UBIVERTEX - Letter of Intention

Institute/Company INRIA – I3S - CNRS

Name: OASIS   Country: France

Activity domain: Distributed Computing / Cloud

Number of employees: ☐ <50   ■ <250   ☐ > 500

Name of the department/research team: OASIS

Scientific contact

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Challenge descriptions:

Network testbeds provide highly customizable infrastructures that make them suitable for hosting a large range of experiments, including networking or distributed computing oriented researches. Having in France, a network testbed focused on cloud computing will help OASIS in achieving its objective of providing autonomic solutions to manage both IaaS and PaaS.

A fundamental key in cloud computing is the integration of Service Level Agreements (SLAs) to provide a reliable environment for the running services. OASIS provides solutions both at the platform level and at the infrastructure level to fulfill this challenge. Typically, provisioning a service with replicas is guided by the awaited response time of the service, but also by the infrastructure specificities such as a high network latency between the geographical sites of the cloud. In this setting, every action to manage the services must then be made with regards to its impact on the SLAs and the resource distribution in the cloud. Smart virtual machines placement is one of the key concepts of Entropy[1,2,3]. Its ability to consider the impacts of its decision on elements other than hosting servers, typically the network and the storage servers usage, is however limited. With a realistic multisite cloud environment, the OASIS team will have the opportunity to enlarge the applicability of its works by taking into account more accurately the specificities of the clouds infrastructure and evaluate the resulting prototypes on the testbed.

A second challenge for OASIS consists in providing an auto-adaptation of the services running into a cloud. As an example, a service that have to face up a load spike will query the infrastructure for additional resources. The infrastructure will then have to be reconfigured to provide the awaited resources. This may consist in manipulating the service virtual machines, reconfiguring the network topology or the storage of the virtual machines images. Such operations require manageable routers or file servers. The access to these elements is restricted for security purposes on commodity hosting platforms. This limits our knowledge about such infrastructures so as the ability to evaluate our solutions. Having a testbed dedicated to cloud computing will then permit to OASIS to investigate on infrastructure reconfiguration to serve services requirements. First by providing a realistic infrastructure, second by providing the access to its manageable elements.

A third challenge for OASIS lies in the study of the testbed usage. By nature, a testbed is a flexible platform for users having peculiar infrastructure reconfigurations needs and resource reservation patterns. The study of the testbed usage will then reflect real user expectations in terms of clouds capabilities rather than their transcriptions for a confined common platform. The analysis of the resource usage will provide to OASIS realistic workloads, a prime piece for a prototype evaluation through simulations. Finally, the release of our research results as tools to specify experiment requirements will then validate the suitability of our works related to the deployment of services with strong placement constraints.

[1] Bin Repacking Scheduling in Virtualized Datacenters.
Fabien Hermenier, Sophie Demassey, and Xavier Lorca.
To appear in CP 2011: The 17th International Conference on Principles and Practice of Constraint Programming; Application track. Perugia, Italy, 2011

[2] Dynamic Consolidation of Highly Available Web Applications
Fabien Hermenier, Julia Lawall, Jean-Marc Menaud, and Gilles Muller
Research Report RR-7545. INRIA 2011

[3] Entropy : a consolidation manager for clusters
Fabien Hermenier, Xavier Lorca, Jean-Marc Menaud, Gilles Muller, and Julia Lawall
In VEE'09: Proceedings of the 2009 ACM SIGPLAN/SIGOPS International Conference on Virtualized Environments.

Type of commitment (internship, Phd grant, engineering staff):

 Phd grant, engineering staff

Number of persons involved in these challenges: 25

Signature of   Signature of the
Scientific Contact: Legal Representative:

Date: le 9 septembre 2011   Date: