

BSC building first supercomputer to combine ARM CPUs, GPU accelerators and InfiniBand

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Barcelona, 12th June 2013- 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 [1] 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 [2]. 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.

[1] At 512 meters, and just 7Km from the sea, Tibidabo is the highest peak of Barcelona

[2] Pedraforca is named after the unique mountain of the Pyrenees with two peaks.

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