PhD Position
Smart Memory Allocator for Hypervisor

SECTOR: Higher Education Institution

LOCATION: France, Grenoble

RESEARCHER PROFILE:
- First stage researcher,

INSTITUTION: Univ. Grenoble Alpes, University of Innovation

One of the major research-intensive French universities, Univ. Grenoble Alpes enjoys an international reputation in many scientific fields, as confirmed by international rankings. It benefits from the implementation of major European instruments (ESRF, ILL, EMBL, IRAM, EMFL*). The dynamic ecosystem, grounded on a close interaction between research, education and companies, has earned Grenoble to be ranked as the 5th most innovative city in the world. Surrounded by mountains, the campus benefits from a natural environment and a high quality of life and work environment. With 7000 foreign students and the annual visit of more than 8000 researchers from all over the world, Univ. Grenoble Alps is an internationally engaged university.

A personalized Welcome Center for international students, PhDs and researchers facilitates your arrival and installation.

In 2016, Univ. Grenoble Alpes was labeled «Initiative of Excellence ». This label aims at the emergence of around ten French world class research universities. By joining Univ. Grenoble Alpes, you have the opportunity to conduct world-class research, and to contribute to the social and economic challenges of the 21st century ("sustainable planet and society", "health, well-being and technology", "understanding and supporting innovation: culture, technology, organizations" "Digital technology").

* ESRF (European Synchrotron Radiation Facility), ILL (Institut Laue-Langevin), IRAM (International Institute for Radio Astronomy), EMBL (European Molecular Biology Laboratory), EMFL (European Magnetic Field Laboratory)

Key figures:
- + 50,000 students including 7,000 international students
- 3,700 PhD students, 45% international
- 5,500 faculty members
- 180 different nationalities
- 1st city in France where it feels good to study and 5th city where it feels good to work
- ISSO: International Students & Scholars Office affiliated to EURAXESS
REFERENCES:

IDEX-IRS Project : SmartAlloc
SUBJECT TITLE: Smart Memory Allocator for Hypervisor
RESEARCH FIELD (cf mots clefs sur Euraxess Jobs): Computer science
Keywords : Cloud computing, virtualization, hypervisor, resource management

SUBJECT DESCRIPTION:
Research on dynamic resource allocation for dom0.
This project has to investigate the three following fundamental questions:

Q1: how much resource (number of CPUs, amount of memory) should be allocated to dom0?
Q2: how to organise such an allocation (in terms of distribution) in a NUMA architecture?
Q3: who (provider or users) these resources should be charged to?

The last decade has seen the widespread of virtualized environments, especially for the management of cloud computing infrastructures which implement the Infrastructure as a Service (IaaS) model. In virtualized systems, a low level kernel called the hypervisor is running on the real hardware and provides the illusion of several hardware (called virtual machines - VM) on top of which guest operating systems can be executed. Therefore the hypervisor replaces the traditional operating system and runs directly on the hardware. For the sake of simplicity and maintainability, the original operating system is still present and managed on the machine, generally as a particular VM called the host OS. The phd described in this proposal takes place in the context of the Xen virtualization system, but can be applied to other virtualization environments such as KVM ou VMware. In Xen, the host OS VM is called dom0 and other VMs are called domUs. We rely on this terminology throughout this proposal. In this context we propose to investigate an issue related to dom0 resource allocation : How much resources should be dedicated to the dom0? The problem with a static allocation strategy is that the amount of resource required by dom0 is not constant, as it depends on domU activities. A static allocation can lead to two situations: either dom0 lacks resources, or either resources are overbooked and wasted.

The objective of the phd is to explore the design of a new hypervisor architecture that will allow to dynamically allocate the right amount of resources for the dom0. The phd will explore and evaluate this idea where dom0 is organized in two containers : a main container (MC) and a secondary container (SC). Each container is associated with a specific resource management policy, which controls dom0’s resources mapping on physical resources. The MC is intended to host tasks (i.e. processes) whose resource consumption is constant (i.e. do not depend on domU activities). Other tasks which depend on the activity of a domU are hosted in the SC. This work implies to modify the Xen hypervisor and require the be able to work at the OS Kernel level.

ELIGIBILITY CRITERIA
Applicants must hold a Master's degree (or be about to earn one) or have a university degree equivalent to a European Master's (5-year duration).

Applicants will have to send an application letter in English and attach:
- Their last diploma
- Their CV
- A short presentation of their scientific project (2 to 3 pages max)
- Letters of recommendation are welcome.

Address to send their application: noel.depalma@univ-grenoble-alpes.fr

SELECTION PROCESS
Application deadline: June the 29th 2018 at 17:00 (CET)
Applications will be evaluated through a three-step process:
1. Eligibility check of applications in July the 2nd 2018
2. 1st round of selection: the applications will be evaluated by a Review Board in July the 4th 2018. Results will be given in July the 4th.
3. 2nd round of selection: shortlisted candidates will be invited for an interview session in Grenoble on July the 13th 2018. (if necessary)

TYPE of CONTRACT: temporary-3 years of doctoral contract
JOB STATUS: Full time
HOURS PER WEEK: 35
Salary: between 1768.55 € and 2100 € brut per month (depending on complementary activity or not)