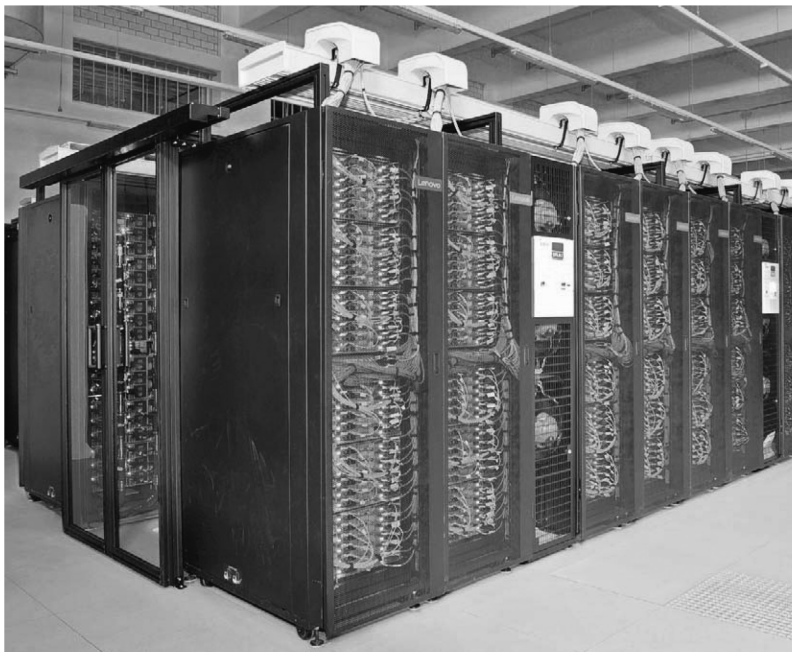# Technology Update

Supercomputer: Better computation for Research

With Super MUC-NG at Leibniz Computer Centre, Germany has high performing (efficiency) computer under the top ten in the world. The three German high-efficiency computer centres supports innovation, in science and economy. These three national high efficiency computer centres which are connected together with the Gauss Centre for Supercomputing (GCS) provide

One of the fastest Super Computer MUC-NGs in Münich.

in total up-to-date on total computing efficiency of more than 45 Petaflops (1 Petaflops = 1 billiard computing operations per second). That is in the top 500 list of worldwide most efficient supercomputer at present rank nine.

For the scientists of Germany and Europe who use the German supercomputer on public commissioning technique is however in the rank

list, a matter of secondary importance. "Super MUC-NG could rather lie at a couple of places further in the front" reports Dieter Kranzlmüller, director of Leibniz Computer Centre and at present chairman of GCS. "The authoritative for that Linpack-Benchmark-Test is for that however to us not relevant".

One does not aim at the top position. "Our aim is that the scientists should get the best possible instrument and we have this, says Kranzlmüller. His focus in GCS is the scaling (measurement) possibilities. We require higher analysis with voluminous data and want short computation duration. These are our aims. We require a system with which we can execute the next step (stage) of research project.

One considers that first ten of Top 500 list. There are only two computers which on graphic processors so-called GPUs abandon – super MUC-NG and Frontera and Texas Advanced Computing Centre (Rank five) – Kranzlmüller says. "Our system provides over 311040 computer cores in Intel-Xenon–CPUs however on no unique GPU. He is convinced that there is no so-called GPU-kick at all. We invite super MUC-NG in an open competition and placed benchmarks for definite application. The appliers had to interpret as to how much efficiency they had achieved for the present benchmarks. The victorious proposal covered no GPUs"

The GPU less computer architecture is therefore noteworthy while both the leading supercomputers which were made by IBM

strongly place on GPUs of Nvdia. In foreground stand performance and energy efficiency, explains Ingolf Wittmann, Chief Technology Officer and leader of high performance computing in CGS (HPC) Europe with IBM.

All the three high performance computer centres are in GCS integrated in a European HPC Computer composite. There a constant further development is promoted, Kranzlmüller judges the perspectives positive. We bring in on the European research infrastructure. We give up a concrete contingent from computing cycle for the cooperation in Europe. That we have splendid projects with which we see how the scientists of whole Europe work together. In this context there are systems which are very attractive. According to Kranzlmüller one works in GCS with federal and states at the smart scaling strategy with which it goes in the direction of Exascale-computing. Covering this we say that is something with which Germany fulfills on one hand national expectations but on the other hand must bring in Europe.

The smart scaling strategy is a consequent knowledge development of which what the GCS already does. Since the foundation one has already installed several petaflop-systems. At present we develop these attained farther and orient ourselves direction of the first pre-exascale-systems. In the next step we realize smart-scaling whereby we hope to be able to build finally systems in the exascale class" explains GCS Chairman, Kranzlmüller emphasizes. At the three GCS centres we have not only the hardware but we have also always the relationship between hardware and expertise. These have to do with also the personal training for further development in order to be able to advance the prevailing project. These experts and specialists are integral component of smart scaling-strategy.

Modular Supercomputer is the future: At the research centre Jülich here generates for the time being a test system for future modular supercomputer which is executed as special on scientific analyses and simulations. Already for eight years Jülich based experts work together with European partners in the Deep-Projects Dynamic Exascale Entry Platform) at a similar modular supercomputer architecture which gets utilized more flexibly and more efficiently than previous systems of scientific applications. A similar modular supercomputer is not out of many similar computing units constructed. Instead of that the arrangement plans forsees several specialised foundations which get combined as per requirement.

With Deep-EST – a computer becomes prototype out of three modules installed under the leadership of Firm Megware from Chemnitz which has installed the CoolMUC-3-system at LRZ in Garching. Two of the three modules of the prototype were commissioned in 2019.

The last for the beginning of 2020 planned perfection stage will be energy efficiency focused booster which will be armed with Nvdia-GPU – says Estela Suarez, project manager for Deep-EST in Jülich. This is a joint project at which also we involved in order to investigate the next generation to build the high efficiency computer (supercomputer).

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