Institute for Development and Resources in Intensive Scientific Computing

www.idris.fr/eng

COMPETENCE AND KNOW-HOW

IDRIS is a service-based structure assuring the implementation and operation of a high performance, calculation-intensive environment designed to meet the great scientific challenges of numerical simulation. Its approximately forty engineers, technicians, and administrators are dedicated to providing the expertise and support needed by its users.

A TEAM OF EXPERTS

THE SYSTEMS/OPERATIONS TEAM ensures the continuous (7 days a week) smooth functioning of the IDRIS supercomputers along with their associated service machines and infrastructures:

- Installation and operation of the various IDRIS computers (calculators, file and pre/post-data processing servers, and the internal usage machines);
- Administration of services specific to the European PRACE ecosystem.

THE NETWORK TEAM in close collaboration with the systems/operations team, maintains and supervises the functioning of a high-performance network linking the centre's machines as well as the connections to RENATER, the national research network, and GÉANT, the European academic network.

THE USER ASSISTANCE GROUP is the privileged interface between IDRIS and its users. Its principal mission consists of helping users make maximum use of the IDRIS supercomputers for the advancement of their scientific research:

- Daily problem follow-up;
- Knowledge base for users (www.idris.fr/eng/);
- Code enabling;
- Installation and maintenance of software and scientific libraries;
- Training (scientific programming languages, MPI code parallelization paradigms, OpenMP and MPI-OpenMP hybrid programming) and other specific courses;
- Advanced applications assistance in the high performance calculations domain (personalized aid to users, big data management, benchmarks of new architectures, technology watch).

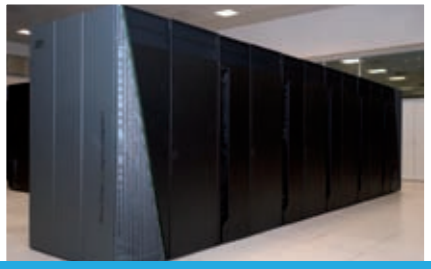
Every year, the user assistance group offers approximately twenty training sessions, held both at IDRIS and at external sites, to which roughly 400 participants from both the academic and industrial worlds are welcomed each year. Since 1996, IDRIS has been able to train more than one thousand researchers and engineers in the MPI parallel programming paradigm.

CALCULATION MEANS

IDRIS provides its users with an architecturally diverse environment of intensive numerical computing, along with all the necessary data management support services: storage and archiving systems, front-end nodes, pre- and post-numerical data processing, and a high-performance interconnecting network between the different IDRIS machines.

The machine group operated by IDRIS now consists of two architecturally complementary supercomputers owned by GENCI (Grand Équipement National de Calcul Intensif) which were installed at the end of 2012. One is a massively parallel computer; the other has 32-processor nodes with a very large shared memory capacity.

These two computers are federated by a shared GPFS file system of 5 PB.



TURING, machine IBM BLUE GENE/Q

- 6 racks containing 4,096 processors, each with 16 cores, for a total of 98,304 cores
- 1GB of memory per core, for a global total of approximately 98 TB of memory
- Cumulated performance peak of 1.26 Pflop/s
- Ranking of November 2014: 42th in TOP500, 37th in Green500, 7th in Graph500
- Named in honor of Alan Turing (1912-1954)

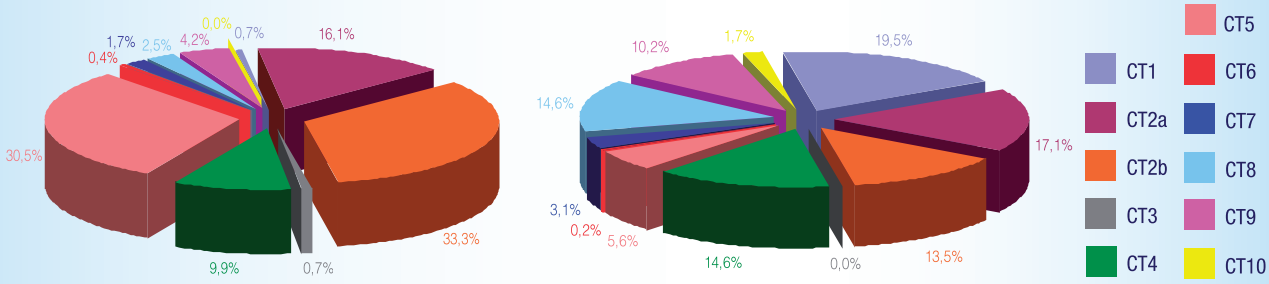
ADA, machine IBM X3750

- 332 nodes with 4 eight-core Intel Sandy Bridge processors, equaling 32 cores per node, for a total configuration of 10,624 cores
- 304 nodes at 128 GB of memory and 28 nodes at 256 GB, with approximately 46 TB of global memory
- Cumulated performance peak of 230 Tflop/s
- Ranking of November 2014: 330th in TOP500
- Named in honor of Ada Lovelace (1815-1852)

Diverse service machines function alongside the supercomputers including a pre- and post-processing server and an archiving machine:

- IBM x3850 pre- and post-processing 4-node machine, each node containing 32 Intel Westmere cores and 1 TB of memory
- IBM archive machine with the Tivoli Storage Manager (TSM) and Hierarchical Storage Manager (HSM) software offering, through the intermediary of a automated robot, a volume scalable by several petabytes on magnetics tapes

Allotments by thematic committees 1st session in 2015



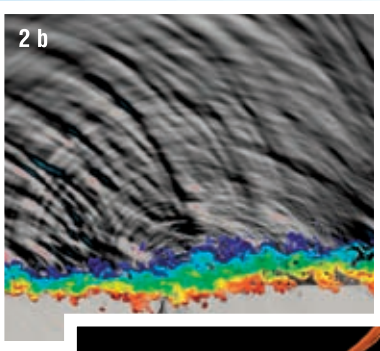
Massively parallel computer

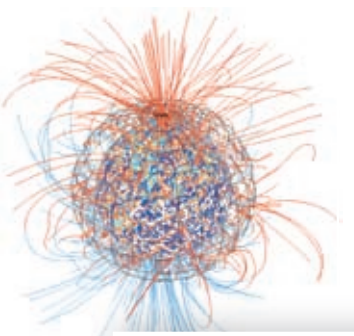
Large node parallel computer

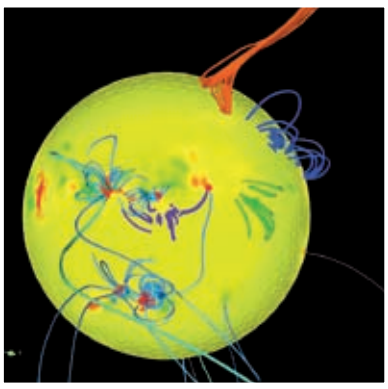
SCIENTIFIC USERS

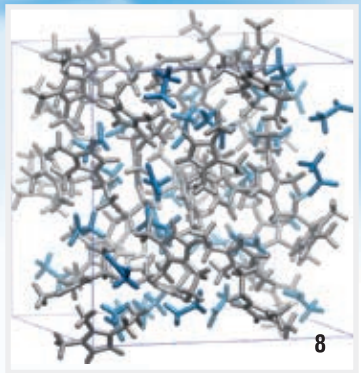
The computer resources at **IDRIS** are accessed each year by about 1000 users, representing at least 300 projects, emanating from nearly every scientific discipline. Scientific projects are granted calculation hours at the national supercomputing centres through a unified procedure supervised by GENCI. Each project is evaluated by scientific experts from one of eleven thematic committees:

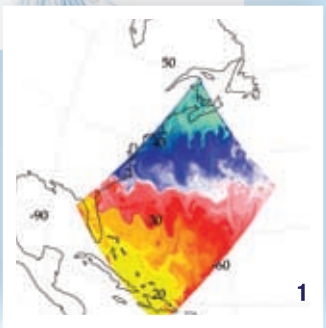
- **CT1 – Environmental sc**
- **CT2a – Non-reactive fluid flows**
- **CT2b – Reactive or multiphase flows**
- **CT3 – Biology and biomedical science**
- **CT4 – Astrophysics and geophysics**
- **CT5 – Theoretical and plasma physics**
- **CT6 – Computer science, algorithms and mathematics**
- **CT7 – Molecular dynamics in biology**
- **CT8 – Quantum chemistry and molecular modelling**
- **CT9 – Physics, chemistry and material properties**
- **CT10 – New and transversal applications of intensive calculations**











MISSIONS AND OBJECTIVES

The Institute for Development and Resources in Intensive Scientific Computing (IDRIS) was founded in 1993 and is the major centre of high performance calculations for France's National Centre for Scientific Research (CNRS). In cooperation with the other national computing centres, IDRIS serves the scientific community by providing the highest available level of computational resources for government-funded research.

A centre of both high performance computing resources and expertise, IDRIS:

- Implements and operates a high-level computing environment adapted to the evolving needs of modelling and numerical simulation.
- Administers its computing means in line with the scientific goals of the CNRS and according to the project evaluation committees' allotment of computing hours to the three national centres.

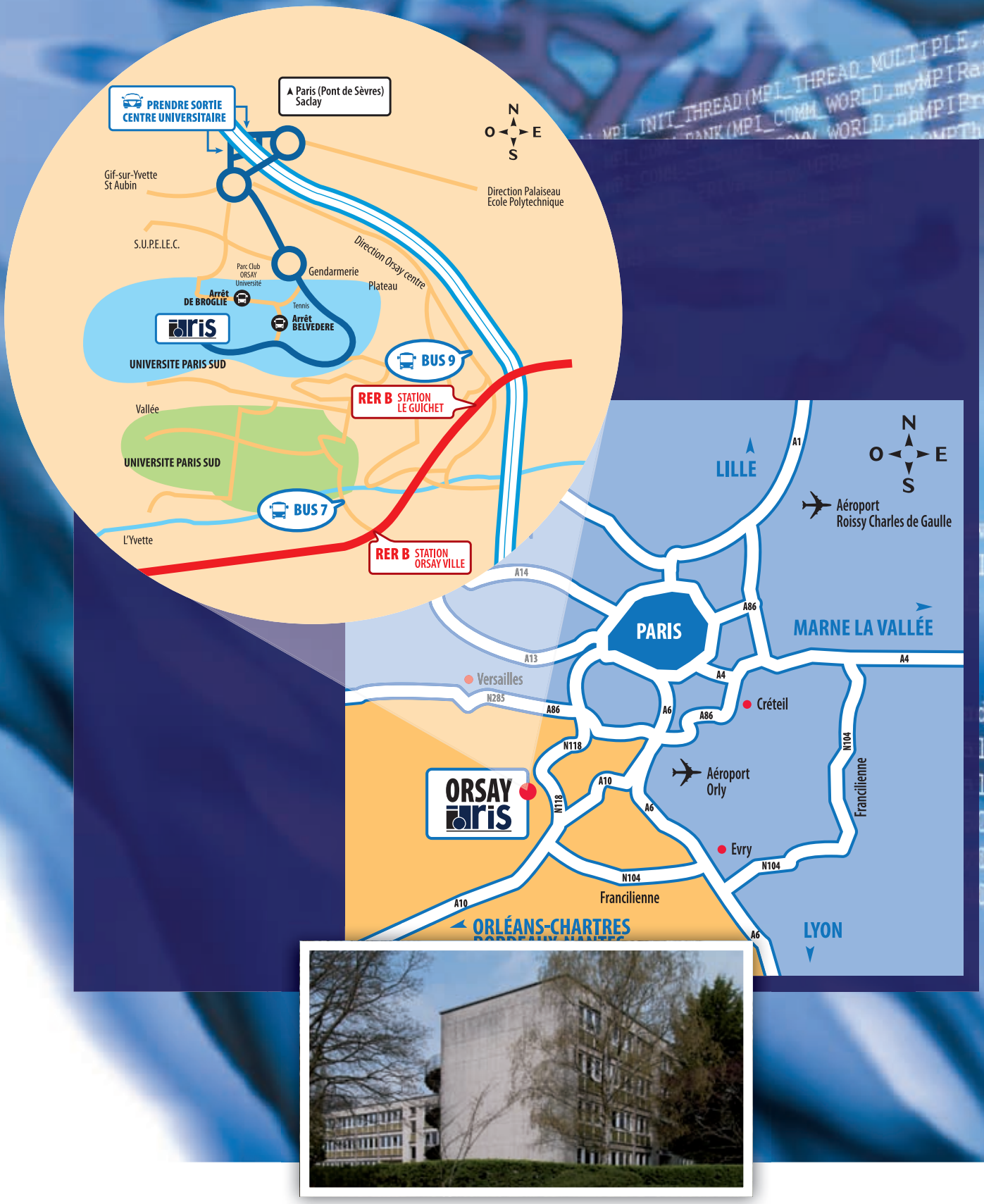
Located in Orsay, France, IDRIS is a service unit of the CNRS under the auspices of the Institute for Information Sciences and Technologies (INS2I). It is an integral part of the French high performance computing structure which includes the Very Large Computing Centre (TGCC) of the CEA (French Alternative Energies and Atomic Energy Commission) and CINES, the computing centre for the French Ministry of Higher Education and Research. The Grand Équipement National de Calcul Intensif (GENCI), a French *"société civile"*, equips and coordinates these three national high performance computing centres.

More than a thousand researchers and engineers from every discipline in the scientific communities find access through IDRIS yearly to what are among the most powerful intensive calculation means available worldwide.

IDRIS plays a major participatory role in the Maison de la Simulation (a joint laboratory of the CNRS, CEA, INRIA [National Institute for Research in Computer Science and Control], the University of Versailles Saint-Quentin-en-Yvelines, and the University of Paris-Sud). The code-development computer of the Maison de la Simulation is both housed and operated at IDRIS, some of whose engineers are involved in related training activities and applications support.

IDRIS also operates the E-Biothon infrastructure, an experimental life sciences platform, in partnership with CNRS, IBM, INRIA, IFB and the Sysfera startup. IDRIS will also house, at the end of 2015, the national platform of the IFB (French Institute of Bioinformatics), a national bioinformatics service structure grouping the CEA, CNRS, INRA, INRIA and INSERM.

Highly implicated in the on-going construction of the European ecosystem of intensive computing, IDRIS was one of the first driving forces in this domain, particularly through the Distributed European Infrastructure for Supercomputing Applications (DEISA, 2004-2011). At the helm of this consortium from 2004 to 2008, IDRIS has continued its activities on a European scale through the different projects of the Partnership for Advanced Computing in Europe (PRACE) which today includes partners in 25 European countries.



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