OpenNebula 2.0 Key Features and Benefits September 2010 - Rev20100917

A. Key Features and Benefits for Cloud Management

Capabilities for Cloud Computing Private Cloud Computing	KVM	XEN	VMware
User Management			
- Authentication framework based on passwords, ssh rsa keypairs or LDAP	x	x	x
- Multiple user and cloud administrator roles	x	x	x
- Secure multi-tenancy	x	x	x
- Quota management for controlling resource consumption	x	x	x
- Functionality for user management: create, delete and list	x	x	x
- Accounting to visualize and report resource usage data, to allow their integration with chargeback and billing platforms, or to guarantee fare share of resources among users	x	x	x
VM Image Management			
- Image repository with catalog and powerful image management	x	x	x
- Creation of VM instances from images in the catalog without worrying about low-level disk configuration attributes or block device mapping	x	x	x
- Access control to the images registered in the repository, hence simplifying multi-user environments and image sharing.	x	x	x
- Creation of new images by saving running virtual machines	x	x	x
- Functionality for VM image management: list, publish, unpublish, show, enable, disable, register, update, mattr, saveas and delete	x	x	x
Virtual Network Management			
- Create ranged or fixed networks	x	x	x
- Network isolation at layer 2	x	x	
- Definition of generic attributes associated to a Virtual Network (e.g. gateway, dns servers...) that can then be included in the context of a VM	x	x	x
- Virtual Networks can be defined as public, and thus shared among multiple users	x	x	x
- Functionality for virtual network management to interconnect your virtual machines: create, delete, monitor and list	x	x	x
VM Instance Management			
- The same physical box can be accessed through different hypervisors	x	x	x
- Centralized management of environments with multiple hypervisors	x	x	x
- Support for automatic configuration of virtual machines	x	x	x
- Administration scripts can be triggered upon VM state change	x	x	

- Functionality for virtual machine management: submit, deploy, migrate, livemigrate, stop, save, resume, cancel, shutdown, restart, delete, monitor and list	x (livemigrate only with shared storage)	x (livemigrate only with shared storage)	x (livemigrate needs VMotion)
User Interfaces			
- Unix-like command line interface to manage users, VM images, VM instances, virtual networks, clusters, physical hosts, accounting and authentication and authorization	x	x	x
- Libvirt interface can be plugged to manage the distributed infrastructure	x	x	x
Service Management			
- Deploy multi-tier services consisting of groups of inter-connected VMs, and their auto-configuration at boot time	x	x	x
- Contextualize each virtual machine to feed information related to the service it belongs to (IP of the front-end, public ssh keys, software licenses, certificates,....)	x	x	x
- Support for Microsoft Windows and Linux machine images	x	x	x
Scheduling			
- Powerful and flexible Requirement/Rank matchmaker scheduler	x	x	x
- Define workload and resource-aware allocation policies such as packing, striping, load-aware, affinity-aware...	x	x	x
Infrastructure Management			
- System features a small footprint, its installation fits in less than 700Kb.	x	x	x
- Multiple cluster support: Physical boxes can be partitioned into logical clusters to serve different types of service workloads	x	x	x
- Management of physical hosts: create, delete, enable, disable, monitor and list	x	x	x
Storage Management			
- Multiple hardware support: FibreChannel, iSCSI, NAS shared storage, local SCSI/SAS/SATA storage...	x	x	x
- Multiple storage backend: Virtual Machine images can be stored and transferred using SSH on a non shared file system, or using a variety of shared file systems (NFS, LVM with CoW, VMFS, etc)	x	x	x (only shared storage)

Hybrid Cloud Computing			
Cloudbursting			
- Outsource virtual machine to a public cloud using pre-uploaded images configured with your particular service	x	x	x
- Support for Amazon EC2	x	x	x
- Simultaneous access to multiple clouds	x	x	x
Federation			
- Federate different cloud instances to build a hierarchy of independent virtualization clusters, enabling higher levels of scalability	x	x	x

Public Cloud Computing			
Cloud Interfaces			
- Turn your local infrastructure into a public cloud by offering REST interfaces to your users	x	x	x
- Implementation of OGF OCCI, the emerging cloud API standard	x	x	x
- Implementation of Amazon EC2, the de facto cloud API standard, and compatibility with EC2 ecosystem tools	x	x	x
- Support for simultaneously exposing multiple cloud APIs	x	x	x
- Client tools available to access your public cloud	x	x	x
- Secure your public cloud by exposing an https interface	x	x	x

B. Key Features and Benefits for Integration

Capabilities for Integration
Infrastructure Abstraction
- An abstraction layer independent from underlying services for virtualization, networking and storage
- Modular approach to fit into any existing datacenter, and to enable its integration with any product and service in the data center
Adaptability and Customization
- Enable the deployment of any cloud architecture: private, public, hybrid and federated
- Customizable plug-ins to access any virtualization system
- Customizable plug-ins to access any storage system
- Customizable plug-ins to access any information system
- Customizable plug-ins to access any system for authentication and authorization
- Customizable plug-ins to access any remote cloud services for hybrid cloud computing
- New plug-ins can be easily written in any language
- Configuration and tuning parameters to adjust behavior of the cloud management instance to the requirements of the environment and use cases
- Hook mechanism to trigger administration scripts upon VM state change
Interoperability and Standards
- Open standard-based architecture to avoid vendor lock-in and to enable interoperability
- Implementation of standards
Openness
- Open-source technology distributed under Apache license that is matured through a vibrant community.
- Open internal and external interfaces
Programming Interfaces
- Native cloud API in Ruby and JAVA to create new cloud interfaces
- XMLRPC API to access the core functionality

C. Key Features and Benefits for Production

Capabilities for Production
Security
- Authentication framework based on passwords, ssh rsa keypairs and LDAP
- External and internal communications through SSL
- Secure multi-tenancy
- Isolated networks
Fault Tolerance
- Persistent database backend to store hosts, networks and virtual machines information
Scalability
- Tested on large scale infrastructures consisting of thousands of cores and VMs
- Highly scalable database back-end
- Support for MySQL and SQLite
- Virtualization plug-ins adjusted for maximum scalability
- Support for multiple isolated clusters to serve different types of service workloads
Performance
- Very efficient core developed in C++ language
Reliability
- Automated testing process for functionality, scalability, performance, robustness and stability

D. Leverage the Vibrant Cloud Ecosystems

Vibrant Ecosystems
OpenNebula Ecosystem
- Leverage the OpenNebula ecosystem with new components enhancing the functionality provided by the OpenNebula Cloud Toolkit or enabling its integration with existing products, services and management tools in the virtualization, cloud and data center ecosystems
- vCloud API, OpenNebula Express, Haizea Scheduler, Libcloud, Deltacloud, Web Management Console, Deltacloud adaptor for hybrid clouds...
Ecosystems around Amazon AWS, OGC OCCI and VMware vCloud
- Leverage the ecosystem being built around most common interfaces