Contribution ID: **109** Type: **Oral Presentation**

Operating grid services on the StratusLab cloud

Monday, 11 April 2011 14:00 (30 minutes)

Overview

Cloud computing has emerged in the recent years as the new paradigm for the provision of on-demand distributed computing resources. The inherent capabilities of the cloud architecture for optimized resource management and consolidation appear very appealing for grid resource providers. StratusLab is a European Funded project that started in 2010 with the purpose to investigate possibilities, implications and optimal solutions for the combination of cloud and grid technologies. The project is integrating its own cloud distribution based on the OpenNebula cloud management middleware. In the first months of execution already the first versions of the distribution have been released and a reference cloud service is being offered to the public. This public cloud currently hosts a minimal but complete grid site. In this paper we present the first experiences gained by operation this grid site on the StratusLab cloud and the impact on users and their applications.

Impact

Cloud technologies can significantly alter the way grid services are currently deployed and operated. By exploiting the inherent capabilities of IaaS clouds for on-demand provision of elastic computing services, grid resource providers can optimize the utilization of their physical computing resources.

The primary user of StratusLab is the grid site administrator, yet the adoption of the cloud paradigm is expected to indirectly have a positive impact to the VO managers and end-users. The project also prepares and makes available through the appliance repository a set of VM images, with grid middleware pre-installed, for the basic grid components (CE, SE, WN). The usage of VMs accelerates the instantiation of a grid site and makes it easier to try out new features or validate middleware updates.

Moreover, for VOs and end-users the ability to use VMs with pre-installed applications and scientific software, provides additional flexibility for deploying grid services customized for specific application domains. Also, end-users are expected to be impacted positively by the expected enhanced stability and availability of grid sites running on virtualized environments.

Description of the work

The StratusLab project, started in June 2010 with the purpose to investigate the impact of the emerging cloud computing paradigm in the provision o grid computing services. The primary motivation was the belief that these two technologies are complimentary and their combination can offer new capabilities and optimize resource utilization. Where cloud offers flexibility in resource management the grid provides high-level services that enable collaboration and resource sharing among disperse scientific teams. StratusLab focuses on the Infrastructure-as-a-Service (IaaS) cloud paradigm, which implies the usage of virtualization technologies for the provision of computing resources.

The project is integrating a cloud distribution, specifically designed with the purpose to host grid services. During the design phase the specific requirements and/or restrictions of grid services are taken into account

in order to provide optimized cloud environments for deploying virtualized grid sites. These requirements are both technical and operational. In the heart of the StratusLab cloud distribution lies the popular OpenNebula (http://www.opennebula.org) cloud management toolkit which is being extended with additional capabilities, either developed within the project or integrated from the ecosystem of existing add-ons. The first version of the StratusLab distribution was released in October 2010. Incremental or bug-fixing versions are released every six weeks. The distribution is used by the project itself to setup and provide a reference cloud service.

Currently two capabilities are available to the public a cloud computing IaaS service, giving the ability to users to instantiate and manage VMs and a appliance repository where the VM images are stored. This reference cloud service is used also internally by the project as testbed for deploying grid sites and in order to investigate potential implications of their operation over the cloud.

URL

http://www.stratuslab.eu

Conclusions

StratusLab is developing a grid-optimized cloud distribution based on OpenNebula. This distribution is used to offer a reference public cloud service which is used as a testbed for deploying virtualized grid sites. The operation of these grid sites is helping us evaluate the applicability of cloud technologies, their impact on end-user applications and to gather requirements for grid middleware. As the distribution evolves new capabilities will be added enhancing the current cloud solution. In parallel the public cloud service is attracting real-life applications which will help us benchmark the technologies and validate the applicability of StratusLab cloud distribution for the operation of production-level grid sites.

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Session Classification: Virtualisation and Cloud Computing

Track Classification: Virtualised & Cloud Computing