Press Release

Atos and the CEA place Tera 1000, the most powerful European supercomputer, in the World's top 15

Paris, June 25, 2018 - Atos, an international leader in digital transformation, and the CEA (French Alternative Energies and Atomic Energy Commission)'s direction of defense applications (CEA/DAM) place Tera 1000 - a supercomputer they developed together for defense and nuclear deterrence uses - among the world's 500 most powerful machines. Reaching the 14th position, Tera 1000 thus becomes the most powerful European general-purpose supercomputer, with a computing power of 25 petaflops and a very competitive power consumption of 4 MegaWatts.

This result crowns the expertise acquired by the CEA/DAM and Atos in High-Performance Computing (HPC) and the co-design strategy initiated some 18 years ago by the two partners, working together as top contenders in the international competition towards exascale capacities - reaching a billion billion calculations per second.

The Tera 1000 supercomputer, operating at the CEA/DAM Center in Bruyères-le-Châtel, Ile-de-France, France
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Developing an exaflop-class supercomputer by 2020 is a necessity for some of the defense programs implemented by the CEA/DAM. To reach this capacity, technological breakthroughs are needed - most notably to maintain low levels of energy consumption, one of the key challenges in the high-performance computing market, but also to ensure smooth information flows and process the significant volumes of data produced by increasingly precise simulations of multi-physical, multi-dimensional phenomena.

To do so, the CEA/DAM decided to adopt co-design processes developed by Atos, with the help of Intel. The objective is to maximize the performances of the supercomputer by testing it on applications. The CEA/DAM's competencies are required at several levels: for the structure of the applications' computing codes, the interaction between these codes and the supercomputer and for the architecture of the supercomputer itself.

25 times more powerful for the same electricity consumption, an outstanding eco-responsible achievement

Deployed in two stages at the CEA center in Bruyères-le-Châtel (Île-de-France), Tera 1000 has a 25-petaflop computing capacity and best-in-class energy efficiency for a large range of applications - an achievement made possible through the use of technologies developed by Atos for its line of BullSequana X supercomputers. BullSequana uses an innovative cooling technology, using streams of lukewarm water circulating in close proximity to processors. A single BullSequana module can deliver almost three quarters of the computing power of the Tera 100, the supercomputer that was formerly in use at the CEA/DAM, with an energy efficiency improved by a factor of 25.

> **François Geleznikoff, the director of defence applications at the CEA,** says : "*Once again, the partnership between Atos and the CEA/DAM has allowed a major technological milestone in the power capacities of supercomputers. With the Tera 1000, we have very significantly increased the quality that digital simulations can attain for defence applications, but also for research and industry uses. This step opens the way to the exaflops in the coming decade.*"
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> **Pierre Barnabé, Chief Operating Officer of Atos' Global Big Data & Security Division**, adds : "*Atos is very proud to help France and Europe gain international prominence in supercomputers, and to provide the CEA with the computing power they need to develop quality innovative research. This spot in the top-500 ranking reflects the successful collaboration between Atos and the CEA, and is one of the best examples of Atos' technological excellence in high-performance computing.*"

The full ranking can be found at https://www.top500.org/

Technical features

Tera 1000 consists of two computing partitions:

- The first one, relying on Intel® Xeon V3 processors, has been in production since 2016
- The second one uses latest-generation BullSequana, based on Intel® Xeon Phi™ Knight Landing processors connected with a very-high-performance Bull X Interconnect(BXI) network, a result of the R&D collaboration between the CEA/DAM and Atos

The second layer of Tera 1000 marks a breakthrough in the parallel setups used for its 540,000 computing cores. Its architecture prefigures those that will be used in the next CEA/DAM computer, EXA1, by 2020.

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About Atos

Atos is a global leader in digital transformation with approximately 100,000 employees in 73 countries and annual revenue of around € 12 billion. European number one in Big Data, Cybersecurity, High Performance Computing and Digital Workplace, the Group provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry. With its cutting-edge technologies, digital expertise and industry knowledge, Atos supports the digital transformation of its clients across various business sectors: Defense, Financial Services, Health, Manufacturing, Media, Energy & Utilities, Public sector, Retail, Telecommunications and Transportation. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline. Atos SE (Societas Europaea) is listed on the CAC40 Paris stock index.

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About the CEA

The French Alternative Energies and Atomic Energy Commission (CEA) is a key player in research, development and innovation in four main areas: defence and security, low carbon energies (nuclear and renewable energies), technological research for industry, fundamental research in the physical sciences and life sciences. Drawing on its widely acknowledged expertise, the CEA actively participates in collaborative projects with a large number of academic and industrial partners.
The CEA is established in nine centers spread throughout France. It works in partnership with many other research bodies, local authorities and universities. Within this context, the CEA is a stakeholder in a series of national alliances set up to coordinate French research in energy (ANCRE), life sciences and health (AVIESAN), digital science and technology (ALLISTENE), environmental sciences (AllEnvi) and human and social sciences (ATHENA). In 2017, Thomson-Reuters / Clarivate identified the CEA as the most innovative public research organization in Europe. As regards the processing of quantum information, the CEA is developing two main areas of research: qubit-tolerant fault architectures in silicon CMOS technology and the development of qubits of high robustness.
For more details: ww.cea.fr

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