A new approach for almost automatic installation of elastic cloud infrastructures

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Summary. — In the context of the cloud infrastructures at the INFN computing center of Torino, we implemented new simplified tools based up on OpenNebula cloud manager for almost automatic deployment of standard cloud infrastructure, monitoring, maintenance, and VMs management within elastic cloud infrastructures. Such new tools for small and medium infrastructures could significantly improve their usability and efficiency by simplifying the installation and set up processes, providing easier access to elastic cloud technologies to sites with limited specific knowledge or dedicated manpower; introducing flexibility in a dynamic allocation of resources to the different stakeholders in one single infrastructure, maximizing the efficiency.

1. – Introduction

The cloud computing paradigm is widely adopted in the field of High Energy Physics (HEP) in order to provide users with access to a shared pool of computational and storage resources. Although from the users' perspective the usage of cloud infrastructures is quite simple, from the providers' point of view it may not be easy to set up and maintain such kind of infrastructure. For that reason, the aim of the tool presented in this work is to facilitate the deployment of a cloud infrastructure by automatizing installation steps which would require the manual input of users. Moreover, the resulting infrastructure is ready for an extension to full elasticity in order to maximize the cloud efficiency.

In this work OpenNebula [1] has been adopted as cloud manager. The rationale behind this choice lies in the ease of use and installation of OpenNebula with respect to other cloud managers. OpenNebula is a free and open source tool that takes advantage of QEMU, KVM, vCenter and Xen as possible virtualisation softwares to virtualise physical

resources from an hypervisor and assign them to virtual machines (VMs). The overall infrastructure can be managed either via command line or via the Sunstone web interface.

Concerning the hardware, the test installation was performed on a: Dell [2] PowerEdge R630 server with 2 x Intel(r) Xeon(r) E5-2650 v3 @ 2.30 GHz, 20 physical cores, 160 GB RAM, and on a HP [3] ProLiant DL360G7 server with 2 x Intel(r) Xeon(r) E5-506 v3 @ 2.13 GHz, 4 physical cores, 12 GB RAM.

2. – Automatic installation

The almost automatic installation takes place exploiting a kickstart file in which all the parameters that the operator would have to prompt manually have to be indicated. It is possible to leave some specific parameter to the manual input, such as the network configuration. A template kickstart file is available online and customizable via a dedicated script. The OS standard `iso` file must be customized in order to search for the installation parameters within the kickstart at boot time. The customized `iso` must be written into an usb drive which will be used to perform the installation on the server.

This installation process required about 1 hour on the hardware indicated in the previous section. The outcome of the procedure is an operating OpenNebula based cloud infrastructure.

3. – Elasticity

It is possible to improve the cloud infrastructure by means of a modular approach in which a *private* instance of OpenNebula interacts, via the `ONE-cloudbursting-driver` [4] developed at JINR, with a *public* one. The main idea is that the *private* instance operates as a normal tenant of the *public* OpenNebula, thus having a given amount of resources assigned. Actual users interact via VMDIRAC [5] with the *private* OpenNebula where the providers can dynamically manage their quota in a transparent way from the point of view of the *public* instance. A further level of elasticity is provided within each quota by VMDIRAC itself.

4. – Application of the tool

The approach described in this work allows for an almost automatic installation of an elastic cloud infrastructure. Such a tool can be addressed to sites with limited computing knowledge or few dedicated manpower. Moreover, it is possible to distribute even a small amount of resources that would be unused otherwise.

In the context of a multi-tenant infrastructure it is possible to dynamically manage the usage of resources, improving the infrastructure efficiency.

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