Barcelona Supercomputing Center
Centro Nacional de Supercomputación

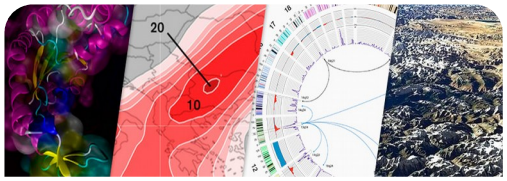
PORTING CODES TO NEW ARCHITECTURES

support@bsc.es

BSC objectives

BSC-CNS objectives

Supercomputing services to Spanish and EU researchers

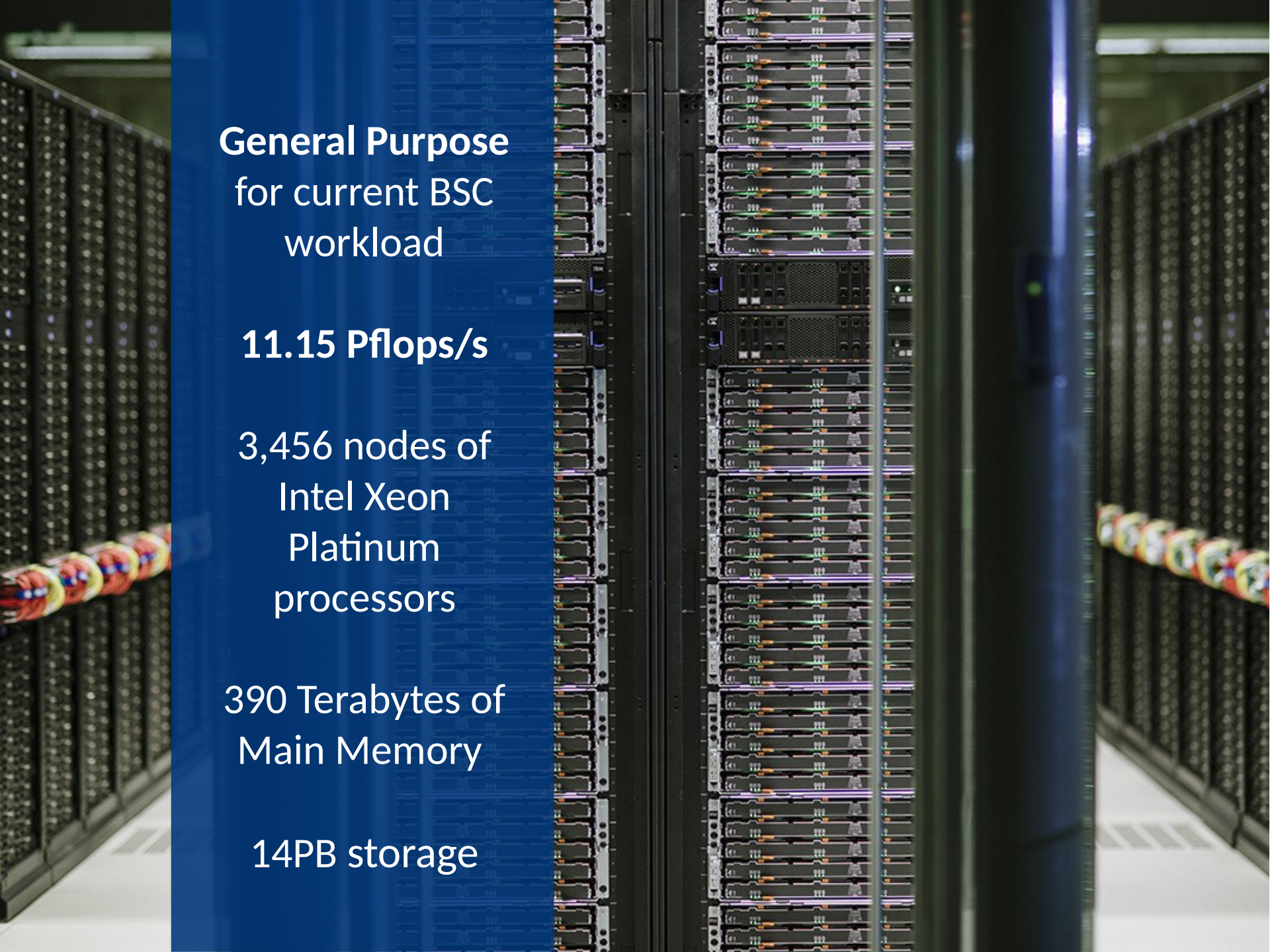


R&D in Computer, Life, Earth and Engineering Sciences

PhD programme, technology transfer, public engagement

BSC-CNS is a consortium that includes

Spanish Government	60%	Gobierno de España · Ministerio de Economía, Industria y Competitividad
Catalonian Government	30%	Generalitat de Catalunya Departament d'Empresa i Coneixement
Univ. Politècnica de Catalunya (UPC)	10%	Universitat Politècnica de Catalunya BarcelonaTech


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

Evolution in numbers
MareNostrum 1-2-3-4

		MN1 (2004)	Ratio	MN2 (2006)	Ratio	MN3 (2012)	Ratio	MN4 (2017)
Compute	Cores/chip	1	x2	2	x4	8	x3	24
	Chip/node	2		2		2		2
	Cores/node	2	x2	4	x4	16	x3	48
	Nodes	2406	+154	2560	+468	3028	+428	3456
	Cores	4812	x2	10240	x4,73	48448	x3,42	165888
Performance	Freq.	2,2		2,3		2,6		2,1
		8,8		9,2		20,8		67,2
		17,6		36,8		332,8		3225,6
		42,3	x2	94,2	x10,61	1000,0	x11,14	11147,6
Memory	GB/core (GB)	2		2		2		2
		4	x2	8	x4	32	x3	96
		9,6	x2	20	x4,84	96,89	x3,42	331,7+
Network	Topology	Non-block Fat Tree		Non-block Fat Tree		Non-block Fat Tree		Non-block Fat Tree
	Gbits/core	2	x0,5	1	x2,5	2,5	X0,8	2,1
	Gbits/node	4		4	x10	40	x2,5	100
Storage	(TB)	236	x2	460	x6,5	3000	x4,6	14000
Consumption	(kW)	650	x1,1	750	x1,44	1080	x1,29+	1400+

Emerging Technologies, for evaluation of 2020 Exascale systems

Power9+NVIDIA V100 – 1.5PFlops, similar to Sierra (2nd Top500 position)

ARMv8 – Fujitsu Post-K

KNH** pending for a new proposal

Work in the emerging technologies prototypes

- Goals
  - Understand the pros and cons of each of the architectures
  - Understand which codes will work better in each architecture and why
  - Be able to provide a better support for the end-users when the machine is in production.

  Current tasks:

- Installing the infrastructure
  - Check the stability of the hardware and the possible problems for a big cluster
  - Check the power consumption with real workflows
  - Chech the support from the different vendors.
- Testing Sofware
  - Compiling
  - Testing the optimized mathematical libraries
  - Scalability
  - Performance
  - Profile and performance analysis of the codes
- Testing compilers and other internal tools from each vendor
  - Mathematical libraries
  - Compilers
  - MPI implementations

BSC infrastructure roadmap

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