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BSC Building First Supercomputer to Combine ARM CPUs, GPU Accelerators, and InfiniBand

BARCELONA, Spain, June 12 -- Barcelona Supercomputing Center (BSC) will deploy its next prototype system, advancing the roadmap towards the successful introduction of ARM processors in High Performance Computing. In July, BSC will install the first hybrid accelerator cluster composed of ARM Cortex-A9, NVIDIA Tesla K20 GPU and Mellanox QDR InfiniBand. Co-funded by the Partnership for Advanced Computing in Europe (PRACE) initiative, the cluster will be named Pedraforca and will be built at BSC premises. BSC and the European HPC manufacturer Bull are in charge of the industrial coordination and integration of the project, while the Italian E4 Computer Engineering company is providing the computing nodes.

Pedraforca enables the use of InfiniBand networks and direct GPU to GPU communication through RDMA on ARM. It features a low-power NVIDIA Tegra 3 (4-core Cortex-A9) to run the operating system and drive both the Tesla K20 accelerator and the QDR InfiniBand at the minimum power consumption.

The benefits of this new system include:

- Superior energy efficiency for applications that run almost exclusively on the GPU
- A high-bandwidth QDR InfiniBand which enables remote GPU off-loading of highly parallel tasks, decoupling the homogeneous high-performance cluster from the GPU accelerators

"Prototypes are critical to accelerate software development, both system software and applications. Pedraforca introduces multiple innovations to the ARM software stack, leading to a more energy-efficient platform for those GPU-centric applications that match the characteristics of the cluster," says Alex Ramirez, Leader of the Heterogeneous Architectures Research Group at BSC.

BSC deployed the first ARM-based multicore HPC cluster in October 2011 with a cluster called Tibidabo. In November 2012, BSC collaborated with NVIDIA and SECO in the development of the KAYLA development platform,

the first hybrid ARM + CUDA GPU platform, which was field-tested in the second BSC cluster. Pedraforca represents another step forward in the BSC research roadmap on new technologies and innovative architectures towards energy-efficient HPC.

About Barcelona Supercomputing Center

Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC) hosts the supercomputer MareNostrum. It also has well-known supercomputing research groups that develop tools for academia and industry. BSC focuses its research areas in Computer Sciences, Life and Earth Sciences and Computer Applications in Science and Engineering. In the context of this multi-disciplinary approach, BSC has more than 350 researchers and experts in HPC (High Performing Computing) and 100 of those are from outside Spain. BSC was constituted as a public consortium formed by the current Spanish Ministry of Economy and Competitivity (Ministerio de Economía y Competitividad), the Department of Economy and Knowledge of the Catalan Government and the Technical University of Catalonia. Barcelona Tech (UPC), and is headed by Professor Mateo Valero. In 2011, the BSC-CNS was recognized as a "Severo Ochoa Centre of Excellence" for its contributions and research agenda in the area of computing and applications. In the first edition of the Severo Ochoa programme, the Ministry of Science and Innovation selected 8 research centres and units in Spain to be among the best in the world in their respective fields. More information: **www.bsc.es (http://www.bsc.es/)** .

About PRACE

The Partnership for Advanced Computing in Europe (PRACE) is an international non-profit association with its seat in Brussels. The PRACE Research Infrastructure provides a persistent world-class high performance computing service for scientists and researchers from academia and industry in Europe. The computer systems and their operations accessible through PRACE are provided by 4 PRACE members (BSC representing Spain, CINECA representing Italy, GCS representing Germany and GENCI representing France). The Implementation Phase of PRACE receives funding from the EU's Seventh Framework Programme (FP7/2007-2013) under grant agreements RI-261557, RI-283493 and RI-312763. For more information, see **www.prace-ri.eu (http://www.prace-ri.eu/)** .

About Bull

Bull is a leader in secure mission-critical digital systems. The Group is dedicated to developing and implementing solutions where computing power and security serve to optimize its customers' information systems, to support their business. Bull operates in high added-value markets including computer simulation, Cloud computing and 'computing power plants', outsourcing and security.. Currently Bull employs around 9,000 people across more than 50 countries, with over 700 staff totally focused on R&D. In 2012, Bull recorded revenues of €1.3 billion. For more information visit: **www.bull.com (http://www.bull.com)**

Source: Barcelona Supercomputing Center

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