

# A PREVIEW: The 1st Petaflops-scale supercomputer at DKRZ

In 2016, a ultra-fast, but extremely energy efficient Bull system will reach a peak performance of 3 Petaflops and a storage capacity of 45 Petabytes. This means it can perform 3 million billion operations per second, and store the equivalent of 10 million DVDs.

## The new high performance computing system for earth system research HLRE-3

On 6th May, 2014, the German Climate Computing Center DKRZ (Deutsches Klimarechenzentrum) and Bull have signed a contract for the delivery of a Petaflops-scale supercomputer. The contract worth 26 million Euros covers the delivery of all the key computing and storage components of the new high performance computing system for earth system research HLRE-3.

The entire HLRE-3 project with a total funding of 41 million Euros also comprises diverse modifications and extensions of DKRZ's electrical and cooling infrastructure as well as a substantial extension of the data archive system. Two thirds of the funding is



Gerd-Lothar Leonhart and Philippe Miltin, directors of Bull and Prof. Thomas Ludwig, director of DKRZ (from left to right side), have signed the contract for the delivery of a Petaflops-scale computing system.

supplied by the German Federal Ministry for Research and Education (BMBF). The remaining part is financed by the Helmholtz Association.

During the first configuration level, which will take up its operation in April 2015, HLRE-3 will deliver six times the application performance compared to the current HLRE-II (Blizzard). In 2016, when the new computing system will finally be completed with more than 60,000 processor cores on the basis of B700 DLC Blades distributed over 60 racks, it will achieve a peak performance of about 3 Petaflops and the effective application performance will be 20 times higher than that of the current computer. The corresponding Lustre-based storage component will in 2015 store up to 15 Petabytes. In 2016 it will be extended to about 45 Petabytes and then be one of the largest storage systems in the world.



Since its foundation the peak performance of the supercomputers at DKRZ (red line, given in Gigaflops) has increase rapidly. It follows the projected rise of Moore's Law. (Graphic: DKRZ)

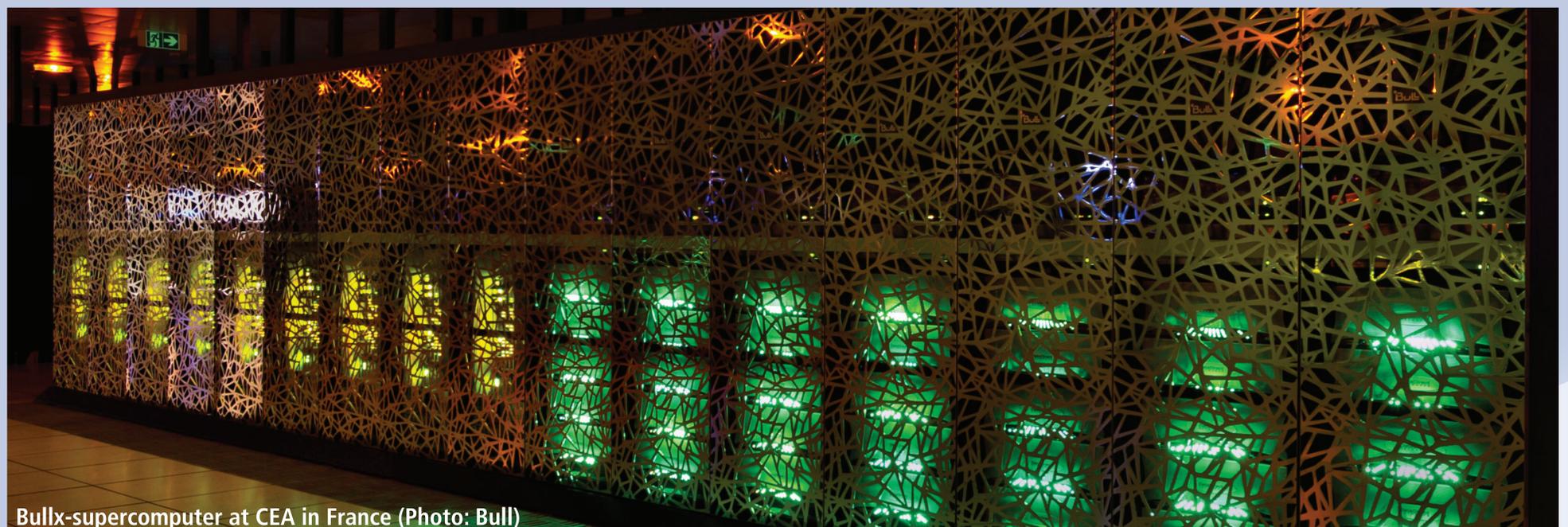
In addition to Bull, Intel („Haswell“- and „Broadwell“ CPUs), Xyratex (storage system) and Mellanox (high-speed network) participate as further hardware suppliers and partners.

## Energy efficiency

Latest computing technology ensures that the HLRE-3 will only consume as much electrical power as its predecessor. Bull developed a new cooling technology for HPC systems: the system being purchased by the Hamburg climate researchers will be cooled using warm water, a technology that requires significantly less energy than standard cooling systems, as the heat generated by processors and memory modules is extracted as close as possible to source. The energy efficiency of the system is also demonstrated with its low PUE of 1.2. The PUE value is the ratio between the global energy consumption of the computing center and the actual energy consumption of the computer.

## Cooperation on climate research simulation

The expertise in the optimization of software codes developed by Bull's Parallel Programming team in Grenoble was a key factor in DKRZ decision. DKRZ and Bull will cooperate to improve the scalability of climate models and the corresponding software algorithms.



Bullx-supercomputer at CEA in France (Photo: Bull)