

## **New Resource Provision Paradigms for Grid Infrastructures: Virtualization and Clouds**

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The aim of the presentation is to analyze the integration of current Grid infrastructures with the emerging virtualization and cloud paradigms. After several decades of Grid computing, Grids still presents some drawbacks that prevents its wide adoption, namely: heterogeneity, high operational costs, expensive application development cycle and a difficult isolation of local and Grid workloads. Virtual machines (VM) constitute a natural way to deal with the previous problems and can be easily applied to computing cluster architectures.

The dynamic deployment of virtualized cluster nodes by a virtual machine manager such as the OpenNebula, totally decouples resource provisioning from job execution management. The introduction of this new virtualization layer provides multiple benefits, such as cluster consolidation, cluster partitioning and heterogeneous workload execution. When the computing platform is part of a Grid Infrastructure, this approach additionally provides generic execution support, and allows Grid sites to be dynamically adapted to changing VO demands.

This model can be further integrated with an external provider when the VMs are provisioned from the cloud. The presentation will show results of a practical integration of a classical Grid middleware stack, based on the Globus Toolkit, with the Amazon EC2 using the OpenNebula virtual machine manager.