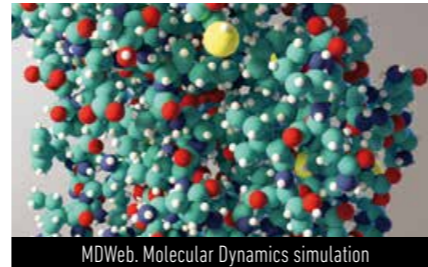
With a total capacity of 24,6 PetaBytes for scientific data storage for short, medium and long term access.

Science

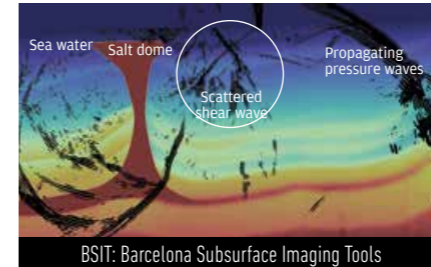
Our scientists develop their own research projects and participate in other centres projects by facilitating the use of high performance computing. HPC experts are essential for many areas of science and technology.



CALIOPE. Operating air quality forecast System



MDWeb. Molecular Dynamics simulation



BSIT: Barcelona Subsurface Imaging Tools



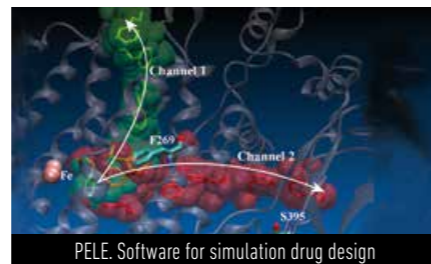
Embedded real-time systems



Aerodynamic simulation of cars



Energy efficient exascale research



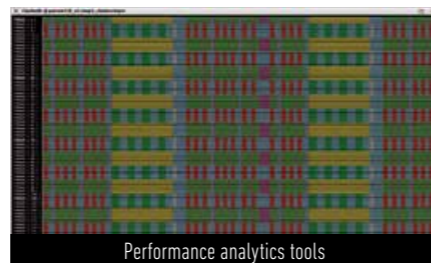
PELE. Software for simulation drug design



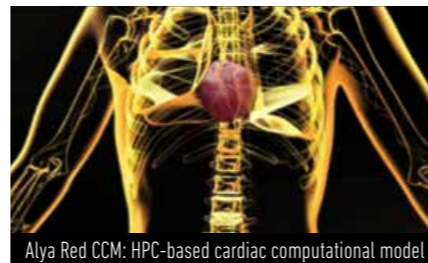
Genomics data mining for personalized medicine



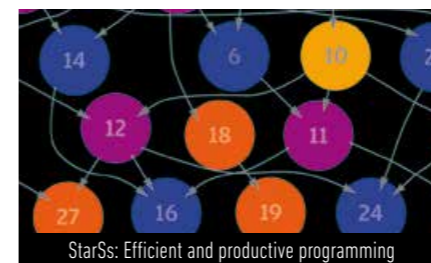
Multilevel enrichment for big data research



Performance analytics tools



Alya Red CCM: HPC-based cardiac computational model



StarSs: Efficient and productive programming

Industry

We collaborate with the private sector on projects to improve companies competitiveness and efficiency, and we provide an extensive range services to industry.

Joint research centres



A joint research activity that began in 2005 and is a follow-up on a previous collaboration within the framework of Universitat Politècnica de Catalunya Barcelona Tech. Research focuses on novel software and hardware technologies for future Petaflop and Cloud architectures, with special emphasis on programming models, performance tools, resource management at different levels, interconnection networks and smart cities.



Joint research since 2011. Research is oriented toward overcoming the challenges of Exascale systems and centers around the creation of:

- Software tools that analyse and predict performance
- Programming models
- The performance and reliability of asynchronous algorithms



Joint research since 2008. Research focuses on the design of tools to understand the performance of platforms to execute big data workloads on Cloud environments as well as to design configurations to effectively execute them (in terms of performance and energy).



BSC/UPC NVIDIA GPU Center of Excellence

As an NVIDIA-accredited GPU Center of Excellence, BSC collaborates closely with NVIDIA in R&D around its GPU Computing technology. This collaboration can be broadly framed in three main topics:

- Helping NVIDIA advance its hardware architecture software stack
- Designing and developing programming models, runtime systems, and libraries supporting GPU Computing
- Developing and porting GPU-accelerated applications.



Joint research began in 2007 and the center was established in 2011. It is a continuation of the Kaleidoscope project to advance seismic imaging technology. The centre specializes in:

- Full wave-form inversion
- Seismic imaging using elastic waves and "reverse time migration"
- controlled source electromagnetic methods