2018-00898 - Automated application management in fog environments

Level of qualifications required: PhD or equivalent
Function: Post-Doctoral Research Visit

About the research centre or Inria department

The Inria Rennes - Bretagne Atlantique Centre is one of Inria's eight centres and has more than thirty research teams. The Inria Center is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

Context

The Myriads team is recruiting a post-doctoral researcher for a duration of 16 months with immediate starting date.

Myriads is a joint team with Inria, CNRS, University Rennes 1, INSA Rennes, and ENS Rennes. It is part of Irisa (D1 department on large scale systems) and Inria Rennes – Bretagne Atlantique. The objective of Myriads is to design and implement systems and environments for autonomous service and resource management in distributed virtualized infrastructures. The team tackles the challenges of dependable application execution and efficient resource management in the future Internet of Services. We contribute to cloud computing, green computing, and autonomous systems and applications programming. We address various application domains including smart cities, smart grids, real-time augmented reality, hyper-local advertising, science.

Assignment

Modern cloud applications operate in increasingly dynamic environments where workloads, resource availabilities, and user requirements are constantly changing. This trend has accelerated with the emergence of fog computing, which enables applications to use resources distributed along a seamless continuum from clouds to things. Coping with the dynamism of fog application environments requires automated application management, involving the deployment, scaling, and migration of application components along the cloud-to-thing continuum.

The objective of this post-doctoral project is to explore application management in fog environments. In particular, the goal is to develop an automated management platform that can ensure application QoS, notably performance- and availability-related QoS, while minimizing operating costs. The platform will focus on serverless applications composed of short-lived, stateless functions that can be deployed on demand on selected fog nodes. The candidate will extend existing adaptation solutions for multi-cloud environments developed in the team and apply machine learning techniques to enable effective decision-making in the complex and unpredictable fog environments.

The proposed solution will be evaluated using smart city applications deployed on an emulated fog platform running on Grid5000.

Main activities

The successful candidate will closely collaborate with researchers and engineers working on the development of cloud and fog platforms within the Myriads team in Rennes. She/he will take part in technical meetings and contribute to the promotion of the developed software (demos, posters, tutorials). Experiments will be performed on Grid5000, an experimental Grid test bed composed of clusters distributed in 9 sites around France.

Skills

- Experience in the design and implementation of distributed systems
- Knowledge in one or more of the following domains: cloud computing, fog computing, autonomic computing, adaptive systems, middleware systems
- Good knowledge of English and good writing ability
- Rigor, autonomy, organizational skills

Benefits package

- Subsidised catering service
- Partially-reimbursed public transport

Remuneration

monthly gross salary amounting to 2653 euros