Dr. Adrien lebre
Inria Researcher
B216 - Ecole des Mines de Nantes
4, rue Alfred Kastler, BP 20722
44307 Nantes Cedex 3,
France

Master Internship Position

Title: Participation to the development of a fully distributed IaaS manager based on OpenStack.
Application deadline: 15 April 2015
Duration: 4 to 6 months
Location: Ecole des Mines de Nantes (France)
Allowance: 500 Euros per month
Supervisors:

- Adrien Lebre (adrien.lebre@inria.fr)
- Jonathan Pastor (jonathan.pastor@inria.fr)

Context of the Internship

In the current ecosystem of the Internet, service-providers are offering services to their users from all over the world. These services require a large amount of computing resources, and each service-provider has its own computing infrastructure leveraging tens of thousand servers concentrated in large data-centers (*a.k.a.,* mega-DCs).

However, concentrating the production of computing resources in few mega-DCs leads to several issues:

- Designing and implementing dedicated software to manage such large scale infrastructures is difficult.
- mega-DCs require dedicated electrical and cooling facilities.
- Providing services to users far-away is source of network overhead.
- World-wide infrastructures leads to jurisdictional conflicts.

The DISCOVERY initiative proposes an alternative to the mega-DC model. Instead of building DCs of ever-increasing size, the initiative proposes to build many small data-centers, geographically spread, deployed upon the network backbones, taking the advantages of existing network centers, starting from the core nodes of the backbone to the different network access points in charge of interconnecting public and private institutions.

By such a mean, network and cloud providers would be able to mutualize resources that are mandatory to operate network/data centers while delivering widely distributed cloud computing platforms being able to better match the geographical dispersal of users.

More information can be found on the DISCOVERY website.

Description of the Internship

The internship will be integrated in the ASCOLA research group located at the Ecole des Mines de Nantes (further information on the ASCOLA website). The objectives of this internship are structured around the on-going development ASCOLA is doing for the aforementionned initiative. Concretely, ASCOLA is currently revisiting the design of the OpenStack solution in order to deliver a fully distributed IaaS manager. A prototype is currently tested on the Grid'5000 testbed.

After studying the OpenStack system (identifying the interactions between its constituting services in order to understand how they collaborate), the student will focus on extending the current OpenStack scheduler in order to take the advantage of the BtrPlace system currently developed at the University of Sophia-Antipolis (see the BtrPlace website for further information).

This objective will be performed by successive actions enabling the student to reach this final goal:

- Replace the current Entropy Scheduler by the BtrPlace one in the VMPlaceS system;
- Validate this integration by comparing the centralized vs the distributed approaches available in VMPlaceS ;
- Integrate the above results in the OpenStack environment.
- Validate this integration on top of Grid'5000.

In the last stage, the intern will integrate his/her work in the prototype developped by ASCOLA, in order to validate the proposed approach. To facilitate this part, the intern will work closely with Jonathan Pastor, a 3rd year PhD applicant at Mines Nantes, in particular for the validation on Grid'5000.

Required skills

- Curiosity and inquiring spirit.
- Good algorithmic skills.
- Knowledge in Python and Scala is a plus.