Press release

Bull, an Atos company, takes the lead in the extreme computing race

En route to processing power that rivals the human brain

- The next generation of supercomputers is required to boost innovation and competitiveness and address a multitude of challenges – most of them at the crossroads where Big Data and HPC meet – related to every aspect of society, including healthcare, climatology, manufacturing and energy.
- So-called exascale supercomputers will achieve a performance of more than one billion billion operations a second (the number 1 followed by 18 zeroes): a thousand times more powerful than current systems.
- Bull is rolling out its exascale program, so it's ready to meet the technical challenges involving in ultra-fast computing of massive datasets on an unprecedented scale.
- Bull is designing and developing its next generation of supercomputers in Europe, drawing on the power and presence of the Atos Group to deliver exascale solutions in key vertical market sectors all over the world.

SC14, New Orleans – 18 November 2014 - Bull, an Atos company, today unveils its exascale program. The main ambition of this program is to design and develop in Europe the next generation of supercomputers that will contribute to producing world-class solutions for both research and industrial purposes. With one of the largest teams dedicated to High-Performance Computing (HPC) – now able to leverage the international strength of Atos, with its 86,000 employees worldwide – Bull is experiencing a paradigm shift that will give it the critical mass to address vertical market sectors across the entire world.

Exascale will increase the competitiveness and innovation capabilities of industries and address the industrial, scientific and societal challenges of the 2020s, from nanoscience and genomics to climatology, aeronautics and energy.

As such, the Bull exascale program is a key contributor to Europe's leadership in science and innovation, as well to its position in the HPC field. It is aligned with the Strategic Research Agenda proposed by ETP4HPC (the European Technology Platform for High Performance Computing). This new generation of supercomputers will be capable of achieving a performance of more than one exaflops, i.e. one billion billion operations a second, a thousand times more powerful than current systems. Exascale computing power is believed to be the order of processing power that matches the human brain.

10^18 Bull exascale program

AT THE CROSSROADS WHERE BIG DATA AND HPC COMBINE

Most of the complex problems scientists and engineers will address in the future are at the crossroads where Big Data meets HPC. For instance, domains like genomic therapy and drug discovery, full-scale simulations of aircraft or modelling of entire weather systems – that involve

huge volumes of data and demand massive computing power – require exascale supercomputers and beyond.

The Bull exascale program therefore relies on tight integration between high levels of computing power and the capacity to process huge amount of data. It combines faster processors, more data capacity, ultra-fast interconnections, greater energy efficiency, enhanced cooling, a scalable packaging, fundamentally redesigned software and a full set of services to optimize user applications.

The Bull exascale program initially involves the development of five main elements:

- An open exascale supercomputer, code-named SEQUANA
- The matching software stack, known as bullx supercomputer suite
- A new generation of fast interconnect, code-named BXI
- A range of servers with ultra-high memory capacity, known as the bullx S6000 series
- A complete set of services to optimize customer applications and make the most of exascale.

The Bull exascale program derives synergies from Bull's global mission to deliver Big Data, HPC and security solutions. It is the result of major investments in R&D, close cooperation with European labs such as the CEA (the French Alternative Energies and Atomic Energy Authority) and other partners, and the long-standing experience built up by Bull's HPC teams in designing, implementing and running large-scale HPC systems. It relies upon the Bull Center for Excellence in Parallel Programming (CEPP) for the application expertise needed to reengineer existing applications so as to make the most of exascale systems.

"*To fulfill its missions, the French Alternative Energies and Atomic Energy Commission (CEA) set up a R&D program in partnership with industry which aims at developing the key technologies needed to design and build competitive supercomputers by 2020. Within this framework, CEA and Bull have renewed their long-time partnership that led in 2010 to the first petaflops supercomputer designed and manufactured in Europe,*" said Pierre Leca, Head of Simulation and Software Engineering at the CEA.

"*With the unveiling of its exascale program, Bull has reaffirmed its capacity for innovation and its ability to design the world's most powerful supercomputers. Bull meets the needs of performance and reliability that our customers require to handle the massive amounts of data generated in the digital world and to help solve major societal and environmental challenges that are arising in our societies*," said Philippe Vannier, Bull's CEO.

About Bull, an Atos company

Bull is the trusted partner for enterprise data. The Group, which is firmly established in the Cloud and in Big Data, integrates and manages high-performance systems and end-to-end security solutions. Bull's offerings enable its customers to process all the data at their disposal, creating new types of demand. Bull converts data into value for organisations in a completely secure manner.

Bull currently employs around 9,200 people across more than 50 countries, with over 700 staff totally focused on R&D. In 2013, Bull recorded revenues of €1.3 billion.

For more information: www.bull.com / twitter.com/Bullfr / https://www.facebook.com/BullGroup

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About Atos
Atos SE (Societas Europaea) is a leader in digital services with 2013 pro forma annual revenue of €10 billion and 86,000 employees in 66 countries. Serving a global client base, the Group provides Consulting & Systems Integration services, Managed Services & BPO, Cloud operations, Big Data & Security solutions, as well as transactional services through Worldline, the European leader in the payments and transactional services industry. With its deep technology expertise and industry knowledge, the Group works with clients across different business sectors: Defence, Health, Manufacturing, Media & Utilities, Public Sector, Retail, Telecommunications and Transportation.

Atos is focused on business technology that powers progress and helps organizations to create their firm of the future. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and is listed on the Euronext Paris market. Atos operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, and Worldline.

For more information, visit: atos.net

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The Bull exascale program in detail

The exascale program is a new step forward in Bull's strategy to deliver exascale supercomputers capable of addressing the new challenges of science, industry and society.

The Bull exascale program aims to address technologies and processes to meet the requirements of High-Performance Computing (HPC) and Big Data: i.e. the rapid computation and analysis of massive data sets. In a first step, it involves developing five main elements:

- An open exascale supercomputer, code-named SEQUANA
- The matching software stack, known as bullx supercomputer suite
- A new generation of fast interconnect, code-named BXI
- A range of servers with ultra-high memory capacity, known as the bullx S6000 series
- A complete set of services to optimize customer applications and make the most of exascale.

A NEVER-ENDING NEED FOR MORE PERFORMANCE

The Bull exascale program ensures that HPC performance will continue to increase in the foreseeable future, with the objective to reach exascale performance levels. That means a complete change in scale compared to today's petascale systems, with more constraints on size and power footprints, while improving system resiliency and usability for current and new categories of users.

SEQUANA: the foundation for exascale

SEQUANA is an open exascale supercomputer. It is designed to easily integrate with and make the most of current and future technologies. It is deliberately designed to be compatible with successive generations of different technologies (CPUs and accelerators). It supports fast state-of-the-art interconnects.

SEQUANA is highly modular, cost-effective and scales to tens of thousands of nodes. The computing resources are grouped into cells to facilitate large-scale implementations.

All SEQUANA components are hot-swappable and can be serviced without interrupting production. The SEQUANA components are cooled using the enhanced Bull Direct Liquid Cooling (DLC) technology currently used in the bullx DLC B700 racks. DLC minimizes the global energy consumption of a system by using warm water up to 40°C.

Getting rid of the communications overhead

Exascale computing entails an explosion in performance, data volumes, power consumption and data movement. So it will be increasingly critical to ensure that CPUs are fully dedicated to computation. Today, with current interconnects, CPUs are also responsible for communications, at the expense of performance. Getting rid of this overhead would immediately and significantly free up CPU performance. Bull is therefore developing a new-generation of fast interconnect, code-named BXI.

The Bull exascale interconnect (BXI) unleashes CPU performance

For compute-intensive HPC workloads, the BXI interconnect is the foundation that will enable the next generation of application scalability. Its core feature is completely hardware-encoded communication management, which enables CPUs to be dedicated to computational tasks while communications are independently managed by BXI. Thanks to this hardware acceleration, BXI will deliver the highest level of communication performance for HPC applications, at full scale, characterized by high bandwidth, low latency and high message rates.

WHERE HPC MEETS BIG DATA

Thanks to its data-oriented conception, SEQUANA implements a tight coupling of data and simulation, and makes it possible to compute, explore and analyze massive multi-disciplinary datasets. It will unlock a new generation of complex simulations and analyses.

SEQUANA is the foundation for High-Performance Data Analytics and will leverage the upcoming Bull Hadoop-based search and analytics appliances and discovery appliances.

In-memory data processing

Some applications – such as some genomics applications – require in-memory data processing. Bull addresses this challenge with a new range of ultra-high memory capacity servers, known as the bullx S6000 series. They will support massive in-memory databases, pre-processing, post-processing and visualization operations. The bullx S6000 series relies on two major Bull innovations: the Bull BCS (Bull Coherence Switch) to inter-connect up to 16 CPUs, and the connecting box to easily assemble modules together.

The bullx S6130, the first available model of the bullx 6000 series, is fully scalable up to 16 CPUs/24 TB. It supports full memory protection and features hot-swappable memory and I/O capabilities. The bullx S6130 is the HPC version of the bullion S16 enterprise server, currently recognized as the fastest x86 server on the market (SPECint_rate2006 for the 16 socket configuration). bullx S6130 is exhibited on the Bull booth # 3331 at SC14.

APPLICATIONS CHALLENGES

The shift to multicore exascale systems will require applications to exploit million way parallelism. Today, the main limitation lies within the code itself: programmers are struggling to extract greater parallelism from their codes, handle increasingly hybrid configurations and support a higher degree of heterogeneity. The Bull Center for Excellence in Parallel Programming (CEPP) is available to help HPC users make the most of the latest and future hardware evolutions, by modifying and optimizing their source codes.

MILESTONES

The Bull exascale program is announced on November 18th, 2014, at SC14.

The bullx S6130 will be available for shipment starting Q2 2015.

Bull will disclose functionalities and will demo BXI and SEQUANA along 2015 with a general availability of the first version planned for 2016.