IMT Atlantique
Bretagne-Pays de la Loire
École Mines-Télécom

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Press release

The HYDDA project seeks to develop an innovative platform, bringing together the Cloud and HPC, to provide an economical solution for the heavy computing needs of businesses of all sizes.

Personalised medicine requires considerable computing power. The same is true of fields such as digital simulation, scientific research and the IoT. However, many innovative companies do not have the means to invest in a Data centre. Through the HYDDA project, IMT Atlantique and its partners propose a technical solution for developing distributed execution platforms dedicated to processing huge quantities of data leveraging both the Cloud and HPC resources. These HPDA (High Performance Data Analysis) solutions will be accessible through payment on demand.

The HYDDA project brings together IMT Atlantique (with the help of Armines) and prestigious industrial partners (Atos, and Dassault Aviation), a local SME (EasyVirt), the Integrated Centre for Oncology (ICO) and the Grenoble Informatics Laboratory (Grenoble Alps University). The project was ratified for a duration of three years, under the auspices of the National Information Society Foundation of the Future Investments Programme (PIA). Jean-Marc Menaud, lecturer in the Automation, CIM and Computer Science Department coordinates this project for IMT Atlantique.

A hybrid solution combining HPC and the Cloud

Big data applications are complex and quite specialised, incorporating on the one hand the availability and responsiveness of Cloud-type user-oriented components accessible on line and on the other hand more computational HPC-type components providing high performance scientific calculation requiring significant computing power and even specialised calculators (GPU, InfiniBand, BXI etc.).

The HYDDA project seeks to design a simple-to-use software solution that can host both Cloud-type and HPC-type applications, associating HPCaaS and IaaS in a single concept. Resources will be supplied on demand through careful management of the computing power and the platforms (CPU, RAM, disk, energy etc) in order to offer a service at the right price, accessible to organisations of any size (startups and SMEs in particular). Jean-Marc Menaud is especially interested in the energy efficiency management of these resources.

Three case studies concerning different sectors: healthcare, aeronautics and data centres

The concept targets different industries, including both medical research and manufacturing. This diversity is right at the heart of the HYDDA project, which builds on three case studies: a healthcare application, an aeronautical design application and finally an application for breakdown prediction in data centres.

The healthcare application carried by the Integrated Centre for Oncology (ICO) is used daily in cancer research. The application includes two phases. The first is the sequencing of a patient's genome and its realignment with a genome of reference, which is expensive in terms of processing time (around 12 hours currently) and draws on a substantial quantity of data (in the order of 1.5Gb). The second phase, aimed at the processing of the specific genetic anomalies under investigation, is lighter in terms of computing time (a few minutes) and volume of data (300 Mb). To manage these computing tasks, hospitals invest in private computing clusters, which are overstretched at key times, but are generally under-utilised.

The same application needs characterise the other two case studies of the HYDDA project: substantial computing power over a short duration. The Dassault Aviation aeronautic application first calculates a complete mesh for determining aerodynamic disturbances around an aircraft in the design phase. It then studies specific aspects (landing gear noise level, disturbances around a wing, etc.). The breakdown prediction application developed by Nantes-based SME, EasyVirt, includes a learning phase demanding extensive computing time, based on data collected by a data center. Once the model has been generated, regular updates follow, requiring periodic calculation

An appropriate solution for private organisations

Infrequent needs for computing power do not justify the significant outlay required for a cluster. The HYDDA project seeks to produce a system that will facilitate running Big Data applications requiring both Cloud and HPC-type functionality and hosting them efficiently on private hybrid (Cloud+HPC) infrastructures. Solutions currently on offer at big Cloud providers such as Amazon EC2, Google Compute Engine and Microsoft Azure are not necessarily suited to specific HPC applications. Either they cannot reach optimal performance as the code cannot be optimised for specific equipment (like GPUs), or because of legal or security constraints such as the confidentiality of medical data, for example, or trade secrets, which forbid the outsourcing of processing to a public data host.

Through the HYDDA project, IMT Atlantique aims to position France as a world leader in the implementation and hosting of Big Data applications requiring HPC capacity.

Contacts Presse :

IMT Atlantique Bretagne-Pays de la Loire
Priscillia Creach
Responsable du pôle médias et promotion
Tél. 02 29 00 10 97/06 30 51 38 30
riscillia.creach@imt-atlantique.fr
www.imt-atlantique.fr

Green Lemon Communication
Laurence Le Masle
Tél. 06 13 56 23 98
l.lemasle@greenlemoncommunication.com
www.greenlemoncommunication.com
@greenlemoncom

Introducing IMT Atlantique Bretagne-Pays de la Loire:

IMT Atlantique is a *grande école* generalist engineering school ranked in the A+ group of the top ten schools in the French magazine *L'Etudiant* ranking, and an international research centre backed by the Ministry of Industry and Digital Affairs. Created on January 1st, 2017 through the merger of the Ecole des Mines de Nantes and Telecom Bretagne, it is a school within the Institut Mines Telecom, the premier group of engineering and management schools in France.

With campuses in Brest, Nantes and Rennes, and one incubator present on the three campuses, as well as a site in Toulouse, the vision of IMT Atlantique is to bring together digital technology, energy and the environment to transform society and industry through training, research and innovation, and to be the leading French institution of higher education and research working in this sector on the international scene.

From September 2018, IMT Atlantique will offer a new course of generalist engineering training with admission via the Mine-Ponts competitive exam. The school also offers two engineering degrees by apprenticeship, master's degrees, specialist master's degrees and doctorates.

The programme at IMT Atlantique, built on cutting-edge research carried out in six joint research units (with the French National Centre for Scientific Research (CNRS), the French Institute for Research in Computer Science (INRIA), the French National Institute of Health and Medical Research (INSERM) and the universities and engineering schools under its trusteeship: The Laboratory for Process Engineering for Environment and Food (GEPEA), the Research Institute of Computer Science and Random Systems (IRISA), the Laboratory of Medical Information Processing (LATIM), the Laboratory of Information and Communication Science and Technology (LABSTICC), the Nantes Laboratory of Digital Sciences (LS2N) and the Laboratory of Subatomic Physics and Related Technologies (SUBATECH). The school builds on research excellence in its flagship areas (energy and digital technology, cybersecurity, the environment and digital technology, industry of the future, nuclear technology and interactions) coupled with scientific disciplines, to confront the challenges of tomorrow: digital transition, environmental transition, industrial transition, energy transition, healthcare of the future and basic research.

The school is a member of the Carnot M.I.N.E.S (Innovative Methods for Business and Society) Institute, the Carnot TSN (Telecom and Digital Society) Institute and a founding member of the Université Bretagne Loire consortium of universities and higher education institutions.

For more information http://www.imt-atlantique.fr/