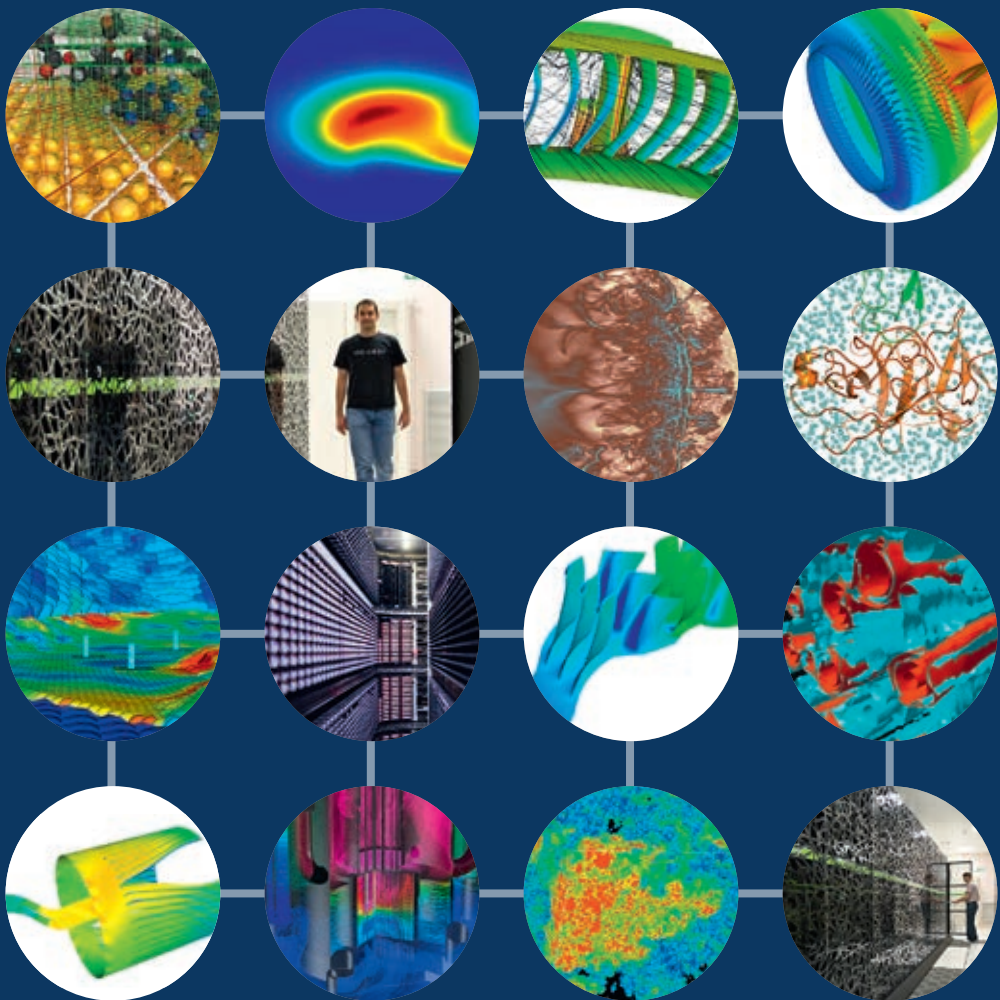


2003-2013

CCRT

COMPUTING CENTRE
FOR RESEARCH
AND TECHNOLOGY

10 YEARS OF SUCCESSFUL SERVICES
FOR RESEARCH AND INDUSTRY



The Computing Centre for Research and Technology (CCRT) is a direct descendent of the Simulation programme at CEA's Military Applications Division and this year celebrates its tenth birthday. The origin of the decision to build and share a computing and pooled services platform was two-fold. Although one of the foundations was CEA's desire to remain faithful to its motto "from research to industry", ensuring that French industry benefits from its work in the field of intensive computing, it is also based on the conviction that in return, its staff should benefit from the distribution and reinforcement of Simulation in all industrial sectors throughout the country.

Far more than just offering access to world-class computing, storage and display resources, the CCRT's role is also to help its partners assimilate new technologies and prepare the simulation tools of the future. Thematic seminars and training sessions are organised to this purpose. Testimonials from the industrial partners today show that the CCRT's guiding principles have been adhered to: "reduced design costs", "developing the codes of tomorrow", "validating design methodologies", are all objectives that we share.

In 10 years, the CCRT has seen 3 generations of supercomputers come and go and its computing power has been multiplied by a factor of more than 200. New services

have been developed. Computing has been supplemented by data management and remote visualization and, more recently, by the mass data processing infrastructure set up for the France-Génomique project (a typical Big Data flagship application). This phenomenal process of change has been accompanied by expansion of the applications handled by the industrial partners. Aeronautics, space and energy have been joined in recent years by automotive, security and environment, health and cosmetics. This diversity represents a cornucopia from which all of CCRT's stakeholders and partners must benefit. It is up to us to ensure that expertise and feedback cross-pollinate to ensure mutual enhancement.

In ten years' time, the computing power of the CCRT will be able to exceed a hundred petaflops. For simulation, the scope of what is possible will exceed our wildest predictions. However, it will not be possible to reach this new level without major developments in computer architectures, programming models and simulation software.

I would therefore like to thank all the CCRT partners for their trust and I would urge them and anyone else who wishes to participate, to prepare together the simulation tools for the coming decades and thus help strengthen the French high performance computing and numerical simulation sector.

Pierre LECA
Head of the Simulation and Information Sciences Department at CEA DAM-Île de France



CCRT IN SHORT

CCRT is located at Bruyères-le-Châtel (Essonne) under the responsibility of CEA DAM-Île de France and is one of the rare computing centres in France open to industrial firms. Its role is to support industrial innovation and promote industry-research partnerships in the field of high-performance numerical simulation and data processing.

COMPUTING RESOURCES

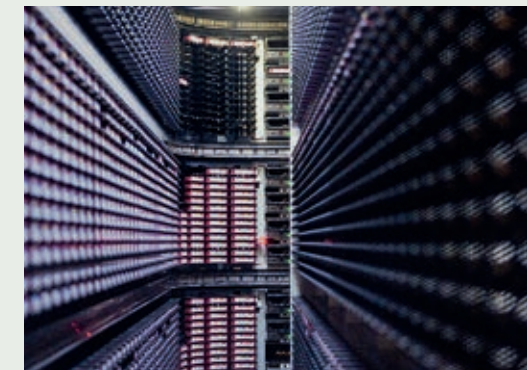
The computing resources at CCRT benefit from the exceptional infrastructures of CEA's **Very Large Computing Centre** (TGCC) offering its partners an extensive and secure working tool.

The heart of this system is **AIRAN supercomputer**, a cluster designed and installed by Bull in 2012. With a computing power of 420 teraflops* distributed over 20,000 cores, it is designed to meet the growing needs of the partners, through a scalable architecture. It has a local data storage system with a useful capacity of 2.3 Pb. CCRT also has access to TGCC's shared storage infrastructure for longer-term hosting of data. This infrastructure uses an automatic, user-transparent system for data migration to different types of media, thus offering "Big Data" class total capacity.

Post-processing and remote visualisation resources complete the range of services offered to the users.

CCRT is accessed by secure links via the national network for technology, teaching and research (Renater).

* 1 teraflop: 1,000 billion operations per second.



Data storage robot

KNOW-HOW AND EXPERTISE

On the back of their experience gained in the simulation programme, the teams from the Simulation and Information Sciences Division and those from CEA DAM-Île de France engineering Department place their know-how at the disposal of CCRT. From energy optimisation of the computing centre, to the development of Open source components (Slurm, Lustre, etc.), to the implementation of an efficient, secure data production and management environment, all the skills required for design and operation of very large computing infrastructures are brought together in one place.

AIRAIN

9504 Intel Xeon® E5-2680 cores running at 2.7 GHz (16 cores/node - 64 GB of memory/node).

7200 Intel Ivy Bridge cores running at 2.8 GHz (20 cores/node - 64 GB of memory/node).

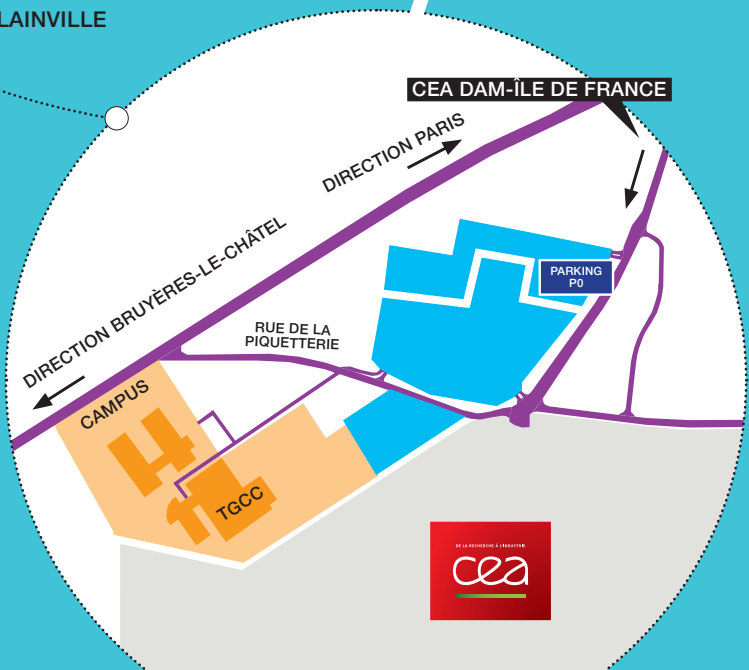
3200 processing cores dedicated to France Génomique (16 cores/node - 128 GB of memory/node).

18 hybrid B515 nodes (equipped with Nvidia K20).

Infiniband QDR interconnection network.

Software environment: Linux, Slurm, Bullx MPI, Intel Cluster studio.





CCRT

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