Sun/Oracle - The Utility Computing Use Case

The use case brought in by Sun/Oracle Microsystems around the Sun/Oracle Grid engine is in the area of utility computing. Existing approaches today fall short of being flexible and secure enough. With current Utility computing environments it is not possible, or only within narrow limitations, to deploy scalable high performance computing environments instead of fixed sized grids. The focus areas of this use case are therefore installation and management of Utility Computing Resources and of a virtualised shared resource pool. This use case is defined from the perspective of the end-user, the enterprise system administrator and the Utility Computing service provider.

Description

The Utility Computing Scenario consists of the Sun/Oracle Grid Engine running as a hosted service within a RESERVOIR system. Usually large Grid Engine installations (large in the sense of needed computing power) require a huge amount of physical hosts. This is necessary to handle peak demands of computing power, such as rendering jobs for digital content creation, biological gene analyses, or any other scientific number crunching task.

Having these resources available during idle times raises maintenance, hardware and electricity costs, which makes this scenario appropriate for a cloud environment. RESERVOIR can provide a valid solution by scaling out the whole system. Therefore, the Utility Computing use case requires the ability of automatically adding hosts when they are required, and removing them after the peak-load has ended.

Scenario

The Sun/Oracle Grid Engine scenario was designed from the beginning to maximize performance while exploiting the RESERVOIR capabilities such us service customization, automated scalability, migration and federation.

The Sun/Oracle Grid Engine was originally designed in the early 90's having the physical cluster paradigm in mind. In that traditional scenario, network topology is usually static and configuration changes (e.g, hostnames, IPs) rarely happen. Nevertheless, in a cloud environment, VMs appear and disappear on demand and configuration changes are frequent. Hence, the SGE was the ideal candidate to prove the flexibility of RESERVOIR by accommodating such a grid-focused application. We developed an Activation Engine for each VEE type to configure each service component, which were constantly enhanced as the RESERVOIR capabilities improved. The Service was modeled as a Virtual Appliance containing two virtual images and the corresponding Service Manifest. In addition to the standard SGE images, another set of two images was developed in order to launch automated regression tests to speed up the development cycle of the whole RESERVOIR system.

Outcome

The Utility Computing use case highlights the main features of RESERVOIR. Automatically growing and shrinking the resources of a Sun/Oracle Grid Engine installation is very reasonable, since many HPC applications show varying demand of resources. But the cloud paradigm brings new challenges also: the configuration of the SGE is not trivial in a regular physical cluster, and it gets even trickier on a cloud infrastructure, where more advanced customization is required. However, we took advantage of the powerful end-to-end RESERVOIR service customization mechanism (from the Service Manifest all the way down to the application running on the VEEs) to overcome this issue. Furthermore, once the Service is deployed, RESERVOIR is able to successfully monitor it and react accordingly, scaling the Service up and down as per the elasticity rule defined by the Service Provider, providing a self-managed and reliable cloud infrastructure for utility computing services.

Further information on RESERVOIR can be found at www.reservoir-fp7.eu

The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n°215605.

For more information, please contact reservoir@cetic.be