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Scaling out EGEE sites on Amazon EC2 with OpenNebula

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The demonstration will show how virtualization can be used to transform a physical cluster into a flexible and elastic virtual infrastructure, separating resource provisioning from job execution management, and supporting the dynamic adaptation of a virtual EGEE site to the users' computational demands. The virtual infrastructure, managed by the OpenNebula VM Manger, will run on local and Cloud resources, so automatically scaling out the local infrastructure in order to meet peak demands.

Impact

The separation of resource provisioning from job execution management provides the following benefits:
- Elastic site capacity. The capacity of the site can be modified by deploying (or shutting down) virtual worker nodes on an on-demand basis, either in local physical resources or in remote resources. A local infrastructure could be supplemented with Cloud resources to meet peak demands.
- Cluster partitioning. The physical resources of the site could be used to execute worker nodes bound to different virtual computing clusters, and thus isolating their workloads and partitioning the performance assigned to each virtual cluster.
- Heterogeneous configurations. The virtual worker nodes of a virtual cluster can have multiple (even conflicting) software configurations.

URL for further information

www.OpenNebula.org

Conclusions and Future Work

OpenNebula is one of the technologies being enhanced in the RESERVOIR Project, a European research initiative in virtualized infrastructures and cloud computing. New functionality is being developed to meet the demanding requirments of the use cases in the project, especially for the dynamic and scalable management of groups of VMs within sites involving a large amount of virtual and physical servers.

Keywords

Amazon EC2, OpenNebula, Reservoir, Cloud

Justification for delivering demo and technical requirements (ONLY for demonstrations)

We will show a real demo of a EGEE site scaling out on Amazon EC2 resources. We believe that demos showing the integration of Grid and Cloud technologies are important in order to show how Grid and Cloud can coexist and complement each other in future e-infrastructures. OpenNebula is an open-source technology that is available for download and so any EGEE site can reproduce the demo in order to evaluate the benefits for its infrastructure.
We only require network connection.

Detailed analysis

Current computing cluster, and so Grid site, maintenance, operation and use exhibit many difficulties mainly because of the heterogeneity in configuration demands, the requirements on performance partitioning and isolation, and the variability in computing demands. Our novel proposal is the implementation of a general-purpose and flexible architecture to provision pre-defined resources using virtualization platforms and distributed virtual machine managers. The implementation of this resource provisioning model creates a new virtual infrastructure on top of a distributed physical infrastructure that isolates a service workload from the resource management, so enabling the dynamic provision of resources in an on-demand basis to adapt an EGEE site to the service demands and requirements. Furthermore, this virtual infrastructure can be seamless integrated with remote resource providers (Cloud infrastructures) in order to support additional elastic capacity.

Primary authors: Mr VÁZQUEZ BLANCO, Constantino (Universidad Complutense); Dr MARTIN LLORENTE, Ignacio (Universidad Complutense); Mr FONTÁN MUIÑOS, Javier (Universidad Complutense); Dr MORENO VOZMEDIANO, Rafael (Universidad Complutense); Dr SANTIAGO MONTERO, Ruben (Universidad Complutense)

Presenter: Dr MARTIN LLORENTE, Ignacio (Universidad Complutense)

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