DKRZ
DEUTSCHES
KLIMARECHENZENTRUM

Press Release

Mistral: Final expansion stage of the high-performance computer at DKRZ starts operation

Hamburg, July 7th, 2016: On June 28th, 2016, company Atos/Bull handed over the second expansion stage of supercomputer Mistral to the German Climate Computing Center (DKRZ) in Hamburg. Since July 4th, 2016, the third „High-performance computing system for Earth system research" (HLRE-3), with a peak performance of approximately 3.5 quadrillion numerical operations per second, has been available to the climate research community.

On the TOP500 list of the most powerful supercomputers, which was published during the International Supercomputing Conference (ISC'16), the final expansion stage of Mistral at DKRZ occupied position no. 33 worldwide. At present, Mistral is the 5th most powerful high-performance computer in Germany.

Roughly 3,000 compute nodes of type bullx DLC 720, provided by Atos/Bull, having a total number of more than 100,000 processor cores on the basis of Intel processors of types Xeon E5-2680v3 12C with a clock rate of 2.5 Gigahertz (Haswell) and E5-2695V4 18C with a clock rate of 2.1 Gigahertz (Broadwell) provide the computing capacity. This is the largest high-performance computing system by company Atos/Bull on the TOP500 list. Due to the warm-water cooling system, which cools the CPU and main memory, Mistral is very energy-efficient: despite a 20-fold increase in performance compared to its predecessor, HLRE-II "Blizzard", Mistral consumes slightly less electrical power.

In order to meet the very data-intensive requirements of climate modelers, the system stands out from most other high-performance computers by having an especially large and powerful parallel file system. Mistral's parallel file system by company Seagate has a capacity of 54 petabytes and occupies position no. 2 on the vi4io.org list, which compares the largest file systems worldwide. The peak transfer rate of the Lustre-based file system is 450 Gigabytes/s. This is the data volume of approximately 100 full-length movies per second!

The entire system consists of about 80 telephone booth-sized cabinets, most of them weighing more than a ton, and being interconnected by bundles of fiber and high-performance network components by Mellanox.

Using Mistral, climate researchers are able to perform climate simulations at a higher resolution, to include additional processes in earth system models, or to reduce uncertainties in climate projections.

Computations are currently being planned for the extensive international model intercomparison project CMIP6 (Coupled Model Intercomparison Project Phase 6), thereby, for the German contribution to the next IPCC Report. Another project examines the formation of clouds and precipitation in greater detail: Mistral enables scientists to perform high-resolution regional simulations at a grid resolution of only 100 meters all of Germany for the first time, ever. This facilitates the explicit computation of small-scale processes such as cloud formation and precipitation, which must be parameterized in coarser models.

Further information:

German Climate Computing Center (DKRZ): www.dkrz.de

DKRZ Media Center - further photos of Mistral: www.dkrz.de/about/media/galerie/Media-DKRZ/hlre-3

TOP500 list: www.top500.org/list/2016/06/

List of the top storage systems: www.vi4io.org/hpsl/start

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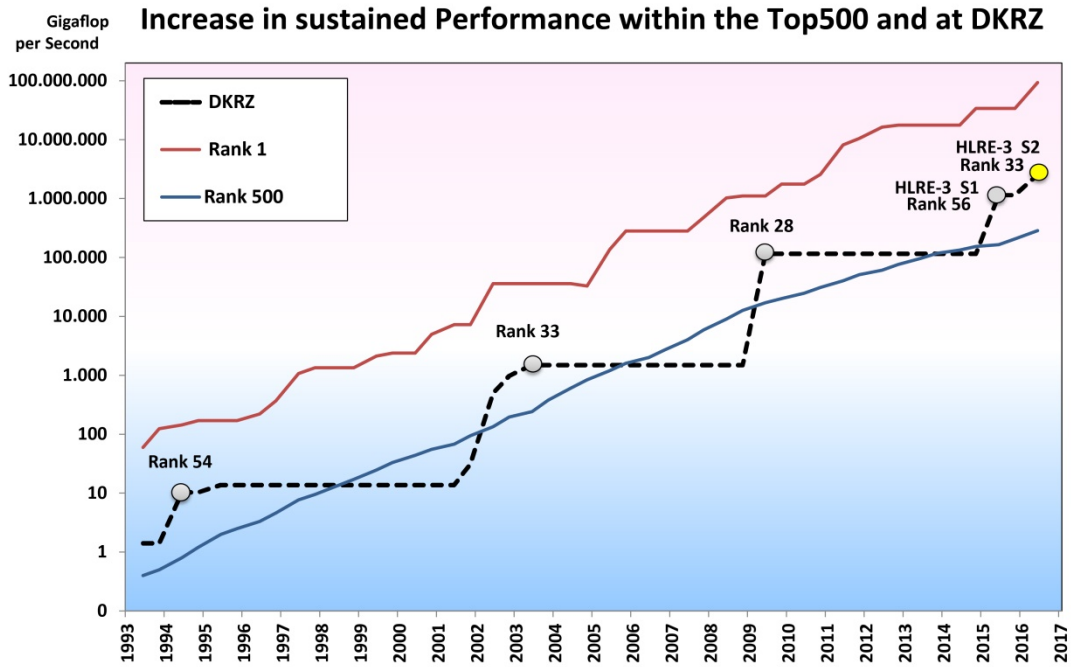
On July 4th, 2016, the final expansion stage of the high-performance computing system Mistral has started its operation at the German Climate Computing Center (DKRZ) in Hamburg.



Since 1993 the performance of the world's Top500 computers, including those of DKRZ, has risen by a factor of about a 1,000,000. The high-performance computing system for Earth system research, Mistral, is at rank 33 on the Top500 list that was released in June 2016.

About the German Climate Computing Center (DKRZ)

DKRZ is a unique national center for premium climate science: it provides high-performance computing platforms, sophisticated and high-capacity data management and related services.

Today, the complexity of the Earth system is one of the great scientific challenges. The Earth as a whole cannot be the object of experiments. Therefore, the computer systems of the DKRZ are the laboratory for climate research. Simultaneously the staff at DKRZ supports the scientists with the optimization of their climate model codes, with the analysis, visualization and the publication of the simulated data.
DKRZ is a limited company (GmbH) with four shareholders: Max Planck Society (55%), the City of Hamburg, being represented by the University of Hamburg (27%), the Alfred-Wegener-Institute for Polar and Marine Research (9%) and the Helmholtz Centre Geesthacht (9%). It was founded on November 11th, 1987. Currently DKRZ has about 75 employees. DKRZ's director, Prof. Dr. Thomas Ludwig, also leads the working group "Scientific computing" at the department of informatics of the University of Hamburg.