OpenNebula: Open Source Virtual Machine Manager for Cluster Computing

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What is OpenNebula?

OpenNebula: Open Source Virtual Machine Manager for Cluster Computing

- Transform a distributed infrastructure into a flexible virtual infrastructure
- Adapt it to the changing demands of the service workload
- OpenNebula is a distributed virtualization layer:
  - Extend the benefits of VMMs
  - Decouple the service from the physical infrastructure
System Overview

OpenNebula: Open Source Virtual Machine Manager for Cluster Computing

**OpenNebula**
- Neutral VM description
- LRMS like interaction
- VM management & control
- Consumption & match-making allocation policies

**Cluster Services**
- Shared FS for VM images
- SSH access for host interaction

Diagram:
- Frontend
  - ONED
  - SSH
  - Shared Storage
- Host 1
  - Xen Hypervisor
  - SSH
  - Shared Storage
- Host 2
  - Xen Hypervisor
  - SSH
  - Shared Storage
System Overview

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**Scheduler**
- ONE core
- VM Life-cycle management & control
- Persistent back-end

**CLI**
- One Client API
  - Based on common interfaces
  - Unix-like CLI
  - Scheduling modules

**Client API**
- XML-RPC
- Access Drivers
  - Interface *different hypervisors*
  - Monitoring physical resources

**Access Drivers**
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**Pools Database**
- sqlite
Dynamic Provisioning of Computational Clusters

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User Requests
- SGE interface
- Virtualization overhead

SGE Frontend

Virtualized SGE nodes

Dedicated SGE nodes

Cluster Nodes

OpenNebula
Dynamic Provisioning of Computational Clusters

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Cluster Consolidation
- Multiple worker nodes in a single resource
- Dynamic provision rules
- VMM functionality (e.g. live migration)

SGE Frontend

Virtualized SGE nodes

Open Nebula

VMM

VMM

...
Dynamic Provisioning of Computational Clusters

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Cluster Partitioning
- Performance partitioning (dedicated workernodes)
- Isolate service workload
- Dedicated HA partitions

SGE Frontend

Virtualized SGE nodes

Dedicated SGE nodes

Cluster Nodes

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VMM

VMM

VMM
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Heterogeneous Workloads
- Custom worker-node configurations (queues)
- Dynamic provision of cluster configurations
- Example: on-demand VO workernodes in Grids

SGE Frontend

Virtualized SGE nodes

Dedicated SGE nodes

Cluster Nodes

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Dynamic Provisioning of Computational Clusters

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Cluster Configuration

- Pre-defined queues for each workernode type
- Basic standard cluster services (NIS, NSF...)

Workernode Configuration

- Workernodes pre-registered to sgemaster
- IP & hostname assigned through DHCP (MAC)
- Copy images to create new nodes
- Basic cluster services installed
THANK YOU FOR YOUR ATTENTION!!!
More info, downloads, mailing lists at www.opennebula.org

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